

CONTRACT DOCUMENTS AND SPECIFICATIONS FOR
**IMPROVEMENTS TO MAPLEWOOD AVENUE &
ADJACENT AREAS**

Bid # 45-18

Portsmouth, New Hampshire

John P. Bohenko, City Manager

February 2018

City of Portsmouth, New Hampshire
Public Works Department



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A. BIDDING REQUIREMENTS

ADVERTISEMENT FOR BIDS

City of Portsmouth, New Hampshire

Owner

Department of Public Works, 680 Peverly Hill Road, Portsmouth, NH 03801

Address

Separate sealed BIDS for the construction of Improvements to Maplewood Avenue & Adjacent Areas will be received at the **City of Portsmouth Purchasing Department, City Hall, 1 Junkins Avenue, Portsmouth, NH 03801**, until 2:00 p.m. local time on **MARCH 6, 2018**. BIDS will then be publicly opened and read aloud at said office and time. The Project includes, but is not limited to, water, sewer, drainage and roadway improvements to Maplewood Avenue from Woodbury Avenue to the intersection of Cutts Street and Maplewood Avenue. The project also includes utility work and roadway reconstruction on Fairview Drive, Central Avenue, Cutts Street, Beechwood Street, Ashland Street, and Leslie Drive.

There will be a mandatory pre-bid meeting on **FEBRUARY 20, 2018 at 10:00 AM**. The pre-bid meeting will be held in the first-floor conference room located at the City of Portsmouth Department of Public Works, 680 Peverly Hill Road, Portsmouth, New Hampshire, 03801.

1. Completion time for the base bid project will be calculated as calendar days (exclusive of winter shut down) from the date specified in the "Notice to Proceed" as follows:

<u>540</u>	calendar days for substantial completion.
<u>720</u>	calendar days for final completion.

If the project includes the work associated with Bid Alternate A, the completion times calculated for the base bid will be extended by the following number of calendar days (exclusive of winter shut down) as follows:

<u>120</u>	calendar days for substantial completion.
<u>120</u>	calendar days for final completion.

If the project includes the work associated with Bid Alternate B, the completion times calculated for the base bid and Bid Alternate A, if awarded, will be extended by the following number of calendar days (exclusive of winter shut down) as follows:

<u>80</u>	calendar days for substantial completion.
<u>80</u>	calendar days for final completion.

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

2. Each General Bid shall be accompanied by a Bid Security in the amount of 10% of the Total amount of the Bid (Base Bid plus Bid Alternates A and B).
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 it may deem to be in the best interest of the Owner.
6. Any questions regarding bidding should be directed to the Purchasing Department at (603) 610-7227. Questions must be received by 1:00 pm on February 26, 2018.
7. Technical questions regarding the plans and specifications shall be directed to Joseph Johnson, P.E., PTOE, Greenman-Pedersen, Inc., at (603) 766-8245 or jjohnson@gpinet.com. Questions must be received by 1:00 pm on February 26, 2018.

Electronic Contract Documents (Plans, Specification, and Addenda) may be obtained at the City's website <http://cityofportsmouth.com/finance/purchasing.htm>. Documents are not available for pickup.

Addenda to this bid document, if any, including written answers to questions will not be provided directly to bidders, but will be posted on the City's website and listed under the project heading by 4:00 pm on February 28, 2018. It will be the bidder's responsibility to check the website for any addenda issued prior to submitting their bid. Bidders must acknowledge receipt of all issued addenda in their Bid (page A-3.2).

INFORMATION FOR BIDDERS

BIDS will be received by The City of Portsmouth, New Hampshire
(herein called the "OWNER"), at Purchasing Dept., 1 Junkins Avenue, Portsmouth, NH 03801
until 2:00pm March 6, 2018 and then at said office publicly opened and read aloud.

Each BID must be submitted in a sealed envelope, addressed to:

City of Portsmouth Purchasing Department at City Hall, 1 Junkins Avenue, Portsmouth, NH 03801

Each sealed envelope containing a BID must be plainly marked on the outside as BID
for Bid No. 45-18 Improvements to Maplewood Avenue & Adjacent Areas 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, City Hall, 1 Junkins Avenue, Portsmouth, NH 03801

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

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

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

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

The CONTRACT DOCUMENTS contain the provisions required for the construction of the
PROJECT. Information obtained from an officer, agent, or employee of the OWNER or any other
person shall not affect the risks or obligations assumed by the CONTRACTOR or relieve him from
fulfilling any of the conditions of the contract.

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Each BID must be accompanied by a BID BOND payable to the OWNER in the amount of ten percent (10%) of the total amount of the BID (Base Bid plus Bid Alternates A and B). As soon as the BID prices have been compared, the OWNER will 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 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, 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 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 PAYMENT BOND, PERFORMANCE BOND 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 OWNER deems 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.

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 complete any of the foregoing shall in no way relieve any BIDDER from any obligation in respect to his 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.

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 shall comply with the requirements of these regulations.

NON-DISCRIMINATION IN EMPLOYMENT

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

COPIES OF THE CONTRACT

There shall be multiple executed copies of the Contract to be distributed as follows:

- a) One (1) copy each to the Engineer, and Contractor. Two (2) copies will go to the Owner.

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 cannot meet all of the following requirements:

- A. BIDDER shall not have defaulted nor turned the work over to the bonding company on any contract within three years prior to the bid date.
- B. BIDDER shall maintain a permanent place of business.
- C. BIDDER shall have adequate personnel and equipment to perform the work expeditiously.
- D. BIDDER shall have suitable financial status to meet obligations incidental to the work.
- E. BIDDER shall have appropriate technical experience satisfactory to the Engineer and the Division in the class of work involved.
- F. BIDDER shall be registered with the Secretary of State to transact business in New Hampshire.
- G. BIDDER shall have performed to the satisfaction of the Engineer and the Division on previous contracts of a similar nature.
- H. BIDDER shall not have failed to complete previous contracts on time, including approved time extensions.
- I. The BIDDER shall be Pre-qualified with NHDOT for Road Construction.

WITHDRAWAL OF BIDS

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

RESERVATION OF RIGHTS

The Owner reserves the right to reject any and all bids, to accept any bid, to waive any informality on any bids received, and to omit any item or items it may deem to be in the best interest of the Owner.

BID

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

To the City of Portsmouth, NH (hereinafter called "OWNER").

In compliance with your Advertisement for Bids, BIDDER hereby proposes to perform all WORK For the construction of Improvements to Maplewood Avenue & Adjacent Areas 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 base bid PROJECT within the number of calendar days (exclusive of winter shut down) from the date specified in the NOTICE TO PROCEED as follows:

540 calendar days for substantial completion.

720 calendar days for final completion.

If the project includes the work associated with Bid Alternate A, the completion times calculated for the base bid will be extended by the following number of calendar days (exclusive of winter shut down) as follows:

120 calendar days for substantial completion.

120 calendar days for final completion.

If the project includes the work associated with Bid Alternate B, the completion times calculated for the base bid and Bid Alternate A, if awarded, will be extended by the following number of calendar days (exclusive of winter shut down) as follows

80 calendar days for substantial completion.

80 calendar days for final completion.

Liquidated damages will be in the amount of \$ 1,000.00 for each calendar day of delay from the date established for substantial completion and \$ 1,000.00 for each calendar day of delay from the date established for final completion, as provided in Paragraph 12.04 of the Supplemental Conditions.

BIDDER acknowledges receipt of the following ADDENDUM:

Bid Instructions:

The work under this contract consists of a base bid and potential bid alternates as follows:

Base Bid

The base bid shall be all work as shown on the Contract Plans and Documents, complete and in place, with the exception of work described in Bid Alternate A and Bid Alternate B, below.

The Bidder shall provide prices for the following Bid Alternate Items that the Owner may elect to add to the Base Bid. The inclusion of one or more of the Bid-Alternate Items to the contract shall be at the discretion of the Owner and subject to available funding:

Bid Alternate A

Location 1 – Consist of Cutts Street, Central Avenue, Ashland Street and Beechwood Street roadway reconstruction and all utility improvements as shown on the Contract Plans and Documents.

Bid Alternate B

Location 2 – Consist of Leslie Drive roadway reconstruction and all utility improvements as shown on the Contract Plans and Documents.

In preparing the Bid Form, Bidders shall note the following:

- (1) Insert Unit Price (numeric amount in dollars and cents) under “Unit Price in Figures” for each Item.
- (2) Multiply the “Est. Quantity” by the “Unit Price in Figures” and insert the product for “Item Total in Figures” for each Item.
- (3) Add all products in the “Item Total in Figures” and insert the sum for the “Total Base Bid Price” in numeric value and words.
- (4) In the event of a discrepancy between a “Unit Price in Figures” and “Item Total in Figures”, the “Unit Price in Figures” shall control, and the “Item Total in Figures” shall be corrected

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by the Owner during the review of bids.

- (5) In the event of a discrepancy between the sum total of the “Item Total in Figures” and the “Total Base Bid Price”, the sum total of the “Item Total in Figures” shall control, and the “Total Base Bid Price” shall be corrected by the Owner during the review of bids.
- (6) Base Bid includes all work except those included in the Bid Alternates. Bid-Alternate A is Location 1; Bid-Alternate B is Location 2; All other locations are included in the Base Bid.

An unbalanced or unreasonable lump sum or unit price submitted herein may be grounds for rejection of the Bid. Specific items of this Contract may be eliminated or reduced in quantity to keep within limits of available funding, at the OWNER'S option.

Unit prices set for certain items (MIN.) are minimum unit prices established by the Engineer to be used by the Bidder. If the Bidder decides that the minimum unit prices are insufficient compensation, the Bidder shall insert additional unit prices (ADD'L) for these items to reflect costs above the minimum unit prices. See Section 01270 for details.

The Bidder shall state below what works of a similar character to that of the proposed contract he has performed, and provide such references as 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. For how many years has your firm engaged in the contracting business under its present name? Also state names and dates of previous firm names, if any.
7. Contracts on hand. (Schedule these, showing gross amount of each contract and the approximate anticipated dates of completion.)
8. General character of work performed by your company.
9. Have you ever failed to complete any work awarded you in the scheduled contract time, including approved time extensions? ___(Yes) ___(No).
If so, where and why?
10. Have you ever defaulted on a contract? ___(Yes) ___(No).
If so, where and why?
11. Have you ever had liquidated damages assessed on a contract? _____(Yes) _____(No).
If so, where and why?
12. List the more important contracts recently executed by your company, stating approximate cost for each, and the month and year completed.
13. List your major equipment available for this contract.
14. List your key personnel such as Project Superintendent and foreman available for this contract.
15. List any subcontractors whom you would expect to use for the following (unless this work is to be done by your own organization):
 - a. Civil Engineering
 - b. Utility Installation
 - c. Other work

16. With what banks do you conduct business?

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

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

Respectfully submitted:

Signature

Address

Title

Date

_____ Being duly sworn, deposes and says that he is

_____ of _____
(Name of Organization)

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

Sworn to before me this _____ day of _____, 20 _____

Notary Public

My commission expires _____

(Seal - If BID is by Corporation)

ATTEST: _____

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

NOTE: BIDS shall include sales tax and all other applicable taxes and fees.

SCHEDULE OF VALUES - BID FORM
UNIT PRICES

Base Bid for Maplewood Ave & Adjacent Areas Improvements
 Portsmouth, New Hampshire

ITEM NO.	EST. QUANTITY	ITEM DESCRIPTION WITH BID PRICE IN WORDS	UNIT PRICE IN FIGURES	ITEM TOTAL IN FIGURES
201.1	0.4	CLEARING AND GRUBBING (F) at: Dollars Cents per acre		
201.2	1.0	TREE REMOVAL (ALLOWANCE) at: Ten Thousand Dollars Zero Cents allowance	\$10,000.00	\$10,000.00
201.4	1	REMOVING STUMPS at: Dollars Cents per each		
201.9	10	TREE PROTECTION at: Dollars Cents per each		
203.1	3,450	COMMON EXCAVATION at: Dollars Cents per cubic yard		
203.21a	1,020	ROCK EXCAVATION AND DISPOSAL (MIN.) - MAIN at: Seventy Five Dollars Zero Cents per cubic yard	\$75.00	\$76,500.00
203.21b	1,020	ROCK EXCAVATION AND DISPOSAL (ADD'L.) - MAIN at: Dollars Cents per cubic yard		
203.22a	475	ROCK EXCAVATION AND DISPOSAL (MIN.) - SERVICES at: Sixty Five Dollars Zero Cents per cubic yard	\$65.00	\$30,875.00
203.22b	475	ROCK EXCAVATION AND DISPOSAL (ADD'L.) - SERVICES at: Dollars Cents per cubic yard		
203.3	70	UNCLASSIFIED EXCAVATION at: Dollars Cents per cubic yard		
203.31a	260	ADDITIONAL EARTHWORK BELOW NORMAL GRADE (MIN.) at: Fifteen Dollars Zero Cents per cubic yard	\$15.00	\$3,900.00
203.31b	260	ADDITIONAL EARTHWORK BELOW NORMAL GRADE (ADD'L.) at: Dollars Cents per cubic yard		
203.41a	620	UNSUITABLE MATERIAL ABOVE NORMAL GRADE (MIN.) at: Seventeen Dollars Zero Cents per cubic yard	\$17.00	\$10,540.00

SCHEDULE OF VALUES - BID FORM
UNIT PRICES

Base Bid for Maplewood Ave & Adjacent Areas Improvements
 Portsmouth, New Hampshire

ITEM NO.	EST. QUANTITY	ITEM DESCRIPTION WITH BID PRICE IN WORDS	UNIT PRICE IN FIGURES	ITEM TOTAL IN FIGURES
203.41b	620	UNSUITABLE MATERIAL ABOVE NORMAL GRADE (ADD'L.) at: Dollars Cents per cubic yard		
203.42a	260	UNSUITABLE MATERIAL BELOW NORMAL GRADE (MIN.) at: Twenty Eight Dollars Zero Cents per cubic yard	\$28.00	\$7,280.00
203.42b	260	UNSUITABLE MATERIAL BELOW NORMAL GRADE (ADD'L.) at: Dollars Cents per cubic yard		
203.6	750	EMBANKMENT-IN-PLACE (F) at: Dollars Cents per cubic yard		
206.1	100	COMMON STRUCTURE EXCAVATION at: Dollars Cents per cubic yard		
206.19	730	COMMON STRUCTURE EXCAVATION EXPLORATORY at: Dollars Cents per cubic yard		
209.4	40	GRANULAR BACKFILL (GRAV) at: Dollars Cents per cubic yard		
211.12	40	VIBRATION MONITORING SERVICES at: Dollars Cents per hour		
214	1	FINE GRADING at: Dollars Cents per unit		
304.2	10	GRAVEL (F) at: Dollars Cents per cubic yard		
304.21	660	SPECIAL PIPE BEDDING MATERIAL at: Dollars Cents per linear foot		
304.301	1,850	CRUSHED GRAVEL at: Dollars Cents per cubic yard		
304.311	160	ADDITIONAL CRUSHED STONE at: Dollars Cents per cubic yard		

SCHEDULE OF VALUES - BID FORM
UNIT PRICES

Base Bid for Maplewood Ave & Adjacent Areas Improvements
 Portsmouth, New Hampshire

ITEM NO.	EST. QUANTITY	ITEM DESCRIPTION WITH BID PRICE IN WORDS	UNIT PRICE IN FIGURES	ITEM TOTAL IN FIGURES
304.35	390	CRUSHED GRAVEL FOR DRIVES at: Dollars Cents per cubic yard		
306.112	2,300	RECLAIMED STABILIZED BASE PROCESSED IN PLACE, 12 IN DEEP (F) at: Dollars Cents per square yard		
306.114	9,350	RECLAIMED STABILIZED BASE PROCESSED IN PLACE, 14 IN DEEP (F) at: Dollars Cents per square yard		
306.208	5,350	RECLAIMED STABILIZED BASE REMOVED AND REHANDLED, 8" DEEP (F) at: Dollars Cents per square yard		
306.36	1,525	STONE FOR RECLAIMED STABILIZED BASE at: Dollars Cents per ton		
403.11	5,500	HOT BITUMINOUS PAVEMENT, MACHINE METHOD at: Dollars Cents per ton		
403.12	350	HOT BITUMINOUS PAVEMENT, HAND METHOD at: Dollars Cents per ton		
403.6	6,000	PAVEMENT JOINT ADHESIVE at: Dollars Cents per linear foot		
403.99	1,435	TEMPORARY BITUMINOUS PAVEMENT at: Dollars Cents per ton		
410.22	1,700	ASPHALT EMULSION FOR TACK COAT at: Dollars Cents per gallon		
417	5,350	COLD PLANING BITUMINOUS SURFACES at: Dollars Cents per square yard		
520.01	3	CONCRETE CLASS AA at: Dollars Cents per cubic yard		
520.2	320	CONCRETE CLASS B at: Dollars Cents per cubic yard		

SCHEDULE OF VALUES - BID FORM
UNIT PRICES

Base Bid for Maplewood Ave & Adjacent Areas Improvements
 Portsmouth, New Hampshire

ITEM NO.	EST. QUANTITY	ITEM DESCRIPTION WITH BID PRICE IN WORDS	UNIT PRICE IN FIGURES	ITEM TOTAL IN FIGURES
544.1	160	REINFORCING STEEL (ROADWAY) at: Dollars Cents per pound		
585.3	75	STONE FILL, CLASS C at: Dollars Cents per cubic yard		
592.16	90	PREFABRICATED MODULAR BLOCK WALL at: Dollars Cents per square yard		
593.221	200	GEOTEXTILE; SEPARATION CL.2, NON-WOVEN at: Dollars Cents per square yard		
603.33212	1	12" CORR. POLYETHYLENE END SECTION at: Dollars Cents per each		
603.33224	1	24" CORR. POLYETHYLENE END SECTION at: Dollars Cents per each		
603.81004	525	4" PVC PIPE at: Dollars Cents per linear foot		
603.82212	2,650	12" PE PIPE (TYPE S) at: Dollars Cents per linear foot		
603.82215	650	15" PE PIPE (TYPE S) at: Dollars Cents per linear foot		
603.82218	125	18" PE PIPE (TYPE S) at: Dollars Cents per linear foot		
603.82224	125	24" PE PIPE (TYPE S) at: Dollars Cents per linear foot		
604.0007	33	POLYETHYLENE LINER at: Dollars Cents per each		

SCHEDULE OF VALUES - BID FORM
UNIT PRICES

Base Bid for Maplewood Ave & Adjacent Areas Improvements
 Portsmouth, New Hampshire

ITEM NO.	EST. QUANTITY	ITEM DESCRIPTION WITH BID PRICE IN WORDS	UNIT PRICE IN FIGURES	ITEM TOTAL IN FIGURES
604.124	33	CATCH BASINS TYPE B, 4-FOOT DIAMETER at: Dollars Cents per unit		
604.224	6	DROP INLETS TYPE B, 4-FOOT DIAMETER at: Dollars Cents per unit		
604.3141	17	SEWER MANHOLE 4' DIA INCL. FRAME & COVER at: Dollars Cents per unit		
604.3142	175	SEWER CONCRETE MANHOLE WALLS & CONE 4 FT. DIA. at: Dollars Cents per vertical foot		
604.324	22	DRAINAGE MANHOLES at: Dollars Cents per unit		
604.391	1	SPECIAL MANHOLES (CDS UNIT) at: Dollars Cents per unit		
604.4	45	RECONSTRUCTING/ADJUSTING CATCH BASIN & DROP INLET at: Dollars Cents per linear foot		
604.5	30	RECONSTRUCTING/ADJUSTING MANHOLES at: Dollars Cents per linear foot		
604.51	35	RECONSTRUCTING/ADJUSTING SEWER MANHOLES at: Dollars Cents per linear foot		
604.54	20	RECONSTRUCTING/ADJUSTING TELEPHONE MANHOLES at: Dollars Cents per linear foot		
604.62	3	DRAINAGE MANHOLE COVERS AND FRAMES at: Dollars Cents per each		
607.2	1	OUTLET PROTECTION FENCE at: Dollars Cents lump sum		

SCHEDULE OF VALUES - BID FORM
UNIT PRICES

Base Bid for Maplewood Ave & Adjacent Areas Improvements
 Portsmouth, New Hampshire

ITEM NO.	EST. QUANTITY	ITEM DESCRIPTION WITH BID PRICE IN WORDS	UNIT PRICE IN FIGURES	ITEM TOTAL IN FIGURES
607.5140	70	WOOD FENCE (STOCKADE), 4'-0" HIGH at: Dollars Cents per linear foot		
608.13	10	3" BITUMINOUS SIDEWALK (F) at: Dollars Cents per square yard		
608.24	2,725	4" CONCRETE SIDEWALK (F) at: Dollars Cents per square yard		
608.26	175	6" CONCRETE SIDEWALK (HC RAMPS) at: Dollars Cents per square yard		
608.54	30	DETECTABLE WARNING DEVICES, CAST IRON at: Dollars Cents per square yard		
608.6	110	BRICK ISLAND at: Dollars Cents per square yard		
608.61	10	REMOVE AND REPLACE BRICK WALK at: Dollars Cents per square yard		
608.71	10	REMOVE AND REPLACE FLAGSTONE WALK at: Dollars Cents per square yard		
609.01	3,500	STRAIGHT GRANITE CURB at: Dollars Cents per linear foot		
609.01123	350	STRAIGHT GRANITE CURB, 12" HIGH WITH 3" X 3" MOUNTABLE BEVELED EDGE at: Dollars Cents per linear foot		
609.01124	150	CURVED GRANITE CURB, 12" HIGH WITH 3" X 3" MOUNTABLE BEVELED EDGE at: Dollars Cents per linear foot		
609.02	150	CURVED GRANITE CURB at: Dollars Cents per linear foot		

SCHEDULE OF VALUES - BID FORM
UNIT PRICES

Base Bid for Maplewood Ave & Adjacent Areas Improvements
 Portsmouth, New Hampshire

ITEM NO.	EST. QUANTITY	ITEM DESCRIPTION WITH BID PRICE IN WORDS	UNIT PRICE IN FIGURES	ITEM TOTAL IN FIGURES
609.21	1,100	STRAIGHT GRANITE SLOPE CURB at: Dollars Cents per linear foot		
609.22	25	STRAIGHT GRANITE SLOPE CURB WITH RADIAL JOINTS at: Dollars Cents per linear foot		
609.5	2,850	RESET GRANITE CURB at: Dollars Cents per linear foot		
609.6	200	REMOVE AND STACK COBBLESTONE at: Dollars Cents per linear foot		
609.7	2	GRANITE SPLAYED END TRANSITION at: Dollars Cents per each		
611.05206	100	6" CEMENT LINED DUCTILE IRON PIPE, CL 52 at: Dollars Cents per linear foot		
611.05208	250	8" CEMENT LINED DUCTILE IRON PIPE, CL 52 at: Dollars Cents per linear foot		
611.05212	3,600	12" CEMENT LINED DUCTILE IRON PIPE, CL 52 at: Dollars Cents per linear foot		
611.413	3,950	POLYETHYLENE ENCASED PIPE at: Dollars Cents per linear foot		
611.5011	750	1" COPPER WATER PIPE at: Dollars Cents per linear foot		
611.5012	250	1-1/2 OR 2-INCH COPPER PIPING at: Dollars Cents per linear foot		
611.51008	40	1" CORPORATION STOP at: Dollars Cents per unit		
611.51009	10	1-1/2" OR 2" CORPORATION STOP at: Dollars Cents per unit		

SCHEDULE OF VALUES - BID FORM
UNIT PRICES

Base Bid for Maplewood Ave & Adjacent Areas Improvements
 Portsmouth, New Hampshire

ITEM NO.	EST. QUANTITY	ITEM DESCRIPTION WITH BID PRICE IN WORDS	UNIT PRICE IN FIGURES	ITEM TOTAL IN FIGURES
611.5201	40	1" CURB STOP at: Dollars Cents per unit		
611.5202	10	1-1/2" OR 2" CURB STOP at: Dollars Cents per unit		
611.70	1,250	ADDITIONAL FITTINGS at: Dollars Cents per pound		
611.71004	1	4" GATE VALVE WITH BOX at: Dollars Cents per each		
611.71006	5	6" GATE VALVE WITH BOX at: Dollars Cents per each		
611.71008	6	8" GATE VALVE WITH BOX at: Dollars Cents per each		
611.71012	11	12" GATE VALVE WITH BOX at: Dollars Cents per each		
611.81	5	HYDRANTS at: Dollars Cents per each		
611.814	3	REMOVE HYDRANT at: Dollars Cents per each		
611.90001	32	ADJUST EXISTING WATER GATES AND SHUTOFFS at: Dollars Cents per each		
611.914	8,350	4" TEMPORARY WATER MAIN at: Dollars Cents per linear foot		
612.61501	4	2" PVC STUB & END CAP (SDR 21) at: Dollars Cents per unit		

SCHEDULE OF VALUES - BID FORM
UNIT PRICES

Base Bid for Maplewood Ave & Adjacent Areas Improvements
 Portsmouth, New Hampshire

ITEM NO.	EST. QUANTITY	ITEM DESCRIPTION WITH BID PRICE IN WORDS	UNIT PRICE IN FIGURES	ITEM TOTAL IN FIGURES
612.61502	80	2" PVC SEWER PIPE (SDR 21) at: Dollars Cents per linear foot		
612.61503	585	8" PVC SEWER PIPE (DR 18) at: Dollars Cents per linear foot		
612.61508	1,350	8" PVC SEWER PIPE (SDR 35) at: Dollars Cents per linear foot		
612.61512	535	12" PVC SEWER PIPE (SDR35) at: Dollars Cents per linear foot		
612.81440	75	1-1/2" OR 2" PVC LOW PRESSURE SEWER SERVICE at: Dollars Cents per linear foot		
612.81441	1,675	6" PVC SEWER SERVICE PIPE (SDR 35) at: Dollars Cents per linear foot		
612.81442a	1	INTERIOR PLUMBING MODIFICATIONS (ALLOWANCE) at: Thirty Two Thousand Dollars Zero Cents Allowance	\$32,000.00	\$32,000.00
612.81442b	16	CORING FOR INTERIOR PLUMBING MODIFICATIONS at: Dollars Cents per each		
612.81443	40	8"x6" WYE at: Dollars Cents per unit		
612.81444	5	12"x6" WYE at: Dollars Cents per unit		
612.81445	50	6-INCH SEWER CHIMNEYS at: Dollars Cents per vertical foot		
612.82606	40	6" PVC SEWER SERVICE CLEANOUT at: Dollars Cents per unit		

SCHEDULE OF VALUES - BID FORM
UNIT PRICES

Base Bid for Maplewood Ave & Adjacent Areas Improvements
 Portsmouth, New Hampshire

ITEM NO.	EST. QUANTITY	ITEM DESCRIPTION WITH BID PRICE IN WORDS	UNIT PRICE IN FIGURES	ITEM TOTAL IN FIGURES
613.010	25	6-INCH DROP CONNECTION at: Dollars Cents per vertical foot		
613.011	20	8-INCH DROP CONNECTION at: Dollars Cents per vertical foot		
613.012	5	CONNECTION TO EXISTING STRUCTURES at: Dollars Cents per each		
613.014	5	DAMS at: Dollars Cents per unit		
613.016	12	SEWER AND DRAIN RECONSTRUCTION at: Dollars Cents per each		
613.017	350	SURFACE RESTORATION OF CROSS-COUNTRY AREAS at: Dollars Cents per linear foot		
613.018	4,500	CALCIUM CHLORIDE at: Dollars Cents per pound		
613.019	100*	ASBESTOS-CEMENT PIPE REMOVAL AND DISPOSAL at: Dollars Cents per linear foot		
613.61a	18	REPLACE SEWER MANHOLE COVERS AND FRAMES (LOCKING) at: Dollars Cents per unit		
614.511	4	CONCRETE PULL BOX 14" at: Dollars Cents per each		
614.73114	225	3" PVC CONDUIT, SCHEDULE 40 at: Dollars Cents per linear foot		
615.0301	170	TRAFFIC SIGN TYPE C at: Dollars Cents per square foot		
615.031	3	ACTIVE DRIVER FEEDBACK SIGN at: Dollars Cents per each		

SCHEDULE OF VALUES - BID FORM
UNIT PRICES

Base Bid for Maplewood Ave & Adjacent Areas Improvements
 Portsmouth, New Hampshire

ITEM NO.	EST. QUANTITY	ITEM DESCRIPTION WITH BID PRICE IN WORDS	UNIT PRICE IN FIGURES	ITEM TOTAL IN FIGURES
615.033	14	REMOVING TRAFFIC SIGN, TYPE C at: Dollars Cents per unit		
615.034	11	RELOCATING TRAFFIC SIGN, TYPE C at: Dollars Cents per unit		
615.0601	35	TRAFFIC SIGN TYPE CC at: Dollars Cents per square foot		
615.065	1	RELOCATING HISTORIC SIGN at: Dollars Cents per unit		
615.066	1	REMOVE AND STACK ENTRY SIGN at: Dollars Cents per unit		
616.21	1	PEDESTRIAN ACTUATED CROSSING ASSEMBLY at: Dollars Cents lump sum		
618.6	1	UNIFORMED OFFICERS (ALLOWANCE) at: One hundred Fifty Thousand Dollars Zero Cents Allowance	\$150,000.00	\$150,000.00
618.7	4,160	FLAGGERS at: Twenty Five Dollars Zero Cents per hour	\$25.00	\$104,000.00
619.1	1	MAINTENANCE OF TRAFFIC at: Dollars Cents per unit		
619.253	60	PORTABLE CHANGEABLE MESSAGE SIGN (UNIT WEEK) at: Dollars Cents per unit week		
622.52	1	RESETTING BOUNDS at: Dollars Cents per each		
628.2	1,150	SAWED BITUMINOUS PAVEMENT at: Dollars Cents per linear foot		
632.0104	17,275	RETROREFLECTIVE PAINT PAVE. MARKING, 4" LINE at: Dollars Cents per linear foot		

SCHEDULE OF VALUES - BID FORM
UNIT PRICES

Base Bid for Maplewood Ave & Adjacent Areas Improvements
 Portsmouth, New Hampshire

ITEM NO.	EST. QUANTITY	ITEM DESCRIPTION WITH BID PRICE IN WORDS	UNIT PRICE IN FIGURES	ITEM TOTAL IN FIGURES
632.0106	6,000	RETROREFLECTIVE PAINT PAVE. MARKING, 6" LINE at: Dollars Cents per linear foot		
632.3112	1,875	RETROREFLECT. THERMOPLAS. PAVE. MARKING, 12" LINE at: Dollars Cents per linear foot		
632.3118	230	RETROREFLECT. THERMOPLAS. PAVE. MARKING, 18" LINE at: Dollars Cents per linear foot		
632.32	400	RETROREFLECT. THERMOPLAS. PAVEMENT MARKING, SYMBOL OR WORD at: Dollars Cents per square foot		
632.321	160	RETROREFLECT. DURABLE LIQUID GREEN PAVEMENT MARKING at: Dollars Cents per square foot		
637.3	2	RESET GRANITE POST at: Dollars Cents per each		
641	1,200	LOAM at: Dollars Cents per cubic yard		
645.512	1,400	COMPOST SOCK FOR PERIMETER BERM at: Dollars Cents per linear foot		
645.6	84	SILT SACKS at: Dollars Cents per unit		
645.7	1	STORM WATER POLLUTION PREVENTION PLAN at: Dollars Cents per unit		
645.71	40	MONITORING SWPPP AND EROSION AND SEDIMENT CONTROLS at: Dollars Cents per hour		
646.31	7,150	TURF ESTABLISHMENT WITH MULCH AND TACKIFIERS at: Dollars Cents per square yard		

SCHEDULE OF VALUES - BID FORM
UNIT PRICES

Base Bid for Maplewood Ave & Adjacent Areas Improvements
 Portsmouth, New Hampshire

ITEM NO.	EST. QUANTITY	ITEM DESCRIPTION WITH BID PRICE IN WORDS	UNIT PRICE IN FIGURES	ITEM TOTAL IN FIGURES
646.315	1,300	TURF ESTABLISHMENT WITH MULCH AND TACKIFIERS - STORMWATER/CONSERVATION at: Dollars Cents per square yard		
647.1	125	HUMUS at: Dollars Cents per cubic yard		
652.06	6	ACER RUBRUM RED MAPLE at: Dollars Cents per each		
652.1	8	STREET TREE 2-2.5 INCH CALIPER at: Dollars Cents per each		
652.69	3	QUERCUS RUBRA RED OAK at: Dollars Cents per each		
655.02	26	AMELANCHIER CANADENSIS DOWNY SHADBLOW at: Dollars Cents per each		
655.38	3	CORNUS SERICEA RED-OSIER DOGWOOD at: Dollars Cents per each		
656.53	3	SPIREA LATIFOLIA MEADOWSWEET at: Dollars Cents per each		
656.73	56	VACCINIUM CORYMBOSUM HIGHBLUSH BLUEBERRY at: Dollars Cents per each		
658.1	1	REMOVE AND RESET TREE at: Dollars Cents per each		
658.736	200	STUCKENIA PECTINATA PONDWEED at: Dollars Cents per each		

SCHEDULE OF VALUES - BID FORM
UNIT PRICES

Base Bid for Maplewood Ave & Adjacent Areas Improvements
 Portsmouth, New Hampshire

ITEM NO.	EST. QUANTITY	ITEM DESCRIPTION WITH BID PRICE IN WORDS	UNIT PRICE IN FIGURES	ITEM TOTAL IN FIGURES
658.915	200	VALLISNERIA AMERICANA WILD CELERY at: Dollars Cents per each		
670.067	4	REMOVE AND REPLACE MAILBOXES at: Dollars Cents per each		
692	1	MOBILIZATION (not to exceed 10% of total bid) at: Dollars Cents per unit		
698	30	FIELD OFFICE at: Dollars Cents per month		
699	1	MISCELLANEOUS TEMPORARY EROSION AND SEDIMENT CONTROL at: Five Thousand Dollars Zero Cents allowance	\$5,000.00	\$5,000.00
1001.101	1	HEALTH AND SAFETY PLAN at: Dollars Cents lump sum		
1001.102	1	MANAGEMENT OF SOILS & MATERIALS at: Dollars Cents lump sum		
1001.103	1	LOAD AND HAUL SURPLUS REGULATED SOILS & MATERIALS (WHERE DIRECTED) at: Dollars Cents ton		
1001.104	1	DISPOSAL OF REGULATED SOILS & MATERIALS (WHERE DIRECTED) (ALLOWANCE) at: Three Thousand Dollars Zero Cents allowance	\$3,000.00	\$3,000.00
1001.105	1	ANALYTICAL TESTING OF SOILS (WHERE DIRECTED) (ALLOWANCE) at: Three Thousand Dollars Zero Cents allowance	\$3,000.00	\$3,000.00
1001.106	1	DISPOSAL OF REGULATED GROUNDWATER (WHERE DIRECTED) (ALLOWANCE) at: Three Thousand Dollars Zero Cents allowance	\$3,000.00	\$3,000.00
1008.51	1	ALTERATIONS AND ADDITIONS AS NEEDED - MISC. LANDSCAPE TREATMENT at: Ten Thousand Dollars Zero Cents allowance	\$10,000.00	\$10,000.00

SCHEDULE OF VALUES - BID FORM
UNIT PRICES

Base Bid for Maplewood Ave & Adjacent Areas Improvements
 Portsmouth, New Hampshire

ITEM NO.	EST. QUANTITY	ITEM DESCRIPTION WITH BID PRICE IN WORDS	UNIT PRICE IN FIGURES	ITEM TOTAL IN FIGURES
1008.52	1	ALTERATIONS AND ADDITIONS AS NEEDED - DEWATERING at: Dollars Cents lump sum		

Refer to Section 01270, 1.01.J for the definition of (F), final pay quantity.

* Indeterminate Quantity

Total Base Bid Price (sum of all items above)

Total Bid Price (Words):

SCHEDULE OF VALUES - BID FORM**UNIT PRICES**

Bid Alternate A for Maplewood Ave & Adjacent Areas Improvements
Portsmouth, New Hampshire

ITEM NO.	EST. QUANTITY	ITEM DESCRIPTION WITH BID PRICE IN WORDS	UNIT PRICE IN FIGURES	ITEM TOTAL IN FIGURES
201.9	1	TREE PROTECTION at: Dollars Cents per each		
202.5	6	REMOVAL OF CATCH BASINS, DROP INLETS, AND MANHOLES at: Dollars Cents per each		
203.21a	150	ROCK EXCAVATION AND DISPOSAL (MIN.) - MAIN at: Seventy Five Dollars Zero Cents per cubic yard	\$75.00	\$11,250.00
203.21b	150	ROCK EXCAVATION AND DISPOSAL (ADD'L.) - MAIN at: Dollars Cents per cubic yard		
203.22a	75	ROCK EXCAVATION AND DISPOSAL (MIN.) - SERVICES at: Sixty Five Dollars Zero Cents per cubic yard	\$65.00	\$4,875.00
203.22b	75	ROCK EXCAVATION AND DISPOSAL (ADD'L.) - SERVICES at: Dollars Cents per cubic yard		
203.3	350	UNCLASSIFIED EXCAVATION at: Dollars Cents per cubic yard		
203.31a	113	ADDITIONAL EARTHWORK BELOW NORMAL GRADE (MIN.) at: Fifteen Dollars Zero Cents per cubic yard	\$15.00	\$1,695.00
203.31b	113	ADDITIONAL EARTHWORK BELOW NORMAL GRADE (ADD'L.) at: Dollars Cents per cubic yard		
203.41a	276	UNSUITABLE MATERIAL ABOVE NORMAL GRADE (MIN.) at: Seventeen Dollars Zero Cents per cubic yard	\$17.00	\$4,692.00
203.41b	276	UNSUITABLE MATERIAL ABOVE NORMAL GRADE (ADD'L.) at: Dollars Cents per cubic yard		
203.42a	113	UNSUITABLE MATERIAL BELOW NORMAL GRADE (MIN.) at: Twenty Eight Dollars Zero Cents per cubic yard	\$28.00	\$3,164.00

SCHEDULE OF VALUES - BID FORM**UNIT PRICES**

Bid Alternate A for Maplewood Ave & Adjacent Areas Improvements
Portsmouth, New Hampshire

ITEM NO.	EST. QUANTITY	ITEM DESCRIPTION WITH BID PRICE IN WORDS	UNIT PRICE IN FIGURES	ITEM TOTAL IN FIGURES
203.42b	113	UNSUITABLE MATERIAL BELOW NORMAL GRADE (ADD'L.) at: Dollars Cents per cubic yard		
206.19	380	COMMON STRUCTURE EXCAVATION EXPLORATORY at: Dollars Cents per cubic yard		
214	1	FINE GRADING at: Dollars Cents per unit		
304.21	15	SPECIAL PIPE BEDDING MATERIAL at: Dollars Cents per linear foot		
304.301	460	CRUSHED GRAVEL at: Dollars Cents per cubic yard		
304.311	13	ADDITIONAL CRUSHED STONE at: Dollars Cents per cubic yard		
304.35	190	CRUSHED GRAVEL FOR DRIVES at: Dollars Cents per cubic yard		
306.112	7,200	RECLAIMED STABILIZED BASE PROCESSED IN PLACE, 12 IN DEEP (F) at: Dollars Cents per square yard		
306.36	650	STONE FOR RECLAIMED STABILIZED BASE at: Dollars Cents per ton		
403.11	1,650	HOT BITUMINOUS PAVEMENT, MACHINE METHOD at: Dollars Cents per ton		
403.12	150	HOT BITUMINOUS PAVEMENT, HAND METHOD at: Dollars Cents per ton		
403.6	3,000	PAVEMENT JOINT ADHESIVE at: Dollars Cents per linear foot		

SCHEDULE OF VALUES - BID FORM**UNIT PRICES**

Bid Alternate A for Maplewood Ave & Adjacent Areas Improvements
Portsmouth, New Hampshire

ITEM NO.	EST. QUANTITY	ITEM DESCRIPTION WITH BID PRICE IN WORDS	UNIT PRICE IN FIGURES	ITEM TOTAL IN FIGURES
403.99	610	TEMPORARY BITUMINOUS PAVEMENT at: Dollars Cents per ton		
410.22	600	ASPHALT EMULSION FOR TACK COAT at: Dollars Cents per gallon		
520.01	5	CONCRETE CLASS AA at: Dollars Cents per cubic yard		
520.2	125	CONCRETE CLASS B at: Dollars Cents per cubic yard		
603.82212	850	12" PE PIPE (TYPE S) at: Dollars Cents per linear foot		
604.0007	18	POLYETHYLENE LINER at: Dollars Cents per each		
604.124	18	CATCH BASINS TYPE B, 4-FOOT DIAMETER at: Dollars Cents per unit		
604.3141	4	SEWER MANHOLE 4' DIA INCL. FRAME & COVER at: Dollars Cents per unit		
604.3142	30	SEWER CONCRETE MANHOLE WALLS & CONE 4 FT. DIA. at: Dollars Cents per vertical foot		
604.324	8	DRAINAGE MANHOLES at: Dollars Cents per unit		
604.392	1	SPECIAL MANHOLES (DOGHOUSE STRUCTURE) at: Dollars Cents per unit		

SCHEDULE OF VALUES - BID FORM**UNIT PRICES**

Bid Alternate A for Maplewood Ave & Adjacent Areas Improvements
Portsmouth, New Hampshire

ITEM NO.	EST. QUANTITY	ITEM DESCRIPTION WITH BID PRICE IN WORDS	UNIT PRICE IN FIGURES	ITEM TOTAL IN FIGURES
604.4	30	RECONSTRUCTING/ADJUSTING CATCH BASIN & DROP INLET at: Dollars Cents per linear foot		
604.5	15	RECONSTRUCTING/ADJUSTING MANHOLES at: Dollars Cents per linear foot		
604.51	15	RECONSTRUCTING/ADJUSTING SEWER MANHOLES at: Dollars Cents per linear foot		
604.62	1	DRAINAGE MANHOLE COVERS AND FRAMES at: Dollars Cents per each		
608.13	15	3" BITUMINOUS SIDEWALK (F) at: Dollars Cents per square yard		
608.24	525	4" CONCRETE SIDEWALK (F) at: Dollars Cents per square yard		
608.26	25	6" CONCRETE SIDEWALK (HC RAMPS) at: Dollars Cents per square yard		
608.54	5	DETECTABLE WARNING DEVICES, CAST IRON at: Dollars Cents per square yard		
608.61	10	REMOVE AND REPLACE BRICK WALK at: Dollars Cents per square yard		
609.01	900	STRAIGHT GRANITE CURB at: Dollars Cents per linear foot		
609.02	50	CURVED GRANITE CURB at: Dollars Cents per linear foot		
609.21	2,050	STRAIGHT GRANITE SLOPE CURB at: Dollars Cents per linear foot		

SCHEDULE OF VALUES - BID FORM**UNIT PRICES**

Bid Alternate A for Maplewood Ave & Adjacent Areas Improvements
Portsmouth, New Hampshire

ITEM NO.	EST. QUANTITY	ITEM DESCRIPTION WITH BID PRICE IN WORDS	UNIT PRICE IN FIGURES	ITEM TOTAL IN FIGURES
609.22	75	STRAIGHT GRANITE SLOPE CURB WITH RADIAL JOINTS at: Dollars Cents per linear foot		
611.05206	60	6" CEMENT LINED DUCTILE IRON PIPE, CL 52 at: Dollars Cents per linear foot		
611.05208	2,800	8" CEMENT LINED DUCTILE IRON PIPE, CL 52 at: Dollars Cents per linear foot		
611.413	2,860	POLYETHYLENE ENCASED PIPE at: Dollars Cents per linear foot		
611.5011	625	1" COPPER WATER PIPE at: Dollars Cents per linear foot		
611.5012	75	1-1/2 OR 2-INCH COPPER PIPING at: Dollars Cents per linear foot		
611.51008	24	1" CORPORATION STOP at: Dollars Cents per unit		
611.51009	5	1-1/2" OR 2" CORPORATION STOP at: Dollars Cents per unit		
611.5201	24	1" CURB STOP at: Dollars Cents per unit		
611.5202	5	1-1/2" OR 2" CURB STOP at: Dollars Cents per unit		
611.70	1,000	ADDITIONAL FITTINGS at: Dollars Cents per pound		
611.71006	3	6" GATE VALVE WITH BOX at: Dollars Cents per each		

SCHEDULE OF VALUES - BID FORM**UNIT PRICES**

Bid Alternate A for Maplewood Ave & Adjacent Areas Improvements
Portsmouth, New Hampshire

ITEM NO.	EST. QUANTITY	ITEM DESCRIPTION WITH BID PRICE IN WORDS	UNIT PRICE IN FIGURES	ITEM TOTAL IN FIGURES
611.71008	13	8" GATE VALVE WITH BOX at: Dollars Cents per each		
611.81	8	HYDRANTS at: Dollars Cents per each		
611.814	2	REMOVE HYDRANT at: Dollars Cents per each		
611.90001	16	ADJUST EXISTING WATER GATES AND SHUTOFFS at: Dollars Cents per each		
611.914	3,500	4" TEMPORARY WATER MAIN at: Dollars Cents per linear foot		
612.61508	250	8" PVC SEWER PIPE (SDR 35) at: Dollars Cents per linear foot		
612.81441	200	6" PVC SEWER SERVICE PIPE (SDR 35) at: Dollars Cents per linear foot		
612.81442a	1	INTERIOR PLUMBING MODIFICATIONS (ALLOWANCE) at: Two Thousand Dollars Zero Cents allowance	\$2,000.00	\$2,000.00
612.81442b	1	CORING FOR INTERIOR PLUMBING MODIFICATIONS at: Dollars Cents per each		
612.81443	4	8"x6" WYE at: Dollars Cents per unit		
612.81445	15	6-INCH SEWER CHIMNEYS at: Dollars Cents per vertical foot		

SCHEDULE OF VALUES - BID FORM**UNIT PRICES**

Bid Alternate A for Maplewood Ave & Adjacent Areas Improvements
Portsmouth, New Hampshire

ITEM NO.	EST. QUANTITY	ITEM DESCRIPTION WITH BID PRICE IN WORDS	UNIT PRICE IN FIGURES	ITEM TOTAL IN FIGURES
612.82606	4	6" PVC SEWER SERVICE CLEANOUT at: Dollars Cents per unit		
613.012	2	CONNECTION TO EXISTING STRUCTURES at: Dollars Cents per each		
613.016	5	SEWER AND DRAIN RECONSTRUCTION at: Dollars Cents per each		
613.018	2,200	CALCIUM CHLORIDE at: Dollars Cents per pound		
613.019	50*	ASBESTOS-CEMENT PIPE REMOVAL AND DISPOSAL at: Dollars Cents per linear foot		
613.61a	11	REPLACE SEWER MANHOLE COVERS AND FRAMES (LOCKING) at: Dollars Cents per unit		
615.0301	40	TRAFFIC SIGN TYPE C at: Dollars Cents per square foot		
615.033	8	REMOVING TRAFFIC SIGN, TYPE C at: Dollars Cents per unit		
615.0601	20	TRAFFIC SIGN TYPE CC at: Dollars Cents per square foot		
632.0104	225	RETROREFLECTIVE PAINT PAVE. MARKING, 4" LINE at: Dollars Cents per linear foot		
632.3112	300	RETROREFLECT. THERMOPLAS. PAVE. MARKING, 12" LINE at: Dollars Cents per linear foot		
632.3118	75	RETROREFLECT. THERMOPLAS. PAVE. MARKING, 18" LINE at: Dollars Cents per linear foot		

SCHEDULE OF VALUES - BID FORM

UNIT PRICES

**Bid Alternate A for Maplewood Ave & Adjacent Areas Improvements
Portsmouth, New Hampshire**

ITEM NO.	EST. QUANTITY	ITEM DESCRIPTION WITH BID PRICE IN WORDS	UNIT PRICE IN FIGURES	ITEM TOTAL IN FIGURES
641	375	LOAM at: Dollars Cents per cubic yard		
645.512	300	COMPOST SOCK FOR PERIMETER BERM at: Dollars Cents per linear foot		
645.6	49	SILT SACKS at: Dollars Cents per unit		
646.31	2,250	TURF ESTABLISHMENT WITH MULCH AND TACKIFIERS at: Dollars Cents per square yard		
670.067	3	REMOVE AND REPLACE MAILBOXES at: Dollars Cents per each		
692	1	MOBILIZATION (not to exceed 10% of total bid) at: Dollars Cents per unit		
698	4	FIELD OFFICE at: Dollars Cents per month		
1008.51	1	ALTERATIONS AND ADDITIONS AS NEEDED - MISC. LANDSCAPE TREATMENT at: Five Thousand Dollars Zero Cents allowance	\$5,000.00	\$5,000.00
1008.52	1	ALTERATIONS AND ADDITIONS AS NEEDED - DEWATERING at: Dollars Cents lump sum		

Refer to Section 01270, 1.01.J for the definition of (F), final pay quantity.

* Indeterminate Quantity

Total Bid Alternate A Price (sum of all items above)

--

Total Bid Price Bid Alternate A
(Words):

SCHEDULE OF VALUES - BID FORM**UNIT PRICES**

Bid Alternate B for Maplewood Ave & Adjacent Areas Improvements
Portsmouth, New Hampshire

ITEM NO.	EST. QUANTITY	ITEM DESCRIPTION WITH BID PRICE IN WORDS	UNIT PRICE IN FIGURES	ITEM TOTAL IN FIGURES
202.5	6	REMOVAL OF CATCH BASINS, DROP INLETS, AND MANHOLES at: Dollars Cents per each		
203.21a	55	ROCK EXCAVATION AND DISPOSAL (MIN.) - MAIN at: Seventy Five Dollars Zero Cents per cubic yard	\$75.00	\$4,125.00
203.21b	55	ROCK EXCAVATION AND DISPOSAL (ADD'L.) - MAIN at: Dollars Cents per cubic yard		
203.22a	39	ROCK EXCAVATION AND DISPOSAL (MIN.) - SERVICES at: Sixty Five Dollars Zero Cents per cubic yard	\$65.00	\$2,535.00
203.22b	39	ROCK EXCAVATION AND DISPOSAL (ADD'L.) - SERVICES at: Dollars Cents per cubic yard		
203.31a	10	ADDITIONAL EARTHWORK BELOW NORMAL GRADE (MIN.) at: Fifteen Dollars Zero Cents per cubic yard	\$15.00	\$150.00
203.31b	10	ADDITIONAL EARTHWORK BELOW NORMAL GRADE (ADD'L.) at: Dollars Cents per cubic yard		
203.41a	20	UNSUITABLE MATERIAL ABOVE NORMAL GRADE (MIN.) at: Seventeen Dollars Zero Cents per cubic yard	\$17.00	\$340.00
203.41b	20	UNSUITABLE MATERIAL ABOVE NORMAL GRADE (ADD'L.) at: Dollars Cents per cubic yard		
203.42a	10	UNSUITABLE MATERIAL BELOW NORMAL GRADE (MIN.) at: Twenty Eight Dollars Zero Cents per cubic yard	\$28.00	\$280.00
203.42b	10	UNSUITABLE MATERIAL BELOW NORMAL GRADE (ADD'L.) at: Dollars Cents per cubic yard		
206.19	130	COMMON STRUCTURE EXCAVATION EXPLORATORY at: Dollars Cents per cubic yard		

SCHEDULE OF VALUES - BID FORM**UNIT PRICES**

Bid Alternate B for Maplewood Ave & Adjacent Areas Improvements
Portsmouth, New Hampshire

ITEM NO.	EST. QUANTITY	ITEM DESCRIPTION WITH BID PRICE IN WORDS	UNIT PRICE IN FIGURES	ITEM TOTAL IN FIGURES
214	1	FINE GRADING at: Dollars Cents per unit		
304.21	10	SPECIAL PIPE BEDDING MATERIAL at: Dollars Cents per linear foot		
304.311	10	ADDITIONAL CRUSHED STONE at: Dollars Cents per cubic yard		
304.35	110	CRUSHED GRAVEL FOR DRIVES at: Dollars Cents per cubic yard		
306.112	6,100	RECLAIMED STABILIZED BASE PROCESSED IN PLACE, 12 IN DEEP (F) at: Dollars Cents per square yard		
306.36	550	STONE FOR RECLAIMED STABILIZED BASE at: Dollars Cents per ton		
403.11	1,400	HOT BITUMINOUS PAVEMENT, MACHINE METHOD at: Dollars Cents per ton		
403.12	100	HOT BITUMINOUS PAVEMENT, HAND METHOD at: Dollars Cents per ton		
403.6	2,000	PAVEMENT JOINT ADHESIVE at: Dollars Cents per linear foot		
403.99	140	TEMPORARY BITUMINOUS PAVEMENT at: Dollars Cents per ton		
410.22	500	ASPHALT EMULSION FOR TACK COAT at: Dollars Cents per gallon		
520.2	125	CONCRETE CLASS B at: Dollars Cents per cubic yard		

SCHEDULE OF VALUES - BID FORM
UNIT PRICES

Bid Alternate B for Maplewood Ave & Adjacent Areas Improvements
Portsmouth, New Hampshire

ITEM NO.	EST. QUANTITY	ITEM DESCRIPTION WITH BID PRICE IN WORDS	UNIT PRICE IN FIGURES	ITEM TOTAL IN FIGURES
603.82212	950	12" PE PIPE (TYPE S) at: Dollars Cents per linear foot		
604.0007	11	POLYETHYLENE LINER at: Dollars Cents per each		
604.124	11	CATCH BASINS TYPE B, 4-FOOT DIAMETER at: Dollars Cents per unit		
604.224	1	DROP INLETS TYPE B, 4-FOOT DIAMETER at: Dollars Cents per unit		
604.3141	7	SEWER MANHOLE 4' DIA INCL. FRAME & COVER at: Dollars Cents per unit		
604.3142	55	SEWER CONCRETE MANHOLE WALLS & CONE 4 FT. DIA. at: Dollars Cents per vertical foot		
604.324	6	DRAINAGE MANHOLES at: Dollars Cents per unit		
604.4	20	RECONSTRUCTING/ADJUSTING CATCH BASIN & DROP INLET at: Dollars Cents per linear foot		
604.5	10	RECONSTRUCTING/ADJUSTING MANHOLES at: Dollars Cents per linear foot		
604.51	15	RECONSTRUCTING/ADJUSTING SEWER MANHOLES at: Dollars Cents per linear foot		
609.21	3,300	STRAIGHT GRANITE SLOPE CURB at: Dollars Cents per linear foot		

SCHEDULE OF VALUES - BID FORM
UNIT PRICES

Bid Alternate B for Maplewood Ave & Adjacent Areas Improvements
Portsmouth, New Hampshire

ITEM NO.	EST. QUANTITY	ITEM DESCRIPTION WITH BID PRICE IN WORDS	UNIT PRICE IN FIGURES	ITEM TOTAL IN FIGURES
611.90001	4	ADJUST EXISTING WATER GATES AND SHUTOFFS at: Dollars Cents per each		
612.15108	1,025	8" CURED IN PLACE PIPE at: Dollars Cents per linear foot		
612.61508	135	8" PVC SEWER PIPE (SDR 35) at: Dollars Cents per linear foot		
612.81441	150	6" PVC SEWER SERVICE PIPE (SDR 35) at: Dollars Cents per linear foot		
612.81443	8	8"x6" WYE at: Dollars Cents per unit		
612.81445	30	6-INCH SEWER CHIMNEYS at: Dollars Cents per vertical foot		
612.82606	8	6" PVC SEWER SERVICE CLEANOUT at: Dollars Cents per unit		
613.011	5	8-INCH DROP CONNECTION at: Dollars Cents per vertical foot		
613.012	3	CONNECTION TO EXISTING STRUCTURES at: Dollars Cents per each		
613.013	30	OPEN CUT POINT REPAIR OF GRAVITY SEWER at: Dollars Cents per linear foot		
613.018	100	CALCIUM CHLORIDE at: Dollars Cents per pound		
613.019	50*	ASBESTOS-CEMENT PIPE REMOVAL AND DISPOSAL at: Dollars Cents per linear foot		

SCHEDULE OF VALUES - BID FORM

UNIT PRICES

**Bid Alternate B for Maplewood Ave & Adjacent Areas Improvements
Portsmouth, New Hampshire**

ITEM NO.	EST. QUANTITY	ITEM DESCRIPTION WITH BID PRICE IN WORDS	UNIT PRICE IN FIGURES	ITEM TOTAL IN FIGURES
613.61a	6	REPLACE SEWER MANHOLE COVERS AND FRAMES (LOCKING) at: Dollars Cents per unit		
615.0301	10	TRAFFIC SIGN TYPE C at: Dollars Cents per square foot		
615.0601	5	TRAFFIC SIGN TYPE CC at: Dollars Cents per square foot		
632.3118	40	RETROREFLECT. THERMOPLAS. PAVE. MARKING, 18" LINE at: Dollars Cents per linear foot		
641	225	LOAM at: Dollars Cents per cubic yard		
645.512	150	COMPOST SOCK FOR PERIMETER BERM at: Dollars Cents per linear foot		
645.6	11	SILT SACKS at: Dollars Cents per unit		
646.31	1,300	TURF ESTABLISHMENT WITH MULCH AND TACKIFIERS at: Dollars Cents per square yard		
692	1	MOBILIZATION (not to exceed 10% of total bid) at: Dollars Cents per unit		
698	2	FIELD OFFICE at: Dollars Cents per month		
1008.52	1	ALTERATIONS AND ADDITIONS AS NEEDED - DEWATERING at: Dollars Cents lump sum		

Refer to Section 01270, 1.01.J for the definition of (F), final pay quantity.

* Indeterminate Quantity

Total Bid Alternate B Price (sum of all items above)

Total Bid Price Bid Alternate B _____
(Words): _____

TOTAL FOR PROJECT: **BASE BID**

In Figures \$ _____

In Words \$ _____

TOTAL FOR PROJECT: **BID ALTERNATE A**

In Figures \$ _____

In Words \$ _____

TOTAL FOR PROJECT: **BID ALTERNATE B**

In Figures \$ _____

In Words \$ _____

TOTAL FOR PROJECT: **BASE BID + BID ALTERNATE A**

In Figures \$ _____

In Words \$ _____

TOTAL FOR PROJECT: **BASE BID + BID ALTERNATE B**

In Figures \$ _____

In Words \$ _____

TOTAL FOR PROJECT **BASE BID + BID ALTERNATE A + BID ALTERNATE B**

In Figures \$ _____

In Words \$ _____

The City reserves the right, after bid opening and prior to award of the contract, to modify the amount of the work in the event that bids exceed budgeted amounts.

It is the intention of this contract that the items listed above describe completely and thoroughly the entirety of the work as shown on the plans and as described in the specifications. All other items required to accomplish the above items are considered to be subsidiary work, unless shown as a pay item.

Bids will be compared based on the Base Bid; Base Bid plus Bid Alternate A; Base Bid plus Bid Alternate B; or Base Bid plus Bid Alternate A and B; whichever is in the best interest of the City.

We certify that the Company is currently pre-qualified with the State of New Hampshire for Road Construction.

Signature

Printed Name & Title

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 of 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

 a certain BID, attached hereto and hereby made a part hereof to enter into a contract in writing, for
 the Improvements to Maplewood Avenue & Adjacent Areas

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.

NOTICE OF INTENT TO AWARD

Dated _____, 20 ____

TO: _____
(BIDDER)

ADDRESS: _____

OWNER'S PROJECT NO: _____

PROJECT: Improvements to Maplewood Avenue & Adjacent Areas

OWNER'S CONTRACT NO: 45-18

CONTRACT FOR: Improvements to Maplewood Avenue & Adjacent Areas

(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:

Improvements to Maplewood Avenue & Adjacent Areas

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

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

Which includes _____ and does not include _____.

_____ 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.

B-1.2

3. (List other conditions precedent).

Proof of Insurance Coverage

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

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

(OWNER)

By _____
(Judie Belanger)

(Director of Finance and Administration)

ACCEPTANCE OF NOTICE

Receipt of the above NOTICE OF AWARD is hereby acknowledged

By _____

The _____ day of _____, 20 _____

By _____

Title _____

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

AGREEMENT

THIS AGREEMENT, made this _____ day of _____, 20____ by
and between City of Portsmouth, NH, 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

Improvements to Maplewood Avenue and Adjacent Areas

(Project)

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

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

540 calendar days for substantial completion.

720 calendar days for final completion.

If the project includes the work associated with Bid Alternate A, the completion times calculated for
the base bid will be extended by the following number of calendar days (exclusive of winter shut
down) as follows:

120 calendar days for substantial completion.

120 calendar days for final completion.

B-2.2

If the project includes the work associated with Bid Alternate B, the completion times calculated for the base bid and Bid Alternate A, if awarded, will be extended by the following number of calendar days (exclusive of winter shut down) as follows:

80 calendar days for substantial completion.
80 calendar days for final completion.

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

4. The **CONTRACTOR** agrees to perform all of the **WORK** described in the **CONTRACT DOCUMENTS** and comply with the terms therein for the sum of \$ _____ or as shown in the **NOTICE OF INTENT TO AWARD**.

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

- (A) ADVERTISEMENT FOR BIDS
- (B) INFORMATION FOR BIDDERS
- (C) BID
- (D) BID BOND
- (E) NOTICE OF INTENT TO AWARD
- (F) AGREEMENT
- (G) PAYMENT BOND
- (H) PERFORMANCE BOND
- (I) CERTIFICATE OF INSURANCE
- (J) NOTICE TO PROCEED
- (K) CHANGE ORDER(S)
- (L) CERTIFICATON OF SUBSTANTIAL COMPLETION
- (M) CERTIFICATION OF FINAL COMPLETION
- (N) CONTRACTOR'S AFFIDAVIT
- (O) CONTRACTOR'S RELEASE
- (P) GENERAL CONDITIONS
- (Q) SUPPLEMENTAL GENERAL CONDITIONS
- (R) GENERAL CONDITIONS
- (S) SUPPLEMENTAL SPECIFICATIONS AND SPECIAL PROVISIONS
- (T) DRAWINGS prepared by:

Greenman Pedersen, Inc. and Weston and Sampson Engineers, Inc.
numbered 1 through 184 , and dated February 5 , 20 18

(T) SPECIFICATIONS prepared or issued by:

Greenman Pedersen, Inc. and Weston and Sampson Engineers, Inc.
_____ and dated February , 20 18

(U) ADDENDA:

No. _____ , dated _____ , 20 _____

No. _____ , dated _____ , 20 _____

No. _____ , dated _____ , 20 _____

No. _____ , dated _____ , 20 _____

No. _____ , dated _____ , 20 _____

6. The **OWNER** will pay to the **CONTRACTOR** in the manner and at such times as set forth in the General Conditions such amounts as required by the **CONTRACT DOCUMENTS**.

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

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

OWNER: City of Portsmouth, New Hampshire

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

(SEAL)

ATTEST: _____

Name: _____

Title: _____

CONTRACTOR: _____

By: _____

Name: _____

Address: _____

(SEAL)

ATTEST: _____

Name: _____

Title: _____

PAYMENT BOND

KNOW ALL MEN BY THESE PRESENTS: that

(Name of Contractor)

(Address of Contractor)

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

and _____
(Name of Surety)

(Address of Surety)

hereinafter called Surety, are held and firmly bound unto

City of Portsmouth, New Hampshire

(Name of Owner)

1 Junkins Avenue, Portsmouth, NH 03801

(Address of Owner)

hereinafter called **OWNER** and unto all persons, firms, and corporations who or which may furnish labor, or who furnish materials to perform as described under the contract and to their successors and assigns, in the total aggregate penal sum of _____ Dollars, (\$ _____) in lawful money of the United States, for the payment of which sum well and truly to be made, we bind ourselves, our heirs, executors, administrators, successors, and assigns, jointly and severally, firmly by these presents.

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

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

Improvements to Maplewood Avenue & Adjacent Areas

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 materialman lienholder whether it acquires its lien by operation of State or Federal Law; then this obligation shall be void; otherwise to remain in full force and effect.

B-3.2

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

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

PROVIDED, FURTHER that no suit or action shall be commenced hereunder by any claimant: (a) Unless claimant, other than one having a direct contract with the PRINCIPAL shall have given written notice to any two of the following: The PRINCIPAL, the OWNER, or the SURETY above named within ninety (90) days after such claimant did or performed the last of the work or labor, or furnished the last of the materials for which said claim is made, stating with substantial accuracy the amount claimed and the name of the party to whom the materials were furnished, or for whom the work or labor was done or performed. Such notice shall be served by mailing the same by registered mail or certified mail, postage prepaid, in an envelope addressed to the PRINCIPAL, OWNER, or SURETY, at any place where an office is regularly maintained for the transaction business, or served in any manner in which legal process may be served in the state in which the aforesaid project is located, save that such service need not be made by a public officer. (b) After the expiration of one (1) year following the date on which PRINCIPAL ceased work on said CONTRACT, it being understood, however, that if any limitation embodied in the BOND is prohibited by any law controlling the construction hereof, such limitation shall be deemed to be amended so as to be equal to the minimum period of limitation permitted by such law.

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

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

B-3.3

IN WITNESS WHEREOF, this instrument is executed in 4 counterparts, each one of
(number)
which shall be deemed an original, this _____ day of _____, 20 ____ .

ATTEST:

By: _____
(Principal) Secretary

(SEAL)

Principal

BY

(Address)

By: _____
Witness as to Principal

(Address)

(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.

PERFORMANCE BOND

KNOW ALL MEN BY THESE PRESENTS: that

(Name of Contractor)

(Address of Contractor)

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

and _____
(Name of Surety)

(Address of Surety)

hereinafter called Surety, are held and firmly bound unto

City of Portsmouth, New Hampshire

(Name of Owner)

Department of Public Works, 680 Peverly Hill Road, Portsmouth NH 03801

(Address of Owner)

hereinafter called **OWNER**, in the total aggregate penal sum of _____ Dollars, \$ (_____)

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

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

NOW, THEREFORE, if the Principal shall 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

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

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

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

IN WITNESS WHEREOF, this instrument is executed in 4 counterparts, each one of which shall be deemed an original, this _____ day of _____, 20 ____ .
(number)

ATTEST:

By: _____
(Principal) Secretary

(SEAL)

Principal

BY

(Address)

By: _____
Witness as to Principal

(Address)

ATTEST:

By _____
Witness as to Surety

(Address)

(Surety)

BY

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

NOTICE TO PROCEED

Dated _____, 20 ____

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

ADDRESS: _____

OWNER'S PROJECT NO. _____

PROJECT: Improvements to Maplewood Avenue & Adjacent Areas

OWNER'S CONTRACT NO. _____

CONTRACT FOR: Improvements to Maplewood Avenue & Adjacent Areas

You are notified that the Contract Time under the above contract will commence to run on _____, 20 ____ . By that date, you are to start performing your obligations under the Contract Documents. In accordance with paragraph 3 of the Agreement, the dates of Substantial Completion and Final Completion are _____, 20 ____ and _____, 20 ____ , respectively.

Before you may start any Work at the site, Paragraph 2.01B of the General Conditions provides that you shall deliver to the OWNER (with a copy to ENGINEER) certificate(s) of insurance which is required to be purchased and maintained in accordance with the Contract Documents. Also before you may start any Work at the site, you must:

(add other requirements)

Copy to ENGINEER

(Use certified Mail, return Receipt Requested)

By _____
(owner)

By _____
(Brian Goetz)

(Deputy Director of Public Works)

ACCEPTANCE OF NOTICE

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

(Contractor)

this the _____, 20 ____

By: _____

Employer Identification

Number: _____

CHANGE ORDER

No. _____

PROJECT: _____ DATE OF ISSUANCE: _____
 OWNER: _____

 (Address)

CONTRACTOR: _____ OWNER's Project No. _____
 CONTRACT FOR: _____ ENGINEER _____
 _____ ENGINEER's Project No. _____

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

Description:

Purpose of Change Order:

Justification:

Attachments: (List documents supporting change)

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

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

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

RECOMMENDED:	APPROVED:	APPROVED:	APPROVED:	APPROVED:
By:	By:	By:	By:	By:
_____ Engineer	_____ John P. Bohenko City Manager	_____ Owner/DPW	_____ Owner/Finance	_____ Contractor
_____ Date	_____ Date	_____ Date	_____ Date	_____ Date

CERTIFICATE OF SUBSTANTIAL COMPLETION

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

Project: Improvements to Maplewood Avenue & Adjacent Areas

CONTRACTOR: _____

Contract For: _____ Contract Date: _____

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

To: City of Portsmouth, New Hampshire
(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.

B-7.2

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

RESPONSIBILITIES:

OWNER: _____

CONTRACTOR: _____

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

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

Executed by ENGINEER on _____, 20 _____

(Engineer)

By: _____

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

(Contractor)

By: _____

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

(Owner)

By: _____

CERTIFICATE OF FINAL COMPLETION

Owner's Project No. _____ Engineer's Project No. _____
Project _____
Owner: _____
Contractor: _____
Engineer: _____

Agreement Date: _____
Notice to Proceed Date: _____
Contractual Substantial Completion Date as modified by Change Orders: _____
Actual Substantial Completion Date: _____
Contractual Final Completion Date as modified by Change Orders: _____

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

_____ Date of Final Completion

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

Executed by Engineer on: _____, 20_____

By: _____

Contractor Accepts this Certificate of Final Completion on: _____, 20_____

By: _____

Owner Accepts this Certificate of Final Completion on: _____, 20_____

By: _____

CONTRACTOR'S AFFIDAVIT

STATE OF: _____

COUNTY OF: _____

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

in and for said County and State personally appeared, _____
(Individual, Partner or duly

_____ who being duly sworn according to law
authorized representative of corporate contractor)

deposes and says that the cost of all the Work, and outstanding claims and indebtedness of whatever nature arising out of the performance of the contract

between The City of Portsmouth, New Hampshire
(Owner)

and _____ of _____
(Contractor) (Address)

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

and necessary appurtenant installations have been paid in full.

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

(Title)

Sworn to and subscribed before me

this _____ day of _____, 20 ____

Notary Public

CONTRACTOR'S FINAL RELEASE AND WAIVER OF LIEN

Project/Owner

Contractor

Project: Improvements to Maplewood Avenue & Adjacent Areas Name _____

Address: N/A Address: _____

Portsmouth NH 03801 _____
City State Zip City State Zip

Owner City of Portsmouth, New Hampshire Contractor License: _____

Contract Date: _____

TO ALL WHOM IT MAY CONCERN:

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

The undersigned further hereby acknowledges that the sum of

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

Dated this ____ day of _____ 20__

Contractor

Witness to Signature

By _____

By _____

Title _____

Title _____

This document has important legal consequences; consultation with an attorney is encouraged with respect to its use or modification. This document should be adapted to the particular circumstances of the contemplated Project and the controlling Laws and Regulations.

STANDARD GENERAL CONDITIONS OF THE CONSTRUCTION CONTRACT

Prepared by

ENGINEERS JOINT CONTRACT DOCUMENTS COMMITTEE

and

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NATIONAL SOCIETY OF PROFESSIONAL ENGINEERS

Endorsed by



CONSTRUCTION SPECIFICATIONS INSTITUTE

These General Conditions have been prepared for use with the Suggested Forms of Agreement Between Owner and Contractor (EJCDC C-520 or C-525, 2007 Editions). Their provisions are interrelated and a change in one may necessitate a change in the other. Comments concerning their usage are contained in the Narrative Guide to the EJCDC Construction Documents (EJCDC C-001, 2007 Edition). For guidance in the preparation of Supplementary Conditions, see Guide to the Preparation of Supplementary Conditions (EJCDC C-800, 2007 Edition).

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**STANDARD GENERAL CONDITIONS OF THE
CONSTRUCTION CONTRACT**

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ARTICLE 1 – DEFINITIONS AND TERMINOLOGY

1.01 *Defined Terms*

- A. Wherever used in the Bidding Requirements or Contract Documents and printed with initial capital letters, the terms listed below will have the meanings indicated which are applicable to both the singular and plural thereof. In addition to terms specifically defined, terms with initial capital letters in the Contract Documents include references to identified articles and paragraphs, and the titles of other documents or forms.
1. *Addenda*—Written or graphic instruments issued prior to the opening of Bids which clarify, correct, or change the Bidding Requirements or the proposed Contract Documents.
 2. *Agreement*—The written instrument which is evidence of the agreement between Owner and Contractor covering the Work.
 3. *Application for Payment*—The form acceptable to Engineer which is to be used by Contractor during the course of the Work in requesting progress or final payments and which is to be accompanied by such supporting documentation as is required by the Contract Documents.
 4. *Asbestos*—Any material that contains more than one percent asbestos and is friable or is releasing asbestos fibers into the air above current action levels established by the United States Occupational Safety and Health Administration.
 5. *Bid*—The offer or proposal of a Bidder submitted on the prescribed form setting forth the prices for the Work to be performed.
 6. *Bidder*—The individual or entity who submits a Bid directly to Owner.
 7. *Bidding Documents*—The Bidding Requirements and the proposed Contract Documents (including all Addenda).
 8. *Bidding Requirements*—The advertisement or invitation to bid, Instructions to Bidders, Bid security of acceptable form, if any, and the Bid Form with any supplements.
 9. *Change Order*—A document recommended by Engineer which is signed by Contractor and Owner and authorizes an addition, deletion, or revision in the Work or an adjustment in the Contract Price or the Contract Times, issued on or after the Effective Date of the Agreement.
 10. *Claim*—A demand or assertion by Owner or Contractor seeking an adjustment of Contract Price or Contract Times, or both, or other relief with respect to the terms of the Contract. A demand for money or services by a third party is not a Claim.
 11. *Contract*—The entire and integrated written agreement between the Owner and Contractor concerning the Work. The Contract supersedes prior negotiations, representations, or agreements, whether written or oral.

12. *Contract Documents*—Those items so designated in the Agreement. Only printed or hard copies of the items listed in the Agreement are Contract Documents. Approved Shop Drawings, other Contractor submittals, and the reports and drawings of subsurface and physical conditions are not Contract Documents.
13. *Contract Price*—The moneys payable by Owner to Contractor for completion of the Work in accordance with the Contract Documents as stated in the Agreement (subject to the provisions of Paragraph 11.03 in the case of Unit Price Work).
14. *Contract Times*—The number of days or the dates stated in the Agreement to: (i) achieve Milestones, if any; (ii) achieve Substantial Completion; and (iii) complete the Work so that it is ready for final payment as evidenced by Engineer's written recommendation of final payment.
15. *Contractor*—The individual or entity with whom Owner has entered into the Agreement.
16. *Cost of the Work*—See Paragraph 11.01 for definition.
17. *Drawings*—That part of the Contract Documents prepared or approved by Engineer which graphically shows the scope, extent, and character of the Work to be performed by Contractor. Shop Drawings and other Contractor submittals are not Drawings as so defined.
18. *Effective Date of the Agreement*—The date indicated in the Agreement on which it becomes effective, but if no such date is indicated, it means the date on which the Agreement is signed and delivered by the last of the two parties to sign and deliver.
19. *Engineer*—The individual or entity named as such in the Agreement.
20. *Field Order*—A written order issued by Engineer which requires minor changes in the Work but which does not involve a change in the Contract Price or the Contract Times.
21. *General Requirements*—Sections of Division 1 of the Specifications.
22. *Hazardous Environmental Condition*—The presence at the Site of Asbestos, PCBs, Petroleum, Hazardous Waste, or Radioactive Material in such quantities or circumstances that may present a substantial danger to persons or property exposed thereto.
23. *Hazardous Waste*—The term Hazardous Waste shall have the meaning provided in Section 1004 of the Solid Waste Disposal Act (42 USC Section 6903) as amended from time to time.
24. *Laws and Regulations; Laws or Regulations*—Any and all applicable laws, rules, regulations, ordinances, codes, and orders of any and all governmental bodies, agencies, authorities, and courts having jurisdiction.
25. *Liens*—Charges, security interests, or encumbrances upon Project funds, real property, or personal property.
26. *Milestone*—A principal event specified in the Contract Documents relating to an intermediate completion date or time prior to Substantial Completion of all the Work.

27. *Notice of Award*—The written notice by Owner to the Successful Bidder stating that upon timely compliance by the Successful Bidder with the conditions precedent listed therein, Owner will sign and deliver the Agreement.
28. *Notice to Proceed*—A written notice given by Owner to Contractor fixing the date on which the Contract Times will commence to run and on which Contractor shall start to perform the Work under the Contract Documents.
29. *Owner*—The individual or entity with whom Contractor has entered into the Agreement and for whom the Work is to be performed.
30. *PCBs*—Polychlorinated biphenyls.
31. *Petroleum*—Petroleum, including crude oil or any fraction thereof which is liquid at standard conditions of temperature and pressure (60 degrees Fahrenheit and 14.7 pounds per square inch absolute), such as oil, petroleum, fuel oil, oil sludge, oil refuse, gasoline, kerosene, and oil mixed with other non-Hazardous Waste and crude oils.
32. *Progress Schedule*—A schedule, prepared and maintained by Contractor, describing the sequence and duration of the activities comprising the Contractor's plan to accomplish the Work within the Contract Times.
33. *Project*—The total construction of which the Work to be performed under the Contract Documents may be the whole, or a part.
34. *Project Manual*—The bound documentary information prepared for bidding and constructing the Work. A listing of the contents of the Project Manual, which may be bound in one or more volumes, is contained in the table(s) of contents.
35. *Radioactive Material*—Source, special nuclear, or byproduct material as defined by the Atomic Energy Act of 1954 (42 USC Section 2011 et seq.) as amended from time to time.
36. *Resident Project Representative*—The authorized representative of Engineer who may be assigned to the Site or any part thereof.
37. *Samples*—Physical examples of materials, equipment, or workmanship that are representative of some portion of the Work and which establish the standards by which such portion of the Work will be judged.
38. *Schedule of Submittals*—A schedule, prepared and maintained by Contractor, of required submittals and the time requirements to support scheduled performance of related construction activities.
39. *Schedule of Values*—A schedule, prepared and maintained by Contractor, allocating portions of the Contract Price to various portions of the Work and used as the basis for reviewing Contractor's Applications for Payment.

40. *Shop Drawings*—All drawings, diagrams, illustrations, schedules, and other data or information which are specifically prepared or assembled by or for Contractor and submitted by Contractor to illustrate some portion of the Work.
41. *Site*—Lands or areas indicated in the Contract Documents as being furnished by Owner upon which the Work is to be performed, including rights-of-way and easements for access thereto, and such other lands furnished by Owner which are designated for the use of Contractor.
42. *Specifications*—That part of the Contract Documents consisting of written requirements for materials, equipment, systems, standards and workmanship as applied to the Work, and certain administrative requirements and procedural matters applicable thereto.
43. *Subcontractor*—An individual or entity having a direct contract with Contractor or with any other Subcontractor for the performance of a part of the Work at the Site.
44. *Substantial Completion*—The time at which the Work (or a specified part thereof) has progressed to the point where, in the opinion of Engineer, the Work (or a specified part thereof) is sufficiently complete, in accordance with the Contract Documents, so that the Work (or a specified part thereof) can be utilized for the purposes for which it is intended. The terms “substantially complete” and “substantially completed” as applied to all or part of the Work refer to Substantial Completion thereof.
45. *Successful Bidder*—The Bidder submitting a responsive Bid to whom Owner makes an award.
46. *Supplementary Conditions*—That part of the Contract Documents which amends or supplements these General Conditions.
47. *Supplier*—A manufacturer, fabricator, supplier, distributor, materialman, or vendor having a direct contract with Contractor or with any Subcontractor to furnish materials or equipment to be incorporated in the Work by Contractor or Subcontractor.
48. *Underground Facilities*—All underground pipelines, conduits, ducts, cables, wires, manholes, vaults, tanks, tunnels, or other such facilities or attachments, and any encasements containing such facilities, including those that convey electricity, gases, steam, liquid petroleum products, telephone or other communications, cable television, water, wastewater, storm water, other liquids or chemicals, or traffic or other control systems.
49. *Unit Price Work*—Work to be paid for on the basis of unit prices.
50. *Work*—The entire construction or the various separately identifiable parts thereof required to be provided under the Contract Documents. Work includes and is the result of performing or providing all labor, services, and documentation necessary to produce such construction, and furnishing, installing, and incorporating all materials and equipment into such construction, all as required by the Contract Documents.
51. *Work Change Directive*—A written statement to Contractor issued on or after the Effective Date of the Agreement and signed by Owner and recommended by Engineer ordering an

addition, deletion, or revision in the Work, or responding to differing or unforeseen subsurface or physical conditions under which the Work is to be performed or to emergencies. A Work Change Directive will not change the Contract Price or the Contract Times but is evidence that the parties expect that the change ordered or documented by a Work Change Directive will be incorporated in a subsequently issued Change Order following negotiations by the parties as to its effect, if any, on the Contract Price or Contract Times.

1.02 Terminology

A. The words and terms discussed in Paragraph 1.02.B through F are not defined but, when used in the Bidding Requirements or Contract Documents, have the indicated meaning.

B. *Intent of Certain Terms or Adjectives:*

1. The Contract Documents include the terms “as allowed,” “as approved,” “as ordered,” “as directed” or terms of like effect or import to authorize an exercise of professional judgment by Engineer. In addition, the adjectives “reasonable,” “suitable,” “acceptable,” “proper,” “satisfactory,” or adjectives of like effect or import are used to describe an action or determination of Engineer as to the Work. It is intended that such exercise of professional judgment, action, or determination will be solely to evaluate, in general, the Work for compliance with the information in the Contract Documents and with the design concept of the Project as a functioning whole as shown or indicated in the Contract Documents (unless there is a specific statement indicating otherwise). The use of any such term or adjective is not intended to and shall not be effective to assign to Engineer any duty or authority to supervise or direct the performance of the Work, or any duty or authority to undertake responsibility contrary to the provisions of Paragraph 9.09 or any other provision of the Contract Documents.

C. *Day:*

1. The word “day” means a calendar day of 24 hours measured from midnight to the next midnight.

D. *Defective:*

1. The word “defective,” when modifying the word “Work,” refers to Work that is unsatisfactory, faulty, or deficient in that it:
 - a. does not conform to the Contract Documents; or
 - b. does not meet the requirements of any applicable inspection, reference standard, test, or approval referred to in the Contract Documents; or
 - c. has been damaged prior to Engineer’s recommendation of final payment (unless responsibility for the protection thereof has been assumed by Owner at Substantial Completion in accordance with Paragraph 14.04 or 14.05).

E. *Furnish, Install, Perform, Provide:*

1. The word “furnish,” when used in connection with services, materials, or equipment, shall mean to supply and deliver said services, materials, or equipment to the Site (or some other specified location) ready for use or installation and in usable or operable condition.
 2. The word “install,” when used in connection with services, materials, or equipment, shall mean to put into use or place in final position said services, materials, or equipment complete and ready for intended use.
 3. The words “perform” or “provide,” when used in connection with services, materials, or equipment, shall mean to furnish and install said services, materials, or equipment complete and ready for intended use.
 4. When “furnish,” “install,” “perform,” or “provide” is not used in connection with services, materials, or equipment in a context clearly requiring an obligation of Contractor, “provide” is implied.
- F. Unless stated otherwise in the Contract Documents, words or phrases that have a well-known technical or construction industry or trade meaning are used in the Contract Documents in accordance with such recognized meaning.

ARTICLE 2 – PRELIMINARY MATTERS

2.01 Delivery of Bonds and Evidence of Insurance

- A. When Contractor delivers the executed counterparts of the Agreement to Owner, Contractor shall also deliver to Owner such bonds as Contractor may be required to furnish.
- B. *Evidence of Insurance:* Before any Work at the Site is started, Contractor and Owner shall each deliver to the other, with copies to each additional insured identified in the Supplementary Conditions, certificates of insurance (and other evidence of insurance which either of them or any additional insured may reasonably request) which Contractor and Owner respectively are required to purchase and maintain in accordance with Article 5.

2.02 Copies of Documents

- A. Owner shall furnish to Contractor up to ten printed or hard copies of the Drawings and Project Manual. Additional copies will be furnished upon request at the cost of reproduction.

2.03 Commencement of Contract Times; Notice to Proceed

- A. The Contract Times will commence to run on the thirtieth day after the Effective Date of the Agreement or, if a Notice to Proceed is given, on the day indicated in the Notice to Proceed. A Notice to Proceed may be given at any time within 30 days after the Effective Date of the Agreement. In no event will the Contract Times commence to run later than the sixtieth day after the day of Bid opening or the thirtieth day after the Effective Date of the Agreement, whichever date is earlier.

2.04 *Starting the Work*

- A. Contractor shall start to perform the Work on the date when the Contract Times commence to run. No Work shall be done at the Site prior to the date on which the Contract Times commence to run.

2.05 *Before Starting Construction*

- A. *Preliminary Schedules:* Within 10 days after the Effective Date of the Agreement (unless otherwise specified in the General Requirements), Contractor shall submit to Engineer for timely review:
 - 1. a preliminary Progress Schedule indicating the times (numbers of days or dates) for starting and completing the various stages of the Work, including any Milestones specified in the Contract Documents;
 - 2. a preliminary Schedule of Submittals; and
 - 3. a preliminary Schedule of Values for all of the Work which includes quantities and prices of items which when added together equal the Contract Price and subdivides the Work into component parts in sufficient detail to serve as the basis for progress payments during performance of the Work. Such prices will include an appropriate amount of overhead and profit applicable to each item of Work.

2.06 *Preconstruction Conference; Designation of Authorized Representatives*

- A. Before any Work at the Site is started, a conference attended by Owner, Contractor, Engineer, and others as appropriate will be held to establish a working understanding among the parties as to the Work and to discuss the schedules referred to in Paragraph 2.05.A, procedures for handling Shop Drawings and other submittals, processing Applications for Payment, and maintaining required records.
- B. At this conference Owner and Contractor each shall designate, in writing, a specific individual to act as its authorized representative with respect to the services and responsibilities under the Contract. Such individuals shall have the authority to transmit instructions, receive information, render decisions relative to the Contract, and otherwise act on behalf of each respective party.

2.07 *Initial Acceptance of Schedules*

- A. At least 10 days before submission of the first Application for Payment a conference attended by Contractor, Engineer, and others as appropriate will be held to review for acceptability to Engineer as provided below the schedules submitted in accordance with Paragraph 2.05.A. Contractor shall have an additional 10 days to make corrections and adjustments and to complete and resubmit the schedules. No progress payment shall be made to Contractor until acceptable schedules are submitted to Engineer.
 - 1. The Progress Schedule will be acceptable to Engineer if it provides an orderly progression of the Work to completion within the Contract Times. Such acceptance will not impose on Engineer responsibility for the Progress Schedule, for sequencing, scheduling, or progress of

the Work, nor interfere with or relieve Contractor from Contractor's full responsibility therefor.

2. Contractor's Schedule of Submittals will be acceptable to Engineer if it provides a workable arrangement for reviewing and processing the required submittals.
3. Contractor's Schedule of Values will be acceptable to Engineer as to form and substance if it provides a reasonable allocation of the Contract Price to component parts of the Work.

ARTICLE 3 – CONTRACT DOCUMENTS: INTENT, AMENDING, REUSE

3.01 *Intent*

- A. The Contract Documents are complementary; what is required by one is as binding as if required by all.
- B. It is the intent of the Contract Documents to describe a functionally complete project (or part thereof) to be constructed in accordance with the Contract Documents. Any labor, documentation, services, materials, or equipment that reasonably may be inferred from the Contract Documents or from prevailing custom or trade usage as being required to produce the indicated result will be provided whether or not specifically called for, at no additional cost to Owner.
- C. Clarifications and interpretations of the Contract Documents shall be issued by Engineer as provided in Article 9.

3.02 *Reference Standards*

- A. Standards, Specifications, Codes, Laws, and Regulations
 1. Reference to standards, specifications, manuals, or codes of any technical society, organization, or association, or to Laws or Regulations, whether such reference be specific or by implication, shall mean the standard, specification, manual, code, or Laws or Regulations in effect at the time of opening of Bids (or on the Effective Date of the Agreement if there were no Bids), except as may be otherwise specifically stated in the Contract Documents.
 2. No provision of any such standard, specification, manual, or code, or any instruction of a Supplier, shall be effective to change the duties or responsibilities of Owner, Contractor, or Engineer, or any of their subcontractors, consultants, agents, or employees, from those set forth in the Contract Documents. No such provision or instruction shall be effective to assign to Owner, Engineer, or any of their officers, directors, members, partners, employees, agents, consultants, or subcontractors, any duty or authority to supervise or direct the performance of the Work or any duty or authority to undertake responsibility inconsistent with the provisions of the Contract Documents.

3.03 *Reporting and Resolving Discrepancies*

- A. *Reporting Discrepancies:*

1. *Contractor's Review of Contract Documents Before Starting Work:* Before undertaking each part of the Work, Contractor shall carefully study and compare the Contract Documents and check and verify pertinent figures therein and all applicable field measurements. Contractor shall promptly report in writing to Engineer any conflict, error, ambiguity, or discrepancy which Contractor discovers, or has actual knowledge of, and shall obtain a written interpretation or clarification from Engineer before proceeding with any Work affected thereby.
2. *Contractor's Review of Contract Documents During Performance of Work:* If, during the performance of the Work, Contractor discovers any conflict, error, ambiguity, or discrepancy within the Contract Documents, or between the Contract Documents and (a) any applicable Law or Regulation, (b) any standard, specification, manual, or code, or (c) any instruction of any Supplier, then Contractor shall promptly report it to Engineer in writing. Contractor shall not proceed with the Work affected thereby (except in an emergency as required by Paragraph 6.16.A) until an amendment or supplement to the Contract Documents has been issued by one of the methods indicated in Paragraph 3.04.
3. Contractor shall not be liable to Owner or Engineer for failure to report any conflict, error, ambiguity, or discrepancy in the Contract Documents unless Contractor had actual knowledge thereof.

B. *Resolving Discrepancies:*

1. Except as may be otherwise specifically stated in the Contract Documents, the provisions of the Contract Documents shall take precedence in resolving any conflict, error, ambiguity, or discrepancy between the provisions of the Contract Documents and:
 - a. the provisions of any standard, specification, manual, or code, or the instruction of any Supplier (whether or not specifically incorporated by reference in the Contract Documents); or
 - b. the provisions of any Laws or Regulations applicable to the performance of the Work (unless such an interpretation of the provisions of the Contract Documents would result in violation of such Law or Regulation).

3.04 *Amending and Supplementing Contract Documents*

- A. The Contract Documents may be amended to provide for additions, deletions, and revisions in the Work or to modify the terms and conditions thereof by either a Change Order or a Work Change Directive.
- B. The requirements of the Contract Documents may be supplemented, and minor variations and deviations in the Work may be authorized, by one or more of the following ways:
 1. A Field Order;
 2. Engineer's approval of a Shop Drawing or Sample (subject to the provisions of Paragraph 6.17.D.3); or

3. Engineer's written interpretation or clarification.

3.05 *Reuse of Documents*

- A. Contractor and any Subcontractor or Supplier shall not:
 1. have or acquire any title to or ownership rights in any of the Drawings, Specifications, or other documents (or copies of any thereof) prepared by or bearing the seal of Engineer or its consultants, including electronic media editions; or
 2. reuse any such Drawings, Specifications, other documents, or copies thereof on extensions of the Project or any other project without written consent of Owner and Engineer and specific written verification or adaptation by Engineer.
- B. The prohibitions of this Paragraph 3.05 will survive final payment, or termination of the Contract. Nothing herein shall preclude Contractor from retaining copies of the Contract Documents for record purposes.

3.06 *Electronic Data*

- A. Unless otherwise stated in the Supplementary Conditions, the data furnished by Owner or Engineer to Contractor, or by Contractor to Owner or Engineer, that may be relied upon are limited to the printed copies (also known as hard copies). Files in electronic media format of text, data, graphics, or other types are furnished only for the convenience of the receiving party. Any conclusion or information obtained or derived from such electronic files will be at the user's sole risk. If there is a discrepancy between the electronic files and the hard copies, the hard copies govern.
- B. Because data stored in electronic media format can deteriorate or be modified inadvertently or otherwise without authorization of the data's creator, the party receiving electronic files agrees that it will perform acceptance tests or procedures within 60 days, after which the receiving party shall be deemed to have accepted the data thus transferred. Any errors detected within the 60-day acceptance period will be corrected by the transferring party.
- C. When transferring documents in electronic media format, the transferring party makes no representations as to long term compatibility, usability, or readability of documents resulting from the use of software application packages, operating systems, or computer hardware differing from those used by the data's creator.

ARTICLE 4 – AVAILABILITY OF LANDS; SUBSURFACE AND PHYSICAL CONDITIONS; HAZARDOUS ENVIRONMENTAL CONDITIONS; REFERENCE POINTS

4.01 *Availability of Lands*

- A. Owner shall furnish the Site. Owner shall notify Contractor of any encumbrances or restrictions not of general application but specifically related to use of the Site with which Contractor must comply in performing the Work. Owner will obtain in a timely manner and pay for easements for permanent structures or permanent changes in existing facilities. If Contractor and Owner are unable to agree on entitlement to or on the amount or extent, if any, of any adjustment in the

Contract Price or Contract Times, or both, as a result of any delay in Owner's furnishing the Site or a part thereof, Contractor may make a Claim therefor as provided in Paragraph 10.05.

- B. Upon reasonable written request, Owner shall furnish Contractor with a current statement of record legal title and legal description of the lands upon which the Work is to be performed and Owner's interest therein as necessary for giving notice of or filing a mechanic's or construction lien against such lands in accordance with applicable Laws and Regulations.
- C. Contractor shall provide for all additional lands and access thereto that may be required for temporary construction facilities or storage of materials and equipment.

4.02 *Subsurface and Physical Conditions*

A. *Reports and Drawings:* The Supplementary Conditions identify:

- 1. those reports known to Owner of explorations and tests of subsurface conditions at or contiguous to the Site; and
- 2. those drawings known to Owner of physical conditions relating to existing surface or subsurface structures at the Site (except Underground Facilities).

B. *Limited Reliance by Contractor on Technical Data Authorized:* Contractor may rely upon the accuracy of the "technical data" contained in such reports and drawings, but such reports and drawings are not Contract Documents. Such "technical data" is identified in the Supplementary Conditions. Except for such reliance on such "technical data," Contractor may not rely upon or make any claim against Owner or Engineer, or any of their officers, directors, members, partners, employees, agents, consultants, or subcontractors with respect to:

- 1. the completeness of such reports and drawings for Contractor's purposes, including, but not limited to, any aspects of the means, methods, techniques, sequences, and procedures of construction to be employed by Contractor, and safety precautions and programs incident thereto; or
- 2. other data, interpretations, opinions, and information contained in such reports or shown or indicated in such drawings; or
- 3. any Contractor interpretation of or conclusion drawn from any "technical data" or any such other data, interpretations, opinions, or information.

4.03 *Differing Subsurface or Physical Conditions*

A. *Notice:* If Contractor believes that any subsurface or physical condition that is uncovered or revealed either:

- 1. is of such a nature as to establish that any "technical data" on which Contractor is entitled to rely as provided in Paragraph 4.02 is materially inaccurate; or
- 2. is of such a nature as to require a change in the Contract Documents; or

3. differs materially from that shown or indicated in the Contract Documents; or
4. is of an unusual nature, and differs materially from conditions ordinarily encountered and generally recognized as inherent in work of the character provided for in the Contract Documents;

then Contractor shall, promptly after becoming aware thereof and before further disturbing the subsurface or physical conditions or performing any Work in connection therewith (except in an emergency as required by Paragraph 6.16.A), notify Owner and Engineer in writing about such condition. Contractor shall not further disturb such condition or perform any Work in connection therewith (except as aforesaid) until receipt of written order to do so.

B. *Engineer's Review:* After receipt of written notice as required by Paragraph 4.03.A, Engineer will promptly review the pertinent condition, determine the necessity of Owner's obtaining additional exploration or tests with respect thereto, and advise Owner in writing (with a copy to Contractor) of Engineer's findings and conclusions.

C. *Possible Price and Times Adjustments:*

1. The Contract Price or the Contract Times, or both, will be equitably adjusted to the extent that the existence of such differing subsurface or physical condition causes an increase or decrease in Contractor's cost of, or time required for, performance of the Work; subject, however, to the following:
 - a. such condition must meet any one or more of the categories described in Paragraph 4.03.A; and
 - b. with respect to Work that is paid for on a unit price basis, any adjustment in Contract Price will be subject to the provisions of Paragraphs 9.07 and 11.03.
2. Contractor shall not be entitled to any adjustment in the Contract Price or Contract Times if:
 - a. Contractor knew of the existence of such conditions at the time Contractor made a final commitment to Owner with respect to Contract Price and Contract Times by the submission of a Bid or becoming bound under a negotiated contract; or
 - b. the existence of such condition could reasonably have been discovered or revealed as a result of any examination, investigation, exploration, test, or study of the Site and contiguous areas required by the Bidding Requirements or Contract Documents to be conducted by or for Contractor prior to Contractor's making such final commitment; or
 - c. Contractor failed to give the written notice as required by Paragraph 4.03.A.
3. If Owner and Contractor are unable to agree on entitlement to or on the amount or extent, if any, of any adjustment in the Contract Price or Contract Times, or both, a Claim may be made therefor as provided in Paragraph 10.05. However, neither Owner or Engineer, or any of their officers, directors, members, partners, employees, agents, consultants, or subcontractors shall be liable to Contractor for any claims, costs, losses, or damages (including but not limited to all fees and charges of engineers, architects, attorneys, and other

professionals and all court or arbitration or other dispute resolution costs) sustained by Contractor on or in connection with any other project or anticipated project.

4.04 *Underground Facilities*

A. *Shown or Indicated:* The information and data shown or indicated in the Contract Documents with respect to existing Underground Facilities at or contiguous to the Site is based on information and data furnished to Owner or Engineer by the owners of such Underground Facilities, including Owner, or by others. Unless it is otherwise expressly provided in the Supplementary Conditions:

1. Owner and Engineer shall not be responsible for the accuracy or completeness of any such information or data provided by others; and
2. the cost of all of the following will be included in the Contract Price, and Contractor shall have full responsibility for:
 - a. reviewing and checking all such information and data;
 - b. locating all Underground Facilities shown or indicated in the Contract Documents;
 - c. coordination of the Work with the owners of such Underground Facilities, including Owner, during construction; and
 - d. the safety and protection of all such Underground Facilities and repairing any damage thereto resulting from the Work.

B. *Not Shown or Indicated:*

1. If an Underground Facility is uncovered or revealed at or contiguous to the Site which was not shown or indicated, or not shown or indicated with reasonable accuracy in the Contract Documents, Contractor shall, promptly after becoming aware thereof and before further disturbing conditions affected thereby or performing any Work in connection therewith (except in an emergency as required by Paragraph 6.16.A), identify the owner of such Underground Facility and give written notice to that owner and to Owner and Engineer. Engineer will promptly review the Underground Facility and determine the extent, if any, to which a change is required in the Contract Documents to reflect and document the consequences of the existence or location of the Underground Facility. During such time, Contractor shall be responsible for the safety and protection of such Underground Facility.
2. If Engineer concludes that a change in the Contract Documents is required, a Work Change Directive or a Change Order will be issued to reflect and document such consequences. An equitable adjustment shall be made in the Contract Price or Contract Times, or both, to the extent that they are attributable to the existence or location of any Underground Facility that was not shown or indicated or not shown or indicated with reasonable accuracy in the Contract Documents and that Contractor did not know of and could not reasonably have been expected to be aware of or to have anticipated. If Owner and Contractor are unable to agree on entitlement to or on the amount or extent, if any, of any such adjustment in Contract Price

or Contract Times, Owner or Contractor may make a Claim therefor as provided in Paragraph 10.05.

4.05 *Reference Points*

- A. Owner shall provide engineering surveys to establish reference points for construction which in Engineer's judgment are necessary to enable Contractor to proceed with the Work. Contractor shall be responsible for laying out the Work, shall protect and preserve the established reference points and property monuments, and shall make no changes or relocations without the prior written approval of Owner. Contractor shall report to Engineer whenever any reference point or property monument is lost or destroyed or requires relocation because of necessary changes in grades or locations, and shall be responsible for the accurate replacement or relocation of such reference points or property monuments by professionally qualified personnel.

4.06 *Hazardous Environmental Condition at Site*

- A. *Reports and Drawings:* The Supplementary Conditions identify those reports and drawings known to Owner relating to Hazardous Environmental Conditions that have been identified at the Site.
- B. *Limited Reliance by Contractor on Technical Data Authorized:* Contractor may rely upon the accuracy of the "technical data" contained in such reports and drawings, but such reports and drawings are not Contract Documents. Such "technical data" is identified in the Supplementary Conditions. Except for such reliance on such "technical data," Contractor may not rely upon or make any claim against Owner or Engineer, or any of their officers, directors, members, partners, employees, agents, consultants, or subcontractors with respect to:
1. the completeness of such reports and drawings for Contractor's purposes, including, but not limited to, any aspects of the means, methods, techniques, sequences and procedures of construction to be employed by Contractor and safety precautions and programs incident thereto; or
 2. other data, interpretations, opinions and information contained in such reports or shown or indicated in such drawings; or
 3. any Contractor interpretation of or conclusion drawn from any "technical data" or any such other data, interpretations, opinions or information.
- C. Contractor shall not be responsible for any Hazardous Environmental Condition uncovered or revealed at the Site which was not shown or indicated in Drawings or Specifications or identified in the Contract Documents to be within the scope of the Work. Contractor shall be responsible for a Hazardous Environmental Condition created with any materials brought to the Site by Contractor, Subcontractors, Suppliers, or anyone else for whom Contractor is responsible.
- D. If Contractor encounters a Hazardous Environmental Condition or if Contractor or anyone for whom Contractor is responsible creates a Hazardous Environmental Condition, Contractor shall immediately: (i) secure or otherwise isolate such condition; (ii) stop all Work in connection with such condition and in any area affected thereby (except in an emergency as required by

Paragraph 6.16.A); and (iii) notify Owner and Engineer (and promptly thereafter confirm such notice in writing). Owner shall promptly consult with Engineer concerning the necessity for Owner to retain a qualified expert to evaluate such condition or take corrective action, if any. Promptly after consulting with Engineer, Owner shall take such actions as are necessary to permit Owner to timely obtain required permits and provide Contractor the written notice required by Paragraph 4.06.E.

- E. Contractor shall not be required to resume Work in connection with such condition or in any affected area until after Owner has obtained any required permits related thereto and delivered written notice to Contractor: (i) specifying that such condition and any affected area is or has been rendered safe for the resumption of Work; or (ii) specifying any special conditions under which such Work may be resumed safely. If Owner and Contractor cannot agree as to entitlement to or on the amount or extent, if any, of any adjustment in Contract Price or Contract Times, or both, as a result of such Work stoppage or such special conditions under which Work is agreed to be resumed by Contractor, either party may make a Claim therefor as provided in Paragraph 10.05.
- F. If after receipt of such written notice Contractor does not agree to resume such Work based on a reasonable belief it is unsafe, or does not agree to resume such Work under such special conditions, then Owner may order the portion of the Work that is in the area affected by such condition to be deleted from the Work. If Owner and Contractor cannot agree as to entitlement to or on the amount or extent, if any, of an adjustment in Contract Price or Contract Times as a result of deleting such portion of the Work, then either party may make a Claim therefor as provided in Paragraph 10.05. Owner may have such deleted portion of the Work performed by Owner's own forces or others in accordance with Article 7.
- G. To the fullest extent permitted by Laws and Regulations, Owner shall indemnify and hold harmless Contractor, Subcontractors, and Engineer, and the officers, directors, members, partners, employees, agents, consultants, and subcontractors of each and any of them from and against all claims, costs, losses, and damages (including but not limited to all fees and charges of engineers, architects, attorneys, and other professionals and all court or arbitration or other dispute resolution costs) arising out of or relating to a Hazardous Environmental Condition, provided that such Hazardous Environmental Condition: (i) was not shown or indicated in the Drawings or Specifications or identified in the Contract Documents to be included within the scope of the Work, and (ii) was not created by Contractor or by anyone for whom Contractor is responsible. Nothing in this Paragraph 4.06.G shall obligate Owner to indemnify any individual or entity from and against the consequences of that individual's or entity's own negligence.
- H. To the fullest extent permitted by Laws and Regulations, Contractor shall indemnify and hold harmless Owner and Engineer, and the officers, directors, members, partners, employees, agents, consultants, and subcontractors of each and any of them from and against all claims, costs, losses, and damages (including but not limited to all fees and charges of engineers, architects, attorneys, and other professionals and all court or arbitration or other dispute resolution costs) arising out of or relating to a Hazardous Environmental Condition created by Contractor or by anyone for whom Contractor is responsible. Nothing in this Paragraph 4.06.H shall obligate Contractor to indemnify any individual or entity from and against the consequences of that individual's or entity's own negligence.

- I. The provisions of Paragraphs 4.02, 4.03, and 4.04 do not apply to a Hazardous Environmental Condition uncovered or revealed at the Site.

ARTICLE 5 – BONDS AND INSURANCE

5.01 Performance, Payment, and Other Bonds

- A. Contractor shall furnish performance and payment bonds, each in an amount at least equal to the Contract Price as security for the faithful performance and payment of all of Contractor's obligations under the Contract Documents. These bonds shall remain in effect until one year after the date when final payment becomes due or until completion of the correction period specified in Paragraph 13.07, whichever is later, except as provided otherwise by Laws or Regulations or by the Contract Documents. Contractor shall also furnish such other bonds as are required by the Contract Documents.
- B. All bonds shall be in the form prescribed by the Contract Documents except as provided otherwise by Laws or Regulations, and shall be executed by such sureties as are named in the list of "Companies Holding Certificates of Authority as Acceptable Sureties on Federal Bonds and as Acceptable Reinsuring Companies" as published in Circular 570 (amended) by the Financial Management Service, Surety Bond Branch, U.S. Department of the Treasury. All bonds signed by an agent or attorney-in-fact must be accompanied by a certified copy of that individual's authority to bind the surety. The evidence of authority shall show that it is effective on the date the agent or attorney-in-fact signed each bond.
- C. If the surety on any bond furnished by Contractor is declared bankrupt or becomes insolvent or its right to do business is terminated in any state where any part of the Project is located or it ceases to meet the requirements of Paragraph 5.01.B, Contractor shall promptly notify Owner and Engineer and shall, within 20 days after the event giving rise to such notification, provide another bond and surety, both of which shall comply with the requirements of Paragraphs 5.01.B and 5.02.

5.02 Licensed Sureties and Insurers

- A. All bonds and insurance required by the Contract Documents to be purchased and maintained by Owner or Contractor shall be obtained from surety or insurance companies that are duly licensed or authorized in the jurisdiction in which the Project is located to issue bonds or insurance policies for the limits and coverages so required. Such surety and insurance companies shall also meet such additional requirements and qualifications as may be provided in the Supplementary Conditions.

5.03 Certificates of Insurance

- A. Contractor shall deliver to Owner, with copies to each additional insured and loss payee identified in the Supplementary Conditions, certificates of insurance (and other evidence of insurance requested by Owner or any other additional insured) which Contractor is required to purchase and maintain.

- B. Owner shall deliver to Contractor, with copies to each additional insured and loss payee identified in the Supplementary Conditions, certificates of insurance (and other evidence of insurance requested by Contractor or any other additional insured) which Owner is required to purchase and maintain.
- C. Failure of Owner to demand such certificates or other evidence of Contractor's full compliance with these insurance requirements or failure of Owner to identify a deficiency in compliance from the evidence provided shall not be construed as a waiver of Contractor's obligation to maintain such insurance.
- D. Owner does not represent that insurance coverage and limits established in this Contract necessarily will be adequate to protect Contractor.
- E. The insurance and insurance limits required herein shall not be deemed as a limitation on Contractor's liability under the indemnities granted to Owner in the Contract Documents.

5.04 *Contractor's Insurance*

- A. Contractor shall purchase and maintain such insurance as is appropriate for the Work being performed and as will provide protection from claims set forth below which may arise out of or result from Contractor's performance of the Work and Contractor's other obligations under the Contract Documents, whether it is to be performed by Contractor, any Subcontractor or Supplier, or by anyone directly or indirectly employed by any of them to perform any of the Work, or by anyone for whose acts any of them may be liable:
 - 1. claims under workers' compensation, disability benefits, and other similar employee benefit acts;
 - 2. claims for damages because of bodily injury, occupational sickness or disease, or death of Contractor's employees;
 - 3. claims for damages because of bodily injury, sickness or disease, or death of any person other than Contractor's employees;
 - 4. claims for damages insured by reasonably available personal injury liability coverage which are sustained:
 - a. by any person as a result of an offense directly or indirectly related to the employment of such person by Contractor, or
 - b. by any other person for any other reason;
 - 5. claims for damages, other than to the Work itself, because of injury to or destruction of tangible property wherever located, including loss of use resulting therefrom; and
 - 6. claims for damages because of bodily injury or death of any person or property damage arising out of the ownership, maintenance or use of any motor vehicle.
- B. The policies of insurance required by this Paragraph 5.04 shall:

1. with respect to insurance required by Paragraphs 5.04.A.3 through 5.04.A.6 inclusive, be written on an occurrence basis, include as additional insureds (subject to any customary exclusion regarding professional liability) Owner and Engineer, and any other individuals or entities identified in the Supplementary Conditions, all of whom shall be listed as additional insureds, and include coverage for the respective officers, directors, members, partners, employees, agents, consultants, and subcontractors of each and any of all such additional insureds, and the insurance afforded to these additional insureds shall provide primary coverage for all claims covered thereby;
2. include at least the specific coverages and be written for not less than the limits of liability provided in the Supplementary Conditions or required by Laws or Regulations, whichever is greater;
3. include contractual liability insurance covering Contractor's indemnity obligations under Paragraphs 6.11 and 6.20;
4. contain a provision or endorsement that the coverage afforded will not be canceled, materially changed or renewal refused until at least 30 days prior written notice has been given to Owner and Contractor and to each other additional insured identified in the Supplementary Conditions to whom a certificate of insurance has been issued (and the certificates of insurance furnished by the Contractor pursuant to Paragraph 5.03 will so provide);
5. remain in effect at least until final payment and at all times thereafter when Contractor may be correcting, removing, or replacing defective Work in accordance with Paragraph 13.07; and
6. include completed operations coverage:
 - a. Such insurance shall remain in effect for two years after final payment.
 - b. Contractor shall furnish Owner and each other additional insured identified in the Supplementary Conditions, to whom a certificate of insurance has been issued, evidence satisfactory to Owner and any such additional insured of continuation of such insurance at final payment and one year thereafter.

5.05 *Owner's Liability Insurance*

- A. In addition to the insurance required to be provided by Contractor under Paragraph 5.04, Owner, at Owner's option, may purchase and maintain at Owner's expense Owner's own liability insurance as will protect Owner against claims which may arise from operations under the Contract Documents.

5.06 *Property Insurance*

- A. Unless otherwise provided in the Supplementary Conditions, Owner shall purchase and maintain property insurance upon the Work at the Site in the amount of the full replacement cost thereof (subject to such deductible amounts as may be provided in the Supplementary Conditions or required by Laws and Regulations). This insurance shall:

1. include the interests of Owner, Contractor, Subcontractors, and Engineer, and any other individuals or entities identified in the Supplementary Conditions, and the officers, directors, members, partners, employees, agents, consultants, and subcontractors of each and any of them, each of whom is deemed to have an insurable interest and shall be listed as a loss payee;
 2. be written on a Builder's Risk "all-risk" policy form that shall at least include insurance for physical loss or damage to the Work, temporary buildings, falsework, and materials and equipment in transit, and shall insure against at least the following perils or causes of loss: fire, lightning, extended coverage, theft, vandalism and malicious mischief, earthquake, collapse, debris removal, demolition occasioned by enforcement of Laws and Regulations, water damage (other than that caused by flood), and such other perils or causes of loss as may be specifically required by the Supplementary Conditions.
 3. include expenses incurred in the repair or replacement of any insured property (including but not limited to fees and charges of engineers and architects);
 4. cover materials and equipment stored at the Site or at another location that was agreed to in writing by Owner prior to being incorporated in the Work, provided that such materials and equipment have been included in an Application for Payment recommended by Engineer;
 5. allow for partial utilization of the Work by Owner;
 6. include testing and startup; and
 7. be maintained in effect until final payment is made unless otherwise agreed to in writing by Owner, Contractor, and Engineer with 30 days written notice to each other loss payee to whom a certificate of insurance has been issued.
- B. Owner shall purchase and maintain such equipment breakdown insurance or additional property insurance as may be required by the Supplementary Conditions or Laws and Regulations which will include the interests of Owner, Contractor, Subcontractors, and Engineer, and any other individuals or entities identified in the Supplementary Conditions, and the officers, directors, members, partners, employees, agents, consultants and subcontractors of each and any of them, each of whom is deemed to have an insurable interest and shall be listed as a loss payee.
- C. All the policies of insurance (and the certificates or other evidence thereof) required to be purchased and maintained in accordance with this Paragraph 5.06 will contain a provision or endorsement that the coverage afforded will not be canceled or materially changed or renewal refused until at least 30 days prior written notice has been given to Owner and Contractor and to each other loss payee to whom a certificate of insurance has been issued and will contain waiver provisions in accordance with Paragraph 5.07.
- D. Owner shall not be responsible for purchasing and maintaining any property insurance specified in this Paragraph 5.06 to protect the interests of Contractor, Subcontractors, or others in the Work to the extent of any deductible amounts that are identified in the Supplementary Conditions. The risk of loss within such identified deductible amount will be borne by Contractor, Subcontractors, or others suffering any such loss, and if any of them wishes property

insurance coverage within the limits of such amounts, each may purchase and maintain it at the purchaser's own expense.

- E. If Contractor requests in writing that other special insurance be included in the property insurance policies provided under this Paragraph 5.06, Owner shall, if possible, include such insurance, and the cost thereof will be charged to Contractor by appropriate Change Order. Prior to commencement of the Work at the Site, Owner shall in writing advise Contractor whether or not such other insurance has been procured by Owner.

5.07 *Waiver of Rights*

- A. Owner and Contractor intend that all policies purchased in accordance with Paragraph 5.06 will protect Owner, Contractor, Subcontractors, and Engineer, and all other individuals or entities identified in the Supplementary Conditions as loss payees (and the officers, directors, members, partners, employees, agents, consultants, and subcontractors of each and any of them) in such policies and will provide primary coverage for all losses and damages caused by the perils or causes of loss covered thereby. All such policies shall contain provisions to the effect that in the event of payment of any loss or damage the insurers will have no rights of recovery against any of the insureds or loss payees thereunder. Owner and Contractor waive all rights against each other and their respective officers, directors, members, partners, employees, agents, consultants and subcontractors of each and any of them for all losses and damages caused by, arising out of or resulting from any of the perils or causes of loss covered by such policies and any other property insurance applicable to the Work; and, in addition, waive all such rights against Subcontractors and Engineer, and all other individuals or entities identified in the Supplementary Conditions as loss payees (and the officers, directors, members, partners, employees, agents, consultants, and subcontractors of each and any of them) under such policies for losses and damages so caused. None of the above waivers shall extend to the rights that any party making such waiver may have to the proceeds of insurance held by Owner as trustee or otherwise payable under any policy so issued.
- B. Owner waives all rights against Contractor, Subcontractors, and Engineer, and the officers, directors, members, partners, employees, agents, consultants and subcontractors of each and any of them for:
 - 1. loss due to business interruption, loss of use, or other consequential loss extending beyond direct physical loss or damage to Owner's property or the Work caused by, arising out of, or resulting from fire or other perils whether or not insured by Owner; and
 - 2. loss or damage to the completed Project or part thereof caused by, arising out of, or resulting from fire or other insured peril or cause of loss covered by any property insurance maintained on the completed Project or part thereof by Owner during partial utilization pursuant to Paragraph 14.05, after Substantial Completion pursuant to Paragraph 14.04, or after final payment pursuant to Paragraph 14.07.
- C. Any insurance policy maintained by Owner covering any loss, damage or consequential loss referred to in Paragraph 5.07.B shall contain provisions to the effect that in the event of payment of any such loss, damage, or consequential loss, the insurers will have no rights of recovery

against Contractor, Subcontractors, or Engineer, and the officers, directors, members, partners, employees, agents, consultants and subcontractors of each and any of them.

5.08 *Receipt and Application of Insurance Proceeds*

- A. Any insured loss under the policies of insurance required by Paragraph 5.06 will be adjusted with Owner and made payable to Owner as fiduciary for the loss payees, as their interests may appear, subject to the requirements of any applicable mortgage clause and of Paragraph 5.08.B. Owner shall deposit in a separate account any money so received and shall distribute it in accordance with such agreement as the parties in interest may reach. If no other special agreement is reached, the damaged Work shall be repaired or replaced, the moneys so received applied on account thereof, and the Work and the cost thereof covered by an appropriate Change Order.
- B. Owner as fiduciary shall have power to adjust and settle any loss with the insurers unless one of the parties in interest shall object in writing within 15 days after the occurrence of loss to Owner's exercise of this power. If such objection be made, Owner as fiduciary shall make settlement with the insurers in accordance with such agreement as the parties in interest may reach. If no such agreement among the parties in interest is reached, Owner as fiduciary shall adjust and settle the loss with the insurers and, if required in writing by any party in interest, Owner as fiduciary shall give bond for the proper performance of such duties.

5.09 *Acceptance of Bonds and Insurance; Option to Replace*

- A. If either Owner or Contractor has any objection to the coverage afforded by or other provisions of the bonds or insurance required to be purchased and maintained by the other party in accordance with Article 5 on the basis of non-conformance with the Contract Documents, the objecting party shall so notify the other party in writing within 10 days after receipt of the certificates (or other evidence requested) required by Paragraph 2.01.B. Owner and Contractor shall each provide to the other such additional information in respect of insurance provided as the other may reasonably request. If either party does not purchase or maintain all of the bonds and insurance required of such party by the Contract Documents, such party shall notify the other party in writing of such failure to purchase prior to the start of the Work, or of such failure to maintain prior to any change in the required coverage. Without prejudice to any other right or remedy, the other party may elect to obtain equivalent bonds or insurance to protect such other party's interests at the expense of the party who was required to provide such coverage, and a Change Order shall be issued to adjust the Contract Price accordingly.

5.10 *Partial Utilization, Acknowledgment of Property Insurer*

- A. If Owner finds it necessary to occupy or use a portion or portions of the Work prior to Substantial Completion of all the Work as provided in Paragraph 14.05, no such use or occupancy shall commence before the insurers providing the property insurance pursuant to Paragraph 5.06 have acknowledged notice thereof and in writing effected any changes in coverage necessitated thereby. The insurers providing the property insurance shall consent by endorsement on the policy or policies, but the property insurance shall not be canceled or permitted to lapse on account of any such partial use or occupancy.

ARTICLE 6 – CONTRACTOR’S RESPONSIBILITIES

6.01 *Supervision and Superintendence*

- A. Contractor shall supervise, inspect, and direct the Work competently and efficiently, devoting such attention thereto and applying such skills and expertise as may be necessary to perform the Work in accordance with the Contract Documents. Contractor shall be solely responsible for the means, methods, techniques, sequences, and procedures of construction. Contractor shall not be responsible for the negligence of Owner or Engineer in the design or specification of a specific means, method, technique, sequence, or procedure of construction which is shown or indicated in and expressly required by the Contract Documents.
- B. At all times during the progress of the Work, Contractor shall assign a competent resident superintendent who shall not be replaced without written notice to Owner and Engineer except under extraordinary circumstances.

6.02 *Labor; Working Hours*

- A. Contractor shall provide competent, suitably qualified personnel to survey and lay out the Work and perform construction as required by the Contract Documents. Contractor shall at all times maintain good discipline and order at the Site.
- B. Except as otherwise required for the safety or protection of persons or the Work or property at the Site or adjacent thereto, and except as otherwise stated in the Contract Documents, all Work at the Site shall be performed during regular working hours. Contractor will not permit the performance of Work on a Saturday, Sunday, or any legal holiday without Owner’s written consent (which will not be unreasonably withheld) given after prior written notice to Engineer.

6.03 *Services, Materials, and Equipment*

- A. Unless otherwise specified in the Contract Documents, Contractor shall provide and assume full responsibility for all services, materials, equipment, labor, transportation, construction equipment and machinery, tools, appliances, fuel, power, light, heat, telephone, water, sanitary facilities, temporary facilities, and all other facilities and incidentals necessary for the performance, testing, start-up, and completion of the Work.
- B. All materials and equipment incorporated into the Work shall be as specified or, if not specified, shall be of good quality and new, except as otherwise provided in the Contract Documents. All special warranties and guarantees required by the Specifications shall expressly run to the benefit of Owner. If required by Engineer, Contractor shall furnish satisfactory evidence (including reports of required tests) as to the source, kind, and quality of materials and equipment.
- C. All materials and equipment shall be stored, applied, installed, connected, erected, protected, used, cleaned, and conditioned in accordance with instructions of the applicable Supplier, except as otherwise may be provided in the Contract Documents.

6.04 *Progress Schedule*

- A. Contractor shall adhere to the Progress Schedule established in accordance with Paragraph 2.07 as it may be adjusted from time to time as provided below.
1. Contractor shall submit to Engineer for acceptance (to the extent indicated in Paragraph 2.07) proposed adjustments in the Progress Schedule that will not result in changing the Contract Times. Such adjustments will comply with any provisions of the General Requirements applicable thereto.
 2. Proposed adjustments in the Progress Schedule that will change the Contract Times shall be submitted in accordance with the requirements of Article 12. Adjustments in Contract Times may only be made by a Change Order.

6.05 *Substitutes and "Or-Equals"*

- A. Whenever an item of material or equipment is specified or described in the Contract Documents by using the name of a proprietary item or the name of a particular Supplier, the specification or description is intended to establish the type, function, appearance, and quality required. Unless the specification or description contains or is followed by words reading that no like, equivalent, or "or-equal" item or no substitution is permitted, other items of material or equipment or material or equipment of other Suppliers may be submitted to Engineer for review under the circumstances described below.
1. *"Or-Equal" Items:* If in Engineer's sole discretion an item of material or equipment proposed by Contractor is functionally equal to that named and sufficiently similar so that no change in related Work will be required, it may be considered by Engineer as an "or-equal" item, in which case review and approval of the proposed item may, in Engineer's sole discretion, be accomplished without compliance with some or all of the requirements for approval of proposed substitute items. For the purposes of this Paragraph 6.05.A.1, a proposed item of material or equipment will be considered functionally equal to an item so named if:
 - a. in the exercise of reasonable judgment Engineer determines that:
 - 1) it is at least equal in materials of construction, quality, durability, appearance, strength, and design characteristics;
 - 2) it will reliably perform at least equally well the function and achieve the results imposed by the design concept of the completed Project as a functioning whole; and
 - 3) it has a proven record of performance and availability of responsive service.
 - b. Contractor certifies that, if approved and incorporated into the Work:
 - 1) there will be no increase in cost to the Owner or increase in Contract Times; and
 - 2) it will conform substantially to the detailed requirements of the item named in the Contract Documents.

2. *Substitute Items:*

- a. If in Engineer's sole discretion an item of material or equipment proposed by Contractor does not qualify as an "or-equal" item under Paragraph 6.05.A.1, it will be considered a proposed substitute item.
- b. Contractor shall submit sufficient information as provided below to allow Engineer to determine if the item of material or equipment proposed is essentially equivalent to that named and an acceptable substitute therefor. Requests for review of proposed substitute items of material or equipment will not be accepted by Engineer from anyone other than Contractor.
- c. The requirements for review by Engineer will be as set forth in Paragraph 6.05.A.2.d, as supplemented by the General Requirements, and as Engineer may decide is appropriate under the circumstances.
- d. Contractor shall make written application to Engineer for review of a proposed substitute item of material or equipment that Contractor seeks to furnish or use. The application:
 - 1) shall certify that the proposed substitute item will:
 - a) perform adequately the functions and achieve the results called for by the general design,
 - b) be similar in substance to that specified, and
 - c) be suited to the same use as that specified;
 - 2) will state:
 - a) the extent, if any, to which the use of the proposed substitute item will prejudice Contractor's achievement of Substantial Completion on time,
 - b) whether use of the proposed substitute item in the Work will require a change in any of the Contract Documents (or in the provisions of any other direct contract with Owner for other work on the Project) to adapt the design to the proposed substitute item, and
 - c) whether incorporation or use of the proposed substitute item in connection with the Work is subject to payment of any license fee or royalty;
 - 3) will identify:
 - a) all variations of the proposed substitute item from that specified, and
 - b) available engineering, sales, maintenance, repair, and replacement services; and

- 4) shall contain an itemized estimate of all costs or credits that will result directly or indirectly from use of such substitute item, including costs of redesign and claims of other contractors affected by any resulting change.
- B. *Substitute Construction Methods or Procedures:* If a specific means, method, technique, sequence, or procedure of construction is expressly required by the Contract Documents, Contractor may furnish or utilize a substitute means, method, technique, sequence, or procedure of construction approved by Engineer. Contractor shall submit sufficient information to allow Engineer, in Engineer's sole discretion, to determine that the substitute proposed is equivalent to that expressly called for by the Contract Documents. The requirements for review by Engineer will be similar to those provided in Paragraph 6.05.A.2.
- C. *Engineer's Evaluation:* Engineer will be allowed a reasonable time within which to evaluate each proposal or submittal made pursuant to Paragraphs 6.05.A and 6.05.B. Engineer may require Contractor to furnish additional data about the proposed substitute item. Engineer will be the sole judge of acceptability. No "or equal" or substitute will be ordered, installed or utilized until Engineer's review is complete, which will be evidenced by a Change Order in the case of a substitute and an approved Shop Drawing for an "or equal." Engineer will advise Contractor in writing of any negative determination.
- D. *Special Guarantee:* Owner may require Contractor to furnish at Contractor's expense a special performance guarantee or other surety with respect to any substitute.
- E. *Engineer's Cost Reimbursement:* Engineer will record Engineer's costs in evaluating a substitute proposed or submitted by Contractor pursuant to Paragraphs 6.05.A.2 and 6.05.B. Whether or not Engineer approves a substitute so proposed or submitted by Contractor, Contractor shall reimburse Owner for the reasonable charges of Engineer for evaluating each such proposed substitute. Contractor shall also reimburse Owner for the reasonable charges of Engineer for making changes in the Contract Documents (or in the provisions of any other direct contract with Owner) resulting from the acceptance of each proposed substitute.
- F. *Contractor's Expense:* Contractor shall provide all data in support of any proposed substitute or "or-equal" at Contractor's expense.

6.06 *Concerning Subcontractors, Suppliers, and Others*

- A. Contractor shall not employ any Subcontractor, Supplier, or other individual or entity (including those acceptable to Owner as indicated in Paragraph 6.06.B), whether initially or as a replacement, against whom Owner may have reasonable objection. Contractor shall not be required to employ any Subcontractor, Supplier, or other individual or entity to furnish or perform any of the Work against whom Contractor has reasonable objection.
- B. If the Supplementary Conditions require the identity of certain Subcontractors, Suppliers, or other individuals or entities to be submitted to Owner in advance for acceptance by Owner by a specified date prior to the Effective Date of the Agreement, and if Contractor has submitted a list thereof in accordance with the Supplementary Conditions, Owner's acceptance (either in writing or by failing to make written objection thereto by the date indicated for acceptance or objection in the Bidding Documents or the Contract Documents) of any such Subcontractor, Supplier, or

other individual or entity so identified may be revoked on the basis of reasonable objection after due investigation. Contractor shall submit an acceptable replacement for the rejected Subcontractor, Supplier, or other individual or entity, and the Contract Price will be adjusted by the difference in the cost occasioned by such replacement, and an appropriate Change Order will be issued. No acceptance by Owner of any such Subcontractor, Supplier, or other individual or entity, whether initially or as a replacement, shall constitute a waiver of any right of Owner or Engineer to reject defective Work.

- C. Contractor shall be fully responsible to Owner and Engineer for all acts and omissions of the Subcontractors, Suppliers, and other individuals or entities performing or furnishing any of the Work just as Contractor is responsible for Contractor's own acts and omissions. Nothing in the Contract Documents:
1. shall create for the benefit of any such Subcontractor, Supplier, or other individual or entity any contractual relationship between Owner or Engineer and any such Subcontractor, Supplier or other individual or entity; nor
 2. shall create any obligation on the part of Owner or Engineer to pay or to see to the payment of any moneys due any such Subcontractor, Supplier, or other individual or entity except as may otherwise be required by Laws and Regulations.
- D. Contractor shall be solely responsible for scheduling and coordinating the Work of Subcontractors, Suppliers, and other individuals or entities performing or furnishing any of the Work under a direct or indirect contract with Contractor.
- E. Contractor shall require all Subcontractors, Suppliers, and such other individuals or entities performing or furnishing any of the Work to communicate with Engineer through Contractor.
- F. The divisions and sections of the Specifications and the identifications of any Drawings shall not control Contractor in dividing the Work among Subcontractors or Suppliers or delineating the Work to be performed by any specific trade.
- G. All Work performed for Contractor by a Subcontractor or Supplier will be pursuant to an appropriate agreement between Contractor and the Subcontractor or Supplier which specifically binds the Subcontractor or Supplier to the applicable terms and conditions of the Contract Documents for the benefit of Owner and Engineer. Whenever any such agreement is with a Subcontractor or Supplier who is listed as a loss payee on the property insurance provided in Paragraph 5.06, the agreement between the Contractor and the Subcontractor or Supplier will contain provisions whereby the Subcontractor or Supplier waives all rights against Owner, Contractor, Engineer, and all other individuals or entities identified in the Supplementary Conditions to be listed as insureds or loss payees (and the officers, directors, members, partners, employees, agents, consultants, and subcontractors of each and any of them) for all losses and damages caused by, arising out of, relating to, or resulting from any of the perils or causes of loss covered by such policies and any other property insurance applicable to the Work. If the insurers on any such policies require separate waiver forms to be signed by any Subcontractor or Supplier, Contractor will obtain the same.

6.07 *Patent Fees and Royalties*

- A. Contractor shall pay all license fees and royalties and assume all costs incident to the use in the performance of the Work or the incorporation in the Work of any invention, design, process, product, or device which is the subject of patent rights or copyrights held by others. If a particular invention, design, process, product, or device is specified in the Contract Documents for use in the performance of the Work and if, to the actual knowledge of Owner or Engineer, its use is subject to patent rights or copyrights calling for the payment of any license fee or royalty to others, the existence of such rights shall be disclosed by Owner in the Contract Documents.
- B. To the fullest extent permitted by Laws and Regulations, Owner shall indemnify and hold harmless Contractor, and its officers, directors, members, partners, employees, agents, consultants, and subcontractors from and against all claims, costs, losses, and damages (including but not limited to all fees and charges of engineers, architects, attorneys, and other professionals, and all court or arbitration or other dispute resolution costs) arising out of or relating to any infringement of patent rights or copyrights incident to the use in the performance of the Work or resulting from the incorporation in the Work of any invention, design, process, product, or device specified in the Contract Documents, but not identified as being subject to payment of any license fee or royalty to others required by patent rights or copyrights.
- C. To the fullest extent permitted by Laws and Regulations, Contractor shall indemnify and hold harmless Owner and Engineer, and the officers, directors, members, partners, employees, agents, consultants and subcontractors of each and any of them from and against all claims, costs, losses, and damages (including but not limited to all fees and charges of engineers, architects, attorneys, and other professionals and all court or arbitration or other dispute resolution costs) arising out of or relating to any infringement of patent rights or copyrights incident to the use in the performance of the Work or resulting from the incorporation in the Work of any invention, design, process, product, or device not specified in the Contract Documents.

6.08 *Permits*

- A. Unless otherwise provided in the Supplementary Conditions, Contractor shall obtain and pay for all construction permits and licenses. Owner shall assist Contractor, when necessary, in obtaining such permits and licenses. Contractor shall pay all governmental charges and inspection fees necessary for the prosecution of the Work which are applicable at the time of opening of Bids, or, if there are no Bids, on the Effective Date of the Agreement. Owner shall pay all charges of utility owners for connections for providing permanent service to the Work.

6.09 *Laws and Regulations*

- A. Contractor shall give all notices required by and shall comply with all Laws and Regulations applicable to the performance of the Work. Except where otherwise expressly required by applicable Laws and Regulations, neither Owner nor Engineer shall be responsible for monitoring Contractor's compliance with any Laws or Regulations.
- B. If Contractor performs any Work knowing or having reason to know that it is contrary to Laws or Regulations, Contractor shall bear all claims, costs, losses, and damages (including but not limited to all fees and charges of engineers, architects, attorneys, and other professionals and all

court or arbitration or other dispute resolution costs) arising out of or relating to such Work. However, it shall not be Contractor's responsibility to make certain that the Specifications and Drawings are in accordance with Laws and Regulations, but this shall not relieve Contractor of Contractor's obligations under Paragraph 3.03.

- C. Changes in Laws or Regulations not known at the time of opening of Bids (or, on the Effective Date of the Agreement if there were no Bids) having an effect on the cost or time of performance of the Work shall be the subject of an adjustment in Contract Price or Contract Times. If Owner and Contractor are unable to agree on entitlement to or on the amount or extent, if any, of any such adjustment, a Claim may be made therefor as provided in Paragraph 10.05.

6.10 *Taxes*

- A. Contractor shall pay all sales, consumer, use, and other similar taxes required to be paid by Contractor in accordance with the Laws and Regulations of the place of the Project which are applicable during the performance of the Work.

6.11 *Use of Site and Other Areas*

A. *Limitation on Use of Site and Other Areas:*

1. Contractor shall confine construction equipment, the storage of materials and equipment, and the operations of workers to the Site and other areas permitted by Laws and Regulations, and shall not unreasonably encumber the Site and other areas with construction equipment or other materials or equipment. Contractor shall assume full responsibility for any damage to any such land or area, or to the owner or occupant thereof, or of any adjacent land or areas resulting from the performance of the Work.
2. Should any claim be made by any such owner or occupant because of the performance of the Work, Contractor shall promptly settle with such other party by negotiation or otherwise resolve the claim by arbitration or other dispute resolution proceeding or at law.
3. To the fullest extent permitted by Laws and Regulations, Contractor shall indemnify and hold harmless Owner and Engineer, and the officers, directors, members, partners, employees, agents, consultants and subcontractors of each and any of them from and against all claims, costs, losses, and damages (including but not limited to all fees and charges of engineers, architects, attorneys, and other professionals and all court or arbitration or other dispute resolution costs) arising out of or relating to any claim or action, legal or equitable, brought by any such owner or occupant against Owner, Engineer, or any other party indemnified hereunder to the extent caused by or based upon Contractor's performance of the Work.

- B. *Removal of Debris During Performance of the Work:* During the progress of the Work Contractor shall keep the Site and other areas free from accumulations of waste materials, rubbish, and other debris. Removal and disposal of such waste materials, rubbish, and other debris shall conform to applicable Laws and Regulations.

- C. *Cleaning:* Prior to Substantial Completion of the Work Contractor shall clean the Site and the Work and make it ready for utilization by Owner. At the completion of the Work Contractor

shall remove from the Site all tools, appliances, construction equipment and machinery, and surplus materials and shall restore to original condition all property not designated for alteration by the Contract Documents.

- D. *Loading Structures:* Contractor shall not load nor permit any part of any structure to be loaded in any manner that will endanger the structure, nor shall Contractor subject any part of the Work or adjacent property to stresses or pressures that will endanger it.

6.12 *Record Documents*

- A. Contractor shall maintain in a safe place at the Site one record copy of all Drawings, Specifications, Addenda, Change Orders, Work Change Directives, Field Orders, and written interpretations and clarifications in good order and annotated to show changes made during construction. These record documents together with all approved Samples and a counterpart of all approved Shop Drawings will be available to Engineer for reference. Upon completion of the Work, these record documents, Samples, and Shop Drawings will be delivered to Engineer for Owner.

6.13 *Safety and Protection*

- A. Contractor shall be solely responsible for initiating, maintaining and supervising all safety precautions and programs in connection with the Work. Such responsibility does not relieve Subcontractors of their responsibility for the safety of persons or property in the performance of their work, nor for compliance with applicable safety Laws and Regulations. Contractor shall take all necessary precautions for the safety of, and shall provide the necessary protection to prevent damage, injury or loss to:
1. all persons on the Site or who may be affected by the Work;
 2. all the Work and materials and equipment to be incorporated therein, whether in storage on or off the Site; and
 3. other property at the Site or adjacent thereto, including trees, shrubs, lawns, walks, pavements, roadways, structures, utilities, and Underground Facilities not designated for removal, relocation, or replacement in the course of construction.
- B. Contractor shall comply with all applicable Laws and Regulations relating to the safety of persons or property, or to the protection of persons or property from damage, injury, or loss; and shall erect and maintain all necessary safeguards for such safety and protection. Contractor shall notify owners of adjacent property and of Underground Facilities and other utility owners when prosecution of the Work may affect them, and shall cooperate with them in the protection, removal, relocation, and replacement of their property.
- C. Contractor shall comply with the applicable requirements of Owner's safety programs, if any. The Supplementary Conditions identify any Owner's safety programs that are applicable to the Work.

- D. Contractor shall inform Owner and Engineer of the specific requirements of Contractor's safety program with which Owner's and Engineer's employees and representatives must comply while at the Site.
- E. All damage, injury, or loss to any property referred to in Paragraph 6.13.A.2 or 6.13.A.3 caused, directly or indirectly, in whole or in part, by Contractor, any Subcontractor, Supplier, or any other individual or entity directly or indirectly employed by any of them to perform any of the Work, or anyone for whose acts any of them may be liable, shall be remedied by Contractor (except damage or loss attributable to the fault of Drawings or Specifications or to the acts or omissions of Owner or Engineer or anyone employed by any of them, or anyone for whose acts any of them may be liable, and not attributable, directly or indirectly, in whole or in part, to the fault or negligence of Contractor or any Subcontractor, Supplier, or other individual or entity directly or indirectly employed by any of them).
- F. Contractor's duties and responsibilities for safety and for protection of the Work shall continue until such time as all the Work is completed and Engineer has issued a notice to Owner and Contractor in accordance with Paragraph 14.07.B that the Work is acceptable (except as otherwise expressly provided in connection with Substantial Completion).

6.14 *Safety Representative*

- A. Contractor shall designate a qualified and experienced safety representative at the Site whose duties and responsibilities shall be the prevention of accidents and the maintaining and supervising of safety precautions and programs.

6.15 *Hazard Communication Programs*

- A. Contractor shall be responsible for coordinating any exchange of material safety data sheets or other hazard communication information required to be made available to or exchanged between or among employers at the Site in accordance with Laws or Regulations.

6.16 *Emergencies*

- A. In emergencies affecting the safety or protection of persons or the Work or property at the Site or adjacent thereto, Contractor is obligated to act to prevent threatened damage, injury, or loss. Contractor shall give Engineer prompt written notice if Contractor believes that any significant changes in the Work or variations from the Contract Documents have been caused thereby or are required as a result thereof. If Engineer determines that a change in the Contract Documents is required because of the action taken by Contractor in response to such an emergency, a Work Change Directive or Change Order will be issued.

6.17 *Shop Drawings and Samples*

- A. Contractor shall submit Shop Drawings and Samples to Engineer for review and approval in accordance with the accepted Schedule of Submittals (as required by Paragraph 2.07). Each submittal will be identified as Engineer may require.

1. *Shop Drawings:*
 - a. Submit number of copies specified in the General Requirements.
 - b. Data shown on the Shop Drawings will be complete with respect to quantities, dimensions, specified performance and design criteria, materials, and similar data to show Engineer the services, materials, and equipment Contractor proposes to provide and to enable Engineer to review the information for the limited purposes required by Paragraph 6.17.D.
 2. *Samples:*
 - a. Submit number of Samples specified in the Specifications.
 - b. Clearly identify each Sample as to material, Supplier, pertinent data such as catalog numbers, the use for which intended and other data as Engineer may require to enable Engineer to review the submittal for the limited purposes required by Paragraph 6.17.D.
- B. Where a Shop Drawing or Sample is required by the Contract Documents or the Schedule of Submittals, any related Work performed prior to Engineer's review and approval of the pertinent submittal will be at the sole expense and responsibility of Contractor.
- C. *Submittal Procedures:*
1. Before submitting each Shop Drawing or Sample, Contractor shall have:
 - a. reviewed and coordinated each Shop Drawing or Sample with other Shop Drawings and Samples and with the requirements of the Work and the Contract Documents;
 - b. determined and verified all field measurements, quantities, dimensions, specified performance and design criteria, installation requirements, materials, catalog numbers, and similar information with respect thereto;
 - c. determined and verified the suitability of all materials offered with respect to the indicated application, fabrication, shipping, handling, storage, assembly, and installation pertaining to the performance of the Work; and
 - d. determined and verified all information relative to Contractor's responsibilities for means, methods, techniques, sequences, and procedures of construction, and safety precautions and programs incident thereto.
 2. Each submittal shall bear a stamp or specific written certification that Contractor has satisfied Contractor's obligations under the Contract Documents with respect to Contractor's review and approval of that submittal.
 3. With each submittal, Contractor shall give Engineer specific written notice of any variations that the Shop Drawing or Sample may have from the requirements of the Contract Documents. This notice shall be both a written communication separate from the Shop

Drawings or Sample submittal; and, in addition, by a specific notation made on each Shop Drawing or Sample submitted to Engineer for review and approval of each such variation.

D. *Engineer's Review:*

1. Engineer will provide timely review of Shop Drawings and Samples in accordance with the Schedule of Submittals acceptable to Engineer. Engineer's review and approval will be only to determine if the items covered by the submittals will, after installation or incorporation in the Work, conform to the information given in the Contract Documents and be compatible with the design concept of the completed Project as a functioning whole as indicated by the Contract Documents.
2. Engineer's review and approval will not extend to means, methods, techniques, sequences, or procedures of construction (except where a particular means, method, technique, sequence, or procedure of construction is specifically and expressly called for by the Contract Documents) or to safety precautions or programs incident thereto. The review and approval of a separate item as such will not indicate approval of the assembly in which the item functions.
3. Engineer's review and approval shall not relieve Contractor from responsibility for any variation from the requirements of the Contract Documents unless Contractor has complied with the requirements of Paragraph 6.17.C.3 and Engineer has given written approval of each such variation by specific written notation thereof incorporated in or accompanying the Shop Drawing or Sample. Engineer's review and approval shall not relieve Contractor from responsibility for complying with the requirements of Paragraph 6.17.C.1.

E. *Resubmittal Procedures:*

1. Contractor shall make corrections required by Engineer and shall return the required number of corrected copies of Shop Drawings and submit, as required, new Samples for review and approval. Contractor shall direct specific attention in writing to revisions other than the corrections called for by Engineer on previous submittals.

6.18 *Continuing the Work*

- A. Contractor shall carry on the Work and adhere to the Progress Schedule during all disputes or disagreements with Owner. No Work shall be delayed or postponed pending resolution of any disputes or disagreements, except as permitted by Paragraph 15.04 or as Owner and Contractor may otherwise agree in writing.

6.19 *Contractor's General Warranty and Guarantee*

- A. Contractor warrants and guarantees to Owner that all Work will be in accordance with the Contract Documents and will not be defective. Engineer and its officers, directors, members, partners, employees, agents, consultants, and subcontractors shall be entitled to rely on representation of Contractor's warranty and guarantee.
- B. Contractor's warranty and guarantee hereunder excludes defects or damage caused by:

1. abuse, modification, or improper maintenance or operation by persons other than Contractor, Subcontractors, Suppliers, or any other individual or entity for whom Contractor is responsible; or
 2. normal wear and tear under normal usage.
- C. Contractor's obligation to perform and complete the Work in accordance with the Contract Documents shall be absolute. None of the following will constitute an acceptance of Work that is not in accordance with the Contract Documents or a release of Contractor's obligation to perform the Work in accordance with the Contract Documents:
1. observations by Engineer;
 2. recommendation by Engineer or payment by Owner of any progress or final payment;
 3. the issuance of a certificate of Substantial Completion by Engineer or any payment related thereto by Owner;
 4. use or occupancy of the Work or any part thereof by Owner;
 5. any review and approval of a Shop Drawing or Sample submittal or the issuance of a notice of acceptability by Engineer;
 6. any inspection, test, or approval by others; or
 7. any correction of defective Work by Owner.

6.20 *Indemnification*

- A. To the fullest extent permitted by Laws and Regulations, Contractor shall indemnify and hold harmless Owner and Engineer, and the officers, directors, members, partners, employees, agents, consultants and subcontractors of each and any of them from and against all claims, costs, losses, and damages (including but not limited to all fees and charges of engineers, architects, attorneys, and other professionals and all court or arbitration or other dispute resolution costs) arising out of or relating to the performance of the Work, provided that any such claim, cost, loss, or damage is attributable to bodily injury, sickness, disease, or death, or to injury to or destruction of tangible property (other than the Work itself), including the loss of use resulting therefrom but only to the extent caused by any negligent act or omission of Contractor, any Subcontractor, any Supplier, or any individual or entity directly or indirectly employed by any of them to perform any of the Work or anyone for whose acts any of them may be liable .
- B. In any and all claims against Owner or Engineer or any of their officers, directors, members, partners, employees, agents, consultants, or subcontractors by any employee (or the survivor or personal representative of such employee) of Contractor, any Subcontractor, any Supplier, or any individual or entity directly or indirectly employed by any of them to perform any of the Work, or anyone for whose acts any of them may be liable, the indemnification obligation under Paragraph 6.20.A shall not be limited in any way by any limitation on the amount or type of damages, compensation, or benefits payable by or for Contractor or any such Subcontractor,

Supplier, or other individual or entity under workers' compensation acts, disability benefit acts, or other employee benefit acts.

- C. The indemnification obligations of Contractor under Paragraph 6.20.A shall not extend to the liability of Engineer and Engineer's officers, directors, members, partners, employees, agents, consultants and subcontractors arising out of:
 - 1. the preparation or approval of, or the failure to prepare or approve maps, Drawings, opinions, reports, surveys, Change Orders, designs, or Specifications; or
 - 2. giving directions or instructions, or failing to give them, if that is the primary cause of the injury or damage.

6.21 *Delegation of Professional Design Services*

- A. Contractor will not be required to provide professional design services unless such services are specifically required by the Contract Documents for a portion of the Work or unless such services are required to carry out Contractor's responsibilities for construction means, methods, techniques, sequences and procedures. Contractor shall not be required to provide professional services in violation of applicable law.
- B. If professional design services or certifications by a design professional related to systems, materials or equipment are specifically required of Contractor by the Contract Documents, Owner and Engineer will specify all performance and design criteria that such services must satisfy. Contractor shall cause such services or certifications to be provided by a properly licensed professional, whose signature and seal shall appear on all drawings, calculations, specifications, certifications, Shop Drawings and other submittals prepared by such professional. Shop Drawings and other submittals related to the Work designed or certified by such professional, if prepared by others, shall bear such professional's written approval when submitted to Engineer.
- C. Owner and Engineer shall be entitled to rely upon the adequacy, accuracy and completeness of the services, certifications or approvals performed by such design professionals, provided Owner and Engineer have specified to Contractor all performance and design criteria that such services must satisfy.
- D. Pursuant to this Paragraph 6.21, Engineer's review and approval of design calculations and design drawings will be only for the limited purpose of checking for conformance with performance and design criteria given and the design concept expressed in the Contract Documents. Engineer's review and approval of Shop Drawings and other submittals (except design calculations and design drawings) will be only for the purpose stated in Paragraph 6.17.D.1.
- E. Contractor shall not be responsible for the adequacy of the performance or design criteria required by the Contract Documents.

ARTICLE 7 – OTHER WORK AT THE SITE

7.01 *Related Work at Site*

- A. Owner may perform other work related to the Project at the Site with Owner's employees, or through other direct contracts therefor, or have other work performed by utility owners. If such other work is not noted in the Contract Documents, then:
1. written notice thereof will be given to Contractor prior to starting any such other work; and
 2. if Owner and Contractor are unable to agree on entitlement to or on the amount or extent, if any, of any adjustment in the Contract Price or Contract Times that should be allowed as a result of such other work, a Claim may be made therefor as provided in Paragraph 10.05.
- B. Contractor shall afford each other contractor who is a party to such a direct contract, each utility owner, and Owner, if Owner is performing other work with Owner's employees, proper and safe access to the Site, provide a reasonable opportunity for the introduction and storage of materials and equipment and the execution of such other work, and properly coordinate the Work with theirs. Contractor shall do all cutting, fitting, and patching of the Work that may be required to properly connect or otherwise make its several parts come together and properly integrate with such other work. Contractor shall not endanger any work of others by cutting, excavating, or otherwise altering such work; provided, however, that Contractor may cut or alter others' work with the written consent of Engineer and the others whose work will be affected. The duties and responsibilities of Contractor under this Paragraph are for the benefit of such utility owners and other contractors to the extent that there are comparable provisions for the benefit of Contractor in said direct contracts between Owner and such utility owners and other contractors.
- C. If the proper execution or results of any part of Contractor's Work depends upon work performed by others under this Article 7, Contractor shall inspect such other work and promptly report to Engineer in writing any delays, defects, or deficiencies in such other work that render it unavailable or unsuitable for the proper execution and results of Contractor's Work. Contractor's failure to so report will constitute an acceptance of such other work as fit and proper for integration with Contractor's Work except for latent defects and deficiencies in such other work.

7.02 *Coordination*

- A. If Owner intends to contract with others for the performance of other work on the Project at the Site, the following will be set forth in Supplementary Conditions:
1. the individual or entity who will have authority and responsibility for coordination of the activities among the various contractors will be identified;
 2. the specific matters to be covered by such authority and responsibility will be itemized; and
 3. the extent of such authority and responsibilities will be provided.
- B. Unless otherwise provided in the Supplementary Conditions, Owner shall have sole authority and responsibility for such coordination.

7.03 *Legal Relationships*

- A. Paragraphs 7.01.A and 7.02 are not applicable for utilities not under the control of Owner.
- B. Each other direct contract of Owner under Paragraph 7.01.A shall provide that the other contractor is liable to Owner and Contractor for the reasonable direct delay and disruption costs incurred by Contractor as a result of the other contractor's wrongful actions or inactions.
- C. Contractor shall be liable to Owner and any other contractor under direct contract to Owner for the reasonable direct delay and disruption costs incurred by such other contractor as a result of Contractor's wrongful action or inactions.

ARTICLE 8 – OWNER'S RESPONSIBILITIES

8.01 *Communications to Contractor*

- A. Except as otherwise provided in these General Conditions, Owner shall issue all communications to Contractor through Engineer.

8.02 *Replacement of Engineer*

- A. In case of termination of the employment of Engineer, Owner shall appoint an engineer to whom Contractor makes no reasonable objection, whose status under the Contract Documents shall be that of the former Engineer.

8.03 *Furnish Data*

- A. Owner shall promptly furnish the data required of Owner under the Contract Documents.

8.04 *Pay When Due*

- A. Owner shall make payments to Contractor when they are due as provided in Paragraphs 14.02.C and 14.07.C.

8.05 *Lands and Easements; Reports and Tests*

- A. Owner's duties with respect to providing lands and easements and providing engineering surveys to establish reference points are set forth in Paragraphs 4.01 and 4.05. Paragraph 4.02 refers to Owner's identifying and making available to Contractor copies of reports of explorations and tests of subsurface conditions and drawings of physical conditions relating to existing surface or subsurface structures at the Site.

8.06 *Insurance*

- A. Owner's responsibilities, if any, with respect to purchasing and maintaining liability and property insurance are set forth in Article 5.

8.07 *Change Orders*

- A. Owner is obligated to execute Change Orders as indicated in Paragraph 10.03.

8.08 *Inspections, Tests, and Approvals*

- A. Owner's responsibility with respect to certain inspections, tests, and approvals is set forth in Paragraph 13.03.B.

8.09 *Limitations on Owner's Responsibilities*

- A. The Owner shall not supervise, direct, or have control or authority over, nor be responsible for, Contractor's means, methods, techniques, sequences, or procedures of construction, or the safety precautions and programs incident thereto, or for any failure of Contractor to comply with Laws and Regulations applicable to the performance of the Work. Owner will not be responsible for Contractor's failure to perform the Work in accordance with the Contract Documents.

8.10 *Undisclosed Hazardous Environmental Condition*

- A. Owner's responsibility in respect to an undisclosed Hazardous Environmental Condition is set forth in Paragraph 4.06.

8.11 *Evidence of Financial Arrangements*

- A. Upon request of Contractor, Owner shall furnish Contractor reasonable evidence that financial arrangements have been made to satisfy Owner's obligations under the Contract Documents.

8.12 *Compliance with Safety Program*

- A. While at the Site, Owner's employees and representatives shall comply with the specific applicable requirements of Contractor's safety programs of which Owner has been informed pursuant to Paragraph 6.13.D.

ARTICLE 9 – ENGINEER'S STATUS DURING CONSTRUCTION

9.01 *Owner's Representative*

- A. Engineer will be Owner's representative during the construction period. The duties and responsibilities and the limitations of authority of Engineer as Owner's representative during construction are set forth in the Contract Documents.

9.02 *Visits to Site*

- A. Engineer will make visits to the Site at intervals appropriate to the various stages of construction as Engineer deems necessary in order to observe as an experienced and qualified design professional the progress that has been made and the quality of the various aspects of Contractor's executed Work. Based on information obtained during such visits and observations, Engineer, for the benefit of Owner, will determine, in general, if the Work is proceeding in accordance with the Contract Documents. Engineer will not be required to make exhaustive or continuous inspections on the Site to check the quality or quantity of the Work. Engineer's efforts will be directed toward providing for Owner a greater degree of confidence that the completed Work will conform generally to the Contract Documents. On the basis of such visits

and observations, Engineer will keep Owner informed of the progress of the Work and will endeavor to guard Owner against defective Work.

- B. Engineer's visits and observations are subject to all the limitations on Engineer's authority and responsibility set forth in Paragraph 9.09. Particularly, but without limitation, during or as a result of Engineer's visits or observations of Contractor's Work, Engineer will not supervise, direct, control, or have authority over or be responsible for Contractor's means, methods, techniques, sequences, or procedures of construction, or the safety precautions and programs incident thereto, or for any failure of Contractor to comply with Laws and Regulations applicable to the performance of the Work.

9.03 *Project Representative*

- A. If Owner and Engineer agree, Engineer will furnish a Resident Project Representative to assist Engineer in providing more extensive observation of the Work. The authority and responsibilities of any such Resident Project Representative and assistants will be as provided in the Supplementary Conditions, and limitations on the responsibilities thereof will be as provided in Paragraph 9.09. If Owner designates another representative or agent to represent Owner at the Site who is not Engineer's consultant, agent or employee, the responsibilities and authority and limitations thereon of such other individual or entity will be as provided in the Supplementary Conditions.

9.04 *Authorized Variations in Work*

- A. Engineer may authorize minor variations in the Work from the requirements of the Contract Documents which do not involve an adjustment in the Contract Price or the Contract Times and are compatible with the design concept of the completed Project as a functioning whole as indicated by the Contract Documents. These may be accomplished by a Field Order and will be binding on Owner and also on Contractor, who shall perform the Work involved promptly. If Owner or Contractor believes that a Field Order justifies an adjustment in the Contract Price or Contract Times, or both, and the parties are unable to agree on entitlement to or on the amount or extent, if any, of any such adjustment, a Claim may be made therefor as provided in Paragraph 10.05.

9.05 *Rejecting Defective Work*

- A. Engineer will have authority to reject Work which Engineer believes to be defective, or that Engineer believes will not produce a completed Project that conforms to the Contract Documents or that will prejudice the integrity of the design concept of the completed Project as a functioning whole as indicated by the Contract Documents. Engineer will also have authority to require special inspection or testing of the Work as provided in Paragraph 13.04, whether or not the Work is fabricated, installed, or completed.

9.06 *Shop Drawings, Change Orders and Payments*

- A. In connection with Engineer's authority, and limitations thereof, as to Shop Drawings and Samples, see Paragraph 6.17.

- B. In connection with Engineer's authority, and limitations thereof, as to design calculations and design drawings submitted in response to a delegation of professional design services, if any, see Paragraph 6.21.
- C. In connection with Engineer's authority as to Change Orders, see Articles 10, 11, and 12.
- D. In connection with Engineer's authority as to Applications for Payment, see Article 14.

9.07 *Determinations for Unit Price Work*

- A. Engineer will determine the actual quantities and classifications of Unit Price Work performed by Contractor. Engineer will review with Contractor the Engineer's preliminary determinations on such matters before rendering a written decision thereon (by recommendation of an Application for Payment or otherwise). Engineer's written decision thereon will be final and binding (except as modified by Engineer to reflect changed factual conditions or more accurate data) upon Owner and Contractor, subject to the provisions of Paragraph 10.05.

9.08 *Decisions on Requirements of Contract Documents and Acceptability of Work*

- A. Engineer will be the initial interpreter of the requirements of the Contract Documents and judge of the acceptability of the Work thereunder. All matters in question and other matters between Owner and Contractor arising prior to the date final payment is due relating to the acceptability of the Work, and the interpretation of the requirements of the Contract Documents pertaining to the performance of the Work, will be referred initially to Engineer in writing within 30 days of the event giving rise to the question.
- B. Engineer will, with reasonable promptness, render a written decision on the issue referred. If Owner or Contractor believes that any such decision entitles them to an adjustment in the Contract Price or Contract Times or both, a Claim may be made under Paragraph 10.05. The date of Engineer's decision shall be the date of the event giving rise to the issues referenced for the purposes of Paragraph 10.05.B.
- C. Engineer's written decision on the issue referred will be final and binding on Owner and Contractor, subject to the provisions of Paragraph 10.05.
- D. When functioning as interpreter and judge under this Paragraph 9.08, Engineer will not show partiality to Owner or Contractor and will not be liable in connection with any interpretation or decision rendered in good faith in such capacity.

9.09 *Limitations on Engineer's Authority and Responsibilities*

- A. Neither Engineer's authority or responsibility under this Article 9 or under any other provision of the Contract Documents nor any decision made by Engineer in good faith either to exercise or not exercise such authority or responsibility or the undertaking, exercise, or performance of any authority or responsibility by Engineer shall create, impose, or give rise to any duty in contract, tort, or otherwise owed by Engineer to Contractor, any Subcontractor, any Supplier, any other individual or entity, or to any surety for or employee or agent of any of them.

- B. Engineer will not supervise, direct, control, or have authority over or be responsible for Contractor's means, methods, techniques, sequences, or procedures of construction, or the safety precautions and programs incident thereto, or for any failure of Contractor to comply with Laws and Regulations applicable to the performance of the Work. Engineer will not be responsible for Contractor's failure to perform the Work in accordance with the Contract Documents.
- C. Engineer will not be responsible for the acts or omissions of Contractor or of any Subcontractor, any Supplier, or of any other individual or entity performing any of the Work.
- D. Engineer's review of the final Application for Payment and accompanying documentation and all maintenance and operating instructions, schedules, guarantees, bonds, certificates of inspection, tests and approvals, and other documentation required to be delivered by Paragraph 14.07.A will only be to determine generally that their content complies with the requirements of, and in the case of certificates of inspections, tests, and approvals that the results certified indicate compliance with, the Contract Documents.
- E. The limitations upon authority and responsibility set forth in this Paragraph 9.09 shall also apply to the Resident Project Representative, if any, and assistants, if any.

9.10 *Compliance with Safety Program*

- A. While at the Site, Engineer's employees and representatives shall comply with the specific applicable requirements of Contractor's safety programs of which Engineer has been informed pursuant to Paragraph 6.13.D.

ARTICLE 10 – CHANGES IN THE WORK; CLAIMS

10.01 *Authorized Changes in the Work*

- A. Without invalidating the Contract and without notice to any surety, Owner may, at any time or from time to time, order additions, deletions, or revisions in the Work by a Change Order, or a Work Change Directive. Upon receipt of any such document, Contractor shall promptly proceed with the Work involved which will be performed under the applicable conditions of the Contract Documents (except as otherwise specifically provided).
- B. If Owner and Contractor are unable to agree on entitlement to, or on the amount or extent, if any, of an adjustment in the Contract Price or Contract Times, or both, that should be allowed as a result of a Work Change Directive, a Claim may be made therefor as provided in Paragraph 10.05.

10.02 *Unauthorized Changes in the Work*

- A. Contractor shall not be entitled to an increase in the Contract Price or an extension of the Contract Times with respect to any work performed that is not required by the Contract Documents as amended, modified, or supplemented as provided in Paragraph 3.04, except in the case of an emergency as provided in Paragraph 6.16 or in the case of uncovering Work as provided in Paragraph 13.04.D.

10.03 *Execution of Change Orders*

- A. Owner and Contractor shall execute appropriate Change Orders recommended by Engineer covering:
1. changes in the Work which are: (i) ordered by Owner pursuant to Paragraph 10.01.A, (ii) required because of acceptance of defective Work under Paragraph 13.08.A or Owner's correction of defective Work under Paragraph 13.09, or (iii) agreed to by the parties;
 2. changes in the Contract Price or Contract Times which are agreed to by the parties, including any undisputed sum or amount of time for Work actually performed in accordance with a Work Change Directive; and
 3. changes in the Contract Price or Contract Times which embody the substance of any written decision rendered by Engineer pursuant to Paragraph 10.05; provided that, in lieu of executing any such Change Order, an appeal may be taken from any such decision in accordance with the provisions of the Contract Documents and applicable Laws and Regulations, but during any such appeal, Contractor shall carry on the Work and adhere to the Progress Schedule as provided in Paragraph 6.18.A.

10.04 *Notification to Surety*

- A. If the provisions of any bond require notice to be given to a surety of any change affecting the general scope of the Work or the provisions of the Contract Documents (including, but not limited to, Contract Price or Contract Times), the giving of any such notice will be Contractor's responsibility. The amount of each applicable bond will be adjusted to reflect the effect of any such change.

10.05 *Claims*

- A. *Engineer's Decision Required:* All Claims, except those waived pursuant to Paragraph 14.09, shall be referred to the Engineer for decision. A decision by Engineer shall be required as a condition precedent to any exercise by Owner or Contractor of any rights or remedies either may otherwise have under the Contract Documents or by Laws and Regulations in respect of such Claims.
- B. *Notice:* Written notice stating the general nature of each Claim shall be delivered by the claimant to Engineer and the other party to the Contract promptly (but in no event later than 30 days) after the start of the event giving rise thereto. The responsibility to substantiate a Claim shall rest with the party making the Claim. Notice of the amount or extent of the Claim, with supporting data shall be delivered to the Engineer and the other party to the Contract within 60 days after the start of such event (unless Engineer allows additional time for claimant to submit additional or more accurate data in support of such Claim). A Claim for an adjustment in Contract Price shall be prepared in accordance with the provisions of Paragraph 12.01.B. A Claim for an adjustment in Contract Times shall be prepared in accordance with the provisions of Paragraph 12.02.B. Each Claim shall be accompanied by claimant's written statement that the adjustment claimed is the entire adjustment to which the claimant believes it is entitled as a result of said event. The

opposing party shall submit any response to Engineer and the claimant within 30 days after receipt of the claimant's last submittal (unless Engineer allows additional time).

- C. *Engineer's Action:* Engineer will review each Claim and, within 30 days after receipt of the last submittal of the claimant or the last submittal of the opposing party, if any, take one of the following actions in writing:
1. deny the Claim in whole or in part;
 2. approve the Claim; or
 3. notify the parties that the Engineer is unable to resolve the Claim if, in the Engineer's sole discretion, it would be inappropriate for the Engineer to do so. For purposes of further resolution of the Claim, such notice shall be deemed a denial.
- D. In the event that Engineer does not take action on a Claim within said 30 days, the Claim shall be deemed denied.
- E. Engineer's written action under Paragraph 10.05.C or denial pursuant to Paragraphs 10.05.C.3 or 10.05.D will be final and binding upon Owner and Contractor, unless Owner or Contractor invoke the dispute resolution procedure set forth in Article 16 within 30 days of such action or denial.
- F. No Claim for an adjustment in Contract Price or Contract Times will be valid if not submitted in accordance with this Paragraph 10.05.

ARTICLE 11 – COST OF THE WORK; ALLOWANCES; UNIT PRICE WORK

11.01 Cost of the Work

- A. *Costs Included:* The term Cost of the Work means the sum of all costs, except those excluded in Paragraph 11.01.B, necessarily incurred and paid by Contractor in the proper performance of the Work. When the value of any Work covered by a Change Order or when a Claim for an adjustment in Contract Price is determined on the basis of Cost of the Work, the costs to be reimbursed to Contractor will be only those additional or incremental costs required because of the change in the Work or because of the event giving rise to the Claim. Except as otherwise may be agreed to in writing by Owner, such costs shall be in amounts no higher than those prevailing in the locality of the Project, shall not include any of the costs itemized in Paragraph 11.01.B, and shall include only the following items:
1. Payroll costs for employees in the direct employ of Contractor in the performance of the Work under schedules of job classifications agreed upon by Owner and Contractor. Such employees shall include, without limitation, superintendents, foremen, and other personnel employed full time on the Work. Payroll costs for employees not employed full time on the Work shall be apportioned on the basis of their time spent on the Work. Payroll costs shall include, but not be limited to, salaries and wages plus the cost of fringe benefits, which shall include social security contributions, unemployment, excise, and payroll taxes, workers' compensation, health and retirement benefits, bonuses, sick leave, vacation and holiday pay applicable thereto. The expenses of performing Work outside of regular working hours, on

Saturday, Sunday, or legal holidays, shall be included in the above to the extent authorized by Owner.

2. Cost of all materials and equipment furnished and incorporated in the Work, including costs of transportation and storage thereof, and Suppliers' field services required in connection therewith. All cash discounts shall accrue to Contractor unless Owner deposits funds with Contractor with which to make payments, in which case the cash discounts shall accrue to Owner. All trade discounts, rebates and refunds and returns from sale of surplus materials and equipment shall accrue to Owner, and Contractor shall make provisions so that they may be obtained.
3. Payments made by Contractor to Subcontractors for Work performed by Subcontractors. If required by Owner, Contractor shall obtain competitive bids from subcontractors acceptable to Owner and Contractor and shall deliver such bids to Owner, who will then determine, with the advice of Engineer, which bids, if any, will be acceptable. If any subcontract provides that the Subcontractor is to be paid on the basis of Cost of the Work plus a fee, the Subcontractor's Cost of the Work and fee shall be determined in the same manner as Contractor's Cost of the Work and fee as provided in this Paragraph 11.01.
4. Costs of special consultants (including but not limited to engineers, architects, testing laboratories, surveyors, attorneys, and accountants) employed for services specifically related to the Work.
5. Supplemental costs including the following:
 - a. The proportion of necessary transportation, travel, and subsistence expenses of Contractor's employees incurred in discharge of duties connected with the Work.
 - b. Cost, including transportation and maintenance, of all materials, supplies, equipment, machinery, appliances, office, and temporary facilities at the Site, and hand tools not owned by the workers, which are consumed in the performance of the Work, and cost, less market value, of such items used but not consumed which remain the property of Contractor.
 - c. Rentals of all construction equipment and machinery, and the parts thereof whether rented from Contractor or others in accordance with rental agreements approved by Owner with the advice of Engineer, and the costs of transportation, loading, unloading, assembly, dismantling, and removal thereof. All such costs shall be in accordance with the terms of said rental agreements. The rental of any such equipment, machinery, or parts shall cease when the use thereof is no longer necessary for the Work.
 - d. Sales, consumer, use, and other similar taxes related to the Work, and for which Contractor is liable, as imposed by Laws and Regulations.
 - e. Deposits lost for causes other than negligence of Contractor, any Subcontractor, or anyone directly or indirectly employed by any of them or for whose acts any of them may be liable, and royalty payments and fees for permits and licenses.

- f. Losses and damages (and related expenses) caused by damage to the Work, not compensated by insurance or otherwise, sustained by Contractor in connection with the performance of the Work (except losses and damages within the deductible amounts of property insurance established in accordance with Paragraph 5.06.D), provided such losses and damages have resulted from causes other than the negligence of Contractor, any Subcontractor, or anyone directly or indirectly employed by any of them or for whose acts any of them may be liable. Such losses shall include settlements made with the written consent and approval of Owner. No such losses, damages, and expenses shall be included in the Cost of the Work for the purpose of determining Contractor's fee.
- g. The cost of utilities, fuel, and sanitary facilities at the Site.
- h. Minor expenses such as telegrams, long distance telephone calls, telephone service at the Site, express and courier services, and similar petty cash items in connection with the Work.
- i. The costs of premiums for all bonds and insurance Contractor is required by the Contract Documents to purchase and maintain.

B. *Costs Excluded:* The term Cost of the Work shall not include any of the following items:

- 1. Payroll costs and other compensation of Contractor's officers, executives, principals (of partnerships and sole proprietorships), general managers, safety managers, engineers, architects, estimators, attorneys, auditors, accountants, purchasing and contracting agents, expeditors, timekeepers, clerks, and other personnel employed by Contractor, whether at the Site or in Contractor's principal or branch office for general administration of the Work and not specifically included in the agreed upon schedule of job classifications referred to in Paragraph 11.01.A.1 or specifically covered by Paragraph 11.01.A.4, all of which are to be considered administrative costs covered by the Contractor's fee.
- 2. Expenses of Contractor's principal and branch offices other than Contractor's office at the Site.
- 3. Any part of Contractor's capital expenses, including interest on Contractor's capital employed for the Work and charges against Contractor for delinquent payments.
- 4. Costs due to the negligence of Contractor, any Subcontractor, or anyone directly or indirectly employed by any of them or for whose acts any of them may be liable, including but not limited to, the correction of defective Work, disposal of materials or equipment wrongly supplied, and making good any damage to property.
- 5. Other overhead or general expense costs of any kind and the costs of any item not specifically and expressly included in Paragraphs 11.01.A.

C. *Contractor's Fee:* When all the Work is performed on the basis of cost-plus, Contractor's fee shall be determined as set forth in the Agreement. When the value of any Work covered by a Change Order or when a Claim for an adjustment in Contract Price is determined on the basis of Cost of the Work, Contractor's fee shall be determined as set forth in Paragraph 12.01.C.

- D. *Documentation:* Whenever the Cost of the Work for any purpose is to be determined pursuant to Paragraphs 11.01.A and 11.01.B, Contractor will establish and maintain records thereof in accordance with generally accepted accounting practices and submit in a form acceptable to Engineer an itemized cost breakdown together with supporting data.

11.02 *Allowances*

- A. It is understood that Contractor has included in the Contract Price all allowances so named in the Contract Documents and shall cause the Work so covered to be performed for such sums and by such persons or entities as may be acceptable to Owner and Engineer.

B. *Cash Allowances:*

1. Contractor agrees that:

- a. the cash allowances include the cost to Contractor (less any applicable trade discounts) of materials and equipment required by the allowances to be delivered at the Site, and all applicable taxes; and
- b. Contractor's costs for unloading and handling on the Site, labor, installation, overhead, profit, and other expenses contemplated for the cash allowances have been included in the Contract Price and not in the allowances, and no demand for additional payment on account of any of the foregoing will be valid.

C. *Contingency Allowance:*

1. Contractor agrees that a contingency allowance, if any, is for the sole use of Owner to cover unanticipated costs.

- D. Prior to final payment, an appropriate Change Order will be issued as recommended by Engineer to reflect actual amounts due Contractor on account of Work covered by allowances, and the Contract Price shall be correspondingly adjusted.

11.03 *Unit Price Work*

- A. Where the Contract Documents provide that all or part of the Work is to be Unit Price Work, initially the Contract Price will be deemed to include for all Unit Price Work an amount equal to the sum of the unit price for each separately identified item of Unit Price Work times the estimated quantity of each item as indicated in the Agreement.
- B. The estimated quantities of items of Unit Price Work are not guaranteed and are solely for the purpose of comparison of Bids and determining an initial Contract Price. Determinations of the actual quantities and classifications of Unit Price Work performed by Contractor will be made by Engineer subject to the provisions of Paragraph 9.07.
- C. Each unit price will be deemed to include an amount considered by Contractor to be adequate to cover Contractor's overhead and profit for each separately identified item.

- D. Owner or Contractor may make a Claim for an adjustment in the Contract Price in accordance with Paragraph 10.05 if:
1. the quantity of any item of Unit Price Work performed by Contractor differs materially and significantly from the estimated quantity of such item indicated in the Agreement; and
 2. there is no corresponding adjustment with respect to any other item of Work; and
 3. Contractor believes that Contractor is entitled to an increase in Contract Price as a result of having incurred additional expense or Owner believes that Owner is entitled to a decrease in Contract Price and the parties are unable to agree as to the amount of any such increase or decrease.

ARTICLE 12 – CHANGE OF CONTRACT PRICE; CHANGE OF CONTRACT TIMES

12.01 Change of Contract Price

- A. The Contract Price may only be changed by a Change Order. Any Claim for an adjustment in the Contract Price shall be based on written notice submitted by the party making the Claim to the Engineer and the other party to the Contract in accordance with the provisions of Paragraph 10.05.
- B. The value of any Work covered by a Change Order or of any Claim for an adjustment in the Contract Price will be determined as follows:
1. where the Work involved is covered by unit prices contained in the Contract Documents, by application of such unit prices to the quantities of the items involved (subject to the provisions of Paragraph 11.03); or
 2. where the Work involved is not covered by unit prices contained in the Contract Documents, by a mutually agreed lump sum (which may include an allowance for overhead and profit not necessarily in accordance with Paragraph 12.01.C.2); or
 3. where the Work involved is not covered by unit prices contained in the Contract Documents and agreement to a lump sum is not reached under Paragraph 12.01.B.2, on the basis of the Cost of the Work (determined as provided in Paragraph 11.01) plus a Contractor's fee for overhead and profit (determined as provided in Paragraph 12.01.C).
- C. *Contractor's Fee:* The Contractor's fee for overhead and profit shall be determined as follows:
1. a mutually acceptable fixed fee; or
 2. if a fixed fee is not agreed upon, then a fee based on the following percentages of the various portions of the Cost of the Work:
 - a. for costs incurred under Paragraphs 11.01.A.1 and 11.01.A.2, the Contractor's fee shall be 15 percent;
 - b. for costs incurred under Paragraph 11.01.A.3, the Contractor's fee shall be five percent;

- c. where one or more tiers of subcontracts are on the basis of Cost of the Work plus a fee and no fixed fee is agreed upon, the intent of Paragraphs 12.01.C.2.a and 12.01.C.2.b is that the Subcontractor who actually performs the Work, at whatever tier, will be paid a fee of 15 percent of the costs incurred by such Subcontractor under Paragraphs 11.01.A.1 and 11.01.A.2 and that any higher tier Subcontractor and Contractor will each be paid a fee of five percent of the amount paid to the next lower tier Subcontractor;
- d. no fee shall be payable on the basis of costs itemized under Paragraphs 11.01.A.4, 11.01.A.5, and 11.01.B;
- e. the amount of credit to be allowed by Contractor to Owner for any change which results in a net decrease in cost will be the amount of the actual net decrease in cost plus a deduction in Contractor's fee by an amount equal to five percent of such net decrease; and
- f. when both additions and credits are involved in any one change, the adjustment in Contractor's fee shall be computed on the basis of the net change in accordance with Paragraphs 12.01.C.2.a through 12.01.C.2.e, inclusive.

12.02 *Change of Contract Times*

- A. The Contract Times may only be changed by a Change Order. Any Claim for an adjustment in the Contract Times shall be based on written notice submitted by the party making the Claim to the Engineer and the other party to the Contract in accordance with the provisions of Paragraph 10.05.
- B. Any adjustment of the Contract Times covered by a Change Order or any Claim for an adjustment in the Contract Times will be determined in accordance with the provisions of this Article 12.

12.03 *Delays*

- A. Where Contractor is prevented from completing any part of the Work within the Contract Times due to delay beyond the control of Contractor, the Contract Times will be extended in an amount equal to the time lost due to such delay if a Claim is made therefor as provided in Paragraph 12.02.A. Delays beyond the control of Contractor shall include, but not be limited to, acts or neglect by Owner, acts or neglect of utility owners or other contractors performing other work as contemplated by Article 7, fires, floods, epidemics, abnormal weather conditions, or acts of God.
- B. If Owner, Engineer, or other contractors or utility owners performing other work for Owner as contemplated by Article 7, or anyone for whom Owner is responsible, delays, disrupts, or interferes with the performance or progress of the Work, then Contractor shall be entitled to an equitable adjustment in the Contract Price or the Contract Times, or both. Contractor's entitlement to an adjustment of the Contract Times is conditioned on such adjustment being essential to Contractor's ability to complete the Work within the Contract Times.
- C. If Contractor is delayed in the performance or progress of the Work by fire, flood, epidemic, abnormal weather conditions, acts of God, acts or failures to act of utility owners not under the

control of Owner, or other causes not the fault of and beyond control of Owner and Contractor, then Contractor shall be entitled to an equitable adjustment in Contract Times, if such adjustment is essential to Contractor's ability to complete the Work within the Contract Times. Such an adjustment shall be Contractor's sole and exclusive remedy for the delays described in this Paragraph 12.03.C.

- D. Owner, Engineer, and their officers, directors, members, partners, employees, agents, consultants, or subcontractors shall not be liable to Contractor for any claims, costs, losses, or damages (including but not limited to all fees and charges of engineers, architects, attorneys, and other professionals and all court or arbitration or other dispute resolution costs) sustained by Contractor on or in connection with any other project or anticipated project.
- E. Contractor shall not be entitled to an adjustment in Contract Price or Contract Times for delays within the control of Contractor. Delays attributable to and within the control of a Subcontractor or Supplier shall be deemed to be delays within the control of Contractor.

ARTICLE 13 – TESTS AND INSPECTIONS; CORRECTION, REMOVAL OR ACCEPTANCE OF DEFECTIVE WORK

13.01 Notice of Defects

- A. Prompt notice of all defective Work of which Owner or Engineer has actual knowledge will be given to Contractor. Defective Work may be rejected, corrected, or accepted as provided in this Article 13.

13.02 Access to Work

- A. Owner, Engineer, their consultants and other representatives and personnel of Owner, independent testing laboratories, and governmental agencies with jurisdictional interests will have access to the Site and the Work at reasonable times for their observation, inspection, and testing. Contractor shall provide them proper and safe conditions for such access and advise them of Contractor's safety procedures and programs so that they may comply therewith as applicable.

13.03 Tests and Inspections

- A. Contractor shall give Engineer timely notice of readiness of the Work for all required inspections, tests, or approvals and shall cooperate with inspection and testing personnel to facilitate required inspections or tests.
- B. Owner shall employ and pay for the services of an independent testing laboratory to perform all inspections, tests, or approvals required by the Contract Documents except:
 - 1. for inspections, tests, or approvals covered by Paragraphs 13.03.C and 13.03.D below;
 - 2. that costs incurred in connection with tests or inspections conducted pursuant to Paragraph 13.04.B shall be paid as provided in Paragraph 13.04.C; and
 - 3. as otherwise specifically provided in the Contract Documents.

- C. If Laws or Regulations of any public body having jurisdiction require any Work (or part thereof) specifically to be inspected, tested, or approved by an employee or other representative of such public body, Contractor shall assume full responsibility for arranging and obtaining such inspections, tests, or approvals, pay all costs in connection therewith, and furnish Engineer the required certificates of inspection or approval.
- D. Contractor shall be responsible for arranging and obtaining and shall pay all costs in connection with any inspections, tests, or approvals required for Owner's and Engineer's acceptance of materials or equipment to be incorporated in the Work; or acceptance of materials, mix designs, or equipment submitted for approval prior to Contractor's purchase thereof for incorporation in the Work. Such inspections, tests, or approvals shall be performed by organizations acceptable to Owner and Engineer.
- E. If any Work (or the work of others) that is to be inspected, tested, or approved is covered by Contractor without written concurrence of Engineer, Contractor shall, if requested by Engineer, uncover such Work for observation.
- F. Uncovering Work as provided in Paragraph 13.03.E shall be at Contractor's expense unless Contractor has given Engineer timely notice of Contractor's intention to cover the same and Engineer has not acted with reasonable promptness in response to such notice.

13.04 *Uncovering Work*

- A. If any Work is covered contrary to the written request of Engineer, it must, if requested by Engineer, be uncovered for Engineer's observation and replaced at Contractor's expense.
- B. If Engineer considers it necessary or advisable that covered Work be observed by Engineer or inspected or tested by others, Contractor, at Engineer's request, shall uncover, expose, or otherwise make available for observation, inspection, or testing as Engineer may require, that portion of the Work in question, furnishing all necessary labor, material, and equipment.
- C. If it is found that the uncovered Work is defective, Contractor shall pay all claims, costs, losses, and damages (including but not limited to all fees and charges of engineers, architects, attorneys, and other professionals and all court or arbitration or other dispute resolution costs) arising out of or relating to such uncovering, exposure, observation, inspection, and testing, and of satisfactory replacement or reconstruction (including but not limited to all costs of repair or replacement of work of others); and Owner shall be entitled to an appropriate decrease in the Contract Price. If the parties are unable to agree as to the amount thereof, Owner may make a Claim therefor as provided in Paragraph 10.05.
- D. If the uncovered Work is not found to be defective, Contractor shall be allowed an increase in the Contract Price or an extension of the Contract Times, or both, directly attributable to such uncovering, exposure, observation, inspection, testing, replacement, and reconstruction. If the parties are unable to agree as to the amount or extent thereof, Contractor may make a Claim therefor as provided in Paragraph 10.05.

13.05 *Owner May Stop the Work*

- A. If the Work is defective, or Contractor fails to supply sufficient skilled workers or suitable materials or equipment, or fails to perform the Work in such a way that the completed Work will conform to the Contract Documents, Owner may order Contractor to stop the Work, or any portion thereof, until the cause for such order has been eliminated; however, this right of Owner to stop the Work shall not give rise to any duty on the part of Owner to exercise this right for the benefit of Contractor, any Subcontractor, any Supplier, any other individual or entity, or any surety for, or employee or agent of any of them.

13.06 *Correction or Removal of Defective Work*

- A. Promptly after receipt of written notice, Contractor shall correct all defective Work, whether or not fabricated, installed, or completed, or, if the Work has been rejected by Engineer, remove it from the Project and replace it with Work that is not defective. Contractor shall pay all claims, costs, losses, and damages (including but not limited to all fees and charges of engineers, architects, attorneys, and other professionals and all court or arbitration or other dispute resolution costs) arising out of or relating to such correction or removal (including but not limited to all costs of repair or replacement of work of others).
- B. When correcting defective Work under the terms of this Paragraph 13.06 or Paragraph 13.07, Contractor shall take no action that would void or otherwise impair Owner's special warranty and guarantee, if any, on said Work.

13.07 *Correction Period*

- A. If within one year after the date of Substantial Completion (or such longer period of time as may be prescribed by the terms of any applicable special guarantee required by the Contract Documents) or by any specific provision of the Contract Documents, any Work is found to be defective, or if the repair of any damages to the land or areas made available for Contractor's use by Owner or permitted by Laws and Regulations as contemplated in Paragraph 6.11.A is found to be defective, Contractor shall promptly, without cost to Owner and in accordance with Owner's written instructions:
 - 1. repair such defective land or areas; or
 - 2. correct such defective Work; or
 - 3. if the defective Work has been rejected by Owner, remove it from the Project and replace it with Work that is not defective, and
 - 4. satisfactorily correct or repair or remove and replace any damage to other Work, to the work of others or other land or areas resulting therefrom.
- B. If Contractor does not promptly comply with the terms of Owner's written instructions, or in an emergency where delay would cause serious risk of loss or damage, Owner may have the defective Work corrected or repaired or may have the rejected Work removed and replaced. All claims, costs, losses, and damages (including but not limited to all fees and charges of engineers, architects, attorneys, and other professionals and all court or arbitration or other dispute

resolution costs) arising out of or relating to such correction or repair or such removal and replacement (including but not limited to all costs of repair or replacement of work of others) will be paid by Contractor.

- C. In special circumstances where a particular item of equipment is placed in continuous service before Substantial Completion of all the Work, the correction period for that item may start to run from an earlier date if so provided in the Specifications.
- D. Where defective Work (and damage to other Work resulting therefrom) has been corrected or removed and replaced under this Paragraph 13.07, the correction period hereunder with respect to such Work will be extended for an additional period of one year after such correction or removal and replacement has been satisfactorily completed.
- E. Contractor's obligations under this Paragraph 13.07 are in addition to any other obligation or warranty. The provisions of this Paragraph 13.07 shall not be construed as a substitute for, or a waiver of, the provisions of any applicable statute of limitation or repose.

13.08 *Acceptance of Defective Work*

- A. If, instead of requiring correction or removal and replacement of defective Work, Owner (and, prior to Engineer's recommendation of final payment, Engineer) prefers to accept it, Owner may do so. Contractor shall pay all claims, costs, losses, and damages (including but not limited to all fees and charges of engineers, architects, attorneys, and other professionals and all court or arbitration or other dispute resolution costs) attributable to Owner's evaluation of and determination to accept such defective Work (such costs to be approved by Engineer as to reasonableness) and for the diminished value of the Work to the extent not otherwise paid by Contractor pursuant to this sentence. If any such acceptance occurs prior to Engineer's recommendation of final payment, a Change Order will be issued incorporating the necessary revisions in the Contract Documents with respect to the Work, and Owner shall be entitled to an appropriate decrease in the Contract Price, reflecting the diminished value of Work so accepted. If the parties are unable to agree as to the amount thereof, Owner may make a Claim therefor as provided in Paragraph 10.05. If the acceptance occurs after such recommendation, an appropriate amount will be paid by Contractor to Owner.

13.09 *Owner May Correct Defective Work*

- A. If Contractor fails within a reasonable time after written notice from Engineer to correct defective Work, or to remove and replace rejected Work as required by Engineer in accordance with Paragraph 13.06.A, or if Contractor fails to perform the Work in accordance with the Contract Documents, or if Contractor fails to comply with any other provision of the Contract Documents, Owner may, after seven days written notice to Contractor, correct, or remedy any such deficiency.
- B. In exercising the rights and remedies under this Paragraph 13.09, Owner shall proceed expeditiously. In connection with such corrective or remedial action, Owner may exclude Contractor from all or part of the Site, take possession of all or part of the Work and suspend Contractor's services related thereto, take possession of Contractor's tools, appliances, construction equipment and machinery at the Site, and incorporate in the Work all materials and

equipment stored at the Site or for which Owner has paid Contractor but which are stored elsewhere. Contractor shall allow Owner, Owner's representatives, agents and employees, Owner's other contractors, and Engineer and Engineer's consultants access to the Site to enable Owner to exercise the rights and remedies under this Paragraph.

- C. All claims, costs, losses, and damages (including but not limited to all fees and charges of engineers, architects, attorneys, and other professionals and all court or arbitration or other dispute resolution costs) incurred or sustained by Owner in exercising the rights and remedies under this Paragraph 13.09 will be charged against Contractor, and a Change Order will be issued incorporating the necessary revisions in the Contract Documents with respect to the Work; and Owner shall be entitled to an appropriate decrease in the Contract Price. If the parties are unable to agree as to the amount of the adjustment, Owner may make a Claim therefor as provided in Paragraph 10.05. Such claims, costs, losses and damages will include but not be limited to all costs of repair, or replacement of work of others destroyed or damaged by correction, removal, or replacement of Contractor's defective Work.
- D. Contractor shall not be allowed an extension of the Contract Times because of any delay in the performance of the Work attributable to the exercise by Owner of Owner's rights and remedies under this Paragraph 13.09.

ARTICLE 14 – PAYMENTS TO CONTRACTOR AND COMPLETION

14.01 Schedule of Values

- A. The Schedule of Values established as provided in Paragraph 2.07.A will serve as the basis for progress payments and will be incorporated into a form of Application for Payment acceptable to Engineer. Progress payments on account of Unit Price Work will be based on the number of units completed.

14.02 Progress Payments

A. Applications for Payments:

1. At least 20 days before the date established in the Agreement for each progress payment (but not more often than once a month), Contractor shall submit to Engineer for review an Application for Payment filled out and signed by Contractor covering the Work completed as of the date of the Application and accompanied by such supporting documentation as is required by the Contract Documents. If payment is requested on the basis of materials and equipment not incorporated in the Work but delivered and suitably stored at the Site or at another location agreed to in writing, the Application for Payment shall also be accompanied by a bill of sale, invoice, or other documentation warranting that Owner has received the materials and equipment free and clear of all Liens and evidence that the materials and equipment are covered by appropriate property insurance or other arrangements to protect Owner's interest therein, all of which must be satisfactory to Owner.
2. Beginning with the second Application for Payment, each Application shall include an affidavit of Contractor stating that all previous progress payments received on account of the

Work have been applied on account to discharge Contractor's legitimate obligations associated with prior Applications for Payment.

3. The amount of retainage with respect to progress payments will be as stipulated in the Agreement.

B. *Review of Applications:*

1. Engineer will, within 10 days after receipt of each Application for Payment, either indicate in writing a recommendation of payment and present the Application to Owner or return the Application to Contractor indicating in writing Engineer's reasons for refusing to recommend payment. In the latter case, Contractor may make the necessary corrections and resubmit the Application.
2. Engineer's recommendation of any payment requested in an Application for Payment will constitute a representation by Engineer to Owner, based on Engineer's observations of the executed Work as an experienced and qualified design professional, and on Engineer's review of the Application for Payment and the accompanying data and schedules, that to the best of Engineer's knowledge, information and belief:
 - a. the Work has progressed to the point indicated;
 - b. the quality of the Work is generally in accordance with the Contract Documents (subject to an evaluation of the Work as a functioning whole prior to or upon Substantial Completion, the results of any subsequent tests called for in the Contract Documents, a final determination of quantities and classifications for Unit Price Work under Paragraph 9.07, and any other qualifications stated in the recommendation); and
 - c. the conditions precedent to Contractor's being entitled to such payment appear to have been fulfilled in so far as it is Engineer's responsibility to observe the Work.
3. By recommending any such payment Engineer will not thereby be deemed to have represented that:
 - a. inspections made to check the quality or the quantity of the Work as it has been performed have been exhaustive, extended to every aspect of the Work in progress, or involved detailed inspections of the Work beyond the responsibilities specifically assigned to Engineer in the Contract Documents; or
 - b. there may not be other matters or issues between the parties that might entitle Contractor to be paid additionally by Owner or entitle Owner to withhold payment to Contractor.
4. Neither Engineer's review of Contractor's Work for the purposes of recommending payments nor Engineer's recommendation of any payment, including final payment, will impose responsibility on Engineer:
 - a. to supervise, direct, or control the Work, or

- b. for the means, methods, techniques, sequences, or procedures of construction, or the safety precautions and programs incident thereto, or
 - c. for Contractor's failure to comply with Laws and Regulations applicable to Contractor's performance of the Work, or
 - d. to make any examination to ascertain how or for what purposes Contractor has used the moneys paid on account of the Contract Price, or
 - e. to determine that title to any of the Work, materials, or equipment has passed to Owner free and clear of any Liens.
5. Engineer may refuse to recommend the whole or any part of any payment if, in Engineer's opinion, it would be incorrect to make the representations to Owner stated in Paragraph 14.02.B.2. Engineer may also refuse to recommend any such payment or, because of subsequently discovered evidence or the results of subsequent inspections or tests, revise or revoke any such payment recommendation previously made, to such extent as may be necessary in Engineer's opinion to protect Owner from loss because:
- a. the Work is defective, or completed Work has been damaged, requiring correction or replacement;
 - b. the Contract Price has been reduced by Change Orders;
 - c. Owner has been required to correct defective Work or complete Work in accordance with Paragraph 13.09; or
 - d. Engineer has actual knowledge of the occurrence of any of the events enumerated in Paragraph 15.02.A.

C. Payment Becomes Due:

- 1. Ten days after presentation of the Application for Payment to Owner with Engineer's recommendation, the amount recommended will (subject to the provisions of Paragraph 14.02.D) become due, and when due will be paid by Owner to Contractor.

D. Reduction in Payment:

- 1. Owner may refuse to make payment of the full amount recommended by Engineer because:
 - a. claims have been made against Owner on account of Contractor's performance or furnishing of the Work;
 - b. Liens have been filed in connection with the Work, except where Contractor has delivered a specific bond satisfactory to Owner to secure the satisfaction and discharge of such Liens;
 - c. there are other items entitling Owner to a set-off against the amount recommended; or

- d. Owner has actual knowledge of the occurrence of any of the events enumerated in Paragraphs 14.02.B.5.a through 14.02.B.5.c or Paragraph 15.02.A.
2. If Owner refuses to make payment of the full amount recommended by Engineer, Owner will give Contractor immediate written notice (with a copy to Engineer) stating the reasons for such action and promptly pay Contractor any amount remaining after deduction of the amount so withheld. Owner shall promptly pay Contractor the amount so withheld, or any adjustment thereto agreed to by Owner and Contractor, when Contractor remedies the reasons for such action.
3. Upon a subsequent determination that Owner's refusal of payment was not justified, the amount wrongfully withheld shall be treated as an amount due as determined by Paragraph 14.02.C.1 and subject to interest as provided in the Agreement.

14.03 *Contractor's Warranty of Title*

- A. Contractor warrants and guarantees that title to all Work, materials, and equipment covered by any Application for Payment, whether incorporated in the Project or not, will pass to Owner no later than the time of payment free and clear of all Liens.

14.04 *Substantial Completion*

- A. When Contractor considers the entire Work ready for its intended use Contractor shall notify Owner and Engineer in writing that the entire Work is substantially complete (except for items specifically listed by Contractor as incomplete) and request that Engineer issue a certificate of Substantial Completion.
- B. Promptly after Contractor's notification, Owner, Contractor, and Engineer shall make an inspection of the Work to determine the status of completion. If Engineer does not consider the Work substantially complete, Engineer will notify Contractor in writing giving the reasons therefor.
- C. If Engineer considers the Work substantially complete, Engineer will deliver to Owner a tentative certificate of Substantial Completion which shall fix the date of Substantial Completion. There shall be attached to the certificate a tentative list of items to be completed or corrected before final payment. Owner shall have seven days after receipt of the tentative certificate during which to make written objection to Engineer as to any provisions of the certificate or attached list. If, after considering such objections, Engineer concludes that the Work is not substantially complete, Engineer will, within 14 days after submission of the tentative certificate to Owner, notify Contractor in writing, stating the reasons therefor. If, after consideration of Owner's objections, Engineer considers the Work substantially complete, Engineer will, within said 14 days, execute and deliver to Owner and Contractor a definitive certificate of Substantial Completion (with a revised tentative list of items to be completed or corrected) reflecting such changes from the tentative certificate as Engineer believes justified after consideration of any objections from Owner.
- D. At the time of delivery of the tentative certificate of Substantial Completion, Engineer will deliver to Owner and Contractor a written recommendation as to division of responsibilities

pending final payment between Owner and Contractor with respect to security, operation, safety, and protection of the Work, maintenance, heat, utilities, insurance, and warranties and guarantees. Unless Owner and Contractor agree otherwise in writing and so inform Engineer in writing prior to Engineer's issuing the definitive certificate of Substantial Completion, Engineer's aforesaid recommendation will be binding on Owner and Contractor until final payment.

- E. Owner shall have the right to exclude Contractor from the Site after the date of Substantial Completion subject to allowing Contractor reasonable access to remove its property and complete or correct items on the tentative list.

14.05 *Partial Utilization*

- A. Prior to Substantial Completion of all the Work, Owner may use or occupy any substantially completed part of the Work which has specifically been identified in the Contract Documents, or which Owner, Engineer, and Contractor agree constitutes a separately functioning and usable part of the Work that can be used by Owner for its intended purpose without significant interference with Contractor's performance of the remainder of the Work, subject to the following conditions:
 1. Owner at any time may request Contractor in writing to permit Owner to use or occupy any such part of the Work which Owner believes to be ready for its intended use and substantially complete. If and when Contractor agrees that such part of the Work is substantially complete, Contractor, Owner, and Engineer will follow the procedures of Paragraph 14.04.A through D for that part of the Work.
 2. Contractor at any time may notify Owner and Engineer in writing that Contractor considers any such part of the Work ready for its intended use and substantially complete and request Engineer to issue a certificate of Substantial Completion for that part of the Work.
 3. Within a reasonable time after either such request, Owner, Contractor, and Engineer shall make an inspection of that part of the Work to determine its status of completion. If Engineer does not consider that part of the Work to be substantially complete, Engineer will notify Owner and Contractor in writing giving the reasons therefor. If Engineer considers that part of the Work to be substantially complete, the provisions of Paragraph 14.04 will apply with respect to certification of Substantial Completion of that part of the Work and the division of responsibility in respect thereof and access thereto.
 4. No use or occupancy or separate operation of part of the Work may occur prior to compliance with the requirements of Paragraph 5.10 regarding property insurance.

14.06 *Final Inspection*

- A. Upon written notice from Contractor that the entire Work or an agreed portion thereof is complete, Engineer will promptly make a final inspection with Owner and Contractor and will notify Contractor in writing of all particulars in which this inspection reveals that the Work is incomplete or defective. Contractor shall immediately take such measures as are necessary to complete such Work or remedy such deficiencies.

14.07 *Final Payment*

A. *Application for Payment:*

1. After Contractor has, in the opinion of Engineer, satisfactorily completed all corrections identified during the final inspection and has delivered, in accordance with the Contract Documents, all maintenance and operating instructions, schedules, guarantees, bonds, certificates or other evidence of insurance, certificates of inspection, marked-up record documents (as provided in Paragraph 6.12), and other documents, Contractor may make application for final payment following the procedure for progress payments.
2. The final Application for Payment shall be accompanied (except as previously delivered) by:
 - a. all documentation called for in the Contract Documents, including but not limited to the evidence of insurance required by Paragraph 5.04.B.6;
 - b. consent of the surety, if any, to final payment;
 - c. a list of all Claims against Owner that Contractor believes are unsettled; and
 - d. complete and legally effective releases or waivers (satisfactory to Owner) of all Lien rights arising out of or Liens filed in connection with the Work.
3. In lieu of the releases or waivers of Liens specified in Paragraph 14.07.A.2 and as approved by Owner, Contractor may furnish receipts or releases in full and an affidavit of Contractor that: (i) the releases and receipts include all labor, services, material, and equipment for which a Lien could be filed; and (ii) all payrolls, material and equipment bills, and other indebtedness connected with the Work for which Owner might in any way be responsible, or which might in any way result in liens or other burdens on Owner's property, have been paid or otherwise satisfied. If any Subcontractor or Supplier fails to furnish such a release or receipt in full, Contractor may furnish a bond or other collateral satisfactory to Owner to indemnify Owner against any Lien.

B. *Engineer's Review of Application and Acceptance:*

1. If, on the basis of Engineer's observation of the Work during construction and final inspection, and Engineer's review of the final Application for Payment and accompanying documentation as required by the Contract Documents, Engineer is satisfied that the Work has been completed and Contractor's other obligations under the Contract Documents have been fulfilled, Engineer will, within ten days after receipt of the final Application for Payment, indicate in writing Engineer's recommendation of payment and present the Application for Payment to Owner for payment. At the same time Engineer will also give written notice to Owner and Contractor that the Work is acceptable subject to the provisions of Paragraph 14.09. Otherwise, Engineer will return the Application for Payment to Contractor, indicating in writing the reasons for refusing to recommend final payment, in which case Contractor shall make the necessary corrections and resubmit the Application for Payment.

C. *Payment Becomes Due:*

1. Thirty days after the presentation to Owner of the Application for Payment and accompanying documentation, the amount recommended by Engineer, less any sum Owner is entitled to set off against Engineer's recommendation, including but not limited to liquidated damages, will become due and will be paid by Owner to Contractor.

14.08 *Final Completion Delayed*

- A. If, through no fault of Contractor, final completion of the Work is significantly delayed, and if Engineer so confirms, Owner shall, upon receipt of Contractor's final Application for Payment (for Work fully completed and accepted) and recommendation of Engineer, and without terminating the Contract, make payment of the balance due for that portion of the Work fully completed and accepted. If the remaining balance to be held by Owner for Work not fully completed or corrected is less than the retainage stipulated in the Agreement, and if bonds have been furnished as required in Paragraph 5.01, the written consent of the surety to the payment of the balance due for that portion of the Work fully completed and accepted shall be submitted by Contractor to Engineer with the Application for such payment. Such payment shall be made under the terms and conditions governing final payment, except that it shall not constitute a waiver of Claims.

14.09 *Waiver of Claims*

- A. The making and acceptance of final payment will constitute:
 1. a waiver of all Claims by Owner against Contractor, except Claims arising from unsettled Liens, from defective Work appearing after final inspection pursuant to Paragraph 14.06, from failure to comply with the Contract Documents or the terms of any special guarantees specified therein, or from Contractor's continuing obligations under the Contract Documents; and
 2. a waiver of all Claims by Contractor against Owner other than those previously made in accordance with the requirements herein and expressly acknowledged by Owner in writing as still unsettled.

ARTICLE 15 – SUSPENSION OF WORK AND TERMINATION

15.01 *Owner May Suspend Work*

- A. At any time and without cause, Owner may suspend the Work or any portion thereof for a period of not more than 90 consecutive days by notice in writing to Contractor and Engineer which will fix the date on which Work will be resumed. Contractor shall resume the Work on the date so fixed. Contractor shall be granted an adjustment in the Contract Price or an extension of the Contract Times, or both, directly attributable to any such suspension if Contractor makes a Claim therefor as provided in Paragraph 10.05.

15.02 *Owner May Terminate for Cause*

- A. The occurrence of any one or more of the following events will justify termination for cause:

1. Contractor's persistent failure to perform the Work in accordance with the Contract Documents (including, but not limited to, failure to supply sufficient skilled workers or suitable materials or equipment or failure to adhere to the Progress Schedule established under Paragraph 2.07 as adjusted from time to time pursuant to Paragraph 6.04);
 2. Contractor's disregard of Laws or Regulations of any public body having jurisdiction;
 3. Contractor's repeated disregard of the authority of Engineer; or
 4. Contractor's violation in any substantial way of any provisions of the Contract Documents.
- B. If one or more of the events identified in Paragraph 15.02.A occur, Owner may, after giving Contractor (and surety) seven days written notice of its intent to terminate the services of Contractor:
1. exclude Contractor from the Site, and take possession of the Work and of all Contractor's tools, appliances, construction equipment, and machinery at the Site, and use the same to the full extent they could be used by Contractor (without liability to Contractor for trespass or conversion);
 2. incorporate in the Work all materials and equipment stored at the Site or for which Owner has paid Contractor but which are stored elsewhere; and
 3. complete the Work as Owner may deem expedient.
- C. If Owner proceeds as provided in Paragraph 15.02.B, Contractor shall not be entitled to receive any further payment until the Work is completed. If the unpaid balance of the Contract Price exceeds all claims, costs, losses, and damages (including but not limited to all fees and charges of engineers, architects, attorneys, and other professionals and all court or arbitration or other dispute resolution costs) sustained by Owner arising out of or relating to completing the Work, such excess will be paid to Contractor. If such claims, costs, losses, and damages exceed such unpaid balance, Contractor shall pay the difference to Owner. Such claims, costs, losses, and damages incurred by Owner will be reviewed by Engineer as to their reasonableness and, when so approved by Engineer, incorporated in a Change Order. When exercising any rights or remedies under this Paragraph, Owner shall not be required to obtain the lowest price for the Work performed.
- D. Notwithstanding Paragraphs 15.02.B and 15.02.C, Contractor's services will not be terminated if Contractor begins within seven days of receipt of notice of intent to terminate to correct its failure to perform and proceeds diligently to cure such failure within no more than 30 days of receipt of said notice.
- E. Where Contractor's services have been so terminated by Owner, the termination will not affect any rights or remedies of Owner against Contractor then existing or which may thereafter accrue. Any retention or payment of moneys due Contractor by Owner will not release Contractor from liability.

- F. If and to the extent that Contractor has provided a performance bond under the provisions of Paragraph 5.01.A, the termination procedures of that bond shall supersede the provisions of Paragraphs 15.02.B and 15.02.C.

15.03 *Owner May Terminate For Convenience*

- A. Upon seven days written notice to Contractor and Engineer, Owner may, without cause and without prejudice to any other right or remedy of Owner, terminate the Contract. In such case, Contractor shall be paid for (without duplication of any items):
1. completed and acceptable Work executed in accordance with the Contract Documents prior to the effective date of termination, including fair and reasonable sums for overhead and profit on such Work;
 2. expenses sustained prior to the effective date of termination in performing services and furnishing labor, materials, or equipment as required by the Contract Documents in connection with uncompleted Work, plus fair and reasonable sums for overhead and profit on such expenses;
 3. all claims, costs, losses, and damages (including but not limited to all fees and charges of engineers, architects, attorneys, and other professionals and all court or arbitration or other dispute resolution costs) incurred in settlement of terminated contracts with Subcontractors, Suppliers, and others; and
 4. reasonable expenses directly attributable to termination.
- B. Contractor shall not be paid on account of loss of anticipated profits or revenue or other economic loss arising out of or resulting from such termination.

15.04 *Contractor May Stop Work or Terminate*

- A. If, through no act or fault of Contractor, (i) the Work is suspended for more than 90 consecutive days by Owner or under an order of court or other public authority, or (ii) Engineer fails to act on any Application for Payment within 30 days after it is submitted, or (iii) Owner fails for 30 days to pay Contractor any sum finally determined to be due, then Contractor may, upon seven days written notice to Owner and Engineer, and provided Owner or Engineer do not remedy such suspension or failure within that time, terminate the Contract and recover from Owner payment on the same terms as provided in Paragraph 15.03.
- B. In lieu of terminating the Contract and without prejudice to any other right or remedy, if Engineer has failed to act on an Application for Payment within 30 days after it is submitted, or Owner has failed for 30 days to pay Contractor any sum finally determined to be due, Contractor may, seven days after written notice to Owner and Engineer, stop the Work until payment is made of all such amounts due Contractor, including interest thereon. The provisions of this Paragraph 15.04 are not intended to preclude Contractor from making a Claim under Paragraph 10.05 for an adjustment in Contract Price or Contract Times or otherwise for expenses or damage directly attributable to Contractor's stopping the Work as permitted by this Paragraph.

ARTICLE 16 – DISPUTE RESOLUTION

16.01 *Methods and Procedures*

- A. Either Owner or Contractor may request mediation of any Claim submitted to Engineer for a decision under Paragraph 10.05 before such decision becomes final and binding. The mediation will be governed by the Construction Industry Mediation Rules of the American Arbitration Association in effect as of the Effective Date of the Agreement. The request for mediation shall be submitted in writing to the American Arbitration Association and the other party to the Contract. Timely submission of the request shall stay the effect of Paragraph 10.05.E.
- B. Owner and Contractor shall participate in the mediation process in good faith. The process shall be concluded within 60 days of filing of the request. The date of termination of the mediation shall be determined by application of the mediation rules referenced above.
- C. If the Claim is not resolved by mediation, Engineer's action under Paragraph 10.05.C or a denial pursuant to Paragraphs 10.05.C.3 or 10.05.D shall become final and binding 30 days after termination of the mediation unless, within that time period, Owner or Contractor:
 1. elects in writing to invoke any dispute resolution process provided for in the Supplementary Conditions; or
 2. agrees with the other party to submit the Claim to another dispute resolution process; or
 3. gives written notice to the other party of the intent to submit the Claim to a court of competent jurisdiction.

ARTICLE 17 – MISCELLANEOUS

17.01 *Giving Notice*

- A. Whenever any provision of the Contract Documents requires the giving of written notice, it will be deemed to have been validly given if:
 1. delivered in person to the individual or to a member of the firm or to an officer of the corporation for whom it is intended; or
 2. delivered at or sent by registered or certified mail, postage prepaid, to the last business address known to the giver of the notice.

17.02 *Computation of Times*

- A. When any period of time is referred to in the Contract Documents by days, it will be computed to exclude the first and include the last day of such period. If the last day of any such period falls on a Saturday or Sunday or on a day made a legal holiday by the law of the applicable jurisdiction, such day will be omitted from the computation.

17.03 *Cumulative Remedies*

- A. The duties and obligations imposed by these General Conditions and the rights and remedies available hereunder to the parties hereto are in addition to, and are not to be construed in any way as a limitation of, any rights and remedies available to any or all of them which are otherwise imposed or available by Laws or Regulations, by special warranty or guarantee, or by other provisions of the Contract Documents. The provisions of this Paragraph will be as effective as if repeated specifically in the Contract Documents in connection with each particular duty, obligation, right, and remedy to which they apply.

17.04 *Survival of Obligations*

- A. All representations, indemnifications, warranties, and guarantees made in, required by, or given in accordance with the Contract Documents, as well as all continuing obligations indicated in the Contract Documents, will survive final payment, completion, and acceptance of the Work or termination or completion of the Contract or termination of the services of Contractor.

17.05 *Controlling Law*

- A. This Contract is to be governed by the law of the state in which the Project is located.

17.06 *Headings*

- A. Article and paragraph headings are inserted for convenience only and do not constitute parts of these General Conditions.

SECTION 00800

SUPPLEMENTARY CONDITIONS

ARTICLE 1. DEFINITIONS & TERMINOLOGY

SC-1.01

Defined Terms:

SC-1.01

Delete definition 1.01 A.19 entitled “Engineer” in the General Conditions in its entirety and insert the following in its place:

“The individual or entity duly appointed by the Owner to undertake the duties and powers herein assigned to the Engineer, acting either directly or through duly appointed representatives.”

SC-1.01

Delete definition 1.01 A.42 entitled “Specifications” in the General Conditions in its entirety and insert the following in its place:

“Sections included under Division A through Division E of the Contract Documents.”

SC-1.01

Delete the definition 1.01 A.44 entitled “Substantial Completion” in the General Conditions in its entirety and add the following in its place:

“The Work (or a specified part thereof) required by the Contract has been completed except for work (or a specified part thereof) having a Contract Price of less than one percent of the then adjusted total contract price, or substantially all of the Work (or a specified part thereof) has been completed and opened to Owner's use except for minor incomplete or unsatisfactory work items that do not materially impair the usefulness of the Work (or a specified part thereof) required by the Contract.”

ARTICLE 2. PRELIMINARY MATTERS

SC-2.01

Delivery of Bonds and Evidence of Insurance

Delete paragraph 2.01B of the General Conditions in its entirety and insert the following in its place:

B. Evidence of Insurance: Before any work at the site is started, CONTRACTOR shall deliver to OWNER, with a copy to ENGINEER, certificates of insurance (and other evidence of insurance requested by OWNER) which CONTRACTOR is required to purchase and maintain in accordance with the requirements of Article 5.

SC-2.02

Copies of Documents

Delete Paragraph 2.02.A in its entirety and insert the following in its place:

A. Owner shall furnish Contractor up to 6 printed or hard copies of the Drawings and Project Manual and one set in electronic format. Additional printed copies will be furnished upon request at the cost of reproduction.

SC-2.03

Commencement of Contract Times; Notice to Proceed:

Delete paragraph 2.03A of the General Conditions in its entirety and insert the following in its place:

A. The Contract Time will commence to run on the tenth day following the effective date of the Agreement, or if a Notice to Proceed is issued, the Contract Time will commence to run on the date of the Notice to Proceed.

ARTICLE 3. CONTRACT DOCUMENTS: INTENT, AMENDING, REUSE

SC-3.01

Intent:

Add a new paragraph immediately after paragraph 3.01A of the General Conditions which is to read as follows:

1. Each and every provision of law and clause required by law to be inserted in the Contract shall be deemed to be inserted herein, and the Contract shall be read and enforced as though they were included herein. If through mistake or otherwise any such provision is not inserted, or is not correctly inserted, then upon the application of either party, the Contract shall forthwith be physically amended to make such insertion.
2. Sections of Division D - General Requirements govern the execution of the work of all sections of the specifications.

ARTICLE 4. AVAILABILITY OF LANDS; SUBSURFACE AND PHYSICAL CONDITIONS; REFERENCE POINTS

SC-4.02

Subsurface and Physical Conditions:

Delete paragraph 4.02A of the General Conditions in its entirety and insert the following in its place:

- A. Reports and Drawings: In the preparation of Drawings and Specifications, Engineer or Engineer's Consultants have relied upon:
 1. Data obtained from subsurface investigations made at the site in the form of test borings. Such data is in the form of boring logs which are included in Appendix A to the Specifications. The locations of the test borings are indicated on the Drawings.

SC-4.04

Underground Facilities:

Delete the following words from line 5 of paragraph 4.04B.2 of the General Conditions:

“or not shown or indicated with reasonable accuracy”

SC-4.06

Hazardous Environmental Conditions at Site:

Delete Paragraph 4.06.G and add the following new paragraph 4.06.G immediately after Paragraph 4.06.F:

G. To the fullest extent permitted by Laws and Regulations, Owner shall release Contractor, Subcontractors, and Engineer, and officers, directors, members, partners, employees, agents, consultants and subcontractors of each and any of them from and against all claims, costs, losses and damages arising out of or relating to a Hazardous Environmental Condition, provided that such Hazardous Environmental Conditions: (i) was not shown or indicated in the Drawings or Specifications or identified in the Contract Documents to be included within the scope of work, and (ii) was not created by Contractor or by anyone for whom Contractor is responsible. Nothing in this Paragraph 4.06.G shall constitute an indemnity of obligation.

ARTICLE 5. BONDS AND INSURANCE

SC-5.02

Licensed Sureties and Insurers:

Insert the following paragraphs at the end of Paragraph 5.02.A.:

B. The insurance policies and surety bonds required to be provided by the Contractor shall be written by a company or companies licensed by the State of New Hampshire which company or companies shall have not less than an A rating and a Class XV financial status as reported in the latest edition of Best's Insurance Guide. In addition all carriers are subject to approval by the OWNER.

C. The CONTRACTOR shall name the OWNER, Greenman-Pedersen, Inc. and Weston & Sampson Engineers, Inc. as an Additional Insured on a primary and non-contributory basis to all polices except Works Compensation and Professional Liability.

SC-5.03

Certificates of Insurance:

Delete paragraph 5.03B of the General Conditions.

SC-5.04

Contractor's Insurance:

Add the following new paragraph immediately after Paragraph 5.04.B.:

C. The limits of liability for the insurance required by Paragraph 5.04 of the General Conditions shall provide coverage for not less than the following amounts or greater where required by Laws and Regulations:

1. Worker's Compensation, and related coverage under Paragraphs 5.04.A.1 and 5.04.A.2 of the General Conditions:
 - a. State: Statutory
 - b. Applicable Federal
(e.g., Longshoreman's): Statutory
2. Contractor's General Liability under Paragraphs 5.04.A.3 through 5.04.A.6 of the General Conditions which shall include completed operations and product liability coverage's and eliminate the exclusion with respect to property under the care, custody, and control of Contractor or provide equivalent coverage under Builders Risk:
 - a. General Aggregate including per project aggregate endorsement:
(Except Products-Completed Operations): \$ 2,000,000
 - b. Products-Completed
Operations Aggregate: \$ 2,000,000
 - c. Each Occurrence
(Bodily Injury and Property Damage): \$ 2,000,000
Property Damage liability insurance shall include Collapse
and Underground coverages
 - d. If blasting is to be used, include explosion coverage.
Occurrence: \$ 2,000,000
Aggregate: \$ 2,000,000
3. Automobile Liability under Paragraph 5.04.A.6 of the General Conditions:
 1. Combined Single Limit for bodily injury
and property damage: \$ 2,000,000

4. The Contractual Liability coverage required by Paragraph 5.04.B.3 of the General Conditions shall provide coverage for not less than the following amounts:
 - a. Bodily Injury:

Each Accident	\$ 2,000,000
Annual Aggregate	\$ 2,000,000
 - b. Property Damage:

Each Accident	\$ 2,000,000
Annual Aggregate	\$ 2,000,000
5. Owner does not have pollution property or liability coverage. Contractor shall maintain Pollution Liability Coverage of at least \$1,000,000 for this Project.
6. Coverage amounts may be satisfied by excess or umbrella policies provided Owner is satisfied as to the form of coverage.
7. Owner shall be listed as an additional insured on all liability policies. The City of Portsmouth shall be named as additional insured as follows:

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

SC-5.06

Property Insurance:

Delete Paragraph 5.06 in its entirety and insert the following in its place:

A. Owner will maintain Builders Risk for its interest in the Work. Owner's policy is available for review. Contractor and subcontractors shall be responsible for insuring their own interests in the event of loss.

SC-5.07

Delete Section 5.07 in its entirety.

SC-5.08

Delete section 5.08 in its entirety.

ARTICLE 6. CONTRACTOR'S RESPONSIBILITIES

SC-6.01

Delete paragraph 6.01B of the General Conditions in its entirety and replace with the following:

B. At the site of the Work the CONTRACTOR shall employ a full-time construction superintendent or foreman who shall have full authority to act for the CONTRACTOR. It is understood that such representative shall be acceptable to the ENGINEER and shall be one who will be continued in the capacity for the particular job involved unless the representative ceases to be on the CONTRACTOR's payroll. If at any time during the Work the representative is deemed by the ENGINEER to be no longer acceptable, the representative shall be promptly replaced by the CONTRACTOR. All communications to the superintendent or foreman shall be as binding as if given to the CONTRACTOR.

SC-6.04

Add the following paragraph after paragraph 6.04A.2 of the General Conditions:

B. The CONTRACTOR's resident superintendent shall attend monthly progress meetings at the site of the work with the ENGINEER and others as appropriate to review schedule status and such other pertinent subjects as may be listed on the agenda by the ENGINEER.

SC-6.05

Substitutes and "Or Equals":

Add the following new paragraphs immediately after Paragraph 6.05.F.:

1. When a substitute item of material or equipment is proposed by Contractor and accepted by Engineer, and the substitution will require a change in any of the Contract Documents to adapt the design to the proposed substitute, Contractor shall notify Engineer of the changes and be responsible for the costs involved to revise the design and to make modifications or changes to the construction, including the costs associated with the Work of other contractors due to such changes in design or space requirements.
 - a. Redesign and drawing revisions will be prepared by Engineer and Contractor shall reimburse Owner for charges of Engineer for redesign and drawing preparation.

b. Reimbursement of Engineer shall be based on Engineer's direct labor costs, indirect labor costs, profit on the total labor, and any direct non-labor expenses such as travel or per diem.

SC-6.06

Concerning Subcontractor's, Suppliers, and Others:

Re-number subparagraph 6.06F to 6.06G and subparagraph 6.06G to 6.06H and add new subparagraph as follows:

F. Owner or Engineer may furnish to any such Subcontractor, Supplier, or other person or organization, to the extent practicable, information about amounts paid to Contractor in accordance with Contractor's Applications for Payment on account of the particular Subcontractor's, Suppliers, other person's, or other organization's Work.

SC-6.08

Permits:

Delete the last sentence in Paragraph 6.08.A. in its entirety and replace with the following:

Unless otherwise specified in the General Requirements or Specifications, Contractor shall pay all charges of utility owners for connections for providing permanent service to the Work.

The following permits and/or licenses will be obtained by the Owner:

- a. Waivers/Conditional Use Permit Granted by The Planning Board.
- b. No Adverse Effect Determination (#8803), Cultural Resources Staff, Bureau of Environment, NHDHR, July 11, 2017.
- c. Conditional Use Permit Approval for Property Located at 1275 Maplewood Avenue, September 25, 2017.
- d. Wetlands and Non-Site Specific Permit 2017-02909, NHDES, October 19, 2017.

SC-6.16

Emergencies:

Add the following new paragraph immediately after Paragraph 6.16.A.:

- B. In emergencies affecting the safety or protection of persons or property or maintenance of temporary construction at the Site or adjacent thereto, and Contractor cannot be reached, Owner may act to attempt to prevent threatened damage, injury, or loss. Owner will give Contractor and Engineer prompt written notice of such action and the cost of the correction or remedy shall be charged against Contractor. A Change Order will be issued to document the change in Contract Price.

SC-6.17

Shop Drawings and Samples:

Add the following new paragraphs immediately after Paragraph 6.17.E.:

- F. Contractor shall furnish required submittals with sufficient information and accuracy in order to obtain required approval of an item with no more than three submittals. Engineer will record Engineer's time for reviewing subsequent submittals of Shop Drawings, samples, or other items requiring approval and Contractor shall reimburse Owner for Engineer's charges for such time.
- G. After Engineer has reviewed and approved a Shop Drawing or Sample, Contractor shall provide the material or equipment approved. Engineer will not review subsequent submittals of a different manufacturer or Supplier unless Contractor provides sufficient information to Engineer that the approved material or equipment is unavailable, time of delivery will delay the construction progress but not as a result of Contractor's failure to timely pursue the Work or to coordinate various activities properly, or Owner requests a different manufacturer or Supplier.

SC-6.19

Contractor's General Warranty and Guarantee

Add the following new paragraph to Article 6.19, of the General Conditions:

- D. The Contractor warrants the Work for a period of one year from substantial completion of the entire project or a part thereof, unless a longer warranty is specified for a particular item or element of the project, in which case the longer warranty period shall govern.

ARTICLE 7. OTHER WORK AT THE SITE

SC-7.04

Add the following new paragraph 7.04 at the end of Article 7 of the General Conditions:

7.04 Damage to the Work or Properties:

- A. Should Contractor cause damage to the work or property of any separate contractor at the site, or should any claim arising out of Contractor's performance of the Work at the site be made by any separate contractor against Contractor, Owner, Engineer, Engineer's Consultants, or any other person, Contractor shall promptly attempt to settle with such other contractor by agreement, or to otherwise resolve the dispute by arbitration or at law. Contractor shall, to the fullest extent permitted by Laws and Regulations, indemnify and hold Owner, Engineer, and Engineer's Consultants, harmless from and against all claims, damages, losses, and expenses (including, but not limited to, fees of engineers, architects, attorneys, and other professionals, and court and arbitration costs) arising directly, indirectly, or consequentially out of any action, legal or equitable, brought by any separate contractor against Owner, Engineer, or Engineer's Consultants, to the extent based on a claim arising out of the Contractor's performance of the Work. Should a separate contractor cause damage to the Work or property of Contractor or should the performance of Work by any separate contractor at the site give rise to any other claim, Contractor shall not institute any action, legal or equitable, against Owner, Engineer or Engineer's Consultants, or permit any action against any of them to be maintained and continued in its name or for its benefit in any court or before any arbiter which seeks to impose liability on or to recover damages from Owner, Engineer, or Engineer's Consultants, on such damage or claim. If Contractor is delayed at any time in performing or furnishing Work by any act or neglect of a separate contractor and Owner and Contractor are unable to agree to the extent of any adjustment in Contract Times attributable thereto, Contractor may make a claim for an extension of times in accordance with Article 12. An extension of the Contract Times shall be Contractor's exclusive remedy with respect to Owner, Engineer, and Engineer's Consultants, for any delay, disruption, interference or hindrance caused by any separate contractor. This paragraph does not prevent recovery from Owner, Engineer, or Engineer's Consultant, for activities that are their respective responsibilities.

ARTICLE 8. OWNER'S RESPONSIBILITIES

SC-8.02

Delete the phrase "to whom the CONTRACTOR makes no reasonable objection."

SC-8.09

Insert the following after the first sentence:

However, the OWNER shall have the right to direct the CONTRACTOR to perform the Work according to any sequence schedule set forth in the Contract Documents or established pursuant thereto.

ARTICLE 9. ENGINEER'S STATUS DURING CONSTRUCTION

SC-9.01

Add a new paragraph 9.01B after paragraph 9.01A of the General Conditions, which is to read as follows:

B. Nothing contained in the Contract Documents shall be construed to create a contractual relationship of any kind (1) between the ENGINEER and CONTRACTOR, (2) between the OWNER and a Subcontractor or Subcontractors, or (3) between any person or entities other than the OWNER and CONTRACTOR. The ENGINEER shall, however, be entitled to performance and enforcement of obligations under the CONTRACT DOCUMENTS intended to facilitate performance of the ENGINEER'S duties.

SC-9.03

Project Representative:

Add the following new paragraphs immediately after Paragraph 9.03.A.:

B. ENGINEER will furnish a Project Representative and assistants to assist ENGINEER in observing the performance of the Work. The duties and responsibility of the Project Representative will be as enumerated in an agreement(s) By and Between the City of Portsmouth and Greenman-Pedersen, Inc. and Weston & Sampson Engineers, Inc.” and will be made available to CONTRACTOR at the start of his work.

SC-9.10

Compliance with Safety Program:

Add the following new paragraph immediately after Paragraph 9.10.A.:

B. In the event Engineer and/or Owner determines that Contractor's safety plans, programs, and procedures do not provide adequate protection for Engineer and/or Owner, Engineer

and/or Owner may direct its employees to leave the Project Site or implement additional safeguards for Engineer's protection. If taken, these actions will be in furtherance of Engineer and/or Owner's responsibility to its own employees only, and Engineer and/or Owner will not assume any responsibility for protection of any other persons affected by the Work. In the event Engineer and/or Owner observes situations which appear to have potential for immediate and serious injury to persons, Engineer may warn the persons who appear to be affected by such situations. Such warnings, if issued, shall be given based on general humanitarian concerns, and Engineer and/or Owner will not, by the issuance of any such warning, assume any responsibility to issue future warnings or any general responsibility for protection of persons affected by the Work.

ARTICLE 10 - CHANGES IN THE WORK; CLAIMS

SC-10.01

Authorized Changes in the Work:

Add the following new subparagraph immediately after Paragraph 10.01.B.:

1. By submission of a Claim, Contractor certifies that the claim is made in good faith, that the supporting data are accurate and complete to the best of Contractor's knowledge and belief, and that the amount or time requested accurately reflects the Contract adjustment for which Contractor believes Owner is liable.

SC-10.03

Execution of Change Orders:

Delete Paragraph 10.03.A.3 in its entirety and replace with the following:

Changes in the Contract Price or Contract Times, and agreed to by owner, which embody the substance of any written decision rendered by Engineer pursuant to Paragraph 10.05; provided that, in lieu of executing any such Change Order, an appeal may be taken from any such decision in accordance with the provisions of the Contract Documents and applicable Laws and Regulations, but during any such appeal, Contractor shall carry on the Work and adhere to the Progress Schedule as provided in Paragraph 6.18.A.

SC-10.05

Claims:

Delete paragraph 10.05.A, 10.05.B, 10.05.C and 10.05.E in their entirety and replace with the following:

- A. **Engineer's Decision Required:** All Contractor claims, except those waived pursuant to Paragraph 14.09, shall be referred to the Engineer for decision. A decision by Engineer shall be required as a condition precedent to any exercise by the Contractor of any rights or remedies the Contractor may otherwise have under the Contract Documents or by Laws and Regulations in respect of such claims.

- B. **Notice:** Written notice stating the general nature of each Claim shall be delivered by the Contractor to Engineer and Owner promptly (but in no event later than 30 days) after the start of the event giving rise thereto. The responsibility to substantiate a Claim shall rest with the Contractor. Notice of the amount or extent of the Claim, with supporting data shall be delivered to the Engineer and the Owner within 60 days after the start of such event (unless Engineer allows additional time for claimant to submit additional or more accurate data in support of such Claim). A Claim for an adjustment in Contract Price shall be prepared in accordance with the provisions of Paragraph 12.01.B. A Claim for an adjustment in Contract Times shall be prepared in accordance with the provisions of Paragraph 12.02.B. Each Claim shall be accompanied by Contractor's written statement that the adjustment claimed is the entire adjustment to which the Contractor believes it is entitled as a result of said event.

- C. **Engineer's Action:** Engineer will review each Claim and, within 30 days after receipt shall take one of the following actions in writing:
 - 1. deny the Claim in whole or in part;
 - 2. approve the Claim; or
 - 3. notify the parties that the Engineer is unable to resolve the Claim if, in the Engineer's sole discretion, it would be inappropriate for the Engineer to do so. For purposes of further resolution of Claim, such notice shall be deemed a denial.

- E. Engineer's written action under Paragraph 10.05.C or denial pursuant to Paragraphs 10.05.C.3 or 10.05.D will be final and binding upon the Contractor, unless the Contractor invokes the dispute resolution procedure set forth in Article 16 within 30 days of such action or denial.

ARTICLE 11. COST OF THE WORK; ALLOWANCES; UNIT PRICE WORK

SC-11.01

Cost of the Work:

In the second sentence of Paragraph 11.01.A.1, delete the word “superintendents.”

SC-11.01

Cost of the Work:

In Paragraph 11.01.B.1 add “superintendents” after “engineers” in the first sentence.

SC-11.02

Allowances:

In Paragraph 11.02.B.1.b, add “Except where Contractor’s costs are allowed in the description of the bid item in Section 01151 - Measurement and Payment,” prior to the first sentence.

SC-11.03

Unit Price Work:

Delete Paragraph 11.03.D in its entirety and insert the following in its place:

- D. The unit price of an item of Unit Price Work shall be subject to reevaluation and adjustment under the following conditions:
 - 1. If the Bid price of a particular item of Unit Price Work amounts to 5 percent or more of the Contract Price and the variation in the quantity of that particular item of Unit Price Work performed by Contractor differs by more than 25 percent from the estimated quantity of such item indicated in the Agreement.
 - 2. If there is no corresponding adjustment with respect to any other item of Work.
 - 3. If Contractor believes that Contractor has incurred additional expense as a result thereof or if Owner believes that the quantity variation entitles Owner to an adjustment in the unit price, either Owner or Contractor may make a claim for an adjustment in the Contract Price in accordance with Article 10 if the parties are unable to agree as to the effect of any such variations in the quantity of Unit Price Work performed.

ARTICLE 12. CHANGE OF CONTRACT PRICE; CHANGE OF CONTRACT TIMES

SC-12.01

Change of Contract Price:

Delete paragraph 12.01.C.1 in its entirety.

SC-12.02

Change of Contract Times:

Delete Paragraph 12.02.A in its entirety and replace with the following:

- A. The Contract Times may only be changed by a Change Order. Contractor's Claim for an adjustment in the Contract Times shall be based on written notice submitted in accordance with the provisions of Paragraph 10.05.

SC-12.04

Liquidated Damages

Add new paragraph immediately after paragraph 12.03E of the General Conditions to read as follows:

If the Contractor shall fail to achieve Substantial Completion and/or Final Completion within the times stipulated in the Contract, it shall be liable to pay the Owner the daily amount as stipulated in the Contract not as a penalty, but as fixed and agreed upon damages for breach of contract. The said amount is fixed and agreed upon because of the difficulty of ascertaining the Owner's actual damages. It is mutually understood that the amount is a reasonable approximation or estimate thereof as of the date of the Contract. The said amount may be withheld from periodic or final payments due to the Contractor, in addition to retainage and other backcharges.

ARTICLE 14. PAYMENTS TO CONTRACTOR AND COMPLETION

SC-14.02

Progress Payments:

Delete paragraph 14.02.A.3 of the General Conditions in its entirety and replace with the following:

3. Partial payments will be made on a monthly basis during the contract period. From the total amount ascertained as payable, an amount equivalent to ten percent (10%) of the whole will be deducted and retained by the Owner up until fifty percent (50%) completion of the work. Five Percent (5%) of the whole will be deducted and retained by the Owner up until substantial completion. At which point the Contractor can request a reduction down to two percent (2%) in accordance with Final Payment.

SC-14.02

Progress Payments:

Add new paragraphs immediately after paragraph 14.02A.3 of the General Conditions to read as follows:

4. Equipment accepted for delivery at the site or at a local bonded warehouse and included in progress estimates in advance of actual requirement will be subject to all conditions stated below.
5. Materials and equipment will not be included in progress estimates until the following requirements have been fulfilled.
 - a. The Contractor must present an invoice to the Engineer for each item of equipment he is requesting payment for. The invoice must be broken down to show the costs for the actual equipment, and reasonable costs for O&M Manuals, spare parts, start-up certification, training, testing, final acceptance testing, and any other services required by Contract.
 - b. Sufficient monies have been allocated in the payment requisition line items to cover all of the costs listed in "a" above, plus the costs of physically installing the equipment.
 - c. The equipment has been submitted and accepted for use in this Project.
 - d. The equipment is acceptably stored and protected. Storage in a bonded warehouse will require proof of bonding, and insurance coverage specifically for the item being stored.

- e. The manufacturer's short and/or long term storage requirements have been received by the Engineer, prior to payment.
 - f. The Contractor has established a program to implement the manufacturer's required storage procedures. Said program to consist of at the very least a written schedule of daily, weekly, monthly, etc., routine maintenance requirements for each piece of equipment. A copy of this schedule to be presented to the Engineer prior to each requisition submittal, signed by the Contractor, stating that the required maintenance has been performed.
 - g. Signed, notarized Title Transfers, format to be furnished by the Engineer, must be furnished for each item of equipment.
6. When the above have been complied with to the satisfaction of the Engineer, payment will be authorized for the full invoice values of the item of equipment, less normal retainage and less all costs for O&M Manuals, spare parts, start-up certification, training, testing, final acceptance testing, and installation.

SC-14.02

Progress Payments:

Amend Paragraph 14.02.C.1. by striking out the words "Ten days" and inserting the words "Thirty days" in their place.

SC-14.02

Progress Payments:

Delete paragraph 14.02.D.1 in its entirety and replace with the following:

1. Owner may refuse to make payment of the full amount recommended by Engineer for reasons that may without limitation include:
 - a. claims have been made against Owner on account of Contractor's performance or furnishing of the Work;
 - b. Owner requires additional supporting documentation of the work;
 - c. Liens have been filed in connection with the Work, except where Contractor has delivered a specific bond satisfactory to Owner to secure the satisfaction and discharge of such Liens;

- d. there are other items entitling Owner to a set-off against the amount recommended;
or
- e. Owner has a reasonable belief of the occurrence of any of the events enumerated in Paragraphs 14.02.B.5.a through 14.02.B.5.c or Paragraph 15.02.A.

SC-14.02

Progress Payments:

Delete paragraph 14.02.D.3 in its entirety.

ARTICLE 16. DISPUTE RESOLUTION

SC-16.01

Methods and Procedures:

Delete Paragraphs 16.01.A, B, and C. in their entirety and replace with the following:

- A. Either Owner or Contractor may request mediation of any Claim or dispute. The parties will endeavor to identify a mutually agreeable mediator and share the costs for such mediation equally. Neither party shall be required to agree to mediation.
- B. Owner and Contractor shall participate in any mediation process in good faith. If held, the process shall be concluded within 60 days of filing of the request.

ARTICLE 17. MISCELLANEOUS

SC-17.06

Delete paragraph 17.06 in its entirety and replace with the following:

17.06 Headings:

- A. The headings or titles of any article, paragraph, subparagraph, section, subsection, or part of the Contract Documents shall not be deemed to limit or restrict the article, paragraph, section, or part.

SC-17.07

Add new paragraph immediately after paragraph 17.06 of the General Conditions as follows:

17.07 Legal Address of Contractor:

- A. Contractor's business address and his office at or near the site of the Work are both hereby designated as places to which communications shall be delivered. The depositing of any letter, notice, or other communication in a postpaid wrapper directed to the Contractor's business address in a post office box regularly maintained by the Post Office Department or the delivery at either designated address of any letter, notice, or other communication by mail or otherwise shall be deemed sufficient service thereof upon Contractor, and the date of such service shall be the date of receipt. The first-named address may be changed at any time by an instrument in writing, executed and acknowledged by Contractor and delivered to Engineer. Service of any notice, letter, or other communication upon the Contractor personally shall likewise be deemed sufficient service.

Insert the following Article immediately after Paragraph 17.01 of the General Conditions as follows:

ARTICLE 18. OSHA CONSTRUCTION SAFETY PROGRAM

18.01 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.

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

18.03 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.

END OF SECTION

SECTION 00331

TV INSPECTION LOGS, MH INSPECTION REPORTS AND FIELD OBSERVATIONS PROVIDED BY THE OWNER

PART I - GENERAL

1.01 PURPOSE:

A. PURPOSE OF LOGS, REPORTS AND FIELD OBSERVATIONS:

1. The purpose of the TV Inspection, Manhole Inspections and Field Observations Logs was to determine the condition of the existing sewer system and assess the extent of cleaning, repairs and/or replacement required for the system.
2. The inspections and observations provided information to prepare the design specifications included in these contract documents and to meet the requirements of the Owner.
3. Information reported from the TV Inspection, Manhole Inspections and Field Observations Logs are those observed in the field at the particular location and time the observations were made, and do not necessarily represent the present conditions.

1.02 SCOPE:

A. TV INSPECTION LOGS:

1. TV Inspection of existing pipelines has been performed, with reasonable care. The results of the inspection program are appended hereto and are a part of the Contract Documents. Videos of what was encountered at the time of the inspection may be seen by appointment, upon request, during the bidding period at the office of Weston & Sampson Engineers, Inc., 100 International Drive Suite 152, Portsmouth, NH or at the office of the Owner. Contractors may, after obtaining Owner's permission, carry out additional pipeline inspection, at no expense to the Owner.
2. TV Inspection Logs provided in the Contract Documents are limited by the methods used for obtaining and expressing such data, and is subject to various interpretations. The terms used to describe conditions encountered are subject to local usage and individual interpretation.
3. TV Inspections have been taken substantially at the locations indicated on the drawings and shown on the logs. Information presented in the inspection logs, as to the pipe condition, material build up in the pipe; etc. is based on visual observation from the videos. Information reported on the TV Inspection logs are those observed in the field at the particular location and at the time the videos were taken, and do not necessarily

represent the present conditions. Condition of the pipeline, material build up in the pipe, and other factors may differ now from those originally observed. Contractors should be aware that present conditions might affect methods of construction.

B. MANHOLE INSPECTION FORMS:

Videos or Photos of what was encountered in the pipelines at the time of the inspection may be seen upon request during the bidding period at the office of Weston & Sampson Engineers, Inc., 100 International Drive Suite 152, Portsmouth, NH. Contractors may, after obtaining Owner's permission, carry out additional manhole inspections at no expense to the Owner.

PART II – MATERIALS – NOT APPLICABLE

PART III. EXECUTION

3.01 EXECUTION:

- A. TV Inspection Logs and Manhole Inspection Reports are for the general information of the Contractors. The Contractors are obligated, to examine the site, records of investigations and other data pertinent to the site, and then, based upon their own interpretations and investigations, decide the character and quantity of material to be encountered, the difficulties or obstacles likely to be encountered, and other conditions affecting the work. The TV Inspection Logs and Manhole Inspection Reports are accurate only at the particular locations and times the original inspections were made. No other warranty, either expressed or implied, by the Owner, Engineer or their agents is made to the accuracy of the information contained on TV Inspection Logs, Manhole Inspection Reports, or other data shown on the drawings or presented in the Contract Documents.

END OF SECTION

\\wse03.local\WSE\Projects\NH_PortsmouthOldServer\Portsmouth NH\2150737 Maplewood\80 Spec\Div 0\00331 TV Insp, MH INsp Logs.doc

SECTION 00890
PERMITS

1. General Requirements

- A. The Owner has obtained or will obtain and pay for the permits listed below, which are required for this project. The Contractor shall assist in obtaining certain permits, as indicated. The Contractor shall obtain and pay for all other permits required, as defined under the Permits subsection of Section 6.08 of the General Conditions, and as amended by the Supplementary Conditions.

PERMITS BY OWNER:

- **City of Portsmouth Conditional Use Permit – Approved**
- **NHDHR – No Adverse Effect Determination (#8803)**
- **NHDES – Wetlands and Non-Site Specific Permit (#2017-02909)**
- **NHDES – Alteration of Terrain (AoT-1352)**
- **NHDES – Water**
- **NHDES – Sewer**

- B. The Contractor shall prepare a Stormwater Pollution Prevention Plan (SWPP) in accordance with requirements of the EPA Phase II Program.
- C. The Contractor shall submit as required a “Notice of Intent” for coverage and authorization to discharge to surface water under EPA - General NPDES Permit for construction dewatering activities and shall be responsible for meeting requirements of said coverage and authorization.
- D. The Contractor shall coordinate with the Department of Public works to obtain any municipal permits required.
- E. The Contractor shall perform the work in accordance with the Contract Documents, including the attached permits/order of conditions, and any applicable municipal requirements.

END OF SECTION

SECTION 01100

SUMMARY

This section is intended to provide the Contractor a summary of project requirements for easy reference. It is not intended to provide all requirements. Refer to Control of Work, Supplemental Specifications and Special Provisions along with the Drawings for details.

PART 1 GENERAL

- 1.01 GENERAL SCOPE OF WORK
- 1.02 TIME OF COMPLETION
- 1.03 SEQUENCING OF WORK
- 1.04 MEETINGS
- 1.05 SUPPLEMENTAL SPECIFICATIONS AND SPECIAL PROVISIONS

1.01 GENERAL SCOPE OF WORK

A. The work under the Contract consist of the following locations:

- (1) Maplewood Avenue
- (2) Woodbury Avenue
- (3) Fairview Drive
- (4) Central Avenue
- (5) Cutts Street
- (6) Beechwood Street
- (7) Ashland Street
- (8) Leslie Drive

B. In addition, the Work under the Contract includes:

- (1) Work outside the Project Site as called for in the Contract Documents and as required for the performance of the Work;
- (2) The restoration of any items damaged or destroyed by encroaching upon areas outside the Project Site;
- (3) Providing and restoring, where appropriate, all temporary facilities;
- (4) All work either shown on the Drawings or included in the specifications unless specifically indicated as not to be done.

C. Work to be completed for this project includes the following:

- (1) New Sanitary Sewers
 - a. 2" to 12" PVC pipes, with manholes, all depths
 - b. Replacement of all sanitary sewer service laterals to homes as directed

- c. Maintain sewer until completion of new system
 - d. Sewer main rehabilitation as directed
 - e. Close circuit television inspection as directed
 - f. Internal plumbing modifications as directed
- (2) New Storm Sewer Drains
- a. 6" to 24" pipes, all depths with manholes and stormwater unit
 - b. Modifications to the existing combined sewer system, to separate combined flows
 - c. Installation of storm sewer laterals whether public or private (for inflow removal)
 - d. Maintain drainage until completion of new systems
- (3) Water Distribution Improvements
- a. 6"-12" CLDI 52 water mains
 - b. Replacement of all water service laterals
 - c. Maintenance of water system without interruption to service to users
 - d. Temporary Water systems
- (4) Roadway and Property Restoration
- a. Roadway gravel reclamation or replacement & fine grading to elevations shown on the plans or as directed
 - b. Pavement & curb Installations
 - c. Concrete sidewalk installation
 - d. Complete restoration of all properties, public and private
 - e. Perform testing of systems prior to paving

1.02 TIME OF COMPLETION

- A. In accordance with the General Conditions, the Work shall start as stated in the Notice to Proceed and shall be completed within the allocated completion time. Work during winter months (December 15 to April 1) shall not be allowed unless permitted by the Owner. Mandatory shut down periods will not be included in the time of completion.
- B. Normal working hours shall be from 7:00 AM to 5:00 PM Monday through Friday, except City Holidays. No construction vehicles shall be started prior to 7:00 AM. Contractor shall refer to the City of Portsmouth Noise Ordinance.
- C. Any request for work outside of these times must be made to the Owner two weeks in advance. The Contractor should not assume any extension of work hours will be granted.
- D. The legal holidays to be observed by the City of Portsmouth, NH in 2018 are shown on the posting from the City Manager dated October 9, 2017 and included at the end of this section.

1.03

SEQUENCING OF WORK (Also refer to SECTION 01310)

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

A. ROAD RECONSTRUCTION

- (1) Provide a schedule, sequence of installation, and material submittals to the owner for review. Mark out and call in dig safe. Prepare for a preconstruction meeting to be held with the neighborhoods. The person in responsible charge for the project should plan on attending the meeting.
- (2) Install and maintain temporary erosion control devices throughout the construction period (including winter shut down periods as required) as shown in the approved SWPPP, on the drawings, or as approved by the engineer.
- (3) Institute exploratory excavation program with engineer to identify potential conflicts at utility crossings. Any exploratory excavation completed outside the limits shown on the drawings without prior approval from the engineer will be at no additional cost to the owner.
- (4) This project has been designed to be constructed using a temporary water main system. The city generally expects that the connections to individual homes will be made underground and not to sillcocks. Hook up, flush and chlorinate the system. After a chemical test is taken by the city and the water is proved to be acceptable, tie ins to the temporary system can take place.
- (5) Proposed pond and CDS unit shall be installed prior to drainage/ sewer separation between McGee Drive and Woodbury Avenue. Stormwater BMPs should be stabilized before conveying stormwater to them.
- (6) Dispose of surplus and unsuitable materials as the work progresses. Stockpiles will not be allowed on site unless approved by the engineer ahead of time. Excavated materials will be loaded into trucks and taken away as work progresses in order to keep the road passable.
- (7) Repair trenches each night with either reclaimed based (if construction phasing allows), suitable excavated subbase or crushed gravel. The trench(es) shall be flat and compacted firm each night. Construct temporary pavement repairs as soon as practical following utility installation and testing.

- (8) Restore road drainage at night prior to leaving the site.
- (9) Finish grading, loam and seed disturbed areas and back up pavement with gravel immediately following pavement repairs.
- (10) Remove all temporary erosion control devices as soon as vegetation is established and areas are stabilized.

B. UTILITY RECONSTRUCTION

- (1) This project consists of complex pipe sequencing issues. It will be necessary to maintain all existing sewage/drainage, gas lines and water systems throughout the duration of the Project. The Contractor shall review sewer, water, and drainage sequencing with the Owner and Engineer. The existing sewer system will need to be maintained to prevent flooding and/or surcharging until new systems are operational as specified in Section 01575 HANDLING EXISTING FLOWS and Section 01535 TEMPORARY BYPASS PUMPING SYSTEM. Gas systems will be maintained and/or protected from damage while other utilities are installed. The need for temporary utilities will depend on the contractor's operations. Temporary water systems installed by the Contractor will be measured for payment only to the amounts identified in the Bid Schedule. Additional systems are subsidiary and will not be measure for payment.

C. TESTING

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

D. PROPERTY RESTORATION

- (1) Loam, seed and mulch and complete property restoration as work progresses.

1.04 MEETINGS

A. Public Information Meetings (see Section 01201)

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

B. Project Meetings (see Section 01200)

- (1) It is anticipated that regular scheduled meetings will be held with Owner's Representatives, Contractor, sub-contractors and regulatory will be held at a maximum frequency of twice monthly, unless weekly meetings are considered necessary by the Contractor, Owner or Engineer.

C. Coordination Meetings

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

1.05 SUPPLEMENTAL SPECIFICATIONS AND SPECIAL PROVISIONS

- A. Division E, Supplemental Specifications and Special Provisions, provides information required to complete the work as shown on the Contract Documents. All other work not fully described in Division E shall be performed in accordance with the New Hampshire Department of Transportation's *Standard Specifications for Road and Bridge Construction, March 2016*.

END SECTION

**CITY OF PORTSMOUTH
PORTSMOUTH, NH 03801**

Office of the City Manager

DATE: October 9, 2017
TO: All Departments
FROM: Nancy Colbert Puff, Acting City Manager *NCP*
RE: *Holidays for 2018*

HOLIDAY

OBSERVED

New Year's Day	Monday, January 1
Dr. Martin Luther King Jr. Day	Monday, January 15
Presidents' Day	Monday, February 19
Good Friday (Half Day)	Friday, March 30
Memorial Day	Monday, May 28
Independence Day	Wednesday, July 4
Labor Day	Monday, September 3
Columbus Day	Monday, October 8
Veterans' Day	Monday, November 12
Thanksgiving Day and Day After	Thursday, November 22 Friday, November 23
Christmas Day	Monday, December 24 Tuesday, December 25

All employees must check their union contract for those holidays permitted.

cc: Honorable Mayor Blalock and City Council Members

SECTION 01110

CONTROL OF WORK AND MATERIALS

PART 1 – GENERAL

Not Used.

PART 2 – PRODUCTS

Not Used

PART 3 - EXECUTION

3.01 HAULING, HANDLING AND STORAGE OF MATERIALS:

- A. The Contractor shall, at its own expense, handle and haul all materials furnished by it and shall remove any of its surplus materials at the completion of the work.
- B. The Contractor shall provide suitable and adequate storage for equipment and materials furnished by it that are liable to injury and shall be responsible for any loss of or damage to any equipment or materials by theft, breakage, or otherwise.
- C. All excavated materials and equipment to be incorporated in the Work shall be placed so as not to injure any part of the Work or existing facilities and so that free access can be had at all times to all parts of the Work and to all public utility installations in the vicinity of the work. Materials and equipment shall be kept neatly piled and compactly stored in such location as will cause a minimum of inconvenience to public travel and adjoining owners, tenants and occupants.
- D. The Contractor shall be responsible for all damages to the work under construction during its progress and until final completion and acceptance even though partial payments have been made under the Contract.

3.02 EASEMENTS:

- A. As indicated on the drawings, the work is located in easements obtained by the Owner. The Contractor has no rights outside of the easements unless they are obtained from the property owner.
- B. Contractor shall schedule work so that it will cause minimum inconvenience and nuisance to abutting property owners, over the shortest possible time.
- C. Easements shall be kept clean; no rubbish or discarded construction materials shall be allowed to accumulate. Storage of excess construction materials, including soil, ledge, equipment, or machinery on easements will not be allowed.

- D. Restoration of fences, shrubs, trees and grass shall be completed promptly following completion of the work in an easement, to minimize disruption and inconvenience to property owners.
- E. Unless approved by the Engineer, the use of easements for ease of access to and egress from other areas of the project will not be permitted.

3.03 OPEN EXCAVATIONS:

- A. All open excavations shall be adequately safeguarded by providing temporary barricades, caution signs, lights and other means to prevent accidents to persons, and damage to property. The Contractor shall, at its own expense, provide suitable and safe means for completely covering all open excavations and for accommodating travel when work is not in progress.
- B. Bridges provided for access to private property during construction shall be removed when no longer required.
- C. The length of open trench will be controlled by the particular surrounding conditions but shall always be confined to the limits prescribed by the Engineer.
- D. If the excavation becomes a hazard, or if it excessively restricts traffic at any point, then special construction procedures shall be taken, such as limiting the length of trench and prohibiting stocking excavated material in the street.
- E. All street excavations shall be completely closed at the end of each work day. Backfilling or use of steel plates (with prior permission of Owner) of adequate strength to carry traffic shall be used.

3.04 TRAFFIC CONTROL:

- A. Unless permission to close the street is received in writing from the proper authority, all excavated materials and equipment shall be placed so that vehicular and pedestrian traffic may be safely maintained at all times.
- B. Whenever and wherever, in the opinion of the Engineer, traffic is sufficiently congested or public safety is endangered, the Contractor, as required, shall furnish uniformed special officers to direct traffic and keep traffic off the highway area affected by his construction operations.
- C. Traffic Control Plan (TCP) shall be submitted to the Engineer, for review and approval by the City of Portsmouth. Road detours (excepting local traffic) are anticipated. Construction warning signs must conform to MUTCD standards, as applicable. Trenches will be backfilled (plates may be used occasionally with prior approval from the Owner) and roads shall be re-opened to provide safe vehicular and pedestrian traffic at the end of each working day. The Plan shall also include the anticipated number of flaggers to be

used for a given work area. Police details shall only be used at major intersections (Woodbury Avenue & Cutts Street). The Engineer reserves the right to request more or fewer flaggers as work progresses and conditions change. Variations to the TCP will be dependent on the Contractors schedule and operations. All temporary detours require approval from the Portsmouth DPW. The Contractor shall coordinate implementation of detours with the DPW. However, the Contractor shall maintain access to properties and driveways throughout construction, to the extent that is possible.

- D. Equipment - Provide necessary barricades, signs and traffic control devices in accordance with approved TCP and Section 01571. Contractor shall provide all portable message signs required for traffic control.
- E. The intent of policing is to ensure public safety by direction of traffic. Police officers are not to serve as watchmen to protect the Contractor's equipment and materials.
- F. Nothing contained herein shall be construed as relieving the Contractor of any of its responsibilities for protection of persons and property under the terms of the Contract.

3.05 INTERFERENCE WITH/ AND PROTECTION OF STREETS:

- A. The Contractor shall not close or obstruct any portion of a street, road, or private way without obtaining permission from the proper authorities. If any street or private way shall be rendered unsafe by the Contractor's operations, he shall make such repairs or provide such temporary ways or guards as shall be acceptable to the Engineer.
- B. Streets, roads, private ways, and walks not closed shall be maintained passable by the Contractor at his expense, and the Contractor shall assume full responsibility for the adequacy and safety of provisions made.
- C. The Contractor shall, 24 hours in advance of closing any street, notify the police and fire departments in writing, with a copy to the Engineer. He shall cooperate with the police department in the establishment of alternate routes and, at his own expense, shall provide adequate, plainly marked detour signs.
- D. The work areas are in residential neighborhoods and pedestrian traffic corridors need to be maintained. The Contractor will need to separate work zones from pedestrian corridors

3.06 CARE AND PROTECTION OF PROPERTY:

The Contractor shall be responsible for the preservation of all public and private property, and shall use every precaution necessary to prevent damage thereto. If any direct or indirect damage is done to public or private property by or on account of any act, omission, neglect, or misconduct in the execution of the work on the part of the Contractor, such property shall be promptly restored by the Contractor, at its expense, to a condition similar or equal to that existing before the damage was done, to the satisfaction of the Engineer.

3.07 PROTECTION AND RELOCATION OF EXISTING STRUCTURES AND UTILITIES:

- A. All existing buildings, utilities, pipes, poles, wires fences, curbing, property line markers and other structures which the Engineer decides must be preserved in place without being temporarily or permanently relocated, shall be carefully supported and protected from damage by the contractor. Should such property be damaged, it shall be restored by the Contractor, at no additional cost to the Owner.
- B. Where the dimensions and locations of existing structures are of importance in the installation or connection of any part of the work, the Contractor shall verify such dimensions and locations in the field before the fabrication of any material or equipment which is dependent on the correctness of such information.
- C. The Contractor shall determine the location of all underground structures and utilities (including existing water services, drain lines, electrical lines, sewer laterals and sewer mains). Services to buildings shall be maintained, and all costs or charges resulting from damage thereto shall be paid by Contractor.
- D. When fences interfere with the Contractor's operations, it shall remove and (unless otherwise specified) promptly restore them in accordance with Section 01564 EXISTING FENCES.
- E. On paved surfaces the Contractor shall not use or operate tractors, bulldozers, or other power-operated equipment with treads or wheels which are shaped so as to cut or otherwise damage such surfaces.
- F. All property damaged by the Contractor's operations shall be restored to a condition at least equal to that in which it was found immediately before work was begun. Suitable materials and methods shall be used for such restoration.
- G. Restoration of existing property and structures shall be carried out as promptly as practicable and shall not be left until the end of the construction period.

3.08 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.
 - a. City of Portsmouth:
 - i. Contractor shall coordinate access, egress, detours and traffic control, if required, with the City of Portsmouth's Police Department. The Contractor shall notify the Portsmouth Police, Fire Department and Rescue Squad at least 24 hours in advance of any street closings or

detours. All fees for police traffic control details or flaggers shall be paid as an allowance under items 618.6 and/or 618.7.

- ii. The Contractor shall be responsible for coordinating and maintaining public services to all public and private properties.
- iii. 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

b. City of Portsmouth: **Department of Public Works (DPW)**

- i. The Contractor shall be responsible for obtaining all opening and utility location permits.
- ii. The Contractor shall be responsible for coordinating access, egress, detours and traffic control on all City roadways with the City DPW.
- iii. The Contractor shall be responsible for coordinating the operation of valves and work in the vicinity of water lines with the DPW.

Portsmouth Water/Sewer Division

600 Peverly Hill Road
Portsmouth, NH 03801
(603) 4247-1552 (Primary contact, DPW Dispatch)
Dispatch (City Emergency Services)
(603) 427-1530
Jim Tow (Water and Sewer)
(603) 610-7264

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

- i. The Contractor shall be responsible with coordinating tree removal and interior plumbing work through City sub-contractors. It should be noted that these City sub-contractors have yearly contracts with the City and may change throughout the course of the project. Contract allowances are provided for the associated work.

Tree Removal

Urban Tree Service
119A Walnut Street
PO Box 1631
Rochester, NH 03866
(603) 332-1246

Interior Plumbing

Hart Plumbing
Bob Hart
PO Box 687

Portsmouth, NH 03801
(603) 431-8688

d. City of Portsmouth: **Power, Cable, Gas and Phone**

- i. The Contractor shall be responsible for coordinating and providing temporary utilities (power, phone, internet) to the construction site.
- ii. 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.
- iii. The Engineer has made initial contact with the utilities regarding the relocation of utility poles to accommodate the proposed work. These are noted on the plans as “By Others” (B.O.). It shall be the Contractor’s responsibility to coordinate the relocation/upgrade work so that it does not interrupt the day to day operations of the work to be completed.
- iv. The Contractor shall be responsible to coordinate protection of all existing gas mains in close proximity to the proposed work.
- v. It will be the Contractor’s responsibility to coordinate with the utility companies for identification and re-location, if necessary, of any utilities that are interfering or conflicting with the work shown on the drawings. Loss of production or crew downtime relating to utility work by others will not be considered for additional payment.
- vi. Service pipes for gas, sewer and water utilities may not be necessarily shown on the drawings, but are to be expected for each building unit. Where buildings have multiple units, multiple services can be expected. The Contractor is expected to coordinate utility markings through Dig Safe, Unitil and the City of Portsmouth, Water and Sewer Department before proceeding with this work. Utility Markings for sewer and water are based on information on file and should be considered approximate. Repairs to damaged utilities either shown on the plans or through markings on the ground will not be measured for payment. Direct conflicts with utilities resulting in the need for relocation of utilities will be measured for payment, utilizing contract unit items, as deemed appropriate by the Engineer. Additional compensation beyond unit items for loss of production, delays or downtime will not be considered.
- vii. Written notice shall be given by the Contractor to all public service corporations or municipal and State officials owning or having charge of publicly or privately owned utilities of his intention to commence operations affecting such utilities at least one week in advance of the commencement of such operations. The Contractor shall, at the same time, file a copy of such notice with the Engineer. It is the Contractor's responsibility to provide adequate notice to all public and private utilities that may be affected by the construction of the project.

The following are the names of owners of the principal utilities affected as well as other major contacts, but completeness of this list is not guaranteed:

DPW Engineering

City of Portsmouth DPW
600 Peverly Hill Road
Portsmouth, NH 03801
Attn: Raymond Pezzullo
(603) 766-1755

Water/Sewer Department

City of Portsmouth Water/Sewer Department
600 Peverly Hill Road
Portsmouth, NH 03801
Attn: Jim Tow
(603) 766-1438

Highway

City of Portsmouth DPW
600 Peverly Hill Road
Portsmouth, NH 03801
Attn: Todd Croteau
(603) 766-1428

Engineer

Greenman-Pedersen, Inc.
21 Daniel Street
Portsmouth, NH 03801
Attn: Joseph Johnson, P.E., PTOE,
(603) 766-8245

Electric

Eversource (PSNH)
Nickolai Kosko
(603) 332-42276

Gas

Unitil
Timothy Patterson
(603) 294-5035

Telephone

Fairpoint
1575 Greenland Road
Greenland, NH
Attn: Joseph Considine
(603) 427-5525

Cable

Comcast
334B Calef Highway
Epping, NH 03042
Attn: Ted Quint
(603) 773-6048

The Contractor's attention is directed to the necessity of making his own investigation in order to assure that no damage to existing structures, drainage lines, etc., will occur. Whatever measures are necessary to protect these lines during work shall be included in the Contract unit price for the items involved.

The locations of existing underground utilities are shown in an approximate way only and have not been independently verified by the owners or representatives. The Contractor shall notify DIG SAFE and procure a Dig Safe Number for each location prior to disturbing existing ground in any way.

- e. The Contractor shall coordinate and sequence daily operations with the City school bus company as well as COAST.
- f. 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 the work.

3.09 MAINTENANCE OF FLOW:

- A. The Contractor shall at its own cost, provide for the flow of sewers and drains interrupted during the progress of the work, and shall immediately cart away and dispose of all offensive matter. The entire procedure of maintaining existing flow shall be fully discussed with the Engineer well in advance of the interruption of any flow.
- B. All existing drainage facilities including, but not limited to; brooks, streams, canals, channels, ditches, culverts, catch basins and drainage piping shall be adequately safeguarded so as not to impede drainage or to cause siltation of downstream areas in any manner whatsoever. If the Contractor damages or impairs any of the aforesaid drainage facilities, it shall repair the same within the same day.
- C. At the conclusion of the work, the Contractor shall remove all silt in drainage structures caused by its operations as described in Section 01710, CLEAN UP.

3.10 PIPE LOCATIONS

- A. Exterior pipelines will be located substantially as indicated on the Contract Drawings, but the right is reserved to the Owner, acting through the Engineer, to make such modifications in location as may be found desirable to avoid interference with existing structures or for other reasons. Where fittings, etc., are noted on the Contract Drawings, such notation is for the Contractor's convenience and does not relieve him from laying and jointing different or additional items where required.
- B. Small interior piping is indicated diagrammatically on the Contract Drawings, and the exact location is to be determined in the field. Piping shall be arranged in a neat, compact, and workmanlike manner, with a minimum of crossing and interlacing, so as not to interfere with equipment or access way, and, in general, without diagonal runs.

3.11 CONSTRUCTION DEWATERING

- A. Trench dewatering may be required to complete the work. The Contractor shall comply with the Environmental Protection Agency's (EPA) National Pollutant Discharge Elimination System (NPDES) General Permit for Construction Dewatering before proceeding with the work. This NPDES general permit covers construction dewatering discharges defined as pumped or drained discharges of groundwater and/or storm water from excavations or other points of accumulation associated with a construction activity. Qualified dischargers must submit a Construction Dewatering NOI to EPA-NE to be covered and will receive a written notification from EPA-NE of permit coverage.
- B. Appropriate sediment and erosion controls shall be operational prior to commencing trench dewatering operations. See Supplemental Specification 1008.52 (02240) for additional information.

3.12 REJECTED MATERIALS AND DEFECTIVE WORK:

- A. Materials furnished by the Contractor and condemned by the Engineer as unsuitable or not in conformity with the specifications shall forthwith be removed from the work by the Contractor, and shall not be made use of elsewhere in the work.
- B. Any errors, defects or omissions in the execution of the work or in the materials furnished by the Contractor, even though they may have been passed or overlooked or have appeared after the completion of the work, discovered at any time before the final payment is made hereunder, shall be forthwith rectified and made good by and at the expense of the Contractor and in a manner satisfactory to the Engineer.
- C. The Contractor shall reimburse the Owner for any expense, losses or damages incurred in consequence of any defect, error, omission or act of the Contractor or its employees, as determined by the Engineer, occurring previous to the final payment.

3.13 SANITARY REGULATIONS:

Sanitary conveniences for the use of all persons employed on the work, properly screened from public observation, shall be provided in sufficient numbers in such manner and at such locations as may be approved. The contents shall be removed and disposed of in a satisfactory manner as the occasion requires. The Contractor shall rigorously prohibit the committing of nuisances within, on or about the work. Any employees found violating these provisions shall be discharged and not again employed on the work without the written consent of the Engineer. The sanitary conveniences specified above shall be the obligation and responsibility of the Contractor.

3.14 PERSONAL PROTECTIVE EQUIPMENT FOR CONTRACTOR PERSONNEL

Contractor is responsible to ensure that all personnel, including all subcontractors, working on the project are issued and are wearing all necessary personal protective safety equipment while working within the project limits. This equipment shall include, as a minimum, a hardhat and a safety vest, regardless of the type of work being performed. Other safety equipment shall be added as required to perform the work in which they are engaged and in accordance with all local, state and federal requirements in effect. Safety equipment shall be provided at no additional cost to the City.

3.15 SITE INVESTIGATION:

The Contractor acknowledges that it has satisfied itself as to the conditions existing at the site of the work, the type of equipment required to perform this work, the quality and quantity of the materials furnished insofar as this information is reasonably ascertainable from an inspection of the site, as well as from information presented by the drawings and specifications made a part of this contract. Any failure of the Contractor to acquaint itself with available information will not relieve it from the responsibility for estimating properly the difficulty or cost of successfully performing the work. The Owner assumes no responsibility for any conclusion or interpretation made by the Contractor on the basis of the information made available by the Owner.

3.16 CONSTRUCTION LAYOUT

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

3.17 SALVAGE OF MATERIALS

- A. Existing drainage catch basin grates and frames and granite curb inlets, shall be salvaged to the City of Portsmouth if determine appropriate by the Engineer. All items selected by the City for salvage shall be delivered to a location specified by the City. The City has the right to salvage additional materials as requested. Contractor is to coordinate delivery of materials within the City.

3.18 REUSE OF MATERIALS

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

3.12 SEWER SERVICE CONNECTIONS:

- A. All sewer service connections shall be identified and located prior to each segment replacement to expedite reconnection.
- B. The Contractor shall affix a written notice to the door of each home that has sewer service on the segment to be replaced 48-hours prior to disconnection of the service and again the day of disconnection.
- C. Services on the segments of mainline scheduled to be pipe burst, shall be disconnected from the existing main and connected to the temporary bypass pumping system prior to bursting.

- D. Flow from the existing sewer services shall be bypass pumped as specified in Section 01575 HANDLING EXISTING FLOWS and in Section 01535 TEMPORARY BYPASS PUMPING SYSTEM.
- E. Once the new mainline is available for connection, the existing service pipeline shall be removed to at or near the property line and replaced as described in Section 02530 BUILDING CONNECTIONS AND DROP CONNECTIONS.

3.20 TEMPORARY EROSION CONTROL

- A. The Contractor shall exercise caution to minimize the intrusion of any spillage, sediment, turbidity, or pollution into the waterways or adjacent properties around the project area, as this watershed drains to waters of the state, including North Mill Pond. Sediment and erosion controls shall be operational prior to commencing trench de-watering operations.

3.21 SIDEWALKS

- A. The project includes the construction of new sidewalks; however, all sidewalks will not be replaced. The Contractor shall protect from damages sidewalks designated to remain, to the extent that is possible. Sidewalks damaged as a result of the Contractor's operations or equipment will be repaired at the Contractor's own cost. Cross sections are provided for grading of sidewalks. Sidewalks will slope towards the curb line, unless otherwise shown or directed. Careful grading around doorways and steps is required to prevent puddling. Sidewalk grading shall be in accordance with ADA requirements. Review sidewalk grading with the Resident Project Representative before concrete is placed.

3.22 GRANITE CURBING

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

3.22 RAISING STRUCTURE COVERS AND GRATES

- A. All structure and casting (sewer and drainage) adjustments shall be paid for under the respective bid items. Adjustment of structures as necessary for reclaim shall be subsidiary to the Contract bid items. The work for reconstructing and adjusting manholes, catch basin and water gates is for any adjustments to grade for existing structures and to allow for one adjustment for proposed structures. All other adjustments for new catch basins or manholes shall be subsidiary to the cost of the structure. Adjustments shall be measured from the existing elevation. No extra payment shall be made for lowering or raising structures for reclaiming activities.

3.23 GEOTECHNICAL INFORMATION (refer to Appendix A)

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

3.24 PRECAUTIONS DURING ADVERSE WEATHER

- A. During adverse weather and against the possibility thereof, the Contractor shall take all necessary precautions so that the work may be properly done and be satisfactory in all respects. When required, protection shall be provided by use of tarpaulins, wood and building-paper shelters, or other suitable means.
- B. During cold weather, materials shall be preheated, if required, and the materials and adjacent structure into which they are to be incorporated shall be made and kept sufficiently warm so that a proper bond will take place and a proper curing, aging or drying will result. Protected spaces shall be artificially heated by suitable means which will result in a moist or dry atmosphere according to the particular requirements of the work being protected. Ingredients for concrete and mortar shall be sufficiently heated so that the mixture will be warm throughout when used.

3.25 CUTTING AND PATCHING

- A. The Contractor shall leave all chases or openings for the installation of his own or any other contractor's or subcontractor's work, or shall cut the same in existing work, and shall see that all sleeves or forms are properly set in ample time to prevent delays. He shall see that all such chases, openings, and sleeves are located accurately and are of proper size and shape and shall consult with the Engineer and the contractors and subcontractors concerned in reference to this work.
- B. In case of his failure to leave or cut all such openings or have all such sleeves provided and set in proper time, he shall cut them or set them afterwards at his own expense, but in so doing he shall confine the cutting to the smallest extent possible consistent with the work to be done. In no case shall piers or structural members be cut without the written consent of the Engineer.
- C. The contractor shall carefully fit around, close up, repair, patch, and point around the work specified herein to the satisfaction of the Engineer.
- D. All of this work shall be done by careful workmen competent to do such work and with the proper small hand tools. Power tools shall not be used except where, in the opinion of the Engineer, the type of tool proposed can be used without damage to any work or structures and without inconvenience or interference with the operation of any facilities. The Engineer's concurrence with the type of tools shall not in any way relieve or diminish the responsibility of the Contractor for such damage, inconvenience, or interference resulting from the use of such tools.

- E. The Contractor shall not cut or alter the work of any subcontractor or any other contractor, nor permit any of his subcontractors to cut or alter the work of any other contractor or subcontractor, except with the written consent of the contractor or subcontractor whose work is to be cut or altered or with the written consent of the Engineer. All cutting and patching or repairing made necessary by the negligence, carelessness, or incompetence of the Contractor or any of his subcontractors shall be done by or at the expense of the Contractor and shall be the responsibility of the Contractor.

3.26 VIBRATION MONITORING

- A. Vibration Monitoring in addition to the vibration monitoring for blasting, required by state and local ordinances, will be provided by the Contractor upon request, if deemed necessary to monitor vibration resulting from the Contractor's equipment, compaction efforts or operations. Vibration monitoring for blasting operations is provided at the Contractor's own expense. The City's blasting ordinance is provided on the City website <https://www.cityofportsmouth.com/cityclerk/city-ordinances>.

3.27 TREE REMOVAL

- A. The Contractor shall coordinate all isolated tree removal and trimming with the City's sub-contractor. An allowance has been established for this work (Item 201.2). No trees within the public right-of-way will be removed without prior approval from the Mayor's Trees and Public Greenery Committee (City of Portsmouth). This approval will be obtained by the City. Tree removal within the limits of Clearing and Grubbing will be performed by the Contractor and paid for under the respective Clearing and Grubbing contract item.

3.28 PROTECTION OF TREES

- A. The Contractor will endeavor to prevent damage to all trees that are designated to remain. Tree limbs that impede normal construction operations will be removed with Engineer and Owner approval. Trees to be removed are shown on the drawings. Additional limb or tree removal is subject to Owner approval. To be used at the discretion of the Engineer, refer to Contract plans for tree protection detail.

3.29 STAGING AREA

- A. The Contractor is required to locate and secure all staging and material storage areas. All staging areas to be secured by the Contractor must be approved in advance by the City. Contractor shall provide a Hold Harmless Release to the City prior to start of use of the staging area. At the completion of work, the Contractor shall receive a release from the property owners of the staging area(s) and a copy of each release shall be provided to the City prior to final acceptance of the project. With City approval, the Contractor may use the side of the roadway for staging of pipe and structures (CB's and manholes) providing the following conditions are met (unless approved otherwise by the City).

- (1) That structures are placed no sooner than one (1) week preceding installation.

- (2) Sidewalks and driveways are unimpeded and a minimum of 20 feet of roadway is maintained as a smooth traveling surface for vehicular traffic.
- (3) That the Contractor will relocate structures upon notification by the City, if deemed necessary to maintain public relations and/or public safety.
- (4) The contractor shall not park in individual driveways or parking areas not owed by the City. Any damage to private areas will be paid for entirely by the contractor.

3.30 ARCHEOLOGICAL SENSITIVITY

- A. No archeologically sensitive areas are identified within the project area. However, in the event that archaeological resources are discovered, then the Contractor and the Owner's Representatives will meet to discuss protocols to be employed by the Contractor.

3.31 WORK ON PRIVATE PROPERTY

- A. The City will obtain homeowner authorization for work on private property. The Contractor will review all sewer and/or drain connection work, pipe locations and grades with the City in advance. Work on private property will need to be scheduled in advance, and the homeowner shall be notified of the Contractor's schedule a week in advance. The City reserves the right to request additional sanitary sewer or storm sewer work, with homeowner's approval, if the work is considered necessary to re-route flows from sewers that will be abandoned by the City. Property restoration, excluding any approved tree removal that may be necessary, is subsidiary to the work and will not be measured for payment. Property restoration will be completed by the Contractor to the existing or better condition.
- B. Work requiring access to buildings will need to be coordinated with the Owner of the property, the Engineer and/or the Portsmouth Sewer Department. Plumbing modifications at building interior, pipe penetration and materials through foundation, and connection outside the foundation, will need to be inspected by the City's Plumbing Inspector. Materials and workmanship shall meet all local ordinances.

3.32 ENVIRONMENTAL PROTECTION

- A. The Contractor shall operate only in those areas approved by the Engineer and shall provide protective measures called for in various Contract Items or at the direction of the Engineer. All protective measures shall be maintained by the Contractor until removal is approved by the Engineer or at the end of the Project.
- B. The Contractor shall maintain all construction and storage areas free of debris and trash.
- C. The Contractor shall be responsible for restoration of disturbed areas as provided for in the various items. Any damage to areas not approved by the Engineer shall be restored at the Contractor expense. Should the Contractor fail to make the necessary repairs, the City may make such repairs and charge them against the Contractor.

- D. Daily maintenance and fueling of equipment shall be conducted away from all wetland areas. The Contractor shall have sufficient materials on hand to control and clean up any spillage. In the event of an accidental spillage within any wetland area, the Contractor shall take immediate action to prevent contamination of wetland areas, and he shall cease operations and notify the Engineer. The cost of clean up of any contamination shall be the responsibility of the Contractor.
- E. Maintenance and repair other than daily requirement shall be done off-site at the Contractor's own facility or service yard.
- F. From time to time the site may be visited or inspected by Local, State or Federal agencies responsible for protection of the environment. The Contractor shall cooperate with the representatives and shall not hinder or impede their work.
- G. All protective measures shall be paid for in the costs of the various items.
- H. The Contractor shall provide for removal of dirt spilled from his trucks on existing pavement over which it is hauled or otherwise deposited whenever in the judgment of the Engineer the accumulation is sufficient to cause the formation of mud or dust or interfere with drainage.
- I. Dust Control: Provide positive methods and apply dust control materials to minimize raising dust from construction operations. Provide positive means to prevent air-borne dust from dispersing into the atmosphere.

3.33 INVASIVE SPECIES

- A. This project shall be managed in a manner that meets the requirements and intent of RSA 430:55 Chapter AGR 3800 relative to invasive species. The Contractor shall follow best management practices (BMP's) to avoid spreading of plants to new sites. The NHDOT manual "Best Management Practices for Roadside Invasive Plants" is available on line at the Department's Website or through the NHDOT Records Section (603) 271-1601.

END OF SECTION

SECTION 01200

PROJECT MEETINGS

PART 1 - GENERAL

1.1 INTRODUCTION

A. Project meeting requirements

1.2 PROJECT MEETINGS (FORMAL)

A. The Contractor shall attend project meetings throughout the progress of the work.

B. Meetings shall be held at a frequency no greater than twice per month.

C. The following representatives of the Contractor shall attend:

1. Superintendent or authorized representative
2. Representative of major subcontractors (when requested)
3. Representatives of major suppliers (when requested)
4. Other representatives as appropriate to agenda topics

D. The Engineer shall prepare and distribute project meeting notes.

E. Sample Agenda

1. Work progress
2. Progress schedule
3. Delivery schedules
4. Submittals
5. Payment applications
6. Change Orders and Field Orders
7. Other items

1.3 WEEKLY COORDINATION MEETINGS (INFORMAL)

A. The contractor's superintendent, the owner, and the resident engineer shall meet weekly to informally discuss the project progress/schedule, sequence, and other issues.

PART 2 - PRODUCTS

(NOT PART OF THIS SECTION)

PART 3 - EXECUTION

(NOT PART OF THIS SECTION)

END OF SECTION

SECTION 01201

COMMUNITY INFORMATION

PART 1 - GENERAL

1.1 INTRODUCTION

- A. Community information requirements of the Contractor.

1.2 COMMUNITY INFORMATION REQUIREMENTS

- A. The Contractor shall be responsible for keeping the Public informed of the progress of the work.
- B. On the date of each scheduled formal project meeting, the Contractor shall complete the following (minimum) requirements:
 - 1. Prepare and post a map representing the work locations for the next two-week period of each work crew.
 - 2. Prepare a brief written narrative of upcoming work and deliver to the Owner for public information and for posting on the local Community Access Channel and/or Website.
 - 3. Provide a system for tracking complaints.
- C. The Contractor shall provide a twenty-four (24) hour contact person for emergencies.

1.3 PUBLIC INFORMATION MEETINGS

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

PART 2 - PRODUCTS

(NOT PART OF THIS SECTION)

PART 3 - EXECUTION

(NOT PART OF THIS SECTION)

END OF SECTION

SECTION 01270

MEASUREMENT AND PAYMENT

PART 1 - DESCRIPTION

1.01 GENERAL:

- A. The following subsections describe the measurement of and payment for the work to be done under the items listed in A-3, BID.
- B. All work performed as described in these contract documents shall be paid for under one or more of the items listed in the BID. All other activities required in connection with performance of the work, including all work required under the GENERAL REQUIREMENTS, whether described in the contract documents or mandated by applicable codes, permits and laws, will not be separately paid for unless specifically provided for in the BID, but will be considered incidental to performance of the overall project.
- C. Each unit or lump sum price stated in the BID shall constitute full compensation as herein specified for each item of work completed in accordance with the drawings and specifications.
- D. The payment items listed herein and in the BID are intended to provide full payment for the work shown on the drawings and specified herein. Any work called for or implied in the documents but not listed as a payment item shall be considered incidental to the overall project.
- E. Unless otherwise noted, all earthwork shall be included under any item requiring excavation. Unless otherwise noted, each item specified or shown on the drawings shall be furnished and installed in accordance with the technical section whether a specific applicable payment item exists or not.
- F. The prices for those items which involve excavation shall include compensation for disposal of surplus excavated material, and installation of all necessary sheeting and bracing.
- G. In all items involving excavation, the price shall be based on doing the entire excavation in earth. Where rock is excavated, the price therefor shall be in addition to the cost of excavating the earth, and no deduction shall be made in the amount for earth excavation.
- H. The price for all pipe items for water mains and fittings, hydrants and valves, and service connections shall constitute full compensation for earth excavation, 12-inch gravel sub-base, sheeting, dewatering, bedding, furnishing, laying, jointing, testing pipe, tracer tape (if required), backfilling, sidewalk replacement, curbing replacement, pavement replacement, loaming and seeding, and cleaning up.

- I. The price for all pipe items for sewers, wyes, tees, building connections, chimneys, pressure sewers, force mains, fittings, valves, service connections, and other pipelines shall constitute full compensation for furnishing, laying, jointing, and testing pipe; earth excavation and backfill; crushed stone bedding; and cleaning up.
- J. When an item of work is designated as a final pay quantity in the Method of Measurement, or Basis of Payment, or Bid Schedule as (F), the estimated bid quantity for that item of work shall be the final pay quantity, unless the dimensions of any portion or the quantity of that item are revised by the Engineer, or the item or any portion of the item is eliminated. If the dimensions of any portion or the quantity of the item are revised, and the revision results in an increase or decrease in the estimated quantity of that item of work, the final pay quantity for the item will be revised in the amount represented by the changes in the dimensions or the quantity. If a final pay item is eliminated, the estimated quantity for the item will be eliminated. If a portion of a final pay item is eliminated, the final pay quantity will be revised in the amount represented by the eliminated portion of the item of work. The estimated quantity for each item of work designated as a final pay quantity in the Method of Measurement or Basis of Payment or Bid Schedule shall be considered as approximate only, and no guarantee is made that the quantity that can be determined by computations, based on the details and dimensions shown on the plans, will equal the estimated quantity. No adjustment will be made in the event that the actual quantity based on measurements / computations does not equal the estimated quantity.

1.02 SEWERS COMPLETE IN PLACE:

- A. The length of sewers to be paid for under the appropriate items 612.61502, 612.61503, 612.61508, and 612.61512 shall be measured by the linear foot along the completed sewers, including wyes and tees, from centerline of manhole to centerline of manhole.
- B. The unit prices under the appropriate subdivisions of these items shall constitute full compensation for constructing the sewers, complete in place, as indicated on the drawings and as specified, including furnishing and installing pipe and fittings, removal and disposal of existing sewer pipes, excavation, backfill, bedding, select material, separation fabric on pipe 12-inch or larger, 12-inch gravel sub-base, clearing, grubbing, testing, removal and replacement of sidewalks and curbing and all work incidental thereto and not specifically included for payment under other items.
- C. Pre and post inspection CCTV and testing shall be considered incidental to the work and shall not be measured separately for payment.
- D. Ten (10) percent may be withheld from payment under the item until the sewer has satisfactorily passed the testing requirements as specified.
- E. Bypass pumping and plugging or blockage of sewer flow shall be considered incidental to the work and shall not be measured separately for payment.

1.03 BUILDING CONNECTIONS SYSTEMS:

A. WYES AND TEES:

1. The unit price to be paid for under the appropriate items 612.81443 and 612.81444 shall be measured for payment per wye or tee installed within the main sewer.
2. The contract unit price under the appropriate sub-divisions of these items shall constitute full compensation for furnishing and installing wyes or tees in the main sewer, complete, as indicated on the drawings and/or specified, including all work incidental thereto and not specifically included for payment under other items.

B. CHIMNEYS:

1. The unit price to be paid for under the appropriate item 612.81445 shall be measured for payment per vertical foot of chimney completed in place. Measurement shall be based on the distance from the crown of the sewer to the plug of the top wye branch of the completed chimney. Minimum vertical height of chimney that will be measured for payment shall be three (3) vertical feet.
2. The contract unit price under the appropriate subdivisions of this item shall constitute full compensation for constructing the chimney, including excavation and backfill, the vertical pipe and encasement, wye and plug at the top, and the additional incremental cost of the transition pipe and fittings needed at the top of the chimney, as shown on the drawings and/or as specified, including all work incidental thereto and not specifically included for payment under other items.

C. BUILDING CONNECTIONS:

1. The length of building connections to be paid for under the appropriate subdivisions of the items shall be measured per linear foot along the horizontal projection of the centerline of the completed building connection, from the centerline of the main sewer to the end of the building connection.
2. Gravity building connections shall be paid at the contract unit price under item 612.81441. This unit price shall include excavation, backfill, 12-inch gravel sub-base, crushed stone and select backfill; furnishing and installing pipe, fittings, detectable tracer tape, end plug, oak marker or fittings required for re-connection; restoration of the ground surface, including gravel subbase and pavement, loaming and seeding, surface restoration, sidewalk and curb replacement, and incidentals necessary to construct the building connections as shown on the drawings and/or as specified.
3. Pressure building connections shall be paid at the contract unit price under item 612.81440. This unit price shall include excavation, backfill, 12-inch gravel sub-base, crushed stone and select backfill; furnishing and installing pipe, fittings,

valves, detectable tracer tape, end plug, oak marker or fittings required for re-connection; restoration of the ground surface, including gravel subbase and pavement, loaming and seeding, surface restoration, sidewalk and curb replacement, and incidentals necessary to construct the building connections as shown on the drawings and/or as specified.

4. Ten (10) percent may be withheld from payment under this item until the building connection has satisfactorily passed the testing requirements as specified.

D. CLEANOUTS:

1. The unit price to be paid under item 612.82606 shall be measured for payment per cleanout installed.
2. The contract unit price under this item shall constitute full compensation for furnishing and installing the cleanout, plug, cover and concrete base complete, as shown on the drawings, including all excavation and backfill.

E. INTERNAL PLUMBING MODIFICATION:

1. Internal plumbing modifications under item 612.81442a shall be paid as an allowance based on the dollar amount of invoices from the City's sub-contractor, submitted with a 15% Contractor markup.
2. The dollar limit (allowance) prescribed in the Bid Schedule shall not limit the Engineer or Owner in determination of the value of the work.
3. The contract unit price for internal plumbing connection modification shall constitute full compensation for the City's subcontractor to supply all material, labor, tools, and equipment required for modifying the existing plumbing to accommodate the new relocated sewer service connection including, but not limited to furnishing, installing, cutting, jointing, and testing pipe and fittings; disconnecting old service and capping/abandonment.
4. All work shall be performed by a New Hampshire licensed plumber and conform to state plumbing requirements.

F. CORING FOR INTERNAL PLUMBING MODIFICATIONS:

1. Coring foundation wall for internal plumbing modifications under item 612.81442b shall be paid per each building core.
2. The contract unit price for coring for internal plumbing modifications shall constitute full compensation for supplying all material, labor, tools, and equipment required for coring and patching the foundation wall to accommodate the new relocated sewer service connection.

1.04 SEWER MANHOLES AND APPURTENANCES:

A. Unless otherwise provided for, the work shall be measured per unit of completed work under the appropriate subdivisions of the items.

B. BASES, FRAMES and COVERS:

1. Bases, frames and covers shall be measured per set installed in place.
2. The unit price for item 604.3141 shall include excavation, crushed stone bedding, and backfill; furnishing and installing base, invert channels, gaskets, sealants, connections and couplings; removal and disposal if replacement and all incidental work necessary to complete the precast concrete base as shown on the drawings and as specified herein.
3. The unit price for this item shall include installing the City's standardized frame and cover furnished by Owner at no cost, and grouting the frame to the brick courses.
4. Bypass pumping and plugging or blocking of sewer flow shall be considered incidental to the work and shall not be measured separately for payment.

C. WALLS AND CONES:

1. Walls and cones shall be measured per vertical foot installed in place. Measurement shall be based on the vertical distance from the invert of the pipeline to the top of the completed frame at finished grade.
2. Walls and cones shall be paid at the contract unit prices under the item 604.3142. The unit price for this item shall include excavation and backfill; furnishing and installing walls, cones, gaskets, seals, steps, and bricks and grout to grade; and all incidentals necessary to complete the precast concrete walls and cones as shown on the drawings and specified herein.

D. CONNECTIONS TO EXISTING SEWER MANHOLE:

1. The work of item 613.012 shall be measured per connection to existing sewer manholes under the item "Connections to Existing Structures."
2. The work of this section shall be paid at the contract unit price for work completed.

E. STUBS & END CAPS:

1. Stubs and end caps shall be measured per stub and end cap installed in place under the item "Stubs and End Caps."

2. Stubs and end caps shall be paid at the contract unit price under the appropriate item 612.61501. The unit price under this item shall include all earthwork, boots, valves, and all incidental work necessary to complete the stub and end cap as shown on the plans and specified herein.

F. DROP CONNECTIONS:

Drop connections shall be measured per vertical foot of the drop connection completed in place under items 613.010 and 613.011. Measurement shall be based on a vertical projection of the distance from the invert of the incoming sewer down to the invert of the completed drop connection. External drop connections shall include concrete encasement in the unit price.

G. REPLACE SEWER MANHOLE FRAME AND COVER:

1. The work of item 613.61a shall be paid per cover and frame replaced.
2. The contract unit price per manhole frame and cover to be paid shall constitute full compensation for installing the City's standardized frame and cover furnished by the Owner at no cost, including the labor, tools, and equipment required to install the manhole frame and cover as specified in Section 02631, PRECAST MANHOLES.
3. Raising of manhole frames and covers shall be paid for under item 604.51.
4. Remove old frame and covers and deliver to the City at no additional cost.

1.05 CURED-IN-PLACE PIPE:

A. General:

1. The work of item 612.15108 shall be measured at the unit price bid per linear foot of lined pipe.
2. Measurement, including all material, labor, tools and equipment shall be based on the actual length of pipes lined as determined by the Engineer. Pipes shall be lined as specified in Section 02428, CURED-IN-PLACE PIPE.
3. Reinstating service connections shall be considered incidental to the work and shall not be measured separately for payment.
4. Bypass pumping and plugging or blocking of sewer flow shall be considered incidental to the work and shall not be measured separately for payment.
5. Television inspection prior to and after relined sewer pipes shall be considered incidental to the work and shall not be measured separately for payment.

- B. Ten percent of the payment for the subdivisions of the item “Cured-in-Place Pipe” shall be withheld until the pipeline rehabilitations have satisfactorily completed and passed field testing/inspection(s) as specified in Section 02428, CURED-IN-PLACE PIPE.

1.06 OPEN CUT POINT REPAIR OF GRAVITY SEWER:

A. POINT REPAIR OF GRAVITY SEWER

1. The work of this item 613.013 shall be measured per linear foot of sewer replaced and per wye connection replaced.
2. The unit prices under the appropriate subdivisions of this item shall constitute full compensation for constructing the sewers, complete in place, as indicated on the drawings and as specified, including proper disposal of existing pipe, furnishing and installing pipe, wyes and fittings, excavation and disposal, 12-inch gravel sub base, backfill, bedding, select material, clearing, grubbing, testing, removal and replacement of sidewalks and curbing, replacement of paving, infrared pavement where specified, pre and post television inspection, and all work incidental thereto and not specifically included for payment under other items as specified in Section 02442, POINT REPAIR OF GRAVITY SEWERS (OPEN-CUT).
3. Bypass pumping and plugging or blocking of sewer flow shall be considered incidental to the work and shall not be measured separately for payment.

1.07 WATER MAINS AND FITTINGS:

- A. Polyethylene encased water mains, including all fittings noted on plans, compacted select backfill (as shown in the water main trench detail), 12-inch gravel sub-base, couplings, **brass wedges**, joint and thrust restraints, and concrete backing, shall be measured per linear foot of water main installed, and shall be paid at the contract unit prices under items 611.05206, 611.05208, 611.05212, and 611.413.
- B. Measurement shall not include valves. The laying length of all valves shall be taken as 12 inches and, for each valve; this length shall be subtracted from the length of pipe measured.
- C. All fittings used to provide clearance beneath existing utilities or hydrant laterals that are not shown on the plans shall be measured per pound and paid for under the item 611.70. The weight of fittings up through 64-inch size shall be measured as compact ductile iron fittings (body weight only).
- D. Ten percent of the payment for the items shall be withheld until the pipeline has satisfactorily passed the pressure test and disinfection requirements.

- E. The cost of making connections to existing water mains shall be considered incidental to the project.
- F. The cost of fittings required for testing and disinfection shall be considered incidental to the project.

1.08 TEMPORARY WATER SERVICE PIPING:

- A. Temporary water service piping shall be measured per linear foot completed as shown on the plans or as required by the Engineer and shall be paid at the contract unit price under the item 611.914. Payment shall include paving, cutting trenches for road crossings, driveway crossings, connections to existing water mains and services, reconnection of existing services, temporary hydrants and valves, disinfection of temporary water service pipe, providing any tools requested by the local Fire Department for the operation of temporary hydrants and all incidental work associated with installing and maintaining temporary water main for the duration of the project.
- B. Individual below ground connections to houses at curb stop shall not be separately measured for payment, but shall be considered incidental to the installation of the temporary water service piping.
- C. Measurement for payment of temporary service piping shall stop at a distance of 40 feet from the last building on terminal pipe runs.

1.09 HYDRANTS AND VALVES:

- A. Hydrants shall be measured per hydrant installed, relocated or removed. Tapping sleeves and valves shall be measured per set installed. Valves shall be measured per valve installed.
- B. Hydrants, tapping sleeve and valve sets and valves shall be paid at the contract price under items 611.71004, 611.71006, 611.71008, 611.71012, 611.81, and 611.814.
- C. The cost of making connections to existing mains, and the cost of joint restraints, couplings and concrete backing shall be considered incidental to the cost of the project.
- D. The cost of providing valve boxes shall be considered incidental to the project.
- E. The cost of removing abandoned valves and/or valve boxes shall be considered incidental to the project.

1.10 SERVICE CONNECTIONS:

- A. Service piping, including couplings, shall be measured per linear foot completed.
- B. Corporation stops, including saddles if required, shall be measured per unit completed.

- C. Curb stops, including curb boxes and couplings, if required, shall be measured per unit completed.
- D. Payment shall be made at the contract unit prices under items 611.5011, 611.5012, 611.51008, 611.51009, 611.5201, and 611.5202.
- E. Payment shall include curb replacement, sidewalk replacement, 12-inch gravel sub-base, temporary and/or permanent trench paving and/or loaming and seeding as required over the service connection.

1.11 ROCK EXCAVATION AND DISPOSAL:

- A. Rock excavated and disposed of off-site by the Contractor shall be measured by the cubic yard, within the payment limits as defined in the trench details or as defined in Paragraph G below. The unit price established by the Engineer under items 203.21a and 203.22a are the minimum unit price to be used for rock excavation. The unit price to be inserted by the Contractor in his bid under items 203.21b and 203.22b are intended to reflect the Contractor's additional costs for performing the rock excavation and disposal, should he decide that the minimum unit price in items 203.21a and 203.22a is insufficient compensation.
- B. Payment for this item includes rock excavation and disposal; furnishing and installing gravel borrow in its place, and providing all required documentation.
- C. Only boulders and concrete structures greater than one cubic yard shall be included for measurement and payment.
- D. Where rock is encountered, it shall be uncovered but not excavated until the Engineer has made measurements, unless, in the opinion of the Engineer, satisfactory measurements can be made in some other manner.
- E. The bidder shall include in the bid for items involving excavation, the cost of doing the entire excavation as earth, the price for Item "Rock Excavation and Disposal" being intended to cover the difference between the cost of rock excavation and the cost of earth excavation.
- F. The cost of pre-blast surveys, vibration air blast monitoring, blasting records and post-blast inspection shall be considered incidental to the cost of rock excavation and disposal and will not be separately paid.
- G. When two or more pipes are installed parallel to one another and the trench payment limits overlap, rock excavation in the overlap section will only be paid once.
- H. For all manholes and structures, measurement will be to one foot outside the widest dimension of the structure or shall be the maximum connecting trench width, whichever is greater. No allowance will be made for overbreakage.

1.12 EARTHWORK:

A. Unless designated otherwise, earthwork shall not be separately measured for payment, but shall be considered incidental to construction of the project.

B. EXCAVATION AND BACKFILL OF UNSUITABLE MATERIAL ABOVE NORMAL GRADE:

1. If, in the opinion of the Engineer, the material at or above normal grade is unsuitable for use as backfill, it shall be removed and disposed of to such depths and widths within the limits of payment as ordered by the Engineer. Normal grade is defined as the elevation of the trench bottom, as shown on the drawings.
2. The quantity of earth excavation and backfill of unsuitable material above normal grade to be included for payment shall be the number of cubic yards of unsuitable material ordered to be removed and measured by the Engineer within the trench payment limit shown on the contract drawings, excluding quantities paid under other items.
3. Topsoil, paving materials, frozen material or ledge excavation above the normal grade of the trench excavation will not be considered for payment.
4. The unit price for this item shall constitute full compensation for excavation of unsuitable material above normal grade and disposal of unsuitable material, excluding materials noted above, and furnishing, installing and compacting approved backfill materials as specified in the Contract Documents.
5. The unit price established by the Engineer under item 203.41a is the minimum unit price to be used for unsuitable material above normal grade. The unit price to be inserted by the Contractor in his bid under item 203.41b is intended to reflect the Contractor's additional costs for performing the excavation of unsuitable material above grade, should he decide that the minimum unit price in item 203.41a is insufficient compensation.
6. The Contractor will not be reimbursed for excavation of unsuitable material above normal grade, which has not been ordered by the Engineer.

C. EXCAVATION AND BACKFILL OF UNSUITABLE MATERIAL BELOW NORMAL GRADE:

1. If, in the opinion of the Engineer, the material at or below normal grade is unsuitable for use as foundation, it shall be removed and disposed of to such depths and within the limits of payment. Normal grade is defined as the elevation of the proposed pipeline trench bottom, as indicated on the drawings.

2. The quantity of earth excavation and backfill below normal grade to be included for payment shall be the number of cubic yards of unsuitable material ordered to be removed and measured by the Engineer within the trench payment limit as indicated on the contract drawings.
3. The unit price for excavation and backfill of unsuitable material below normal grade shall constitute full compensation for excavation of unsuitable material below normal grade, disposal of unsuitable material, and furnishing, installing and compacting approved backfill materials as specified in Section 02300 of the Contract Documents.
4. The unit price established by the Engineer under item 203.42a is the minimum unit price to be used for unsuitable material below normal grade. The unit price to be inserted by the Contractor in his bid under item 203.42b is intended to reflect the Contractor's additional costs for performing the excavation of unsuitable material below grade, should he decide that the minimum unit price in item 203.42a is insufficient compensation.
5. The Contractor will not be reimbursed for excavation of unsuitable material below grade, which has not been ordered by Engineer. The Contractor shall backfill and compact any such over-excavated areas in accordance with the specifications, at no additional cost to the Owner.

D. ADDITIONAL EARTHWORK BELOW NORMAL GRADE:

1. Additional earthwork necessary to lower the pipeline below the grade indicated on the drawings, if ordered by the Engineer, shall be measured per cubic yard and paid at the contract unit price under items "Additional Earthwork Below Normal Grade." Payment shall cover both earth excavation and backfill with excavated material. Payment for the removal, disposal, and replacement of unsuitable material shall be in accordance with Paragraphs B and C above.
2. The unit price established by the Engineer under item 203.31a is the minimum unit price to be used for additional earthwork below normal grade. The unit price to be inserted by the Contractor in his bid under item 203.31b is intended to reflect the Contractor's additional costs for performing the additional earthwork below normal grade, should he decide that the minimum unit price in item 203.31a is insufficient compensation.

E. ADDITIONAL CRUSHED STONE:

1. Additional crushed stone ordered by the Engineer shall be measured in place per cubic yard installed.
2. The unit price under item 304.311 shall constitute full compensation for furnishing and placing crushed stone.

3. The work shall be paid for at the contract unit price.

F. TEST PITS:

1. Test pits as shown or as ordered by the Engineer and not incidental to construction shall be measured per cubic yard excavated and backfilled.
2. Test pits shall be paid at the contract unit price under item 206.19. The unit price under this item shall constitute full compensation for all excavation, backfill, pavement repair, surface restoration, or other work incidental to excavation or restoration of test pits.

G. SPECIAL PIPE BEDDING MATERIAL:

1. The quantity of special pipe bedding to be paid for under item shall be that indicated on the drawings or otherwise ordered by the Engineer in accordance with Section 02300 EARTHWORK, as measured per linear foot of work completed.
2. The unit price for item 304.21 shall constitute full compensation for all filter cloth and crushed stone bedding material installed in place as shown on the drawings, and all work incidental thereto and not specifically included for payment under other items.

H. DAMS:

1. The number of dams shall be measured per dam constructed in place, as shown on the drawings or as required by the Engineer.
2. The unit price for item 613.014 shall constitute full compensation for furnishing and installing dams complete in place as specified and all work incidental thereto and not specifically included for payment under other items.

1.13 SEWER AND DRAIN RECONSTRUCTION:

- A. Reconstruction of sewers and drains shall be measured per sewer or drain reconstructed and shall be paid at the contract unit price under item 613.016.
- B. Only pipe which is not shown on the drawings nor located for the Contractor in the field shall be considered for payment.
- C. Pipes damaged by the Contractor which pass below the proposed pipeline or are outside the specified trench limits shall be repaired by the Contractor at no cost to the Owner.
- D. Service connections damaged by the Contractor shall not be measured separately for payment but shall be considered incidental to the work.

1.14 SURFACE RESTORATION OF CROSS COUNTRY AREAS:

- A. The length of surface restoration to be paid for under the appropriate item 613.017 shall be measured per linear foot of pipe for the portion of the pipeline over which the surface restoration of the cross-country areas designated on the drawings has been completed.
- B. Surface restoration for 6-inch PVC or pressure building connections and copper water service connections shall not be separately measured for payment but shall be considered incidental to construction of the building service.
- C. Surface restoration for 8-inch and 12-inch PVC mainline Easements 1 and 2 shall be measured for payment under this item per linear foot of surface restoration completed. No payment on this item shall be made until the Engineer is satisfied with the surface restoration.
- D. Any existing features that are required to be removed and reset shall not be separately measured for payment, but shall be considered incidental to construction of the pipeline.

1.15 DUST CONTROL (CALCIUM CHLORIDE):

- A. The work of this section shall be measured per pound of calcium chloride applied as ordered by the Engineer and shall be paid under item 613.018.

1.16 DEWATERING:

- A. The work of this section shall be measured on a lump sum basis under item 1008.52 as defined in specification section 02240. The work shall include both dewatering and disposal of the resultant pumped water.
- B. In making up progress estimates, the percentage of the lump sum amount allowed for the Item shall be in the same proportion that the length of completed sewer bears to the total length of sewer indicated on the drawings.
- C. Excavation required for sumps, underdrains, or other work incidental to drainage inside or outside of the limits of payment shall not be separately measured for payment but shall be considered incidental to normal dewatering.
- D. The work of this section shall be paid for work completed, at the contract lump sum price.
- E. Payment for handling existing sewage flows in accordance with the specifications, including providing, installing, and removing all required equipment, piping, and pumping as required shall be made under the designated payment item.

1.17 MOBILIZATION:

The lump sum for item 692 shall constitute full compensation to the Contractor for the general mobilization necessary to make the contract operational, exclusive of the cost of materials. The total for mobilization shall not exceed 10 percent of the total of all bid items excluding this item.

1.18 CLEANING, INSPECTION, TESTING, AND SEALING OF SEWERS FOR CURED-IN-PLACE PIPE:

A. Cleaning and Inspection of Sewers:

1. The work under this item shall be considered incidental to the work and shall not be measured separately for payment.

1.19 SERVICE CONNECTION REHABILITATION FOR CURED-IN-PLACE PIPE:

A. TV Inspecting and Testing Service Connections:

1. The work of this item shall be considered incidental to the work and shall not be measured separately for payment.

B. Grouting Service Connections:

1. The work of this item shall be considered incidental to the work and shall not be measured separately for payment.

C. Cutting Protruding Service Connections:

1. Cutting protruding service connections in accordance with the specifications shall be considered incidental to the work and shall not be measured separately for payment.

1.20 ABANDON EXISTING MANHOLES:

This item shall be considered incidental to the work and shall not be measured separately for payment.

1.21 SUPPORT OF EXCAVATION:

- A. Unless otherwise indicated, the work of this section shall not be separately measured for payment, but shall be considered incidental to the project.
- B. No payment shall be made under this item for trench boxes, sheeting or steel plates used at the Contractor's option in the course of the work.

1.22 SHEETING LEFT IN PLACE:

Unless designated otherwise, the work as specified in Section 02252 - SUPPORT OF EXCAVATION shall not be separately measured for payment, but shall be considered incidental to the pipeline or structure for which it is required.

1.23 SEWER MAINLINE AND LATERAL TESTING FOR CURED-IN-PLACE PIPE:

The work of this section shall not be separately measured for payment, but shall be considered incidental to the project.

1.24 HANDLING EXISTING FLOWS:

Handling existing sewage flows in accordance with the specifications, including providing, installing, and removing all required equipment, piping, and pumping as required shall not be measured separately for payment, but shall be considered incidental to the project.

1.25 TELEVISION INSPECTION VIDEO TAPES:

Television inspection removable drives or DVDs provided to the Owner shall not be separately measured for payment but shall be considered incidental to the project.

1.26 WARRANTY INSPECTION:

All warranty inspections and related work shall not be separately measured for payment but shall be considered incidental to the project.

1.27 LOAMING AND SEEDING:

- A. Loaming and seeding required above the main pipeline outside of Cross Country Easements shall not be separately measured for payment, but shall be considered incidental to the project.
- B. Loaming and seeding required above building service connections shall not be separately measured for payment, but shall be considered incidental to construction of the building service connection.
- C. The work of furnishing and installing a temporary cover crop shall not be separately measured for payment, but shall be considered incidental to the permanent seeding.

1.28 SIGNAGE:

Unless otherwise indicated, the work of this section shall not be separately measured for payment, but shall be considered incidental to the project.

1.29 CONNECTIONS TO EXISTING MAINS:

Unless otherwise indicated, the work of this section shall not be separately measured for payment, but shall be considered incidental to the project.

1.30 ABANDONMENT OF EXISTING MAINS:

Unless otherwise indicated, the work of this section, including plugs, caps, concrete backing, or removal of valves and valve boxes as required, shall not be separately measured for payment, but shall be considered incidental to the project.

1.31 PIPE INSULATION:

Unless otherwise indicated, the work of this section shall not be separately measured for payment, but shall be considered incidental to the project.

1.32 FIELD CONCRETE:

Unless otherwise indicated, the work of this section shall not be separately measured for payment, but shall be considered incidental to the project.

1.33 TRACER TAPE:

Unless otherwise indicated, the work of this section shall not be separately measured for payment, but shall be considered incidental to the project.

1.34 CLEARING AND GRUBBING RELATIVE TO SEWER/WATER:

Unless otherwise indicated, the work of this section shall not be separately measured for payment, but shall be considered incidental to the project.

1.35 PROTECTION AND RELOCATION OF EXISTING STRUCTURES AND UTILITIES:

Unless otherwise indicated, protection or temporary removal and replacement of existing utilities and structures as described in Section 01110 shall not be separately measured for payment, but shall be considered incidental to the project.

1.36 REPLACE WATER GATE VALVE FRAME AND COVER:

Nominal raising of water gate valve frame and cover shall be considered incidental to the work and shall not be measured separately for payment.

1.37 CONCRETE ENCASEMENT:

Unless otherwise indicated, the work of this section shall not be separately measured for

payment, but shall be considered incidental to the project.

1.38 ABANDONING AND REMOVING PIPES AND STRUCTURES:

A. FILL ABANDONED PIPE (STORM SEWER):

1. The work of this item will not be measured for payment, but shall be subsidiary to the Contract.
2. This work shall include furnishing all materials, labor, tools, and equipment necessary to fill abandoned pipes as shown on the plans or as directed by the Engineer.

B. FILL AND ABANDON STRUCTURE (STORM SEWER):

1. The work of this item will not be measured for payment, but shall be subsidiary to the Contract.
2. This work shall include furnishing all materials, labor, tools, and equipment necessary to fill abandoned structures as shown on the plans or as directed by the Engineer.

C. REMOVAL OF CATCH BASINS, DROP INLETS, AND MANHOLES:

1. The work of this item will not be measured for payment, but shall be subsidiary to the Contract.
2. This work shall include furnishing all materials, labor, tools, and equipment necessary to remove catch basins, drop inlets, and manholes as shown on the plans or as directed by the Engineer.

1.39 STRUCTURES AND WALLS:

A. PREFABRICATED MODULAR BLOCK WALL:

1. The work of this item shall be paid by the vertical square yard, complete in place.
2. The contract unit price per square yard shall include full compensation for furnishing all materials, labor, tools, and equipment necessary to install Prefabricated Modular Block Wall as shown on the plans or as directed by the Engineer.
3. The work under this section shall be paid for at the contract unit price per square yard for Item 592.16.

B. RECONSTRUCTING/ADJUSTING CATCH BASINS, DROP INLETS MANHOLES AND SEWER MANHOLES:

1. The work for reconstructing and adjusting manholes is for any adjustments to grade for existing manholes and to allow for one adjustment for proposed structures. All other adjustments for new catch basins or manholes shall be subsidiary to the cost of the structure. Adjustments shall be measured from the existing elevation. No extra payment shall be made for lowering or raising structures for reclaiming activities.
2. The one (1) adjustment shall be paid for at the contract unit price per linear foot measured vertically under Item 604.51, 604.4, and 604.5.

C. ADJUSTING WATER GATES

1. ADJUSTING WATER GATES, will be measured for payment by the each, complete and in place.
2. ADJUSTING WATER GATES, will be paid for at the Contract unit price per each, which price shall include all labor, materials, equipment, and incidental costs required to complete the work. Adjustments from binder to final grade for all water gate boxes shall be paid for under Item 611.90001. This assumes all new water gates have been installed and adjusted to existing grade prior to the roadway reconstruction, this original adjustment is subsidiary to the water gates. Items 611.90001 will provide for one additional adjustment during the course of the project. If the construction schedule requires more than one additional adjustment to structures this additional quantity will be the responsibility of the contractor.

D. SPECIAL MANHOLES (CDS UNIT):

1. The work of this item shall be paid per each Special Manhole (CDS Unit) installed, complete in place.
2. The contract unit price per each shall include full compensation for furnishing all materials, labor, tools, and equipment necessary to install Special Manhole CDS Unit structures as shown on the plans or as directed by the Engineer.
3. The work under this section shall be paid for at the contract unit price for Item 604.391.

E. SPECIAL MANHOLES (DOGHOUSE STRUCTURE):

1. The work of this item shall be paid per each Special Manhole (Doghouse structure) installed, complete in place.
2. The contract unit price per each shall include full compensation for furnishing all

materials, labor, tools, and equipment necessary to install Special Manhole Doghouse Structures as shown on the plans or as directed by the Engineer.

3. The work under this section shall be paid for at the contract unit price for Item 604.392.

1.40 SIDEWALKS, WALKWAYS, AND CURB:

A. 6" CONCRETE SIDEWALK (CURB RAMPS):

1. The work of this item shall be paid by the square yard, complete in place.
2. The contract unit price per square yard shall include full compensation for furnishing all materials, labor, tools, and equipment necessary to install 6" Concrete Sidewalk (Curb Ramps) as shown on the plans or as directed by the Engineer.
3. The work under this section shall be paid for at the contract unit price per square yard for Item 608.26.

B. BRICK ISLAND:

1. The work of this item shall be paid by the square yard, complete in place.
2. The contract unit price per square yard shall include full compensation for furnishing all materials, labor, tools, and equipment necessary to install Brick Islands as shown on the plans or as directed by the Engineer.
3. The work under this section shall be paid for at the contract unit price per square yard for Item 608.6.

C. REMOVE AND REPLACE BRICK WALK:

1. The work of this item shall be paid by the square yard, complete in place.
2. The contract unit price per square yard shall include full compensation for furnishing all materials, labor, tools, and equipment necessary to remove and replace Brick Walk as shown on the plans or as directed by the Engineer.
3. Existing brick shall be used to the maximum extent practicable. Damaged bricks will be replaced by the contractor at not additional cost. Additional brick required shall be furnished by the contractor at no additional cost.
4. The work under this section shall be paid for at the contract unit price per square yard for Item 608.61.

D. REMOVE AND REPLACE FLAGSTONE WALK:

1. The work of this item shall be paid by the square yard, complete in place.
2. The contract unit price per square yard shall include full compensation for furnishing all materials, labor, tools, and equipment necessary to remove and replace Flagstone Walk as shown on the plans or as directed by the Engineer.
3. Existing flagstone shall be used to the maximum extent practicable. Damaged flagstones will be replaced by the contractor at no additional cost. Additional flagstone required shall be furnished by the contractor at no additional cost.
4. The work under this section shall be paid for at the contract unit price per square yard for Item 608.71.

E. STRAIGHT GRANITE CURB, 12" HIGH WITH 3" X 3" MOUNTABLE BEVELED EDGE:

1. The work of this item shall be paid by the linear foot to the nearest 0.1 of a foot, measured from end to end along the lower edge of the exposed face of the curbing, complete in place, except that all special cutting ordered due to changes in the plans will be paid for as provided in Section 109.04 of the NHDOT Standard Specifications.
2. The contract unit price per linear foot shall include full compensation for furnishing all materials, labor, tools, and equipment necessary to install straight granite curb with mountable beveled edge as shown on the plans or as directed by the Engineer.
3. Concrete Class B used as backfill for straight granite curb with mountable beveled edge will not be measured and no additional payment will be made for this Concrete Class B.
4. The work under this section shall be paid for at the contract unit price per linear foot for Item 609.01123.

F. CURVED GRANITE CURB, 12" HIGH WITH 3" X 3" MOUNTABLE BEVELED EDGE:

1. The work of this item shall be paid by the linear foot to the nearest 0.1 of a foot, measured from end to end along the lower edge of the exposed face of the curbing, complete in place, except that all special cutting ordered due to changes in the plans will be paid for as provided in Section 109.04 of the NHDOT Standard Specifications.
2. The contract unit price per linear foot shall include full compensation for furnishing all materials, labor, tools, and equipment necessary to install curved granite curb

with mountable beveled edge as shown on the plans or as directed by the Engineer.

3. Concrete Class B used as backfill for curved granite curb with mountable beveled edge will not be measured and no additional payment will be made for this Concrete Class B.
4. The work under this section shall be paid for at the contract unit price per linear foot for Item 609.01124.

G. REMOVE AND STACK COBBLESTONES:

1. The work of this item shall be paid by the linear foot.
2. The contract unit price per linear foot shall include full compensation for furnishing all materials, labor, tools, and equipment necessary to remove and stack Cobblestones as shown on the plans or as directed by the Engineer.
3. The work under this section shall be paid for at the contract unit price per linear foot for Item 609.6.

H. GRANITE SPLAYED END TRANSITION:

1. The work of this item shall be paid per each Granite Splayed End Transition installed, complete in place.
2. The contract unit price per each shall include full compensation for furnishing all materials, labor, tools, and equipment necessary to install Granite Splayed End Transitions as shown on the plans or as directed by the Engineer. No separate payment will be made for concrete backfill and gravel sub base, but all costs in connection therewith shall be included in the Contract unit price bid.
3. The work under this section shall be paid for at the contract unit price for Item 609.7.

1.41 SIGNS AND TRAFFIC CONTROL:

A. TRAFFIC SIGNS:

1. The work under these items shall be paid by the square foot, measured to the nearest 0.1 of a square foot of area installed.
2. The contract unit price per square foot shall include all necessary posts, footings, bases, and mounting hardware as shown on the plans or as directed by the Engineer.
3. The work under this section shall be paid for at the contract unit price per square

foot for Item 615.0301 and Item 615.0601.

B. RETROREFLECTIVE PREFORMED THERMOPLASTIC PAVEMENT MARKINGS:

1. The work of this item shall be paid by the square foot, measured to the nearest 0.1 of a square foot of area applied.
2. The contract unit price per square foot shall include full compensation for furnishing all materials, labor, tools, and equipment necessary to install retroreflective preformed thermoplastic pavement markings as shown on the plans or as directed by the Engineer.
3. The work under this section shall be paid for at the contract unit price per square foot for Item 632.321.

C. ACTIVE DRIVER FEEDBACK SIGN:

1. The work of this item shall be paid per each Active Driver Feedback Sign installed, complete in place.
2. No separate payment will be made for tree trimming, concrete foundation, post, paint, regulatory speed sign, wiring, sawcutting, excavation, backfill and surface restoration, required for the active driver feedback sign placement as shown on the plans or as ordered by the Engineer.
3. The contract unit price per each shall include full compensation for furnishing all materials, labor, tools, and equipment necessary to install Active Driver Feedback Signs as shown on the plans or as directed by the Engineer.
4. The work under this section shall be paid for at the contract unit price for Item 615.031.

D. RELOCATING HISTORIC SIGN:

1. The work of this item shall be paid per unit for each "Historic Sign" relocated, complete in place.
2. The contract price per unit shall include full compensation for developing and revising, as necessary, a procedure for relocating the Historic Sign, and all labor, tools, materials, storage, transportation, equipment and all incidentals necessary for relocating the Historic Sign to the satisfaction of the Engineer.
3. The work under this section shall be paid for at the contract unit price for Item 615.065.

E. REMOVE AND STACK ENTRY SIGN

1. The work of this item shall be paid per unit for each "Entry Sign" removed and stacked, complete in place.
2. The contract price per unit shall include full compensation for developing and revising, as necessary, a procedure for removing and stacking the Entry Sign, and all labor, tools, materials, storage, transportation, equipment and all incidentals necessary for relocating the Entry Sign to the satisfaction of the Engineer.
3. No separate payment will be made for disconnecting electrical and lighting, excavation and disposal of the existing foundations, backfilling hole, restoration of existing surface, dismantling, loading, transporting and stacking of the signs but all costs in connection therewith shall be included in the Contract unit price bid.
4. Hot Bituminous Pavement for trenching and permanent pavement repairs shall be paid for separately under the appropriate Contract item.
5. The work under this section shall be paid for at the contract unit price for Item 615.066.

F. PEDESTRIAN ACTUATED CROSSING ASSEMBLY:

1. The work of this item shall be paid by the lump sum for each pedestrian actuated crossing assembly, complete in place. An assembly is considered all equipment and materials to accommodate one crosswalk (i.e., two posts and all associated signs, etc. per crosswalk).
2. No separate payment will be made for tree trimming, concrete foundation, steel, paint, signs, pushbuttons, wiring, wireless communications, sawcutting, excavation, backfill and surface restoration, required for the pedestrian actuated crossing assembly placement as shown on the plans or as ordered by the Engineer.
3. The contract lump sum price shall include full compensation for all labor, equipment, tools, supervision, and materials necessary to complete the work associated with construction and installation of pedestrian actuated crossing assembly as shown on the plans and specified herein, The work shall include, but not be limited to tree trimming, excavation, concrete foundation installation, breakaway bracket, erection, electrical work, sawcutting, backfill, surface restoration, wireless communications for each crosswalk location, system programming, testing, and all other work required to complete the pedestrian actuated crossing assembly installation not paid for under other items specified herein.

4. The work under this section shall be paid for at the contract lump sum price for Item 616.21.

G. UNIFORMED OFFICERS:

1. The work of this item shall be measured as an allowance under Item 618.6, based on the dollar amount of invoices from the Police Department, submitted without Contractor markup. Invoices must only reflect the actual hours worked in the field. Hours billed to the Contractor for minimum time requirements that are not hours actually on duty are excluded from payment under this item.
2. The dollar limit (allowance) prescribed in the Bid Schedule shall not limit the Engineer or Owner in determination of the value of the work.

H. FLAGGERS:

1. The work of this item shall be measured by the hour under Item 618.7, based on the actual hours worked in the field. 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. Hours billed to the Contractor for minimum time requirements that are not hours actually on duty are excluded from payment under this item.
2. The dollar limit (allowance) prescribed in the Bid Schedule shall not limit the Engineer or Owner in determination of the value of the work. Payment for uniformed flaggers shall be the actual hours on duty directing traffic.

1.42 EROSION CONTROL AND ENVIRONMENT:

A. OUTLET PROTECTION FENCE:

1. The work of this item shall be paid by the lump sum, complete in place.
2. The contract lump sum price shall include full compensation for the design, layout, materials, labor, and installation.
3. The work under this section shall be paid for at the contract lump sum price for Item 607.2.

B. SILT SACKS:

1. The work of this item shall be paid per each Silt Sack installed, complete in place.
2. The contract unit price per each shall include full compensation for furnishing all materials, labor, tools, and equipment necessary to install Silt Sacks as shown on the plans or as directed by the Engineer. Payment will be made once per

construction season and shall be full compensation for the maintenance, replacement if necessary, removal following construction, and Catch Basin vacuuming of any debris resulting from failed silt sacks.

3. No separate payment will be made for removal and disposal of the sediment from the insert, but all costs in connection therewith shall be included in the Contract unit price bid.
4. The work under this section shall be paid for at the contract unit price per each for Item 645.6.

C. COMPOST SOCK FOR PERIMETER BERM:

1. The work of this item shall be paid by the linear foot to the nearest 1 foot. Measurement will be along the top of each continuous run, complete in place.
2. The contract unit price per linear foot shall include full compensation for furnishing all materials, labor, tools, and equipment necessary to install Compost Sock For Perimeter Berm as shown on the plans or as directed by the Engineer. No additional payment will be made for overlaps, splices or the anchoring of the system.
3. The work under this section shall be paid for at the contract unit price per linear foot for Item 645.512.

1.43 MISCELLANEOUS ROADWAY ITEMS:

A. CRUSHED GRAVEL:

1. Crushed Gravel, of the depth specified will be measured by the cubic yard to the nearest cubic yard from measurements taken in the field.
2. The contract unit price per cubic yard shall include full compensation for furnishing all materials, labor, tools, and equipment necessary to install crushed gravel to the lines and grades as shown on the plans or as directed by the Engineer.
3. The work under this section shall be paid for at the contract unit price per cubic yard for Item 304.301.

B. RECLAIMED STABLIZED BASE:

1. Reclaimed stabilized base, of the depth specified will not be measured, but shall be the square yard final pay quantity for material within the limits shown on the plans.
2. Reclaimed stabilized base, of the depth specified is a final pay quantity and will be paid for at the contract unit price per square yard complete in place.

3. Removal and rehandling or removal of excess material shall be subsidiary to reclaimed stabilized base.

C. VIBRATION MONITORING SERVICES:

1. Construction vibration monitoring for this item will be measured for any additional monitoring ordered by the Engineer that is beyond what is required by state and local ordinances for blasting.
2. Vibration monitoring for blasting will not be measured for payment under this item.
3. The 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.
4. Payment for vibration monitoring shall be based on actual invoices from the subcontractor and submitted to the Engineer. Payment shall be without markup.
5. 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.
6. 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.
7. The work under this section shall be paid for at the contract unit price for Item 211.12.

D. RESET GRANITE POST:

1. The work of this item shall be paid per each Granite Post removed, stored and reset, complete in place.
2. The contract unit price per each shall include full compensation for furnishing all materials, labor, tools, and equipment necessary to reset Granite Posts as shown on the plans or as directed by the Engineer.
3. The work under this section shall be paid for at the contract unit price per each for Item 637.3.

E. REMOVE AND REPLACE MAILBOXES:

1. The work of this item shall be paid by the each, complete in place.

2. The contract unit price per each shall include full compensation for furnishing all materials, labor, tools, and equipment necessary to remove and replace Mailboxes as shown on the plans or as directed by the Engineer.
3. No separate payment will be made for backfilling existing foundations, new foundations and patching of existing surfaces, but all costs in connection therewith shall be included in the Contact unit prices bid. Coordination with the USPS shall be included in the Item.
4. The work under this section shall be paid for at the contract unit price per each for Item 670.067.

1.44 PLANTINGS:

A. TURF ESTABLISHMENT WITH MULCH AND TACKIFIERS – STORM WATER/CONSERVATION MIX:

1. Turf establishment of the type specified will be measured by the square yard to the nearest square yard from measurements taken on the ground surface covered.
2. The work under this section shall be paid for at the contract unit price per square yard for Item 646.315.

B. TREES:

1. Plant material will be measured by the number of units of plants in healthy condition, of the specified sizes and species, furnished and planted.
2. The work under this section shall be paid for at the contract unit price per each for Items 652.1, 652.06 & 652.69.

C. SHRUBS:

1. Plant material will be measured by the number of units of plants in healthy condition, of the specified sizes and species, furnished and planted.
2. The work under this section shall be paid for at the contract unit price per each for Items 655.02, 655.38, 656.53 and 656.73

D. STORM WATER PLANTINGS:

1. Plant material will be measured by the number of units of plants in healthy condition, of the specified sizes and species, furnished and planted.
2. The work under this section shall be paid for at the contract unit price per each for Items 658.736 & 658.915.

E. MISC. LANDSCAPE TREATMENT:

1. Misc. Landscape Treatment (where directed) will be measured as an allowance under Item 1008.51. All landscaping shall be in accordance with NHDOT Sections 650 through 658.
2. The dollar limit (allowance) prescribed in the Bid Schedule shall not limit the Engineer or Owner in determination of the value of the work. Tree removals, tree trimming, specific plantings called for on the plans and all other landscape work with an associated contract item will not be included under Item 1008.51.

1.45 TREE REMOVAL

1. Tree removal, tree trimming and stump grinding, as shown on the plans and as directed by the Engineer, will be measured as an allowance under Item 201.2, based on the dollar amount of invoices from the City's subcontractor, submitted without Contractor markup. The allowance only includes tree removal, trimming and stump grinding that is outside the limits of clearing and grubbing. Tree removal within the limits of clearing and grubbing will be paid for under Item 201.1.
2. The dollar limit (allowance) prescribed in the Bid Schedule shall not limit the Engineer or Owner in determination of the value of the work.

1.46 TREE PROTECTION

1. The work under this item shall be measured for payment at the contract unit price per unit under Item 201.9.
2. Compensation for Tree Protection will be paid for at the contract unit price per each under Item 201.9. This item shall include full compensation for all labor, equipment, materials, and incidentals for the satisfactory completion of the work, including water and fertilizer, and the subsequent removal and satisfactory disposal of the protective materials upon completion of the contract.
 - a. Payment under these items shall be scheduled throughout the length of contract: 30 percent of value shall be paid upon installation, 30 percent approximately halfway through the contract, and the remainder to be paid at the end of the contract after completion of construction operations that would disturb plants and after the protection materials have been removed and properly disposed of off-site by the Contractor.
 - b. Cost of wood chips, as required, shall be incidental to these items.

1.47 HEALTH AND SAFETY PLAN

1. The Health and Safety Plan (HASP) will be measured as a lump sum unit complete, as described in Item 1001.101.
2. Basis of payment – The Contractor will prepare a HASP which will identify procedures and protocols for handling regulated soils or groundwater, if encountered. The HASP will be paid at the contract unit price in accordance with the following percentages:
 - a. Preparation of the HASP - 70%
 - b. Delivery of the Closeout Safety Report - 30%
3. Said unit price will be considered full compensation for the work as described in Item 1001.101 - Health and Safety Plan requirements, including air monitoring equipment and Personal Protection Equipment (PPE).

1.48 MANAGEMENT OF SOILS & MATERIALS

1. Management of Soils and materials including regulated soils and materials, un-regulated soils, surplus soils, surplus materials and separation of materials will be measured will be measured as a lump sum unit under Item 1001.102.
2. Basis of payment – Management of Soils including regulated soils and materials, un-regulated soils, surplus soils, surplus materials and separation of materials will be paid for at the contract unit price per lump sum based on percent complete. Said unit price will be considered full compensation for all activities associated with management of soils, including:
 - a. Identification and characterization of soil regulated by the State of New Hampshire Department of Environmental Services (NHDES).
 - b. Segregation of regulated soils from non-regulated soils.
 - c. Incorporating regulated soils back into the project as backfill trenches wherever possible.
 - d. Coordination with 3rd party for analytical testing of soils, where directed.
 - e. Maintenance of stockpiles and material staging areas in accordance with applicable state and federal regulations.
 - f. Said payment will also be considered full compensation for covering regulated soils and materials to prevent leaching or migration of contaminants into ground water.
 - g. Said unit price shall be considered full compensation for documenting and tracking all excavation materials (regulated and non-regulated) in accordance with applicable local, state and federal regulations. Said documentation shall be provided to the owner at the completion of the project or upon request.
3. Trucking and disposal of surplus regulated soils and materials is included in Items 1001.103 and 1001.104 and is not included in this item.

1.49 LOAD AND HAUL SURPLUS REGULATED SOILS & MATERIALS
(WHERE DIRECTED)

1. Load and Haul surplus regulated soils and materials (where directed) will be measured by the ton based on weight slips from a certified scale at a landfill disposal facility that is approved by the Owner. Copies of slips shall be provided.
2. Measurement will include trucking within 30 miles (one way) of the project site (Turnkey, Rochester NH). Measurement for disposal sites less or greater than 30 miles will be based on the proportionate distances as follows:
$$\text{Ton delivered} \times \text{Actual distance} / 30 \text{ miles}$$
3. Loading, Hauling and Disposal of non-regulated soils will not be measured for payment.
4. Basis of payment – Loading and hauling surplus regulated soils and materials (where directed) will be paid for at the Contract Unit Price (Item 1001.103) per ton delivered to disposal location approved by the Owner.
5. Said unit price shall be considered full compensation for all materials, labor and equipment necessary for loading and hauling to the approved disposal site.
6. Said payment will be considered full compensation for decontamination and cleanup of equipment and staging areas if needed.
7. Disposal of regulated soils and materials (where directed) is included in Item 1001.104 and is not included in this item.

1.50 DISPOSAL OF REGULATED SOILS & MATERIALS (WHERE DIRECTED)

1. Disposal of regulated soils and materials will be measured as an allowance based on weight slips from a certified scale at landfill disposal facility approved by the Owner. Copies of slips shall be provided.
2. Basis of payment – Disposal of contaminated soils and materials will be paid for based on fees charged to the contractor charged by the disposal location. No markup will be allowed for this item. Delivery of the material to the final location will be paid under item 1001.103.

1.51 ANALYTICAL TESTING OF SOILS (WHERE DIRECTED)

1. Analytical testing of soils (where directed) will be measured as an allowance under Item 1001.105, based on the dollar amount of invoices from an approved 3rd party testing company experienced with NHDES soil disposal regulations, submitted without Contractor markup.

2. The dollar limit (allowance) prescribed in the Bid Schedule shall not limit the Engineer or Owner in determination of the value of the work.
3. Analytical testing not approved by the Owner will not be measured.
4. Basis of payment – Payment for Analytical testing of soils will be based on actual invoices from approved 3rd party testing company experienced with NHDES soil disposal regulations. Payment shall be without markup.
5. Coordination of 3rd party testing (where directed) is included in Item 1001.102 and is not included in this item.

1.52 DISPOSAL OF REGULATED GROUNDWATER (WHERE DIRECTED)

1. Disposal of regulated groundwater will be measured as an allowance under Item 1001.106. The allowance has been included in the Bid Schedule.
2. Groundwater that can be discharged to sanitary or storm sewers using temporary erosion and silt control measures will not be measured for payment.
3. Basis of payment – Disposal of regulated groundwater will be on a dollar amount basis in accordance with General Conditions Article 11. The dollar limit (allowance) prescribed in the Bid Schedule shall not limit the Engineer or Owner in determination of the value of the work.

1.53 FIELD OFFICE

1. Field office used on the project by the Engineer will be measured by the month and paid for under Item 698, from the date each field office is completely furnished and ready for occupancy, as determined by the Engineer, to the date that it is released back to the Contractor. Periods of less than one month will be computed at the rate of 1/30 of the unit price per month for each day of occupancy by the Engineer.
2. Payment for each accepted Field Office, installed as specified, will be made at the corresponding Contract unit price per month. Such payment shall constitute full compensation for furnishing and erecting the field office; for providing the specified utilities and maintaining the field office and its equipment throughout the period of usage by the Engineer, including periods of project suspension and for restoration of the field office or physical testing laboratory is needed on the project.

1.54 ASBESTOS-CEMENT PIPE REMOVAL AND DISPOSAL:

1. Asbestos-Cement Pipe removal and disposal shall be paid for at the contract bid price per linear foot under item 613.019 as defined in specification section 02111, irrespective of the size and depth of the main and/or service, which shall include the cost of removing and disposing all pipe material, pipe bend sections, jointing material, restraints, stainless steel stiffeners and all other appurtenances, and of handling, hauling, dewatering, trenching, sheeting, excavating and backfilling, restoring the surface equal to or better than the original condition (unless separate bid item is provided), necessary permits, and all material or work necessary to remove and dispose of the pipe as specified in the Contract Documents and/or as directed by the Engineer.
2. All work shall be in accordance with all applicable federal, state and local regulations and requirements.

1.55 MEASUREMENT AND PAYMENT FOR ALL OTHER ITEMS:

Measurement and Payment of all other items not noted hereinbefore shall be in accordance with the New Hampshire Department of Transportation's *Standard Specifications for Road and Bridge Construction, March 2016*.

END OF SECTION

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SECTION 01310

CONSTRUCTION SCHEDULES

PART 1 - GENERAL

1.1 DESCRIPTION

- A. Work Included: Within ten days after the effective date of the Agreement between Owner and Contractor, submit to the Engineer an estimated progress schedule.
- B. Form of Schedules:
1. Narrative: Completely describe the construction methods to be employed.
 2. Horizontal Bar Chart (i.e., Gantt chart):
 - a. Provide a separate horizontal bar column for each trade or operation.
 - b. Order: Chronological, for each trade and/or operation.
 - c. Horizontal scale: Identify first work day of each week, allow space for updating and revision.
 3. Provide electronic copies of updated schedules upon request.
- C. Content of Schedules:
1. Provide complete sequence of construction by activity. Include sequencing of utilities as identified in the Prosecution of Work (POW) Item 3, Temporary Water Systems and/or other utilities will be dependent on the Contractor's sequencing for work that is in the Owner's best interest, as determined by the Engineer. Other items requiring special consideration, to be identified in schedules include:
 - a. Shop Drawings, Project Data and Samples:
 1. Submittal Dates
 2. Dates reviewed copies will be required.
 - b. Decision dates for:
 1. Products specified by allowances.
 2. Selection of finishes (when applicable).
 - c. Product procurement and delivery dates.
 - d. Dates for beginning and completion of each element of construction.
 2. Identify work of separate phases and logically grouped activities.
 3. Show the projected percentage of completion for each item of work as of the first day of each month.
 4. Provide separate sub-schedules, if requested by the Engineer, showing submittals, review times, procurement schedules, and delivery dates.
- D. Updating:
1. The schedules shall be updated at least every month and for each project meeting.
 2. Show all changes occurring since previous submission.
 3. Indicate progress of each activity, show completion dates.
 4. Include:

- a. Major changes in scope.
 - b. Activities modified since previous updating.
 - c. Revised projections due to changes.
 - d. Other identifiable changes.
5. Provide narrative report, including:
- a. Discussion of problem areas, including current and anticipated delay factors.
 - b. Corrective action taken, or proposed.
 - c. Description of revisions that may affect schedules.

1.2 SUBMITTALS

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

PART 2 - PRODUCTS

(NOT PART OF THIS SECTION)

PART 3 - EXECUTION

(NOT PART OF THIS SECTION)

END OF SECTION

SECTION 01330

SUBMITTALS

PART 1 - GENERAL

1.01 WORK INCLUDED:

- A. The Contractor shall provide the Engineer with submittals as required by the contract documents.

1.02 RELATED WORK:

- A. Divisions D - E of these specifications that require submittals.

PART 2 - PRODUCTS

NOT USED

PART 3 - EXECUTION

3.01 GENERAL:

- A. As required by the General Conditions, Contractor shall submit a schedule of shop and working drawing submittals.
- B. The Contractor shall submit the shop and working drawing submittals either electronically or hard copy.

3.02 ELECTRONIC SUBMITTALS:

- A. In accordance with the accepted schedule, the Contractor shall submit promptly to the Engineer by email (cstairs@gpinet.com) or on Compact Disc (mail to GPI, attention: CLS), one electronic copy in Portable Document Format (PDF) of shop or working drawings required as noted in the specifications, of equipment, structural details and materials fabricated especially for this Contract.
- B. Each electronic copy of the shop or working drawing shall be accompanied by the Engineer's standard shop drawing transmittal form, included as Exhibit 1 of this section (use only for electronic submittals), on which is a list of the drawings, descriptions and numbers and the names of the Owner, Project, Contractor and building, equipment or structure.
- C. The Contractor shall receive a shop drawing memorandum with the Engineer's approval or comments via email.

3.03 HARD COPY SUBMITTALS:

- A. In accordance with the accepted schedule, the Contractor shall submit promptly to the Engineer, by mail (to GPI, attention: CLS), six (6) copies each of shop or working drawings required as noted in the specifications, of equipment, structural details and materials fabricated especially for this Contract.
- B. Each shipment of drawings shall be accompanied by the Engineer's (if applicable) standard shop drawing transmittal form on which is a list of the drawings, descriptions and numbers and the names of the Owner, Project, Contractor and building, equipment or structure.

3.04 SHOP AND WORKING DRAWINGS:

- A. Shop and working drawings shall show the principal dimensions, weight, structural and operating features, space required, clearances, type and/or brand of finish of shop coat, grease fittings, etc., depending on the subject of the drawings. 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 this Contract.
- B. 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. All shop and working drawings shall be prepared on standard size, 24-inch by 36-inch sheets, except those, which are made by changing existing standard shop or working drawings. All drawings shall be clearly marked with the names of the Owner, Project, Contractor and building, equipment or structure to which the drawing applies, and shall be suitably numbered. Each shipment of drawings shall be accompanied by the Engineer's (if applicable) standard shop drawing transmittal form on which is a list of the drawings, descriptions and numbers and the names mentioned above.
- C. Only drawings that have been prepared, 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 Contract Documents in all respects. Shop drawings shall be reviewed and marked with the date, checker's name and indication of the Contractor's approval, and only then shall be submitted to the Engineer. Shop drawings unsatisfactory to the Contractor shall be returned directly to their source for correction, without submittal to the Engineer. Shop drawings submitted to the Engineer without the Contractor's approval stamp and signature will be rejected. Any deviation from the Contract Documents indicated on the shop drawings must be identified on the drawings and in a separate submittal to the Engineer, as required under subsection 6.17 Shop Drawings and Samples; C. Submittal Procedures, Paragraph 3 of the 2007 General Conditions.

- D. The Contractor shall be responsible for the prompt submittal and resubmittal, as necessary, of all shop and working drawings so that there will be no delay in the work due to the absence of such drawings.
- E. The Engineer will review the shop and working drawings as to their general conformance with the design concept of the project and general compliance with the information given in the Contract Documents. Corrections of comments made on the drawings during the review do not relieve the Contractor from compliance with requirements of the Contract Documents. The Contractor is responsible for: confirming and correlating all quantities and dimensions; selecting fabrication processes and techniques of construction; coordinating his work with that of all other trades; and performing his work in a safe and satisfactory manner. The review of the shop drawings is general and shall not relieve the Contractor of the responsibility for details of design, dimensions, code compliance, etc., necessary for interfacing with other components, proper fitting and construction of the work required by the Contract and for achieving the specified performance. The Engineer will review submittals two times: once upon original submission and a second time if the Engineer requires a revision or corrections. The Contractor shall reimburse the Owner amounts charged to the Owner by the Engineer for performing any review of a submittal for the third time or greater.
- F. With few exceptions, shop drawings will be reviewed and returned to the Contractor within 30 days of submittal.
- G. No material or equipment shall be purchased or fabricated especially for this Contract nor shall the Contractor proceed with any portion of the work, the design and details of which are dependent upon the design and details of equipment or other features for which review is required, until the required shop and working drawings have been submitted and reviewed by the Engineer as to their general conformance and compliance with the project and its Contract Documents. All materials and work involved in the construction shall then be as represented by said drawings.
- H. Two copies of the shop and working drawings and/or catalog cuts will be returned to the Contractor. The Contractor shall furnish additional copies of such drawings or catalog cuts when he needs more than two copies or when so requested.

3.05 SAMPLES:

- A. Samples specified in individual Sections include, but are not necessarily limited to, physical examples of the work such as sections of manufactured or fabricated work, small cuts or containers of materials, complete units of repetitively-used products, color/texture/pattern swatches and range sets, specimens for coordination of visual effect, graphic symbols, and units of work to be used by the Engineer or Owner for independent inspection and testing, as applicable to the work.

- B. The number of samples submitted shall be as specified. Submittal and processing of samples shall follow the procedures outlined for shop and working drawings unless the specifications call for a field submittal or mock-up.
- C. Acceptance of samples will be acknowledged via a copy of the transmittal noting status. When samples are not acceptable, prompt resubmittal will be required.

3.06 OPERATING AND MAINTENANCE MANUALS AND SPARE PARTS LISTS:

- A. Where reference is made in technical specification sections to operating and maintenance manuals and/or spare parts lists, the Contractor shall submit four copies to the Engineer for review in accordance with the instructions furnished under "Shop and Working Drawings." If the submittal is complete and does not require any changes, an acknowledgement (copy of transmittal) will be returned noting status. If the submittal is incomplete or does require changes, corrections, additions, etc., two copies of the submittal will be returned with a copy of transmittal noting status. Four copies of the final operating and maintenance manuals and/or spare parts list shall be delivered to the Engineer prior to or with the equipment when it is delivered to the job site. For systems requiring field adjustment and balancing, such as heating and ventilating, the Contractor shall submit separate test results and adjustment data on completion of the work, to be incorporated into the system manual.
- B. The information included in the manual shall be as described in the specification sections, but as a minimum shall contain clear and concise instructions for operating, adjusting, lubricating and maintaining the equipment, an exploded assembly drawing identifying each part by number and a listing of all parts of the equipment, with part numbers and descriptions required for ordering spare parts. Spare parts lists shall include recommended quantity and price.
- C. Operating and maintenance manuals shall be in durable loose-leaf binders, on 8½-inch by 11-inch paper, with diagrams and illustrations either on 8½-inch by 11 inch or multiple foldouts. The instructions shall be annotated to indicate only the specific equipment furnished. Reference to other sizes or models of similar requirement shall be deleted or neatly lined out.

END OF SECTION

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SECTION 01331
DOCUMENTATION

PART 1 – GENERAL

1.01 WORK INCLUDED:

- A. This section covers the requirements for documentation to be furnished by the Contractor on this project.

1.02 RELATED WORK:

- A. Section 02428, CURED-IN-PLACE PIPE
- B. Section 02440, SEWER CLEANING, INSPECTION, TESTING AND SEALING
- C. Section 02442, POINT REPAIR OF GRAVITY SEWERS (OPEN-CUT)
- D. Section 02443, SERVICE CONNECTION REHABILITATION

1.03 DOCUMENTATION:

- A. The Contractor shall maintain printed television inspection logs of sewer segments, for each sewer line segment undergoing repair/rehabilitation under this contract and provide one (1) copy of the logs within five (5) working days of the work being performed. Log sheet format shall be approved by Engineer prior to start of work.
- B. The log sheet(s) as a minimum shall clearly identify:
 - 1. Project Name
 - 2. Street Location, Name, Intersection, Station
 - 3. Date of inspection
 - 4. Total Length of Line Inspected
 - 5. Line Size(s)/Joint Spacing/Type
 - 6. Line and Manhole(s) Condition
 - 7. Significant observations such as service connections, offset joints, drop joints, broken/cracked pipe, protruding services, roots, collapsed sections, infiltration, presence of scale and corrosion and other discernible features.

8. Digital Video Disc (DVD) number and filename.
- C. All logs shall be provided to the Engineer in PDF format (one log per PDF file) at the completion of the project.
- D. All television inspection shall be recorded in MPEG-1 format and shall include accompanying audio. Inspections shall be recorded one at a time, with each segment recorded as a separate file on the DVD. The Contractor shall provide two (2) original and labeled copies of each DVD to the Owner, at no additional cost, as requested by the Engineer during the Project. All DVD's shall have a typed label listing DVD number, date work was performed, Engineer: Weston & Sampson Engineers, Inc., Owner: City of Portsmouth, and Contractor name. Filenames shall contain upstream and downstream sub-area and manhole designations as well as camera direction e.g. "AR-050 to AR-049 Downstream."
- E. The Contractor shall additionally provide one (1) copy of all logs relative to work performed on sewer manholes within five (5) working days of the work being performed.
- F. The Contractor shall take a digital photograph, in JPEG format, at each manhole before and after manhole rehabilitation. Filenames shall contain sub-area and manhole designations e.g. "AR-049." Digital photographs shall have a minimum resolution of four (4) megapixels.
- G. The Contractor shall deliver to the Owner, at no additional cost, two (2) external hard drives each including the following information at the end of the project. The external hard drives shall be USB powered and capable of USB 2.0 connectivity and will become the property of the Owner upon delivery. The Contractor shall use file folders to organize individual types of data on the external hard drives. The Contractor shall include the following data on the external hard drives prior to delivery to the Engineer.
- **Sewer Manhole Rehabilitation**
 - Pre and Post Rehabilitation Manhole Inspection Photos in JPEG format
 - Filenames shall contain sub-area and manhole designations e.g. "AR-059"
 - Each manhole rehabilitation log as a separate PDF file
 - Filenames shall contain sub-area and manhole designations e.g. "AR-049"
 - **Clean, Inspect, Test, and Seal**
 - Television Inspection MPEG-1 Files
 - Filenames shall contain upstream and downstream sub-area and manhole designations as well as camera direction e.g. "AR-050 to AR-049 Downstream."
 - Each television inspection log as a separate PDF file

- Filenames shall contain upstream and downstream sub-area and manhole designations as well as camera direction e.g. “AR-050 to AR-049 Downstream.”
- **Cured-in-Place Pipe – Organized per Inversion**
 - Pre-inversion Television Inspection MPEG-1 Files
 - Filenames shall contain upstream and downstream sub-area and manhole designations as well as camera direction e.g. “AR-050 to AR-049 Downstream.”
 - Each pre-inversion television inspection log as a separate PDF file
 - Filenames shall contain upstream and downstream sub-area and manhole designations as well as camera direction e.g. “AR-050 to AR-049 Downstream.”
 - Each liner order sheet (describing the material ordered) as a separate PDF file
 - Each service connection reinstatement sign-off sheet as a separate PDF file
 - Each thermo couple log kept during inversion process as a separate PDF file
 - Post-inversion Television Inspection MPEG-1 Files
 - Filenames shall contain upstream and downstream sub-area and manhole designations as well as camera direction e.g. “AR-050 to AR-049 Downstream.”
 - Each post-inversion television inspection log as a separate PDF file
 - Filenames shall contain upstream and downstream sub-area and manhole designations as well as camera direction e.g. “AR-050 to AR-049 Downstream.”
 - Each material testing results report as a separate PDF file
- **Service Connection Test and Grout**
 - Television Inspection MPEG-1 Files
 - Filenames shall contain upstream and downstream sub-area and manhole designations as well as camera direction e.g. “AR-050 to AR-049 Downstream.”
 - Each television inspection log as a separate PDF file
 - Filenames shall contain upstream and downstream sub-area and manhole designations as well as camera direction e.g. “AR-050 to AR-049 Downstream.”
- **Point Repair of Gravity Sewer (Open Cut)**
 - Television Inspection MPEG-1 Files
 - Filenames shall contain upstream and downstream sub-area and manhole designations as well as camera direction e.g. “SI-057 to SI-056 Downstream.”
 - Each television inspection log as a separate PDF file
 - Filenames shall contain upstream and downstream sub-area and manhole designations as well as camera direction e.g. “SI-057 to SI-056 Downstream.”

PART 2 – PRODUCTS

Not Used.

PART 3 – EXECUTION

Not Used.

END OF SECTION

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SECTION 01381

AUDIO-VIDEO RECORDING

PART 1 GENERAL

1.01 SCOPE OF WORK

- A. Work under this section consists of furnishing all labor, materials, and equipment necessary to furnish color audio-video digital recording of the existing pre-construction conditions and post-construction conditions of the project area as specified herein.
- B. Furnish to the Engineer an original and one copy of a continuous color audio-video digital recording. The recording shall be taken prior to any construction activity and following final completion.
- C. The Engineer reserves the right to reject the audio-video recording because of poor quality, unintelligible audio or uncontrolled pan or zoom. Any recording rejected by the Engineer shall be re-recorded at no additional cost. Under no circumstances shall construction begin until the Engineer has received and accepted the audio-video record(s).
- D. The recording shall be performed by a qualified, established audio-video recording firm knowledgeable in construction practices and experienced in the implementation of established inspection procedures.

PART 2 PRODUCTS

2.01 AUDIO-VIDEO RECORDS

- A. All materials shall be professional grade CDs or DVDs as directed by the Engineer.
- B. Each recording shall begin with the owner's name, contract name and number, contractor's name, date and location information such as street name, direction of travel, viewing side, etc.
- C. Information appearing on the recording must be continuous and run simultaneously by computer generated transparent digital information. No editing or overlaying of information at a later date will be acceptable.
- D. Digital information will be as follows:
 - 1. Upper left corner: Name of Contractor, Day, Date, Time and Name of Project.

2. Lower left corner: Route of travel, viewing side, direction of travel and stationing.
- E. Time must be accurate to within 1/10 of a second and continuously generated.
- F. Written documentation must coincide with the information on the recording so as to make easy retrieval of locations sought for a later date.
- G. The video system shall have the capability to transfer electronically individual frames of video into hard copy prints or photographic negatives.
- H. Audio shall be recorded at the same time as the video recording and shall have the same information as on the viewing screen. Special commentary will be given for unusual conditions of buildings, sidewalks and curbing, foundations, trees and shrubbery, etc.
- I. All recordings and boxes shall bare labels with the following information: Recording number, Owner's name, Date of recording, Project name and number and Location.

PART 3 EXECUTION

3.01 COLOR AUDIO-VIDEO RECORDING

- A. The recordings shall be of sufficient detail to accurately and clearly show the existing, pre-construction conditions of the entire project area. Each recording shall be accompanied by an audio description of the area being video-recorded with special attention given to areas which could be involved in disputes after completion of construction.
- B. Coverage shall include, but not be limited to, all existing roadways, sidewalks, curbs, driveways, buildings and structures, stonewalls, above ground utilities, landscaping, trees, signage and other physical features located within the zone of influence of the construction. The coverage may be expanded if directed by the Engineer. All recording will be done during daylight hours. No recording shall be performed if weather is not acceptable, such as rain or fog, etc.
- C. Special attention shall be given the I-95 Bridge. Contractor shall take all necessary steps to ensure the pre-construction condition of the bridge is documented.

END OF SECTION

SECTION 01500

TEMPORARY PROVISIONS AND PROTECTION OF UTILITIES AND PROPERTIES

PART 1 GENERAL

1.01 SCOPE OF WORK

- A. The Contractor's attention is directed to the location of underground utilities in the proposed area of work.
- B. The Contract Drawings indicate the approximate location in plan of existing overhead and subsurface utilities in the vicinity of the work.
- C. Whatever measures are necessary to protect these lines during the work shall be included in the contract Unit Price for the various items involved.
- D. In case of damage to utilities, the Contractor shall promptly notify the Owner and shall, if requested, furnish manpower under the Owner's direction in getting access to the utility. Pipes or other structures damaged by the operation of the Contractor may be repaired by the Owner, either the municipality or the utility company. The cost of such repairs shall be borne by the Contractor without compensation.
- E. The locations of existing underground utilities are shown in an approximate way only. The Contractor shall determine the exact location of all existing utilities before commencing work. He agrees to be fully responsible for any and all damages which might be occasioned by his failure to exactly locate and preserve any and all underground utilities. Contractor should note that all services shown should be assumed to be approximate. Additionally it is assumed that there is a service connection to every house, whether shown or not.
- F. The work to be done under this Contract may necessitate changes in the properties of utility companies or the municipality hereinbefore listed. Immediately after executing the Contract, the Contractor shall confer with the owners of all utilities in order that relocations of mains or services may be made at times consistent with operations of this Contract.
- G. The rims of all utility manholes and boxes shall be set to conform to the required grades and the Contractor shall see that all such setting or resetting is substantially and accurately done in conformity with new grades, whether such setting or resetting is done by him or by companies owner controlling same, and shall notify the Engineer of any negligence by the part of the owners of the utilities to perform their work promptly.

1.02 RELATED WORK SPECIFIED ELSEWHERE

SECTION 01300 - SUBMITTALS

SECTION 01570 - TRAFFIC CONTROL AND POLICING

PART 2 PRODUCTS

Not Used

PART 3 EXECUTION

2.01 COORDINATION WITH OTHERS

- A. Before starting any work under this contract, the contractor shall submit a Schedule of Operations. The work schedule shall include a plan of his construction procedures and the safety measures he will use during the prosecution of the work.
- B. The contractor shall coordinate his work with the work to be done by the public utilities or other agencies, and he shall so schedule his operations as to cause the least interruption to the normal flow of traffic in existing roads.
- C. The contractor shall provide, place and erect all necessary barricades and warning signs and maintain adequate lights and illumination. He shall be held responsible for all damage to the work due to any failure of signs and barricades needed to protect the work from traffic, pedestrians or other causes.
- D. The contractor shall assume full charge of space for the storage of materials of all subcontractors and trucks, confining all apparatus, storage of materials and construction operations to the limits indicated by ordinance or permits. He shall allot space for the storage of materials of subcontractors, facilitate the progress of the work, prevent friction, and maintain order and tidiness throughout the project site. Storage areas within the project are limited. The contractor may be required to obtain storage areas outside the project limits at his own expense. The contractor shall enforce any instruction of the owner or the Engineer regarding signs, advertising, fires, danger signals, barricades, smoking, etc.
- E. Existing property markers shall be tied by the contractor with respect to the construction and/or base line with such ties being given to the resident engineer. Such work shall be considered as part of the contractor's incidental work for which no payment will be received.
- F. No extra payment shall be made for scheduling the work or for maintenance of traffic; the cost of which shall be included in the various bid items of the bid.

- G. The casting of all structures, which are required to be set or reset under the pertinent items of this contract or by others, shall not be set complete in place to the established grade until after the bituminous concrete base course has been completed in place as directed.
- H. The contractor shall not proceed with surfacing operations without the specific written approval of the Engineer.
- I. Wherever it is necessary to meet existing surface, the Contractor shall construct a foundation, base and surface to form a continuous smooth roadway.
- J. The contractor shall provide for the removal of all dirt spilled from his trucks on existing pavement over which it is hauled, or otherwise deposited thereon whenever, in the judgment of the Engineer, the accumulation is sufficient to cause the formation of mud or dust to interfere with drainage or create a traffic hazard.
- K. Private property that is disturbed, outside of the construction limits, shall be repaired by the contractor at his own expense. No area shall be used for storage without the permission of the Engineer, and the Contractor may be required to obtain storage areas outside the project limits at his own expense.
- L. Particular care shall be taken to establish and maintain methods and procedures which will not create unnecessary or unusual hazards to public safety. The convenience of the general public along and adjacent to the highway shall be provided for in an adequate and satisfactory manner. Adequate access shall be maintained to all buildings in use. Signs are to be kept clean at all times, and legends shall be distinct and unmarred.
- M. The Contractor shall place and erect the necessary detour signs if proposed and approved by the City. Contractor shall maintain said signs for the duration of the detour.
- N. The Telephone Company and the Electric Company shall install and/or relocate poles and services as required. The Gas Company shall relocate its service as required. The Contractor shall schedule his operation so as to permit regulated public service corporations to remove and temporarily or permanently relocate their property which conflicts with respect to line and grade of any structure to be constructed under this Contract. All other structures which are owned by public service corporations and are within the limits of work shall be protected by the Contractor. Any public service corporation's property which require temporary supports shall be supported by the respective utilities during the period of construction.
- O. Written notice shall be given by the Contractor to all public service corporations or officials owning or having charge of publicly or privately owned utilities or his intention to commence operations affecting such utilities at least one (1) week in

advance of the commencement of such operations that may affect their utilities and the Contractor shall at the same time file a copy of such notice with the Engineer.

- P. For the purpose of observing work that affects their respective properties, inspectors for the municipality, public agencies and the utility companies shall be permitted access to the work, but all official orders and directives to the Contractor shall be issued by the Engineer.

2.02 PUBLIC SAFETY AND CONVENIENCE

- A. Trenches shall not be excavated in traveled ways until all materials and equipment required for such work are at the site and available for immediate use. When work is not in progress, trenches in areas subject to public travel shall be covered with steel plates capable of safely sustaining a 20 ton truck load with impact. The work in each trench shall be practically continuous, with the placing of pipe, backfilling and patching of the surface closely following each preceding operation. Payment for steel plates will be included under the unit bid price per linear foot for each respective pipe item regardless of width of trench.
- B. The Contractor's attention is directed to the MSHTO Guide on Occupational Safety of Highway Construction Projects, subpart N, 1926.550, relating to construction equipment clearances at overhead electric lines, which states in part "...the minimum clearance between the lines and any part of the crane or load must be at least 10 feet from lines rated 50 KV or below, and greater distances for higher voltage...". For the protection of personnel and equipment, the Contractor should be aware of this regulation especially during paving operations using large semi-trailer vehicles.

END OF SECTION

SECTION 01535

TEMPORARY BYPASS PUMPING SYSTEM

PART 1 - GENERAL

1.01 WORK INCLUDED:

- A. This Section includes furnishing of all materials, labor, equipment, power, and maintenance, to implement a temporary pumping system for the purpose of diverting existing sewage flows around the work area for the duration of the project.
- B. The design, installation and operation of the temporary pumping system shall be the Contractor's responsibility. The Contractor shall employ the services of a vendor firm who can demonstrate to the Engineer that it has the required expertise in the design and operation of temporary bypass pumping systems. The vendor firm shall provide at least five references of projects similar in size and complexity to this project that have been performed by the firm within the past three years.
- C. The by-pass system shall meet the requirements of all codes and regulatory agencies having jurisdiction.

1.02 SUBMITTALS: IN ACCORDANCE WITH REQUIREMENTS OF GENERAL SPECIFICATIONS, SUBMIT THE FOLLOWING:

- A. The Contractor shall submit to the Engineer detailed plans and descriptions outlining all provisions and precautions to be taken by the Contractor regarding the handling of existing sewage flows. This plan must be specific and complete, including such items as schedules, locations, elevations, capacities of equipment, materials and all other incidental items necessary and/or required to insure proper protection of the facilities, including protection of the access and bypass pumping locations from damage due to the discharge flows, and compliance with the requirements and permit conditions specified in these contract documents. No construction shall begin until all provisions and requirements have been reviewed by the Engineer.
- C. The plan shall include but not be limited to the following:
 - 1. Staging areas for pumps;
 - 2. Flow diversion method and types of materials;
 - 3. Number, size, material, location and method of installation of suction piping;
 - 4. Number, size, material, method of installation and location of discharge piping;
 - 5. Bypass pump sizes, capacity, number of each size to be on site and the related power requirements;

6. Calculations of static lift, friction losses, and flow velocity (pump curves showing pump operating range shall be submitted);
7. Standby power generator size, location;
8. Downstream discharge plan;
9. Method of protecting suction and discharge areas from erosion and damage;
10. Thrust and restraint block sizes and locations;
11. Sections showing suction and discharge pipe depth, embedment, select fill and special backfill;
12. Method of noise control for each pump and/or generator, with external dB valve.
13. Any temporary pipe supports and anchoring required;
14. Design plans and computation for access to bypass pumping locations indicated on the drawings;
15. Calculations for selection of bypass pumping pipe size;
16. Schedule for installation of and maintenance of bypass pumping lines;
17. Plan indicating proposed location of bypass pumping lines.

1.03 RELATED WORK:

- A. Section 01014, SCOPE AND SEQUENCE OF WORK

PART 2 - PRODUCTS

2.01 EQUIPMENT:

- A. All pumps used shall be centrifugal, end suction, fully automatic self-priming units that do not require the use of foot-valves, diaphragm pumps, isolation valves or vacuum pumps in the priming system. The pumps may be electric or diesel powered. All pumps used must be constructed to allow dry running for long periods to accommodate the cyclical nature of bypass flows. The pumps shall not be hydraulic submersible type.
- B. All pumps shall be Godwin Dri-prime Automatic Self-priming Pumps (CD, DPC, or HL Series) as manufactured by Godwin Pumps of America, Inc., (609) 467-3636, (301) 390-3806, or approved equal.
- C. The Contractor shall provide the necessary stop/start controls for each pump.

- D. The Contractor shall include one stand-by pump system (including suction and discharge piping) of each size to be maintained on site.
- E. Additional back-up pumps shall be on-line, isolated from the primary system by a valve.
- F. Discharge Piping - in order to prevent the accidental spillage of flows, all temporary discharge systems shall be constructed of rigid pipe with positive, restrained joints. Under no circumstances will aluminum "Irrigation" type piping or glued PVC pipe be allowed. Discharge hoses will only be allowed in short sections and with the specific permission of the Engineer.
- G. Allowable piping materials will be Godwin "QD" steel pipe (Godwin Pumps of America, Inc.), or fused, high-density polyethylene pipe as manufactured by Phillips Driscopipe, Inc., or approved equal.

2.02 SYSTEM DESCRIPTION:

A. DESIGN REQUIREMENTS:

1. Bypass pumping systems shall have sufficient capacity to pump a peak flow of 275 gpm for 8" PVC sections and 600 gpm for 12" PVC sections. The Contractor shall provide all pipeline, plugs, pumps of adequate size to handle peak flow, and discharge piping to ensure that the total flow can be safely diverted around the area of work. Bypass pumping system will be required to operate 24 hours per day.
2. The Contractor shall have adequate standby power and pumping equipment available and ready for immediate operation and use in the event of an emergency or breakdown. One standby pump for each size pump utilized shall be installed at the mainline flow bypassing locations, ready for use in the event of primary pump failure.
3. Bypass pumping system shall be capable of bypassing the flow around the work area and of releasing any amount of flow up to full available flow into the work area as necessary for satisfactory performance of work.
4. Where practical flows shall be restored to the existing main at the end of the work day. The Contractor shall make necessary temporary connections as needed.

B. PERFORMANCE REQUIREMENTS:

1. It is essential for the protection of the public safety and private property that there be no interruption in the flow throughout the duration of the project. To this end, the Contractor shall provide, maintain and operate all temporary facilities such as dams, plugs, pumping equipment (both primary and back-up units as required),

conduits, all necessary power, and all other labor and equipment necessary to intercept the sewage flow before it reaches the point where it would interfere with his work, carry it past his work and return it to the existing sewer main downstream of his work.

2. The design, installation and operation of the temporary pumping system shall be the Contractor's responsibility. The bypass system shall meet the requirements of all codes and regulatory agencies having jurisdiction.
3. The Contractor shall provide all necessary means to safely convey the sewage flow past the work area. The Contractor will not be permitted to stop or impede the flows under any circumstances.
4. The Contractor shall maintain flow around the work area in a manner that will not cause surcharging or significant level variations sewer main, and that will protect public and private property from damage and flooding.
5. The Contractor shall protect water resources, wetlands and other natural resources.
6. The Contractor shall be responsible to meet noise requirements (73dbA @ 30'). All diesel driven primary and standby pumps shall be sound attenuated. The use of Critical Silenced Canopy Pumps or acoustical Whisper Pac enclosures for sound attenuation is required.

PART 3 - EXECUTION

3.01 FIELD QUALITY CONTROL AND MAINTENANCE.

- A. The Contractor shall perform leakage and pressure tests of the bypass pumping discharge piping using clean water prior to actual operation. The Engineer shall be given 24 hours notice prior to testing.
- B. Contractor shall inspect bypass pumping system every two hours to ensure that the system is working correctly.
- C. The Contractor shall insure that the temporary pumping system is properly maintained and a responsible operator shall be on hand at all times when pumps are operating.
- D. Spare parts for pumps and piping shall be kept on site as required.
- E. Adequate hoisting equipment for each pump and accessories shall be maintained on the site.

3.02 PRECAUTIONS:

- A. Contractor is responsible for locating any existing utilities in the area the Contractor selects to locate the bypass pipelines. The Contractor shall locate his by pass pipelines to minimize any disturbance to existing utilities and shall obtain approval of the pipeline locations from the Owner and the Engineer. All costs associated with relocating utilities and obtaining all approvals shall be paid by the Contractor.
- B. During all bypass pumping operation, the Contractor shall protect the work area and all local utilities from damage inflicted by any equipment. The Contractor shall be responsible for all physical damage to public and private property caused by human or mechanical failure.

3.03 INSTALLATION AND REMOVAL:

- A. The Contractor shall construct temporary bypass pumping structures only at the access locations indicated on the drawings and may be required to provide adequate suction conduit.
- B. Diverting or blocking of sewage flows shall incorporate primary and secondary devices. When diversion or blocking is no longer needed for performance and acceptance or work, it is to be removed in a manner that permits the flow to slowly return to normal without surge, to prevent surcharging or causing other major disturbances downstream.
- C. The Contractor shall exercise caution and comply with OSHA requirements when working in the presence of gases, combustible or oxygen-deficient atmospheres, and confined spaces.
- D. Except as specifically permitted, the installation of the bypass pipelines is prohibited in all salt marsh/wetland areas. The pipeline must be located off streets and sidewalks and on shoulders of the roads. When the bypass pipeline crosses local streets and private driveways, the Contractor must place the bypass pipelines in trenches and cover with temporary pavement. Upon completion of the bypass pumping operations, and after the receipt of written permission from the Engineer, the Contractor shall remove all the piping, restore all property to pre-construction condition and restore all pavement. The Contractor is responsible for obtaining any approvals from the Owner for placement of the temporary pipeline within public ways.

END OF SECTION

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SECTION 01564

EXISTING FENCES

PART 1 - GENERAL

1.01 DESCRIPTION:

- A. This section of the specification covers the removal and resetting of existing fences.
- B. Where the removal of existing fences, at locations shown on the plans and where required by the Engineer, is required, the Contractor shall remove and reset such fences as required by the Engineer.

PART 2 - PRODUCTS

2.01 FENCING:

- A. The materials removed shall be utilized to reset the fence. Where necessary, new posts and bases shall be furnished and installed by the Contractor. Any materials damaged or lost during or subsequent to removal shall be replaced by the Contractor without additional compensation.
- B. All new materials required shall be equal in quality and design to the materials in the existing fences.

PART 3 - EXECUTION

3.01 REMOVAL OF EXISTING FENCES:

- A. The existing fences shall be carefully removed together with all appurtenances and satisfactorily stored and protected until required for resetting.

3.02 ERECTION:

- A. Fences shall be reset plumb and to the grades required and shall conform to the original fence or as the Engineer requires. Backfilling around the posts shall consist of suitable material satisfactorily compacted. If the fence posts were originally set in concrete bases they shall be reset in concrete bases.

3.03 PAINTING:

- A. Painting, if required, shall be done as required by the Engineer.

END OF SECTION

SECTION 01567

POLLUTION CONTROL & ENVIRONMENTAL PROTECTION

PART 1 GENERAL

1.01 SCOPE OF WORK

- A. This work shall consist of temporary and permanent control and restoration measures as hereinafter stated or ordered by the Engineer during the life of the Contract to control water pollution and erosion (through use of berms, dikes, dams, sediment basins, fiber mats, netting, gravel, mulches, grasses, slope drains and other erosion and pollution control devices or methods) and to limit disturbance and/or alteration of the natural environmental setting.
- B. The temporary pollution control and environmental protection and restoration provisions contained herein shall be coordinated with detailed construction specifications elsewhere in the Contract to the extent practical to assure economical, effective and continuous pollution and erosion control, and environmental protection and restoration throughout the construction and post construction period.
- C. All work shall also be in compliance with the Order of Conditions issued by the Palmer Conservation Commission and included herein.

1.02 RELATED WORK SPECIFIED ELSEWHERE

- A. This is a general section and relates to any and all other sections wherein the work might result in pollution or environmental damage.
- B. SECTION 01710 - CLEAN UP

PART 2 - PRODUCTS

2.01 POLLUTION AND EROSION CONTROL MATERIALS

- A. Mulches may be hay, straw, fiber mats, netting, wood cellulose, corn or tobacco stalks, bark, corncobs, wood chips, or other suitable material acceptable to the Engineer and shall be reasonably clean and free of noxious weeds and deleterious materials.
- B. Slope drains may be constructed of pipe, fiber mats, riprap, plastic sheets, or other material acceptable to the Engineer that will adequately control pollution.

- C. Grass shall be quick growing species (such as rye grass, Italian rye grass, or cereal grasses) suitable to the area providing a temporary cover which will not later compete with grasses sown for permanent cover.
- D. Fertilizer and soil conditioners shall be a standard commercial grade acceptable to the Engineer. The use of fertilizer is prohibited in both the vegetated buffer strip and limited cut area. Beyond the limited cut area, only low phosphate and slow release fertilizers are allowed in the wetland buffer. The wetland buffer extends from any wetland 100 feet upland.
- E. Flake calcium chloride shall be used for dust control.

PART 3 EXECUTION

3.01 PRECONSTRUCTION CONFERENCE

- A. At the preconstruction conference or prior to the start of the applicable construction, the Contractor shall submit to the Engineer for acceptance his schedules for accomplishment of temporary and permanent pollution and erosion control and environmental protection and restoration work, as are applicable for clearing and grubbing and general construction. The Contractor shall also submit for approval his proposed method of disposal of unsuitable material and restoration of disturbed land to its original (prior to construction) condition, either at the time of the pre-construction conference or prior to the starting of any work. No work shall be started until schedules and methods of operations have been approved by the Engineer.

3.02 PROCEDURAL DETAILS

- A. The Engineer shall have the authority to limit the area of erodible earth exposed by construction and to direct the Contractor to provide immediate permanent or temporary pollution control and environmental protection measures to prevent contamination of adjacent streams or other watercourses, ponds, or other areas of water impoundment. Such work may involve the construction of temporary mulches, mats, seeding or other control devices or methods as required by the conduct of the work.
- B. The Contractor shall be required to incorporate all permanent pollution control and environmental protection features into the project at the earliest practical time as outlined in his approved schedule. Temporary pollution control and environmental protection measures will be used to correct conditions that develop during construction that were not foreseen during the design stage; that are needed prior to installation of permanent pollution control or environmental protection features; or that are needed temporarily.

C. The Contractor shall undertake and comply with the following measures with respect to adverse environmental impacts, resulting from the operations listed below.

1. Clearing/Grubbing - Disturbed areas shall be temporarily reseeded at the direction of the Engineer.
2. Material Storage - Materials shall be stored only at approved locations. Petroleum products shall be stored away from wetland areas.
3. Excavation - The Contractor shall use care to contain wet fill where it is dumped. When material is stockpiled next to a trench, the side away from neighboring brooks, swamps, canals, etc., shall be utilized where space conform to the natural angle of repose of the soil. The Contractor shall promptly remove all sediment from brooks and swamp areas, if deposition cannot be avoided during construction. The Contractor shall promptly remove excess fill and regress the work area. Excess fill shall not be disposed of in wetlands, other than in areas defined on the drawings, or areas approved by commissions or authorities having jurisdiction.
4. Water handling - The Contractor shall be required to use crushed stone or plastic sluiceways leading to brooks to filter and pool pumped discharges.
5. Backfilling - The Contractor shall replace unsuitable material with suitable material. He shall also be responsible for surface repairs as required.
6. Spillings - Ground Spillings of oil or other petroleum products drained from equipment shall be strictly prohibited. The Contractor shall provide leak proof containers for receiving drained oil and shall properly dispose of such oil away from the site of the job.

3.03 ACCEPTANCE

A. Final inspection and acceptance in regard to cleanup, site restoration and pollution control measure areas shall be made in the presence of the Owner and/or commissions or authorities having jurisdiction. The Contractor shall notify the Owner in writing of readiness of the work for final inspection.

END OF SECTION

SECTION 01571

TRAFFIC CONTROL AND POLICING

PART 1 GENERAL

1.01 SCOPE OF WORK

- A. The Contractor shall install construction traffic and pedestrian controls as specified herein and any additional construction and/or detour controls deemed necessary by the Engineer or the Contractor himself, or required by the Manual on Uniform Traffic Control Devices, latest edition (MUTCD).

PART 2 PRODUCTS

2.01 GENERAL

- A. All signs, barricades, and drums shall have encapsulated lens and reflective sheeting in accordance with the Standard Specifications.

PART 3 EXECUTION

3.01 SCHEDULE OF OPERATIONS

- A. At a reasonable time in advance of the construction work, the Contractor shall submit to the Engineer for approval a traffic management plan showing all construction and/or detour control devices to be erected. All of the devices shall be moved after each phase of the project and after the project is completed.
- B. The Contractor shall provide temporary lighting to properly illuminate the work area and approaches in the event of nighttime work.

3.02 LOCATION OF SIGNS

- A. The detour signs and other control devices shall be located as specified herein.
- B. The construction and/or detour signs as herein specified shall be removed and relocated after each phase of the project.
- C. The Contractor shall notify the responsible heads of the Fire, Police and Public Works Departments before beginning each phase of the project.
- D. All signs, barricades, markings and lighting devices shall conform to the Manual on Uniform Traffic Control Devices - latest edition.
- E. The contractor shall submit a Traffic Control Management plan detailing types of signs, detours, and locations of signs for review by the City.

END OF SECTION

01571-1

SECTION 01575

HANDLING EXISTING FLOWS

PART 1 - GENERAL

1.01 WORK INCLUDED:

This Section covers all materials, equipment, and labor required to handle existing sanitary and combined sewage flows and installation and maintenance of all temporary connections, plugs, and by-pass pumping. Upon completion of the rehabilitation, all temporary plugs and connections shall be removed and flows returned to the sanitary sewer or flows transferred to the new pipes. Plug, fill, and abandon existing pipes and manholes as shown on the drawings or as specified herein.

1.02 RELATED WORK:

Section 01330, SUBMITTALS

Section 02428, CURED-IN-PLACE PIPE

Section 02440, SEWER CLEANING, INSPECTION, TESTING AND SEALING

Section 02442, POINT REPAIR OF GRAVITY SEWERS (OPEN CUT)

Section 02443, SERVICE CONNECTION REHABILITATION

1.03 SUBMITTALS: IN ACCORDANCE WITH REQUIREMENTS OF GENERAL SPECIFICATIONS, SUBMIT THE FOLLOWING:

Six sets of complete, checked shop drawings, showing equipment, method of by-passing, and the method of transferring flows from the existing system to the new system.

PART 2 - PRODUCTS

Not Used.

PART 3 - EXECUTION

3.01 MAINTAINING EXISTING FLOWS:

- A. The Contractor shall maintain all flows in the existing system until construction of the sanitary sewer is complete and ready for safe operation.

- B. The Contractor shall protect against surcharging of the existing system upstream of the work area by installing adequate temporary by-pass pumping to handle dry weather and wet weather flows.
- C. The Contractor shall repair any damage that occurs to existing pipes and structures to the satisfaction of the Engineer. Work performed under this section shall be considered incidental and shall not be measured separately for payment.
- D. Existing pipes to be abandoned shall be filled with cement grout as specified in Section 03302. Plugs shall be installed at locations shown on the drawings.
- E. The Contractor shall not allow sanitary flow to discharge to any salt or fresh water body by means of overflow, by-pass pumping, or any other method that may contaminate these water areas.
- F. The temporary bypass pumping system shall include floats (or other acceptable level sensing devices) that will transmit a high water condition to an on-site autodialer that shall send an alarm condition to the Contractor's Superintendent. The autodialer shall also alert a designated "on-call" employee of the Contractor, should the Superintendent fail to acknowledge the call.

END OF SECTION

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SECTION 01611

OWNER'S RIGHT TO MATERIAL

PART 1 - GENERAL

1.1 DESCRIPTION

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

PART 2 - PRODUCTS

(NOT PART OF THIS SECTION)

PART 3 - EXECUTION

(NOT PART OF THIS SECTION)

END OF SECTION

SECTION 01701

PROJECT CLOSE-OUT PROCEDURES

PART 1 – GENERAL

1.1 INTRODUCTION:

- A. Contractor's requirements of the Contract to close-out 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. Submission of warrantees

PART 2 - PRODUCTS

(NOT PART OF THIS SECTION)

PART 3- EXECUTION

(NOT PART OF THIS SECTION)

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.

END OF SECTION

SECTION 01735

CUTTING, CORING AND PATCHING

PART 1 - GENERAL

1.01 WORK INCLUDED:

This Section covers the cutting, coring, rough and finish patching of holes and openings in existing structures.

1.02 RELATED WORK:

A. SECTION 03302 FIELD CONCRETE

PART 2 - PRODUCTS

2.01 SEALING MATERIALS:

- A. Mechanical seals shall be modular, adjustable, bolted, mechanical type consisting of interlocking synthetic rubber links shaped to continuously fill the annular space between the pipe and sleeve. The seal shall be rated by the manufacturer for 40 feet of head or 20 psig. Mechanical seals shall be Link-Seal, manufactured by Thunderline Corp., Wayne, MI., or approved equal.
- B. Sealant shall be a two part foamed silicone elastomer as manufactured by Dow Corning Co., product No. 3-6548 silicone R.T.V.; 3M brand fire barrier products caulk C.P. 25 and 3M brand putty 303; Flame-Safe fire stop systems Fig. No. FS-500 by Thomas & Betts Corporation, or approved equal. Packing shall be a fire retardant pliable material, Fig. 310 by Sealtite Co.; White Oakum W.S.-600 by American Manufacturing Co., or approved equal. Sealant bead configuration, depth and width shall be in accordance with manufacturer's recommendations.

2.02 MISCELLANEOUS MATERIALS:

- A. Bonding compound shall be Sikadur Hi-Mod epoxy by Sika Corporation, or equivalent by Euclid Chemical Corporation, Master Builders Company, or approved equal.
- B. Non-shrink grout shall be Masterflow 713 by Master Builders Company; Euco N-S by Euclid Chemical Co.; Five Star Grout by U.S. Grout Corp. or approved equal.
- C. Materials for finish patching shall be equal to those of adjacent construction.

PART 3 - EXECUTION

3.01 GENERAL:

- A. The Contractor shall leave all chases or openings for the installation of his own or any other contractor's or subcontractor's work, or shall cut the same in existing work, and shall see that all sleeves or forms are at the work and properly set in ample time to prevent delays. He shall see that all such chases, openings, and sleeves are located accurately and are of proper size and shape and shall consult with the Engineer and the contractors and subcontractors concerned in reference to this work.
- B. In case of his failure to leave or cut all such openings or have all such sleeves provided and set in proper time, Contractor shall cut them or set them afterwards at his own expense, but in so doing he shall confine the cutting to the smallest extent possible consistent with the work to be done. In no case shall piers or structural members be cut without the written consent of the Engineer.
- C. The Contractor shall not cut or alter the work of any subcontractor or any other contractor, nor permit any of his subcontractors to cut or alter the work of any other contractor or subcontractor, except with the written consent of the contractor or subcontractor whose work is to be cut or altered or with the written consent of the Engineer. All cutting and patching or repairing made necessary by the negligence, carelessness, or incompetence of the Contractor or any of his subcontractors shall be done by or at the expense of the Contractor and shall be the responsibility of the Contractor.
- D. All cutting and coring shall be performed in such a manner as to limit the extent of patching.
- E. All holes cut through concrete and masonry walls, slabs or arches shall be core drilled unless otherwise approved. No structural members shall be cut without the approval of the Engineer and all such cutting shall be done in a manner required by him. No holes may be drilled in beams or other structural members without obtaining prior approval. All work shall be performed by mechanics skilled in this type of work.

3.02 CORING:

- A. Coring shall be performed with an approved non-impact rotary tool with diamond core drills. Size of holes shall be suitable for pipe, conduit, sleeves, equipment or mechanical seals to be installed.
- B. If holes are cored through floor slabs they shall be drilled from below.
- C. All equipment shall conform to OSHA standards and specifications pertaining to plugs, noise and fume pollution, wiring and maintenance.

- D. Provide protection for existing equipment, utilities and critical areas against water or other damage caused by drilling operation.
- E. Slurry or tailings resulting from coring operations shall be vacuumed or otherwise removed from the area following drilling.

3.03 CUTTING:

- A. Cutting shall be performed with a concrete saw and diamond saw blades of proper size and application.
- B. Provide for control of slurry generated by sawing operation on both sides of wall or slab.
- C. When cutting a reinforced concrete wall, the cutting shall be done so as not to damage bond between the concrete and reinforcing steel left in the structure. Cut shall be made so that steel neither protrudes nor is recessed from the face of the cut.
- D. Adequate bracing of area to be cut shall be installed prior to start of cutting. Check area during sawing operations for partial cracking and provide additional bracing as required to prevent a partial release of cut area during sawing operations.
- E. Provide equipment of adequate size to remove cut panel.
- F. For cutting a trench in a floor slab, a full-depth cut shall be made using a concrete saw for the desired width of the trench. A partial-depth cut shall be made to expose the reinforcing bars. The width of the partial cut shall be to the required lap length of the reinforcing bars. Care shall be taken not to cut exposed reinforcing bars but if any are cut, dowel holes shall be drilled and dowels epoxied in. Reinforcing of the same size, as the existing shall be tied to the existing exposed reinforcing and/or dowels with the proper lap length.

3.04 PATCHING:

Rough patching shall be such as to bring the cut or cored area flush with existing construction unless otherwise shown. Finish patching shall match existing surfaces as approved.

Trenches in floor slabs shall be repaired as described in 3.03F above and concrete meeting the requirements of Section 03302 FIELD CONCRETE shall be poured and cured.

END OF SECTION

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SECTION 01740

CLEANING UP

PART 1 - GENERAL

1.01 DESCRIPTION:

The Contractor must employ at all times during the progress of his work adequate cleanup measures and safety precautions to prevent injuries to persons or damage to property. The Contractor shall immediately, upon request by the Engineer provide adequate material, equipment and labor to cleanup and make safe any and all areas deemed necessary by the Engineer.

1.02 RELATED WORK:

- A. Section 01110 CONTROL OF WORK AND MATERIALS

PART 2 - PRODUCTS

Not applicable

PART 3 - EXECUTION

2.01 DAILY CLEANUP:

- A. The Contractor shall clean up, at least daily, all refuse, rubbish, scrap and surplus material, debris and unneeded construction equipment resulting from the construction operations and sweep the area. The site of the work and the adjacent areas affected thereby shall at all times present a neat, orderly and workmanlike appearance.
- B. Upon written notification by the Engineer, the Contractor shall within 24 hours clean up those areas, which in the Engineer's opinion are in violation of this section and the above referenced sections of the specifications.
- C. If in the opinion of the Engineer, the referenced areas are not satisfactorily cleaned up, all other work on the project shall stop until the cleanup is satisfactory.

2.02 MATERIAL OR DEBRIS IN DRAINAGE FACILITIES:

- A. Where material or debris has washed or flowed into or has been placed in existing watercourses, ditches, gutters, drains, pipes, structures, such material or debris shall be entirely removed and satisfactorily disposed of during progress of the work, and the ditches, channels, drains, pipes, structures, and work shall, upon completion of the work, be left in a clean and neat condition.

2.03 REMOVAL OF TEMPORARY BUILDINGS, STRUCTURES AND EQUIPMENT:

- A. On or before completion of the work, the Contractor shall, unless otherwise specifically required or permitted in writing, tear down and remove all temporary buildings and structures built by him; shall remove all temporary works, tools and machinery or other construction equipment furnished by him; shall remove all rubbish from any grounds which he has occupied; shall remove silt fences and hay bales used for trapping sediment; and shall leave the roads and all parts of the property and adjacent property affected by his operations in a neat and satisfactory condition.

2.04 RESTORATION OF DAMAGED PROPERTY:

- A. The Contractor shall restore or replace, when and as required, any property damaged by his work, equipment or employees, to a condition at least equal to that existing immediately prior to the beginning of operations. To this end the Contractor shall do as required all necessary highway or driveway, walk and landscaping work. Materials, equipment, and methods for such restoration shall be as approved by the Engineer.

2.05 FINAL CLEANUP:

- A. Before acceptance by the Owner, the Contractor shall perform a final cleanup to bring the construction site to its original or specified condition. This cleanup shall include removing all trash and debris off of the premises. Before acceptance, the Engineer shall approve the condition of the site.

END OF SECTION

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E. SUPPLEMENTAL SPECIFICATIONS AND SPECIAL PROVISIONS

The 2016 edition of the State of New Hampshire Department of Transportation *Standard Specifications for Road and Bridge Construction*, and any Addenda, shall apply but without regard to Division 100 “General Provisions” of those *Standard Specifications* (unless specifically referenced in a contract bid item) and without regard to any of those NHDOT provisions that allow for an adjustment for changing fuel and asphalt prices. Additional Supplemental Specifications and Special Provisions for this project are included in Division E. All other work not described in Division E shall be performed in accordance with the *Standard Specifications*.

S U P P L E M E N T A L S P E C I F I C A T I O N**ITEM 6.13.018****CALCIUM CHLORIDE****LB**

SECTION 01562

DUST CONTROL

PART 1 - GENERAL

1.01 DESCRIPTION:

This section of the specification covers the control of dust via calcium chloride and water, complete.

PART 2 - PRODUCTS

2.01 CALCIUM CHLORIDE:

- A. Calcium chloride shall conform to the requirements of AASHTO-M 144, Type I or Type II and Specification for Calcium Chloride, ASTM D98. The calcium chloride shall be packaged in moisture proof bags or in airtight drums with the manufacturer, name of product, net weight, and percentage of calcium chloride guaranteed by the manufacturer legibly marked on each container.
- B. Calcium chloride failing to meet the requirements of the aforementioned specifications or that which has become caked or sticky in shipment, may be rejected by the Engineer.

2.02 WATER:

- A. Water shall not be brackish and shall be free from oil, acid, and injurious alkali or vegetable matter.
- B. Apply water 2-3 times a day and on weekends as needed

2.03 Street Sweeper:

- A. Mechanical street sweeper with watering device able to pick up and haul away debris.
- B. Minimum of once per week and as needed or requested by the Engineer.

PART 3 - EXECUTION

3.01 APPLICATION:

- A. Calcium chloride shall be applied when ordered by the Engineer and only in areas which will not be adversely affected by the application. See Section 01570, ENVIRONMENTAL PROTECTION.
- B. Calcium chloride shall be uniformly applied at the rate of 1-1/2 pounds per square yard or at any other rate as required by the Engineer. Application shall be by means of a mechanical spreader, or other approved methods. The number and frequency of applications shall be determined by the Engineer.
- C. Water may be sprinkler applied with equipment including a tank with gauge-equipped pressure pump and a nozzle-equipped spray bar.
- D. Water shall be dispersed through the nozzle under a minimum pressure of 20 pounds per square inch, gauge pressure.

END OF SECTION

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S U P P L E M E N T A L S P E C I F I C A T I O N**ITEM 304.21****SPECIAL PIPE BEDDING MATERIAL****LINEAR FOOT**

SECTION 02071

GEOTEXTILE FABRICS

PART 1 - GENERAL

1.01 WORK INCLUDED:

This Section covers furnishing of all labor, materials, and equipment necessary to install specified geotextile fabrics in locations shown on the drawings and as required by the Engineer.

1.02 SUBMITTALS: IN ACCORDANCE WITH REQUIREMENTS OF GENERAL SPECIFICATIONS, SUBMIT THE FOLLOWING:

Six (6) sets of shop drawings or working drawings and material specifications shall be submitted to the Engineer for review for each type of geotextile fabric furnished. General installation practices and installation schedule shall be included.

PART 2 - PRODUCTS

2.01 FILTER/DRAINAGE FABRIC:

- A. The filter/drainage fabric shall be composed of continuous-filament fibers bonded together to form a sheet. The fabric shall be an average of 20 mils thick and possess the characteristics of Tencate Mirafi 140N.
- B. The filter/drainage fabric shall be Tencate Mirafi 140N as manufactured by Tencate Geosynthetics, Pendergrass, GA; Foss-65 by Foss Manufacturing Co., Hampton, NH; US 120NW, as manufactured by US Fabrics, Cincinnati, OH, or approved equal.

PART 3 - EXECUTION

3.01 INSTALLATION:

A. GENERAL:

Installation of geotextile fabrics shall be strictly in accordance with manufacturer's instructions and specific layout plans and details reviewed by the Engineer.

B. FILTER/DRAINAGE FABRIC:

1. The filter/drainage fabric shall be installed in the final graded trench bottom prior to placement of the crushed stone bedding and at other locations shown on the drawings or designated by the Engineer. The drainage fabric in place shall cover the entire trench bottom and trench sides as shown on the drawings. Each width of drainage fabric shall be overlapped in accordance with manufacturer's recommendations, but not less than 2 feet, to prevent intrusion of soil fines into the bedding.
2. The Contractor shall separate the compacted crushed stone and the compacted select backfill with filter/drainage fabric on all 12" sewer pipes or larger.

3.02 FINAL INSPECTION AND ACCEPTANCE:

- A. The Contractor shall, at his expense, have a manufacturer's representative inspect the work at completion of the installation. Any work found to be unsatisfactory shall be corrected at the Contractor's expense.
- B. The Engineer, at the Contractor's expense, reserves the right to have a manufacturer's representative inspect the installation process at any time during construction.

END OF SECTION

S U P P L E M E N T A L S P E C I F I C A T I O N

<u>ITEM 611.05206</u>	<u>6" CEMENT LINED DUCTILE IRON PIPE, CL52</u>	<u>LINEAR FOOT</u>
<u>ITEM 611.05208</u>	<u>8" CEMENT LINED DUCTILE IRON PIPE, CL52</u>	<u>LINEAR FOOT</u>
<u>ITEM 611.05212</u>	<u>12" CEMENT LINED DUCTILE IRON PIPE, CL52</u>	<u>LINEAR FOOT</u>
<u>ITEM 611.413</u>	<u>POLYETHYLENE ENCASED PIPE</u>	<u>LINEAR FOOT</u>
<u>ITEM 611.70</u>	<u>ADDITIONAL FITTINGS</u>	<u>LB</u>

SECTION 02080

DUCTILE IRON PIPE AND FITTINGS

PART 1 - GENERAL

1.01 WORK INCLUDED:

This Section covers the furnishing, handling, hauling, laying, jointing, testing and disinfecting of all ductile iron pipe, including fittings and appurtenant work as indicated on the drawings and as specified.

1.02 RELATED WORK:

- A. Section 02300, EARTHWORK
- B. Section 02513, INSULATION FOR PIPELINES
- C. Section 02514, HYDRANTS AND VALVES
- D. Section 02515, WATER SERVICE CONNECTIONS
- E. Section 02516, CONNECTIONS TO EXISTING WATER MAINS

1.03 QUALITY ASSURANCE:

- A. All pipe and fittings shall be inspected and tested at the foundry as required by the standard specifications to which the material is manufactured. The Contractor shall furnish in duplicate to the Engineer sworn certificates of such tests.
- B. In addition, the Owner reserves the right to have any or all pipe, fittings and special castings inspected and/or tested by an independent service at either the manufacturer's plant or elsewhere. Such inspection and/or tests shall be at the Owner's expense.

1.04 REFERENCES:

- A. The following standards, latest revision thereof, form a part of this specification as referenced:

American Water Works Association (AWWA)

AWWA	C104	Cement-Mortar Lining for Ductile- Iron Pipe and Fittings
AWWA	C105	Polyethylene Encasement for Ductile Iron Pipe Systems
AWWA	C110	Ductile-Iron and Gray-Iron Fittings
AWWA	C111	Rubber Gasket Joints for Ductile- Iron Pressure Pipe and Fittings
AWWA	C116	Protective Fusion-Bonded Epoxy Coatings for the Interior and Exterior Surfaces of Ductile-Iron and Gray-Iron Fittings
AWWA	C150	Thickness Design of Ductile-Iron Pipe
AWWA	C151	Ductile-Iron Pipe, Centrifugally Cast
AWWA	C153	Ductile-Iron Compact Fittings for Water Service.
AWWA	C600	Installation of Ductile-Iron Water Mains and Their Appurtenances
AWWA	C651	Disinfecting Water Mains

1.05 SUBMITTALS: IN ACCORDANCE WITH REQUIREMENTS OF GENERAL SPECIFICATIONS, SUBMIT THE FOLLOWING:

- A. Six sets of all shop drawings shall be submitted to the Engineer for review.
- B. Shop drawings shall consist of manufacturer's scale drawings, cuts or catalogs including descriptive literature and complete characteristics and specifications, and code requirements. Shop drawings shall be submitted for the ductile iron pipe, type of joint, fittings, couplings, filling rings, restrained joints, and lining and coating in accordance with specifications.

PART 2 - PRODUCTS

2.01 PIPE:

- A. The Contractor shall use push-on joint type ductile iron pipe unless otherwise indicated on the plans or specified herein.
- B. All ductile iron pipe shall be designed in accordance with AWWA C150 and shall be manufactured in accordance with AWWA C151.
- C. Unless otherwise indicated or specified, ductile iron pipe shall be Thickness Class 52.

2.02 JOINTS:

- A. Joints for ductile iron pipe shall conform to AWWA C111.
- B. Pipe and fittings shall be furnished with approved joint restraining appurtenances as specified herein, or within the limits as indicated on the drawings, to keep the piping from pulling apart under pressure.

2.03 FITTINGS:

- A. Fittings shall conform to the requirements of AWWA C110 or C153 as appropriate and shall be of a pressure classification at least equal to that of the pipe with which they are used.
- B. The Contractor shall use ductile iron fittings. Cast-iron, Class 250 fittings may be substituted, upon approval of the Engineer, for ductile iron fittings.
- C. Unless otherwise indicated, fittings shall have all bell mechanical joint ends.

2.04 GASKETS, GLANDS, NUTS AND BOLTS:

- A. Gaskets, glands, nuts, bolts and accessories shall conform to AWWA C111 or C153 as appropriate.
- B. Gaskets shall be of plain tipped rubber, suitable for exposure to the liquid within the pipe.
- C. Glands shall be ductile or cast iron.
- D. Bolts and nuts shall be high strength alloy.

2.05 LINING AND COATING:

- A. The inside of pipe and fittings shall be given a cement lining and asphaltic seal coat in accordance with AWWA C104. The thickness of the lining shall be double that specified in AWWA C104.
- B. The outside of pipe and fittings shall be coated with the standard asphaltic coating specified under the appropriate AWWA Standard Specification for pipe and fittings.
- C. Machined surfaces shall be cleaned and coated with a suitable rust preventative coating at the shop immediately after being machined.

2.06 COUPLINGS:

- A. The Contractor shall use solid sleeve coupling fittings for joining pipe. Sleeve-type flexible couplings may be substituted only with the approval of the Engineer.

- B. All couplings and accessories shall be of a pressure rating at least equal to that of the pipeline in which they are to be installed.
- C. Couplings shall be cast or ductile iron and shall be provided with gaskets of a composition suitable for exposure to the liquid within the pipe.
- D. Sleeve-type couplings shall be made by Dresser Mfg. Div., Bradford, PA; Smith-Blair, Inc., San Francisco, CA; Romac Industries Inc., Seattle, WA; Ford Meter Box Co., Wabash, IN; or be an approved equal.
- E. Couplings for buried pipe shall be Dresser 153; Smith-Blair Type 441 or 443; Romac Style 501; Ford Style FC1 or FC2; or approved equal.

2.07 JOINT RESTRAINTS:

- A. Where indicated or necessary to prevent joints or sleeve couplings from pulling apart under pressure, anchoring and joint restraint methods shall be utilized. Methods shall be restrained joint systems. The number of joints to be restrained shall be determined in accordance with Table 1, as shown on the construction plans or provided by the Engineer.
- B. Restrained joint systems for standard mechanical joint fittings or push on joint pipe shall be restraining glands (Megalug by EBAA Iron Sales Inc., Eastland, TX; StarGrip by Star Pipe Products, Houston, TX; RomaGrip by Romac Industries, Inc., Sultan, WA; Sigma One-Lok by Sigma Corporation, Cream Ridge, NJ; or approved equal) and restraining gaskets (Fast-grip joint by American Cast Iron Pipe Company, Birmingham, AL; Field Lok 350 Gasket by United States Pipe and Foundry Company, Birmingham, AL; Sure Stop 350 Restrained Joint Gaskets by McWane Ductile, Phillipsburg, NJ; or approved equal). Methods that rely on the use of friction clamps and/or retainer glands with set screws alone are not acceptable.
- C. Restrained joint systems for non-standard or modified joints shall be Flex-Ring or Lok-Ring by American Cast Iron Pipe Company, Birmingham, AL; T.R. Flex Joint by McWane Ductile, Phillipsburg, NJ; TR-Flex Joint by United States Pipe and Foundry Company, Birmingham, AL; Snap-Lok or Bolt-Lok by United States Pipe and Foundry Company, Birmingham, AL; or approved equal.
- D. Concrete thrust blocks may only be used for 6-inch, 8-inch, 10-inch, or 12-inch pipe where use of a joint restraint system is not feasible. Use of concrete thrust blocks shall be installed with the minimum bearing area (in square feet) against undisturbed material in accordance with the following:

Size of Main	90° Bends, Tees, Caps and Plugs	45° Bends and Wyes	22-1/2° Bends	11-1/4° Bends
6- & 8-inch	5	4	2	2
10- & 12-inch	12	9	5	2

- E. Tie rods may only be used for 6-inch, 8-inch, 10-inch, or 12-inch pipe where use of a joint restraint system is not feasible. Bolts shall have adequate length to allow nuts on both sides of the gland. Tie bolts shall have the same diameter as the tie rods and be in accordance with the following:

Pipe Size	Tie Rod	
	Number	Diameter
6	2	½"
8	2	¾"
10	2	¾"
12	4	¾"

- F. Location of restrained joints shall be based on Table 1, as shown on the construction plans or provided by the Engineer. All joints that occur within the restrained length listed in Table 1, for the specific application, shall be restrained. For example, for a 90° bend, 8-inch unwrapped pipe, the restrained length required is 33 feet. Therefore, all joints within 33 feet of the 90° bend must be restrained.

2.08 POLYETHYLENE ENCASEMENT:

All water main pipe shall be encased in 8 mil thick polyethylene conforming to AWWA C105.

PART 3 - EXECUTION

3.01 INSPECTION BEFORE INSTALLATION:

Pipes and fittings shall be subjected to a careful inspection just before being laid or installed.

3.02 HANDLING AND CUTTING:

- A. Any pipe or fitting which has a damaged lining, scratched or marred machine surface and/or abrasion of the pipe coating or lining shall be rejected and removed from the job-site.
- B. Any fitting showing a crack and any fitting or pipe which has received a severe blow that may have caused incipient fracture, even though no such fracture can be seen, shall be marked as rejected and removed at once from the work.
- C. In any pipe showing a distinct crack and in which it is believed there is no incipient fracture beyond the limits of the visible crack, the cracked portions, if so approved, may be cut off by and at the expense of the Contractor before the pipe is laid so that the pipe used will be perfectly sound. The cut shall be made in the sound barrel at a point at least 12-inches from the visible limits of the crack.
- D. Except as otherwise approved, all cutting shall be done with a machine suitable for cutting ductile iron pipe. Hydraulic squeeze cutters are not acceptable for cutting

ductile iron pipe. Travel type cutters or rotary type abrasive saws may be used. All cut ends shall be examined for possible cracks caused by cutting.

- E. Lined and coated pipe and fittings shall be assembled and installed with approved packing or gaskets of the type recommended by the pipe manufacturer for the particular lining used.

3.03 INSTALLATION:

A. DEPTH:

1. The pipe shall be installed with a minimum of 5'-0" of cover, unless specifically indicated otherwise on the plans or required by the Engineer.
2. Where pipe is installed at less than the required cover, the Contractor shall furnish and install insulation in accordance with Section 02513, INSULATION FOR PIPELINES, or as required by the Engineer.

B. PIPE AND FITTINGS:

1. No defective pipe or fittings shall be laid or placed in the piping, and any piece discovered to be defective after having been laid or placed shall be removed and replaced by a sound and satisfactory piece.
2. Each pipe and fitting shall be cleared of all debris, dirt, etc., before being laid and shall be kept clean until accepted in the complete work.
3. Pipe and fittings shall be laid accurately to the lines and grades indicated on the drawings or as required. Care shall be taken to ensure good alignment both horizontally and vertically.
4. In buried pipelines, each pipe shall have firm bearing along its entire length.
5. Castings to be encased in masonry shall be accurately set, with the bolt holes, if any, carefully aligned.
6. Immediately prior to being set, castings shall be thoroughly cleaned of all rust, scale and other foreign material.
7. Fittings shall not be used to clear beneath or above an existing structure or pipeline unless approved by the Engineer. The water main shall be brought to a depth sufficient to clear the structure or pipeline without the use of bends.

C. TEMPORARY PLUGS:

At all times when pipe laying is not actually in progress, the open ends of pipe shall be closed by temporary watertight plugs or by other approved means. If water is in the

trench when work is resumed, the plug shall not be removed until all danger of water entering the pipe has passed.

D. PUSH ON JOINTS:

1. Joining of push-on joint pipe shall conform to AWWA C600.
2. If effective sealing of the joint is not attained, the joint shall be disassembled, thoroughly cleaned, a new gasket inserted and joint reassembled.
3. Deflection of alignment at a joint shall not exceed the appropriate permissible deflection as specified in AWWA C600. The tables in AWWA C600 indicate the maximum permissible deflection for 18 and 20-foot pipe lengths. Maximum permissible deflections for other lengths shall be in proportion to such lengths.
4. Electromagnetic type pipe locators are used, **insert 2 serrated brass wedges at all joints to assure continuity**. Each wedge shall be driven into opening between the plain end and the bell end.

E. MECHANICAL JOINTS:

1. Assembling of fittings with mechanical joint ends shall conform to AWWA C600.
2. If effective sealing of the joint is not attained at the maximum torque indicated in the above standard, the joint shall be disassembled and thoroughly cleaned, then reassembled. Bolts shall not be overstressed to tighten a leaking joint.
3. The deflection of alignment at a joint shall not exceed the appropriate permissible deflection as specified in the following table. These values indicate the maximum permissible deflection for 18-foot lengths. Maximum permissible deflections for other lengths shall be in proportion to such lengths.

Pipe Deflection Allowances	
Maximum permissible deflection, inches	
<u>Diameter of Pipe (inches)</u>	<u>Mechanical-Joint</u>
6	27
8-12	20
16	13.5
20	11
24	9

F. RESTRAINED JOINTS:

1. Joining of restrained joint piping shall conform to the manufacturer's recommendations.
2. If effective sealing of the joint is not attained, the joint shall be disassembled, thoroughly cleaned, a new gasket inserted and joint reassembled.
3. Deflection of alignment at a joint shall not exceed the appropriate permissible deflection recommended by the manufacturer.
4. All restraining appurtenances (and tie rods) shall be coated with an approved bituminous paint after assembly. The completed joint shall be inspected and the paint repaired/touched-up as necessary.

G. SLEEVE-TYPE COUPLINGS:

1. Pipe ends shall be cleaned thoroughly prior to installation. After the bolts have been inserted and all nuts have been made up finger tight, diametrically opposite nuts shall be progressively and uniformly tightened all around the joint, preferable by use of a torque wrench of the appropriate size and torque for the bolts. The correct torque as indicated by a torque wrench shall not exceed 90 foot-lb. for joints up to 24-inches.

3.04 POLYETHYLENE ENCASEMENT:

- A. The pipe to be encased shall be thoroughly cleaned of all soil and debris prior to installation of the polyethylene encasement. No soil or debris shall be allowed to enter the encasement during or after its installation.
- B. Polyethylene encasement shall be installed using Method A as described in AWWA C105, with the encasement joints coincident with pipe joints. Adhesive tape shall be used to secure the encasement.
- C. Minimum overlap of polyethylene encasement shall be 24-inches, 12 inches on each side of pipe joints.
- D. Tears, cuts and other damage shall be repaired with a piece of polyethylene covering secured with adhesive tape, when approved by the Engineer. Otherwise, the damaged length of polyethylene shall be replaced at the Contractor's expense.
- E. Care shall be taken when backfilling to avoid damage to the polyethylene encasement.
- F. Service and fitting connections shall be made by making an x-shaped cut in the polyethylene and folding back the cut film. Immediately following completion of the connection, the film shall be secured to the connection with adhesive tape and the cut area repaired. Alternately, apply 2 to 3 wraps of polyethylene adhesive tap completely

around the pipe to cover the area where the tapping machine and chain will be mounted; make the tap directly through the tape and polyethylene material. Check for any damage from the chain after the tap is complete and repair with polyethylene adhesive tape as needed. Service connections shall be wrapped with polyethylene encasement for a minimum of 3 feet from the point of connection to the encased pipe.

- G. At the junctions between wrapped and unwrapped pipe the polyethylene encasement shall be extended a minimum of 3 feet beyond the end of the pipe scheduled to be encased and the ends of the encasement securely taped so that no soil can enter the encasement.

3.05 TESTING:

- A. Prior to the hydrostatic pressure test, the piping shall be thoroughly flushed clean of all dirt, dust, oil, grease and other foreign material. This work shall be done with care to avoid damage to linings and coatings. Flushing velocity shall be a minimum of 2.5 ft./sec.
- B. The installed pipe shall be pressure tested in accordance with AWWA Standard C600.

C. HYDROSTATIC PRESSURE TEST:

1. Unless otherwise approved, all pipelines shall be given a hydrostatic pressure test between line valves. The Contractor shall furnish and install suitable temporary testing plugs or caps; all necessary pressure pumps, pipe connections, meters, gates, and other necessary equipment; and all labor required. The Owner or Engineer shall have the privilege of using its own gauges.
2. Subject to approval and provided that the tests are made within a reasonable time considering the progress of the project as a whole, and the need to put the section into service, the Contractor may make the tests when desired.
3. Pipelines intended for buried service shall be tested after backfill and compaction of the trench.
4. The section of pipe to be tested shall be filled with water of approved quality and all air shall be expelled from the pipe. The Contractor shall follow established procedures for filling the pipe and expelling trapped air to avoid exposing the piping system to water-hammer. If blowoffs are not available at high points for releasing air, the Contractor shall excavate as required and install the necessary taps. If the Contractor changes the grade of pipe installation, he will be responsible for locating the taps at the correct location in the system for testing. Taps shall be installed at the beginning and end of each disinfection run. After completion of the test, if so required by the Engineer, the Contractor shall remove corporations used for testing; plug the holes; and backfill as necessary.

5. The section under test shall be maintained full of water at working pressure for a period of 24 hours prior to the hydrostatic pressure test being applied to stabilize the pipeline with respect to movement under pressure, water absorption by the lining, etc. The pipeline may require several cycles of pressurizing and bleeding trapped air prior to beginning the test.
6. When hydrants are in the pipeline test section, the hydrostatic test shall be made against the main valve in the hydrant. The hydrostatic test shall not be conducted against the branch valve.
7. The hydrostatic test shall consist of raising the water pressure within the test section to a pressure not less than 1.25 times the working pressure of the pipeline measured at the highest elevation along the test section and not less than 1.5 times the working pressure of the lowest elevation of the test section. The specified test pressure shall be corrected to the elevation of the test gauge.
8. The hydrostatic test shall be of at least a 2 hour duration. The test pressure shall not vary by more than +/- 5 psi for the duration of the test. Test pressure shall be maintained within this tolerance by adding makeup water through the pressure test pump into the pipeline test section.
9. The amount of makeup water (testing allowance) added to the test section shall be accurately measured by suitable methods and shall not exceed the maximum allowable quantity of makeup water. No pipe installation will be accepted if the quantity of makeup water is greater than that determined by the following formula:

$$L = \frac{S D \sqrt{P}}{148,000}$$

Where:

- L = makeup water, in gallons per hour
- S = length of test section, in feet
- D = nominal diameter of pipe, in inches
- P = average test pressure, in psi (gauge)

10. If the section fails to pass the hydrostatic pressure 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 hydrostatic test.

3.06 DISINFECTION AND FLUSHING:

- A. The Contractor shall disinfect the lines carrying potable water.

- B. The Contractor shall furnish all equipment and materials necessary to do the work of disinfecting, and shall perform the work in accordance with the procedure outlined in AWWA C651 and all amendments thereto.
- C. In general, the procedure of disinfecting the main shall be to apply the chlorine through a tap in one end of the section and bleed it off through a tap at the other end. Powdered chlorine placed in each length of pipe during installation is not an acceptable method of disinfection.
- D. The applied dosage shall be such as to produce a chlorine concentration of not less than 10 mg/l after a contact time of not less than 24 hours.
- E. During the disinfection period, care shall be exercised to prevent contamination of water in existing mains.
- F. Any temporary connection to the mains or other facilities required to accomplish the disinfection of the mains shall be at the Contractor's expense.
- G. After treatment, the main shall be flushed with clean water until the residual chlorine concentration is less than 0.2 mg/l. The flushing rate shall be 3.0 ft. /sec to achieve full scour of sand particles.
- H. Before disposing of the water used in disinfecting and flushing water mains the Contractor shall thoroughly neutralize it through the application of a reducing agent, as referenced in AWWA C651 and C655.
- I. Bacteriological sampling and testing shall be done in accordance with AWWA C651 (Option A – One sample taken after flushing is complete followed by another sample taken 16 hours after the first sample or Option B – Two samples taken 15 minutes apart after a 16 hour post flushing rest period) for each main and each branch. Sampling shall be accomplished with sterile bottles treated with sodium thiosulfate, as required by Standard Methods. No hose or fire hydrants shall be used in collection of samples. A corporation stop installed on the main, with a removable copper tube gooseneck assembly, is the recommended method.
- J. Bacteriological sampling and testing shall be conducted by a state certified laboratory certified for total and fecal coliform analyses of potable water.
- K. Testing shall be done by a laboratory approved by the Engineer, in accordance with Standard Methods, and shall show the absence of coliform organisms. A standard plate count may be required at the option of the Engineer.

END OF SECTION

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S U P P L E M E N T A L S P E C I F I C A T I O N

<u>ITEM 603.81004</u>	<u>4" PVC PIPE (SDR 35)</u>	<u>LINEAR FOOT</u>
<u>ITEM 612.61508</u>	<u>8" PVC SEWER PIPE (SDR 35)</u>	<u>LINEAR FOOT</u>
<u>ITEM 612.61512</u>	<u>12" PVC SEWER PIPE (SDR 35)</u>	<u>LINEAR FOOT</u>
<u>ITEM 612.81441</u>	<u>6" PVC SEWER SERVICE PIPE (SDR 35)</u>	<u>LINEAR FOOT</u>
<u>ITEM 612.81443</u>	<u>8"x6" WYE</u>	<u>EACH</u>
<u>ITEM 612.81444</u>	<u>12"x6" WYE</u>	<u>EACH</u>

SECTION 02085

POLYVINYL CHLORIDE GRAVITY PIPE AND FITTINGS

PART 1 - GENERAL

1.01 WORK INCLUDED:

This section covers the furnishing and installation of Polyvinyl Chloride (PVC) pipe and fittings, as indicated on the drawings and as specified herein. Pre and post CCTV inspection shall be performed by the Contractor and reviewed by the Engineer.

1.02 RELATED WORK:

- A. Section 02252, SUPPORT OF EXCAVATION
- B. Section 02300, EARTHWORK
- C. Section 02518, TRACER TAPE
- D. Section 02631, PRECAST MANHOLES

1.03 REFERENCES:

- A. The following standards form a part of these specifications as referenced:

American Society for Testing and Materials (ASTM)

ASTM	D2321	Recommended Practice for Underground Installation of Flexible Thermoplastic Sewer Pipe
ASTM	D3034	Specification for Type PSM Polyvinyl Chloride (PVC) Sewer Pipe and Fittings
ASTM	D3212	Specification for Joints for Drain and Sewer Plastic Pipes Using Flexible Elastomeric Seals

ASTM F679 Specification for Polyvinyl Chloride (PVC) Large Diameter Plastic Gravity Sewer Pipe and Fittings

1.04 SUBMITTALS: IN ACCORDANCE WITH REQUIREMENTS OF GENERAL SPECIFICATIONS, SUBMIT THE FOLLOWING:

Six sets of manufacturer's literature of the materials of this section shall be submitted to the Engineer for review.

PART 2 - PRODUCTS

2.01 MATERIALS:

- A. PVC nonpressure sewer pipe 4-inches through 15-inches diameter shall conform to ASTM D3034, 18-inches through 60-inches diameter to ASTM F679, all with SDR of 35 unless noted, and shall meet the specific requirements and exceptions to the aforementioned specifications that follow.
- B. PVC nonpressure sewer pipe shall be furnished in standard lengths.
- C. One pipe bell consisting of an integral wall section with a solid cross section rubber ring, factory assembled, shall be furnished with each standard, random and short length of pipe. Rubber rings shall be provided to the requirements of ASTM D3212.
- D. The rubber ring shall be retained within the bell of the pipe by a precision formed groove or recess designed to resist fishmouthing or creeping during assembly of joints.
- E. Spigot pipe ends shall be supplied with bevels from the manufacturer to ensure proper insertion. Each spigot end shall have an "assembly stripe" imprinted thereon to which the bell end of the mated pipe will extend upon proper jointing of the two pipes.
- F. PVC fittings shall be provided with bell and/or spigot configurations with rubber gasketed joints compatible with that of the pipe. Bend fittings with spigot ends shorter than the pipe recess bells will not be allowed. The shorter spigot end would not allow proper seating of the spigot in the mating bell and would permit undesired contact between the mating bell and the outside of the fitting bell.
- G. All pipe delivered to the job site shall be accompanied by independent testing laboratory reports certifying that the pipe and fittings conform to the above-mentioned specifications. In addition, the pipe shall be subject to thorough inspection and tests, the right being reserved for the Engineer to apply such of the tests specified as he may from time to time deem necessary.
- H. All cutting of pipe shall be done with a machine suitable for cutting PVC pipe. Cut ends shall be beveled when recommended by the pipe manufacturer.

PART 3 - EXECUTION

3.01 INSTALLATION:

- A. Except as modified herein, installation of the PVC pipe shall be in accordance with ASTM D2321.
- B. Each pipe length shall be inspected before being laid to verify that it is not cracked. Pipe shall be laid to conform to the lines and grades indicated on the drawings or given by the Engineer. Each pipe shall be so laid as to form a close joint with the next adjoining pipe and bring the inverts continuously to the required grade.
- C. The pipe shall be supported by compacted crushed stone. Crushed stone shall be as specified under Section 02300, EARTHWORK.
- D. The pipe shall not be driven down to grade by striking it with a shovel handle, timber, rammer, or other unyielding object. When each pipe has been properly bedded, enough of the backfill material shall be placed and compacted between the pipe and the sides of the trench to hold the pipe in correct alignment.
- E. Before a joint is made, the pipe shall be checked to assure that a close joint with the next adjoining pipe has been maintained and that inverts are matched and conform to the required line and grade.
- F. For pipe placed on crushed stone, immediately after the joint is made, the jointing area shall be filled with suitable materials so placed and compacted that the ends of either pipe will not settle under backfill load.
- G. No pipe or fitting shall be permanently supported on saddles, blocking, or stones.
- H. Branches and fittings shall be laid by the Contractor as indicated on the drawings, and/or as required by the Engineer. Open ends of pipe and branches shall be closed with PVC caps secured in place with premolded gasket joints or as required by the Engineer.
- I. All pipe joints shall be made as nearly watertight as practicable. There shall be no visible leakage at the joints and there shall be no sand, silt, clay, or soil of any description entering the pipeline at the joints. Where there is evidence of water or soil entering the pipeline, connecting pipes, or structures, the defects shall be repaired to the satisfaction of the Engineer.
- J. The Contractor shall build a tight bulkhead in the pipeline where new work enters an existing sewer. This bulkhead shall remain in place until the Engineer authorizes its removal.
- K. Care shall be taken to prevent earth, water, and other materials from entering the pipe, and when pipe laying operations are suspended, the Contractor shall maintain a suitable stopper in the end of the pipe and also at openings for manholes.

- L. As soon as possible after the pipe and manholes are completed on any street, the Contractor shall flush out the new pipeline using a rubber ball ahead of the water, and none of the flushing water or debris shall be permitted to enter any existing sewer.

3.02 QUALITY ASSURANCE

A. LEAKAGE TESTING:

1. On completion of a section of sewer, including building connections installed to the property line, the Contractor shall install suitable bulkheads as required, dewater and test the sewer for leakage.
2. Unless otherwise approved, the section shall be tested using low pressure air test procedures.
3. The air test procedures shall conform to the Uni-Bell Recommended Practice for Low Pressure Air Testing of Installed Sewer Pipe, UNI-B-6. The starting air pressure for the test shall be 4 psig (greater than the average groundwater back pressure of any groundwater above the pipe, but not greater than 9.0 psig). The minimum duration permitted for the prescribed low pressure air exfiltration pressure drop between two consecutive manholes shall not be less than provided in Table I or Table II of UNI-B-6. The two tables are reproduced on the following pages.
4. Using the air pressure test, if there has been no leakage (zero psig drop) after one hour of testing, the section undergoing test shall have passed.
5. The Contractor shall be responsible for the satisfactory watertightness of the entire section of sewer. Should the sections under test fail to meet the requirements, the Contractor shall do all work of locating and repairing leaks and retesting as the Engineer may require without additional compensation. A plan of the method of repairing any leaks that are found shall be submitted to the Engineer for review.

B. PIPE DEFLECTION MEASUREMENT:

1. In accordance with ASTM D3034, no less than 30 days after completion of the PVC sewer pipe installation, the Contractor shall test the pipeline for deflection using a "go/no-go" deflection mandrel having a minimum of nine evenly spaced arms or prongs. The "go/no-go" gauge shall be hand pulled through all sections of the pipeline by the Contractor. The Contractor shall submit drawings of the "go/no-go" gauge to the Engineer for approval prior to testing. Complete dimensions of the gauge for each diameter of pipe to be tested shall be in accordance with ASTM D3034.
2. Any section of pipe found to exceed 5 percent deflection shall be deemed a failed pipe and shall be excavated and replaced by the Contractor at his own expense.

TABLE I

**MINIMUM SPECIFIED TIME REQUIRED FOR A 1.0 PSIG PRESSURE DROP
FOR SIZE AND LENGTH OF PIPE INDICATED FOR Q=0.0015**

Pipe Diameter (in)	Minimum Time (min:sec)	Length for Min. Time (ft)	Time for Longer Length (sec)	Specification Time for Length (L) shown (min:sec)								
				<u>100 ft</u>	<u>150 ft</u>	<u>200 ft</u>	<u>250 ft</u>	<u>300 ft</u>	<u>350 ft</u>	<u>400 ft</u>	<u>450 ft</u>	
4	3:46	597	0.380 L	3:46	3:46	3:46	3:46	3:46	3:46	3:46	3:46	3:46
6	5:40	398	0.854 L	5:40	5:40	5:40	5:40	5:40	5:40	5:40	5:42	6:24
8	7:34	298	1.52 L	7:34	7:34	7:34	7:34	7:36	8:52	10:08	11:24	
10	9:26	239	2.374 L	9:26	9:26	9:26	9:53	11:52	13:51	15:49	17:48	
12	11:20	199	3.418 L	11:20	11:20	11:24	14:15	17:05	19:56	22:47	25:38	
15	14:10	159	5.342 L	14:10	14:10	17:48	22:15	26:42	31:09	35:36	40:04	
18	17:00	133	7.692 L	17:00	19:13	25:38	32:03	38:27	44:52	51:16	57:41	
21	19:50	114	10.470 L	19:50	26:10	34:54	43:37	52:21	61:00	69:48	78:31	
24	22:40	99	13.674 L	22:47	34:11	45:34	56:58	68:22	79:46	91:10	102:33	
27	25:30	88	17.306 L	28:51	43:16	57:41	72:07	86:32	100:57	115:22	129:48	
30	28:20	80	21.366 L	35:37	53:25	71:13	89:02	106:50	124:38	142:26	160:15	
33	31:10	72	25.852 L	43:05	64:38	86:10	107:43	129:16	150:43	172:21	193:53	
36	34:00	66	30.768 L	51:17	76:55	102:34	128:12	153:50	179:29	205:07	230:46	
42	39:48	57	41.883 L	69:48	104:42	139:37	174:30	209:24	244:19	279:13	314:07	
48	45:34	50	54.705 L	91:10	136:45	182:21	227:55	273:31	319:06	364:42	410:17	
54	51:02	44	69.236 L	115:24	173:05	230:47	288:29	346:11	403:53	461:34	519:16	
60	56:40	40	85.476 L	142:28	213:41	284:55	356:09	427:23	498:37	569:50	641:04	

TABLE II

**MINIMUM SPECIFIED TIME REQUIRED FOR A 0.5 PSIG PRESSURE DROP
FOR SIZE AND LENGTH OF PIPE INDICATED FOR Q=0.0015**

Pipe Diameter (in)	Minimum Time (min:sec)	Length for Min. Time (ft)	Time for Longer Length (sec)	Specification Time for Length (L) shown (min:sec)							
				<u>100 ft</u>	<u>150 ft</u>	<u>200 ft</u>	<u>250 ft</u>	<u>300 ft</u>	<u>350 ft</u>	<u>400 ft</u>	<u>450 ft</u>
4	1:53	597	0.190 L	1:53	1:53	1:53	1:53	1:53	1:53	1:53	1:53
6	2:50	398	0.427 L	2:50	2:50	2:50	2:50	2:50	2:50	2:51	3:12
8	3:47	298	0.760 L	3:47	3:47	3:47	3:47	3:48	4:26	5:04	5:42
10	4:43	239	1.187 L	4:43	4:43	4:43	4:57	5:56	6:55	7:54	8:54
12	5:40	199	1.709 L	5:40	5:40	5:42	7:08	8:33	9:58	11:24	12:50
15	7:05	159	2.671 L	7:05	7:05	8:54	11:08	13:21	15:35	17:48	20:02
18	8:30	133	3.846 L	8:30	9:37	12:49	16:01	19:14	22:26	25:38	28:51
21	9:55	114	5.235 L	9:55	13:05	17:27	21:49	26:11	30:32	34:54	39:16
24	11:20	99	6.837 L	11:24	17:57	22:48	28:30	34:11	39:53	45:35	51:17
27	12:45	88	8.653 L	14:25	21:38	28:51	36:04	43:16	50:30	57:42	64:54
30	14:10	80	10.683 L	17:48	26:43	35:37	44:31	53:25	62:19	71:13	80:07
33	15:35	72	12.926 L	21:33	32:19	43:56	53:52	64:38	75:24	86:10	96:57
36	17:00	66	15.384 L	25:39	38:28	51:17	64:06	76:55	89:44	102:34	115:23
42	19:54	57	20.942 L	34:54	52:21	69:49	87:15	104:42	122:10	139:37	157:04
48	22:47	50	27.352 L	45:35	68:23	91:11	113:58	136:46	159:33	182:21	205:09
54	25:31	44	34.618 L	57:42	86:33	115:24	144:15	173:05	201:56	230:47	259:38
60	28:20	40	42.738 L	71:14	106:51	142:28	178:05	213:41	249:18	284:55	320:32

END OF SECTION

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S U P P L E M E N T A L S P E C I F I C A T I O N

<u>ITEM 612.61501</u>	<u>2" PVC STUB & END CAP (SDR 21)</u>	<u>EACH</u>
<u>ITEM 612.61502</u>	<u>2" PVC SEWER PIPE (SDR 21)</u>	<u>LINEAR FOOT</u>
<u>ITEM 612.61503</u>	<u>8" PVC SEWER PIPE (DR 18)</u>	<u>LINEAR FOOT</u>
<u>ITEM 612.81440</u>	<u>1-1/2" OR 2" PVC LOW PRESSURE SEWER SERVICE</u>	<u>LINEAR FOOT</u>

SECTION 02088

POLYVINYL CHLORIDE PRESSURE PIPE

PART 1 - GENERAL

1.01 **WORK INCLUDED:**

This section covers the furnishing, handling, hauling, laying, jointing, testing, and disinfecting of all polyvinyl chloride (PVC) pressure pipe, fittings, and appurtenant work as indicated on the drawings and as specified herein. Pre and post CCTV inspection shall be performed by the Contractor and reviewed by the Engineer.

1.02 **RELATED WORK:**

- A. Section 02300, EARTHWORK
- B. Section 02252, SUPPORT OF EXCAVATION
- C. Section 02631, PRECAST MANHOLES
- D. Section 02518, TRACER TAPE

1.03 **QUALITY ASSURANCE:**

- A. All pipe and fittings shall be inspected and tested at the factory as required by the standard specifications to which the material is manufactured. The Contractor shall furnish in duplicate to the Engineer sworn certificates of such tests.
- B. In addition, the Owner reserves the right to have any or all pipe, fittings, and special castings inspected and/or tested by an independent service at either the manufacturer's plant or elsewhere. Such inspection and/or tests shall be at the Owner's expense.

1.04 **REFERENCES:**

- A. The following standards form a part of this specification as referenced:

American Water Works Association (AWWA)

AWWA	C110	Ductile-Iron and Gray-Iron Fittings, 3- In. through 48-In., for Water and Other Liquids
AWWA	C153	Ductile-Iron Compact Fittings, 3 In. through 16 In., for Water and Other Liquids
AWWA	C600	Installation of Ductile-Iron Water Mains and Their Appurtenances
AWWA	C651	Disinfecting Water Mains
AWWA	C900	Polyvinyl Chloride (PVC) Pressure Pipe, 4-In. through 12-In., for Water Distribution
AWWA	C905	Polyvinyl Chloride (PVC) Water Transmission Pipe, Nominal Diameters 14 In. through 36 In.
AWWA	C907	Polyvinyl Chloride (PVC) Pressure Fittings for Water (4 In. through 8 In.)

American Society for Testing and Materials (ASTM)

ASTM	D1784	Specification for Rigid Polyvinyl Chloride (PVC) Compounds and Chlorinated Polyvinyl Chloride (CPVC) Compounds
ASTM	D2241	Specification for Polyvinyl Chloride (PVC) Pressure-Rated Pipe (SDR-Series)
ASTM	D2321	Recommended Practice for Underground Installation of Flexible Thermoplastic Sewer Pipe
ASTM	D3139	Specification for Joints for Plastic Pressure Pipes Using Flexible Elastomeric Seals
ASTM	F477	Specification for Elastomeric Seals (Gaskets) for Joining Plastic Pipe

1.05 SUBMITTALS: IN ACCORDANCE WITH REQUIREMENTS OF GENERAL SPECIFICATIONS, SUBMIT THE FOLLOWING:

Shop drawings shall consist of manufacturer's scale drawings, cut, or catalogs including descriptive literature and complete characteristics and specifications, and code requirements. Shop drawings shall be submitted for the PVC pressure pipe, type of joints, fittings, and couplings in accordance with specifications.

PART 2 - PRODUCTS

2.01 PIPE:

- A. PVC pressure pipe from 1 1/2-inch through 3-inch shall be designed and manufactured in accordance with ASTM D2241.; 4-inch through 12-inch to AWWA C900, using materials which conform to ASTM D1784.
- B. Unless otherwise indicated or specified, PVC pressure pipe from 1 1/2-inch through 3-inch shall be pressure class SDR 21 and from 4-inch through 12-inch shall be pressure class DR18.
- C. Pipe shall be homogeneous throughout; free from voids, cracks, inclusions, and other defects; as uniform as commercially practicable in color, density, and other physical properties.
- D. Pipe surfaces shall be free from nicks, scratches, and other blemishes. The joining surfaces of pipe spigots and of integral-bell and sleeve-reinforced bell sockets shall be free from gouges and other imperfections that might cause leakage at joints.

2.02 JOINTS:

- A. Push-on joints for PVC pressure pipe shall conform to ASTM D3139 and F477.
- B. Where so indicated, pipe and fittings shall be furnished with approved thrust restraining appurtenances to keep the piping from pulling apart under pressure.

2.03 FITTINGS:

- A. PVC fittings shall be used for pipe sizes 1-1/2-inch through 3-inch.
- B. PVC fittings, conforming to AWWA C907 shall be used for pipe sizes 4-inch through 8-inch.
- C. Ductile iron compact fittings, conforming to AWWA C153 shall be used for pipe sizes 10-inch through 16-inch.
- D. Pressure classification of fittings shall be at least equal to that of the pipe with which they are used.
- E. Gaskets shall be of a composition suitable for exposure to the liquid within the pipe.
- F. Unless otherwise indicated, ductile iron fittings shall have all bell mechanical joint ends, and PVC fittings shall have all bell ends conforming to ASTM D3139.

2.04 FLEXIBLE COUPLINGS:

- A. To ensure correct fitting of pipe and couplings, all sleeve-type couplings and accessories shall be furnished by the supplier of the pipe and shall be of a pressure rating at least equal to that of the pipeline in which they are to be installed. Sleeve-type couplings shall be made by Dresser Mfg. Div., Bradford, PA; Rockwell International, Pittsburgh, PA; Clow Corporation, Rochester, NY; or be an approved equal.
- B. Couplings for buried pipe shall be of cast iron and shall be Dresser Style 38 or 153, Rockwell Type 441, Clow Type F-1208, or approved equal products. Couplings shall be provided with galvanized steel bolts and nuts.
- C. All couplings shall be furnished with the pipe stop removed.
- D. Couplings shall be provided with gaskets of a composition suitable for exposure to the liquid within the pipe.

PART 3 - EXECUTION

3.01 INSPECTION BEFORE INSTALLATION:

Pipes and fittings shall be subjected to a careful inspection and a hammer test just before being laid or installed.

3.02 HANDLING AND CUTTING:

- A. Every care shall be taken in handling and laying pipe and fittings to avoid damaging the pipe, and scratching or marring surfaces.
- B. Any fitting or pipe showing a crack or which has received a severe blow that may have caused an incipient fracture, even though no such fracture can be seen, shall be marked as rejected and removed at once from the work site.
- C. In any pipe showing a distinct crack and in which it is believed there is no incipient fracture beyond the limits of the visible crack, the cracked portions, if so approved, may be cut off by and at the expense of the Contractor before the pipe is laid so that the pipe used will be perfectly sound. The cut shall be made in the sound barrel at a point at least 12-inches from the visible limits of the crack.
- D. All cutting of pipe shall be done with a machine suitable for cutting PVC pipes. Cut ends shall be beveled when recommended by the pipe manufacturer.

3.03 INSTALLATION:

A. Pipe and Fittings

1. No defective pipe or fittings shall be laid or placed in the piping, and any piece discovered to be defective after having been laid or placed shall be removed and replaced by a sound and satisfactory piece.
2. Each pipe and fitting shall be cleared of all debris, dirt, etc., before being laid and shall be kept clean until accepted in the complete work.
3. Pipe and fittings shall be laid accurately to the lines and grades indicated on the drawings or as required. Care shall be taken to ensure good alignment both horizontally and vertically.
4. In buried pipelines, each pipe shall have firm bearing along its entire length.
5. If the pipe is to be installed in a curvilinear configuration using pipe bending, or pipe must have slight changes in direction using joint deflection, the Contractor is to follow the installation guide provided by the manufacturer. Under no circumstances shall the pipe be curved or the joints offset more than the maximum limits provided by the manufacturer.
6. Pipe shall be installed underground in a manner that will ensure that external loads will not subsequently cause a decrease of more than 5 percent in the vertical cross-section dimension (deflection). When installing the pipes, they shall be rotated 180 degrees so that the upper quadrant of the pipe that was exposed to direct sunlight will not be backfilled upon.
7. At all times when pipe laying is not actually in progress, the open ends of pipe shall be closed by temporary water-tight plugs or by other approved means. If water is in the trench when work is resumed, the plug shall not be removed until all danger of water entering the pipe has passed.
8. Assembling of fittings with mechanical joint ends shall conform to AWWA C600, Section 9B and all amendments thereto.
9. If effective sealing of the mechanical joint is not attained at the maximum allowable torque, the joint shall be disassembled and thoroughly cleaned, then reassembled. Bolts shall not be overstressed to tighten a leaking joint. The correct torque as indicated by a torque wrench shall not exceed manufacturer's recommendations.
10. When PVC pipe is to be drilled and tapped, it shall be done in accordance with the manufacturer's recommendations. Only sharp cutting tools shall be used and

the tool shall be lubricated during drilling to avoid a build-up of excess heat locally in the pipe.

3.04 TESTING:

- A. Prior to the pressure and leakage tests, the piping shall be thoroughly cleaned of all dirt, dust, oil, grease, and other foreign material. This work shall be done with care to avoid damage to the pipe.
- B. Pressure and Leakage Tests
1. Unless otherwise approved, all pipelines shall be given combined pressure and leakage tests between line valves. The Contractor shall furnish and install suitable temporary testing plugs or caps; all necessary pressure pumps, pipe connections, meters, gates, and other necessary equipment; and all labor required. The Owner and Engineer shall have the privilege of using their own gages.
 2. Subject to approval and provided that the tests are made within a reasonable time considering the progress of the project as a whole, and the need to put the section into service, the Contractor may make the tests when he desires. However, pipelines in excavations or embedded in concrete shall be tested prior to backfilling of the excavation or placing of the concrete, and exposed piping shall be tested prior to field painting.
 3. Unless it has already been done, the section of pipe to be tested shall be filled with water and all air shall be expelled from the pipe. The Contractor shall follow established procedures for filling the pipe and expelling trapped air to avoid exposing the piping system to water hammer. If blowoffs are not available at high points for releasing air, the Contractor shall make the necessary excavations and install the necessary taps. If required by the Engineer, it shall plug the holes after completion of the test and backfill as necessary.
 4. The section under test shall be maintained full of water for a period of 24 hours prior to the combined pressure and leakage test being applied.
 5. The pressure test shall consist of first raising the water pressure (based on the elevation of the lowest point of the section under test corrected to the gage location) to the pressure rating of the pipe. If the Contractor cannot achieve the specified pressure and maintain it for a period of one hour, the section shall be considered as having failed to pass the pressure test.
 6. If the pressure test fails, the Contractor shall make a leakage test by metering the flow of water into the pipe while maintaining the specified pressure in the section being tested. If the average leakage during a two-hour period exceeds 11.6 gallons per day, per inch of diameter, per mile of pipe, the section shall be considered as having failed the leakage test. For example, if 1,000 feet of 4-inch pipe is to be tested, the allowable leakage is 0.73 gallons over a 2-hour period, calculated as follows:

$$\underline{L = (11.6 \text{ gal}) \times (4") \times (2 \text{ hr.}) \times (1000')} = 0.73 \text{ gal}$$
$$(1") \times (24 \text{ hr.}) \times (5280')$$

7. If the section fails to pass the pressure and leakage test, the Contractor shall do everything necessary to locate, uncover, and repair or replace the defective pipe, fitting, or joint, all at its 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.

END OF SECTION

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S U P P L E M E N T A L S P E C I F I C A T I O N**ITEM 613.019 ASBESTOS-CEMENT PIPE REMOVAL AND DISPOSAL LINEAR FOOT**

SECTION 02111

ASBESTOS ABATEMENT FOR UNDERGROUND UTILITIES

PART 1 - GENERAL

1.01 GENERAL:

- A. This section specifies requirements for the removal of asbestos-containing material (ACM) during trenching and excavation operations. The work includes, but is not limited to, the removal and disposal of the following ACM's: asbestos cement pipe, asbestos cement pipe duct, asbestos insulated electrical cable, and asbestos insulated steam pipe.

- B. All asbestos removal work is to be performed in accordance with these specifications, Environmental Protection Agency (EPA), Occupational Safety and Health Administration (OSHA), Department of Transportation (DOT), National Institute of Occupational Safety and Health (NIOSH), New Hampshire Department of Environmental Services (NHDES), Department of Labor and Workforce Development (DLWD), and other state and local regulations. Wherever there is a conflict or overlap of the above references, the most stringent provisions apply.

- C. As a description of the general scope of work, the Contractor shall provide as a minimum, the following services:
 - 1. Hand excavate area around the ACM as needed. Necessary Shoring and trench stability shall be the responsibility of the General Contractor.
 - 2. Remove all ACM piping from the work area, according to the procedures detailed in this section. If lifting equipment is required, the General Contractor will provide it.
 - 3. Thoroughly clean each work area.
 - 4. Decontaminate and remove all equipment used to perform the work.
 - 5. Properly dispose of all contaminated and non-contaminated waste material.
 - 6. Provide personal protective equipment and decontamination facilities for all contractor personnel, site visitors and the Engineer.

1.02 DEFINITIONS:

- A. **ABATEMENT ACTIVITIES:** All activities from the initiation of work area preparation through successful clearance air monitoring performed at the conclusion of an asbestos

project, including but not limited to encapsulation, removal and cleaning.

- B. **AIR MONITORING:** The process of measuring the fiber content of a specific volume of air in a stated period of time.
 - C. **ASBESTOS-CONTAINING MATERIAL(S) (ACM):** Any insulation, pipe, duct, and other conduit and materials containing a detectable amount of asbestos, or potentially contaminated on their surface with asbestos fibers.
 - D. **ASBESTOS-CONTAINING WASTE MATERIAL:** Wastes are defined as all asbestos-containing or potentially contaminated materials or other items which have not been completely cleaned or sealed to the satisfaction of the Engineer while in the work area, and must be removed from the job site. Asbestos wastes may include building materials, insulation, disposable clothing and protective equipment, plastic sheeting and tape, exhaust systems or vacuum filters, Contractor equipment, or other materials designated by state or local authorities or the Engineer which may have been contaminated with asbestos and have not been fully cleaned.
 - E. **BARRIER:** Any surface that seals off the work area to inhibit the movement of fibers.
 - F. **DECONTAMINATION FACILITY:** A facility or area used for the decontamination of all workers, and their personal protective equipment, leaving an asbestos removal area as well as for access to the work area.
 - G. **FRIABLE ASBESTOS MATERIAL:** Material that contains more than 1.0-% asbestos by weight, and that can be crumbled, pulverized, or reduced to powder by hand pressure when dry.
 - H. **WORK AREA:** The area where asbestos related work or removal operations are performed which is enclosed or isolated to prevent the spread of asbestos dust, fibers or debris, and entry by unauthorized personnel. Work area is a Regulated Area as defined by 29 CFR 1926. A work area is considered a contaminated space between the time preparation begins and the time the area is certified clean.
- 1.03 **RELATED WORK:**
- A. Section 01110, CONTROL OF WORK AND MATERIALS
 - B. Section 00890, PERMITS
 - C. Section 01567, POLLUTION CONTROL AND ENVIRONMENTAL PROTECTION
 - D. Section 01740, CLEANING UP
 - E. Section 02300, EARTHWORK

1.04 SUBMITTALS:

- A. The Contractor shall submit to the Engineer the following listed items at least 14 days before work abatement is to proceed for review in accordance with Section 01330 – SUBMITTALS. No work under this Section may commence until the Engineer has accepted all required submittals.

Submittal No. 1

Standard Operating Procedure: Submit a detailed plan of the procedures proposed for use in complying with the requirements of OSHA Regulation 29 CFR 1926.1101. The following rules will apply as described in these Regulations.

1. To handle asbestos pipe during removal (without breakage) and package for disposal, all workers must possess an eight (8)–hour asbestos awareness training (job specific) and a trained supervisor/”competent person” must be present holding project authority
2. To handle asbestos pipe during removal with “minimal breakage” (substantially intact) all workers must possess an eight (8)–hour asbestos training (job specific) and a trained supervisor/”competent person” must be present holding project authority. A respirator must also be used by all personnel handling the broken asbestos (medically fit and fit tested). Use of respirators by personnel requires the employer to have a written respirator program.
3. To handle asbestos pipe with “more than minimal breakage,” a licensed Abatement Contractor must perform the work.
4. Degree of “breakage” of pipe will be determined by Contractor before work begins.

The standard operating procedure shall ensure:

1. Work schedule and work practices and, if required, tight security on a 24-hour basis from unauthorized entry into the workspaces.
2. Proper protective clothing and respiratory protection before entering the work space from the outside.
3. Removing asbestos-containing materials in ways that minimize or prevent exposure and contamination.
4. Emergency evacuation of personnel, for medical or safety (fire and smoke) so that exposure will be minimized.
5. Safety from accidents in the work space, especially from electrical shocks, slippery surfaces, and entanglements in loose hoses and equipment.

6. Provisions for effective supervision, and OSHA-specified personnel air monitoring for exposure during the work.
7. Description of work practices so that airborne fibers travel downstream from workers.

Submittal No. 2

Prepare a disposal plan for the materials associated with this Section. The disposal plan shall include but not be limited to:

1. Summary of other proposed materials and equipment (manufacturer, catalog number or model, and description) and method of application or use, including but not limited to encapsulants, wetting agents, personal protective equipment, and test samples of all proposed materials for performing the work.
2. If applicable, lists of all permits, licenses, or manifests that will be applied for and used. Copies of the EPA, State, and local asbestos removal notification forms.
3. Copies of all proposed daily inspection and record logs, including work area entry data, respirator inspections and maintenance, HEPA-exhaust inspections, maintenance, and other work applicable activities.
4. Name, location, and copies of applicable licenses for primary and secondary landfill for disposal of asbestos-containing or asbestos-contaminated waste.
5. Within 30 days of receipt of asbestos waste at the approved landfill, the Contractor shall submit to the Engineer the original copy of the "Waste Shipment Record" acknowledging disposal of all associated waste material from the Contract showing delivery date, quantity, and appropriate signature of Contractor, transporter, and landfill's authorized representative.

Submittal No. 3

Contingency Plan: Submit a contingency plan for emergencies including fire, accident, power failure, air system failure, or any other event that may require modifications or abridgement of decontamination or work area isolation procedures. Include in plan specific procedures for decontamination or work area isolation. Note that nothing in this specification should impede safe exiting or providing of adequate medical attention in case of an emergency. Include telephone number and locations of emergency services including but not limited to fire, ambulance, doctor, hospital, police, power company, telephone company, and gas company.

- B. Should the Contractor determine that there is more than “miniman breakage”, the Contrator shall submit to the Engineer the following listed items for review in accordance with Section 01330 – SUBMITTALS. No work under this Section may commence until the Engineer has accepted all required submittals.

Submittal No. 1

1. Asbestos Abatement Plan: Prepare an Asbestos Abatement Plan describing engineering controls and procedures that the Contractor will use to conduct the Work of this Section. The Plan shall include but not be limited to the following:
 - a. Name Resume Information: Submit resume and training certifications for the individual(s) monitoring the operation of supplied air respiratory systems where applicable and experience of proposed Supervisors and/or Foremen.
 - b. Summary of workforce by disciplines, and a notarized statement documenting that all proposed workers, by name, have received all required medicals and have been properly trained in asbestos removal work, respirator use, and appropriate State of New Hampshire, EPA & OSHA standards.
 - c. The location and description of regulated areas such as work area, personnel decontamination units (clean room, shower room, equipment room), waste load-out decontamination units, and storage areas.
 - d. Work area preparations, such as pre-cleaning, installation of critical barriers and polyethylene sheeting, construction of decontamination units, and storage areas.
 - e. Protection of non-ACM materials and equipment inside of work areas with two layers or polyethylene sheeting.
 - f. Decontamination and clean up of following removal activities in each designated work area.
 - g. Location of HEPA filtration units sufficient to achieve a minimum of four air changes per hour in each containment.
 - h. The personal protective equipment and proposed respiratory program for employees throughout all phases of the job, including make, model and NIOSH approval numbers of respirators to be used.
 - i. Level of supervision.
 - j. Abatement methods to be used including containment control procedures.
 - k. Interface of other trades.

- l. Storage and disposal procedures and plan.
 - m. Personal exposure air monitoring plan.
 - n. Fire and medical emergency response procedures.
 - o. Security procedures to be used for all regulated areas.
2. Copies of all notifications, permits, applications, personal licenses and like documents required by federal, State, or local regulations obtained or submitted in proper fashion.
 3. Chain of Command of responsibility at work site including supervisors, foreman, and competent person, their names, resumes and certificates of training.
 4. List of employees to be used on this Contract.
 5. Proposed transporter and landfill for asbestos wastes.
 6. Certificate of Insurance. (\$2 million occurrence to include pollution and asbestos liability).
 7. A list of all equipment to be used on site, by make and model, including negative pressure equipment, HEPA vacuums, Water Atomizing Devices, etc.
 8. Name and proof of certification for asbestos testing lab.
 9. Schedule detailing the proposed sequence of operations to perform the work specified herein.

1.05 PROJECT COORDINATION:

- A. Minimum administrative and supervisory requirements necessary for coordination of asbestos abatement work on the project to be provided by the Contractor include but are not necessarily limited to the following:
 1. Administrative and supervisory personnel.
 2. Special reports.
 3. Contingency Plan.
 4. Notifications to other entities at job site.

B. ADMINISTRATIVE AND SUPERVISORY PERSONNEL:

1. **Supervisor:** The Supervisor is the Competent Person as required by OSHA in 29 CFR 1926 for the Contractor and is the Contractor's representative responsible for compliance with all applicable federal, state and local regulations relating to asbestos-containing materials. This person must have completed a course in asbestos abatement procedures, have had a minimum of four (4) years on-the-job training and meet any additional requirements set forth in 29 CFR 1926 for a Competent Person. This person shall meet the State of New Hampshire's requirements as an Asbestos Abatement Supervisor and Asbestos Abatement Project Designer. This person shall be available to the state and local authorities and the Engineer at all times while work is in progress.
2. **Supervisor/Foreman:** Provide a full-time supervisor/foreman who is experienced in the supervision of asbestos abatement projects including work practices, protective measures for personnel, disposal procedures, etc. This person must have completed a course at an EPA Training Center or equivalent certificate course in asbestos abatement procedures, have a minimum of two years on-the-job training and meet any additional requirements set forth in 29 CFR 1926 for a competent person. This person must also be certified by the State of New Hampshire as an Asbestos Abatement Supervisor. The Supervisor in 1. (above) complies with this requirement.

C. SPECIAL REPORTS: Except as otherwise indicated, Contractor shall submit special reports directly to the Engineer within one day of occurrence for an unusual event or accident involving the asbestos abatement occurring at the site. The report shall include all pertinent information including personnel involved, activities, and the result of the incident. Copies shall be forwarded to others affected by the occurrence.

D. CONTINGENCY PLAN:

1. **Contingency Plan:** Contractor shall prepare a contingency plan for emergencies in accordance with 1.03.
2. **Post:** Contractor shall post, at a visible location adjacent to the work area, telephone numbers and locations of emergency services including but not limited to fire, ambulance, doctor, hospital, police, power company, telephone company and gas company.

E. NOTIFY: Contractor shall notify other contractors at the job site of the nature of the asbestos abatement activities, location of asbestos containing materials, and the requirements relative to asbestos set forth in these specifications and applicable regulations.

1.06 SCHEDULES AND REPORTS:

- A. COORDINATION: Contractor shall provide close coordination of the progress schedule, schedule of submittals, and progress reports. Contractor shall distribute each report to all parties involved in the work including the Engineer.
- B. DAILY LOG: Contractor shall maintain on site a daily log documenting the dates and time of but not limited to, the following items:
 - 1. Meetings; purpose, participants, discussion (brief)
 - 2. Visitations; authorized and unauthorized
 - 3. Personnel, by name and Social Security Number, entering and leaving the work area
 - 4. Special or unusual events, e.g., barrier breaching, equipment failures
 - 5. Air monitoring tests and test results as required by OSHA
- C. Contractor shall document, with confirmation signature of the Engineer, the following:
 - 1. Inspection of work area preparation prior to start of removal and daily thereafter
 - 2. Removal of any polyethylene barriers
 - 3. Contractor's inspections prior to encapsulation
 - 4. Removal of waste materials from work area
 - 5. Decontamination of equipment (list items)
 - 6. Contractor's final inspection/final air test analysis.
- D. Contractor shall provide two copies of the daily log and above documentation at final closeout of project for use by the Engineer.

1.07 GENERAL APPLICABILITY OF CODES, REGULATIONS AND STANDARDS:

- A. Except to the extent that more explicit or more stringent requirements are written directly into the contract documents, all applicable codes, regulations, and standards have the same force and effect (and are made a part of the contract documents by reference) as if copied directly into the contract documents, or as if published copies are bound herewith. All regulations by these and other governing agencies in their most recent version are applicable.

- B. **FEDERAL REQUIREMENTS:** Federal requirements which govern asbestos abatement work or hauling and disposal of asbestos waste materials include, but are not limited to, the following:
1. U.S. Department of Labor, Occupational Safety and Health Administration, (OSHA) including but not limited to:
 - a. Occupational Exposure to Asbestos, Tremolite, Anthphyllite, and Actinolite, Final Rules, Title 29, Part 1910, Section 1001 and Part 1926, Section 1101 of the Code of Federal Regulations
 - b. Respiratory Protection, Title 29, Part 1910, Section 134 of the Code of Federal Regulations
 - c. Construction Industry, Title 29, Part 1926, of the Code of Federal Regulations
 - d. Access to Employee Exposure and Medical Records, Title 29, Part 1910, Section 2 of the Code of Federal Regulations
 - e. Hazard Communication, Title 29, Part 1910, Section 1200 of the Code of Federal Regulations
 - f. Specifications for Accident Prevention Signs and Tags, Title 29, Part 1910, Section 145 of the Code of Federal Regulations
 2. U.S. Environmental Protection Agency (EPA) including but not limited to:
 - a. Asbestos Abatement Projects Rule
40 CFR Part 762
CPTS 62044, FRL 2843-9
Federal Register, Vol 50 No 134, July 12, 1985
P28530-28540
 - b. Regulation for Asbestos, Title 40, Part 61, Sub-part A of the Code of Federal Regulations
 - c. National Emission Standards for Asbestos, Title 40, Part 61, Sub-part M (Revised Sub-part B) of the Code of Federal Regulations
 3. U.S. Department of Transportation Title 49, Part 172 and 173.
- C. **STATE REQUIREMENTS:** Contractor shall abide by all state requirements, which govern asbestos abatement work or hauling and disposal of asbestos waste materials.
- D. **LOCAL REQUIREMENTS:** Contractor shall abide by all local requirements, which govern asbestos abatement work or hauling and disposal of asbestos waste materials.

E. STANDARDS: Standards which govern asbestos abatement work or hauling and disposal of asbestos waste materials include the following:

1. American National Standard Institute (ANSI);
 - a. Fundamentals Governing the Design and Operation of Local Exhaust Systems, ANSI Publication Z9.2-79
 - b. Practices for Respiratory Protection, ANSI Publication Z288.2-80
2. ASTM - American Society for Testing and Materials
3. UL - Underwriters Laboratories, Inc.

1.08 NOTIFICATIONS, PERMITS, AND LICENSES:

- A. AGENCY NOTIFICATION: As required by USEPA National Emission Standards for Hazardous Air Pollutants (NESHAPS) Asbestos Regulations (40CFR 61, Subpart M), Contractor shall send written notification to the NHDES. Contact at least 10 days prior to beginning any work on asbestos-containing materials.
- B. STATE AND LOCAL AGENCIES: Send written notification as required by state and local regulations before beginning any work on asbestos-containing materials.
- C. LICENSES: Maintain current licenses as required by applicable state and/or local jurisdictions for the removal, transportation, disposal, or other regulated activity to the work of this contract.
- D. POSTING AND FILING OF REGULATIONS: Maintain two (2) copies of applicable federal, state and local regulations above. Post one copy of each at the job site. Keep one copy of each on file in Contractor's office.

PART 2 - PRODUCTS

1.01 GENERAL REQUIREMENTS:

- A. The Contractor shall deliver all materials and equipment to the site in the original containers bearing the name of the manufacturer, and details for proper storage and usage.
- B. All materials or equipment delivered to the site shall be unloaded, temporarily stored, and transferred to the work area in a manner which shall not interfere with construction operations.
- C. Store all materials subject to damage off the ground, away from wet or damp surfaces, and under cover sufficient to prevent damage or contamination.

- D. Unloading and temporary storage sites, and transfer routes, must be reviewed in advance by the Engineer.
- E. Damaged or deteriorated materials may not be used and must be promptly removed from the premises. Material, which becomes contaminated, with asbestos-containing material shall be packaged and legally disposed of in an approved, secure landfill.
- F. All materials, tools, and equipment must comply, at a minimum, with this specification, and relevant federal, state and local codes.

1.02 MATERIALS, TOOLS, AND EQUIPMENT:

A. RESPIRATOR PROTECTION EQUIPMENT:

1. Air Purifying Respirators:

- a. **Respirator Bodies:** Provide half face or full face type respirators. Equip full-face respirators with a nose cup or other anti-fogging device as would be appropriate for use in air temperatures less than 32 degrees Fahrenheit.
- b. **Filter Cartridges:** Provide, at minimum, HEPA type filters labeled with NIOSH and MSHA certification for "Radionuclides, Radon Daughters, Dust, Fumes, Mists including Asbestos-Containing Dusts and Mists" and color-coded in accordance with ANSI Z228.2 (1980). In addition, a chemical cartridge section may be added, if required, for solvents, etc., in use. In this case, provide cartridges that have each section of the combination canister labeled with the appropriate color code and NIOSH/MSHA Certification.
- c. **Non-permitted Respirators:** Do not use single use, disposable or quarter face respirators.

B. WETTING MATERIALS: For wetting before disturbance of asbestos-containing materials use either amended water or a removal encapsulant. The material must be odorless, non-flammable, non-toxic, non-irritating, and non-carcinogenic. It shall be applied as a mist using a low-pressure sprayer recommended by the manufacturer.

- 1. **Amended Water:** Provide water to which a surfactant has been added. Use a mixture of surfactant and water which results in wetting of the asbestos containing material and retardation of fiber release during disturbance of the material equal to or greater than that provided by the use of one ounce of a surfactant consisting of 50% polyoxyethylene ester and 50% polyoxyethylene ether mixed with five gallons of water.
- 2. **Removal Encapsulant:** Provide a penetrating type encapsulant designed specifically for removal of asbestos containing material. Use a material which results in wetting of the asbestos-containing material and retardation of fiber release during disturbance of the material equal to or greater than that provided by water amended

with one ounce of a surfactant consisting of 50% polyoxyethylene ester and 50% polyoxyethylene ether mixed with five gallons of water.

- C. **ENCAPSULANT:** A material that surrounds or embeds asbestos fibers in an adhesive matrix, to prevent release of fibers.
 - 1. **Bridging Encapsulant:** An encapsulant that forms a discrete layer on the surface of an in situ asbestos matrix.
 - 2. **Penetrating Encapsulant:** An encapsulant that is absorbed by the in situ asbestos matrix without leaving a discrete surface layer.
 - 3. **Removal Encapsulant:** A penetrating encapsulant specifically designed for removal of asbestos-containing materials rather than for in situ encapsulation.
- D. **POLYETHYLENE SHEET:** Provide flame resistant polyethylene film that conforms to requirements set forth by the National Fire Protection Association Standard 701, Small Scale Fire Test for Flame-resistant Textiles and Films. Provide largest size possible to minimize seams, 6.0 mils thick as required, frosted or black as indicated.
- E. **DUCT TAPE:** Provide duct tape in 2" or 3" widths as indicated, with an adhesive which is formulated to aggressively stick to sheet polyethylene, is waterproof, and will adhere to other materials.
- F. **SPRAY CEMENT:** Provide spray adhesive in aerosol cans that is specifically formulated to stick tenaciously to sheet polyethylene
- G. **WASTE CONTAINERS:** Provide 6 mil thick leak-tight polyethylene bags labeled as follows:

DANGER
CONTAINS ASBESTOS FIBERS
AVOID CREATING DUST
CANCER AND LUNG DISEASE HAZARD

and

DANGER
RQ HAZARDOUS SUBSTANCE,
SOLID, NOS,
ORM-E NA 9188
(ASBESTOS)

If the waste material contains sharp edges or may otherwise puncture polyethylene bags, provide properly labeled drums or other closed containers for storage, transportation, and disposal.

- H. **WARNING SIGNS AND LABELS:** Shall comply with 29 CFR 1926.59(k), and all other federal, state, or local codes and regulations.
- I. **LADDERS OR SCAFFOLDS:** Shall be OSHA-approved, and be of sufficient dimensions and quantities so that the Engineer, workers, and other inspectors can easily and safely access all work surfaces. Scaffold joints and ends shall be sealed with tape to prevent incursion of asbestos fibers.
- J. **HAND POWER TOOLS:** Shall be equipped with HEPA-filtered local exhaust ventilation if used to drill, cut into, or otherwise disturb ACM.
- K. **BRUSHES:** All brushes shall have nylon bristles. Wire brushes are excluded from use due to their potential to shred asbestos fibers into small fibers. Wire brushes may be used on pipe joint applications upon prior written notice to the Engineer.
- L. **HEPA-VACUUM CLEANER:** Each HEPA-vacuum cleaner shall be separately equipped with an airtight, securely attached hose, of proper length, and a collection wand, brush, and other special attachments appropriate to the required cleaning tasks. The equipment shall be properly operated at all times and shall contain no air leaks. The Engineer may inspect all vacuuming equipment before its use and may request verification of the efficiency of the filtration of the equipment.
- M. **TWO WAY RADIOS:** Provide General Superintendent and all Work Area Supervisors and Foremen with compatible two-way radios.

PART 3 - EXECUTION

3.01 GENERAL:

- A. **PRE-ASBESTOS ABATEMENT PREPARATIONS:** Prior to completion of excavation work, the Contractor will set-up the work area as follows:
 - 1. Demarcate, at ground level, the boundaries of the work area and post required warning signs in English meeting the requirements of OSHA 29 CFR 1926.1101.
 - 2. Construct barriers as required to isolate the work area.
 - 3. Install Decontamination Facility, including location and method for entering and exiting the work area.
 - 4. Install and test temporary power and lighting. All Contractor costs associated with the isolation of electrical systems and installations of temporary power and lighting systems and installations of temporary power and lighting must be included in his prices.
 - 5. Install and test temporary water service.

6. Install and test HEPA-filtered exhaust systems as required. HEPA-exhaust units are to remain at grade level. Flexible hoses (minimum 8" diameter) will be extended into the excavation.
 7. Obtain Engineer's written acceptance of all preparation work before starting pre-cleaning or removal of asbestos materials.
 8. Where shutdown of electrical equipment is not possible and use of a wet removal process is unsafe, the Contractor shall obtain the approval of EPA and other applicable agencies to use a "dry" removal procedure.
- B. **CODES AND STANDARDS:** All temporary structures and temporary construction shall be designed in accordance with the latest editions of the following codes, standards, and specifications.
1. National Electrical Code (NEC) – most recent edition
 2. National Bureau of Standards, Handbook, National Electrical Safety Code
 3. State and Local Codes, and all other authorities having jurisdiction
 4. Underwriter Laboratories (UL)
 5. National Board of Fire Underwriters
 6. OSHA
- C. **APPROVAL OF PREPARATION WORK:** After each asbestos removal work area has been prepared as specified above, the Contractor shall request a formal site inspection by the Engineer. No removal, demolition, or other disturbance of asbestos-containing materials, dust, or debris shall occur until the Engineer has inspected and accepted the site preparation work.
- D. **NOTIFICATION OF POLICE AND FIRE DEPARTMENT:** Notify the local police and fire department of the asbestos abatement project. Coordinate with the police for all security aspects of the project, and with the fire department for all emergency evacuation and safety aspects. Where possible, secure acknowledgement from both the police and fire department that they have reviewed the established security and safety procedures.
- E. **ACCESS RESTRICTIONS:** The Contractor shall restrict access to work areas to person who have previously been identified to the Engineer; or persons who have legal jurisdiction over the work. The Contractor's Supervisor shall at all times monitor the entrance to the Decontamination Facility to prevent unauthorized people from entering, and to maintain a written log of all people entering the work area.

3.02 ASBESTOS REMOVAL DURING EXCAVATION:

- A. This section is provided for removal of asbestos-containing materials in excavation areas. The Contractor shall not begin any work until he has verified that the excavation (trench) has been adequately shored and that all pertinent safety systems are in place. Refer to Paragraph 1.01.D.1 for responsibility of providing shoring and support.
- B. **REMOVAL OF FRIABLE ASBESTOS MATERIALS:** This section refers to removal of asbestos-containing materials which are defined by 40 CFR Part 61.141 as friable asbestos containing. Refer to Paragraph 1.01.D.2 for responsibility of providing power equipment for lifting in required.
1. Prepare work area as described in Section 3.01.
 2. Carefully excavate, by hand, a sufficient area around the material to perform the abatement work. Any asbestos debris that is present or generated by these activities will be promptly wetted and placed into 6-mil asbestos waste bags before continuing with the work.
 3. Once excavation is complete, place one layer of 6-mil polyethylene sheeting on sidewalls and bottom of trench under the ACM to be removed.
 4. Thoroughly wet all asbestos-containing materials with wetting materials as specified in Section 2.02B. Materials are to be kept wet at all times during abatement work.
 5. Remove asbestos materials as follows:
 - a. **Non-encased Friable Asbestos Material**
 1. Insulation shall be removed from all piping. A containment shall be constructed around each point where a section of pipe is to be cut.
 2. For small diameter piping, glovebags may be used for containment. Remove approximately a 1 – foot width band of insulation from both ends of each section of piping to be cut.
 3. Properly bag and dispose of any insulation and fallen debris from the removal operation.
 4. Using an HEPA-filter equipped saw, cut pipe into manageable sections. During all cutting activities, keep asbestos materials wet and provide constant misting of the air surrounding the immediate area. Additionally, provide localized negative air by positioning HEPA-exhaust fan inlet duct in the area of the cutting.

5. Wet the exposed ends of the insulation and encapsulate exposed ends of the insulation with rewettable sheeting prior to making any saw cuts in the pipe.
6. Wrap the length of pipe with two layers of 6-mil polyethylene sheeting and seal all seams air-tight using duct tape. Remove the section from the trench. Once at ground level, apply required asbestos waste labels and take each section to a remote full containment area where the insulation is removed, bagged and disposed of.
7. Each section of pipe is then visually inspected to ensure no visible dust or debris remains, and then is encapsulated and removed from containment for removal as scrap by others.

b. Concrete Encased Friable Asbestos Material

1. Using a HEPA-filter equipped saw, cut pipe into manageable sections. During all cutting activities, keep asbestos materials wet and provide constant misting of the air surrounding the immediate area. Additionally, provide localized negative air by positioning HEPA-exhaust fan inlet duct in the area of the cutting.
2. As each cut is completed, wet the exposed ends of the insulation and remove approximately one inch deep of insulation from the end. Place removed insulation into a 6-mil asbestos waste bag taking care not to allow removed insulation to fall to the bottom of the trench. Apply enough quick-setting mortar to the cut end of the section to fill the area of the removed insulation and seal the insulation within the section. Allow the mortar to adequately dry.
3. As each section of material is cut free and properly prepared, remove the sections from the trench.
4. Prepared component sections will be placed into an acceptable waste transport vehicle. No stockpiling of removed components will be allowed outside of a locked, secure waste transport vehicle. Massachusetts DEP approval is required before disposal of materials generated in this manner.

C. REMOVAL OF NON-FRIABLE ASBESTOS MATERIALS: This section refers to removal of asbestos-containing materials which are defined by 40 CFR Part 61.141 as non-friable asbestos-containing materials.

1. Prepare work area as described in Section 3.01.
2. Carefully excavate, by hand, a sufficient area around the material to perform the abatement work. Any asbestos debris that is present or generated by these

activities will be promptly wetted and placed into 6-mil asbestos waste bags before continuing with the work.

3. Once excavation is complete, place one layer of 6-mil polyethylene sheeting on sidewalls and bottom of trench under the ACM to be removed.
4. Thoroughly encapsulate asbestos-containing materials with an acceptable penetrating encapsulant per manufacturer guidelines.
5. Remove asbestos materials as follows:
 - a. Asbestos Cement Pipe or Pipe Duct: Cut material into manageable sections using HEPA-filtered saw. The Asbestos Contractor will take all necessary precautions to avoid any breakage of ACM. Cut ends of pipe will be immediately encapsulated. Cut sections of pipe will be removed from the trench and immediately wrapped and sealed in two layers of 6-mil asbestos waste bags. Packaged waste will then be placed into acceptable waste transportation vehicle. Whenever possible, the Contractor shall limit cutting asbestos cement materials and dismantle materials in intact sections..

D. CLEAN-UP AND WORK AREA DECONTAMINATION:

1. Before removing protective poly sheeting, carefully HEPA-vacuum or wet wipe all poly surfaces.
2. Place poly sheeting into double 6-mil asbestos waste bags and remove from the work area.
3. Thoroughly wet and place into 6-mil asbestos disposal bags any earth contaminated with asbestos debris.
4. Water contaminated with asbestos shall be filtered through a 5 micron cartridge filtering system. Filtered water may be routed as surface water in accordance with Section 01570. Used filter cartridges shall be disposed of as asbestos waste.

E. PERSONNEL EXITING: After completion of removal activities, workers shall clean the outer layer of protective clothing using the HEPA-vac, then carefully remove the outer layer and dispose of it in 6-mil waste bags. The workers shall then proceed directly to the Decontamination Facility and proceed with decontamination procedures.

3.03 ASBESTOS WASTE DISPOSAL PROCEDURES:

A. The Contractor shall package, label, and remove all asbestos waste from the Work Area as specified below. Packaging shall be accomplished in a manner that minimizes waste volume, but insures waste containers shall not tear or break. Transportation and disposal of the containerized waste at an approved landfill shall be the responsibility of the Contractor.

B. WASTE LABELING:

1. Warning labels, having waterproof print and permanent adhesive in compliance with OSHA, EPA and Department of Transportation requirements shall be affixed to or printed on the sides of all waste bags or transfer containers. Warning labels shall be conspicuous and legible. (Refer to 2.02.)
2. In compliance with NESHAPS, 40 CFR, Part 61.150 , all waste containers or bags shall be labeled with the following generator information:
 - a. Name of waste generator.
 - b. Location where waste was generated.

3.04 MONITORING, TESTING AND INSPECTION:

- A. The Contractor shall be responsible for the performance and execution of the work and closely and continuously monitor the work. The monitoring work shall be performed inside both the work area and the surroundings to ensure full compliance with these specifications and all applicable regulations. Monitoring and inspections shall include air samples in the workspace, air samples in the areas surrounding the work area, checking of the standard operating procedures, engineering controls, respiratory protection equipment, packaging, transporting and disposal of asbestos, decontamination facilities and procedures, and any other aspects of the abatement process that may impact the health and safety of the people and the pollution of the environment.
- B. The Contractor shall bear all costs concerning the laboratory work required for the analyses.
- C. The Engineer shall receive copies of all laboratory reports presenting the results of the Contractor's air monitoring and inspection program. All information shall be recorded in the Contractor's air monitoring log.

3.05 AIR MONITORING BY CONTRACTOR:**A. PERSONAL MONITORING:**

1. The Contractor shall perform air monitoring as required to meet OSHA Requirements for maintenance of Time Weighted Average (TWA) fiber counts for the types of respiratory protection provided. The Engineer will not be performing air monitoring to meet these OSHA requirements.
2. The sampling person and analytical laboratory performing this work shall be an independent party not financially or managerially connected to the Contractor.

3. The laboratory shall be successfully participating in the AIHA/NIOSH Proficiency Analytical Testing (PAT) program and be certified by the Commonwealth of Massachusetts.
4. Air sampling materials and equipment requirements are as follows:
 - a. Sampling for analysis by phase contract microscopy shall employ cellulose ester collection filters with 0.8 micron pore size or less. Cassettes shall be loaded with filters under clean laboratory conditions. A 5.0 micron pore-size cellulose ester-backing filter shall be placed behind the collecting filter, followed by cellulose support pad and the cassette base. A metal cowl or an electrically conductive cowl shall be used in conjunction with the sampling train.
 - b. The filter assembly shall be upstream of all other components in the sampling train. An airflow-measuring device (when used) shall be downstream of the filter and the pump assembly, or integral with the pump assembly.
 - c. Sampling pumps shall supply constant flow.
 - d. An airflow measuring/metering device shall be used, and shall be high quality rotometer, mass flow, dry gas meter or critical orifice. Measuring devices shall have a range of at least 1.5 times the desired flow and be readable to at least +5% of the desired flow rate. They shall be calibrated against standards of higher accuracy before and after sampling. The calibrations shall be recorded.
5. Numbers and frequencies of personal air sampling shall be as required by OSHA regulations but not less than one (1) sample per eight (8) hour work shift during times of asbestos removal work.
6. Results of sample analysis shall be provided to the Engineer within twenty-four (24) hours of collection.
7. The Contractor shall use a pre-approved "chain-of-custody" form for all personal air samples he collects.
8. Personal sampling shall be performed using the OSHA Reference Method (ORM).

B. PERIMETER MONITORING:

1. This paragraph describes air monitoring carried out by the Contractor to verify that the outside environment remains uncontaminated.
 - a. The Contractor will perform all perimeter sampling and analysis. A complete record of all air monitoring tests and results will be furnished to the Engineer. Written reports of all air monitoring tests will be posted at the job site on a daily basis.
 - b. Work Area Clearance: To determine if the elevated airborne fiber counts encountered during abatement operations have been reduced to an acceptable level, the Contractor will sample and analyze air per Paragraph 3.08.
2. Airborne Fiber Counts:
 - a. Inside Work Area (Trench): Maintain an average airborne count in the work area of less than 0.01 fibers per cubic centimeter. If the fiber counts rise above this figure for any sample taken, revise work procedures to lower fiber counts. If the Time Weighted Average (TWA) fiber count for any work shift or 8 hour period exceeds 0.1 fibers per cubic centimeter, stop all work, leave negative air system in operation and notify Engineer. Do not recommence work until authorized in writing by Engineer.

If airborne fiber counts exceed 0.1 fibers per cubic centimeter for any period of time, cease all work until fiber counts fall below 0.1 fibers per cubic centimeter and notify Engineer. Do not recommence work until authorized in writing by the Engineer.
 - b. Outside Work Area: If any air sample taken outside of the work area exceeds the base line established below, immediately and automatically stop all work.
 1. Decontaminate the affected area in accordance with these specifications.
 2. Respiratory protection shall be work in affected areas until area is cleared for re-occupancy.
3. Analytical Methods: The following methods will be used by the Contractor in analyzing filters used to collect air samples:
 - a. Cellulose ester filters will be analyzed using NIOSH 7400. The Engineer will carry out this analysis at the job site.
 - b. Polycarbonate filters may be analyzed using EPA Level 2 or AHERA protocol.

4. Baseline: Is an action level expressed in fibers per cubic centimeter which is ten percent greater than the largest of the following:
 - a. Average of the samples collected on cellulose ester filters outside each work area.
 - b. 0.01 fibers per cubic centimeter.

3.06 ENGINEER'S ACCEPTANCE OF REMOVAL WORK:

- A. Upon completion of removal work, but before commencing encapsulation or cleaning of the work area, the Contractor shall request the Engineer to conduct an inspection for acceptance of the removal work.

3.07 CLEANING AND FINAL DECONTAMINATION:

- A. This section applies to cleaning all work areas where asbestos removal work has been performed. After all asbestos-containing (or contaminated) materials have been removed; the Contractor shall remove all wastes and perform a thorough final cleanup and decontamination of each work area. Final cleaning shall be performed only after all waste is packaged, and removed, and before the dismantling of any barrier, decontamination facility, or protective coverings. Cleaning shall be subject to the Engineer's acceptance based on a visual inspection and air testing results performed using NIOSH Method 7400 and submitted by the Contractor. HEPA-exhaust systems shall operate continuously throughout the cleaning and air testing processes until the Engineer agrees to their shutdown and removal from the site. The Contractor shall notify the Engineer in writing at least 12 hours in advance of the expected completion time of site cleaning in order to allow the Engineer to schedule air clearance testing.
- B. After successful completion of the final air clearance testing, as prescribed in Paragraph 3.09, the Contractor shall remove the decontamination facilities and any temporary barriers. The HEPA-exhaust systems shall be removed only after all other items are removed. An HEPA-vacuum shall be kept on-site during this final disassembly work to cleanup any dust or debris.
- C. If any of the PCM air sample results are above 0.01 fibers/cc (or a pre-existing level of normal background fibers if shown to be higher than 0.01f/cc by the Engineer), the Engineer may require additional cleaning and decontamination; and the above inspection and air tests shall be repeated by the Engineer
- D. Workers shall wear respiratory and personal and protective equipment throughout all cleanup and waste approved respiratory disposal activities

3.08 FINAL INSPECTION AND WORK AREA CLEARANCE:

- A. The final clearance testing shall take place using aggressive air sampling techniques as specified in 453 CMR 6.00. The Contractor shall supply and operate additional

circulating fans and leaf blowers as directed by the Engineer during this final testing to ensure effective air circulation. The final test shall consist of taking air samples in the trench to establish that contamination levels do not exceed 0.01 f/cc or the established baseline as determined by NIOSH Method 7400 (phase contract microscopy).

If the Engineer determines (based on background tests by NIOSH Method 7400) that the normal levels of fibers in a work place are above 0.01 f/cc, this normal background level as determined by the Engineer shall be the air clearance criteria the Contractor must meet. Contractor shall assume final air testing shall require the following minimum times to perform: NIOSH Method 7400 - 6 to 12 hours; TEM Method 40 CFR Part 736 – 24 to 48 hours.

If the results of the final testing are not satisfactory, thorough wet cleaning and/or HEPA vacuuming, and/or removal of contaminated earth shall be repeated until the required decontamination levels are achieved. The Contractor shall bear all costs for follow-up testing should the area not pass clean-air on the first try.

- B. After achieving the level of cleanliness and decontamination as specified herein and as confirmed by the final testing and checking, the Engineer may thoroughly inspect the space jointly with the Contractor. A final inspection report shall be prepared jointly by the Engineer and the Contractor.

END OF SECTION

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**THIS SECTION IS INCIDENTAL TO THE WORK AND SHALL NOT BE MEASURED
SEPARATELY FOR PAYMENT**

SECTION 02221

ABANDONMENT OF EXISTING WATER MAINS

PART 1 - GENERAL

1.01 WORK INCLUDED:

- A. This Section covers the abandonment of existing water mains, complete.
- B. The Contractor shall abandon water mains as indicated on the drawings.

1.02 RELATED WORK:

- A. Section 02300, EARTHWORK
- B. Section 02080, DUCTILE IRON PIPE AND FITTINGS
- C. Section 03302, FIELD CONCRETE

PART 2 - PRODUCTS (NOT APPLICABLE)

PART 3 - EXECUTION

3.01 ABANDONMENT OF EXISTING WATER MAINS:

- A. All water mains to be abandoned shall be physically removed and disposed of by the Contractor only when the main enters the trench limits.
- B. Sections of water mains that are not removed shall have open ends plugged with concrete or brick and mortar to prevent the entrance of soil into the pipe after backfilling.
- C. Any water main to be abandoned shall be cut at its connection to a live main and physically disconnected. A watertight ductile iron cap with concrete backing shall be installed on the live main. If a gate valve or corporation stop exists at the connection, it shall be closed.
- D. Valve boxes shall be removed from all valves and curb stops which are on the abandoned main.
- E. Hydrants, including hydrant barrels to be abandoned shall be removed completely and delivered to the Owner's storage area. Open pipe ends remaining shall be plugged with concrete or brick and mortar to prevent the entrance of soil into the pipe after backfilling.

END OF SECTION

**THIS SECTION IS INCIDENTAL TO THE WORK AND SHALL NOT BE MEASURED
SEPARATELY FOR PAYMENT**

SECTION 02222

ABANDONMENT OF SEWERS

PART 1 - GENERAL

1.01 WORK INCLUDED:

- A. This Section covers the abandonment of sewers and drains through various means including furnishing, handling and installation of all concrete and masonry plugs; removal and disposal of manholes, and filling existing pipes with controlled density fill, as shown on the Drawings and specified herein.
- B. The Contractor shall furnish all materials, tools, labor, and equipment to abandon existing sewers, combined sewers, and drains.

1.02 RELATED WORK:

- A. Section 03302, FIELD CONCRETE

1.03 REFERENCES:

The following standards form a part of this specification, as referenced:

American Society for Testing and Materials (ASTM)

ASTM C32 Specifications for Sewer and Manhole Brick (Made from Clay or shale).

1.04 SUBMITTALS: IN ACCORDANCE WITH REQUIREMENTS OF GENERAL SPECIFICATIONS, SUBMIT THE FOLLOWING:

The Contractor shall submit six sets of its plan for abandoning existing pipe, showing equipment, methods and materials. The plan shall be submitted to and reviewed by the Engineer before construction.

PART 2 - PRODUCTS

2.01 PLUGS:

- A. Plugs installed at the open ends of the pipe to be abandoned shall be 12-inch thick 3,000-psi cement concrete, or 8-inch thick brick masonry as directed. The pipes to be abandoned include all sewer, combined sewer, and drains as specified herein and as shown on the Drawings.

- B. Precast cement concrete plugs that are used shall meet the requirements for 3,000 psi concrete and shall be free of cracks and spalls. Brick masonry plugs shall be made of brick meeting the requirements of ASTM C32, for grade SS, hard brick.
- C. Mortar shall be composed of portland cement, hydrated lime, and sand, and the volume of sand shall not exceed three times the sum of the volumes of cement and lime. The proportions of cement and lime shall be as directed and may vary from 1:1/4 for dense hard-burned brick to 1:3/4 for softer brick. In general, mortar for grade SS brick shall be mixed in the volume proportions of 1:1/2:4-1/2; portland cement to hydrated lime to sand. The cement concrete plug shall be covered with non-shrink grout to prevent leakage at the plug.

2.02 PIPE FILL:

- A. Fill used for the abandonment of sewers and combined sewers as shown on the drawings shall consist of flowable fill.
- B. Any variance from the specified material shown on the plans or as specified herein for the abandonment of the pipeline shall be subject to the written approval of the Engineer.

PART 3 - EXECUTION

3.01 INSTALLATION

A. PLUGS:

1. Existing sewers shall be plugged with 3,000 psi concrete or with brick masonry, as required by the Engineer. For non-circular pipes, the largest interior cross sectional dimension shall govern in determining size of abandonment.
2. Plugs shall be of adequate strength to withstand the full soil and groundwater pressure but not less than 5 psi.
3. Open ends of sewer and drain services less than 12 inches in diameter shall be plugged with the appropriate VC plugs or concrete plug as required by the Engineer. Such plug shall be made watertight with an application around the plug of an approved watertight compound.
4. Masonry plugs shall be at least 8-inches thick and concrete plugs shall be at least 12-inches thick. Pipes entering a manhole or catch basin that are to be abandoned shall have a plug installed that is flush with the interior wall of the structure.

B. PIPE FILL:

1. Existing sewers 8-inches and larger shall be abandoned and filled with flowable fill, and plugged, as shown on the Drawings.

3.02 REMOVAL AND DISPOSAL OF MANHOLES

A. REMOVAL OF MANHOLES

1. Frames and covers will be removed and delivered to the place designated by the Owner.
2. After filling the pipes to be abandoned that are entering the manhole as specified above, the Contractor shall remove the cone section of a precast manhole or the top four feet of brick in a brick manhole.
3. The Contractor shall place and compact clean fill in the void left by the removal of the manhole.
4. The ground or paved surface shall be restored in accordance with the drawings.

B. DISPOSAL OF MANHOLES

1. The Contractor shall dispose of all manhole materials that are to be removed. Unless the Owner designates a site for receiving the removed materials, the Contractor shall dispose of the materials at a site of his own choosing.

END OF SECTION

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S U P P L E M E N T A L S P E C I F I C A T I O N**ITEM 1008.52 ALTERATIONS AND ADDITIONS AS NEEDED-DEWATERING LUMP**

SECTION 02240

DEWATERING

PART 1 - GENERAL

1.01 WORK INCLUDED:

This section specifies designing, furnishing, installing, maintaining, operating and removing temporary dewatering systems as required to lower and control water levels and hydrostatic pressures during construction; disposing of pumped water; constructing, maintaining, observing and, except where indicated or required to remain in place, removing of equipment and instrumentation for control of the system.

1.02 RELATED WORK:

- A. Section 00890, PERMITS
- B. Section 01570, ENVIRONMENTAL PROTECTION
- C. Section 02252, SUPPORT OF EXCAVATION
- D. Section 02300, EARTHWORK

1.03 SYSTEM DESCRIPTION:

- A. Dewatering includes lowering the water table and intercepting seepage which would otherwise emerge from the slopes or bottom of the excavation; increasing the stability of excavated slopes; preventing loss of material from beneath the slopes or bottom of the excavation; reducing lateral loads on sheeting and bracing; improving the excavation and hauling characteristics of sandy soil; preventing rupture or heaving of the bottom of any excavation; and disposing of pumped water.

1.04 QUALITY ASSURANCE:

- A. The Contractor is responsible for the adequacy of the dewatering systems.
- B. The dewatering systems shall be capable of effectively reducing the hydrostatic pressure and lowering the groundwater levels to a minimum of 2 feet below excavation bottom, unless otherwise required by the Engineer, so that all excavation bottoms are firm and dry.

- C. The dewatering system shall be capable of maintaining a dry and stable subgrade until the structures, pipes and appurtenances to be built therein have been completed to the extent that they will not be floated or otherwise damaged.
- D. The dewatering system and excavation support (see Section 02252, SUPPORT OF EXCAVATION) shall be designed so that lowering of the groundwater level outside the excavation does not adversely affect adjacent structures, utilities or wells.

1.05 SUBMITTALS

- A. Contractor shall submit six copies of a plan indicating how they intend to control the discharge from any dewatering operations on the project, whether it is discharge of groundwater from excavations or stormwater runoff during the life of the project.

PART 2 - PRODUCTS: NOT APPLICABLE

PART 3 - EXECUTION

3.01 DEWATERING OPERATIONS:

- A. All water pumped or drained from the work shall be disposed of in a manner that will not result in undue interference with other work or damage to adjacent properties, pavements and other surfaces, buildings, structures and utilities. Suitable temporary pipes, flumes or channels shall be provided for water that may flow along or across the site of the work. All disposal of pumped water shall conform to the provisions of Section 01570 ENVIRONMENTAL PROTECTION and Section 00890 PERMITS.
- B. Dewatering facilities shall be located where they will not interfere with utilities and construction work to be done by others.
- C. Dewatering procedures to be used shall be as described below:
 1. Crushed stone shall encapsulate the suction end of the pump to aid in minimizing the amount of silt discharged.
 2. For dewatering operations with relatively minor flows, pump discharges shall be directed into hay bale sedimentation traps lined with filter fabric. Water is to be filtered through the hay bales and filter fabric prior to being allowed to seep out into its natural watercourse.
 3. For dewatering operations with larger flows, pump discharges shall be into a steel dewatering basin. Steel baffle plates shall be used to slow water velocities to increase the contact time and allow adequate settlement of sediment prior to discharge into waterways.

4. Where indicated on the contract drawings or in conditions of excess silt suspended in the discharge water, silt control bags shall be utilized in catch basins.
- D. The Contractor shall be responsible for repair of any damage caused by his dewatering operations, at no cost to the Owner.

END OF SECTION

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**THIS SECTION IS INCIDENTAL TO THE WORK AND SHALL NOT BE MEASURED
SEPARATELY FOR PAYMENT**

SECTION 02252

SUPPORT OF EXCAVATION

PART 1 - GENERAL

1.01 WORK INCLUDED:

- A. This section of the specification covers wood sheeting and bracing for support of excavations. The requirements of this section shall also apply, as appropriate, to other methods of excavation support and underpinning which the Contractor elects to use to complete the work.
- B. The Contractor shall furnish and place timber sheeting of the kinds and dimensions required, complying with these specifications, where indicated on the drawings or required by the Engineer.

1.02 RELATED WORK:

- A. Section 02240, DEWATERING.
- B. Section 02300, EARTHWORK.

1.03 QUALITY ASSURANCE:

- A. This project is subject to the Safety and Health regulations of the U.S. Department of Labor set forth in 29 CFR, Part 1926, and to the New Hampshire Law, RSA, Title XXIII: Labor. Contractors shall be familiar with the requirements of these regulations.
- B. The excavation support system shall be of sufficient strength and be provided with adequate bracing to support all loads to which it will be subjected. The excavation support system shall be designed to prevent any movement of earth that would diminish the width of the excavation or damage or endanger adjacent structures.

PART 2 - PRODUCTS

2.01 MATERIALS:

- A. Timber sheeting shall be sound spruce, pine, or hemlock, planed on one side and either tongue and grooved or splined. Timber sheeting shall not be less than nominal 2-inches thick.
- B. Timber and steel used for bracing shall be of such size and strength as required in the excavation support design. Timber or steel used for bracing shall be new or undamaged

used material which does not contain splices, cutouts, patches, or other alterations which would impair its integrity or strength.

PART 3 - EXECUTION

3.01 INSTALLATION:

- A. Work shall not be started until all materials and equipment necessary for their construction are either on the site of the work or satisfactorily available for immediate use as required.
- B. The sheeting shall be securely and satisfactorily braced to withstand all pressures to which it may be subjected and be sufficiently tight to minimize lowering of the groundwater level outside the excavation, as required in Section 02240, DEWATERING.
- C. The sheeting shall be driven by approved means to the design elevation. No sheeting may be left so as to create a possible hazard to safety of the public or a hindrance to traffic of any kind.
- D. If boulders or very dense soils are encountered, making it impractical to drive a section to the desired depth, the section shall, as required, be cut off.
- E. The sheeting shall be left in place where indicated on the drawings or required by the Engineer in writing. At all other locations, the sheeting may be left in place or salvaged at the option of the Contractor. Steel or wood sheeting permanently left in place shall be cut off at a depth of not less than two feet below finish grade unless otherwise required.
- F. All cut-off will become the property of the Contractor and shall be removed by him from the site.
- G. Responsibility for the satisfactory construction and maintenance of the excavation support system, complete in place, shall rest with the Contractor. Any work done, including incidental construction, which is not acceptable for the intended purpose shall be either repaired or removed and reconstructed by the Contractor at his expense.
- H. The Contractor shall be solely responsible for repairing all damage associated with installation, performance, and removal of the excavation support system.

END OF SECTION

S U P P L E M E N T A L S P E C I F I C A T I O N

<u>ITEM 203.31a</u>	<u>ADDITIONAL EARTHWORK BELOW NORMAL GRADE (MIN.)</u>	<u>CY</u>
<u>ITEM 203.31b</u>	<u>ADDITIONAL EARTHWORK BELOW NORMAL GRADE (ADD'L)</u>	<u>CY</u>
<u>ITEM 203.41a</u>	<u>UNSUITABLE MATERIAL ABOVE NORMAL GRADE (MIN.)</u>	<u>CY</u>
<u>ITEM 203.41b</u>	<u>UNSUITABLE MATERIAL ABOVE NORMAL GRADE (ADD'L)</u>	<u>CY</u>
<u>ITEM 203.42a</u>	<u>UNSUITABLE MATERIAL BELOW NORMAL GRADE (MIN.)</u>	<u>CY</u>
<u>ITEM 203.42b</u>	<u>UNSUITABLE MATERIAL BELOW NORMAL GRADE (ADD'L)</u>	<u>CY</u>
<u>ITEM 304.311</u>	<u>ADDITIONAL CRUSHED STONE</u>	<u>CY</u>

SECTION 02300

EARTHWORK

PART 1 - GENERAL

1.01 WORK INCLUDED:

The Contractor shall make excavations of normal depth in earth for trenches and structures, shall backfill and compact such excavations to the extent necessary, shall furnish the necessary material and construct embankments and fills, and shall make miscellaneous earth excavations and do miscellaneous grading.

1.02 RELATED WORK:

- A. Section 01110, CONTROL OF WORK AND MATERIALS
- B. Section 02240, DEWATERING
- C. Section 02324, ROCK EXCAVATION AND DISPOSAL
- D. Section 02071, GEOTEXTILE FABRICS
- E. Section 02252, SUPPORT OF EXCAVATION

1.03 REFERENCES:

American Society for Testing and Materials (ASTM)

ASTM	C131	Test Method for Resistance to Degradation of Small Size Coarse Aggregate by Abrasion and Impact in the Los Angeles Machine.
ASTM	C136	Method for Sieve Analysis of Fine and Coarse Aggregates
ASTM	C330	Specification for Lightweight Aggregate for Structural Concrete.
ASTM	D1556	Test Method for Density of Soil in Place by the Sand Cone Method.

ASTM D1557 Test Methods for Moisture-density Relations of Soils and Soil Aggregate Mixtures Using Ten-pound (10 Lb.) Hammer and Eighteen-inch (18") Drop.

ASTM D2922 Test Methods for Density of Soil and Soil-aggregate in Place by Nuclear Methods (Shallow Depth).

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

1.04 SUBMITTALS: IN ACCORDANCE WITH REQUIREMENTS OF GENERAL SPECIFICATIONS, SUBMIT THE FOLLOWING:

Samples of all materials proposed for the project shall be submitted to the Engineer for review. Size of the samples shall be as approved by the Engineer.

1.05 PROTECTION OF EXISTING PROPERTY:

- A. The work shall be executed in such manner as to prevent any damage to facilities at the site and adjacent property and existing improvements, such as but not limited to streets, curbs, paving, service utility lines, structures, monuments, bench marks, observation wells, and other public or private property. Protect existing improvements from damage caused by settlement, lateral movements, undermining, washout and other hazards created by earthwork operations.
- B. In case of any damage or injury caused in the performance of the work, the Contractor shall, at its own expense, make good such damage or injury to the satisfaction of, and without cost to, the Owner. Existing roads, sidewalks, and curbs damaged during the project work shall be repaired or replaced to at least the condition that existed at the start of operations. The Contractor shall replace, at his own cost, existing benchmarks, observation wells, monuments, and other reference points which are disturbed or destroyed.
- C. Buried drainage structures and pipes, observation wells and piezometers, including those which project less than eighteen inches (18") above grade, which are subject to damage from construction equipment shall be clearly marked to indicate the hazard. Markers shall indicate limits of danger areas, by means which will be clearly visible to operators of trucks and other construction equipment, and shall be maintained at all times until completion of project.

1.06 FROST PROTECTION AND SNOW REMOVAL:

- A. The Contractor shall, at its own expense, keep earthwork operations clear and free of accumulations of snow as required to carry out the work.
- B. The Contractor shall protect the subgrade beneath new structures and pipes from frost penetration when freezing temperatures are expected.

PART 2 - PRODUCTS

2.01 MATERIAL:

A. GRAVEL BORROW:

Gravel Borrow shall satisfy the requirements listed in NHDOT Specification Section 304.2.4, Item No. 304.2.

B. CRUSHED STONE:

Crushed stone shall satisfy the requirements listed in NHDOT Specification Section 304.2.10, Item No. 304.4.

C. SAND BORROW:

Sand Borrow shall satisfy the requirements listed in NHDOT Specification Section 304.2.3, Item No. 304.1.

D. PEASTONE:

Peastone shall be smooth, hard, naturally occurring, rounded stone meeting the following gradation requirements:

Passing 5/8 inch square sieve opening	-	100%
Passing No. 8 sieve opening	-	0%

E. BACKFILL MATERIALS:

1. Class B Backfill:

Class B backfill shall be granular, well graded friable soil; free of rubbish, ice, snow, tree stumps, roots, clay and organic matter; with 30 percent or less passing the No. 200 sieve; no stone greater than two-third (2/3) loose lift thickness, or six inches, whichever is smaller.

2. Select Backfill:

Select backfill shall be granular, well graded friable soil, free of rubbish, ice, snow, tree stumps, roots, clay and organic matter, and other deleterious or organic material; in accordance with NHDES Env-Wq 704.11; graded within the following limits:

<u>Sieve Size</u>	<u>Percent Finer by Weight</u>
1/2"	100

PART 3 - EXECUTION

3.01 DISTURBANCE OF EXCAVATED AND FILLED AREAS DURING CONSTRUCTION:

- A. Contractor shall take the necessary steps to avoid disturbance of subgrade during excavation and filling operations, including restricting the use of certain types of construction equipment and their movement over sensitive or unstable materials, dewatering and other acceptable control measures.
- B. All excavated or filled areas disturbed during construction, all loose or saturated soil, and other areas that will not meet compaction requirements as specified herein shall be removed and replaced with a minimum 12-inch layer of compacted crushed stone wrapped all around in non-woven filter fabric. Costs of removal and replacement shall be borne by the Contractor.
- C. The Contractor shall place a minimum of 12-inch layer of special bedding materials and crushed stone wrapped in filter fabric over the natural underlying soil to stabilize areas which may become disturbed as a result of rain, surface water runoff or groundwater seepage pressures, all at no additional cost to the Owner. The Contractor also has the option of drying materials in-place and compacting to specified densities.

3.02 EXCAVATION:

A. GENERAL:

- 1. The Contractor shall perform all work of any nature and description required to accomplish the work as shown on the Drawings and as specified.
- 2. Excavations, unless otherwise required by the Engineer, shall be carried only to the depths and limits shown on the Drawings. If unauthorized excavation is carried out below required subgrade and/or beyond minimum lateral limits shown on Drawings, it shall be backfilled with gravel borrow and compacted at the Contractor's expense as specified below, except as otherwise indicated. Excavations shall be kept in dry and good conditions at all times, and all voids shall be filled to the satisfaction of the Engineer.
- 3. In all excavation areas, the Contractor shall strip the surficial topsoil layer and underlying subsoil layer separate from underlying soils. In paved areas, the Contractor shall first cut pavement as specified in paragraph 3.02 B.1 of this specification, strip pavement and pavement subbase separately from underlying soils. All excavated materials shall be stockpiled separately from each other within the limits of work.

4. The Contractor shall follow a construction procedure, which permits visual identification of stable natural ground. Where groundwater is encountered, the size of the open excavation shall be limited to that which can be handled by the Contractor's chosen method of dewatering and which will allow visual observation of the bottom and backfill in the dry.
5. The Contractor shall excavate unsuitable materials to stable natural ground where encountered at proposed excavation subgrade, as directed by the Engineer. Unsuitable material includes topsoil, loam, peat, other organic materials, snow, ice, and trash. Unless specified elsewhere or otherwise required by the Engineer, areas where unsuitable materials have been excavated to stable ground shall be backfilled with compacted special bedding materials or crushed stone wrapped all around in non-woven filter fabric.

B. TRENCHES:

1. Prior to excavation, trenches in pavement shall have the traveled way surface cut in a straight line by a concrete saw or equivalent method, to the full depth of pavement. Excavation shall only be between these cuts. Excavation support shall be provided as required to avoid undermining of pavement. Cutting operations shall not be done by ripping equipment.
2. The Contractor shall satisfy all dewatering requirements specified in Section 02240 DEWATERING, before performing trench excavations.
3. Trenches shall be excavated to such depths as will permit the pipe to be laid at the elevations, slopes, and depths of cover indicated on the Drawings. Trench widths shall be as shown on the Drawings or as specified.
4. Where pipe is to be laid in bedding material, the trench may be excavated by machinery to, or just below, the designated subgrade provided that the material remaining in the bottom of the trench is not disturbed.
5. If pipe is to be laid in embankments or other recently filled areas, the fill material shall first be placed to a height of at least 12-inches above the top of the pipe before excavation.
6. Pipe trenches shall be made as narrow as practicable and shall not be widened by scraping or loosening materials from the sides. Every effort shall be made to keep the sides of the trenches firm and undisturbed until backfilling has been completed.
7. If, in the opinion of the Engineer, the subgrade, during trench excavation, has been disturbed as a result of rain, surface water runoff or groundwater seepage pressures, the Contractor shall remove such disturbed subgrade to a minimum of 12-inches and replace with crushed stone wrapped in filter fabric. Cost of removal and replacement shall be borne by the Contractor.

C. EXCAVATION NEAR EXISTING STRUCTURES:

1. Attention is directed to the fact that there are pipes, manholes, drains, and other utilities in certain locations. An attempt has been made to locate all utilities on the drawings, but the completeness or accuracy of the given information is not guaranteed.
2. As the excavation approaches pipes, conduits, or other underground structures, digging by machinery shall be discontinued and excavation shall be done by means of hand tools, as required. Such manual excavation, when incidental to normal excavation, shall be included in the work to be done under items involving normal excavation.
3. Where determination of the exact location of a pipe or other underground structure is necessary for properly performing the work, the Contractor shall excavate test pits to determine the locations.

3.03 BACKFILL PLACEMENT AND COMPACTION:

A. GENERAL:

1. Prior to backfilling, the Contractor shall compact the exposed natural subgrade to the densities as specified herein.
2. After approval of subgrade by the Engineer, the Contractor shall backfill areas to required contours and elevations with specified materials.
3. The Contractor shall place and compact materials to the specified density in continuous horizontal layers. The degree of compaction shall be based on maximum dry density as determined by ASTM Test D1557, Method C. The minimum degree of compaction for fill placed shall be as follows:

<u>Location</u>	<u>Percent of Maximum Density</u>
Below pipe centerline	95
Above pipe centerline	92
Below pavement (upper 3 ft.)	95
Embankments	95
Below pipe in embankments	95
Adjacent to structures	92
Below structures	95

4. If compaction test results indicate work does not conform to specification requirements, the Contractor shall remove or correct the defective Work by recompacting where appropriate or replacing as necessary and approved by the Engineer, to bring the work into compliance, at no additional cost to the Owner. All

backfilled materials under structures and buildings shall be field tested for compliance with the requirements of this specification.

5. Where horizontal layers meet a rising slope, the Contractor shall key each layer by benching into the slope.
6. If the material removed from the excavation is suitable for backfill with the exception that it contains stones larger than permitted, the Contractor has the option to remove the oversized stones and use the material for backfill or to provide replacement backfill at no additional cost to the Owner.
7. The Contractor shall remove loam and topsoil, loose vegetation, stumps, large roots, etc., from areas upon which embankments will be built or areas where material will be placed for grading. The subgrade shall be shaped as indicated on the Drawings and shall be prepared by forking, furrowing, or plowing so that the first layer of the fill material placed on the subgrade will be well bonded to the subgrade.

B. TRENCHES:

1. Bedding as detailed and specified shall be furnished and installed beneath the pipeline prior to placement of the pipeline. A minimum bedding thickness shall be maintained between the pipe and undisturbed material, as shown on the Drawings.
2. As soon as practicable after pipes have been laid, backfilling shall be started.
3. Unless otherwise indicated on the Drawings, select backfill shall be placed by hand shovel in 6-inch thick lifts up to a minimum level of 12-inches above the top of pipe. This area of backfill is considered the zone around the pipe and shall be thoroughly compacted before the remainder of the trench is backfilled. Compaction of each lift in the zone around the pipe shall be done by use of power-driven tampers weighing at least 20 pounds or by vibratory compactors. Care shall be taken that material close to the bank, as well as in all other portions of the trench, is thoroughly compacted to densities required.
4. Class B backfill shall be placed from the top of the select backfill to the specified material at grade (loam, pavement subbase, etc.). Fill compaction shall meet the density requirements of this specification.
5. Water Jetting:
 - a. Water jetting may be used when the backfill material contains less than 10 percent passing the number 200 sieve, but shall be used only if approved by the Engineer.
 - b. Contractor shall submit a detailed plan describing the procedures he intends to use for water jetting to the Engineer for approval prior to any water jetting taking place.

- c. Compaction of backfill placed by water jetting shall conform to the requirements of this specification.
- 6. If the materials above the trench bottom are unsuitable for backfill, the Contractor shall furnish and place backfill materials meeting the requirements for trench backfill, as shown on the drawings or specified herein.
- 7. Should the Engineer order crushed stone for utility supports or for other purposes, the Contractor shall furnish and install the crushed stone as directed.
- 8. In shoulders of streets and road, the top 12-inch layer of trench backfill shall consist of processed gravel for sub-base, satisfying the requirements listed in NHDOT standard specification 304.2.7, Item No. 304.33.

C. BACKFILLING ADJACENT TO STRUCTURES:

- 1. The Contractor shall not place backfill against or on structures until they have attained sufficient strength to support the loads to which they will be subjected. Excavated material approved by the Engineer may be used in backfilling around structures. Backfill material shall be thoroughly compacted to meet the requirements of this specification.
- 2. Contractor shall use extra care when compacting adjacent to pipes and drainage structures. Backfill and compaction shall proceed along sides of drainage structures so that the difference in top of fill level on any side of the structure shall not exceed two feet (2') at any stage of construction.
- 3. Where backfill is to be placed on only one side of a structural wall, only hand-operated roller or plate compactors shall be used within a lateral distance of five feet (5') of the wall for walls less than fifteen feet (15') high and within ten feet (10') of the wall for walls more than fifteen feet (15') high.

3.04 DISPOSAL OF SURPLUS MATERIALS:

- A. No excavated material shall be removed from the site of the work or disposed of by the Contractor unless approved by the Engineer.
- B. Surplus excavated materials, which are acceptable to the Engineer, shall be used to backfill normal excavations in rock or to replace other materials unacceptable for use as backfill. Upon written approval of the Engineer, surplus excavated materials shall be neatly deposited and graded so as to make or widen fills, flatten side slopes, or fill depressions; or shall be neatly deposited for other purposes as indicated by the Owner, within its jurisdictional limits; all at no additional cost to the Owner.
- C. Surplus excavated material not needed as specified above shall be hauled away and disposed of by the Contractor at no additional cost to the Owner, at appropriate locations,

and in accordance with arrangements made by him. Disposal of all rubble shall be in accordance with all applicable local, state and federal regulations.

END OF SECTION

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S U P P L E M E N T A L S P E C I F I C A T I O N

<u>ITEM 203.21a</u>	<u>ROCK EXCAVATION AND DISPOSAL (MIN.) - MAIN</u>	<u>CY</u>
<u>ITEM 203.21b</u>	<u>ROCK EXCAVATION AND DISPOSAL (ADD'L) - MAIN</u>	<u>CY</u>
<u>ITEM 203.22a</u>	<u>ROCK EXCAVATION AND DISPOSAL (MIN.)-SERVICES</u>	<u>CY</u>
<u>ITEM 203.22b</u>	<u>ROCK EXCAVATION AND DISPOSAL (ADD'L)-SERVICES</u>	<u>CY</u>

SECTION 02324

ROCK EXCAVATION AND DISPOSAL

PART 1 - GENERAL

1.01 WORK INCLUDED:

The Contractor shall excavate rock, if encountered, to the lines and grades indicated on the drawings or as required, shall dispose of the excavated material, and shall furnish the required material as specified in Section 02300 EARTHWORK for backfill in place of the excavated rock.

1.02 RELATED WORK:

- A. Section 02252, SUPPORT OF EXCAVATION
- B. Section 02300, EARTHWORK
- C. Section 03302, FIELD CONCRETE

1.03 DEFINITIONS:

- A. The word "rock," wherever used as the name of the excavated material or material to be excavated, shall mean only boulders and pieces of concrete or masonry exceeding one cubic yard in volume, or solid ledge rock which, in the opinion of the Engineer, requires for its removal, drilling and blasting, wedging, sledging, barring, or breaking up with a power-operated tool. No soft or disintegrated rock which can be removed by normal earth excavation methods, no loose, shaken, or previously blasted rock or broken stone in rock fillings or elsewhere, and no rock exterior to the maximum limits of measurement allowed, which may fall into the excavation, will be measured or allowed as "rock."
- B. The word "earth," wherever used as the name of an excavated material, or material to be excavated shall mean all kinds of material other than rock as above defined.

1.04 QUALITY ASSURANCE:

- A. The Contractor shall conform to all municipal ordinances and state and federal laws relating to the transportation, storage, handling, and use of explosives. In the event that any of the above mentioned laws, ordinances, or regulations require a licensed blaster to

perform or supervise the work of blasting, said licensed blaster shall, at all times, have his license on the work site and shall permit examination thereof by the Engineer or other officials having jurisdiction.

- B. The Contractor shall procure all permits required for blasting.

1.05 SUBMITTALS:

- A. At least two weeks before beginning blasting operations, the Contractor shall submit to the Engineer for record the following data:
 1. Name of Contractor or Subcontractor responsible for blasting and monitoring operations and license number.
 2. Name, affiliation, and license number of the person or persons who will be directly responsible for designing each blast, supervising the loading of the shot, and firing it.
- B. Copies of all permits required for blasting.
- C. Results of pre-blast survey.
- D. When blasting is in progress, daily reports on blasting operations and blast monitoring results.

1.06 DELIVERY/STORAGE AND HANDLING:

Delivery, storage and handling of explosives shall conform to all federal, state and local regulations and permits.

PART 2 - PRODUCTS - NOT APPLICABLE

PART 3 - EXECUTION

3.01 PREPARATION/PRE-BLAST SURVEY

If required, the pre-blast survey shall be conducted in accordance with state regulations and/or local permit requirements.

3.02 EXCAVATION:

- A. The Contractor shall excavate rock to the lines and grades indicated on the drawings or as required by the Engineer. The excavated rock shall be removed and disposed of by the Contractor as specified for surplus excavated materials under Section 02300, EARTHWORK.
- B. Work damaged by blasting shall be repaired or replaced at the Contractor's expense.

- C. If rock is excavated beyond the limits of payment indicated on the drawings, specified, or authorized in writing by the Engineer, the excess excavation, whether resulting from overbreakage or other causes, shall be backfilled, by and at the expense of the Contractor, as specified below:
1. In pipe trenches, excess excavation shall be filled with the required material and compacted in the same manner as specified for the material in the zone around the pipe under Section 02300 EARTHWORK.
 2. In excavations for structures, excess excavation in the rock beneath foundations shall be filled with concrete which shall have a minimum 28-day compressive strength of 3000 psi. Other excess excavation shall be filled with Class B backfill compacted to a minimum of 92 percent density (ASTM D1557 Method C) as specified under Section 02300, EARTHWORK.
 3. If the rock below normal depth is shattered due to drilling or blasting operations of the Contractor, and the Engineer considers such shattered rock to be unfit for foundations, the shattered rock shall be removed and the excavation shall be backfilled with concrete as required, except that in pipe trenches crushed stone may be used for backfill, if approved. All such removal and backfilling shall be done by and at the expense of the Contractor.
- D. When required by the Engineer, the Contractor shall remove all dirt and loose rock from designated areas and shall clean the surface of the rock thoroughly to determine whether seams or other defects exist.
- E. When concrete is to be placed on rock, the rock shall be free of all vegetation, dirt, sand, clay, boulders, scale, excessively cracked rock, loose fragments, water, ice, snow, and other objectionable substances.

3.03 VIBRATION AND AIR BLAST MONITORING:

- A. The Contractor shall measure air blast and vibration levels of blasting operations to assure compliance with all applicable regulations and local permits.
- B. Records of each day's air blast and vibration measurements shall be submitted to the Engineer in writing no later than the start of the next day's work. Records shall include, as a minimum:
- Identification of instrument
 - Name of observer
 - Name of interpreter
 - Distance and direction of recording station from the area of detonation

- Date and exact time of reading
- Type of ground at recording station
- Peak particle velocity for all components as well as resultant for all frequencies of vibrations
- Duration of motion with a velocity in excess of one thousandth of an inch per second
- A copy of the photographic record of seismograph readings
- Peak air blast level.

3.04 BLASTING RECORDS:

The Contractor shall prepare and submit to the Engineer daily blast reports, including logs of each blast. Reports shall be submitted to the Engineer no later than the start of the next day's work. However, during each day of blasting, the Contractor shall review and shall provide access for the Engineer to review the data from that day's blasting. Reports after each blast shall include at least the following information for each blast:

- Date, time, and location of blast
- Permit number and expiration date
- Amount and type of explosives used by weight and number of cartridges
- Total number of delays used and number of holes used for each delay
- On a diagram of the blast pattern, indicate total number and depth of holes, maximum charge per delay, maximum charge per hole, and corresponding delay number
- An evaluation of the blast indicating areas of significant overbreak, unusual results, and any recommended adjustments for the next blast.

3.05 POST BLASTING INSPECTIONS:

The Contractor shall examine any properties, structures, and conditions where complaints of damage have been received or damage claims have been filed. Advance notice shall be given to all interested parties so that the parties may be present during the final examination. Records of the final examination shall be signed and distributed to the owner of the property, the head of the local fire department, and the Engineer.

END OF SECTION

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SUPPLEMENTAL SPECIFICATION**ITEM 613.014****DAMS****EACH**

SECTION 02347

BENTONITE DAMS

PART 1 - GENERAL

1.01 WORK INCLUDED:

This Section covers bentonite dams, complete, including bentonite, sand, and equipment necessary to install the clay dams. Dams shall be installed where shown on the drawings or as indicated by the Engineer.

1.02 RELATED WORK:

- A. Section 02300, EARTHWORK.

PART 2 - PRODUCTS

2.01 MATERIALS:

- A. The bentonite clay shall be granular and high swelling. High swelling is defined as the ability of 2 grams of the base bentonite, when mechanically reduced to 100 mesh, to swell in water to a volume of 16 cc or greater, when added to 100 cc distilled water.
- B. The sand shall be a fine aggregate consisting of natural sand, manufactured sand or combination thereof. The sand shall be free of injurious amounts of organic impurities and shall conform to ASTM C33, Concrete Aggregate.

PART 3 - EXECUTION

3.01 INSTALLATION:

- A. Prior to placement, the bentonite clay shall be uniformly mixed with sand at a minimum ratio of nine pounds of bentonite clay to each cubic foot of sand. The mixture shall be placed such that the entire length of the dam on either side and the bottom of the trench contacts undisturbed earth. The mixture shall be placed in 8-inch lifts, each lift being compacted to the density required for backfill as stated in Section 02300 EARTHWORK.
- B. The dams shall extend from undisturbed material at the bottom of the trench excavation to three feet below the final finished grade or as required by the Engineer. The dam shall extend the full width of the trench excavated by the Contractor and the length of the dam shall be a minimum of 1.5 feet along the laying length of the pipe.

- C. Within areas of contaminated soils or adjacent to wetland areas, install the dams at a spacing not more than fifty (50) feet apart. This spacing shall also apply to pipe gradients with over an 8 percent slope.
- D. When the watertable is above the bottom of the pipe and does not meet the criteria of 3.01 C above, the spacing shall not be more than 400 feet apart or as required by the Engineer.
- E. Dams shall be required when the pipe trench passes from one soil type to another or to ledge if the watertable is above the pipe.
- F. Refer to the contract detail drawings for the construction detail of the dams.

END OF SECTION

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S U P P L E M E N T A L S P E C I F I C A T I O N**ITEM 612.15108****8" CURED IN PLACE PIPE****LINEAR FOOT**

SECTION 02428

CURED-IN-PLACE PIPE

PART 1 - GENERAL**1.01 WORK INCLUDED:**

- A. This section covers installation of cured-in-place pipe as called for herein and on the drawings. The work includes furnishing all equipment, material and labor required to perform the services described herein.

1.02 RELATED WORK:

- A. Section 00331, TELEVISION AND MANHOLE INSPECTION LOGS
- B. Section 01014, SCOPE AND SEQUENCE OF WORK
- C. Section 01330, SUBMITTALS
- D. Section 01331, DOCUMENTATION
- E. Section 01575, HANDLING EXISTING FLOWS
- F. Section 02440, SEWER CLEANING, INSPECTION, TESTING AND SEALING
- G. Section 02443, SERVICE CONNECTION REHABILITATION

1.03 QUALITY ASSURANCE:

- A. The work described herein shall be performed by a company with not less than five (5) years of experience in providing the required services, employing experienced workers and experienced supervisory personnel. Supervisory personnel shall have not less than three (3) years of experience in providing the required services and shall be present at the jobsite during all work related to the required services.

1.04 REFERENCES:

The following standards form a part of this specification as referenced:

American Society for Testing and Materials (ASTM)

ASTM F1216 Standard Practice for Rehabilitation of Existing Pipelines and Conduits
by the Inversion and Curing of a Resin-Impregnated Tube

The National Association of Sewer Service Companies (NASSCO)

Performance Specification Guideline for the Installation of Cured-in-Place Pipe (CIPP)

1.05 SYSTEM DESCRIPTION:

- A. Unless otherwise indicated herein, installation of cured-in-place pipe shall be carried out in accordance with ASTM F1216, Section 7.
- B. Curing of liner tube using hot water or steam shall be acceptable.
- C. The Contractor shall design all cured-in-place liners assuming partially deteriorated pipe conditions and a groundwater height above the crown of the pipe equal to one-half (50%) of the distance between the ground surface and the invert of the sanitary sewer line to be rehabilitated unless otherwise noted below.
- D. The Contractor may propose alternative cured-in-place processes and/or products for review and approval by the Engineer.
- E. The location, length, and approximate interior dimensions of the cured-in-place pipe to be installed are as shown on the drawings.
- F. The Contractor shall provide MSDS for all chemicals used in the lining process.

1.06 SUBMITTALS: IN ACCORDANCE WITH REQUIREMENTS OF GENERAL SPECIFICATIONS, SUBMIT THE FOLLOWING:

- A. Prior to beginning the work, submit six (6) sets of the following:
 - 1. Qualifications of the firm/personnel who will perform the Work.
 - 2. Descriptions of system proposed for handling existing flows, if necessary, during the procedures to be carried out.
 - 3. Description of the system, equipment and material proposed for the cured-in-place pipe.
 - 4. Manufacturer's warranty.
- B. Prior to beginning the work, the Contractor shall submit, a written plan for contacting homeowners whose service connections may be affected due to the installation of liner. Such plan is subject to approval by the Engineer and the Owner.

- C. The Contractor shall submit the following information for each inversion within 21 days following completion of the liner installation.
- Pre-inversion television inspection logs and DVDs (Video files shall also be included on external hard drives as described in Section 01331, DOCUMENTATION)
 - Liner order sheet describing the material ordered
 - Service connection reinstatement sign-off sheet
 - Thermo couple log kept during inversion process
 - Post-inversion television inspection logs and DVDs (Video files shall also be included on external hard drives as described in Section 01331, DOCUMENTATION)
 - Material testing results

Information should be organized by inversion and two (2) copies shall be delivered.

1.07 WARRANTY:

The cured-in-place pipe shall be warranted against infiltration and faulty workmanship and materials for one (1) year from the date the project is accepted by the Owner.

PART 2 - PRODUCTS

2.01 MATERIALS:

- A. Materials used for the cured-in-place pipe shall meet the requirements of ASTM F1216.
- B. Cured-in-place pipe shall be as manufactured by Insituform Technologies, National Liner, Cure-Line, or approved equal.
- C. Hydrophylic rubber gaskets shall have two (2) beads of material protruding from one side of the strip and shall swell to a minimum of three times its dry size when in contact with water. Flat types of gaskets shall not be accepted. Gaskets shall be a manufactured by Hydrotite or approved equal.

PART 3 - EXECUTION

3.01 PIPE CLEANING AND INSPECTION:

Pipe cleaning and inspection shall be carried out in accordance with Section 02440, SEWER CLEANING, INSPECTION, TESTING AND SEALING and shall not be measured separately for payment.

3.02 FLOW CONTROL:

Flow control, if required, shall be in accordance with Section 01575, HANDLING

EXISTING FLOWS.

3.03 WATER FOR CONSTRUCTION PURPOSES:

Availability of water for construction purposes shall be provided at the City's Department of Public Works. Contractor must give the Owner 6 hours in advance when water is needed.

3.04 NOTIFICATION:

- A. The Contractor shall affix a written notice to the door of each home that has sewer service through the pipe being lined one week prior to the lining operation and again one day before the lining operation. A notice shall also be distributed following service connection reinstatement stating that the service connection has been restored to service.
- B. The written notice must be approved by the Engineer prior to its distribution.
- C. The printing and distribution of notices to the homeowners by the Contractor shall be considered incidental to the lining operation.

3.05 INSTALLATION:

- A. Each sewer segment shall be television inspected prior to the installation of the cured-in-place liner. The inspection shall be performed in "dry-pipe" conditions with no flow in the pipe. The pipe shall be clean and free of all obstructions prior to installation of the liner.
- B. Prior to installation of the cured-in-place pipe the Contractor shall install a hydrophilic rubber gasket on the inside of each pipe where it meets a manhole such that the hydrophilic rubber gasket is between the host pipe and the cured-in-place pipe. The annular space shall be made watertight at the ends of the liner in the manholes.
- C. Installation of the cured-in-place pipe shall be in accordance with ASTM F1216, Section 7.
- D. After the liner has been cured in place, the Contractor shall reinstate all active service connections as required by the Engineer. Branch connections to buildings shall be reinstated to a minimum of 95% of the inside diameter of the existing service connection without excavation, utilizing a remotely controlled cutting device, monitored by a video TV camera. No additional payment will be made for excavations for the purpose of reinstating connections and the contractor will be responsible for all cost and liability associated with such excavation and restoration work.
- E. The service connections to be reinstated for each inversion will be listed on the attached form (Service Connection Reinstatement Certification Form) and will be signed by an

authorized representative of the Contractor.

- F. The Contractor shall make a mainline television inspection camera available for confirming service connections to be reinstated. At the Engineer's discretion, the Contractor shall dye test service connections in order to confirm that each service connection that should be reinstated is included on the attached Service Connection Reinstatement Certification Form. No additional payment will be made for television inspection in conjunction with dye testing of service connections.
- G. All reinstated service connections shall be sealed with grout in accordance with Section 02443, SERVICE CONNECTION REHABILITATION. The Contractor shall make certain that the annular space between the host pipe and the cured-in-place pipe is fully sealed with grout. No additional payment will be made for grouting service connections.
- H. Each sewer segment shall be television inspected after the liner installation and service grouting have been completed. The inspection shall be performed in "dry-pipe" conditions with no flow in the pipe. Post rehabilitation television inspection shall be performed prior to removing any sewer bypass equipment. Post rehabilitation television inspection shall be considered incidental to the lining process and shall not be measured separately for payment.

3.06 TESTING REQUIREMENTS:

- A. Cured-in-place pipe samples shall be prepared and tested by the Contractor in accordance with ASTM F1216 Section 8.1 unless otherwise stated in this section.
- B. The Contractor shall obtain samples for each pipe inversion.
- C. If field conditions or pipe shape prevent the Contractor from obtaining the samples as specified in ASTM F1216 Section 8.1 the samples shall be taken as required by the Engineer.
- D. An independent testing laboratory shall test the cured-in-place pipe samples and the results are to be sent directly to the Engineers Resident Project Representative within 21 calendar days following the completion of each inversion.
- E. The cost of obtaining the samples and testing shall be the sole responsibility of the Contractor and shall be considered incidental to the lining process.
- F. Inversions where the cured-in-place pipe samples that do not meet the requirements of ASTM D790 and D638 as indicated in ASTM F1216 Section 8 will be televised by the Contractor, as required by the Engineer, at no additional cost to the Owner, for review by the Engineer. Liner deemed unacceptable by the Engineer will be removed and replaced at no additional cost to the Owner.

3.07 FIELD TESTING/INSPECTION:

- A. Prior to expiration of the warranty period, during periods of high groundwater, and at a time to be approved by the Engineer, the Contractor shall clean and television inspect each of the cured-in-place pipes in accordance with Section 02440, SEWER CLEANING, INSPECTION, TESTING AND SEALING. The contractor shall repair any defects found in the cured-in-place pipe. The contractor shall reseal the annular space between the sewer main and the cured-in-place pipe at manhole locations and service connections until there are no visible leaks through television inspection.
- B. All inspecting and resealing or lining within the warranty period shall be provided at no additional cost to the Owner.

SERVICE CONNECTION REINSTATEMENT CERTIFICATION FORM

The Contractor shall review sewer tie cards, television inspection tapes, and perform dye tests as necessary to determine which service connections should be reinstated following installation of a Cured-in-Place Liner. Details regarding the location of each service connection that will be reinstated, including Manhole-to-Manhole reach, stationing, and clock position shall be recorded on this form.

Service Connections to be Reinstated (Clock Position)

Inversion # _____	MH _____ to MH _____	_____
	MH _____ to MH _____	_____
	MH _____ to MH _____	_____
	MH _____ to MH _____	_____
	MH _____ to MH _____	_____
	MH _____ to MH _____	_____
	MH _____ to MH _____	_____
	MH _____ to MH _____	_____

The Contractor shall be responsible for reinstatement of **all active** service connections following Cured-in-Place Lining. If active service connections are found, at any future date, not to have been reinstated, the Contractor shall reinstate them within three (3) calendar days of notification, at his sole expense.

Contractor

Signature

Date

Print Name

END OF SECTION

**THIS SECTION IS INCIDENTAL TO THE WORK AND SHALL NOT BE MEASURED
SEPARATELY FOR PAYMENT**

SECTION 02440

SEWER CLEANING, INSPECTION, TESTING AND SEALING

PART 1 - GENERAL

1.01 WORK INCLUDED:

- A. This section covers cleaning, inspection, testing and sealing of pipelines as called for herein and on the drawings. The work includes furnishing all equipment, material and labor required to perform the services described herein. The sewer lines were previously cleaned and televised. The television inspection logs are included as Appendix C for reference.

1.02 RELATED WORK:

- A. Section 00331, TELEVISION AND MANHOLE INSPECTION LOGS
- B. Section 01330, SUBMITTALS
- C. Section 01331, DOCUMENTATION
- D. Section 01575, HANDLING EXISTING FLOWS
- E. Section 02428, CURED-IN-PLACE PIPE
- F. Section 02443, SERVICE CONNECTION REHABILITATION

1.03 QUALITY ASSURANCE:

- A. The work described herein shall be performed by a company with not less than five (5) years of experience in providing the required services, employing experienced workers and experienced supervisory personnel. Supervisory personnel shall have not less than three (3) years of experience in providing the required services and shall be present at the jobsite during all work related to the required services.

1.04 REFERENCES:

- A. The following standards form a part of this specification as referenced:

The National Association of Sewer Service Companies (NASSCO)

Suggested Standard Specification for Pressure Testing and Grouting of Sewer Joints, Laterals and Lateral Connections (Using the Packer Method with Solution Grouts)

American Society of Testing and Materials (ASTM)

ASTM F2304 Standard Practice for Rehabilitation of Sewers Using Chemical Grouting

1.05 SYSTEM DESCRIPTION:

- A. Unless otherwise indicated herein, the pipe cleaning, inspection, testing and sealing of the specified length of pipe shall be carried out in accordance with Section 3, Execution, of the NASSCO Suggested Standard Specification for Pressure Testing and Grouting of Sewer Joints, Laterals and Lateral Connections (Using the Packer Method with Solution Grouts). Sewer flow control shall comply with Section 01575, HANDLING OF EXISTING FLOWS. Sealing materials shall comply with Part 2, Products, of the NASSCO Suggested Standard Specification for Pressure Testing and Grouting of Sewer Joints, Laterals and Lateral Connections (Using the Packer Method with Solution Grouts).
- B. The Contractor may propose alternative processes and/or products for review and approval by the Engineer.

1.06 SUBMITTALS: IN ACCORDANCE WITH REQUIREMENTS OF GENERAL SPECIFICATIONS, SUBMIT THE FOLLOWING:

- A. Prior to beginning work, submit six (6) sets of the following:
 - 1. Qualifications of the firm/personnel who will perform the work.
 - 2. Description of system proposed for handling existing flows during the various procedures to be carried out.
 - 3. Description of the system and equipment proposed for cleaning the pipe.
 - 4. Description of the equipment and system proposed for inspecting the pipe after cleaning.
 - 5. Description of the equipment and system proposed for testing the joints.
 - 6. Description of the equipment, the sealing compound and the system proposed for sealing selected joints and circular cracks.
 - 7. Manufacturer's warranty.
 - 8. Submit MSDS for the sealing compound to be used.
- B. Refer to Section 01331, DOCUMENTATION for required documentation to be submitted.

1.07 WARRANTY:

- A. The joint and circular crack sealing shall be warrantied for one year after the project is accepted by the Owner.

PART 2 - PRODUCTS

2.01 CLEANING AND SEALING MATERIALS:

- A. The Contractor shall use a chemical grout which is environmentally safe for the sealing of sewers. The chemical sealing materials shall be in accordance with Part 2, Products, of the NASSCO Suggested Standard Specification for Pressure Testing and Grouting of Sewer Joints, Laterals and Lateral Connections (Using the Packer Method with Solution Grouts)s. All other products used for sealing, patching and cleaning of sewers shall also be environmentally safe.
- B. The chemical sealing material shall be EPA registered and labeled for use in sewer lines and acceptable to the State Agencies having jurisdiction over its use.
- C. The Contractor shall submit MSDS data sheets for all materials used.

PART 3 - EXECUTION

3.01 PIPE CLEANING:

- A. The Contractor may elect to use either high velocity jet, or mechanically powered equipment, as described in the NASSCO Suggested Standard Specification for Pressure Testing and Grouting of Sewer Joints, Laterals and Lateral Connections (Using the Packer Method with Solution Grouts). Selection of equipment shall be based upon field conditions such as access to manholes, quantity of debris, size of sewer, depth of flow, etc.
- B. All sludge, dirt, sand, rocks, grease, and other solid or semisolid material resulting from the cleaning operation shall be disposed of in accordance with all applicable regulations and in a method acceptable to the Owner. Pipe cleaning shall be performed in advance of pipe television inspection.
- C. The Contractor shall be responsible for the legal disposal of all debris removed from the sewers during the cleaning operation including any costs incurred. The Contractor shall not expect the Owner to provide a dump site.
- D. Acceptance by the Engineer of the cleaning results will be based on the results of television inspection. If the results are unsatisfactory, the Contractor shall repeat the cleaning until accepted by the Engineer at no additional cost to the Owner.

3.02 PIPE INSPECTION:

- A. Pipe shall be visually inspected by means of closed-circuit television. The television camera used for the inspection shall be one specifically designed and constructed for such inspection. Lighting for the camera shall be suitable to allow a clear picture, with minimal reflective glare, for the entire periphery of the pipe. The camera shall be operative in 100% humidity conditions. The camera, television monitor and other components of the video system shall be capable of producing a minimum 400 line resolution color video picture. Picture quality and definition shall be to the satisfaction of the Engineer.
 - 1. Refer to Section 01331, DOCUMENTATION, in regard to DVD's/external hard drives to be given to the Owner upon completion of project and before the project is accepted by the Owner.
- B. The camera shall have a remote controlled, pan and tilt type lens and lighting system capable of turning perpendicular to the direction of flow and rotating 360 degrees while inside the pipe. The camera shall be able to view a minimum service connection length of 4 feet in order to determine whether the connection is active or inactive.
- C. Electronic video equipment shall be capable of displaying and recording during the entire inspection, as a minimum, the following data for each sewer reach videotaped:
 - 1. Project identification
 - 2. Date recorded
 - 3. Sewer reach identification (street location, MH to MH)
 - 4. Footage counter
- D. The camera shall be moved through the line in either direction at a uniform rate, stopping when necessary to ensure proper identification of the sewer's condition. Manual winches, power winches, television 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 sewer section, the Contractor shall re-set his equipment in a manner so that the inspection can be performed from the opposite manhole.
- E. Flow control shall be in accordance with Section 01575, HANDLING OF EXISTING FLOWS.
- F. Standing water within a sagging pipe shall be removed so that the pipe can be adequately television inspected. A minimum of 80% of the pipe shall be visible before television inspection.
- G. Removal of obstruction caused by protruding taps shall be in accordance with Section 02443, SERVICE CONNECTION REHABILITATION.

- H. Television inspection shall be performed in advance of pipe joint testing, sealing, pipe repair and pipe lining activities.

3.03 EQUIPMENT TESTING:

- A. The Contractor shall perform an above ground demonstration test in a test cylinder with the same diameter as the proposed pipe being tested to simulate a pipe leak. The setup shall have a valve and pressure gauge to simulate leaks and monitor pressure. The tests shall be performed in accordance with ASTM F 2304, Standard Practice for Rehabilitation of Sewers Using Chemical Grouting, Section 11.4.1, Control Testing.
- B. The pressure displayed by the testing equipment shall be within ± 0.5 psi of the gauge pressure to pass successfully. The void pressure should drop to within ± 0.5 psi of the pre-test pressure displayed by the testing equipment after the pressure is released to pass successfully. Test pressures shall be between 7 and 10 psi.
- C. If the demonstration test cannot be performed successfully, the contractor shall repair or modify the equipment and perform the test again until the test is passed.
- D. The Contractor shall perform the demonstration test for each chemical sealing unit prior to the equipment being used on the Project. Additional tests may be required by the Engineer at various times during the Project.

3.04 PIPE TESTING:

- A. Testing of pipe joints or circular cracks to identify joints or circular cracks that are defective and that can be successfully sealed by the internal pipe joint sealing process, shall be in accordance with Section 3.6, Joint Testing Procedure for Mainline Sewer and Laterals Connected to Manholes, of the NASSCO Suggested Standard Specification for Pressure Testing and Grouting of Sewer Joints, Laterals and Lateral Connections (Using the Packer Method with Solution Grouts). The test medium may be liquid or gas, at the Contractor's option. Test pressure used shall be acceptable to the Engineer.
- B. The allowable pressure drop shall be 0.5 pounds in 15 seconds at a pressure greater than $\frac{1}{2}$ pounds per vertical foot of pipe cover, or 4 pounds minimum.
- C. Electronic video equipment shall be capable of displaying and recording, at a minimum the following data for each pipe joint:
 - 1. Project Identification
 - 2. Date Recorded
 - 3. Footage counter
 - 4. Test Pressure
 - 5. Sewer Reach Identification (Street, location, start MH and second MH).

3.05 PIPE SEALING:

- A. Pipe joints and circular cracks to be sealed shall be designated by the Engineer and shall be sealed in accordance with the procedures described in Section 3.9, Pipe Joint Sealing by Packer Injection Grouting for Mainline Sewers and Laterals Connected to Manholes, of the NASSCO Suggested Standard Specification for Pressure Testing and Grouting of Sewer Joints, Laterals and Lateral Connections (Using the Packer Method with Solution Grouts). The chemical sealing materials used shall be as described in Part 2, Products, of the NASSCO Suggested Standard Specification for Pressure Testing and Grouting of Sewer Joints, Laterals and Lateral Connections (Using the Packer Method with Solution Grouts).

3.06 FIELD TESTING/INSPECTION:

- A. Prior to the expiration of the warranty period, an initial test sample of approximately 100% of the linear feet of the total project will be selected and approved by the Engineer. The test sample will consist of manhole-to- manhole segments from throughout the project area that are representative of the sealing work originally performed. The Contractor shall television inspect and test all previously sealed joints and circular cracks as specified in paragraphs 3.02 and 3.04 of this Section. Any joints or circular cracks failing the test shall be resealed as specified in paragraph 3.05 of this Section.
- B. If the failure rate of retested joints and circular cracks is less than 5% of the previously sealed locations, the work will be considered satisfactory and no further testing will be required.
- C. If the failure rate in the initial test sample of the tested joints and circular cracks equals or exceeds 5%, an additional and equivalent test sample of 100% of the linear feet of the total project will be selected and approved by the Engineer. Additional warranty test samples will be tested and resealed as necessary until the failure rate of less than 5% is met. No previously tested segments can be included in a subsequent test sample.
- D. Should the total project area fail to meet the less than 5% failure rate in the 100% test samples, the Contractor will be required to repeat the inspection procedure.
- E. Testing and resealing of sealed joints and circular cracks shall be performed prior to the expiration of the warranty period, during periods of high groundwater, and at a time to be approved by the Engineer.
- F. All inspecting, testing and resealing within the warranty period shall be provided at no additional cost to the Owner.

END OF SECTION

S U P P L E M E N T A L S P E C I F I C A T I O N

ITEM 613.013 OPEN CUT POINT REPAIR OF GRAVITY SEWER LINEAR FOOT

SECTION 02442

POINT REPAIR OF GRAVITY SEWERS
(OPEN-CUT)

PART 1 - GENERAL

1.01 WORK INCLUDED:

- A. This Section covers the point repair of gravity sewers using open cut construction methods. The work includes furnishing all equipment, material and labor required to point repair a sewer pipe section as described herein.
- B. A point repair shall be identified as a repair made at a specified location on a sanitary sewer line. The point repairs are identified on the drawings; see the television inspection logs for additional information. Additional point repairs on Leslie Drive not shown on the drawings may be required by approval of the Engineer.

1.02 RELATED WORK:

- A. Section 01575, HANDLING EXISTING FLOWS
- B. Section 01740, CLEANING UP
- C. Section 02085, POLYVINYL CHLORIDE GRAVITY PIPE AND FITTINGS
- D. Section 02252, SUPPORT OF EXCAVATION
- E. Section 02300, EARTHWORK

1.03 QUALITY ASSURANCE:

The Work described herein shall be performed by a company with not less than two years of experience in providing the required services, employing experienced supervisory personnel.

1.04 REFERENCES:

The following standards form a part of this specification as referenced:

The National Association of Sewer Service Companies (NASSCO) Specifications Guidelines for Sewer Collection System Maintenance & Rehabilitation.

1.05 SUBMITTALS: IN ACCORDANCE WITH REQUIREMENTS OF GENERAL SPECIFICATIONS, SUBMIT THE FOLLOWING:

Prior to beginning the Work, submit six (6) sets of the following:

1. Qualifications of the firm/personnel who will perform the Work.
2. Description of system proposed for handling existing flows, if necessary.
3. Description of the system, equipment and material proposed, including the source and name of manufacturer.
4. Specifications and Data Sheets of all materials to be used, including a list of applicable ASTM standards.
5. Material and structural details of the point repair method proposed, including typical cross-sections and strength calculations.

PART 2 - PRODUCTS

2.01 GENERAL:

All workmanship and materials used for making point repairs shall be of the highest quality. The materials shall be the products of a manufacturer actively engaged in research, development and manufacturing of said materials.

2.02 REPAIR PIPE:

The repair pipe shall be POLYVINYL CHLORIDE GRAVITY PIPE as specified in Section 02085. The inside diameter of the replacement pipe size shall be the same as the existing pipe. If sewer is located within 10' of water main the repair shall be POLYVINYL CHLORIDE PRESSURE PIPE as specified in Section 02088.

2.03 JOINT MATERIALS:

When connecting together joints of plain-end spigot pipe, suitable adaptors shall be used for joining dissimilar pipe materials. The adapters shall be Fernco Couplings, or approved equal. All materials shall pass the strength and chemical requirements of current ASTM requirements. Adapters and methods of connecting pipes shall be approved by the Engineer. The Contractor shall submit to the Engineer descriptive literature and materials on the adaptors and connection method he proposes to use.

2.04 BUILDING CONNECTIONS:

Any building connection replaced during a point repair shall conform to pipe manufacturer's recommendations and specifications and applicable ASTM

specifications, for furnishing and installing the building connection. The connection materials shall be similar to the connecting sewer pipe.

2.05 SEALING OPEN JOINTS:

Any open joint to be sealed during a point repair shall be yarned, wiped and encased with concrete. The encasement shall be centered on the joint, have a minimum thickness of six (6) inches of concrete, and have a minimum length equal to the pipe diameter, but not less than twelve (12) inches. Any alternative method for sealing open joints shall be submitted to the Engineer for approval.

PART 3 - EXECUTION

3.01 SAFETY:

The Contractor shall perform all work in strict accordance with all applicable OSHA standards. Particular attention is drawn to those safety requirements regarding confined space entry.

3.02 POINT REPAIR METHOD:

The method by which the point repair shall be made shall include all supervision, labor, equipment and materials necessary to perform and successfully complete the following items of work:

1. Excavate a trench deep enough to uncover the gravity sewer line and wide enough and long enough to work in, in accordance with the latest OSHA requirements.
2. Remove any existing fences, base material, storm sewers, water mains, and other items that interfere with the repair made at each specific point, and replace the fences, base material, storm sewers, water mains, and other removed items in the same or better condition than found, as determined by the Engineer.
3. Replace and reshape the bottom of the trench so that the grade of the pipe replaced will match that required for the existing sewer line. Any material replaced in the bottom of the trench shall be tamped so as to prevent sags in the sewer line due to settlement of trench material. If the material in the bottom of the trench is not stable, the Contractor shall stabilize the trench bottom by placing suitable materials at the request of the Engineer.
4. Repair and replace the section of damaged sewer identified herein. The damaged section of pipe shall be removed and a replacement section of PVC pipe shall be spliced in its place, using Fernco couplings at each end of the splice.
5. Repair and replace any service wye or tee encountered within the required point repair, or any service wye or tee connection or service line judged to be a source

of infiltration/inflow by the Engineer. All service lines broken by the Contractor shall be replaced by the Contractor at his expense.

6. Seal open joints exposed within the pipe excavation, where the barrel of the pipe is still satisfactory but the joints are not. Any roots in open joints shall be removed before sealing. Determination as to whether or not roots exist shall be made by the Engineer. The materials to use when sealing open joints are listed in subsection 2.05.
7. Connect all newly laid sewer pipe to existing pipe, and main sewer lines to services, so that no possible source of infiltration/inflow (a leak in the line) may be created. When applicable, the main sewer line shall be cut so that a smooth plain-end spigot exists at both ends of the trench and connected, as specified in subsection 2.03. The materials used to make the tie-ins shall be properly sized as specified in section 2.01. Any sewer pipe broken by the Contractor shall be replaced at the Contractors expense. All such occurrences shall be pointed out to the Engineer.
8. Backfill the excavation, and replace the trench pavement as specified, so that the finished elevation will match the natural ground elevation and no ponding will occur after the backfilled material has settled.
9. Clean up the area as specified in Section 01740 CLEANING UP.

3.03 ABANDONMENT:

- A. If a decision is made by the Engineer in the field that a point repair will not satisfactorily correct the problem, or if the Contractor excavates at the required location and does not find the source of the problem, the Engineer shall verify the condition, declare the point repair to be abandoned and the excavation shall be backfilled.
- B. At such time as the point repair has been declared abandoned, the Engineer shall determine how to proceed or whether to reclassify the sewer line for further investigation.

3.04 FIELD JUDGEMENTS:

At any time during a point repair, the Engineer shall make field judgements which shall govern the point repair process until such time that the specifications will again prevail. Field judgements shall include the following situations and any other questionable situation that may arise:

1. Determination of the length of sewer pipe to repair.
2. Determination of method of payment for additional work outside the original point repair area.

3. Determination of dewatering requirements.
4. Determination of abandonment.
5. By-pass pumping of sewage.
6. Determination of the amount of asphalt, concrete driveway, curb or sidewalk, or any other surface feature to be replaced.

3.05 BY-PASS PUMPING:

On all point repairs, the normal flow of sewage shall be re-routed by by-pass pumping so as not to interrupt the flow of sewage to the treatment plant. By-pass pumping shall be as specified in Section 01575 HANDLING OF EXISTING FLOWS.

3.06 RESTORATION:

- A. The Contractor shall replace all streets, roadways, sidewalks, and driveways which may be removed, disturbed, or damaged in connection with his operation under this Contract. The Contractor shall reconstruct same to the original lines and grades and in such a manner as to leave all such surfaces in fully as good or better condition than that which existed prior to his operations. The re-use of materials removed in making excavations will be permitted in the manner described, provided said materials are in good condition and are acceptable to the Engineer.
- B. In easements and other unpaved areas, the Contractor shall return the area as close as is practicable to its original condition to the satisfaction of the Engineer, at no additional cost to the Owner.

3.07 INSPECTION

- A. Prior to the end of the warranty period, the section of pipe where the point repair is located shall be television inspected for defects in accordance with Section 02440, SEWER CLEANING, INSPECTION, TESTING, AND SEALING.

END OF SECTION

**THIS SECTION IS INCIDENTAL TO THE WORK AND SHALL NOT BE MEASURED
SEPARATELY FOR PAYMENT**

SECTION 02443

SERVICE CONNECTION REHABILITATION

PART 1 - GENERAL

1.01 WORK INCLUDED:

- A. This Section covers the rehabilitation of service connections, including cutting of protruding services, television inspection and testing of services, and grouting of services as called for herein and on the drawings. The work includes furnishing all equipment, material and labor required to perform the services described herein.

1.02 RELATED WORK:

- A. Section 00331, TELEVISION AND MANHOLE INSPECTION LOGS
- B. Section 01330, SUBMITTALS
- C. Section 01331, DOCUMENTATION
- D. Section 01575, HANDLING EXISTING FLOWS
- E. Section 02428, CURED-IN-PLACE PIPE
- F. Section 02440, SEWER CLEANING, INSPECTION, TESTING AND SEALING

1.03 QUALITY ASSURANCE:

- A. The work described herein shall be performed by a company with not less than five (5) years of experience in providing the required services, employing experienced workmen and experienced supervisory personnel. Supervisory personnel shall have not less than three (3) years of experience in providing the required services and shall be present at the jobsite during all work related to the required services.

1.04 REFERENCES:

- A. The following standards form a part of this specification as referenced:

The National Association of Sewer Service Companies (NASSCO)

Suggested Standard Specification for Pressure Testing and Grouting of Sewer Joints, Laterals and Lateral Connections (Using the Packer Method with Solution Grouts)

American Society of Testing and Materials (ASTM)

ASTM F2454 Standard Practice for Sealing Lateral Connections and Lines from the Mainline Sewer Systems by the Lateral Packer Method, Using Chemical Grouting

1.05 SYSTEM DESCRIPTION:

- A. Unless otherwise indicated herein, service connection rehabilitation shall be carried out in accordance with Lateral Connection Sealing from the Mainline by Packer Injection Grouting, Section 3.10, of the NASSCO Suggested Standard Specification for Pressure Testing and Grouting of Sewer Joints, Laterals and Lateral Connections (Using the Packer Method with Solution Grouts).
- B. The Contractor may propose alternative processes and/or products for review and approval by the Engineer.
- C. The location of the service connection rehabilitations are indicated on the drawings.

1.06 SUBMITTALS: IN ACCORDANCE WITH REQUIREMENTS OF GENERAL SPECIFICATIONS, SUBMIT THE FOLLOWING:

- A. Prior to beginning the work, submit six (6) sets of the following:
 - 1. Qualifications of the firm/personnel who will perform the work.
 - 2. Descriptions of system proposed for handling existing flows, if necessary, during the procedures to be carried out.
 - 3. Description of the system, equipment and material proposed for the service connection rehabilitations.
 - 4. Manufacturer's warranty.
 - 5. Submit MSDS Data Sheets for proposed chemicals to be used.
- B. Refer to Section 01331, DOCUMENTATION, for documentation required to be submitted.

1.07 WARRANTY:

- A. The service connection rehabilitations shall be warrantied against infiltration and faulty workmanship and materials for one year from the date the project is accepted by the Owner.

PART 2 - PRODUCTS

2.01 CHEMICAL GROUT:

- A. The Contractor shall use chemical grout which is environmentally safe for the sealing of sewers. The chemical sealing materials shall be used in accordance with Part 2, Products, of the NASSCO Suggested Standard Specification for Pressure Testing and Grouting of Sewer Joints, Laterals and Lateral Connections (Using the Packer Method with Solution Grouts). All other products used for sealing, patching and cleaning of sewers shall also be environmentally safe.
- B. The chemical grout material shall be EPA registered and labeled for use in sewer lines and acceptable to the state agencies having jurisdiction over its use.

PART 3 - EXECUTION

3.01 PIPE CLEANING AND INSPECTION:

- A. Pipe cleaning and inspection shall be carried out in accordance with Section 02440, SEWER CLEANING, INSPECTION, TESTING AND SEALING.

3.02 FLOW CONTROL:

- A. Flow control, if required, shall be in accordance with Section 01575, HANDLING EXISTING FLOWS.

3.03 CUTTING OF PROTRUDING SERVICE CONNECTIONS:

- A. The Contractor shall cut protruding service connections where called for on the drawings. The protruding services shall be cut flush with the wall of the sewer, using either a lateral cutter or grinder.
- B. After the protruding services are cut, the service connections shall be grouted in accordance with paragraph 3.06 of this Section. No additional payment shall be made for grouting service connections.

3.04 EQUIPMENT TESTING:

- A. The Contractor shall perform an above ground demonstration test in a test cylinder with the same diameter as the proposed pipe being tested to simulate a pipe leak. The setup shall have a valve and pressure gauge to simulate leaks and monitor pressure. The tests shall be performed in accordance with ASTM F2454, Standard Practice for Sealing Lateral Connections and Lines from the Mainline Sewer Systems by the Lateral Packer Method, Using Chemical Grouting, Section 11.3.3, Initial Testing.
- B. The pressure displayed by the testing equipment shall be within ± 0.5 psi of the gauge pressure to pass successfully. The void pressure should drop to within ± 0.5 psi of the

pre-test pressure displayed by the testing equipment after the pressure is released to pass successfully. Test pressures shall be between 7 and 10 psi.

- C. If the demonstration test cannot be performed successfully, the Contractor shall repair or modify the equipment and perform the test again until the results are satisfactory to the Engineer
- D. The Contractor shall perform the demonstration test for each chemical sealing unit prior to the equipment being used on the Project. Additional tests may be required by the Engineer at various times during the Project.

3.05 TELEVISION INSPECTION AND TESTING OF SERVICE CONNECTIONS:

- A. The Contractor shall television inspect and test service connections where called for on the drawings. Television inspection of services shall utilize a pan and tilt camera which shall inspect a minimum of 4 feet of the service connection from the main sewer.
- B. Pressure Testing: Air testing is accomplished by isolating the area to be tested with the packer and applying positive pressure into the isolated VOID area. VOID area shall include a minimum 3 feet of service connection pipe.
- C. Pressure testing shall be carried out in accordance with Section 3.7, Lateral Connection Testing Procedure, of the NASSCO Suggested Standard Specification for Pressure Testing and Grouting of Sewer Joints, Laterals and Lateral Connections (Using the Packer Method with Solution Grouts).
- D. The television inspection and testing equipment shall be capable of inspecting and testing 4-inch, 5-inch and 6-inch diameter service connections.
- E. If the service fails the pressure test, the service shall be grouted in accordance with paragraph 3.06 of this Section. If the service passes the pressure test, grouting is not required.

3.06 GROUTING OF SERVICE CONNECTIONS:

- A. The Contractor shall grout service connections where indicated on the drawings or when a service fails the pressure test, as described in paragraph 3.05 of this Section. The Contractor shall grout all service connections reinstated as described in Section 02428, CURED-IN-PLACE PIPE, regardless of the results of the pressure test. Grouting of service connections shall be carried out in accordance with Section 3.10, Lateral Connection Sealing from the Mainline by Packer Injection Grouting, of the NASSCO Suggested Standard Specification for Pressure Testing and Grouting of Sewer Joints, Laterals and Lateral Connections (Using the Packer Method with Solution Grouts)..
- B. The grouting equipment shall be capable of grouting 4-inch, 5-inch and 6-inch diameter service connections.

- C. The chemical sealing materials shall be as described in Part 2, Products of the NASSCO Suggested Standard Specification for Pressure Testing and Grouting of Sewer Joints, Laterals and Lateral Connections (Using the Packer Method with Solution Grouts).
- D. If a service connection becomes clogged with grout, the Contractor shall clear the grout from the lateral. This work shall be done at no additional cost to the Owner.

3.07 FIELD TESTING/INSPECTION:

- A. Prior to the expiration of the warranty period, an initial test sample of approximately 100% of the original service connection rehabilitation work will be selected and approved by the Engineer. The test sample will consist of manhole sections from throughout the project area that are representative of the sealing work originally performed. The Contractor shall television inspect and test all previously grouted service connections within the initial test sample as specified in paragraph 3.05 of this Section. Any service connections failing the retest shall be regouted as specified in paragraph 3.06 of this Section.
- B. If the failure rate in the initial test sample is less than 5%, the work will be considered satisfactory and no further testing will be required.
- C. If the failure rate in the initial test sample equals or exceeds 5%, an additional and equivalent test sample will be selected and approved by the Engineer. Additional test samples will be tested and resealed as necessary until the failure rate of less than 5% is met. No previously tested service connections can be included in a subsequent warranty test sample.
- D. Should all of the original service connection rehabilitation work fail to meet the less than 5% failure rate in the 100% test samples, the Contractor will be required to repeat the inspection procedure.
- E. Any remaining service connection rehabilitation work not television inspected and tested as part of a test sample shall be television inspected. The Contractor shall repair any defects found and shall regout the services until there are no visible leaks through television inspection.
- F. Television inspecting, testing, and regrouting of service connections shall be performed prior to the expiration of the warranty period, during periods of high groundwater and at a time to be approved by the Engineer.
- G. All inspecting, retesting, and regrouting within the warranty period shall be provided at no additional cost to the Owner.

END OF SECTION

S U P P L E M E N T A L S P E C I F I C A T I O N**ITEM 611.914****4" TEMPORARY WATER MAIN****LINEAR FOOT**

SECTION 02511

TEMPORARY WATER SERVICE

PART 1 - GENERAL

1.01 WORK INCLUDED:

- A. The Contractor shall furnish, install, maintain, and remove temporary water service pipe of the size required from which connections shall be made to all water customers. The temporary water system shall consist of mains, services and fire department outlets adequately sized to provide uninterrupted water and fire service to all water customers. Temporary service pipe shall not be installed without prior approval of the Engineer.

- B. The Contractor shall do all excavating for connections of temporary service pipes to existing live water mains and services, make and maintain all such connections and reinstate them to the new water main upon completion of the required disinfection and testing. The Contractor shall also furnish, install, maintain, connect, disconnect, and remove individual temporary service lines to all water customers.

1.02 REFERENCES:

The following standard forms a part of this specification, as referenced:

American Water Works Association (AWWA)

AWWA C651 Disinfecting Water Mains

1.03 SUBMITTALS: IN ACCORDANCE WITH REQUIREMENTS OF THE GENERAL SPECIFICATIONS, SUBMIT THE FOLLOWING:

Shop drawings shall consist of manufacturer's scale drawings, cuts, or catalogs including descriptive literature. Shop drawings shall be submitted for the pipe, type of joint, fittings, couplings, and valves. A plan of the temporary bypass system, showing location and size of all pipelines, services and fire department outlets, shall be submitted to the Engineer for review prior to installation of the bypass system.

PART 2 - PRODUCTS

- 2.01 The temporary service pipe, connections, and branches shall be of the highest quality and shall be fully adequate to withstand the pressures and all conditions of use. The

temporary service shall be made of Class 160 Yelomine PVC pipe as manufactured by Certainteed or approved equal. The installation shall be watertight.

PART 3 - EXECUTION

3.01 RESPONSIBILITIES:

- A. Before starting any work that will affect service to customers, the Contractor shall notify the customers and Owner at least 48 hours in advance.
- B. The Contractor shall be responsible for all repairs and maintenance required to the temporary services. The Contractor shall immediately repair and/or replace any leaking or faulty temporary service pipe as ordered by the Engineer.
- C. The work of providing suitable safety precautions to prevent any interruptions of water service during the temporary service period, including taking any steps necessary to prevent freezing, shall be the responsibility of the Contractor. If freezing does occur, the Contractor shall thaw the lines, make any necessary repairs, and promptly restore temporary service.
- D. Before placing the temporary water pipe into service, a representative from the local Fire Department shall inspect any connections to existing fire hydrants, the placement of emergency fire connections, and shall be familiar with the operation of the emergency fire connections. The Contractor shall make any adjustments to the layout of the temporary water piping and hydrants requested by the local Fire Department. The Contractor shall provide any tools required to operate the emergency fire connections to the Fire Department. The Fire Department shall be contacted at least 48 hours in advance of placing the temporary water pipe into service.

3.02 INSTALLATION:

- A. Generally, temporary service pipe shall be laid in gutters or several feet back from the edge of pavement. At driveways, crossings over the pipe shall be made by hot-mix pavement berm, wood or rubber mat ramp or other approved method. At street intersections and road crossings, pipe shall be laid in a shallow trench covered with temporary surfacing.
- B. All service pipe shall be suitably valved to meet the approval of the Engineer. Line valves shall be located at all intersecting streets but no further than 1,000 feet apart.
- C. Suitably threaded 2-1/2-inch valved emergency fire connections shall be installed and maintained adjacent to each fire hydrant which is scheduled to be out of service. Hydrant nozzle caps shall be placed on all emergency fire connections.
- D. Temporary connections to live hydrants or water mains shall be of the same size as the temporary pipe that they feed. No restrictions or reduction in size will be allowed.

- E. All hydrants that are out of service shall be covered with burlap bags, securely held in place.
- F. The Contractor shall be responsible for all consumer connections. The connection shall be made via a temporary hose from the temporary main to each homes curb stop below-ground connection.
- G. All service connections shall be valved at the temporary service pipe.
- H. The temporary water main driveway crossings shall have compacted gravel placed on top for a smooth transition which will be maintained during the entire duration of the temporary water main.
- I. The temporary water main roadway crossings shall be set below grade and covered with temporary hot asphalt which will be maintained during the entire duration of the temporary water main.

3.03 DISINFECTING AND FLUSHING:

- A. The Contractor shall disinfect the temporary mains and services carrying temporary water.
- B. The Contractor shall furnish all equipment and materials necessary to do the work of disinfecting, and shall perform the work in accordance with the procedure outlined in AWWA C651 and all amendments thereto.
- C. In general, the procedure of disinfecting the main shall be to apply the chlorine through a tap in one end of the section and bleed off through a tap at the other end.
- D. The applied dosage shall be such as to produce a chlorine concentration of not less than 10 mg/l after a contact time of not less than 24 hours.
- E. During the disinfection period, care shall be exercised to prevent contamination of water in existing mains.
- F. Any temporary connection to the mains or other facilities required to accomplish the disinfection of the mains as described below, shall be at the Contractor's expense.
- G. After treatment, the main shall be flushed with clean water until the residual chlorine concentration is less than 0.2 mg/l.
- H. The Contractor shall dispose of the water used in disinfecting and flushing in an approved manner.
- I. Bacteriological sampling and testing shall be done by the Contractor in accordance with AWWA C651 for each main and each branch. Sampling shall be accomplished with sterile bottles treated with sodium thiosulfate, as required by Standard Methods. No

hose or fire hydrants shall be used in collection of samples. A corporation stop installed on the main, with a removable copper tube gooseneck assembly, is the recommended method.

- J. Testing shall be done by a laboratory approved by the Engineer, in accordance with Standard Methods, and shall show the absence of coliform organisms. A standard plate count may be required at the option of the Engineer.
- K. The Contractor shall handle all sampling and coordinating of testing of such samples through a laboratory approved by the Engineer.

END OF SECTION

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**THIS SECTION IS INCIDENTAL TO THE WORK AND SHALL NOT BE MEASURED
SEPARATELY FOR PAYMENT**

SECTION 02513

INSULATION FOR PIPELINES

PART 1 - GENERAL

1.01 WORK INCLUDED:

This Section covers the furnishing of all material, accessories, labor, and equipment necessary to insulate the pipelines where shown on the drawings and where so required by the Engineer.

1.02 RELATED WORK:

- A. Section 02080, DUCTILE IRON PIPE AND FITTINGS
- B. Section 02085, POLYVINYL CHLORIDE GRAVITY PIPE AND FITTINGS
- C. Section 02300, EARTHWORK

1.03 REFERENCES:

- A. The following standards form a part of this specification as referenced:

American Society for Testing and Materials (ASTM)

ASTM C552 Specification for Cellular Glass Block and Pipe Thermal
Insulation

1.04 SUBMITTALS: IN ACCORDANCE WITH REQUIREMENTS OF GENERAL SPECIFICATIONS, SUBMIT THE FOLLOWING:

- A. Six sets of manufacturer's literature of the materials of this section and installation instructions for the products being provided for the project shall be submitted to the Engineer for review.
- B. A sample of the insulation shall be submitted to the Engineer.

PART 2 - PRODUCTS

2.01 INSULATION: DIRECT BURIED PIPE

- A. Insulation shall be cellular glass type. The insulation shall be a cellular glass product that is made specifically for thermal insulation of piping and is compatible with the

piping material. Insulation shall be a minimum of 2 inches thick, unless otherwise shown on the drawings.

- B. Insulation shall be composed of all glass sealed cells having no binders or fillers. The completed product shall be rigid and impermeable, with an ultimate compressive strength of at least 90 psi. The thermal conductivity of the cellular glass shall be no higher than 0.29 BTU-in./hr • ft² • °F @ 75°F and 0.28 BTU-in./hr • ft² • °F @ 50°F.
- C. The cellular glass insulation shall comply with all requirements of ASTM C552. The cellular glass shall be fabricated in half sections whenever possible.
- D. Bands for securing the insulation to the pipe shall be 0.5 inches wide by 0.020 inches thick made of stainless steel.
- E. The jacketing for the insulation shall be one of the following methods:
 - 1. A 125 mil (3mm) thick, heat sealed high polymer asphaltic membrane with an integral glass scrim and integral 1 mil (.02mm) aluminum foil and a thin Mylar film on the surface, equal to Pittwrap Jacketing as manufactured by Pittsburgh Corning or equal.
 - 2. Mastic - asphalt cutback mastic, equal to Pittcote 300 Finish, as manufactured by Pittsburgh Corning or equal.
 - 3. Reinforcing fabric - an open mesh polyester fabric with a 6 x 5.5 mesh/inch configuration, equal to PC Fabric 79, as manufactured by Pittsburgh Corning or equal.
- F. The insulation shall be "Foamglass" with jacketing as manufactured by Pittsburgh Corning Corporation, Pittsburgh, PA, or an approved equal. A minimum of 6" layer of fine sand shall surround the insulated pipe before rock free backfill is used in the trench.
- G. The Foamglass and jacketing shall be installed per the manufacturer instructions included in the approved shop drawings.
- H. Tees, valves, and bends shall be covered with form fitting factory made sections.

PART 3 - EXECUTION

3.01 INSTALLATION:

- A. Cellular glass shall not be applied to the piping until the piping has been wiped clean and supported so that there is adequate space to apply the full thickness of insulation and the covering completely around the pipe. The Contractor must obtain the Engineer's approval before the installation begins.
- B. Cellular glass insulation and jacketing shall be applied in accordance with the manufacturers installation procedures included in the approved shop drawings.

- C. There shall be at least three 0.50-inch wide stainless steel bands secured around each joint and these bands shall be placed not over 9 inches on center on straight sections of pipe.
- D. Tees, valves, and bends shall be covered with form fitting factory made sections.
- E. All testing of the piping system, such as hydrostatic, x-ray or other such testing, shall be accomplished prior to application of insulation.

END OF SECTION

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S U P P L E M E N T A L S P E C I F I C A T I O N

<u>ITEM 611.71004</u>	<u>4" GATE VALVE WITH BOX</u>	<u>EACH</u>
<u>ITEM 611.71006</u>	<u>6" GATE VALVE WITH BOX</u>	<u>EACH</u>
<u>ITEM 611.71008</u>	<u>8" GATE VALVE WITH BOX</u>	<u>EACH</u>
<u>ITEM 611.71012</u>	<u>12" GATE VALVE WITH BOX</u>	<u>EACH</u>
<u>ITEM 611.81</u>	<u>HYDRANTS</u>	<u>EACH</u>
<u>ITEM 611.814</u>	<u>REMOVE HYDRANTS</u>	<u>EACH</u>

SECTION 02514

HYDRANTS AND VALVES

PART 1 - GENERAL

1.01 WORK INCLUDED:

- A. This Section covers the furnishing and installation of all outside hydrants, valves and appurtenances as indicated on the drawings and as specified herein.
- B. Pipe and couplings shall be specified under the appropriate pipe sections.

1.02 RELATED WORK:

- A. Section 02080, DUCTILE IRON PIPE AND FITTINGS FOR WATER MAINS
- B. Section 02300, EARTHWORK
- C. Section 02516, CONNECTIONS TO EXISTING WATER MAINS

1.03 REFERENCES:

- A. The following standards form a part of this specification:

American Society for Testing and Materials (ASTM)

ASTM	A48	Gray Iron Castings
ASTM	A126	Gray Iron Castings for Valves, Flanges, and Pipe Fittings
ASTM	A536	Ductile Iron Castings
ASTM	B62	Composition Bronze or Ounce Metal Castings
ASTM	D429	Test Method for Rubber Property Adhesion to Rigid Substrate.

American Water Works Association (AWWA)

AWWA	C500	Metal Seated Gate Valves For Water Supply Service
AWWA	C502	Dry-Barrel Fire Hydrants
AWWA	C504	Rubber-Seated Butterfly Valves
AWWA	C509	Resilient-Seated Gate Valves for Water Supply Service
AWWA	C515	Reduced Wall, Resilient-Seated Gate Valves for Water Supply Service
AWWA	C550	Protective Interior Coatings for Valves and Hydrants

Federal Specifications (FS)

FS	TT-V-51F	Varnish, Asphalt
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1.04 SUBMITTALS: IN ACCORDANCE WITH REQUIREMENTS OF THE GENERAL SPECIFICATIONS, SUBMIT THE FOLLOWING:

- A. Shop drawings shall be submitted for the hydrants, valves and appurtenances indicating type of joint, and lining and coating, etc., in accordance with the specifications.
- B. Shop drawings shall consist of manufacturer's scale drawings, cuts or catalogs including descriptive literature and complete characteristics and specifications, and code requirements.
- C. Refer to Paragraph 3.01.A for Affidavit of Compliance required to be submitted.

PART 2 - PRODUCTS

2.01 GENERAL:

- A. Valves shall open **right (clockwise)**.
- B. Hydrants shall open **right (clockwise)**.

2.02 HYDRANTS:

- A. Hydrants shall conform to the requirements of AWWA C502. They shall be equipped with a 5-1/4-inch main valve and 6-inch mechanical joint inlet.
- B. Hydrants shall have one 4-1/2-inch pumper and two 2-1/2- inch hose connections. Threads shall be NST.

- C. Hydrant operating and nozzle cap nuts shall be of pentagonal shape and measure one and one half inches from flat to point. The height of the nut shall not be less than one inch.
- D. All internal operating parts including main valve, main valve seat, drain valve mechanism, operating rod, etc., shall be removable without excavating.
- E. Main valve seats shall be made of brass or bronze, and shall screw into a seat ring or sub-seat, which shall also be made of brass or bronze.
- F. Hydrants shall be traffic models with frangible bolts or breakaway couplings. Details of hydrant design shall meet the requirements of the Owner.
- G. For purposes of standardization, hydrants shall be Kennedy Model K-81A or as approved equal by the engineer.

2.03 HYDRANT PAINT:

- A. Hydrants shall be thoroughly cleaned.
- B. Hydrants shall be delivered with the Owner's standard color, they shall be given one matching field coat of an alkyd gloss enamel after installation and testing.
- C. Hydrant paint shall be as manufactured by Sherwin-Williams, Cleveland, OH; Tnemec Company, Inc., Kansas City, MO; or Minnesota Mining and Manufacturing Co. (3M), St. Paul, MN; or approval equal.
- D. Alkyd gloss enamel shall be 801 DTM by Sherwin-Williams, 2H-Tneme by Tnemec; or approved equal. Reflective paint shall be Scotchlite #7211 by 3M.

2.04 RESILIENT SEAT GATE VALVES:

- A. Resilient seat, wedge type gate valves shall be manufactured to meet all applicable requirements of AWWA C509 or AWWA C515. All valves shall be bubble-tight at 200 psi water working pressure, tested in both directions.
- B. Valve bodies shall be of cast or ductile iron and shall have non-rising threaded bronze stems acting through a bronze stem nut. Opening nuts shall be 2-inches square and shall open as specified above. All buried valves shall have mechanical joint ends.
- C. Valve wedges shall be of ductile iron with resilient seating surfaces permanently bonded to the wedges in strict accordance with ASTM D429 or attached to the face of the wedges with stainless steel screws. Each valve shall have a smooth, unobstructed water way free from sediment pockets.

- D. Valves shall have low friction, torque-reduction thrust bearings. All O-rings and gaskets shall be removable without taking the valves out of service.
- E. An NSF 61-approved epoxy coating, which is safe for potable water, shall be applied to exterior and interior valve surfaces.
- F. Valves for horizontal applications shall have Delrin wedge covers, and be specifically designed for horizontal installation.
- G. Resilient seat gate valves shall be as manufactured by Clow Valve Co., Oskaloosa, IA; Mueller Co., Decatur, IL; American Valve and Hydrant; Birmingham, AL; Waterous Co., S. St. Paul, MN; MH Valve, Anniston, AL; Kennedy Valve, Elmira, NY; or approved equal.
- H. Post indicating valve assemblies shall have a post and indicator as an integral part of the resilient seated gate valve assembly. The unit shall be provided with a detachable crank which OPENS the valve in a counterclockwise direction. Shafts shall be Type 304 stainless steel. Post indicators and valves shall be UL listed, FM approved. Post indicators and valves shall be as manufactured by Pratt, Clow or approved equal.

2.06 TAPPING SLEEVES AND VALVES:

- A. Tapping sleeves and valves shall consist of a split cast iron or ductile iron sleeve tee with mechanical joint ends on the main and a flange on the branch. Tapping-type gate valves shall have one flange and one mechanical joint end. The valves shall conform to the requirements hereinbefore specified for gate valves and shall be furnished with a 2-inch square operating nut. The Contractor shall be responsible for verifying the outside diameter of the pipe to be tapped.
- B. Oversized valves shall be provided as required to permit the use of full size cutters. Before backfilling, all exposed portions of bolts used to hold the two halves of the sleeve together shall be heavily coated with two coats of bituminous paint comparable to Inertol No. 66, Special Heavy. Sleeves shall be of cast iron furnished with rubber gaskets. Gaskets shall cover the entire area of flange surfaces.
- C. Tapping sleeves and valves shall be as manufactured by Clow Valve Co., Oskaloosa, IA; Mueller Co., Decatur, IL; American Valve and Hydrant, Birmingham, AL; MH Valve, Anniston, AL; Kennedy Valve, Elmira, NY; US Pipe, Chattanooga, TN; or approved equal.

PART 3 - EXECUTION

3.01 AFFIDAVIT OF COMPLIANCE

- A. The manufacturer shall furnish as part of the shop drawing submittal the Engineer with an affidavit stating that valve(s), hydrants conform to the applicable requirements of the

applicable AWWA Standard and the Engineer's specifications, and that all tests specified therein have been performed and all test requirements have been met and the test date.

- B. A copy of the Affidavit of Compliance shall be delivered to the construction site attached to each valve and/or hydrant furnished. The Affidavit shall be attached to the valve or hydrant inside a waterproof pouch.
- C. Any valve or hydrant received without the required affidavit shall be removed from the project and replaced at no expense to the Owner.
- D. All materials shall be certified "NEW". No reconditioned or repaired materials are permitted. Any reconditioned or repaired materials furnished or installed shall be removed and replaced with new materials at no expense to the Owner.

3.02 INSTALLATION:

- A. All valves shall be carefully installed and supported in their respective positions free from distortion and strain. Care shall be taken to prevent damage or injury to the valves and appurtenances during handling and installation.
- B. All material shall be carefully inspected for defects in workmanship and all debris and foreign material cleaned out of valve openings and seats. All mechanisms shall be operated to check for proper functioning, and all nuts and bolts checked for tightness.
- C. Valves and other equipment that do not operate easily or are otherwise defective shall be repaired or replaced at the Contractor's expense.
- D. Hydrants shall be set plumb. Earth fill shall be carefully tamped around the hydrants to a distance of 4 feet on all sides of the hydrant, or to the undisturbed trench face, if less than 4 feet. Hydrants and connecting pipe shall have at least the same depth of cover as the distributing main. Hydrants shall be set upon a layer of stone or a slab of concrete not less than 4-inches thick and 15-inches square. The side of the hydrant opposite the pipe connection shall be firmly wedged against the vertical face of the trench with a concrete thrust block, as indicated on the drawings.
- E. Broken stone shall be placed around the base of the hydrant at the location of the drain hole, and backfill around the hydrant shall be thoroughly compacted to the grade line in a satisfactory manner. Hydrants shall have the interiors cleaned of all foreign matter before installation, and shall be inspected in both the open and closed positions.
- F. The body of the hydrant shall be of sufficient length to allow the hydrant to be set at the proper elevation, as shown on the drawings. Extensions shall be furnished and installed at the Contractor's expense, when required for greater depths.
- F. Valve boxes shall be set plumb, flush with the ground or paved surface, and centered directly over the operating nut of the valves. Earth fill shall be carefully tamped around the

valve boxes to a distance of 4 feet on all sides of the boxes or to the undisturbed trench face, if less than 4 feet.

- G. Valves shall be operational and accessible at all times during construction and warranty period. The Contractor shall verify proper operation of all valves in the presence of the Engineer and/or Owner following completion of the project and prior to the acceptance of Substantial Completion.

END OF SECTION

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S U P P L E M E N T A L S P E C I F I C A T I O N

<u>ITEM 611.5011</u>	<u>1" COPPER WATER PIPE</u>	<u>FOOT</u>
<u>ITEM 611.5012</u>	<u>1-1/2" OR 2" COPPER PIPING</u>	<u>FOOT</u>
<u>ITEM 611.51008</u>	<u>1" CORPORATION STOP</u>	<u>EACH</u>
<u>ITEM 611.51009</u>	<u>1-1/2" OR 2" CORPORATION STOP</u>	<u>EACH</u>
<u>ITEM 611.5201</u>	<u>1" CURB STOP</u>	<u>EACH</u>
<u>ITEM 611.5202</u>	<u>1-1/2" OR 2" CURB STOP</u>	<u>EACH</u>

SECTION 02515

SERVICE CONNECTIONS

PART 1 - GENERAL

1.01 WORK INCLUDED:

This section covers the furnishing and installation of new water service connections and the repair, replacement, and/or transfer of existing water service connections as shown on the drawings, as specified herein, and as required by the Engineer.

1.02 RELATED WORK:

- A. Section 02080, DUCTILE IRON PIPE AND FITTINGS

1.03 REFERENCES:

- A. The following standards form a part of this specification:

American Society for Testing and Materials (ASTM)

ASTM	B88	Seamless Copper Water Tube
ASTM	B584	Copper Alloy Sand Castings for General Applications
ASTM	D2737	Polyethylene (PE) Plastic Tubing

American Water Works Association (AWWA)

AWWA	C800	Water-Service Line Fittings
AWWA	C651	Disinfecting Water Mains
AWWA	C901	Polyethylene Pressure Pipe & Tubing, 1/2-inch through 3-inch for Water Service

Federal Specifications (FS)

FS WW-T-799C Tube, Copper, Seamless

1.04 SUBMITTALS: IN ACCORDANCE WITH REQUIREMENTS OF THE GENERAL SPECIFICATIONS, SUBMIT THE FOLLOWING:

Six sets of manufacturer's literature of the materials of this section for review.

PART 2 - PRODUCTS

2.01 SERVICE PIPING:

- A. Piping for buried copper water services shall be continuous Type K annealed seamless copper water tubing conforming to ASTM B88 Standard Specification for Seamless Copper Water Tube or U.S. Federal Specification WW-T-799C for Tube, Copper, Seamless. Tubing shall be 1-inch diameter unless otherwise indicated.
- B. Piping for buried polyethylene PE 4710 water services shall conform to ASTM D2737 and be as specified in AWWA C901. Polyethylene piping shall be designed for 200 psi minimum service and tested at 330 psi for 1,000 hours or greater. The tubing shall be copper O.D. size and be suitable for use with standard industry brass compression fittings without special adapters. Stainless steel insert stiffeners shall be provided for use with all compression joint connections.
- C. Couplings, if required, for existing to new service pipe connections shall have compression connections on the inlet and compression connections on the outlet. Couplings shall be made of brass as specified in AWWA C800. All brass components that come into contact with potable water shall be made from either CDA/UNS Brass Alloys C89520 or C89833 and shall not contain more than twenty five hundredths of one percent (0.25% or less) total lead content by weight. The lead leach limit of the coupling shall be 5 parts per billion (ppb). Couplings shall be NSF/ANSI 61 Annex F and Annex G and NSF/ANSI 372 certified by an ANSI accredited organization and shall be stamped or embossed with a mark or name indicating that the product is manufactured from a low-lead alloy, as specified above.

2.02 CORPORATION STOPS:

- A. Corporations stops shall be made of brass as specified in AWWA C800. All brass components that come into contact with potable water shall be made from either CDA/UNS Brass Alloys C89520 or C89833 and shall not contain more than twenty five hundredths of one percent (0.25% or less) total lead content by weight. The lead leach limit of the corporation stops shall be 5 ppb. Corporation stops shall be NSF/ANSI 61 Annex F and Annex G and NSF/ANSI 372 certified by an ANSI accredited organization and shall be stamped or embossed with a mark or name indicating that the product is manufactured from a low-lead alloy, as specified above.
- B. Corporation stops shall be approved for use with plastic water service pipe. The inlet shall have AWWA taper thread (CC) connections and the outlet shall have compression connections.

- C. Service clamps shall be installed with all corporation stops 2-inches and larger in size and with all corporation stops installed in PVC pipe. Clamps shall be all bronze, ductile iron or stainless steel, single or double strap, AWWA taper thread (CC) with O-ring seal.
- D. Corporation stops shall be by Ford Meter Box Co., Inc., Wabash, IN; Red Hed Manufacturing Co., Lincoln, RI; Mueller Co., Decatur, IL; or approved equal.

2.03 CURB STOPS:

- A. Curb stops shall be of brass as specified in AWWA C800. All brass components that come into contact with potable water shall be made from either CDA/UNS Brass Alloys C89520 or C89833 and shall not contain more than twenty five hundredths of one percent (0.25% or less) total lead content by weight. The lead leach limit of the curb stops shall be 5 ppb. Curb stops shall be NSF/ANSI 61 Annex F and Annex G and NSF/ANSI 372 certified by an ANSI accredited organization and shall be stamped or embossed with a mark or name indicating that the product is manufactured from a low-lead alloy, as specified above.
- B. Curb stops shall be ball style and the inlet and the outlet shall have compression connections.
- C. Curb stops shall be by A.Y McDonald Mfg. Co.; Mueller Co.; or approved equal.

2.04 CURB BOXES:

- A. The cast iron box shall be the sliding Buffalo type with Arch pattern base. Minimum inside diameter of the upper section shall be 1-1/2-inch for 3/4-inch and 1-inch curb stops and 2-inch for 1-1/2-inch and 2-inch curb stops. Curb box lid shall be Erie pattern.

PART 3 - EXECUTION

3.01 INSTALLATION:

- A. Where new water mains are being installed and existing water services are to be transferred to the new main, the Contractor shall discontinue the existing water services by shutting down the corporation stop at the old water main, unless specifically otherwise required by the Engineer. The Contractor shall take special care to minimize the interruption of existing water service.
- B. The Contractor shall tap a new corporation stop, cut the existing service piping and connect the new service piping to the old service piping using an approved coupling at a point between the main and the existing curb stop and box.
- C. Where transfers are to be made and the existing curb stop and box cannot be utilized or a new curb stop and box is required, the Contractor shall connect the new service piping

to the existing service piping using an approved coupling approximately 12-inches from the curb stop on the building side of the stop.

- D. Where transfers are being made and the existing service is of lead, galvanized steel, or iron, the service shall be replaced to the curb stop and box unless otherwise required. If required, the curb stop and box shall be replaced as specified above.
- E. Curb stops and boxes shall be set plumb, flush with the ground or paved surface, and centered with the box located directly over the stop. The box shall be set on a concrete block or flat stone. Earth fill shall be carefully tamped around the boxes to a distance of 4 feet on all sides of the box or to the undisturbed face of the trench, if less than 4 feet.
- F. Curb stops shall be operational and accessible at all times during construction and warranty period. The Contractor shall verify the proper operation of all curb stops in the presence of the Engineer and/or Owner following completion of the project and prior to the acceptance of substantial completion.
- G. All services shall be installed at 5 feet 0 inches of cover unless otherwise required by the Engineer.
- H. Service connections shall be tested and disinfected in accordance with AWWA standards.

END OF SECTION

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**THIS SECTION IS INCIDENTAL TO THE WORK AND SHALL NOT BE MEASURED
SEPARATELY FOR PAYMENT**

SECTION 02516

CONNECTIONS TO EXISTING WATER MAINS

PART 1 - GENERAL

1.01 WORK INCLUDED:

- A. This section covers connections to existing water mains, complete.
- B. The Contractor shall furnish all pipe, fittings, valves, tapping machines, if required, and appurtenances. The Contractor shall do all excavation and backfill as required.

1.02 RELATED WORK:

- A. Section 02080, DUCTILE IRON PIPE AND FITTINGS.
- B. Section 02511, TEMPORARY WATER SERVICE.
- C. Section 02514, HYDRANTS AND VALVES.
- D. Section 03302, FIELD CONCRETE.

PART 2 - PRODUCTS: NOT APPLICABLE

PART 3 - EXECUTION

3.01 CONTRACTOR OPERATIONS:

- A. The Contractor shall make all connections to the existing mains as indicated on the drawings and as herein specified.
- B. The Contractor shall develop a program for the construction and putting into service of the new work subject to the approval of the Engineer. All work involving cutting into and connecting to the existing work shall be planned so as to interfere with operation of the existing facilities for the shortest possible time and when the demands on the system best permit such interference even to the extent of working outside of normal working hours to meet these requirements.
- C. The Contractor shall have all possible preparatory work done prior to making the connection and shall provide all labor, tools, material, and equipment required to do the work in one continuous operation.

- D. The Contractor shall have no claim for additional compensation, by reason of delay or inconvenience, for adapting his operations to the needs of the Owner's water supply. No damages shall be claimed by the Contractor for delays in dewatering pipelines nor shall any damages be claimed because of water leaking through closed valves after dewatering is completed.
- E. Under no circumstances shall any customers be without water for a period of more than 4 hours without prior approval of the Owner. Should it appear that any customer will be without water for more than 4 hours, the Contractor shall install temporary water service as specified in Section 02511, TEMPORARY WATER SERVICE where required by the Engineer.
- F. Existing pipeline that is not to be abandoned but is damaged by the Contractor during the work shall be replaced by him at his own expense in a manner approved by the Engineer.

3.02 TAPPING CONNECTION TO EXISTING MAINS:

- A. Tapping connections to the existing mains, where indicated on the drawings, shall be made with service pressure in the main, using tapping sleeves and valves and a suitable tapping machine.
- B. Other connections to existing mains shall be made with the main out of service, unless otherwise required by the Engineer. Such connections will not require tapping sleeves and valves but connections as indicated on the drawings.

END OF SECTION

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**THIS SECTION IS INCIDENTAL TO THE WORK AND SHALL NOT BE MEASURED
SEPARATELY FOR PAYMENT**

SECTION 02518

TRACER TAPE

PART 1 - GENERAL

1.01 WORK INCLUDED:

This section covers the furnishing, handling and installation of tracer tape, as called for on the drawings.

1.02 SUBMITTALS: IN ACCORDANCE WITH REQUIREMENTS OF GENERAL SPECIFICATIONS, SUBMIT THE FOLLOWING:

- A. Six sets of manufacturer's literature on the materials, colors and printing specified herein, shall be submitted to the Engineer for review.
- B. Tape samples shall also be submitted to the Engineer for review.

PART 2 - PRODUCTS

2.01 ACCEPTABLE MANUFACTURERS:

Tracer tape shall be by Reef Industries, Houston, TX; Empire Level, Mukwonago, WI; Pro-Line Safety Products Co., W. Chicago, IL; or approved equal.

2.02 TRACER TAPE:

- A. Tracer tape shall be at least 3-inches wide.
- B. Tracer tape for non-ferrous pipe or conduit shall be constructed of a metallic core bonded to plastic layers. The metallic tracer tape shall be a minimum 5-mil thick and must be locatable at a depth of 18 inches with ordinary pipe locaters.
- C. Tracer tape for ferrous pipe or conduit shall consist of multiple bonded plastic layers. The non-metallic tracer tape shall elongate at least 500% before breaking.
- D. The tape shall bear the wording: "BURIED DRAIN LINE BELOW" (with "DRAIN" replaced by "WATER", "SEWER", "ELECTRICAL", "GAS", "TELEPHONE", or "CHEMICAL" as appropriate), continuously repeated every 30 inches to identify the pipe.
- E. Tape colors shall be as follows, as recommended by the American Public Works Association (APWA):

Electric	Red
Gas & Oil	Yellow
Communications	Orange
Water	Blue
Sewer & Drain	Green
Chemical	Red (not APWA)

PART 3 - EXECUTION

3.01 INSTALLATION:

- A. Tracer tape shall be installed directly above the pipe or conduit it is to identify, approximately 12 inches below the proposed ground surface.
- B. The Contractor shall follow the manufacturer's recommendations for installation of the tape, as approved by the Engineer.

END OF SECTION

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S U P P L E M E N T A L S P E C I F I C A T I O N

<u>ITEM 612.81442a</u>	<u>INTERIOR PLUMBING MODIFICATIONS</u>	<u>ALLOWANCE</u>
<u>ITEM 612.81442b</u>	<u>CORING FOR INTERIOR PLUMBING MODIFICATIONS</u>	<u>EACH</u>
<u>ITEM 612.82606</u>	<u>6" PVC SEWER SERVICE CLEANOUT</u>	<u>EACH</u>
<u>ITEM 613.010</u>	<u>6" DROP CONNECTION</u>	<u>VERTICAL FEET</u>
<u>ITEM 613.011</u>	<u>8" DROP CONNECTION</u>	<u>VERTICAL FEET</u>

SECTION 02530

BUILDING CONNECTIONS AND
DROP CONNECTIONS

PART 1 - GENERAL

1.01 WORK INCLUDED:

- A. This Section covers furnishing of all materials and labor to construct building sewer connections and drop connections as indicated on the Drawings, and as herein specified.
- B. Final location of building connections shall be determined in the field by the Engineer.

1.02 RELATED WORK:

- A. Section 01331, DOCUMENTATION
- B. Section 01535, TEMPORARY BYPASS PUMPING SYSTEM
- C. Section 01575, HANDLING EXISTING FLOWS
- D. Section 02085, POLYVINYL CHLORIDE GRAVITY PIPE AND FITTINGS
- F. Section 02300, EARTHWORK
- G. Section 02324, ROCK EXCAVATION AND DISPOSAL
- H. Section 02518, TRACER TAPE
- I. Section 02531, SEWER CHIMNEYS
- J. Section 02533, CONNECTIONS TO EXISTING STRUCTURES
- K. Section 02631, PRECAST MANHOLES
- L. Section 03302, FIELD CONCRETE

1.03 SUBMITTALS: IN ACCORDANCE WITH REQUIREMENTS OF GENERAL SPECIFICATIONS, SUBMIT THE FOLLOWING:

- A. Six sets of shop drawings and manufacturers literature of the materials of this section shall be submitted to the Engineer for review.
- B. Shop drawings of any special connections, including the proposed adapters for service connections, shall be submitted to the Engineer.

PART 2 - PRODUCTS

2.01 MATERIALS:

- A. Pipe and fittings for drop connections and for gravity building connections shall be as specified under Section 02085 POLYVINYL CHLORIDE GRAVITY PIPE AND FITTINGS. Adaptors shall be as recommended by the pipe manufacturer.
- B. Concrete for encasement shall be as specified in Section 03302 FIELD CONCRETE.
- C. Cleanouts are required at each building connection.

PART 3 - EXECUTION

3.01 INSTALLATION:

- A. Building Connections
 - 1. Building connections shall be installed using the same construction and pipe joining techniques as specified in Section 02085 POLYVINYL CHLORIDE GRAVITY PIPE AND FITTINGS.
 - 2. In general, connections shall be carried only to the property line. The end of the pipes shall be closed with PVC stoppers jointed in place to ensure against infiltration into the sewer line or re-connected to existing.
 - 3. There are a number of building connections that will be connected at the building foundation.
- B. Existing Active Building Connection Replacement
 - 1. The Contractor shall affix a written notice to the door of each home that has sewer service to be disconnected and reinstated 48-hours prior to disconnection of the service and again the day of disconnection. A completion notice shall also be distributed following reconnection of the sewer service.

2. The written notice must include an approximation of the time that the service will be bypass pumped and the notice be approved by the Engineer prior to its distribution. The printing and distribution of notices to the homeowners by the Contractor shall be considered incidental to construction.
3. Flow from the existing sewer services shall be bypass pumped as specified in Section 01575 HANDLING EXISTING FLOWS and in Section 01535 TEMPORARY BYPASS PUMPING SYSTEM.
4. Once the new mainline is available for connection, the existing service pipeline shall be removed at or near the property line and replaced as described below.
5. Building connections shall be installed using the same construction and pipe joining techniques as specified in Section 02085 POLYVINYL CHLORIDE GRAVITY PIPE AND FITTINGS.
6. In general, new connections shall be carried to the existing building connection at or near the property line. Final connection between the new and existing piping shall be made. If no existing service is present, the end of the new connection pipe shall be closed with PVC stoppers jointed in place to ensure against infiltration into the sewer line. There are a number of service connections that will be connected at the building foundations.
7. Where building connection changes line and grade, a cleanout shall be installed as required by the Engineer.

C. INTERIOR PLUMBING MODIFICATIONS:

1. The City's subcontractor shall supply all material, labor, tools, and equipment to modify the existing plumbing to accommodate the new relocation of sewer service. The subcontractor shall furnish, install, cut, join and test the new interior plumbing modification piping. All abandoned pipes shall be disconnected and capped.
2. All work shall be performed by a New Hampshire licensed plumber and conform to state plumbing requirements.
3. The Contractor shall notify the home owner in writing 48 hours in advance.
4. City subcontractor shall coordinate with City plumbing inspector for all inspections.

D. CORING FOR INTERIOR PLUMBING MODIFICATION:

1. The contractor shall coordinate all work with the plumbing subcontractor for coring locations.

2. Coring and patching shall be done by the contractor to accommodate the new sewer service connection.
3. The contractor shall notify the home owner in writing 48 hours in advance.

E. DROP CONNECTIONS:

1. When the invert of a pipe entering a manhole is 24 inches or more above the invert of the lowest pipe leaving the manhole, it shall be connected to the manhole with an inside drop section.
2. The drop pipe shall be the same diameter, material, and class as the sewer pipe entering the manhole, unless otherwise noted in the drawings.

F. TESTING:

1. Testing of building connection shall be in accordance with section 02085 POLYVINYL CHLORIDE GRAVITY PIPE AND FITTINGS, and shall be tested at new cleanout located at property line.

END OF SECTION

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S U P P L E M E N T A L S P E C I F I C A T I O N**ITEM 612.81445****6" DI SEWER CHIMNEYS****VERTICAL FEET**

SECTION 02531

SEWER CHIMNEYS

PART 1 - GENERAL

1.01 WORK INCLUDED:

This Section covers furnishing all equipment, materials and labor to provide and install sewer chimneys as shown on the Drawings and described herein. Final locations of the chimneys shall be as determined in the field by the Engineer.

1.02 RELATED WORK:

- A. Section 02085, POLYVINYL CHLORIDE GRAVITY PIPE AND FITTINGS
- B. Section 02089, DUCTILE IRON PIPE AND FITTINGS FOR SEWERS
- C. Section 02300, EARTHWORK
- D. Section 02530, BUILDING CONNECTIONS AND DROP CONNECTIONS

1.03 SYSTEM DESCRIPTION:

The sewer chimney shall be designed and installed such that it provides a direct positive connection from the mainline pipe to the building connection, will withstand the required pressure tests after backfilling, and will not be adversely affected by local settlement after completion and acceptance by the Owner. Ductile iron tees shall be used in the mainline at each location of the chimney as indicated in the detailed drawings.

1.04 REFERENCES:

- A. The following standards form a part of these specifications, as referenced:

American Society for Testing & Materials (ASTM)

ASTM	D1557	Test for Moisture-Density Relations of Soils and Soil Aggregate Mixtures Using 10 lb. Rammer and 18-inch Drop.
ASTM	D3034	Specification for Type PSM Poly (Vinyl-Chloride) (PVC) Sewer Pipe and Fittings.

American Water Works Association (AWWA)

AWWA	C900	Polyvinyl Chloride (PVC) Pressure Pipe, 4-inch through 12 inch, for Water Distribution.
AWWA	C110	Ductile -Iron and Gray-Iron Fittings
AWWA	C151	Ductile-Iron Pipe

1.05 SUBMITTALS: IN ACCORDANCE WITH REQUIREMENTS OF GENERAL SPECIFICATIONS, SUBMIT THE FOLLOWING:

Six sets of shop drawings and manufacturers literature of the materials of this section shall be submitted to the Engineer for review.

PART 2 - PRODUCT

2.01 CHIMNEYS:

- A. Chimneys shall consist of a minimum 6-inch DI pipe extending vertically from the mainline pipe to the local building connection elevation. The pipe and fittings shall be Class 51 or heavier. A wye shall be placed at the top of the riser and a DI plug cleanout shall be provided at the top of the fitting for future cleaning of the chimney.
- B. The riser pipe shall be protected during installation with a 18 inch diameter ABS ribbed pipe section or equivalent encasement and filled with crushed stone, as shown on the Drawings or as approved by the Engineer, to prevent damage to the pipe or movement of the pipe during the backfilling operation. The encasement shall be supported independently of the mainline pipe at the base. Refer to Measurement and Payment Section for the minimum height of chimney considered for payment.
- C. Building connection piping from the chimney to the property line shall be in accordance with Section, 02530, BUILDING CONNECTIONS AND DROP CONNECTIONS.

PART 3 - EXECUTION

3.01 INSTALLATION:

- A. Unless otherwise indicated, at locations designated by the Engineer to receive sewer chimneys, crushed stone shall be placed and compacted in maximum 6-inch lifts from the bottom of the trench to the top of the mainline pipe.
- B. The Contractor shall install the sewer chimney piping and then backfill carefully to avoid dislocating or damaging the chimney piping.
- C. The completed chimney shall be tested with and subject to the same test requirements as the sewer main to which it is attached.

END OF SECTION

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S U P P L E M E N T A L S P E C I F I C A T I O N**ITEM 613.012****CONNECTION TO EXISTING STRUCTURES****EACH**

SECTION 02533

CONNECTIONS TO EXISTING STRUCTURES

PART 1 - GENERAL

1.01 WORK INCLUDED:

The Contractor shall furnish materials, tools, labor and equipment to cut suitable openings into the existing sewer manholes, make connections to existing sewers and all other work necessary to direct the existing sewage flow as indicated on the drawings and as herein specified.

1.02 RELATED WORK:

Section 02631, PRECAST MANHOLES AND CATCH BASINS

1.03 SUBMITTALS: IN ACCORDANCE WITH REQUIREMENTS OF THE GENERAL SPECIFICATIONS, SUBMIT THE FOLLOWING:

Prior to start of work, submit details of the methods proposed for doing the work and for maintaining the sewage flow as herein specified.

PART 2 - PRODUCTS - NOT APPLICABLE**PART 3 - EXECUTION**

3.01 INSTALLATION:

- A. The Contractor shall provide temporary plugs or provide other suitable means for maintaining the new sewer free of sewage flow until such time as it can be inspected and tested for leakage.
- B. Connections to the new sewer shall be made when required by the Engineer and only after the new pipeline has been inspected and has successfully passed the leakage test.
- C. The Contractor shall modify each existing structure for installation of the necessary piping, but in so doing shall confine the cutting to the smallest amount possible consistent with the work to be done.
- D. All new piping connected to existing structures shall be cored and booted to make a watertight seal in a manner satisfactory to the Engineer.

- E. All work shall be done with the proper tools and by careful workmen competent to do work.
- F. The Contractor shall cut, reshape and fill the existing manhole tables and plug existing outlets as indicated on the drawings and as required by the Engineer, to accommodate the new connections. Reshaped manhole invert channels shall be smoothly shaped to permit the flow of sewage. Manhole invert channels shall be reconstructed as specified under Section 02631, PRECAST MANHOLES AND CATCH BASINS.

END OF SECTION

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S U P P L E M E N T A L S P E C I F I C A T I O N**ITEM 613.016****SEWER AND DRAIN RECONSTRUCTION****EACH**

SECTION 02534

RECONSTRUCTION OF EXISTING SEWERS AND DRAINS

PART 1 - GENERAL

1.01 WORK INCLUDED:

This Section covers work required to reconstruct affected piping where proposed water mains cross existing street sewers, house sewer connections (referred to as sewers) and drains.

PART 2 - PRODUCTS

2.01 REPLACEMENT PIPE FOR SEWERS AND DRAINS:

- A. The Contractor shall furnish all pipe, couplings, jointing materials, labor, tools and equipment necessary to reconstruct the sections of existing sewers or drains removed.
- B. The size of replacement pipe shall closely approximate the size of existing section to be replaced, allowing a watertight joint to be made while maintaining the existing invert and slope.

PART 3 - EXECUTION

3.01 INSTALLATION:

- A. Unless field conditions or the plans require otherwise, water mains shall pass over sewers and drains, except where, in the opinion of the Engineer, suitable cover and insulation cannot be provided. In such cases water mains shall pass under sewers and drains.
- B. The vertical clear distance between water mains and sewers or drains will be no less than 18-inches, unless otherwise approved by the Engineer, or specifically indicated on the drawings. In locations where water mains shall pass over or under existing sewers or drains, the Contractor shall plan the laying of the mains such that the joints of a section of water main at least 18 feet long are equally distant from the sewer or drain.
- C. Where proposed water mains pass under existing vitrified clay sewers, and damage to the sewer line cannot be prevented, and if approved by the Engineer, the sewer line shall be reconstructed using a minimum 9-foot section of ductile iron pipe or PVC sewer pipe. The pipe shall be installed such that joints of the reconstructed sewer are at a minimum distance of 4.5 feet on either side of the proposed water main.

- D. Drains which are shown on the plans or located in the field and are damaged by the Contractor shall be replaced with identical materials at the Contractor's expense unless the Engineer agrees in writing that the Contractor was not at fault.
- E. Joints between existing pipe and replacement pipe shall be made with suitable watertight sleeves or couplings.
- F. Joints shall not be backfilled until approved for watertightness by the Engineer.
- G. Watertightness shall be determined by allowing water to flow through the repaired pipeline (street sewers, drains and house connections). If there is any visual leakage under these conditions, the pipe will not be accepted as watertight and shall be repaired at the Contractor's expense.

3.02 EXISTING SEWERS:

The composition, diameter, flow direction, approximate locations and depths to inverts of street sewers are indicated on the drawings, if known.

3.03 EXISTING DRAINS:

- A. Existing drains are assumed to be of reinforced concrete pipe, unless otherwise noted on the drawings.
- B. The diameter, flow direction and approximate locations and depths to inverts of drains are indicated on the drawings, if known.

3.04 DIVERSION OF SEWAGE FLOWS:

- A. During construction of the water mains under existing street sewers and replacement of required sections of street sewers, sewage flows shall be diverted away from said street sewer. This may be accomplished by plugging both ends of the street sewer at the nearest manhole and pumping the sewage from the upstream manhole to the next downstream manhole.
- B. The Contractor shall furnish all labor, materials, tools and equipment necessary to divert sewage flows from such street sewers.
- C. During construction of water mains under house sewer connections, and replacement of required section of house sewer connections, no sewage flow shall be allowed in the house sewer connections.

END OF SECTION

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S U P P L E M E N T A L S P E C I F I C A T I O N**ITEM 604.3141 SEWER MANHOLE 4' DIA INCL. FRAME & COVER EACH**

SECTION 02630

BUILD MANHOLE INVERT

PART 1 - GENERAL

1.01 WORK INCLUDED:

This Section covers all manholes complete, including, but not limited to, bases, mortar, and inverts.

1.02 RELATED WORK:

- A. Section 01330, SUBMITTALS
- B. Section 01331, DOCUMENTATION
- C. Section 01575, HANDLING EXISTING FLOWS

1.03 SYSTEM DESCRIPTION:

- A. Invert channel shall be formed of brick and mortar upon the base.

1.04 REFERENCES:

- A. The following standards form a part of this specification as referenced:

American Society for Testing and Materials (ASTM)

ASTM C32	Sewer and Manhole Brick
ASTM C144	Aggregate for Masonry Mortar
ASTM C207	Hydrated Lime for Masonry Purposes
ASTM C923	Specification for Resilient Connectors Between Reinforced Concrete Manhole Structures and Pipes

ASTM C1244 Standard Test Method for Concrete Sewer Manholes by
the Negative Air Pressure (Vacuum) Test.

1.05 SUBMITTALS: IN ACCORDANCE WITH REQUIREMENTS OF GENERAL SPECIFICATIONS, SUBMIT THE FOLLOWING:

- A. Six sets of manufacturer literature of the materials of this section shall be submitted to the Engineer for review.
- B. Tests reports as required shall be submitted to the Engineer.

PART 2 – INVERT MATERIALS

- 2.01 The invert shall be formed of brick and mortar, as specified in this specification section.
- 2.02 BRICK MATERIALS:
- A. Brick shall be sound, hard, and uniformly burned brick, regular and uniform in shape and size, of compact texture, and satisfactory to the Engineer. Bricks shall comply with ASTM C32, for Grade SS, hard brick, except that the mean of five tests for absorption shall not exceed 8 percent by weight.
 - B. Rejected brick shall be immediately removed from the work and brick satisfactory to the Engineer substituted.
 - C. Mortar shall be composed of portland cement, hydrated lime, and sand in which the volume of sand shall not exceed three times the sum of the volumes of cement and lime. The proportions of cement and lime shall be as required and may vary from 1:1/4 for dense hard-burned brick to 1:3/4 for softer brick. In general, mortar for Grade SS Brick shall be mixed in the volume proportions of 1:1/2:4-1/2; portland cement to hydrated lime to sand.
 - D. Cement shall be Type II portland cement as specified for concrete masonry.
 - E. Hydrated lime shall be Type S conforming to ASTM C207.
 - F. The sand shall comply with ASTM C144 specifications for "Fine Aggregate," except that all of the sand shall pass a No. 8 sieve.

PART 3 - EXECUTION

- 3.01 INSTALLATION:
- A. INVERT BRICK WORK:
 1. All debris shall be removed from the bottom of the manhole before the invert is constructed.
 2. Bricks shall be moistened by suitable means, as required, until they are neither so dry as to absorb water from the mortar nor so wet as to be slippery when laid.

3. Each brick shall be laid as a header in a full bed and joint of mortar without requiring subsequent grouting, flushing or filling, and shall be thoroughly bonded as required.
4. The brick inverts shall conform accurately to the size of the adjoining pipes. Side inverts shall be curved and main inverts (where direction changes) shall be laid out in smooth curves of the longest possible radius which is tangent to the centerlines of adjoining pipe.

3.02 CLEANING:

All manholes shall be thoroughly cleaned of all silt, debris and foreign matter of any kind, prior to final inspection.

END OF SECTION

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Inverts.doc

S U P P L E M E N T A L S P E C I F I C A T I O N

<u>ITEM 604.3141</u>	<u>SEWER MANHOLE 4' DIA INCL. FRAME & COVER</u>	<u>EACH</u>
<u>ITEM 604.3142</u>	<u>SEWER CONC. MH WALLS & CONE 4' DIA.</u>	<u>VERTICAL FEET</u>
<u>ITEM 613.61a</u>	<u>REPLACE SEWER MANHOLE COVER & FRAMES (LOCKING) UNIT</u>	

SECTION 02631

PRECAST MANHOLES

PART 1 - GENERAL

1.01 WORK INCLUDED:

This Section covers all precast manholes complete, including, but not limited to, bases, walls, cones, mortar, inverts, frames and covers.

1.02 RELATED WORK:

- A. Section 02300, EARTHWORK
- B. Section 03302, FIELD CONCRETE

1.03 SYSTEM DESCRIPTION:

- A. Precast sections shall conform in shape, size, dimensions, materials, and other respects to the details indicated on the drawings or as required by the Engineer.
- B. All manholes shall have concrete bases. Concrete bases shall be precast unless otherwise specified. Invert channels shall be formed of brick and mortar upon the base.
- C. Riser and cone sections shall be precast concrete.

1.04 REFERENCES:

- A. The following standards form a part of this specification as referenced:

American Society for Testing and Materials (ASTM)

ASTM A48	Gray Iron Castings
ASTM C32	Sewer and Manhole Brick
ASTM C144	Aggregate for Masonry Mortar
ASTM C207	Hydrated Lime for Masonry Purposes

ASTM C478	Precast Reinforced Concrete Manhole Sections
ASTM C923	Specification for Resilient Connectors Between Reinforced Concrete Manhole Structures and Pipes
ASTM C1244	Standard Test Method for Concrete Sewer Manholes by the Negative Air Pressure (Vacuum) Test.

American Association of State Highway and Transportation Officials (AASHTO)

AASHTO M198	Joints for Circular Concrete Sewer and Culvert Pipe Using Flexible Watertight Gaskets
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Occupational Safety and Health Administration

OSHA 29 CFR 1910.27	Fall Prevention Protection
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1.05 SUBMITTALS: IN ACCORDANCE WITH REQUIREMENTS OF GENERAL SPECIFICATIONS, SUBMIT THE FOLLOWING:

- A. Six sets of manufacturer literature of the materials of this section shall be submitted to the Engineer for review.
- B. Test reports as required shall be submitted to the Engineer.

PART 2 - PRODUCTS

2.01 PRECAST CONCRETE SECTIONS:

- A. All precast concrete sections shall conform to ASTM C478 with the following exceptions and additional requirements:
 - 1. The wall thickness of precast sections shall be as designated on the drawings, meeting the following minimum requirements:

<u>Section Diameter (Inches)</u>	<u>Minimum Wall Thickness (Inches)</u>
48	5
60	6
72	7
84	8

- 2. Type II cement shall be used except as otherwise approved.

3. Sections shall be steam cured and shall not be shipped until at least five days after having been cast.
 4. Minimum compressive strength of concrete shall be 4000 psi at 28 days.
 5. No more than two lift holes may be cast or drilled in each section.
 6. The date of manufacture and the name or trademark of the manufacturer shall be clearly marked on the inside of each precast section.
 7. Acceptance of the sections will be on the basis of material tests and inspection of the completed product.
 8. Circumferential steel reinforcement in walls and bases shall be a minimum of 0.12 sq. in./lin. ft. for 4-foot diameter sections and 0.15 sq. in./lin. ft. for 5- and 6-foot diameter sections. Reinforcing shall extend into tongue and groove.
- B. Conical reducing sections shall have a wall thickness not less than 5-inches at the bottom and wall thickness of 8-inches at the top. Conical sections shall taper from a minimum of 48-inches diameter to 24 or 30-inches diameter at the top, as shown on the drawings.
- C. Except where insufficient depth of cover dictates the use of a shorter base, bases shall be a minimum of 4 feet in height.
- D. Slab top sections and flat riser sections (Grade Rings) shall conform to the contract drawings, with particular attention focused upon the reinforcing steel and be designed to meet or exceed an HS-20 Loading requirement.
- E. The tops of the bases shall be suitably shaped by means of accurate ring forms to receive the riser sections.
- F. Precast sections shall be manufactured to contain wall openings of the minimum size to receive the ends of the pipes, such openings being accurately set to conform with line and grade of the sewer or drain. Subsequent cutting or tampering in the field, for the purpose of creating new openings or altering existing openings, will not be permitted except as required by the Engineer.
- G. The exterior surfaces of all precast manhole bases, walls, and cones shall be given a minimum of one shop coat of bituminous damp-proofing.
- H. The Engineer reserves the right to reject any unsatisfactory precast section and the rejected unit shall be tagged and removed from the job site immediately.
- I. The Engineer may also require the testing of concrete sections as outlined under Physical Requirements in ASTM C478 with the Contractor bearing all testing costs.

2.02 BRICK MATERIALS:

- A. Brick shall be sound, hard, and uniformly burned brick, regular and uniform in shape and size, of compact texture, and satisfactory to the Engineer. Bricks shall comply with ASTM C32, for Grade SS, hard brick, except that the mean of five tests for absorption shall not exceed 8 percent by weight.
- B. Rejected brick shall be immediately removed from the work and brick satisfactory to the Engineer substituted.
- C. Mortar shall be composed of Portland cement, hydrated lime, and sand in which the volume of sand shall not exceed three times the sum of the volumes of cement and lime. The proportions of cement and lime shall be as required by the Engineer and may vary from 1:1/4 for dense hard-burned brick to 1:3/4 for softer brick. In general, mortar for Grade SS Brick shall be mixed in the volume proportions of 1:1/2:4-1/2; Portland cement to hydrated lime to sand.
- D. Cement shall be Type II Portland cement as specified for concrete masonry.
- E. Hydrated lime shall be Type S conforming to ASTM C207.
- F. The sand shall comply with ASTM C33 specifications for "Fine Aggregate," except that all of the sand shall pass a No. 8 sieve.

2.03 FRAMES, GRATES AND COVERS:

- A. Castings shall be of good quality, strong, tough, even-grained cast iron, smooth, free from scale, lumps, blisters, sandholes, and defects of every nature which would render them unfit for the service for which they are intended. Contact surfaces of covers and frame seats shall be machined to prevent rocking of covers.
- B. All castings shall be thoroughly cleaned and may be subject to a careful hammer inspection at the Engineer's discretion.
- C. Castings shall be ASTM A48 Class 30B or better.
- D. Frames and covers shall be **supplied by the Department of Public Works. The Contractor shall pickup the frames and covers at the Department of Public Works.** The manholes have the City's seal on them and are hinged type manufactured by ej Product Number 41421053L01.

2.04 SEWER MANHOLE ACCESSORIES:

- A. Gasket materials shall be top grade (100% solids, vulcanized) butyl rubber and shall meet or exceed AASHTO M-198.

- B. Couplings at the manhole-pipe interface shall be made with a rubber seal system (with or without stainless steel straps) meeting the requirements of ASTM C923 and recommended for this type of connection.
- C. Stubs installed as specified and indicated on the drawings shall be short pieces of the same class pipe as that entering the manhole and shall have either stoppers or end caps as shown on the drawings. Stoppers or end caps shall be especially designed for that application.

PART 3 - EXECUTION

3.01 INSTALLATION:

A. PRECAST SECTIONS:

1. Precast bases shall be supported on a compacted level foundation of crushed stone, as specified in Section 02300 EARTHWORK, at least 6-inches thick, but shall vary to the depth necessary to reach sound undisturbed earth.
2. Precast reinforced concrete sections shall be set vertical and with sections in true alignment.
3. Double rows of butyl rubber joint sealant shall be installed between each concrete section.
4. All holes used for handling the sections and section joints shall be thoroughly plugged with hydraulic cement. Cement shall be mixed slightly damp to the touch (just short of "balling"), hammered into the holes until it is dense and an excess of paste appears on the surface, and then finished smooth and flush with the adjoining surfaces.

B. BRICK WORK:

1. Bricks shall be moistened by suitable means, as required, until they are neither so dry as to absorb water from the mortar nor so wet as to be slippery when laid.
2. Each brick shall be laid as a header in a full bed and joint of mortar without requiring subsequent grouting, flushing or filling, and shall be thoroughly bonded as directed.
3. The brick inverts shall conform accurately to the size of the adjoining pipes. Side inverts shall be curved and main inverts (where direction changes) shall be laid out in smooth curves of the longest possible radius which is tangent to the centerlines of adjoining pipe.

C. CASTINGS:

1. Ductile frames, grates and covers shall be as specified. The frames and covers shall be set by the Contractor to conform accurately to the grade of the finished pavement, existing ground surface, or as indicated on the drawings. Frames shall be adjusted to meet the street surface.
2. Ductile manhole frames and covers not located in paved areas shall be set 6-inches above finished grade, at a height as required by the Engineer, or as indicated on the drawings. The top of the cone shall be built up with a minimum of 1 course and a maximum of 5 courses of brick and mortar used as headers for adjustment to final grade.
3. Frames shall be set concentric with the top of the concrete section and in a full bed of mortar so that the space between the top of the concrete section or brick headers and the bottom flange of the frame shall be completely filled and made watertight. A thick ring of mortar extending to the outer edge of the concrete shall be placed all around the bottom flange. The mortar shall be smoothly finished to be flush with the top of the flange and have a slight slope to shed water away from the frame.
4. Covers and/or grates shall be left in place in the frames, for safety reasons, except while work is being performed.
5. Cross Country Installation: Manholes frame and covers shall be installed at grade in lawns or above grade in cross country areas, unless specified otherwise on the plans.

D. ACCESSORIES:

1. Accessories shall be installed in accordance with manufacturer's instructions.
2. Stubs shall be set accurately to the dimensions indicated on the drawings. Stubs shall be sealed with suitable watertight plugs.

3.02 LEAKAGE TESTS:

- A. Leakage tests shall be made by the Contractor and observed by the Engineer on each manhole. Manholes shall be tested for leakage using a vacuum test in accordance with NHDES Env-Wq 704.17 and below.

B. VACUUM TEST:

1. The vacuum test shall be conducted in accordance with ASTM C1244. Test results will be judged by the length of time it takes for the applied vacuum to drop from 10 inches of mercury to 9 inches. If the time is less than that listed in Table 1 of ASTM C1244, the manhole will have failed the test. Test times from Table 1 are excerpted below.

TABLE 1

Minimum Test Times for Various Manhole Diameters

<u>Depth (Feet)</u>	<u>Diameter (Inches)</u>		
	48	60	72
	<u>Times (Seconds)</u>		
0-10	120	120	120
10-15	150	150	150
>15	180	180	180

2. If the manhole fails the initial test, the Contractor shall locate the leaks and make proper repairs. Leaks may be filled with a wet slurry of accepted quick setting material. If the manhole should again fail the vacuum test, additional repairs shall be made, and the manhole water tested as specified.

3.03 CLEANING:

All new manholes shall be thoroughly cleaned of all silt, debris and foreign matter of any kind, prior to final inspection.

END OF SECTION

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S U P P L E M E N T A L S P E C I F I C A T I O N**ITEM 613.017 SURFACE RESTORATION OF CROSS-COUNTRY AREAS LINEAR FOOT**

SECTION 02920

LOAMING AND SEEDING

PART 1 - GENERAL

1.01 WORK INCLUDED:

This section covers all labor, materials, and equipment necessary to do all loaming, seeding and related work as indicated on the drawings and as herein specified. All lawns disturbed by the Contractor's operations shall be repaired as herein specified.

1.02 RELATED WORK:

- A. Section 02931, LANDSCAPING

1.03 QUALITY ASSURANCE:

- A. For a particular source of loam, the Engineer may require the Contractor to send approximately 10 pounds of loam to an approved testing laboratory and have the following tests conducted:
 - 1. Organic concentration
 - 2. pH
 - 3. Nitrogen concentration
 - 4. Phosphorous concentration
 - 5. Potash concentration

- B. These tests shall be at the Contractor's expense. Test results, with soil conditioning and fertilizing recommendations, shall be forwarded to the Engineer.

1.04 SUBMITTALS: IN ACCORDANCE WITH REQUIREMENTS OF GENERAL SPECIFICATIONS, SUBMIT THE FOLLOWING:

- A. Six sets of information detailing the seed mixes, fertilizers, mulch material, slope protection material (if required) and origin of loam shall be submitted to the Engineer for review.
- B. Three sets of test results shall be submitted to the Engineer for review.

PART 2 - PRODUCTS

2.01 MATERIALS:

A. LOAM:

1. Loam shall be a natural, fertile, friable soil, typical of productive soils in the vicinity, obtained from naturally well-drained areas, neither excessively acid nor alkaline, and containing no substances harmful to grass growth. Loam shall not be delivered to the site in frozen or muddy condition and shall be reasonably free of stumps, roots, heavy or stiff clay, stones larger than 1-inch in diameter, lumps, coarse sand, noxious weeds, sticks, brush or other litter.
2. The loam shall contain not less than 4 percent nor more than 20 percent organic matter as determined by the loss of weight by ignition of oven-dried samples. Test samples shall be oven-dried to a constant weight at a temperature of 230 degrees F.

B. LIME:

Lime shall be standard commercial ground limestone containing at least 50 percent total oxides (calcium oxide and magnesium oxide), and 50 percent of the material must pass through a No. 100 mesh sieve with 98 percent passing a No. 2 mesh sieve.

C. FERTILIZER:

Fertilizer shall be commercial fertilizer, 10-10-10 fertilizer mixture containing at least 40 percent of organic nitrogen. It shall be delivered to the site in the original sealed containers, each showing the manufacturer's guaranteed analysis. Fertilizer shall be stored so that when used it will be dry and free flowing. No fertilizer shall be used which has not been marketed in accordance with State and Federal Laws, relating to fertilizers.

D. MULCH:

1. Materials to be used in mulching shall conform to the following requirements:
2. Straw Mulch - Straw Mulch shall consist of stalks or stems of grain after threshing.
3. Wood Fibre Mulch - Wood Fibre Mulch shall consist of wood fibre produced from clean, whole uncooked wood, formed into resilient bundles having a high degree of internal friction and shall be dry when delivered to the project.

E. SEED:

1. Seed shall be of an approved mixture, the previous year's crop, clean, high in germinating value, a perennial variety, and low in weed seed. Seed shall be obtained

from a reliable seed company and shall be accompanied by certificates relative to mixture purity and germinating value.

2. Grass seed for lawn areas shall conform to the following requirements:

	Proportion by Weight	Germination Purity	Purity Minimum
Chewing's Fescue	30%	70%	97%
Kentucky 31 Fescue	30%	90%	98%
Kentucky Blue Grass	20%	80%	85%
Domestic Rye Grass	20%	90%	98%

F. TEMPORARY COVER CROP:

1. Temporary cover crop shall conform to the following requirements:

	% Weight	Germination Minimum
Winter Rye	80 min.	85%
Red Fescue (creeping)	4 min.	80%
Perennial Rye Grass	3 min.	90%
Red Clover	3 min.	90%
Other Crop Grass	0.5 max.	
Noxious Weed Seed	0.5 max.	
Inert Matter	1.0 max.	

PART 3 - EXECUTION

3.01 SURFACE PREPARATION:

- A. After approval of rough grading, loam shall be placed on areas affected by the Contractor's operations. Loam shall be at least 6-inches compacted thickness.
- B. Lime shall be applied to bring the pH to 6.5 or, without a soil test, at the rate of 2-3 tons of lime per acre.
- C. Fertilizer shall be applied according to the soil test, or without a soil test, at the rate of 1000 pounds per acre.
- D. Loam shall be worked a minimum of 3-inches deep, thoroughly incorporating the lime and fertilizer into the soil. The loam shall then be raked until the surface is finely pulverized and smooth and compacted with rollers, weighing not over 100 pounds per linear foot of tread, to an even surface conforming to the prescribed lines and grades. Minimum depth shall be 6-inches after completion.

3.02 SEEDING:

- A. Seeding shall be done when weather conditions are approved as suitable, in the periods between April 1 and May 30 or August 15 to October 1, unless otherwise approved.
- B. If there is a delay in seeding, during which weeds grow or soil is washed out, the Contractor shall remove the weeds or replace the soil before sowing the seed, without additional compensation. Immediately before seeding is begun, the soil shall be lightly raked.
- C. Seed shall be sown at the approved rate, on a calm day by machine.
- D. One half the seed shall be sown in one direction and the other half at right angles. Seed shall be raked lightly into the soil to a depth of 1/4-inch and rolled with a roller weighing not more than 100 pounds per linear foot of tread.
- E. The surface shall be kept moist by a fine spray until the grass shows uniform germination over the entire area. Wherever poor germination occurs in areas larger than 3 sq. ft., the Contractor shall reseed, roll, and water as necessary to obtain proper germination.
- F. The Contractor shall water, weed, cut and otherwise maintain and protect seeded areas as necessary to produce a dense, healthy growth of perennial lawn grass.
- G. If there is insufficient time in the planting season to complete the fertilizing and seeding, permanent seeding may be left until the following planting season, at the option of the Contractor or as required by the Engineer. In that event, a temporary cover crop shall be sown. This cover crop shall be cut and watered as necessary until the beginning of the following planting season, at which time it shall be plowed or harrowed into the soil, the area shall be fertilized and the permanent seed crop shall be sown as specified.

3.03 PLACING MULCH:

- A. Straw Mulch shall be loosely spread to a uniform depth over all areas designated on the plans, at the rate of 4-1/2 tons per acre, or as otherwise required.
- B. Straw Mulch may be applied by mechanical apparatus, if in the judgment of the Engineer the apparatus spreads the mulch uniformly and forms a suitable mat to control slope erosion. The apparatus shall be capable of spreading at least 80 percent of the hay or straw in lengths of 6-inches or more, otherwise it shall be spread by hand without additional compensation.
- C. Wood Fibre Mulch shall be uniformly spread over certain selected seeded areas at the minimum rate of 1,400 pounds per acre unless otherwise required. It shall be placed by spraying from an approved spraying machine having pressure sufficient to cover the entire area in one operation.

3.04 SEEDING AND MULCHING BY SPRAY MACHINE:

- A. The application of lime, fertilizer, grass seed and mulch may be accomplished in one operation by the use of an approved spraying machine. The materials shall be mixed with water in the machine and kept in an agitated state in order that the materials may be uniformly suspended in the water. The spraying equipment shall be so designed that when the solution is sprayed over an area, the resulting deposits of lime, fertilizer, grass seed and mulch shall be equal to the specified quantities.
- B. A certified statement shall be furnished, prior to start of work, to the Engineer by the Contractor as to the number of pounds of limestone, fertilizer, grass seed and mulch per 100 gallons of water.
- C. This statement should also specify the number of square yards of seeding that can be covered with the solution specified above. If the results of the spray operation are unsatisfactory, the Contractor will be required to abandon this method and to apply the lime, fertilizer, grass seed and mulch by other methods.

3.05 INSPECTION AND ACCEPTANCE:

At the beginning of the planting season following that in which the permanent grass crop is sown, the seeded areas will be inspected. Any section not showing dense, vigorous growth at that time shall be promptly reseeded by the Contractor at his own expense. The seeded areas shall be watered, weeded, cut and otherwise maintained by the Contractor until the end of that planting season, when they will be accepted if the sections show dense, vigorous growth.

END OF SECTION

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**THIS SECTION IS INCIDENTAL TO THE WORK AND SHALL NOT BE MEASURED
SEPARATELY FOR PAYMENT**

SECTION 03302

FIELD CONCRETE

PART 1 - GENERAL

1.01 WORK INCLUDED:

- A. This Section covers concrete and all related items necessary to place and finish the concrete work.
- B. Concrete thrust, and anchor blocks, to be provided at all water main bends, tees, plugs and wyes and at other locations required by the Engineer shall be installed in accordance with the details shown on the drawings and as specified in this section.
- C. Concrete encasement for piping with shallow cover and for encasement of telephone, and electrical duct bank when specified shall be installed in accordance with the details shown on the drawings and as specified in this section.
- D. Flowable fill shall be placed into abandoned pipes/structures (minimum 85% of total void for pipes) where directed by the Owner or the Owners Representative including narrative summarizing execution and verification of the work.

1.02 RELATED WORK:

- A. Section 02300, EARTHWORK
- B. Section 02080, DUCTILE IRON PIPE AND FITTINGS

1.03 REFERENCES:

- A. The following standards form a part of this specification:

American Concrete Institute (ACI)

- | | |
|-----------|---|
| ACI 304 | Recommended Practice for Measuring, Mixing, Transporting, and Placing Concrete. |
| ACI 305 | Recommended Practice for Hot Weather Concreting |
| ACI 306 | Recommended Practice for Cold Weather Concreting |
| ACI SP-66 | ACI Detailing Manual |

ACI 318 Building Code Requirements for Reinforced Concrete

American Society for Testing and Materials (ASTM)

ASTM A615 Deformed and Plain Billet-Steel Bars for Concrete Reinforcement

ASTM C33 Concrete Aggregates

ASTM C94 Ready-Mixed Concrete

ASTM C143 Test for Slump of Portland Cement Concrete

ASTM C150 Portland Cement

ASTM C260 Air Entraining Admixtures for Concrete

ASTM C494 Chemical Admixtures for Concrete

1.04 SUBMITTALS: IN ACCORDANCE WITH REQUIREMENTS OF GENERAL SPECIFICATIONS, SUBMIT THE FOLLOWING:

Six copies of the statement of materials constituting the design of mixes for each size aggregate as required by ASTM C94 shall be submitted to the Engineer within one week following award of the Contract.

PART 2 - PRODUCTS

2.01 CONCRETE:

- A. All concrete, reinforced or non-reinforced shall have a 28 day compressive strength of 3000 psi unless otherwise noted on the design drawings. A minimum of 5.5 sacks of cement per cubic yard and a maximum water cement ratio of 6.9 gallons per sack shall be used.
- B. Concrete shall conform to ASTM C94. The Contractor shall be responsible for the design of the concrete mixtures. Slump shall be a maximum of 4-inches and a minimum of 2-inches, determined in accordance with ASTM C143.
- C. Admixtures shall be as specified in subsection 2.05. No additional admixtures shall be used unless approved by the Engineer.
- D. No additional water, except for the amount indicated by the design mix shall be added to the concrete without the prior permission of the Engineer.

2.02 REINFORCING:

Reinforcing as shown on the plans or as required by the Engineer, shall conform to ACI 318 and ASTM A615 and shall be detailed in accordance with ACI SP-66. All Steel reinforcing bars shall be grade 60.

2.03 CEMENT:

The cement shall be an approved brand of American manufactured Portland Cement, Type II conforming to the applicable requirements of ASTM C150.

2.04 AGGREGATES

- A. Except as otherwise noted, aggregate shall conform to the requirements of ASTM C33.
- B. Maximum size aggregate shall be 3/4-inch.

2.05 ADMIXTURES:

- A. All concrete (unless otherwise directed) shall contain an air entraining agent. Air entrained concrete shall have air content by volume of 4 to 8 percent for 3/4-inch aggregate.
- B. Air entraining agent shall be in accordance with ASTM C260 and shall be Darex AEA, as manufactured by W.R. Grace & Company; Placewel (air entraining Type), as manufactured by Johns Manville; Sika AER as manufactured by Sika Chemical Company; or an approved equal product.
- C. Water reducing agent shall be WRDA, as manufactured by W.R. Grace & Company; Placewel (non-air entraining Type), as manufactured by Johns Manville; Sika Plastiment as manufactured by Sika Chemical Company; or an approved equal product.
- D. Water reducing agent-retarder shall be "Daratard," as manufactured by W.R. Grace & Company; Sika Plastiment as manufactured by Sika Chemical Company; or an approved equal product.

2.06 WATER:

- A. Water for concrete shall be potable, free of deleterious amounts of oil, acid, alkali, organic matter and other deleterious substances.

2.07 CONCRETE FORMS:

- A. Forms for exterior and interior surfaces which will be exposed to view after the work is completed, whether such surfaces are painted or unpainted, shall be new plywood stock, steel, tempered masonite, or other materials which will provide smooth concrete surfaces

without subsequent surface plastering. Plastic or plastic-faced forms shall not be used, except with the prior approval of the Engineer.

- B. Form ties shall be cone type or equal, with waterstop, which leaves no metal closer than 2-inches to finished face of concrete.
- C. Form release agent shall be a non-staining, non-yellowing, non-toxic liquid free from kerosene and resins of the type recommended by the manufacturer of the forming system being used such as EZ strip by L&M Construction Chemicals, Omaha, NB and "Magic Kote" by Symons Corp., Des Plaines, IL or approved equal.
- D. Where steel adjacent to vertical faces of forms cannot be otherwise secured, mortar doughnuts shall be used to prevent steel from lying too close to the finish vertical faces of the concrete

PART 3 - EXECUTION

3.01 PREPARATION:

- A. Before placing concrete, forms and the space to be occupied by the concrete shall be thoroughly cleaned, and reinforcing steel and embedded metal shall be free from dirt, oil, mill scale, loose rust, paint or the material which would tend to reduce the bond.
- B. Earth, concrete, masonry, or other water permeable material against which concrete is to be placed shall be thoroughly saturated with water immediately before concrete is placed.
- C. No concrete shall be placed until the consolidation of the ground and the arrangement and details of forms and reinforcing have been inspected and approved by the Engineer.

3.02 THRUST AND ANCHOR BLOCKS:

- A. Minimum bearing areas for thrust blocks and dimensions of anchor blocks shall be as shown on the drawings.
- B. Concrete for thrust and anchor blocks shall be placed against undisturbed earth, and wooden side forms shall be used to provide satisfactory lines and dimensions. Felt roofing paper shall be placed to protect joints. No concrete shall be placed so as to cover joints, bolts or nuts, or to interfere with the removal of the joints.

3.03 FILL CONCRETE:

- A. Fill concrete shall be placed in those locations as indicated on the design drawings. Fill concrete shall consist of materials as previously specified, with a minimum 28-day compressive strength of 3000 psi.

- B. Before fill concrete is placed, the following procedures shall be used to prepare surfaces; all dirt, scum and laitance shall be removed by chipping and washing. The clean, roughened base surface shall be saturated with water, but shall have no free water on the surface. A coat of 1:2 cement-sand grout, approximately 1/8-inch thick, shall be well scrubbed into the thoroughly dampened concrete base. The concrete fill shall be placed immediately, before grout has dried or set.
- C. Fill concrete shall be brought to lines and grades as shown on the design drawings.

3.04 FLOWABLE FILL:

- A. Flowable fill materials shall be in accordance with Section 520.2 of the NHDOT Standard Specifications for Road and Bridge Construction (latest edition).

1. Flowable fill shall be mixed using the approximate proportions described below (per cubic yard)

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

2. Flowable fill shall have a minimum 28 day compressive strength of 100 psi.

3.05 CONCRETE PLACING DURING COLD WEATHER:

- A. Concrete shall not be placed on frozen ground, and no frozen material or material containing ice shall be used. Materials for concrete shall be heated when temperature is below 40°F, or is expected to fall to below 40°F, within 73 hours, and the concrete after placing shall be protected by covering, heat, or both.
- B. All details of Contractor's handling and protecting of concrete during freezing weather shall be subject to the approval of the Engineer. All procedures shall be in accordance with provisions of ACI 306.

3.06 CONCRETE PLACING DURING HOT WEATHER:

- A. Concrete just placed shall be protected from the direct rays of the sun and the forms and reinforcement just prior to placing, shall be sprinkled with cold water. The Contractor shall make every effort to minimize delays, which will result in excessive mixing of the concrete after arrival on the job.

- B. During periods of excessively hot weather (90°F or above), ingredients in the concrete shall be cooled insofar as possible and cold mixing water shall be used to maintain the temperature of the concrete at permissible levels all in accordance with the provisions of ACI 305. Any concrete with a temperature above 90°F, when ready for placement, will not be acceptable, and will be rejected.

3.07 FIELD QUALITY CONTROL:

- A. Concrete inspection and testing shall be performed by the Engineer or by an inspection laboratory, designated by the Engineer, engaged and paid for by the Owner. Testing equipment shall be supplied by the laboratory, and the preparation of samples and all testing shall be performed by the laboratory personnel. Full assistance and cooperation, concrete for samples, and such auxiliary personnel and equipment as needed shall be provided by the Contractor.
- B. At least 4 standard compression test cylinders shall be made and tested and 1 slump test from each day's placement of concrete. A minimum of four compression test cylinders shall be made and tested for each 100 cubic yards of each type and design strength of concrete placed. One cylinder shall be tested at 7 days, and two at 28 days. The fourth cylinder from each set shall be kept until the 28 day test report on the second and third cylinders in the same set has been received. If the average compressive strength of the two 28 day cylinders do not achieve the required level, the Engineer may elect to test the fourth cylinder immediately or test it after 56 days. If job experience indicates additional cylinder tests or other tests are required for proper control or determination of concrete quality, such tests shall be made.
- C. The Engineer shall have the right to reject concrete represented by low strength tests. Rejected concrete shall be promptly removed and replaced with concrete conforming to the specification. The decision of the Engineer as to whether substandard concrete is to be accepted or rejected shall be final.

END OF SECTION

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SPECIAL PROVISION
AMENDMENT TO SECTION 201 – CLEARING AND GRUBBING

ITEM 201.2

TREE REMOVAL

ALLOWANCE

The work under these items shall conform to the relevant provisions of Section 201 of the Standard Specifications and the following.

Description

1.1: The item for Tree Removal shall provide an allowance for the City’s subcontractor to remove all trees except those located within the limits of clearing and grubbing. The allowance also includes tree trimming by the City’s subcontractor as necessary to construct the project.

Construction Requirements

3.1: General

3.1.1 Tree removals will not include stump removal. Contractor will be responsible for complete removal of all stumps under Contract Bid Item 201.4 - Removing Stumps.

Method of Measurement & Basis of Payment see 1.45 – TREE REMOVAL in SECTION 01270 - MEASUREMENT AND PAYMENT

S U P P L E M E N T A L S P E C I F I C A T I O N**ITEM 201.9****TREE PROTECTION****EACH****Description**

- 1.1 The purpose of these items is to prevent damage to branches, stems and root systems of existing individual trees as well as shrubs and other quality vegetation to remain, and to ensure their survival. To the extent possible, to avoid soil compaction within the root zone, construction activities including, but not limited to, vehicle movement, excavation, embankment, staging and storage of materials or equipment shall not occur underneath the canopy (drip line) of trees to remain. Where these activities will occur within 10 feet of the canopy of trees or where directed, the Contractor shall take the appropriate protective measures specified herein.
- 1.2 The Contractor shall be solely responsible for judging the full extent of the work requirements, including, but not necessarily limited to any equipment and materials necessary for providing tree protection.
- 1.3 Prior to any construction activities, the Contractor shall walk the site with the Engineer and City Arborist to identify which trees will require protection and to determine approved measures. The Arborist shall make recommendations as to appropriate methods to protect the trees.
- 1.4 The Contractor is responsible for the protection of all existing trees and plants within and immediately adjacent to the construction area that are not designated to be removed for the length of the construction period.

Materials

- 2.1 Fence and temporary fence posts shall be subject to the approval of the Engineer.
- 2.2 Fencing for individual plants shall be polyethylene fencing or chain link fence (new or used).
- 2.3 Incidental to these items, the Contractor shall provide water for maintaining plants in the construction area that will have exposed root systems for any period during construction.

Construction Requirements

- 3.1 To the extent possible, to avoid soil compaction within the root zone, construction activities including, but not limited to, vehicle movement, excavation, embankment, staging and storage of materials or equipment shall not occur underneath the canopy (drip line) of trees to remain. Where these activities will occur within 10 feet of the canopy of trees, the Contractor shall provide Individual Tree Protection as specified herein.

- 3.2 For individual tree protection, the Contractor shall set posts and fencing at the limits of the tree canopy. Where construction activities closer to the trees is unavoidable, the contractor shall tie branches out of the way and place wood chips to a depth of 6 inches on the ground to protect the root systems. The Contractor shall wrap the area of the trunk of the tree with burlap prior to armoring with 2x4 cladding. Cladding for tree trunks shall extend from the base of the tree to at least 8 feet from the base.
- 3.3 To the extent possible, temporary landscaped fencing shall be installed at the limit of tree canopy and shall be staked and maintained vertical for the length of the contract.
- 3.4 Where excavation within canopy is unavoidable, the Contractor shall use equipment and methods that shall minimize damage to the tree roots, per recommendations of the Certified Arborist. Such methods may require root pruning prior to, as well as during, any excavation activities.
- 3.5 All fencing, trunk protection, branch protection, and woodchips shall be maintained throughout the duration of the contract. Protective fencing shall be repaired and woodchip mulch replaced as necessary during the duration of the contract at no additional cost.

Cutting and Pruning

Some pruning of roots and branches may be a necessary part of construction. Pruning will be performed on the same side of the tree that roots have been severed.

The Contractor shall notify the City Arborist to oversee any cutting of limbs, stem or roots of existing trees. All cuts shall be clean and executed with an approved tool. Under no circumstances shall excavation in the tree protection area be made with mechanical equipment that might damage the existing root systems.

Any tree root area exposed by construction shall be covered and watered immediately. Exposed tree roots shall be protected by dampened burlap at all times until they can be covered with soil.

Watering

Water each tree within the construction area where work is in progress twice per week until the surrounding soil of each tree is saturated for the duration of construction activities.

Removal of Protection

After all other construction activities are complete, but prior to final seeding, wood chips, temporary fencing, branch protection, and trunk protection materials shall be removed and disposed off-site by the Contractor at no additional cost.

Tree Damage

The Contractor shall be held responsible for the health and survival of the existing trees in the immediate vicinity of the of the construction area. Damage that, in the Engineer's opinion, can be remedied by corrective measures shall be repaired immediately. Broken

limbs shall be pruned according to industry standards. Wounds shall not be painted. Trees or shrubs that are damaged irreparably shall, at the Engineer's discretion, be replaced. Cost of replacement trees shall be borne by the Contractor.

Method of Measurement & Basis of Payment see 1.46 – TREE PROTECTION in SECTION 01270 - MEASUREMENT AND PAYMENT

S U P P L E M E N T A L S P E C I F I C A T I O N**ITEM 211.12****VIBRATION MONITORING SERVICES****HOUR**

SECTION 01548

VIBRATION MONITORING SERVICES

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

PART 2 - 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 plan shall be submitted to the Engineer and Owner for approval.
3. 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.
4. Vibration monitoring equipment shall meet the requirements of 203.3.2.5.6 of the NHDOT Standard Specifications (included by reference).
5. The Contractor shall conduct a Pre-Construction Condition Survey of existing structures on the site identified in the Vibration Monitoring Plan including but not limited to brick and masonry structures, stone retaining walls and other sensitive areas. Further observation may be required at the discretion of the Contractor's Vibration Consultant. The completed Survey shall be provided to the Engineer as a written report.
6. The frequency and duration of vibration monitoring for construction activities shall be identified in the Vibration Monitoring Plan.
7. 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.
8. 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.
9. The Engineer and/or Owner will notify the Contractor of any complaints concerning vibrations resulting from construction activities.

END OF SECTION

SPECIAL PROVISION

AMENDMENT TO SECTION 304 – AGGREGATE BASE COURSE

ITEM 304.301

CRUSHED GRAVEL

CUBIC YARD

The work under these items shall conform to the relevant provisions of Section 304 of the Standard Specifications.

Method of Measurement & Basis of Payment see 1.43 – MISCELLANEOUS ROADWAY ITEMS in SECTION 01270 - MEASUREMENT AND PAYMENT

SPECIAL PROVISION

AMENDMENT TO SECTION 306 – RECLAIMED STABILIZED BASE

<u>ITEM 306.112</u>	<u>RECLAIMED STABILIZED BASE PROCESSED IN PLACE, 12” DEEP (F)</u>	<u>SQUARE YARD</u>
<u>ITEM 306.114</u>	<u>RECLAIMED STABILIZED BASE PROCESSED IN PLACE, 14” DEEP (F)</u>	<u>SQUARE YARD</u>
<u>ITEM 306.208</u>	<u>RECLAIMED STABILIZED BASE REMOVED AND REHANDLED, 8” DEEP (F)</u>	<u>SQUARE YARD</u>
<u>ITEM 306.36</u>	<u>STONE FOR RECLAIMED STABILIZED BASE</u>	<u>TON</u>

The work under these items shall conform to the relevant provisions of Section 306 of the Standard Specifications and the following.

Add to Description:

- 1.2** The following work shall be included in the item:
 - 1.2.1** Lower existing utility structures to a depth below the material to be scarified.
 - 1.2.2** Prepare road surface in accordance with reclaimer manufacturer recommendations.
 - 1.2.3** Reclaim roadway to specifications listed below.
 - 1.2.4** Regrade stabilized base according to typical section.
 - 1.2.5** Provide additional material or remove excess material to achieve the required profile and cross-section.
 - 1.2.6** Raise existing utility structures and adjust to grade.
- 1.3** The following work shall not be included in the item:
 - 1.3.1** 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.

Materials

Add to 2.1

2.1.4 Additional stone for reclaimed stabilized base shall be 1 ½” – 2” angular crushed stone.

Construction Requirements

Add to 3.1:

3.1.1 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.

3.1.2 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.

Add to 3.5:

3.5.1 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.

3.5.2 Testing shall be performed at an NHDOT approved laboratory in accordance with AASHTO T 164.

Add 3.13:

3.13.1 All utility structures shall be lowered to prevent damage by the processing.

3.13.2 Where applicable, cut pavement according to Section 02555 of the Specifications.

3.13.3 The road surface and an approximately equal thickness of gravel base shall be reclaimed.

3.13.4 Reclaiming:

3.13.4.1 Apply water to insure optimum water content.

3.13.4.2 The reclaimer shall process the material to the specified gradation.

3.13.4.3 The process shall be repeated until the "Stabilized Base" meets the required specification.

3.13.5 Placement of the Stabilized Base:

3.13.5.1 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.

3.13.5.2 The stabilized base shall be compacted in accordance with NHDOT Section 304, "Aggregate Base Course", current edition.

3.13.5.3 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.

3.13.5.3 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.

3.14. Contractor shall sawcut existing drives in accordance with the standard details on the plans.

Add 5.4: Reconstructing and adjusting all utilities will be subsidiary to the reclaimed stabilized base. This includes, but is not limited to catch basins, drop inlets, drain manholes, sewer manholes, water gates, water shutoffs and communication manholes. All structures shall be reconstructed/adjusted immediately following the reclaim.

SPECIAL PROVISION

SECTION 401

<u>ITEM 403.11</u>	<u>HOT BITUMINOUS PAVEMENT, MACHINE METHOD</u>	<u>TON</u>
<u>ITEM 403.12</u>	<u>HOT BITUMINOUS PAVEMENT, HAND METHOD</u>	<u>TON</u>
<u>ITEM 403.6</u>	<u>PAVEMENT JOINT ADHESIVE</u>	<u>LF</u>
<u>ITEM 403.99</u>	<u>TEMPORARY BITUMINOUS PAVEMENT</u>	<u>TON</u>

Description

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.

Materials

2.1 Materials

- A. Materials shall conform to NHDOT Section 401 except the following:
 - 1. **The maximum amount of Total Reused Binder (TRB) in the pavement mix design shall be .5% and the mix shall meet all volumetric mix design criteria.**
 - 2. Asphalt Cement shall not contain any form of used, recycled or refined oil. Suppliers of PG Binder shall certify that the PG Binder does not contain any used, recycled or refined oil.
 - 3. All 3/4" inch (19mm) and 1 inch (25mm) pavement mixes shall be designed using the 50 gyration N design, unless specified otherwise.
 - 4. Liquid asphalt cement binder shall have a Performance Grade (PG) of PG 64-28 for all standard bituminous and PG 64-E for all high strength bituminous pavements.
 - 5. All high strength asphalt, when specified, shall be 50 gyration unless otherwise directed.

2.2 Pavement Mix Designs

Pavement mix designs shall meet NHDOT Section 401.2.5.1 except the following:

A. Minimum asphalt binder content shall be as follows:

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

The required minimum asphalt content is based on the use of aggregate with a specific gravity of 2.65 to 2.70. The minimum asphalt content requirement may be adjusted when aggregate with a higher specific gravity is used, or the minimum may be adjusted at the Engineer's discretion if it is believed to be in the best interest of the Owner. All mix designs shall be submitted to the Engineer for verification and approval.

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

B. Method Requirements NHDOT Section 401.2.6 shall apply including the following:

1. Coarse Aggregate: Stockpiled coarse aggregate shall meet the requirements of 2.6.1, Table 2.
2. Tolerances: All mixtures shall conform within the range of tolerances provided in NHDOT Section 401.2.6.2
3. When Non-Compliant test result, it shall be the Contractor's responsibility to correct non-compliant pavement. The Contractor may be required to remove non-compliant material that is poorly graded or material exhibiting cracks, open joints or other imperfections (**no payment will be made for this material or its removal**).

Construction Requirements

Construction requirements shall be in accordance with Sections 401 of the NHDOT Standard Specifications for Road and Bridge Construction (latest edition) **and** as specified in this section.

1. Prior to placing any mix, a mix design shall be submitted for approval and pre-paving conference shall be held with the Owner, Contractor, and Engineer to discuss the proposed paving schedule, source of mix, type and amount of equipment to be used, sequence of paving pattern, rate of mix supply, traffic control, and general continuity of the operation. Special attention shall be made to the paving pattern sequence to minimize cold joints.
2. The Contractor shall notify the Engineer one week in advance of paving operations to allow sufficient time for scheduling personnel.
3. Any pavement course four inches (compacted depth) or greater shall be placed and compacted in two lifts.
4. Sweeping. Existing pavement or previously laid courses shall be thoroughly dry and free from all dust, dirt, and loose material. Sweeping with a power broom, supplemented by hand brooming, may be necessary.

5. Tack coat. Surfaces of any pavement course shall have a tack coat of emulsified asphalt applied in accordance with NHDOT Specifications. Application of emulsified asphalt shall be between 0.03 and 0.05 gal/yd².
6. **Joint adhesive shall be used for all transverse and lateral seams when placing more than 100 tons of asphalt or more. This item is subsidiary unless a separate pay item is provided.**
6. Utility covers, frames and grates, valves and other castings shall be set and raised. Contact surfaces of the drainage and utility castings shall be painted with a thin coating of suitable bituminous material. Surface pavement shall be removed from covers and castings immediately following pavement operations.
7. Method requirements NHDOT Section 401.3.1.2 shall apply.
8. In addition to 3.1.A.7 above, the following performance requirements shall apply:
 - a). Tier 2 QA/QC performance requirements shall apply.
 - b). Ride Smoothness: NHDOT Section 401.3.17.3.4.1 shall apply except variations exceeding **3/8** inch in profile or cross slope shall be eliminated.
 - c). Ride Smoothness: Section 401.3.17.3.4.4 shall apply except high points 0.5 inches in 25 feet shall corrected.

Method of Measurement & Basis of Payment see NHDOT Standard Specifications for Road and Bridge Construction

S U P P L E M E N T A L S P E C I F I C A T I O N**ITEM 592.16****PREFABRICATED MODULAR BLOCK
RETAINING WALL****SQUARE YARD****Description**

1.1 This work shall consist of the construction of prefabricated modular block retaining walls as shown on the plans. It is the responsibility of the contractor to determine the materials, methods and means of installation required to satisfactorily complete the installation of the walls at the locations shown on the plans. Any geotechnical/sub-surface information needed to construct the wall is the responsibility of the contractor.

Materials

2.1 The prefabricated modular block retaining walls shall be the ReCon Retaining Wall System manufactured by Shea Concrete Products, or approved equal.

2.2 Contractor shall submit Shop Drawings and manufacturer's literature in conformance with the standard General Conditions of the construction contract.

Construction Requirements

3.1 The Contractor shall be responsible for the installation of the precast block retaining wall per the manufacturer's specifications. It is the responsibility of the Contractor to determine the materials, methods and means of installation required to satisfactorily complete the installation of the walls at the locations shown on the plans.

Method of Measurement & Basis of Payment see 1.39 – STRUCTURES AND WALLS in SECTION 01270 - MEASUREMENT AND PAYMENT

SPECIAL PROVISION

AMENDMENT TO SECTION 603 – CULVERTS AND STORM DRAINS

<u>ITEM 603.82212</u>	<u>12" PE PIPE (TYPE S)</u>	<u>LINEAR FOOT</u>
<u>ITEM 603.82215</u>	<u>15" PE PIPE (TYPE S)</u>	<u>LINEAR FOOT</u>
<u>ITEM 603.82218</u>	<u>18" PE PIPE (TYPE S)</u>	<u>LINEAR FOOT</u>
<u>ITEM 603.82224</u>	<u>24" PE PIPE (TYPE S)</u>	<u>LINEAR FOOT</u>

The work under these items shall conform to the relevant provisions of Section 603 of the Standard Specifications and the following.

Replace 3.1.7 to read:

3.1.7 The width of trenches shall be held to a minimum consistent with the space required to permit satisfactory jointing and thorough tamping of the bedding material under and around the pipe. Trenching below the top of the pipe shall be kept to a maximum of the diameter plus three (3) feet. The width of the trench above the pipe may be at the Contractors option as shown in the detail.

Add to: 3.2:

3.2.3 Bedding material shall conform to Table 703-1 – Required Grading, Graded Coarse Aggregates, Standard Size #4. separated with geotextile fabric consistent with Section 593 as shown in the permanent and temporary trench details.

Replace 5.8 to read:

3.2.3 Backfill, including crushed stone bedding material, geotextile fabric for separation, concrete class F, flowable fill substituted for backfill material (if directed by the engineer) shall be subsidiary to the pipe item.

SPECIAL PROVISION
AMENDMENT TO SECTION 604 – CATCH BASINS, DROP INLETS, AND
MANHOLES

The work under these items shall conform to the relevant provisions of Section 604 of the Standard Specifications and the following.

<u>ITEM 604.124</u>	<u>CATCH BASINS TYPE B, 4-FOOT DIAMETER</u>	<u>UNIT</u>
<u>ITEM 604.242</u>	<u>DROP INLETS TYPE D-B</u>	<u>UNIT</u>
<u>ITEM 604.324</u>	<u>DRAINAGE MANHOLES, 4-FOOT DIAMETER</u>	<u>UNIT</u>
<u>ITEM 604.4</u>	<u>RECONSTRUCTING/ADJUSTING CATCH BASIN & DROP INLET</u>	<u>LF</u>
<u>ITEM 604.5</u>	<u>RECONSTRUCTING/ADJUSTING MANHOLES</u>	<u>LF</u>
<u>ITEM 604.51</u>	<u>RECONSTRUCTING/ADJUSTING SEWER MANHOLES</u>	<u>LF</u>
<u>ITEM 604.62</u>	<u>DRAINAGE MANHOLE COVER AND FRAMES</u>	<u>EACH</u>

The work under these items shall conform to the relevant provisions of Section 604 of the Standard Specifications and the following.

Description

Add to 1.1:

1.1.1 All structures throughout the project shall be constructed of the same materials.

Materials

Add 2.11: Catch basin frames and grates either new or to be replaced shall NHDOT Type B and be fabricated in the USA.

Add 2.12: Drain manhole frames and covers shall dual hinged, Ergo XL from EJIW – 41421025L01. 32” Hinged and gasketed with locking cam and be fabricated in the USA.

Amend 2.5 to read:

2.5 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.

Amend 2.7 to read:

2.7 Castings shall be gray iron, Class 30, conforming to AASHTO M105, unless otherwise specified.

Add to 2.8:

2.8.1 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. Grates shall be manufactured by LeBaron, Neenah, or East Jordan.

Add to Materials:

2.11 Composite hood devices shall be constructed of molded High Density Polyethylene (HDPE) with an Anti-syphon opening.

2.11.1 Install composite hood devices in structures in accordance with manufacturer's instructions. Only install hoods as directed by Engineer.

2.11.2 Multiple piece construction will not be allowed.

2.11.3 Mounting hardware shall be used as needed or provided by the manufacturer.

2.11.4 Composite hood devices shall be manufactured by Kleanstream.

2.12 The Contractor shall submit Shop Drawings and manufacturer's literature in conformance with the standard General Conditions of the construction contract.

Construction Requirements

Add to 3.1:

3.1.3 Sides of catch basins shall be made of precast concrete barrel sections (except proposed square structures) or cast-in-place concrete. Pipe connections will be made with rubber boot connections. Solidly fill annular spaces around pipes entering the catch basin with non-shrink grout. 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.

3.1.4 All Catch Basins shall be provided with polyethylene liners.

3.1.5 If necessary, adjust the tops of catch basins to grade with brick masonry. Do not permit water to rise over newly made joints until after inspection by the Engineer. Unreinforced Concrete rings are not acceptable for adjusting to grade. Completely fill all voids beneath the bottom flange to make a watertight fit.

Add 3.10: All test pits shall be conducted prior to ordering drainage materials. Test pits are required at all locations shown on plans and as directed by the engineer.

Method of Measurement

Amend 4.3: Frames with grates or manhole covers will be measured by the number of units installed except when they are a part of a structure measured under 4.1. A cover and frame will be a unit; and a grate and frame will be a unit. Installation of drain manhole frames and covers will not be measured for payment, they will be considered subsidiary to the drain manhole structure pay item.

Basis of Payment

Add to 5.3:

5.3.1 Removal and disposal of existing frames and grates shall be subsidiary.

Add 5.6: Adjustments from binder to final grade for all proposed drop inlets, catch basins and manholes shall be paid for under items 604.4 and 604.5. This assumes all new manholes, drop inlets and catch basins have been installed and adjusted to existing grade prior to the roadway reconstruction, this original adjustment is subsidiary to the items for drop inlets, catch basins and manholes per 5.1. Items 604.4 and 604.5 will provide for one additional adjustment during the course of the project. If the construction schedule requires more than one additional adjustment to structures this additional quantity will be the responsibility of the contractor.

SPECIAL PROVISION
AMENDMENT TO SECTION 604 – CATCH BASINS, DROP INLETS, AND
MANHOLES

ITEM 604.391 **SPECIAL MANHOLES (CDS UNIT)** **UNIT**

The work under this item shall conform to the relevant provisions of Section 604 of the Standard Specifications and the following:

Amend Description to read:

1.1 This work shall consist of installing a proprietary stormwater treatment system at the location shown on the plans. The stormwater treatment structure shall separate dirt, grit, oil, etc. and provide 100% capture of trash and debris (including neutrally buoyant trash and debris) prior to discharge into wetlands and the unnamed pond. The stormwater treatment structure shall be a CDS2025 unit as manufactured by Contech Engineered Solutions LLC, or approved equal. The unit shall remove over 80% TSS with a 100% impervious surface in a total drainage area of 8.31 acres.

Amend Materials to read:

2.1 Materials used shall be in accordance with the manufacturer's recommendations. Contractor shall submit Shop Drawings and manufacturer's literature in conformance with the standard General Conditions of the construction contract.

Amend Construction Requirements to read:

3.1 The stormwater treatment structure shall be installed in accordance with the manufacturer's recommendations. Upon installation all product information (manual, warranty, etc.) shall be provided to the Engineer.

Method of Measurement & Basis of Payment see 1.39 – STRUCTURES AND WALLS in SECTION 01270 - MEASUREMENT AND PAYMENT

SPECIAL PROVISION

**AMENDMENT TO SECTION 604 – CATCH BASINS, DROP INLETS, AND
MANHOLES**

ITEM 604.392 SPECIAL MANHOLES (DOGHOUSE STRUCTURE) UNIT

The work under these items shall conform to the relevant provisions of Section 604 of the Standard Specifications and the following.

Amend 1.1 to read:

1.1 This work shall consist of installing a Precast 60-inch diameter doghouse structure over an existing 36” reinforced concrete pipe.

Amend 2.1 to read:

2.1 Materials shall conform to all relevant provisions of Section 604. Contractor shall submit Shop Drawings and manufacturer's literature in conformance with the standard General Conditions of the construction contract.

Add to Construction Requirements:

3.10 Remove existing concrete pipe to spring line within the inside of the precast manhole base and construct the invert to the spring line.

Method of Measurement & Basis of Payment see 1.39 – STRUCTURES AND WALLS in SECTION 01270 - MEASUREMENT AND PAYMENT

SPECIAL PROVISION**AMENDMENT TO SECTION 607 – FENCES****ITEM 607.2****OUTLET PROTECTION FENCE****LUMP SUM**

The work under these items shall conform to the relevant provisions of Section 607 of the Standard Specifications and the following.

Description

1.1 This work shall consist of constructing and installing an Outlet Protection Fence as shown on the plans and details of the contract plans. The fencing is meant to deter beavers from blocking culverts.

Materials**2.1 Steel Posts.**

2.2.1 All posts shall be galvanized using materials conforming to the requirements of AASHTO M 111.

2.2.2 Steel posts shall be sound and reasonably straight. The ends shall be cut square or as indicated. All steel posts and angle braces shall conform to ASTM A 499 and A 702, as well in accordance with 607.2.1.2.

2.2 Fencing. A 6" X 6" mesh of 6 gauge concrete reinforcement wire shall be used as the fencing material and shall conform to ASTM A 116, as well as in accordance to 607.2.1.

Construction Requirements

3.1 Outlet Protection Fence shall be constructed as shown on the plans or the Contractor may propose an alternate plan. It shall be constructed in accordance with 607.3.2, unless otherwise directed by the manufacturer.

3.1.1 The Contractor shall submit the design and method of construction of the Outlet Protection Fence for approval in conformance with the standard General Conditions of the construction contract.

3.2 Posts. Steel posts shall be set plumb at the required locations by either auguring, excavating or driving. Posts shall be set with butt ends down and without cutting the tops after treatment. The bottom of the holes shall be thoroughly tamped to grade. The face of the post nearest the headwall shall present a vertical line from the top to bottom. The posts shall be driven 2'6" into the ground (as shown on the plans).

3.3 Outlet Protection Fence shall be built to the dimensions shown in the contract plan. The fencing shall be attached to the posts in accordance with 607.3.2.

Method of Measurement & Basis of Payment see 1.42 – EROSION CONTROL AND ENVIRONMENT in SECTION 01270 - MEASUREMENT AND PAYMENT

SPECIAL PROVISION

AMENDMENT TO SECTION 607 – FENCES

ITEM 607.514 WOOD FENCE (STOCKADE), 4'-0" HIGH LINEAR FOOT

The work under these items shall conform to the relevant provisions of Section 607 of the Standard Specifications and the following.

Description

1.1 Work under this item shall include furnishing and installing a 4-foot timber stockade fence in the location indicated on the plan when an existing wood fence panel is unsuitable to be reset as determined by the Engineer.

Materials

2.1 Timber fence materials shall be new and without defect. All materials shall meet the approval of the Engineer. Wood fences shall be pressure-treated with chromated water-borne copper arsenate per AWPB LB-22 at the rate of 0.60 pounds per cubic foot. Prior to pressure treatment, posts shall be kiln-dried to a maximum 15 percent moisture content. Contractor shall submit Shop Drawings in conformance with the standard General Conditions of the construction contract.

Construction Requirements

3.1 The posts shall be set true to the line and grade of the proposed fence. All fencing panels shall be 4 feet in height to match existing panels.

SPECIAL PROVISION

AMENDMENT TO SECTION 608 – SIDEWALKS

<u>ITEM 608.24</u>	<u>4" CONCRETE SIDEWALK (F)</u>	<u>SQUARE YARD</u>
<u>ITEM 608.26</u>	<u>6" CONCRETE SIDEWALK (CURB RAMPS)</u>	<u>SQUARE YARD</u>

The work under these items shall conform to the relevant provisions of Section 608 of the Standard Specifications and the following.

Amend 2.2 to read:

2.2 Portland cement concrete shall be Class AA (4000 psi) conforming to Section 520.

Add to 2.3:

2.3.1 Curb ramps (at crosswalk locations) shall be 6" deep, class AA 4000 psi synthetic fiber reinforced with 6" x 6" x 10ga welded wire mesh sheets.

2.3.2 4" sidewalks shall be reinforced with synthetic fibers.

Amend 3.2.6.1 to read:

3.2.6.1 Construct transverse and longitudinal crack control joints by sawing, jointing tool or other approved method to a minimum depth of one third the slab thickness. If the jointing tool is not capable of constructing a joint to the correct depth, saw the joint to the correct depth. Saw crack control joints as soon as concrete has hardened sufficiently to permit sawing without excessive raveling and before uncontrolled shrinkage cracking occurs, usually between four and twenty four hours. Control joints for cracking shall be spaced at 5 ft., unless otherwise specified. Construct expansion joints at 25 ft. intervals. Bond breaker shall be used at all construction joints.

Method of Measurement & Basis of Payment see 1.40 – SIDEWALKS, WALKWAYS, AND CURB in SECTION 01270 - MEASUREMENT AND PAYMENT

SPECIAL PROVISION
AMENDMENT TO SECTION 608 – SIDEWALKS

ITEM 608.6**BRICK ISLAND****SQUARE YARD**

The work under these items shall conform to the relevant provisions of Section 608 of the Standard Specifications and the following.

Description

1.1 The work shall consist of constructing brick islands as shown on the plans and as directed in the field by the Engineer.

Materials

2.1 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") (or modular for the herringbone style). The Engineer will have five (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.

Construction Requirements

3.1 All labor and materials shall conform to the State of New Hampshire Standard Specifications for Road and Bridge Construction, Section 608.

3.2 The Contractor shall lay the bricks so that approximately 5 bricks shall cover one square foot (tight joints).

3.3 The brick island shall pitch 1/4 inch per foot towards the street or as directed by the Engineer.

3.4 All half bricks needed for running bond work shall be snapped if possible and all efforts will be made to keep brick dust to a minimum. All cuts not made by snapping shall be wet cut.

Method of Measurement & Basis of Payment see 1.40 – SIDEWALKS, WALKWAYS, AND CURB in SECTION 01270 - MEASUREMENT AND PAYMENT

SPECIAL PROVISION**AMENDMENT TO SECTION 608 – SIDEWALKS****ITEM 608.61 REMOVE AND REPLACE BRICK WALK SQUARE YARD**

The work under these items shall conform to the relevant provisions of Section 608 of the Standard Specifications and the following.

Amend Description to read:

1.1 The work under this item shall conform to the relevant provisions of Section 608 of the Standard Specifications and shall consist of removing and relaying the existing brick surface at the location shown on the contract drawings and the following.

Amend Materials to read:

2.1 The Contractor shall reuse the existing bricks that he or she has removed from the designated area in order to construct the adjacent cement concrete sidewalk. The foundation for the re-laid bricks shall match the existing foundation for the remainder of the brick walkway. The Contractor at his or her expense shall replace any bricks damaged during the removal and storage of the bricks or during the construction of the sidewalk. These replacement bricks shall match as close as possible the color and detail of the original bricks and also shall meet or exceed the requirements specified in Section 608.

Amend Construction Requirements to read:

3.1 The Contractor shall first determine a reasonable limit for the removal of the existing brick walkway that will allow the contractor to complete the construction of the adjacent sidewalk and driveway at the area designated on the Construction Plans. The Contractor shall then remove these bricks in such a way as to not damage them. The removed bricks shall be cleaned off and then stored in a designated area that will prevent them from being stained, chipped or damaged in any way. Bricks that are damaged during their removal or storage shall be replaced at the Contractor's expense. Upon completion of the sidewalk and driveway work, the Contractor shall relay the bricks in such a way as to match any existing pattern on the adjacent brick walkway area. The foundation for the re-laid bricks shall match the foundation for the adjacent brick walkway.

All masonry shall be laid by skilled workmen under adequate supervision, and shall be laid true to lines and levels referred to in previous paragraphs. Masonry work shall not be laid in temperatures below 40 degrees Fahrenheit unless provisions are made to adequately protect the masonry materials and the finished work from frost. All masonry materials used in freezing weather shall be at a temperature between 50 degrees Fahrenheit and 90 degrees Fahrenheit. Protect masonry against freezing for a minimum of forty-eight (48) hours after being laid. Anti-freezing admixtures will not be allowed in the mortar. Frozen work shall not be built upon. Any completed work found to be affected by frost shall be taken apart and rebuilt at the Contractor's expense.

Method of Measurement & Basis of Payment see 1.40 – SIDEWALKS, WALKWAYS, AND CURB in SECTION 01270 - MEASUREMENT AND PAYMENT

SPECIAL PROVISION**AMENDMENT TO SECTION 608 – SIDEWALKS****ITEM 608.71 REMOVE AND REPLACE FLAGSTONE WALK SQUARE YARD**

The work under these items shall conform to the relevant provisions of Section 608 of the Standard Specifications and the following.

Amend Description to read:

1.1 The work to be done under this item consists of removing and resetting existing flagstone walks at locations as shown on the plans or where directed by the Engineer.

Amend Materials to read:

2.1 The reset flagstone walks shall be similar in appearance to the walks which are removed or which are to abut an existing walk. All flagstones shall be thoroughly cleaned before being reset. If existing flagstones are broken or if the use of new stones is necessary to reset the walks, they shall be of the same color and texture as the existing stones. If the existing flagstone walk is set upon a cement concrete base course, a new concrete base course shall be constructed to the same depth as the existing base course and placed on an 8-inch gravel foundation.

Amend Construction Requirements to read:

3.1 It is the intention of this special provision that the reset flagstone walks, at the new locations, shall conform to the existing walks as closely as possible in every detail as approved by the Engineer.

Method of Measurement & Basis of Payment see 1.40 – SIDEWALKS, WALKWAYS, AND CURB in SECTION 01270 - MEASUREMENT AND PAYMENT

SPECIAL PROVISION
AMENDMENT TO SECTION 609 – CURBS

<u>ITEM 609.01</u>	<u>STRAIGHT GRANITE CURB</u>	<u>LINEAR FOOT</u>
<u>ITEM 609.01123</u>	<u>STRAIGHT GRANITE CURB, 12” HIGH WITH 3” X 3” MOUNTABLE BEVELED EDGE</u>	<u>LINEAR FOOT</u>
<u>ITEM 609.01124</u>	<u>CURVED GRANITE CURB, 12” HIGH WITH 3” X 3” MOUNTABLE BEVELED EDGE</u>	<u>LINEAR FOOT</u>
<u>ITEM 609.02</u>	<u>CURVED GRANITE CURB</u>	<u>LINEAR FOOT</u>
<u>ITEM 609.21</u>	<u>STRAIGHT GRANITE SLOPE CURB</u>	<u>LINEAR FOOT</u>
<u>ITEM 609.22</u>	<u>STRAIGHT GRANITE SLOPE CURB WITH RADIAL JOINTS</u>	<u>LINEAR FOOT</u>
<u>ITEM 609.5</u>	<u>RESET GRANITE CURB</u>	<u>LINEAR FOOT</u>

The work under these items shall conform to the relevant provisions of Section 609 of the Standard Specifications and the following.

Add to Materials:

2.8 Concrete Class B, used as backfill for special straight and curved granite curb with mountable beveled edge, shall conform to 520.

Add to 3.1:

Amend 3.1.4.1 Concrete Class B in accordance with Section 520 shall be used for curb backfill as shown on the construction details.

3.1.6 Special straight and curved granite curb with mountable beveled edge shall be as shown on the plans or as order by the Engineer.

3.1.6.1 Concrete Class B shall be used in place of backfill as shown on the plans.

Add to 3.3

3.3.2 Granite curb to be reset shall be a minimum of 3.5 feet in length and in good condition.

Method of Measurement & Basis of Payment see 1.40 – SIDEWALKS, WALKWAYS, AND CURB in SECTION 01270 - MEASUREMENT AND PAYMENT

SPECIAL PROVISION

AMENDMENT TO SECTION 609 – CURBS

ITEM 609.6 REMOVE AND STACK COBBLESTONES LINEAR FOOT

The work under these items shall conform to the relevant provisions of Section 609 of the Standard Specifications and the following.

Amend Description to read:

1.1 Work to be done under this item shall consist of the removal and stacking of existing granite rubble block pavement (cobble) as shown on the plans or as directed by the Engineer.

Granite rubble blocks (cobble) to be stacked shall be stacked neatly on the homeowner's property. Contractor shall contact the owner to coordinate the location and schedule.

Method of Measurement & Basis of Payment see 1.40 – SIDEWALKS, WALKWAYS, AND CURB in SECTION 01270 - MEASUREMENT AND PAYMENT

SPECIAL PROVISION
AMENDMENT TO SECTION 609 – CURBS

ITEM 609.7 **GRANITE SPLAYED END TRANSITION** **EACH**

The work under these items shall conform to the relevant provisions of Section 609 of the Standard Specifications and the following.

Amend Description to read:

1.1 The work shall consist of installing transition curbs between sloped granite edging and vertical curbing at the locations shown on the Plans and as directed by the Engineer.

Method of Measurement & Basis of Payment see 1.40 – SIDEWALKS, WALKWAYS, AND CURB in SECTION 01270 - MEASUREMENT AND PAYMENT

S U P P L E M E N T A L S P E C I F I C A T I O N

ITEM 611.90001

ADJUSTING WATER GATES

EACH

Description

- 1.1** The work shall include adjusting water gates located within the paving limits to match the proposed pavement elevation.

Construction Requirements

- 3.1** Structures within the limits of bituminous concrete pavement shall be temporarily set at the elevation of the bottom of the binder course or as ordered. After the binder course has been compacted, these structures shall be set at their final grade. Backfill necessary around such structures after the binder course has been completed shall be made with Class AA concrete unless otherwise ordered.

Method of Measurement & Basis of Payment see 1.39 – STRUCTURES AND WALLS in SECTION 01270 - MEASUREMENT AND PAYMENT

SPECIAL PROVISION
SECTION 615 – TRAFFIC SIGNS

ITEM 615.031 **ACTIVE DRIVER FEEDBACK SIGN** **EACH**

The work under these items shall conform to the relevant provisions of Section 615 and 616 of the Standard Specifications and the following.

Description

1.1 The work under this item consists of furnishing and installing Active Driver Feedback Signs, complete and in place, as shown in the Contract Documents.

Materials

2.1 The Active Driver Feedback Sign is a dynamic numeric sign that provides motorists passing through real-time feedback as to their vehicle's speed via radar speed detection. It is intended that by providing this feedback, motorist will better obey the speed limit and enhance pedestrian safety. The vehicle speed is to be detected via a radar module mounted within the sign enclosure. Contractor shall submit Shop Drawings and manufacturer's literature in conformance with the standard General Conditions of the construction contract.

2.1.1 Display.

2.1.1.1 The display shall flash the LEDs, independent of the shutters, should the detected vehicle speed exceed the posted speed.

2.1.1.2 The Display shall utilize MUTCD compliant colors and reflectivity, either fluorescent yellow or fluorescent yellow-green, and shall conform to the latest MUTCD standards.

2.1.2 Cabinet.

2.1.2.1 The cabinet and cabinet face shall be constructed out of aluminum and shall be vandal and tamper resistant.

2.1.2.3 The face of the display shall be non-glare UV inhibited high impact polycarbonate.

2.1.2.5 The cabinet shall house the display, radar gun (K-band one-way) and controller in a sealed, weather-tight environment.

2.1.3 Controller.

2.1.3.1 The controller shall be capable of taking radar generated speed input and displaying it on the sign.

2.1.3.2 The local control shall be a lockable, vandal resistant switch to allow for on/off toggle control of the sign at the sign location or shall be hardwired dry contact, allowing the sign to be turned on and off from an existing switching source.

2.1.4 Post.

2.1.4.1 The Active Driver Feedback Speed Sign shall be mounted on a breakaway 4" diameter traffic signal post and 10 feet in height. The post shall utilize a transformer base. Both the base and post shall be constructed out of aluminum (or steel), and shall be black, powder coated. A MUTCD compliant speed limit sign (R2-1, 24"x30") shall be mounted above the LED display and included as part of the assembly.

2.1.5 Foundation.

2.1.5.1 The post shall be mounted on a concrete base per NHDOT Standard Plans for Road Construction No. PS-4.

2.1.6 Solar Panel.

2.1.6.1 The solar panel shall be of an appropriate wattage (minimum 65 watts) to be able to power the Active Driver Feedback Sign in cloudy conditions as well as in areas of overhanging vegetation.

Method of Measurement & Basis of Payment see 1.41 – SIGNS AND TRAFFIC CONTROL in SECTION 01270 - MEASUREMENT AND PAYMENT

S U P P L E M E N T A L S P E C I F I C A T I O N

ITEM 615.065

RELOCATING HISTORIC SIGN

UNIT

Description

1.1 The work to be performed under this item shall include the removal and relocating of the existing Historic sign, post and foundation located in the existing island at the intersection of Maplewood Avenue and Woodbury Avenue.

Construction Requirements

3.1 If the operation of removing and relocating the Historic sign requires the Contractor to store it for any period of time, the storage site shall be approved by the City. The Historic sign shall be wrapped in protective material for storage and eventual resetting. The Contractor shall be responsible for securing the Historic sign and protecting it from damage, theft, or vandalism during storage. The Contractor shall also be responsible for any damage to the Historic sign during the removal and relocating operation.

Prior to installing the Historic sign in its new location, a base of one (1) foot of gravel (1) foot beyond the limits of the existing foundation, shall be placed and thoroughly compacted.

Method of Measurement & Basis of Payment see 1.41 – SIGNS AND TRAFFIC CONTROL in SECTION 01270 - MEASUREMENT AND PAYMENT

SUPPLEMENTAL SPECIFICATION

ITEM 615.066

REMOVE AND STACK ENTRY SIGN

UNIT

Description

1.1 Work under this items includes the dismantling, removal, transporting and stacking an existing entry sign for the Heritage Hill Condominium, and removal of the median island on which it is located. The Contractor shall stack signs at a location specified by the Engineer.

Construction Requirements

3.1 Prior to commencing the work called for under these Items, the Contractor shall coordinate with the owner for the removal and the final stacking location of the sign.

3.2 The work shall also include disconnecting and making safe electrical, removing the supports, excavation of the existing foundations, disposing of the concrete masonry island, backfilling with compacted gravel until full depth driveway pavement can be constructed within the footprint of the island. The Contractor shall be responsible for the protection of the sign until accepted by the sign owner.

3.3 The entry sign is electrified. Prior to commencing the work called for under these items, the Contractor shall coordinate with the property owners and electric utility company to locate panels and disconnect power to the signs. Wires shall be removed and electrical conduit shall be abandoned.

3.4 Any signs damaged through a lack of protection or carelessness on the part of the Contractor shall be replaced by the Contractor at his own expense.

3.5 The hot bituminous pavement for driveways within the footprint of the median island will be paid for under the associated contract items.

Method of Measurement & Basis of Payment see 1.41 – SIGNS AND TRAFFIC CONTROL in SECTION 01270 - MEASUREMENT AND PAYMENT

SPECIAL PROVISION

AMENDMENT TO SECTION 615 – TRAFFIC SIGNS

<u>ITEM 615.0301</u>	<u>TRAFFIC SIGN TYPE C</u>	<u>SQUARE FOOT</u>
<u>ITEM 615.0601</u>	<u>TRAFFIC SIGN TYPE CC</u>	<u>SQUARE FOOT</u>

The work under these items shall conform to the relevant provisions of Section 615 of the Standard Specifications and the following.

Amend 2.9.1.1, 2.9.1.2, and 2.9.1.3 to read:

2.9.1.1 The design, arrangement, color, and spacing of copy shall be in accordance with, the NHDOT Standard Plans for Road Construction, or the MUTCD and the FHWA “Standard Highway Signs”.

2.9.1.2 All sign sheeting and copy materials shall be fabricated from components of compatible systems warrantied by the same manufacturer in accordance with the NHDOT Qualified Products List Product Qualification Criteria/Acceptance Criteria.

2.9.1.3 Blank.

Amend 4.2 and 4.3 to read:

4.2 Traffic sign Type A, B, C will be measured by the square foot, including all necessary posts, footings, bases, and mounting hardware.

4.3 Traffic sign Type AA, BB or CC will be measured by the square foot, including all necessary mounting hardware.

Amend 4.5 to read:

4.5 Removing traffic signs Type C shall be measured by the unit. Removal will include all footings (to a minimum of one foot below finished grade), posts, mounting hardware and all signs on each post.

Method of Measurement & Basis of Payment see 1.41 – SIGNS AND TRAFFIC CONTROL in SECTION 01270 - MEASUREMENT AND PAYMENT

SPECIAL PROVISION
SECTION 616 – TRAFFIC SIGNALS

ITEM 616.21 PEDESTRIAN ACTUATED CROSSING ASSEMBLY LUMP SUM

The work under this item shall conform to the relevant provisions of Section 616 of the Standard Specifications and the following.

Description

1.1: This work consists of furnishing and installing pedestrian actuated crossing assemblies as indicated on the plans or as ordered by the Engineer. Posts and bases shall be black, powder coated. Assemblies at each crosswalk shall have wireless communications so that all corresponding LEDs for a crosswalk activate at the same time. An alternating flash pattern shall be used for signs located on opposing ends of the associated crosswalk.

Materials

2.1: The crossing assembly components shall conform to plan details and notes and FHWA, MUTCD, NEMA, ADA and Table 1 requirements:

Table 1	
LED Modules along Sign Perimeter direction)	Amber LEDs installed within the perimeter of the W11-2 signs. Compliant with MUTCD Section 2A.07.
Flash Pattern	MUTCD Compliant Flash Pattern. Multiple units to flash in synchronized pattern in the same direction without the need for wiring.
Mounting Hardware	Stainless steel u-bolts for 4" to 4 1/2 " O.D. pole.
Housing	NEMA 4 rated fiberglass cabinet with lockable clasps.
Solar Power	Manufacturer to size solar panel to provide sufficient electrical power for all year operation, with full consideration of the local climate, surrounding vegetation, and structures. Panel to conform to IP-67 and include aluminum mounting bracket for 4" to 4 1/2" O.D. pole.
Batteries (one per assembly)	4.8V, 14Ah Sealed battery requiring no periodic watering.
Battery Warranty	3 years
Autonomy	Minimum 14 days without sun.
Control Circuit	IP-67 NEMA rated enclosure, dustproof and waterproof in water up to 3' for 30 minutes.
Frequency	900 MHz FHSS
Range	Minimum 1,500 feet.

Programmability	Up to 50 systems in one network
Communications Port	RS232
Programming	Programming via Windows basic software.
Sign Substrate	Highway grade aluminum meeting MUTCD and NHDOT requirements.
Reflective Sheeting	3M™ DG3 with anti-graffiti overlay
Hardware	Zinc-plated steel anti-vandal fasteners for signs.
Activation	Each assembly shall be activated by push button with audible and visual confirmation. The push button shall be fully ADA compliant.
Operation	The assembly shall be normally dark, shall initiate operation only upon pedestrian actuation, and cease operation at a predetermined time after the pedestrian actuation. All LEDs associated with a given crosswalk shall, when activated, simultaneously commence operation of their alternating flashing indications and shall cease operation simultaneously. The duration of a predetermined period of operation of the assemblies following each actuation should be based on the MUTCD procedures for timing of pedestrian clearance times for pedestrian signals.
Signs	Each sign assembly shall consist of two sets (mounted back to back) of W11-2 (30"x30") with W16-7P (24"x12") signs on each pole. All warning signs shall have the MUTCD fluorescent yellow-green background color. Signs shall be mounted back to back (either side of the pole) such that they are visible from both vehicle approaches to the crosswalk.

Construction Requirements

3.1: General

3.1.1 Crossing assemblies to be set plumb at the required locations on a concrete base in conformance with plan details and notes and FHWA, MUTCD, NEMA and ADA requirements. The base shall have a minimum buried depth of 4-feet in accordance with Manufacturer recommendations. Signs and LEDs shall be visible to both directions of approaching traffic.

3.1.2 No work shall be commenced by the Contractor until approval of the shop drawings and the manufacturer's data has been received in writing from the Engineer. Approval of these drawings shall be general in character and shall not relieve the Contractor from the responsibility of, or the necessity of, furnishing materials and workmanship conforming to the plans and specifications.

Method of Measurement & Basis of Payment see 1.41 – SIGNS AND TRAFFIC CONTROL in SECTION 01270 - MEASUREMENT AND PAYMENT

SPECIAL PROVISION**AMENDMENT TO SECTION 618 – UNIFORMED OFFICERS AND FLAGGERS**

<u>ITEM 618.6</u>	<u>UNIFORMED OFFICERS</u>	<u>ALLOWANCE</u>
<u>ITEM 618.7</u>	<u>FLAGGERS</u>	<u>HOURL</u>

The work under these items shall conform to the relevant provisions of Section 618 of the Standard Specifications and the following.

Add to Description:

1.2 Daily traffic control personnel will be required to facilitate traffic through the work zone quickly and safely. The use of, type of, and number of personnel will be reviewed and approved with the Engineer.

Method of Measurement & Basis of Payment see 1.41 – SIGNS AND TRAFFIC CONTROL in SECTION 01270 - MEASUREMENT AND PAYMENT

SPECIAL PROVISION

AMENDMENT TO SECTION 619 – MAINTENANCE OF TRAFFIC

ITEM 619.1 MAINTENANCE OF TRAFFIC UNIT

The work under these items shall conform to the relevant provisions of Section 619 of the Standard Specifications and the following.

Add to Construction Requirements:

3.4 All work shall be prosecuted so pedestrian and traffic flow can be maintained whenever possible. No travel lane or sidewalk closures will be allowed without prior approval from the Engineer. If lane closures are required, a traffic flagging and/or detour plan will be generated and will need to be approved by the City prior to its implementation

3.5 The Contractor will develop a construction staging plan for this project. The plan shall be submitted to be approved by the Engineer.

3.6 Access shall be maintained to the abutting driveways and entrances at all times during construction. Open lanes of the road shall be graded safely for traffic at all times. A 24 hour contact will be required in case of emergency or safety concerns or in case the road surface needs attention.

3.7 Pedestrian walkways etc. may be ordered by the Engineer if the need arises. The Contractor is responsible for the safety of pedestrians at all times, including non-working hours.

3.8 All costs associated with the application of these measures or other measures directed by the Engineer shall be paid for under these items and will not be further chargeable to the project, except as stipulated and specified under Contract Items.

Amend 5.1.4 to read:

5.1.4 The material cost of permanent construction signs is subsidiary to the Pay Item.

Add to 5.1:

5.1.10 The following items are incidental to the 619.1 Pay Item: Traffic control, construction signs (permanent and temporary), traffic control plans, and traffic cones and barrels.

SPECIAL PROVISION**AMENDMENT TO SECTION 632 – RETROREFLECTIVE PAVEMENT MARKINGS****ITEM 632.321 RETROREFLECTIVE PREFORMED SQUARE FOOT
THERMOPLASTIC PAVEMENT MARKINGS**

The work under these items shall conform to the relevant provisions of Section 632 of the Standard Specifications and the following.

Add to 1.1:

1.2 This work consists of furnishing and installing retroreflective preformed thermoplastic pavement markings which will be used to delineate the bicycle lane as it crosses potential vehicular conflict points. These are to be installed at locations shown on the plans or as directed by the Engineer. The markings will match the width of the crosswalk/bicycle lane. The work includes furnishing and installing the markings as well as all materials that will be part of the work needed to complete the installation.

Add to 2.1:

2.5.4 The retroreflective preformed thermoplastic pavement markings to be used for the bicycle lane shall consist of the PreMark Product with ViziGrip, or approved equal. The markings shall be green in color.

Add to 3.1:

3.1.9 Retroreflective preformed thermoplastic pavement markings to be used for the bicycle lane shall be applied to the pavement surface per manufacturer's application instructions taking into account all aspects such as surface preparation, weather, traffic control and cleanup. The Contractor shall submit Shop Drawings for the bicycle markings and manufacturer's literature in conformance with the standard General Conditions of the construction contract. Approval of this submittal shall be general in character and shall not relieve the Contractor from the responsibility of, or the necessity of, furnishing materials and workmanship conforming to the plans and specifications.

Method of Measurement & Basis of Payment see 1.41 – SIGNS AND TRAFFIC CONTROL in SECTION 01270 - MEASUREMENT AND PAYMENT

S U P P L E M E N T A L S P E C I F I C A T I O N**ITEM 637.3****RESET GRANITE POST****EACH****Description**

1.1 The work under this item shall include the removal and resetting of granite posts and attached light fixtures as shown on the plans or as ordered.

Construction Requirements

3.1 Excavate around the existing granite post so that the post can be removed along with its foundation (if present). The reset locations of the posts shall be as shown on Construction Plans and coordinated with the Engineer. The granite post shall be set plumb and backfilled with gravel borrow. Gravel shall be properly compacted in 6” lifts in order to provide a firm support. The granite post and light fixtures shall be replaced by the Contractor if damaged during construction. The work includes any and all modifications to the wiring and conduit (if present) to accommodate the new locations and to ensure the light fixtures function properly.

Method of Measurement & Basis of Payment see 1.43 – MISCELLANEOUS ROADWAY ITEMS in SECTION 01270 - MEASUREMENT AND PAYMENT

SPECIAL PROVISION
SECTION 645 – EROSION CONTROL

ITEM 645.6

SILT SACKS

EACH

The work under these items shall conform to the relevant provisions of Section 645 of the Standard Specifications and the following.

Description

1.1 The work under this item includes the furnishing, installation, maintenance and removal of a reusable fabric sack to be installed in drainage structures for the protection of wetlands and other resource areas and the prevention of silt and sediment from the construction site from entering the storm water collection system at the locations specified in the contract plans or as directed by the Engineer.

Materials

2.1 The silt sack shall consist of a pre-manufactured non-woven geotextile intended for use as inlet protection; manufactured items include SiltSack, and approved equals.

Construction Requirements

3.1 Contractor shall install per manufacturer's recommendation. Silt sacks shall be maintained weekly or after every storm event. The Contractor shall remove and dispose of the silt sack following construction, and shall remove any accumulated debris inside the Catch Basin.

Method of Measurement & Basis of Payment see 1.42 – EROSION CONTROL AND ENVIRONMENT in SECTION 01270 - MEASUREMENT AND PAYMENT

SPECIAL PROVISION**AMENDMENT TO SECTION 645 – EROSION CONTROL****ITEM 645.512 COMPOST SOCK FOR PERIMETER BERM LINEAR FOOT**

This special provision provides for compost sock for perimeter berm and neither amends nor modifies the provision of this section except as noted below. The intent of this item is to work in conjunction with or in-lieu of silt fence where entrenched silt fence is not feasible.

Description

1.1 The Contractor shall furnish and install degradable compost socks for perimeter berm at locations shown on the SWPPP plans or as ordered. Removal, if necessary, will be subsidiary to the item, and will be conducted as directed by the Engineer. The compost sock for perimeter berm shall be used as such and is not intended for areas which may receive concentrated flows such as channels or restricted outlets.

Materials

2.1 Compost Sock for Perimeter Berm. Sock must be:

- A mesh tube, oval to round in cross section, 12 inches in diameter. Sock must have a minimum durability of one year after installation.
- Composed of knitted biodegradable or photodegradable material with 1/8 to 3/8 inch openings. Fabric must be clean; evenly woven; free of encrusted concrete or other contaminated materials; and free from cuts tears, broken or missing yarns and thin, open, or weak places.

2.2 Compost Media.

- Compost may be derived from green material consisting of chipped, shredded, or ground vegetation; or clean recycled wood products.
- Compost must not be derived from mixed municipal solid waste and be reasonably free of visible contaminants. Compost must not contain paint, petroleum products, pesticides or any other chemical residues harmful to animal life or plant growth. Compost must not possess objectionable odors.

2.3 Chemical, Physical and Biological Parameters.

- Compost products specified for use in this application must meet the criteria specified in Table 1, below.
- Only compost products that meet all applicable state and federal regulations pertaining to its production and distribution may be used in this application. Approved compost products must meet related state and federal chemical containment (e.g. heavy metals, pesticides, etc.) and pathogen limits pertaining to the feedstocks (source materials) in which it was derived.

Table 1 – Compost Media Parameters

Parameters	Reported as (units of measure)	Characteristics
pH ²	pH units	5.0 – 8.5
Soluble Salt Concentration (electrical conductivity)	dS/m (mmhos/cm)	Maximum 5
Moisture Content	%, wet weight basis	30 - 60
Organic Matter Content	%, dry weight basis	25 - 65
Particle Size	% passing a selected mesh size, dry weight basis	3" (75 mm), 100% passing 1" (25 mm), 90% to 100% passing 3/4" (19 mm), 70% to 100% passing 1/4" (6.4 mm), 30% to 75% passing Maximum: particle size length of 6" (152 mm) (no more than 60% passing 1/4" (6.4 mm) in high rainfall/flow rate situations)
Stability Carbon Dioxide Evolution Rate	Mg CO ₂ -C per g OM per day	<8
Physical Contaminants (man-made inerts)	%, dry weight basis	<1

Note: The composition of this media is similar to the vegetated filter berm media from AASHTO R 51. Very coarse (woody) composts that contain less than 30% of fine particles (1 mm in size) shall be avoided, as optimum reductions in total suspended solids (TSS) is desired and berms may be seeded.

Construction Requirements

3.1 Site Preparation. To ensure optimum performance, cut down or remove heavy vegetation, and level uneven surfaces to ensure that the filter sock uniformly contacts the ground surface.

3.2 Installation.

- Prior to installation, clear the area of obstructions including rocks, clods, and debris greater than one inch.
- Fill socks uniformly with compost to the desired length such that the logs do not deform. Secure ends.
- When more than one compost sock is required to achieve desired length, join socks longitudinally with a 1 foot 6 inch overlap.
- Compost sock may be installed using installation method Type 1, Type 2, or a combination:
 - Installation method Type 1:
 - Place directly on the ground with good contact with the finish grade.
 - Secure with wood stakes every 4 feet along the length of the compost sock.

- Secure the ends of the compost sock by placing a stake 6 inches from the end of the compost sock.
- Drive the stakes into the soil so that the top of the stake is less than 2 inches above the top of the compost sock.
- o Installation method Type 2:
 - Place directly on the ground with good contact with the finish grade.
 - Secure with rope and notched wood stakes.
 - Drive stakes into the soil until the notch is even with the top of the compost sock.
 - Lace the rope between stakes and over the compost sock. Knot the rope at each stake.
 - Tighten the compost sock to the surface of the slope by driving the stakes further into the soil.
- Install compost sock approximately parallel to the slope contour or as otherwise specified in the SWPPP or ordered by the Engineer.

3.3 Maintenance.

- Inspect compost socks regularly, and after each rainfall event, to ensure that they are intact and functioning correctly. Remove sediment that builds up behind the sock before it interferes with the functionality of the sock. Deposit the removed sediment within the project limits so that the sediment is not subject to erosion by wind or by water.
- Repair or replace split, torn, or unraveling socks. Replace broken or split stakes. Sagging or slumping compost socks must be repaired with additional stakes or replaced. Correct locations where rills and other evidence of concentrated runoff have occurred beneath the socks. Compost socks must be repaired or replaced within 24 hours of identifying the deficiency.
- Remove sock mesh tubes when directed by the Engineer. Cut mesh and empty sock contents in place and rake to distribute evenly.

Method of Measurement & Basis of Payment see 1.42 – EROSION CONTROL AND ENVIRONMENT in SECTION 01270 - MEASUREMENT AND PAYMENT

SPECIAL PROVISION

SECTION 646 – TURF ESTABLISHMENT

ITEM 646.31

**TURF ESTABLISHMENT WITH MULCH
AND TACKIFIERS**

SQUARE YARD

The work under these items shall conform to the relevant provisions of Section 646 of the Standard Specifications and the following.

Add to 3.3:

3.3.6 The use of hydroseeding will not be permitted within the 100-foot buffer area surrounding wetlands, as shown on the plans or as directed by the Engineer.

SPECIAL PROVISION

AMENDMENT TO SECTION 646 – TURF ESTABLISHMENT

**ITEM 646.315 TURF ESTABLISHMENT WITH MULCH AND SQUARE YARD
TACKIFIERS – STORM WATER/CONSERVATION**

The work under these items shall conform to the relevant provisions of Section 646 of the Standard Specifications and the following.

Amend Materials to read:

2.3 – Seed shall be “New England Erosion Control/Restoration Mix for Detention Basins and Moist Sites” and “New England Conservation/Wildlife Mix” as noted on the landscape plans.

Method of Measurement & Basis of Payment see 1.44 – PLANTINGS in SECTION 01270 - MEASUREMENT AND PAYMENT

SPECIAL PROVISION
AMENDMENT TO SECTION 650 – PLANTING – GENERAL
AMENDMENT TO SECTION 651 – EVERGREEN TREES
AMENDMENT TO SECTION 652 & 653 – DECIDUOUS TREES

<u>ITEM 652.1</u>	<u>STREET TREE 2-2.5 INCH CALIPER</u>	<u>EACH</u>
<u>ITEM 652.06</u>	<u>ACER RUBRUM RED MAPLE</u>	<u>EACH</u>
<u>ITEM 652.69</u>	<u>QUERCUS RUBRA RED OAK</u>	<u>EACH</u>

The work under these items shall conform to the relevant provisions of Section 650 through 653 of the Standard Specifications and the following:

City of Portsmouth Tree Planting Requirements

The base of the City of Portsmouth Tree Planting Requirements is the *ANSI A300 Part 6 Standard Practices for Planting and Transplanting*. ANSI A300 Part 6 lays out terms and basic standards as set forth by industry but it is NOT the “end all” for the City of Portsmouth. The following are the City of Portsmouth, NH Tree Planting Requirements that are in addition to or that go beyond the ANSI A300 Part 6.

1. All planting holes shall be dug by hand- **NO MACHINES**. The only exceptions are **new** construction where new planting pits, planting beds with granite curbing, and planting sites with Silva Cells are being created. If a machine is used to dig in any of these situations and planting depth needs to be raised the material in the bottom of the planting hole **MUST** be firmed with machine to prevent sinking of the root ball.
2. **ALL** Wire and Burlap shall be removed from the root ball **AND** planting hole.
3. The root ball of the tree shall be worked so that the root collar of the tree is visible and no girdling roots are present.
4. The root collar of the tree shall be 2”-3” above grade of planting hole for finished depth.
5. All plantings shall be backfilled with soil from the site and amended no more than 20% with Organic Compost. The only exceptions are new construction where engineered soil is being used in conjunction with Silva Cells and where new planting beds are being created.
6. All plantings shall be backfilled in three lifts and **ALL** lifts shall be watered so the planting will be set and free of air pockets- **NO EXCEPTIONS**.
7. An earth berm shall be placed around the perimeter of the planting hole except where curbed planting beds or pits are being used.

8. 2"-3" of mulch shall be placed over the planting area.
9. At the time the planting is complete the planting shall receive additional water to ensure complete hydration of the roots, backfill material and mulch layer.
10. Stakes and guys shall be used where appropriate and/or necessary. Guy material shall be non-damaging to the tree.
11. All planting stock shall be specimen quality, free of defects, and disease or injury. The City of Portsmouth, NH reserves the right to refuse/reject any plant material or planting action that fails to meet the standards set forth in the ANSI A300 Part 6 Standard Practices for Planting and Transplanting and/or The City of Portsmouth, NH Planting Requirements.

Method of Measurement & Basis of Payment see 1.44 – PLANTINGS in SECTION 01270 - MEASUREMENT AND PAYMENT

SPECIAL PROVISION

**AMENDMENT TO SECTION 655, 656 & 657 – DECIDUOUS SHRUBS & VINES AND GROUND
COVERS**

<u>ITEM 655.02</u>	<u>AMELANCHIER CANADENSIS DOWNY SHADBLOW</u>	<u>EACH</u>
<u>ITEM 655.38</u>	<u>CORNUS SERICEA RED-OSIER DOGWOOD</u>	<u>EACH</u>
<u>ITEM 656.53</u>	<u>SPIREA LATIFOLIA MEADOWSWEET</u>	<u>EACH</u>
<u>ITEM 656.73</u>	<u>VACCINIUM CORYMBOSUM HIGHBLUSH BLUEBERRY</u>	<u>EACH</u>
<u>ITEM 658.736</u>	<u>STUCKENIA PECTINATA PONDWEED</u>	<u>EACH</u>
<u>ITEM 658.915</u>	<u>VALLISNERIA AMERICANA WILD CELERY</u>	<u>EACH</u>

The work under these items shall conform to the relevant provisions of Section 655, 656 and 657 of the Standard Specifications.

Method of Measurement & Basis of Payment see 1.44 – PLANTINGS in SECTION 01270 - MEASUREMENT AND PAYMENT

SPECIAL PROVISION

AMENDMENT TO SECTION 658 – TRANSPLANTING PLANT MATERIAL

ITEM 658.1

REMOVE AND RESET TREE

EACH

The work under these items shall conform to the relevant provisions of Section 658 of the Standard Specifications and the following.

Add to Construction Requirements:

3.2 The method and machinery used for transplanting shall be approved by the Engineer.

S U P P L E M E N T A L S P E C I F I C A T I O N**ITEM 670.067****REMOVE AND REPLACE MAILBOXES****EACH****Description**

1.1 Contractor shall coordinate with the United States Postal Service (USPS) Post Master General for the removal, relocation and resetting of USPS mailboxes. The Contractor shall remove and reset the USPS mailboxes if the USPS is unable to do so, under the direction and agreement of the United States Postal Service. The work also includes the removal, relocation and resetting of privately owned residential mailboxes which conflict with the limits of work. The new locations of the mailboxes to be moved shall be coordinated with the Engineer.

Construction Requirements

2.1 The Contractor shall carefully remove all existing mailboxes and foundations. Existing foundations shall be removed to a depth of at least 2' below the existing ground and the holes backfilled with gravel. The surface shall be patched with a material to match the existing ground or as directed by the Engineer.

2.2 The Contractor shall make every effort to relocate the mailbox in one day so as not to interrupt service. If this is not possible, mailboxes shall be satisfactorily stored and protected until reset in the proposed work. A temporary mailbox shall be provided by the Contractor for the residential locations in order to avoid any interruption in mail service.

2.3 Mailboxes and concrete support foundation lost, damaged or otherwise made unsuitable for reuse while being removed, transported, stored or reset shall be replaced with new material at no additional cost. New attachment hardware shall be furnished and installed as necessary to replace any missing or unusable existing hardware.

Method of Measurement & Basis of Payment see 1.43 – MISCELLANEOUS ROADWAY ITEMS in SECTION 01270 - MEASUREMENT AND PAYMENT

S U P P L E M E N T A L S P E C I F I C A T I O N**ITEM 698.****FIELD OFFICE****MONTH**

SECTION 01520

TEMPORARY FACILITIES

PART 1 -GENERAL

1.01 SCOPE OF WORK:

- A. The Contractor shall provide all temporary facilities as described in this Section for the proper completion of the work, as required and as specified.

1.02 TEMPORARY FIELD OFFICE TRAILER:

- A. Promptly at the start of work on the project, the Contractor shall furnish all labor, materials and equipment, perform all work to furnish, deliver, set up, and maintain for the duration of the project a field office trailer for the exclusive use of the Engineer, including the connection of electric and telephone services. The trailer and furniture shall be relatively new and in good condition and acceptable to the Engineer.
- B. The office shall be adequately lighted for detailed working conditions, heated and air conditioned during the appropriate seasons. The office shall have at least one closet for storage of equipment. The Contractor shall enclose and weatherproof the areas beneath the trailer with insulation and exterior grade plywood.
- C. The trailer shall be located at the work site where it will not interfere with the construction as approved by the Engineer, and shall be not less than 400 square feet. The trailer shall have provisions for locking and the Contractor shall provide two sets of keys to the Engineer.
- D. Space shall be provided adjacent to the trailer for parking for the exclusive use of the Engineer and visitors to the Engineer's trailer. The Contractor shall be responsible for snow removal, dust control etc. for the parking area.

1.03 TEMPORARY FIELD OFFICE TRAILER UTILITIES:

- A. All electric services shall be continuously connected. Electric lights and adequate electric power, proper heat, hot water and satisfactorily cooled drinking water. Enough electrical outlets shall be provided and suitably located in the trailer for the equipment and desks specified in this section of the specifications. The trailer shall have

thermostatically controlled heating and air conditioning units to maintain a minimum temperature of 68°F and a maximum temperature of 72°F.

- B. Toilet facilities shall be provided and maintained in continual service; trash, garbage and other wastes shall be properly and satisfactorily disposed of. The toilet facility shall be built into the trailer or at minimum, a portable type as manufactured by Comfort Castle, Inc., Handy House Toilet Co., Port-o-Let, or an approved equal. This unit shall be installed as a complete facility with regular maintenance and pump-outs as required.
- C. Janitor service, to keep the quarters and equipment neat and clean as acceptable working space, shall be furnished weekly by the Contractor. Repairs shall be made from time to time, as required by the Engineer.
- D. The Contractor shall submit catalogs and vendors' data for the trailer and for the additional equipment and furnishings for review and approval by the Engineer.

1.04 TEMPORARY FIELD OFFICE TRAILER EQUIPMENT AND FURNISHINGS:

- A. The Contractor shall also furnish the following computer equipment:

1. **Laptop Computer System Hardware and software:** Intel i5, AMD A10/FX series CPU computer or better; minimum 4 GB RAM; 500 GB or greater hard drive; minimum 4 GB RAM; minimum 500 GB hard drive; CD-RW/DVD-ROM, 10/100/1000 Ethernet; 802.11ac wireless; and a 17-inch LED display. The laptop shall have speakers and shall include the following:

100 CD-R rewritable computer discs

External Mouse: Optical mouse with scroll (USB or PS/2) or equivalent

External Keyboard: Standard 104-key

Printer: HP LaserJet printer or better

Operating System: Windows 7/10 Professional

Software: MS Office Professional (latest edition); industry standard antivirus with 2-year subscription

Connectivity: minimum of 4 high-speed USB 2.0/3.0 ports

2. **Internet Access:** All computers must have an Internet access account. Broadband internet is preferred where available (minimum 25 mbps down/3 mbps up). Only high-speed internet access will be provided. DSL or mobile broadband (assuming

adequate cellular signal exists at the location) are acceptable in areas where broadband is unavailable.

B. The Contractor shall also furnish the following, as a minimum:

- 1 Class ABC type Fire Extinguisher of at least 4-lb capacity
- 1 First aid kit as specified herein – **Refer to Paragraph 1.05 A below**
- 1 Double desk - Formica top with three 2 drawer, steel file cabinets under
- 2 Straight back chairs – metal
- 8 Folding metal chairs
- 1 3' X 6' Conference Table
- 1 Drafting table - 3' X 5'
- 1 Swivel type drafting stool with back - metal
- 1 Air conditioner - Automatic heating - gas or electric
- 1 Toilet facility
- 1 Electric water cooler with refrigerator compartment and continual supply of spring water and paper cups
- 1 Four-drawer filing cabinet with lock, fire proof or fire resistant
- 2 Wastebaskets with provisions for trash collection
- 1 Plan Rack
- 1 Printer/Copier/Fax/Scanner (plain paper) including paper and toner and dedicated phone line

- 1 Digital Camera – Canon SD 1000. 7.1 megapixel with 1 GB SD memory card. Provide the necessary hardware/software to allow the downloading of photos to the computer system provided above.

1.05 TEMPORARY FIELD OFFICE TRAILER SAFETY EQUIPMENT:

A. FIRST AID KIT shall be wall mount cabinet and must include the following:

Band-Aids – Fingertip	1 Box
Band-Aids – Knuckle	1 Box
Band-Aids – Strip	1 Box
Band-Aids – Large Patch	1 Box
Band-Aids – Butterfly – Large	1 Box
Band-Aids – Butterfly – Small	1 Box
Triangular Bandage	1 Each
Compression Bandage	2 Each
Roller Bandage	2 Each
Gauze Pads (3”X3”)	1 Box
Gauze Pads (4”X4”)	1 Box
Waterproof Tape	1 Roll
Latex Gloves	1 Box
Anti-Microbial Towelettes	1 Box
Hydrocortisone Ointment Packets	1 Box
Antibiotic Ointment Packets	1 Box

Burn Gel Packets	1 Box
Scissors	1 Pair
Tweezers	1 Pair
Ice Packs- (Chemical Activated)	4 Each
Saline Eyedroppers	1 Box
CPR Pocket Mask	1 Each
Cotton Balls	1 Box
Flashlight with Working Batteries	1 Each

- B. Contractor to provide stairs and platforms to doorway(s) of field offices and window shades, blinds, or curtains. Screens and storm windows shall also be provided.

1.06 TEMPORARY TOILETS:

- A. The Contractor shall provide and pay all costs for toilet booths with chemical type toilets, as necessary for all persons engaged in the Work.

1.07 TEMPORARY ELECTRICITY:

- A. The Contractor shall at his own expense make all arrangements for and provide all temporary light and power for all Subcontractors and trades, except as otherwise specified herein. The temporary electrical service shall include, but not be limited to, all labor, materials, and equipment necessary to supply temporary power of adequate capacity for the Project operations and testing. Transformers and meters, when required by the power company will be furnished and installed by the appropriate power company, and the Contractor shall pay all costs therefor.
- B. The Contractor shall pay the cost of all electrical energy consumed during prosecution of the Work. The Contractor at his own expense shall maintain all lamps in operating condition. The Contractor and each Subcontractor shall furnish their own extension cords and all additional lamps as they may require. Temporary wiring of a special nature not otherwise specified, shall be furnished, installed, maintained, and paid for by the trade requiring such wiring.
- C. All temporary work shall be furnished and installed in conformity with the National Electrical Code and state and city laws, and requirements of the applicable power company.
- D. The Contractor shall dismantle and completely remove from the Project all temporary wiring and other temporary electrical accessories only when the permanent electrical system has been installed and in operation, and then only with written approval of the Engineer.

1.08 TEMPORARY STRUCTURES:

- A. The Contractor shall provide, maintain, and remove such additional storage sheds, temporary buildings, or trailers as required for performance of the Work. Location of all such temporary structures shall be acceptable to the Engineer. If the Contractor is

required to relocate these Temporary Structures during the prosecution of the Work, the Contractor shall promptly do so at no increase in Contract Price or Contract Time.

1.09 HOISTING, SCAFFOLDING, STAGING, AND PLANKING:

- A. Except as otherwise specified in the various Sections of the Specifications, the Contractor shall provide, set up and maintain all derricks, hoisting machinery, scaffolding, staging, and planking, and do all hoisting required for the Work, or any part of the Work.

1.10 TEMPORARY STAIRS, RAMPS, AND CHUTES:

- A. The Contractor at its own expense shall furnish, install, and maintain all temporary ramps, stairs, ladders, and chutes as required by the Contractor, all Subcontractors and trades for the proper completion of the Work. The Contractor shall remove these and other like items when they are no longer required and permanent stairs are installed.
- B. When permanent stairs are erected the Contractor shall provide all required safety measures including temporary railings, protective treads, and other protective measures.

1.11 TEMPORARY HEAT:

- A. The Contractor shall be responsible for all temporary heat. The temporary system shall be completely independent of the permanent heating system. The Contractor shall furnish, install, and pay for an independent system of sufficient capacity to service the needs of the Project and to protect the existing building's fixtures, equipment finishes and mechanical systems from damage during the Contract Time.
- B. Installation of weather protection and heating devices shall comply with all safety regulations including provisions for adequate ventilation and fire protection devices.
- C. The Contractor shall furnish and install one accurate automatic recording Fahrenheit thermometer at each place designated by the Engineer to ensure that specified temperatures are maintained.
- D. The Contractor shall pay costs of all fuel, electricity, temporary boilers, devices, accessories, and all necessary wiring and controls required for temporary heating until Substantial Completion.
- E. The Contractor shall be responsible for all temporary heat during the Contract Time, and shall be liable for any damage to the Work, or any part thereof caused by the Contractor's failure to supply adequate and proper temporary heat.

PART 2 - PRODUCTS

NOT PART OF THIS SECTION

PART 3 - EXECUTION

3.01 UTILITIES:

- A. All monthly service charges for telephone, electricity, Dial-Up connection service, water supply, and heating of the Temporary Field Office Trailer shall be paid for by the Contractor.

3.02 COMPUTER EQUIPMENT:

- A. All monthly charges and maintenance fees for the computer system and digital camera and associated hardware and software licenses provided shall be paid for by the Contractor.

Method of Measurement & Basis of Payment see 1.53 – FIELD OFFICE in SECTION 01270 - MEASUREMENT AND PAYMENT

END OF SECTION

S U P P L E M E N T A L S P E C I F I C A T I O N**ITEM 1001.101****HEALTH AND SAFETY PLAN****LUMP SUM****SECTION 13710****HEALTH AND SAFETY PLAN REQUIREMENTS****PART 1 - GENERAL****1.1 DESCRIPTION**

- A. This work shall consist of preparing and implementing a Health and Safety Plan (HASP) to establish protocols necessary for protecting workers and the general public from potential hazards during excavation, backfill and pipe installations. Excavated soils encountered in urban development areas often include petroleum contaminants from leaking underground storage tanks (UST's), ash and VOC's as well as other naturally occurring or man-made compounds that may be regulated such as arsenic. The HASP is meant for all personnel associated with excavation, pipe laying, backfill and/or trenching operations and other personnel observing the work who could come in contact with regulated soils, compounds, materials and groundwater. The HASP shall be prepared in accordance with 29 CFR 1910.120.

1.2 REQUIREMENTS

- A. The Contractor shall develop a HASP using these requirements as a baseline and incorporating additional requirements where necessary. The HASP must establish in detail the protocols necessary for protecting workers and potential off-site receptors from any potential hazards encountered during construction.
- B. The HASP shall address the safe work practices and engineering safeguards to be employed for the work performed by the Contractor. These shall include but not be limited to the following:
1. Descriptions of personal protective equipment and clothing used as part of the different levels of protection. Respiratory protection shall also be addressed. The Contractor shall maintain an air quality monitor (for VOC detection) and explosimeter, to aid in the quick detection of methane or other potentially explosive gasses.

1.3 SUBMITTALS

- A. The HASP shall be submitted to the Engineer a minimum of fourteen (14) days prior to earthwork.
- B. A Closeout Safety Report shall be submitted by the contractor to the Engineer on completion of the work. This report shall summarize the weekly safety reports and

provide an overview of the contractor's performance with regard to the HASP requirements.

C. Accident Reports.

1.4 LEVELS OF PROTECTION

- A. The Contractor shall include in the HASP a list of tasks and specific levels of protection for each task. Levels of protection may be upgraded or downgraded during site activities, based upon air monitoring results, meteorological conditions and the professional judgment of the SSHO.

1.5 PERSONAL SAFETY EQUIPMENT AND PROTECTIVE CLOTHING

- A. The Contractor shall provide on-site personnel with appropriate safety equipment and protective clothing, when required by the HASP and shall ensure that all safety equipment and protective clothing is kept clean and well maintained. Specific levels of respiratory, and clothing protection shall be established in the HASP.

1.6 AIR MONITORING

- A. General Requirements
1. The Contractor shall develop and implement an Air Monitoring Program to detect and quantify any volatilization of soil contaminants or release of soil particles associated with the work and the surrounding air. The program shall be consistent with the requirements of this section and submitted as part of HASP for review by the Engineer.
 2. Information gathered during the air-monitoring program shall be logged and included in the project records and safety and health record file.

PART 2 - PRODUCTS

(NOT PART OF THIS SECTION)

PART 3 - EXECUTION

(NOT PART OF THIS SECTION)

Method of Measurement & Basis of Payment see 1.47 – HEALTH AND SAFETY PLAN in SECTION 01270 - MEASUREMENT AND PAYMENT

S U P P L E M E N T A L S P E C I F I C A T I O N

<u>ITEM 1001.102</u>	<u>MANAGEMENT OF SOILS & MATERIALS</u>	<u>LUMP SUM</u>
<u>ITEM 1001.103</u>	<u>LOAD AND HAUL SURPLUS REGULATED SOILS</u>	<u>TON</u>
	<u>& MATERIALS (WHERE DIRECTED)</u>	
<u>ITEM 1001.104</u>	<u>DISPOSAL OF REGULATED SOILS</u>	<u>ALLOWANCE</u>
	<u>& MATERIALS (WHERE DIRECTED)</u>	
<u>ITEM 1001.105</u>	<u>ANALYTICAL TESTING OF SOILS</u>	<u>ALLOWANCE</u>
	<u>(WHERE DIRECTED)</u>	
<u>ITEM 1001.106</u>	<u>DISPOSAL OF REGULATED</u>	<u>ALLOWANCE</u>
	<u>GROUNDWATER (WHERE DIRECTED)</u>	

SECTION 13100

MANAGEMENT & DISPOSAL OF SOILS AND GROUNDWATER

PART 1 - GENERAL

1.1 DESCRIPTION

- A. This work shall include the management, transport, treatment and/or disposal of soils and groundwater transported and disposed of at an offsite facility.

1.2 REQUIREMENTS

- A. Unless specified or indicated, monitoring, testing, treatment (or disposal) of regulated soils and groundwater, or other materials, including sampling protocols and testing shall conform to applicable regulations, including but not limited to:
1. New Hampshire Hazardous Waste Rules He-P 1905.
 2. RSA 146-A, RSA 146-C, and RSA 146-D, (Administered by the NHDES Water Supply and Pollution Control Division).
 3. RSA 147-A, and RSA 147-B, (Administered by the NHDES Waste Management Division).
 4. RSA 125-C (Administered by the NHDES Air Resources Division).
 5. US Laws 29 Code of General Regulations (CRF) 1910 OSHA (Hazardous Materials Training).
- B. Work shall include documenting and tracking all excavation materials (regulated and non-regulated) in accordance with applicable local, state and federal regulations. Said documentations will be provided to the owner upon project completion or upon request.

PART 2 - PRODUCTS

2.1 MATERIALS

- A. Contractor shall prepare and implement a Health and Safety Plan (HASP) for open excavations. (Section 13710)

PART 3 – EXECUTION

SURPLUS MATERIAL -

3.1 CONSTRUCTION REQUIREMENTS

- A. Notify Owner immediately upon encountering soils regulated for disposal (or soils that are suspected to be regulated for disposal).
- B. Segregate regulated soils from non-regulated materials.
- C. Incorporate all regulated soils into project backfill wherever possible, and as soon as possible.
- D. The Engineer and the Owner reserve the right (utilizing an environmental consultant) to field screen surplus excavated material and claim material to be incorporated into the project as backfill, whether regulated or un-regulated.
- E. Regulated soils that represent a threat to the environment or groundwater shall be appropriately secured and covered during stockpiling to prevent emissions or leaching of contaminants into groundwater. Covers shall be secured to prevent displacement or damage from wind, rain or other adverse weather conditions.

3.2 REGULATED SOIL DISPOSAL

- A. The method of disposal of soils shall be approved by the Engineer and the Owner's representatives.

3.3 REGULATED GROUNDWATER DISPOSAL

- A. In order to facilitate the treatment of potential contaminated groundwater, the Contractor shall obtain a Temporary Ground Water Discharge Permit from NHDES or authorization to discharge groundwater to the Owner's sanitary sewer system. A Temporary Surface Water Discharge Permit will require obtaining a NPDES permit exclusion from the United States Environmental Protection Agency for this activity.
- B. Review trench dewatering methods and groundwater disposal with the Owner. Obtain owner approval for any special handling of groundwater.
- C. Health and Safety precautions shall conform to the approved Project Health and Safety Plan.

Method of Measurement & Basis of Payment see 1.48 THROUGH 1.52 in SECTION 01270 - MEASUREMENT AND PAYMENT

SPECIAL PROVISION
AMENDMENT TO SECTIONS 650 – PLANTING – GENERAL

ITEM 1008.51 **ALTERATIONS AND ADDITIONS AS** **ALLOWANCE**
NEEDED - MISC. LANDSCAPE TREATMENT

The work under these items shall conform to the relevant provisions of Sections 650 through 658 of the Standard Specifications and the following.

Description

1.1: The item for Misc. Landscape Treatment shall provide an allowance for general landscaping (where directed) to mitigate project impacts to abutters existing landscaping. Landscaping will be located as directed by the Engineer. Specific plantings called for on the plans that have a respective bid item will not be included in this item.

Method of Measurement & Basis of Payment see 1.44 – PLANTINGS in SECTION 01270 - MEASUREMENT AND PAYMENT

APPENDIX A: GEOTECHNICAL REPORT

Greenman – Pedersen, Inc.
Weston & Sampson Project No. 2150737

August 2, 2017

Greenman – Pedersen, Inc.
C/o Mr. John M. Sykora III
Weston & Sampson Engineers, Inc.
100 International Drive, Suite 152
Portsmouth, NH 03801

**RE: Geotechnical Engineering Report
Maplewood Avenue Utility Improvements
Portsmouth, New Hampshire**

Weston & Sampson is pleased to present this letter summarizing our geotechnical evaluation and recommendations for the proposed Maplewood Avenue infrastructure improvement project in Portsmouth, New Hampshire. Weston & Sampson previously prepared a preliminary geotechnical recommendations memorandum for the project, dated October 20, 2016, which recommended additional explorations for final design. The additional explorations were completed in April 2017. This geotechnical report summarizes the results of our subsurface exploration programs for the project, and presents geotechnical recommendations for design and construction of the proposed utilities.

PROJECT UNDERSTANDING

The project includes replacement of sewer, drainage, and water utility pipes and manhole structures along approximately 10,250 linear feet (ft) of roadway below portions of Maplewood Avenue, Fairview Drive, Central Avenue, Beechwood Street, Cutts Street, Ashland Street, Leslie Drive, and Woodbury Avenue, as well as a utility easement between Fairview Drive and Woodbury Avenue. The project also includes construction of a new drainage outfall in a utility easement north of Maplewood Avenue (between 1179 and 1185 Maplewood Street). The roadways are generally in residential neighborhoods, and are relatively flat. Curb-to-curb pavement reconstruction along all roadways in the project area is proposed. Minor re-grading along the roadways is anticipated. The project area is shown in *Figures 1A and 1B*.

The proposed pipes range in diameter from 8 to 24 inches, with invert depths ranging from 3 to 15 ft below existing grade. *Table 1* below summarizes the proposed utility conditions, as based on our review of June 22, 2017 permit plans titled "Improvements to Maplewood Avenue & Adjacent Areas" prepared by Weston & Sampson.

Table 1 - Summary of Proposed Conditions

<u>Sewer Replacement</u> (8 to 12 inch diameter PVC pipes)		
Section of Road	Replacement Length (ft)	Invert (depth, ft)
Maplewood Avenue	1,080	6 to 11
Fairview Drive	790	8 to 12
Central Avenue	65	6
Cutts Street	170	6
Leslie Drive	90	6 to 7
Easement between Fairview Drive and Woodbury Avenue	175	8 to 15

<u>Drainage Replacement</u> (12 to 24 inch diameter HDPE pipes)		
Section of Road	Replacement Length (ft)	Invert (depth, ft)
Maplewood Avenue	2,200	4 to 7
Fairview Drive	410	4 to 5
Central Avenue	400	5 to 7
Beechwood Street	100	4 to 5
Cutts Street	200	4 to 5
Leslie Drive	840	4 to 6
Easement between Fairview Drive and Woodbury Avenue	175	3 to 5

<u>Water Replacement</u> (8 to 12 inch diameter Ductile Iron pipes)		
Section of Road	Replacement Length (ft)	Invert (depth, ft)
Maplewood Avenue	3,450	5
Central Avenue	950	5
Beechwood Street	350	5
Cutts Street	1,025	5
Ashland Street	350	5

Note: Replacement lengths and invert depths are approximate.

Several new manholes and catch basins, approximately 10-ft by 10-ft in plan and extending at a minimum to the pipe inverts shown in Table 1, will be installed as part of this project. Final sizing of these manholes will take place during final design. Loads on these structures are not available at the time of this report. For the purposes of this report and based on our experience with similar projects, we assume that load imposed at

the bottom of the new manhole/catch basin structures is less than the weight of soil removed to install the new structure, resulting in no net increase in pressure on the underlying materials. If actual design conditions differ from our assumptions stated herein, we should be engaged to review the changes and provide additional/revised geotechnical recommendations as appropriate.

Several utilities exist within the project alignment. Vertical relocation of these utilities may be necessary to avoid conflicts with the new utilities.

SUBSURFACE EXPLORATION AND CONDITIONS

Geology

According to the Surficial Geologic Map of the Portsmouth and Kittery Quadrangles prepared by the New Hampshire Department of Environmental Services, surficial geology conditions at the site include glacial till and bedrock. Unit thicknesses were not indicated on the map. Bedrock outcrops are indicated at the north ends of Central Avenue and Cutts Street. According to the Bedrock Geologic Map of New Hampshire prepared by the US Department of Energy and the State of New Hampshire, bedrock in the project area is mapped as calcareous metasandstone and purple and green phyllite of the Kittery Formation.

Subsurface Explorations

Subsurface conditions in the project area were initially explored between December 16, 2015 and January 5, 2015 by completing 29 test borings (B-1 through B-21, B-23 to B-25, B-27 to B-31) and 29 test probes (P-1 through P-27, P-32, P-33). Subsurface conditions were further explored between April 10 and 21, 2017 by completing 9 test borings (B-101 through B-107, B-109, B110), 1 test probe (P-101), and 17 pavement cores with shallow sampling (C-1, C-2, C-4 through C-18). The approximate locations of the explorations are shown in **Figures 1A and 1B**.

All explorations were completed by New England Boring Contractors of Derry, New Hampshire using a truck-mounted drill rig. The test borings and probes were completed using hollow-stem auger or drive-and-wash drilling methods. Standard penetration tests (SPTs) and sampling were conducted in each boring by driving a 24 in. long by 1-3/8 in. inside diameter (2 in. outside diameter) split spoon sampler with blows from a 140 lb. cathead operated safety hammer or automatic hammer falling freely for 30 in. per blow. Sampling intervals were generally every 2 to 5 ft. Test probes were completed without sampling, except at P-13, where rock was cored. Drilling refusal, where noted in the test boring and test probe logs, is defined as no discernable auger/roller bit advancement over a period of approximately 5 minutes. SPT refusal, where noted in the boring logs, is defined as 100 hammer blows for less than 6 inches of sampler penetration.

The pavement cores were completed using a 4 in. diameter coring shoe attached to 4 in. diameter steel casing. Soil samples below the pavement were collected from depths ranging between 1 and 6.5 ft. using a steel hand auger and 2 and 3 in. outside diameter split-spoon samplers.

Weston & Sampson engineering staff monitored drilling activities in the field and prepared logs for each exploration. Subsurface conditions encountered in the explorations are described in the following sections.

Subsurface Conditions

General – Subsurface conditions encountered below asphalt concrete pavement generally consisted of BASE COURSE FILL and/or SAND FILL above layers of native SAND, GLACIAL TILL and/or BEDROCK along most of the project alignment. Generally along and near Central Avenue, subsurface conditions encountered also consisted of native SILT, CLAYEY SILT, SILTY CLAY below the FILL layers.

General subsurface conditions encountered in the borings are described in the following sections. Detailed descriptions of conditions are provided in the attached ***Boring, Probe and Pavement Core Logs***.

Asphalt Concrete Pavement – The asphalt concrete (AC) pavement surface in the explorations ranged from 2 to 10-inches thick. Approximately 3.5 to 12-inches of concrete was encountered directly below the pavement in B-101 completed on Woodbury Avenue and in P-22 and P-23 completed on Cutts Street.

Base Course Fill – Medium dense to very dense BASE COURSE FILL was encountered below the AC pavement in about half the borings and cores. The layer was generally about 5 inches thick but ranged from 1.5 inches to greater than 24-inch thick in C-6. Where encountered, this layer was generally comprised of fine to coarse sandy gravel, gravelly sand, or fine to coarse sand with trace to little silt.

Sand Fill – Loose to very dense SAND FILL was encountered below the base course fill or AC pavement where indicated on the exploration logs to depths ranging from 1 to 9 ft. This layer was generally comprised of fine to coarse sand with variable amounts of gravel and silt and occasional debris fragments including asphalt, brick, and concrete. An approximately 1-foot thick layer of medium stiff BURIED TOPSOIL, comprised of brown silt with some fine sand and trace roots, was encountered below the fill in B-110 between the approximate depths of 2 and 3 ft.

Silt, Clayey Silt, Silty Clay – Very soft to very stiff SILT, CLAYEY SILT, and SILTY CLAY layers with various amounts of silt, clay, sand and gravel was encountered below the base course fill and/or sand fill generally in borings near and along Central Avenue, including borings B-12, B-19, B-20, B-24, B-25, B-105, B-106, and B-107, as well as borings B-16 and B-110 on or near Maplewood Avenue. In boring B-110 trace organic material (fine roots) was encountered within the layer. Depth to top of this layer range from about 2 ft to 8 ft below ground surface.

Sand – Medium dense to very dense SAND was encountered below the fill, buried topsoil, silt, or silty clay in many of the exploration logs. This layer was generally comprised of fine to coarse SAND with variable amounts of gravel and trace to little silt. Auger/roller bit grinding was noted in this layer at a few exploration locations, which could be indicative of the presence of cobbles and/or boulders.

Glacial Till – Medium dense to very dense GLACIAL TILL was encountered below the fill, sand, or silty clay where indicated on the exploration logs. This layer was generally comprised of fine to coarse sand with variable amounts of gravel and silt. Auger/roller bit grinding was noted in this layer at a few exploration locations, which could be indicative of the presence of cobbles and/or boulders.

Refusal/Rock – Drilling refusal was encountered in most of the borings at depths ranging from approximately 1.5 to 18.5 ft. Rock coring was completed at or about 1 ft. below drilling refusal in B-102, B-103, B-104, B-

109, and P-13. Rock at these locations was classified as hard, fine grained, moderately to intensely fractured SANDSTONE or PHYLLITE with slightly to moderately weathered, closely to moderately spaced joints. The rock quality designation (RQD) of the core samples ranged from 0 to 79 percent indicating very poor to good quality rock. High water loss and core barrel “jamming” observed during sampling at a few locations is further indicative of poor quality, highly fractured bedrock.

Rock core sampling was not completed at other exploration locations where drilling refusals were encountered. Therefore, refusals could have been on very dense soils, cobbles, or bedrock.

Groundwater – Groundwater was observed based on wet samples at depths ranging from approximately 3.5 to 13 ft. We anticipate that groundwater levels will fluctuate with season, variations in precipitation, construction in the area, and other factors. Perched groundwater conditions could exist close to the ground surface, especially during and after extended periods of wet weather.

Laboratory Testing

Fifteen (15) grain size distribution analyses (ASTM D422) were completed on samples of the base course fill and underlying fill and sand layers taken from pavement core locations to aid in classification of these layers. All laboratory tests were performed by GeoTesting Express of Acton, Massachusetts. Laboratory test results are attached.

GEOTECHNICAL RECOMMENDATIONS

The following recommendations are based on our project understanding and assumptions as described above. If changes are made to proposed alignments, grades, structure types, depths, and project approach, the following conclusions and recommendations may not be applicable. If design changes are made, we should be retained to review our conclusions and recommendations and provide a written evaluation or modification.

Based on the subsurface conditions encountered in the borings/probes and the bottom elevations of the proposed infrastructure, it is anticipated that the proposed structures will bear within a variety of the subsurface layers described above. Portions of the pipe lines may bear within the fill layer.

The existing subsurface materials, with the exception of fill, and organics, are geotechnically suitable for support of the proposed infrastructure. At locations where fill and organic deposits are encountered at subgrade level, unsuitable soils should be removed completely, over-excavated and replaced with structural fill. Placed subgrade or bedding consisting of coarse material (such as crushed stone) should be wrapped in filter fabric to prevent soils migration. During construction, excavations should be observed by a representative of the Owner, and if required, a Geotechnical Engineer, to evaluate the supporting capabilities of the bearing materials and provide recommendations for stabilization procedures as appropriate.

Structures bearing on native sand or glacial till or properly constructed structural fill overlying these soils should be designed using an allowable bearing pressure of 4,000 pounds per square foot (psf). Structures bearing on native silt/silty clay/clayey silt layer should be designed using an allowable bearing pressure of 1,000 psf.

We recommend the placement of 12 inches of structural fill or compacted crushed stone wrapped in filter fabric below the structures, and the placement of 6 inches of bedding below the pipeline. Pipe bedding material should be selected and installed in accordance with the pipe manufacturers' recommendations. Subgrade soils that exhibit excessive rutting, pumping, or other signs of instability during construction should be stabilized in place by placing a 12 inch thick crushed stone wrapped in filter fabric and/or geosynthetic reinforcement to create a working mat.

Design of the structures should be in accordance with the AASHTO LRFD Bridge Design Specifications, Seventh Edition, 2014, and consider lateral loadings exerted by earth, groundwater, and surcharge loads such as construction, and traffic loads as appropriate. Structures should be assumed to be fully submerged, with groundwater level assumed to be at ground surface. The following lateral earth pressure parameters are recommended for the design of below-grade structures.

Table 2- Lateral Earth Pressure Parameters

Parameter	Value
Angle of Internal Friction, ϕ (degrees)	27
Coefficient of At-Rest Earth Pressure, K_0	0.55
Total Unit Weight, γ (pounds per cubic foot)	120
Effective Unit Weight, γ' (pounds per cubic foot)	58

Note: These values neglect friction between the backfill and the structure and assume vertical walls, and level backfill/ground surface.

A uniform lateral pressure of 150 psf should be added to the above lateral earth pressures and applied over the full backfill height of embedded structures to account for vertical surcharge pressures up to 300 psf at the ground surface. Additional lateral pressures equal to 0.5 times the additional surcharge pressure should be added where vertical surcharge pressures exceed 300 psf.

Embedded structures should be designed with sufficient mass, friction around the perimeter, foundation configuration, and/or anchors to resist full depth hydrostatic uplift. The construction sequence must also be planned so that uplift is resisted.

Since there is no load increase, and no grade changes are being considered, post-construction total settlements of the new infrastructure are estimated to be less than 1 inch with proper subgrade preparation, backfilling, and compaction as recommended herein.

CONSTRUCTION RECOMMENDATIONS

Excavation Considerations

Excavation to establish pipe invert depths are expected through varying subsurface conditions along the alignments including granular fill and native sand, glacial till, very soft to hard fine grained soils (silt, clayey silt, and silty clay), and bedrock. Occasional cobbles and boulders will likely be encountered while excavating through the overburden soil layers. The contractor will need to adjust his methods of excavation, dewatering, excavation support, and subgrade preparation to accommodate the encountered subgrade conditions.

Any organic soil or debris materials at pipe invert or manhole structure subgrade elevations should be removed to expose underlying, inorganic native soils.

Excavation Support

Excavations for the proposed infrastructure will extend 5 to 16ft. below existing ground surface, and below groundwater in some areas. Excavation should not extend into the zone-of-influence of existing utility pipes or other structures without proper excavation support or underpinning. The zone-of-influence is defined by planes extending horizontally away from the outside edges of pipes/foundations for 2 ft. and then down and away at a 1H:1V slope.

Installation of most of the infrastructure alignment with invert elevations less than 8 ft in depth can likely be conducted using trench boxes, provided they are not immediately adjacent to an existing utility sensitive to movement; trench boxes do not provide effective lateral soil support and should not be used adjacent to movement sensitive utilities such as gas lines, electrical lines, or old and breakable utilities.

Installation of infrastructure with invert elevation greater than 8 ft, will likely require temporary excavation support. Shoring systems such as sheet piling and drilled soldier piles and lagging combined with dewatering systems may be used, however caution must be taken to control the potential for soil movement, to prevent soil movements and/or settlement behind excavation system support elements.

The shoring system should be designed and stamped by a professional engineer licensed in the State of New Hampshire to support lateral earth pressures, construction surcharge loads, unbalanced hydrostatic pressures, and surcharges from adjacent structures and utilities, if present. Excavation support systems should be designed, installed, and monitored in accordance with OSHA Standards and all other applicable laws, regulations, rules, and codes.

Dewatering

All excavation, installation of utility pipes and manholes, and fill placement and compaction should occur in-the-dry. Groundwater and surface water should be controlled during construction and prevented from eroding excavation sidewalls and disturbing subgrade materials. Excavations will encounter groundwater and moderate to severe caving should be expected where seepage is present in granular soils. Flowing conditions are likely where granular soils are present below the groundwater table. Dewatering will be necessary for all excavations below the groundwater table and where seepage is encountered.

The dewatering system should be capable of adapting to variable flows and soil conditions and be capable of lowering and maintaining the groundwater table at least 2 ft. below excavation bases. In areas of shallow groundwater and granular soils, the groundwater table might need to be lowered prior to the start of excavation. The dewatering system should be kept operational until fill placement and compaction has been completed to a level of at least 12-inches above groundwater seepage elevations.

The dewatering system(s) should be designed by a professional engineer licensed in the State of New Hampshire experienced with dewatering design that is retained by the contractor.

Bedrock Excavation

Refusal conditions were encountered at many locations as described above, and proposed invert depths extend below the refusal depths at several locations including but not limited to sections of Maplewood Avenue, Fairview Drive, and Leslie Drive. Therefore, bedrock excavations should be anticipated in these areas.

Difficult excavations and the need for large equipment with rock teeth, hydraulic hammers, and blasting should be anticipated. Bedrock should be removed at least 12-inches below utility pipe invert and manhole structure subgrade elevations and at least 24-inches below bottom of pavement elevations. In areas where poor-quality, fractured bedrock is encountered, rock excavation may be possible using conventional earthwork equipment fitted with rock ripping attachments, or with pneumatic hoe ram attachments.

Given that the site is generally a residential neighborhood, blasting will likely not be permitted. Provided blasting is permitted, all loose bedrock should be completely removed to expose the competent bedrock surface. All blasting should be performed in accordance with Local, State, and Federal regulations. Non-explosive demolition agents, such as Dexpan, or controlled blasting techniques should be considered to facilitate bedrock removal where excessive vibrations from hammering could damage nearby utilities or structures. Vibration monitoring on structures sensitive to vibration is recommended. Properly designed and executed controlled rock blasting is often less expensive, faster, and creates less noise and dust than mechanical rock excavation in areas of solid, intact bedrock.

A condition survey of nearby structures and residences should be completed in accordance with the requirements of the latest edition of The New Hampshire Department of Transportation Standard Specifications for Road and Bridge Construction prior to rock excavation and/or blasting. Vibration (seismic) monitoring should be completed in conjunction with rock excavation or blasting.

Subgrade Preparation, Protection, and Stabilization

Subsurface soil conditions at the base of excavations not in bedrock are mostly expected to consist of loose to very dense granular fill, sand, and glacial till; however, very soft to hard, fine grained silt, clayey silt and silty clay are expected in the areas of Central Avenue, Cutts Street, Ashland Street, Beechwood Street, and section of Maplewood Avenue near Central and Beechwood Streets. It is recommended that excavations within approximately 2 ft. of subgrade elevations be completed with an excavator equipped with a smooth-edged bucket to minimize subgrade disturbance. Soils that become disturbed by the contractor's excavating and dewatering methods should be excavated and replaced as recommended below.

Saturated granular soils, and in particular fine grained soils, are susceptible to destabilization from construction activities. Where saturated granular soils are exposed at the pipe and manhole subgrade elevations or where subgrades are disturbed, install a minimum 6 in. thick stabilization layer on the subgrade soils. Where dry or saturated fine grained soils are exposed at the pipe and manhole subgrade elevations, install a minimum 12-inch thick stabilization layer on the subgrade. The stabilization layer should consist of 1-1/2-inch crushed stone that is separated from the subgrade soils with a non-woven geotextile filter fabric (Mirafi 180N or equivalent). Thicker stabilizations layer could be required depending on the condition of the subgrade soils. A woven geosynthetic fabric (Mirafi FW700 or approved equivalent) may be required depending on the condition of the subgrade soils. The crushed stone should be placed in maximum 6-inch thick lifts, with each lift statically compacted. A geotechnical engineer should observe the excavations prior to placement of the fabric and crushed stone to assess the stability of the subgrade soils.

Subgrade protection is the responsibility of the contractor and special precautions and protective measures appropriate for the weather and subgrade conditions should be used during earthwork construction to preserve the integrity of the subgrades. Fill material, utility pipes, and manhole structures should not be placed on frozen subgrades. If construction occurs during freezing conditions, insulating blankets, heaters, or other suitable measures should be employed to prevent subgrades from freezing.

A minimum 12-inch thick layer of structural fill or crushed stone is recommended below structures and slabs for stabilization and protection of subgrades. Where crushed stone is used it should be completely encased (top, bottom, and all sides) in filter fabric as recommended above.

Backfill Materials

Installation and grain size distribution characteristics of pipe bedding material should meet the requirements established by the pipe manufacturer.

Excavated, well graded granular soils containing less than approximately 20 percent fines, having a maximum particle size of approximately 6-inches, and free of topsoil, debris, organics, ice, snow, and other deleterious materials can potentially be re-used to backfill trench excavations up to proposed pavement subbase elevations and around manhole structures. These materials should be placed in maximum 10-inch thick lifts (measured prior to compaction), with each lift compacted to at least 95 percent of the materials maximum dry density as determined by ASTM Specification D1557. Excavated materials will likely not be suitable for re-use unless sufficiently dried to within approximately 3 percent of its optimum water content, as determined by ASTM Specification D1557. Segregation of granular portions of the existing fill from debris and organic portions will be necessary to allow potential re-use of the excavated fill material. Excavated fine grained soils are not considered suitable as trench backfill.

Imported fill trench backfill material should consist of GRAVEL meeting the requirements of subsection 304.2 of the New Hampshire Department of Transportation Standard Specifications for Road and Bridge Construction. This material should be placed in approximately 10 in. thick loose lifts, with each lift compacted to at least 95 percent of its maximum dry density as determined by ASTM D1557.

Proposed import fill should be approved by the Geotechnical Engineer prior to delivery to the site. A sample should be obtained from each on-site or import source prior to use. If at any time, the representative of the Geotechnical Engineer observes a change in material type of the fill soils, additional testing should be

performed. A grain-size analysis (ASTM D422) should be performed on material desired for use as fill and backfill. If the gradation of the soil is acceptable, a modified proctor compaction test (ASTM D1557) should be performed to determine the range of acceptable moisture contents and maximum dry density.

PAVEMENT RECONSTRUCTION REPORT REVIEW

Greenman – Pedersen, Inc. (GPI) prepared a Pavement Design Recommendation Report for the project dated June 21, 2017 (attached). We reviewed this report to provide our opinion on the recommended reconstruction approach and to assess subsurface conditions that could affect construction of the recommended approach.

The GPI report recommends pavement reclamation for pavement reconstruction in all areas of the project. Pavement reclamation involves mechanically pulverizing the existing AC pavement surfaces and simultaneously blending the pulverized material with the underlying granular fill soils to create a new base course material that meets the requirements of reclaimed stabilized base in Section 306 of the NHDOT Standard Specifications for Road and Bridge Construction. The reclaimed stabilized base layer is compacted and new AC pavement layers are placed to proposed finished roadway elevations. GPI recommends pavement reclamation extend to 14-inches below existing roadway surface elevations and a minimum reclaimed stabilized base thickness of 8-inches. GPI also recommends 1.5-inches of wearing course and 4-inches of binder course along Maplewood Avenue and 1.5-inches of wearing course and 2.5-inches of binder course along side streets.

Given the existing AC pavement thicknesses and the characteristics and thicknesses of the soils directly below the AC pavement, it is our opinion that pavement reclamation is a generally feasible approach for pavement reconstruction in the project area. We did not perform analyses to assess if the reclaimed stabilized base and new AC pavement layer thicknesses are sufficient given subsurface conditions encountered in our explorations and traffic loads expected in the project area. We did, however, assess how subsurface conditions could affect pavement reclamation construction. The following conditions should be considered by GPI:

1. About 8-inches of AC pavement and 1.5-inches of crushed stone were encountered above bedrock in B-102 (STA 22+20 +/- on Maplewood Avenue). Pavement reclamation will likely not be able to extend to the proposed depth in this area of Maplewood Avenue. Rock excavation to achieve proposed pavement subbase elevations could be required, particularly since the roadway will be lowered up to about 12-inches in this area of the project.
2. About 6 to 8.5-inches of crushed gravel/stone with less than about 11 percent sand sized particles or smaller was encountered directly below the AC pavement in C-1 through C-4 (STA 10+70 to STA 28+40 +/- on Maplewood Avenue), C-9 (STA 410+00 +/- on Cutts Street), and B-109 (STA 614+00 +/- on Leslie Drive). The processed reclaim material in these areas will likely not meet grain size requirements of NHDOT reclaimed stabilized base. Augmentation of the processed reclaim material with sandy material will likely be necessary.
3. About 5-inches of AC pavement and 10-inches of granular fill were encountered directly above fine-grained silt in B-24 (STA 411+40 +/- on Cutts Street). Pavement reclamation depth in this area of the project might need to be reduced to avoid penetrating the silt layer.

4. About 3.5 to 12-inches of concrete was encountered directly below the AC pavement in B-101 (STA 207+40 +/- on Woodbury Avenue) and in P-22 and P-23 (STA 415+40 to STA 419+20 +/- on Cutts Street). The concrete will likely prevent pavement reclamation in these areas.

The above considerations should be incorporated into the project documents since change in conditions will add considerable costs to the project budget.

LIMITATIONS

We have prepared this report for use by the Greenman – Pederson, Inc. and the design and construction teams for this project and this site only. The information herein could be used for bidding or estimating purposes but should not be construed as a warranty of subsurface conditions. We have made observations only at the aforementioned locations and only to the stated depths. These observations do not reflect soil types, strata thicknesses, water levels or seepage that may exist between observations.

We recommend that earthwork and related project specifications be prepared by Weston & Sampson geotechnical engineering staff as field performance will be largely dependent on adequacy of subgrade preparation and inclusion of recommendations presented in this report. We should be consulted to review final design to see that our recommendations are suitably followed. If any changes are made to the anticipated locations, loads, grading, configurations, or construction timing, our recommendations may not be applicable, and we should be consulted.

The preceding recommendations should be considered preliminary, as actual soil conditions may vary. For our recommendations to be final, we should be retained to observe actual subsurface conditions encountered and preparation of subgrades. Our observations will allow us to interpret actual conditions and adapt our recommendations if needed.

Within the limitations of scope, schedule and budget, our services have been executed in accordance with the generally accepted practices in this area at the time this report was prepared. No warranty, expressed or implied, is given.

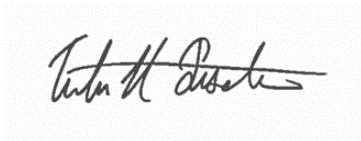
It has been a pleasure assisting you with this project and we look forward to our continued involvement. Please call if you have any questions.

Sincerely,

WESTON & SAMPSON ENGINEERS, INC.



Thomas J. Strike, PE
Project Manager

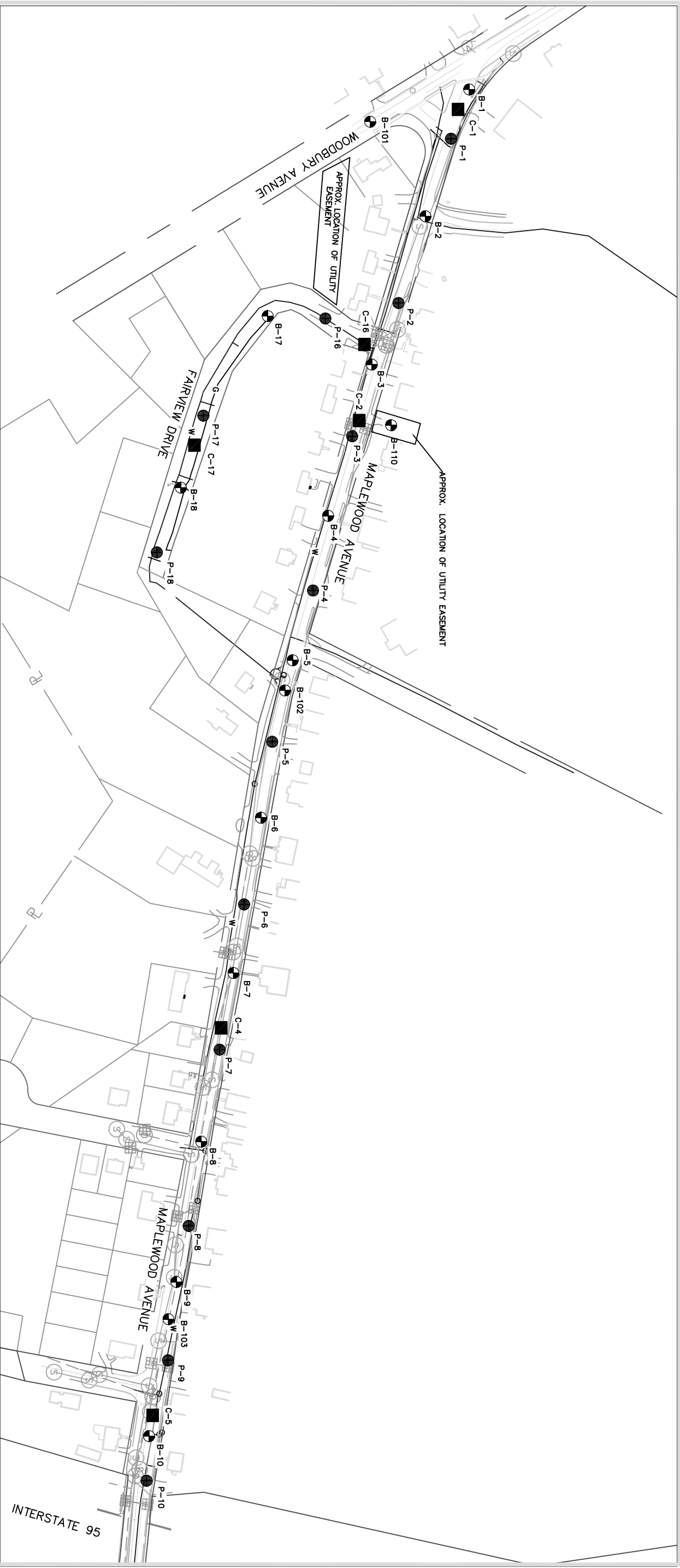


Tulin Fuselier, PE
Geotechnical Practice Leader




Attachments:

- Figures 1A and 1B – Exploration Plans (2 pages)
- Boring, Probe, and Core Logs (86 pages)
- Laboratory Test Results (15 pages)
- Greenman – Pedersen, Inc. Pavement Design Recommendations Report (5 pages)

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- NOTES:**
- BORINGS B-1 THROUGH B-31 AND PROBES P-1 THROUGH P-33 WERE COMPLETED BY NEW ENGLAND BORING CONTRACTORS OF DERRY, NEW HAMPSHIRE FROM DECEMBER 16, 2015 THROUGH JANUARY 5, 2016.
 - BORINGS B-101 THROUGH B-110, PROBE P-101, AND CORES C-1 THROUGH C-18 WERE COMPLETED BY NEW ENGLAND BORING CONTRACTORS OF DERRY, NEW HAMPSHIRE FROM APRIL 10 THROUGH APRIL 21, 2017.
 - EXPLORATION LOCATIONS WERE MEASURED RELATIVE TO EXISTING SITE FEATURES. LOCATIONS SHOWN ARE THEREFORE APPROXIMATE.
 - WESTON & SAMPSON REPRESENTATIVES OBSERVED DRILLING ACTIVITIES IN THE FIELD.

- LEGEND:**
-  B-1 BORING NUMBER AND APPROXIMATE LOCATION
 -  P-1 PROBE NUMBER AND APPROXIMATE LOCATION
 -  C-1 CORE NUMBER AND APPROXIMATE LOCATION

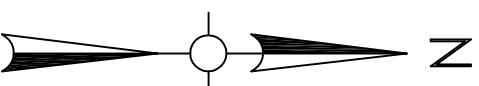
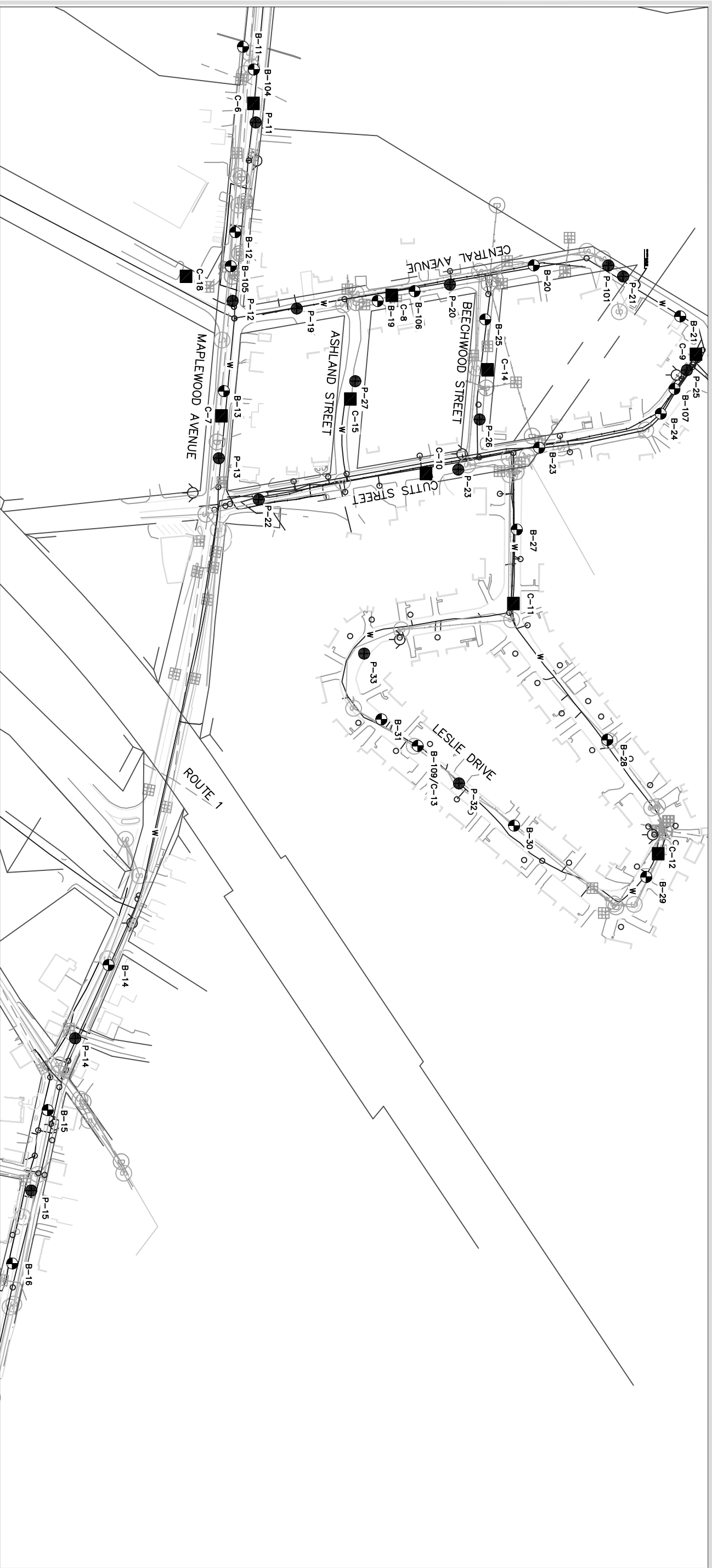


FIGURE 1A
PORTSMOUTH, NEW HAMPSHIRE
MAPLEWOOD AVENUE UTILITY IMPROVEMENTS

EXPLORATION LOCATION PLAN

DESIGNED BY: TJS	CHECKED BY: TF	DATE:
		JULY 2017








NOTES:

1. BORINGS B-1 THROUGH B-31 AND PROBES P-1 THROUGH P-31 WERE COMPLETED BY NEW ENGLAND BORING CONTRACTORS OF DERRY, NEW HAMPSHIRE FROM DECEMBER 16, 2015 THROUGH JANUARY 5, 2016.
2. BORINGS B-101 THROUGH B-110, PROBE P-101, AND CORES C-1 THROUGH C-18 WERE COMPLETED BY NEW ENGLAND BORING CONTRACTORS OF DERRY, NEW HAMPSHIRE FROM APRIL 10 THROUGH APRIL 21, 2017.
3. EXPLORATION LOCATIONS WERE MEASURED RELATIVE TO EXISTING SITE FEATURES. LOCATIONS SHOWN ARE THEREFORE APPROXIMATE.
4. WESTON & SAMPSON REPRESENTATIVES OBSERVED DRILLING ACTIVITIES IN THE FIELD.

LEGEND:

-  B-11 BORING NUMBER AND APPROXIMATE LOCATION
-  P-11 PROBE NUMBER AND APPROXIMATE LOCATION
-  C-6 CORE NUMBER AND APPROXIMATE LOCATION

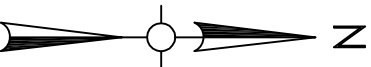


FIGURE 1B	
PORTSMOUTH, NEW HAMPSHIRE	
MAPLEWOOD AVENUE UTILITY IMPROVEMENTS	
EXPLORATION LOCATION PLAN	
DESIGNED BY:	TJS
CHECKED BY:	TF
DATE:	JULY 2017



BORING Co. New England Boring Contractors **BORING LOCATION** Maplewood Avenue - See attached plan
FOREMAN Matt Soucy **GROUND SURFACE ELEV.** 73 ft. +/- **DATUM** NAVD88
WSE GEOLOGIST: Jesse Hofmann **DATE START** 12/18/15 **DATE END** 12/18/15

SAMPLER: 2 IN. OD SPLIT SPOON SAMPLER (SPT) DRIVEN 24 INCHES
USING A 140 lb. CATHEAD OPERATED SAFETY HAMMER.
CASING: HOLLOW STEM AUGER DRILLING METHODS
CASING SIZE: 2 1/4" INSIDE DIAMETER

GROUNDWATER READINGS				
DATE	TIME	WATER AT	CASING AT	STABILIZATION TIME
Groundwater not encountered.				

DEPTH (feet)	CASING (blows/ft)	SAMPLE				PID (ppm)	SAMPLE DESCRIPTION	NOTES	STRATUM DESCRIPTION
		No.	REC/PEN (in)	DEPTH (ft)	BLOWS/6"				
0		S-1	12/24	0.4-2.4	20-24-15-6		Dense, gray, fine to coarse SAND FILL, some gravel, trace silt; moist. Bottom 6": Brown fine to medium SAND FILL, little to some silt, trace gravel; moist.	5" AC PAVEMENT	
								BASE COURSE FILL	
								SAND FILL	
5		S-2	24/24	4-6	12-22-29-37		Very dense, brown, fine to coarse SAND, little silt, trace gravel; moist.	GLACIAL TILL	
10		S-3	24/24	9-11	9-14-19-19		Dense, brown, fine to coarse SAND, little silt, trace gravel; moist.		
							Boring Terminated at 11 ft.		
15									
20									
25									

GRANULAR SOILS		COHESIVE SOILS		NOTES:
BLOWS/FT	DENSITY	BLOWS/FT	DENSITY	
0-4	V. LOOSE	0-2	V. SOFT	
4-10	LOOSE	2-4	SOFT	
10-30	M. DENSE	4-8	M. STIFF	
30-50	DENSE	8-15	STIFF	
> 50	V. DENSE	15-30	V. STIFF	
		> 30	HARD	

GENERAL NOTES: i) THE STRATIFICATION LINES REPRESENT THE APPROXIMATE BOUNDARY BETWEEN SOIL TYPES. TRANSITIONS MAY BE GRADUAL.
ii) WATER LEVEL READINGS HAVE BEEN MADE IN THE DRILL HOLES AT TIMES AND UNDER CONDITIONS STATED ON THIS BORING LOG.
FLUCTUATIONS IN THE LEVEL OF GROUNDWATER MAY OCCUR DUE TO OTHER FACTORS THAN THOSE PRESENT AT THE TIME MEASUREMENTS ARE MADE.

BORING No. B-1

BORING Co. New England Boring Contractors **BORING LOCATION** Maplewood Ave - See attached plan
FOREMAN Matt Soucy **GROUND SURFACE ELEV.** 68 ft. +/- **DATUM** NAVD88
WSE GEOLOGIST: Jesse Hofmann **DATE START** 12/18/15 **DATE END** 12/18/15

SAMPLER: 2 IN. OD SPLIT SPOON SAMPLER (SPT) DRIVEN 24 INCHES
USING A 140 lb. CATHEAD OPERATED SAFETY HAMMER.
CASING: HOLLOW STEM AUGER DRILLING METHODS
CASING SIZE: 2 1/4" INSIDE DIAMETER

GROUNDWATER READINGS				
DATE	TIME	WATER AT	CASING AT	STABILIZATION TIME
12/18/15		11.5 ft.+/-	14 ft.	10 minutes

DEPTH (feet)	CASING (blows/ft)	SAMPLE				PID (ppm)	SAMPLE DESCRIPTION	NOTES	STRATUM DESCRIPTION
		No.	REC/PEN (in)	DEPTH (ft)	BLOWS/6"				
0		S-1	14/24	0.6-2.6	11-15-12-11		Medium dense, gray, fine to coarse SAND FILL, little gravel, little silt; moist. Bottom 10": Brown fine to medium SAND FILL, little to some silt, trace gravel; moist.	1	7" AC PAVEMENT
									BASE COURSE FILL
									SAND FILL
5		S-2	21/24	4-6	8-12-20-20		Dense, brown to gray, fine to coarse SAND, little to some silt, trace gravel; moist.		GLACIAL TILL
10		S-3	22/24	9-11	13-17-30-34		Dense, brown to gray, fine to coarse SAND, some silt, trace gravel; moist.		GLACIAL TILL
15		S-4	3/3	14-14.3	100/3"		Very dense, brown to gray, fine to coarse SAND, little to some silt, little to some gravel; wet. Sampler Refusal at 14.3 ft.		
20									
25									

GRANULAR SOILS		COHESIVE SOILS		NOTES: 1. Auger grinding from about 9 ft. to 14 ft.
BLOWS/FT	DENSITY	BLOWS/FT	DENSITY	
0-4	V. LOOSE	0-2	V. SOFT	
4-10	LOOSE	2-4	SOFT	
10-30	M. DENSE	4-8	M. STIFF	
30-50	DENSE	8-15	STIFF	
> 50	V. DENSE	15-30	V. STIFF	
		> 30	HARD	

GENERAL NOTES: i) THE STRATIFICATION LINES REPRESENT THE APPROXIMATE BOUNDARY BETWEEN SOIL TYPES. TRANSITIONS MAY BE GRADUAL.
ii) WATER LEVEL READINGS HAVE BEEN MADE IN THE DRILL HOLES AT TIMES AND UNDER CONDITIONS STATED ON THIS BORING LOG.
FLUCTUATIONS IN THE LEVEL OF GROUNDWATER MAY OCCUR DUE TO OTHER FACTORS THAN THOSE PRESENT AT THE TIME MEASUREMENTS ARE MADE.

BORING Co. New England Boring Contractors **BORING LOCATION** Maplewood Ave - See attached plan
FOREMAN Matt Soucy **GROUND SURFACE ELEV.** 64 ft. +/- **DATUM** NAVD88
WSE GEOLOGIST: Jesse Hofmann **DATE START** 12/18/15 **DATE END** 12/18/15

SAMPLER: 2 IN. OD SPLIT SPOON SAMPLER (SPT) DRIVEN 24 INCHES
USING A 140 lb. CATHEAD OPERATED SAFETY HAMMER.
CASING: HOLLOW STEM AUGER DRILLING METHODS
CASING SIZE: 2 1/4" INSIDE DIAMETER

GROUNDWATER READINGS				
DATE	TIME	WATER AT	CASING AT	STABILIZATION TIME
12/18/15		9 ft. +/-	NA	NA

DEPTH (feet)	CASING (blows/ft)	SAMPLE				PID (ppm)	SAMPLE DESCRIPTION	NOTES	STRATUM DESCRIPTION
		No.	REC/PEN (in)	DEPTH (ft)	BLOWS/6"				
0		S-1	13/24	0.5-2.5	17-18-23-16		Dense, gray, fine to coarse SAND FILL, some gravel, trace silt; moist. Bottom 8": Brown fine to medium SAND FILL, little gravel, little silt; moist.	1	6" AC PAVEMENT
									BASE COURSE FILL
									SAND FILL
5		S-2	19/24	4-6	13-16-15-14		Dense, brown to gray, fine to coarse SAND, little silt, trace gravel; moist.	1	GLACIAL TILL
10		S-3	20/24	9-11	12-8-8-15		Medium dense, brown to gray, fine to medium SAND, some silt, trace gravel; wet.	1	GLACIAL TILL
15		S-4	19/23	14-15.9	30-90-26-100/5"		Very dense, brown to gray, fine to medium SAND, some silt, trace gravel; wet. Sampler Refusal at 15.9 ft.	1	GLACIAL TILL
20									
25									

GRANULAR SOILS		COHESIVE SOILS		NOTES: 1. Groundwater depth based on observation of wet sample.
BLOWS/FT	DENSITY	BLOWS/FT	DENSITY	
0-4	V. LOOSE	0-2	V. SOFT	
4-10	LOOSE	2-4	SOFT	
10-30	M. DENSE	4-8	M. STIFF	
30-50	DENSE	8-15	STIFF	
> 50	V. DENSE	15-30	V. STIFF	
		> 30	HARD	

GENERAL NOTES: i) THE STRATIFICATION LINES REPRESENT THE APPROXIMATE BOUNDARY BETWEEN SOIL TYPES. TRANSITIONS MAY BE GRADUAL.
ii) WATER LEVEL READINGS HAVE BEEN MADE IN THE DRILL HOLES AT TIMES AND UNDER CONDITIONS STATED ON THIS BORING LOG.
FLUCTUATIONS IN THE LEVEL OF GROUNDWATER MAY OCCUR DUE TO OTHER FACTORS THAN THOSE PRESENT AT THE TIME MEASUREMENTS ARE MADE.

BORING Co. New England Boring Contractors **BORING LOCATION** Maplewood Ave - See attached plan
FOREMAN Matt Soucy **GROUND SURFACE ELEV.** 66 ft. +/- **DATUM** NAVD88
WSE GEOLOGIST: Jesse Hofmann **DATE START** 12/18/15 **DATE END** 12/18/15

SAMPLER: 2 IN. OD SPLIT SPOON SAMPLER (SPT) DRIVEN 24 INCHES
USING A 140 lb. CATHEAD OPERATED SAFETY HAMMER.
CASING: HOLLOW STEM AUGER DRILLING METHODS
CASING SIZE: 2 1/4" INSIDE DIAMETER

GROUNDWATER READINGS				
DATE	TIME	WATER AT	CASING AT	STABILIZATION TIME
12/18/15		7 ft. +/-	14 ft.	10 minutes

DEPTH (feet)	CASING (blows/ft)	SAMPLE				PID (ppm)	SAMPLE DESCRIPTION	NOTES	STRATUM DESCRIPTION
		No.	REC/PEN (in)	DEPTH (ft)	BLOWS/6"				
0		S-1	18/24	0.8-2.8	12-10-15-11		Medium dense, gray, fine to coarse SAND FILL, some gravel, trace silt; moist. Bottom 11": Brown fine to medium SAND FILL, little silt, little gravel; moist.		9" AC PAVEMENT
									BASE COURSE FILL
									SAND FILL
5		S-2	11/24	4-6	7-13-35-100		Dense, brown to gray, fine to coarse SAND, some gravel, little to some silt; moist.		GLACIAL TILL
10		S-3	14/24	9-11	6-13-15-11		Medium dense, brown to gray, fine to coarse SAND, little to some silt, trace gravel; wet.		GLACIAL TILL
15		S-4	11/24	14-16	28-35-44-45		Very dense, brown to dark brown, fine to coarse SAND, little to some silt, little gravel; wet. Boring Terminated at 16 ft.	1	GLACIAL TILL
20									GLACIAL TILL
25									GLACIAL TILL

GRANULAR SOILS		COHESIVE SOILS		NOTES: 1. Approximately 5 ft. of heave was observed at 14 ft.
BLOWS/FT	DENSITY	BLOWS/FT	DENSITY	
0-4	V. LOOSE	0-2	V. SOFT	
4-10	LOOSE	2-4	SOFT	
10-30	M. DENSE	4-8	M. STIFF	
30-50	DENSE	8-15	STIFF	
> 50	V. DENSE	15-30	V. STIFF	
		> 30	HARD	

GENERAL NOTES: i) THE STRATIFICATION LINES REPRESENT THE APPROXIMATE BOUNDARY BETWEEN SOIL TYPES. TRANSITIONS MAY BE GRADUAL.
ii) WATER LEVEL READINGS HAVE BEEN MADE IN THE DRILL HOLES AT TIMES AND UNDER CONDITIONS STATED ON THIS BORING LOG.
FLUCTUATIONS IN THE LEVEL OF GROUNDWATER MAY OCCUR DUE TO OTHER FACTORS THAN THOSE PRESENT AT THE TIME MEASUREMENTS ARE MADE.

BORING Co. New England Boring Contractors **BORING LOCATION** Maplewood Ave - See attached plan
FOREMAN Matt Soucy **GROUND SURFACE ELEV.** 82 ft. +/- **DATUM** NAVD88
WSE GEOLOGIST: Jesse Hofmann **DATE START** 12/22/15 **DATE END** 12/22/15

SAMPLER: 2 IN. OD SPLIT SPOON SAMPLER (SPT) DRIVEN 24 INCHES
USING A 140 lb. CATHEAD OPERATED SAFETY HAMMER.
CASING: HOLLOW STEM AUGER DRILLING METHODS
CASING SIZE: 2 1/4" INSIDE DIAMETER

GROUNDWATER READINGS				
DATE	TIME	WATER AT	CASING AT	STABILIZATION TIME
Groundwater not encountered.				

DEPTH (feet)	CASING (blows/ft)	SAMPLE				PID (ppm)	SAMPLE DESCRIPTION	NOTES	STRATUM DESCRIPTION
		No.	REC/PEN (in)	DEPTH (ft)	BLOWS/6"				
0		S-1	12/24	0.6-2.6	43-35-35-34		Very dense, brown, fine to coarse SAND FILL, little gravel, trace silt; moist. Bottom 6": Brown, fine to medium SAND FILL, little silt, trace gravel; moist.	1	7" AC PAVEMENT
						BASE COURSE FILL			
							SAND FILL		
5							Auger Refusal at 3 ft.		
10									
15									
20									
25									

GRANULAR SOILS		COHESIVE SOILS		NOTES:
BLOWS/FT	DENSITY	BLOWS/FT	DENSITY	
0-4	V. LOOSE	0-2	V. SOFT	
4-10	LOOSE	2-4	SOFT	
10-30	M. DENSE	4-8	M. STIFF	
30-50	DENSE	8-15	STIFF	
> 50	V. DENSE	15-30	V. STIFF	
		> 30	HARD	

GENERAL NOTES: i) THE STRATIFICATION LINES REPRESENT THE APPROXIMATE BOUNDARY BETWEEN SOIL TYPES. TRANSITIONS MAY BE GRADUAL.
ii) WATER LEVEL READINGS HAVE BEEN MADE IN THE DRILL HOLES AT TIMES AND UNDER CONDITIONS STATED ON THIS BORING LOG.
FLUCTUATIONS IN THE LEVEL OF GROUNDWATER MAY OCCUR DUE TO OTHER FACTORS THAN THOSE PRESENT AT THE TIME MEASUREMENTS ARE MADE.

BORING No. B-5

BORING Co. New England Boring Contractors **BORING LOCATION** Maplewood Ave - See attached plan
FOREMAN Ken Smith **GROUND SURFACE ELEV.** 74 ft. +/- **DATUM** NAVD88
WSE GEOLOGIST: Jesse Hofmann **DATE START** 12/21/15 **DATE END** 12/21/15

SAMPLER:	2 IN. OD SPLIT SPOON SAMPLER (SPT) DRIVEN 24 INCHES	GROUNDWATER READINGS				
	USING A 140 lb. HYDRAULIC HAMMER.	DATE	TIME	WATER AT	CASING AT	STABILIZATION TIME
CASING:	HOLLOW STEM AUGER DRILLING METHODS	12/21/15		8.5 ft. +/-	10 ft.	10 minutes
CASING SIZE:	2 1/4" INSIDE DIAMETER					

DEPTH (feet)	CASING (blows/ft)	SAMPLE				PID (ppm)	SAMPLE DESCRIPTION	NOTES	STRATUM DESCRIPTION
		No.	REC/PEN (in)	DEPTH (ft)	BLOWS/6"				
0		S-1	15/24	0.8-2.8	16-27-27-13		Very dense, dark brown, fine to coarse SAND FILL, little gravel, little silt; moist.	9" AC PAVEMENT	
									SAND FILL
5		S-2	4/4	5-5.3	100/4"		Very dense, brown, fine to coarse SAND, little to some gravel, little silt; moist.	SAND	
10		S-3	1/1	10-10.1	100/1"		Very dense, gray, fine to coarse SAND, little gravel, little silt; wet. Sampler Refusal at 10.1 ft.		
15									
20									
25									

GRANULAR SOILS		COHESIVE SOILS		NOTES: 1. Auger grinding from about 7.5 ft. to 10 ft.
BLOWS/FT	DENSITY	BLOWS/FT	DENSITY	
0-4	V. LOOSE	0-2	V. SOFT	
4-10	LOOSE	2-4	SOFT	
10-30	M. DENSE	4-8	M. STIFF	
30-50	DENSE	8-15	STIFF	
> 50	V. DENSE	15-30	V. STIFF	
		> 30	HARD	

GENERAL NOTES: i) THE STRATIFICATION LINES REPRESENT THE APPROXIMATE BOUNDARY BETWEEN SOIL TYPES. TRANSITIONS MAY BE GRADUAL.
ii) WATER LEVEL READINGS HAVE BEEN MADE IN THE DRILL HOLES AT TIMES AND UNDER CONDITIONS STATED ON THIS BORING LOG.
FLUCTUATIONS IN THE LEVEL OF GROUNDWATER MAY OCCUR DUE TO OTHER FACTORS THAN THOSE PRESENT AT THE TIME MEASUREMENTS ARE MADE.

BORING Co. New England Boring Contractors **BORING LOCATION** Maplewood Ave - See attached plan
FOREMAN Ken Smith **GROUND SURFACE ELEV.** 67 ft. +/- **DATUM** NAVD88
WSE GEOLOGIST: Jesse Hofmann **DATE START** 12/21/15 **DATE END** 12/21/15

SAMPLER:	2 IN. OD SPLIT SPOON SAMPLER (SPT) DRIVEN 24 INCHES	GROUNDWATER READINGS				
	USING A 140 lb. HYDRAULIC HAMMER.	DATE	TIME	WATER AT	CASING AT	STABILIZATION TIME
CASING:	HOLLOW STEM AUGER DRILLING METHODS	12/21/15		9 ft. +/-	11 ft.	10 minutes
CASING SIZE:	2 1/4" INSIDE DIAMETER					

DEPTH (feet)	CASING (blows/ft)	SAMPLE				PID (ppm)	SAMPLE DESCRIPTION	NOTES	STRATUM DESCRIPTION
		No.	REC/PEN (in)	DEPTH (ft)	BLOWS/6"				
0		S-1	14/24	0.3-2.3	17-18-23		Dense, brown, fine to coarse SAND FILL, little gravel, trace to little silt; moist.		3" AC PAVEMENT
									SAND FILL
5		S-2	8/24	5-7	10-10-16-15		Medium dense, brown, fine to coarse SAND, little gravel, trace to little silt; moist.		SAND
10		S-3	8/10	10-10.8	30-100/4"		Very dense, brown GRAVEL, little fine to coarse sand, trace silt; wet. Auger Refusal at 11.5 ft.		
15									
20									
25									

GRANULAR SOILS		COHESIVE SOILS		NOTES:
BLOWS/FT	DENSITY	BLOWS/FT	DENSITY	
0-4	V. LOOSE	0-2	V. SOFT	
4-10	LOOSE	2-4	SOFT	
10-30	M. DENSE	4-8	M. STIFF	
30-50	DENSE	8-15	STIFF	
> 50	V. DENSE	15-30	V. STIFF	
		> 30	HARD	

GENERAL NOTES: i) THE STRATIFICATION LINES REPRESENT THE APPROXIMATE BOUNDARY BETWEEN SOIL TYPES. TRANSITIONS MAY BE GRADUAL.
ii) WATER LEVEL READINGS HAVE BEEN MADE IN THE DRILL HOLES AT TIMES AND UNDER CONDITIONS STATED ON THIS BORING LOG.
FLUCTUATIONS IN THE LEVEL OF GROUNDWATER MAY OCCUR DUE TO OTHER FACTORS THAN THOSE PRESENT AT THE TIME MEASUREMENTS ARE MADE.

BORING Co. New England Boring Contractors **BORING LOCATION** Maplewood Ave - See attached plan
FOREMAN Ken Smith **GROUND SURFACE ELEV.** 56 ft. +/- **DATUM** NAVD88
WSE GEOLOGIST: Jesse Hofmann **DATE START** 12/21/15 **DATE END** 12/21/15

SAMPLER: 2 IN. OD SPLIT SPOON SAMPLER (SPT) DRIVEN 24 INCHES
 USING A 140 lb. HYDRAULIC HAMMER.
CASING: HOLLOW STEM AUGER DRILLING METHODS
CASING SIZE: 2 1/4" INSIDE DIAMETER

GROUNDWATER READINGS				
DATE	TIME	WATER AT	CASING AT	STABILIZATION TIME
Groundwater not encountered.				

DEPTH (feet)	CASING (blows/ft)	SAMPLE				PID (ppm)	SAMPLE DESCRIPTION	NOTES	STRATUM DESCRIPTION
		No.	REC/PEN (in)	DEPTH (ft)	BLOWS/6"				
0		S-1	16/22	0.4-2.2	26-54-29-100/4"		Very dense, gray to brown, fine to coarse SAND FILL, little gravel, trace to little silt, trace debris (brick, asphalt); moist.	5" AC PAVEMENT	
								SAND FILL	
								SAND	
5		S-2	3/5	5-5.4	100/5"		Very dense, gray, fine to medium SAND, little silt, trace gravel; moist. Auger Refusal at 5.8 ft.		
10									
15									
20									
25									

GRANULAR SOILS		COHESIVE SOILS		NOTES:
BLOWS/FT	DENSITY	BLOWS/FT	DENSITY	
0-4	V. LOOSE	0-2	V. SOFT	
4-10	LOOSE	2-4	SOFT	
10-30	M. DENSE	4-8	M. STIFF	
30-50	DENSE	8-15	STIFF	
> 50	V. DENSE	15-30	V. STIFF	
		> 30	HARD	

GENERAL NOTES: i) THE STRATIFICATION LINES REPRESENT THE APPROXIMATE BOUNDARY BETWEEN SOIL TYPES. TRANSITIONS MAY BE GRADUAL.
ii) WATER LEVEL READINGS HAVE BEEN MADE IN THE DRILL HOLES AT TIMES AND UNDER CONDITIONS STATED ON THIS BORING LOG.
FLUCTUATIONS IN THE LEVEL OF GROUNDWATER MAY OCCUR DUE TO OTHER FACTORS THAN THOSE PRESENT AT THE TIME MEASUREMENTS ARE MADE.

BORING No. B-8

BORING Co. New England Boring Contractors **BORING LOCATION** Maplewood Ave - See attached plan
FOREMAN Sam Shaw **GROUND SURFACE ELEV.** 56 ft. +/- **DATUM** NAVD88
WSE GEOLOGIST: Jesse Hofmann **DATE START** 12/22/15 **DATE END** 12/22/15

SAMPLER: 2 IN. OD SPLIT SPOON SAMPLER (SPT) DRIVEN 24 INCHES
USING A 140 lb. CATHEAD OPERATED SAFETY HAMMER.
CASING: HOLLOW STEM AUGER DRILLING METHODS
CASING SIZE: 2 1/4" INSIDE DIAMETER

GROUNDWATER READINGS				
DATE	TIME	WATER AT	CASING AT	STABILIZATION TIME
Groundwater not encountered.				

DEPTH (feet)	CASING (blows/ft)	SAMPLE				PID (ppm)	SAMPLE DESCRIPTION	NOTES	STRATUM DESCRIPTION
		No.	REC/PEN (in)	DEPTH (ft)	BLOWS/6"				
0		S-1	16/18	0.4-1.9	13-36-100/6"		Very dense, brown, fine to coarse SAND FILL, trace to little silt, trace gravel; moist.	5" AC PAVEMENT	
								SAND FILL	
5		S-2	6/24	5-7	10-6-5-8		Medium dense, brown, fine to coarse SAND, little to some gravel, little silt; moist.	SAND	
10							Auger Refusal at 7 ft.		
15									
20									
25									

GRANULAR SOILS		COHESIVE SOILS		NOTES: 1. Auger grinding from about 6 ft. to 7 ft.
BLOWS/FT	DENSITY	BLOWS/FT	DENSITY	
0-4	V. LOOSE	0-2	V. SOFT	
4-10	LOOSE	2-4	SOFT	
10-30	M. DENSE	4-8	M. STIFF	
30-50	DENSE	8-15	STIFF	
> 50	V. DENSE	15-30	V. STIFF	
		> 30	HARD	

GENERAL NOTES: i) THE STRATIFICATION LINES REPRESENT THE APPROXIMATE BOUNDARY BETWEEN SOIL TYPES. TRANSITIONS MAY BE GRADUAL.
ii) WATER LEVEL READINGS HAVE BEEN MADE IN THE DRILL HOLES AT TIMES AND UNDER CONDITIONS STATED ON THIS BORING LOG.
FLUCTUATIONS IN THE LEVEL OF GROUNDWATER MAY OCCUR DUE TO OTHER FACTORS THAN THOSE PRESENT AT THE TIME MEASUREMENTS ARE MADE.

BORING Co. New England Boring Contractors **BORING LOCATION** Maplewood Ave - See attached plan
FOREMAN Sam Shaw **GROUND SURFACE ELEV.** 48 ft. +/- **DATUM** NAVD88
WSE GEOLOGIST: Jesse Hofmann **DATE START** 12/22/15 **DATE END** 12/22/15

SAMPLER: 2 IN. OD SPLIT SPOON SAMPLER (SPT) DRIVEN 24 INCHES
USING A 140 lb. CATHEAD OPERATED SAFETY HAMMER.
CASING: HOLLOW STEM AUGER DRILLING METHODS
CASING SIZE: 2 1/4" INSIDE DIAMETER

GROUNDWATER READINGS				
DATE	TIME	WATER AT	CASING AT	STABILIZATION TIME
Groundwater not encountered.				

DEPTH (feet)	CASING (blows/ft)	SAMPLE				PID (ppm)	SAMPLE DESCRIPTION	NOTES	STRATUM DESCRIPTION
		No.	REC/PEN (in)	DEPTH (ft)	BLOWS/6"				
0		S-1	10/24	0.6-2.6	4-14-16-12		Dense, brown to gray, fine to coarse SAND FILL, little gravel, little silt; moist.		7" AC PAVEMENT
									SAND FILL
5		S-2	14/24	5-7	3-5-16-11		Medium dense, brown, fine to coarse SAND, little to some silt, trace gravel; moist.		SAND
							Auger Refusal at 8 ft.		
10									
15									
20									
25									

GRANULAR SOILS		COHESIVE SOILS		NOTES:
BLOWS/FT	DENSITY	BLOWS/FT	DENSITY	
0-4	V. LOOSE	0-2	V. SOFT	
4-10	LOOSE	2-4	SOFT	
10-30	M. DENSE	4-8	M. STIFF	
30-50	DENSE	8-15	STIFF	
> 50	V. DENSE	15-30	V. STIFF	
		> 30	HARD	

GENERAL NOTES: i) THE STRATIFICATION LINES REPRESENT THE APPROXIMATE BOUNDARY BETWEEN SOIL TYPES. TRANSITIONS MAY BE GRADUAL.
ii) WATER LEVEL READINGS HAVE BEEN MADE IN THE DRILL HOLES AT TIMES AND UNDER CONDITIONS STATED ON THIS BORING LOG.
FLUCTUATIONS IN THE LEVEL OF GROUNDWATER MAY OCCUR DUE TO OTHER FACTORS THAN THOSE PRESENT AT THE TIME MEASUREMENTS ARE MADE.

BORING Co. New England Boring Contractors **BORING LOCATION** Maplewood Ave - See attached plan
FOREMAN Sam Shaw **GROUND SURFACE ELEV.** 39 ft. +/- **DATUM** NAVD88
WSE GEOLOGIST: Jesse Hofmann **DATE START** 12/23/15 **DATE END** 12/23/15

SAMPLER: 2 IN. OD SPLIT SPOON SAMPLER (SPT) DRIVEN 24 INCHES
USING A 140 lb. CATHEAD OPERATED SAFETY HAMMER.
CASING: SHALLOW STEM AUGER DRILLING METHODS
CASING SIZE: 2 1/4" INSIDE DIAMETER

GROUNDWATER READINGS				
DATE	TIME	WATER AT	CASING AT	STABILIZATION TIME
Groundwater not encountered.				

DEPTH (feet)	CASING (blows/ft)	SAMPLE				PID (ppm)	SAMPLE DESCRIPTION	NOTES	STRATUM DESCRIPTION
		No.	REC/PEN (in)	DEPTH (ft)	BLOWS/6"				
0		S-1	15/24	0.5-2.5	8-17-16-24		Dense, brown, fine to coarse SAND FILL, little gravel, little silt; moist.		6" AC PAVEMENT
									SAND FILL
5							Auger Refusal at 4.5 ft.		
10									
15									
20									
25									

GRANULAR SOILS		COHESIVE SOILS		NOTES:
BLOWS/FT	DENSITY	BLOWS/FT	DENSITY	
0-4	V. LOOSE	0-2	V. SOFT	
4-10	LOOSE	2-4	SOFT	
10-30	M. DENSE	4-8	M. STIFF	
30-50	DENSE	8-15	STIFF	
> 50	V. DENSE	15-30	V. STIFF	
		> 30	HARD	

GENERAL NOTES: i) THE STRATIFICATION LINES REPRESENT THE APPROXIMATE BOUNDARY BETWEEN SOIL TYPES. TRANSITIONS MAY BE GRADUAL.
ii) WATER LEVEL READINGS HAVE BEEN MADE IN THE DRILL HOLES AT TIMES AND UNDER CONDITIONS STATED ON THIS BORING LOG.
FLUCTUATIONS IN THE LEVEL OF GROUNDWATER MAY OCCUR DUE TO OTHER FACTORS THAN THOSE PRESENT AT THE TIME MEASUREMENTS ARE MADE.

BORING Co. New England Boring Contractors **BORING LOCATION** Maplewood Ave - See attached plan
FOREMAN Sam Shaw **GROUND SURFACE ELEV.** 34 ft. +/- **DATUM** NAVD88
WSE GEOLOGIST: Jesse Hofmann **DATE START** 12/18/15 **DATE END** 12/18/15

SAMPLER: 2 IN. OD SPLIT SPOON SAMPLER (SPT) DRIVEN 24 INCHES
USING A 140 lb. CATHEAD OPERATED SAFETY HAMMER.
CASING: HOLLOW STEM AUGER DRILLING METHODS
CASING SIZE: 2 1/4" INSIDE DIAMETER

GROUNDWATER READINGS				
DATE	TIME	WATER AT	CASING AT	STABILIZATION TIME
12/23/15		13 ft. +/-	15 ft.	10 minutes

DEPTH (feet)	CASING (blows/ft)	SAMPLE				PID (ppm)	SAMPLE DESCRIPTION	NOTES	STRATUM DESCRIPTION
		No.	REC/PEN (in)	DEPTH (ft)	BLOWS/6"				
0		S-1	12/24	0.6-2.6	6-7-7-8		Medium dense, brown to orange, fine to coarse SAND FILL, trace to little gravel, trace silt; moist.		8" AC PAVEMENT
5		S-2	8/24	5-7	5-4-2-3		Loose, brown, fine to coarse SAND FILL, little silt, trace gravel, trace debris (brick); moist.		SAND FILL
10		S-3	24/24	10-12	3-5-6-9		Stiff, brown to gray, SILT, some fine sand; moist.		SILT
15		S-4	24/24	15-17	1-1-1-1		Soft, gray, SILTY CLAY, little to some fine sand; wet.		SILTY CLAY
20							Boring Terminated at 17 ft.		
25									

GRANULAR SOILS		COHESIVE SOILS		NOTES:
BLOWS/FT	DENSITY	BLOWS/FT	DENSITY	
0-4	V. LOOSE	0-2	V. SOFT	
4-10	LOOSE	2-4	SOFT	
10-30	M. DENSE	4-8	M. STIFF	
30-50	DENSE	8-15	STIFF	
> 50	V. DENSE	15-30	V. STIFF	
		> 30	HARD	

GENERAL NOTES: i) THE STRATIFICATION LINES REPRESENT THE APPROXIMATE BOUNDARY BETWEEN SOIL TYPES. TRANSITIONS MAY BE GRADUAL.
ii) WATER LEVEL READINGS HAVE BEEN MADE IN THE DRILL HOLES AT TIMES AND UNDER CONDITIONS STATED ON THIS BORING LOG.
FLUCTUATIONS IN THE LEVEL OF GROUNDWATER MAY OCCUR DUE TO OTHER FACTORS THAN THOSE PRESENT AT THE TIME MEASUREMENTS ARE MADE.

BORING Co. New England Boring Contractors **BORING LOCATION** Maplewood Ave - See attached plan
FOREMAN Sam Shaw **GROUND SURFACE ELEV.** 33 ft. +/- **DATUM** NAVD88
WSE GEOLOGIST: Jesse Hofmann **DATE START** 12/23/15 **DATE END** 12/23/15

SAMPLER: 2 IN. OD SPLIT SPOON SAMPLER (SPT) DRIVEN 24 INCHES
USING A 140 lb. CATHEAD OPERATED SAFETY HAMMER.
CASING: HOLLOW STEM AUGER DRILLING METHODS
CASING SIZE: 2 1/4" INSIDE DIAMETER

GROUNDWATER READINGS				
DATE	TIME	WATER AT	CASING AT	STABILIZATION TIME
12/23/15		10 ft. +/-	12 ft.	10 minutes

DEPTH (feet)	CASING (blows/ft)	SAMPLE				PID (ppm)	SAMPLE DESCRIPTION	NOTES	STRATUM DESCRIPTION
		No.	REC/PEN (in)	DEPTH (ft)	BLOWS/6"				
0		S-1	13/24	0.5-2.5	16-16-10-7		Medium dense, brown, fine to coarse SAND FILL, trace to little gravel, trace silt; moist.		6" AC PAVEMENT
									SAND FILL
5		S-2	11/24	5-7	4-8-6-6		Medium dense, brown, fine to coarse SAND, little silt, trace gravel; moist.		SAND
10		S-3	7/24	10-12	4-3-6-8		Loose, brown, fine to coarse SAND, some gravel, trace silt; wet.		
							Auger Refusal at 12.5 ft.		
15									
20									
25									

GRANULAR SOILS		COHESIVE SOILS		NOTES:
BLOWS/FT	DENSITY	BLOWS/FT	DENSITY	
0-4	V. LOOSE	0-2	V. SOFT	
4-10	LOOSE	2-4	SOFT	
10-30	M. DENSE	4-8	M. STIFF	
30-50	DENSE	8-15	STIFF	
> 50	V. DENSE	15-30	V. STIFF	
		> 30	HARD	

GENERAL NOTES: i) THE STRATIFICATION LINES REPRESENT THE APPROXIMATE BOUNDARY BETWEEN SOIL TYPES. TRANSITIONS MAY BE GRADUAL.
ii) WATER LEVEL READINGS HAVE BEEN MADE IN THE DRILL HOLES AT TIMES AND UNDER CONDITIONS STATED ON THIS BORING LOG.
FLUCTUATIONS IN THE LEVEL OF GROUNDWATER MAY OCCUR DUE TO OTHER FACTORS THAN THOSE PRESENT AT THE TIME MEASUREMENTS ARE MADE.

BORING No. B-13

BORING Co. New England Boring Contractors **BORING LOCATION** Maplewood Ave - See attached plan
FOREMAN Sam Shaw **GROUND SURFACE ELEV.** NA **DATUM** NA
WSE GEOLOGIST: Jesse Hofmann **DATE START** 12/23/15 **DATE END** 12/23/15

SAMPLER: 2 IN. OD SPLIT SPOON SAMPLER (SPT) DRIVEN 24 INCHES
USING A 140 lb. CATHEAD OPERATED SAFETY HAMMER.
CASING: HOLLOW STEM AUGER DRILLING METHODS
CASING SIZE: 2 1/4" INSIDE DIAMETER

GROUNDWATER READINGS				
DATE	TIME	WATER AT	CASING AT	STABILIZATION TIME
Groundwater not encountered.				

DEPTH (feet)	CASING (blows/ft)	SAMPLE				PID (ppm)	SAMPLE DESCRIPTION	NOTES	STRATUM DESCRIPTION
		No.	REC/PEN (in)	DEPTH (ft)	BLOWS/6"				
0		S-1	17/24	0.6-2.6	18-22-25-15		Dense, brown, fine to coarse SAND FILL, little gravel, trace silt; moist.		7" AC PAVEMENT
									BASE COURSE FILL
5							Auger Refusal at 4.5 ft.		
10									
15									
20									
25									

GRANULAR SOILS		COHESIVE SOILS		NOTES:
BLOWS/FT	DENSITY	BLOWS/FT	DENSITY	
0-4	V. LOOSE	0-2	V. SOFT	
4-10	LOOSE	2-4	SOFT	
10-30	M. DENSE	4-8	M. STIFF	
30-50	DENSE	8-15	STIFF	
> 50	V. DENSE	15-30	V. STIFF	
		> 30	HARD	

GENERAL NOTES: i) THE STRATIFICATION LINES REPRESENT THE APPROXIMATE BOUNDARY BETWEEN SOIL TYPES. TRANSITIONS MAY BE GRADUAL.
ii) WATER LEVEL READINGS HAVE BEEN MADE IN THE DRILL HOLES AT TIMES AND UNDER CONDITIONS STATED ON THIS BORING LOG.
FLUCTUATIONS IN THE LEVEL OF GROUNDWATER MAY OCCUR DUE TO OTHER FACTORS THAN THOSE PRESENT AT THE TIME MEASUREMENTS ARE MADE.

BORING No. B-14

BORING Co. New England Boring Contractors **BORING LOCATION** Maplewood Ave - See attached plan
FOREMAN Sam Shaw **GROUND SURFACE ELEV.** NA **DATUM** NA
WSE GEOLOGIST: Jesse Hofmann **DATE START** 12/23/15 **DATE END** 12/23/15

SAMPLER: 2 IN. OD SPLIT SPOON SAMPLER (SPT) DRIVEN 24 INCHES
USING A 140 lb. CATHEAD OPERATED SAFETY HAMMER.
CASING: HOLLOW STEM AUGER DRILLING METHODS
CASING SIZE: 2 1/4" INSIDE DIAMETER

GROUNDWATER READINGS				
DATE	TIME	WATER AT	CASING AT	STABILIZATION TIME
Groundwater not encountered.				

DEPTH (feet)	CASING (blows/ft)	SAMPLE				PID (ppm)	SAMPLE DESCRIPTION	NOTES	STRATUM DESCRIPTION
		No.	REC/PEN (in)	DEPTH (ft)	BLOWS/6"				
0		S-1	13/24	0.8-2.8	4-21-20-11		Dense, brown, fine to coarse SAND FILL, little gravel, trace to little silt, trace debris (asphalt); moist.		10" AC PAVEMENT
									SAND FILL
5							Auger Refusal at 4.5 ft.		
10									
15									
20									
25									

GRANULAR SOILS		COHESIVE SOILS		NOTES:
BLOWS/FT	DENSITY	BLOWS/FT	DENSITY	
0-4	V. LOOSE	0-2	V. SOFT	
4-10	LOOSE	2-4	SOFT	
10-30	M. DENSE	4-8	M. STIFF	
30-50	DENSE	8-15	STIFF	
> 50	V. DENSE	15-30	V. STIFF	
		> 30	HARD	

GENERAL NOTES: i) THE STRATIFICATION LINES REPRESENT THE APPROXIMATE BOUNDARY BETWEEN SOIL TYPES. TRANSITIONS MAY BE GRADUAL.
ii) WATER LEVEL READINGS HAVE BEEN MADE IN THE DRILL HOLES AT TIMES AND UNDER CONDITIONS STATED ON THIS BORING LOG.
FLUCTUATIONS IN THE LEVEL OF GROUNDWATER MAY OCCUR DUE TO OTHER FACTORS THAN THOSE PRESENT AT THE TIME MEASUREMENTS ARE MADE.

BORING Co. New England Boring Contractors **BORING LOCATION** Maplewood Ave - See attached plan
FOREMAN Patrick Schild **GROUND SURFACE ELEV.** NA **DATUM** NA
WSE GEOLOGIST: Jesse Hofmann **DATE START** 1/4/16 **DATE END** 1/4/16

SAMPLER: 2 IN. OD SPLIT SPOON SAMPLER (SPT) DRIVEN 24 INCHES
USING A 140 lb. CATHEAD OPERATED SAFETY HAMMER.
CASING: CASING DRIVEN USING 140 lb. HAMMER FALLING 30 INCHES
THE DRIVE AND WASH TECHNIQUE
CASING SIZE: 4 IN. INSIDE DIAMETER

GROUNDWATER READINGS				
DATE	TIME	WATER AT	CASING AT	STABILIZATION TIME
Groundwater not encountered.				

DEPTH (feet)	CASING (blows/ft)	SAMPLE				PID (ppm)	SAMPLE DESCRIPTION	NOTES	STRATUM DESCRIPTION
		No.	REC/PEN (in)	DEPTH (ft)	BLOWS/6"				
0		S-1	15/24	0.5-2.5	36-69-48-85		Very dense, brown to gray, fine to coarse SAND FILL, little to some gravel, little silt; moist.	6" AC PAVEMENT	
5		S-2	6/24	4-6	13-13-9-9		Medium dense, brown, fine to coarse SAND FILL, little silt, trace gravel, trace debris (asphalt); moist.	SAND FILL	
10		S-3	13/24	10-12	8-9-9-22		Top 2": Very stiff, gray, SILT, trace to little gravel, trace fine sand. Medium dense, brown, fine SAND, little silt, trace gravel; moist.	SILT	
15							Roller Bit Refusal at 15 ft.	SAND	
20									
25									

GRANULAR SOILS		COHESIVE SOILS		NOTES: 1. Open hole drilling below 9 ft.
BLOWS/FT	DENSITY	BLOWS/FT	DENSITY	
0-4	V. LOOSE	0-2	V. SOFT	
4-10	LOOSE	2-4	SOFT	
10-30	M. DENSE	4-8	M. STIFF	
30-50	DENSE	8-15	STIFF	
> 50	V. DENSE	15-30	V. STIFF	
		> 30	HARD	

GENERAL NOTES: i) THE STRATIFICATION LINES REPRESENT THE APPROXIMATE BOUNDARY BETWEEN SOIL TYPES. TRANSITIONS MAY BE GRADUAL.
ii) WATER LEVEL READINGS HAVE BEEN MADE IN THE DRILL HOLES AT TIMES AND UNDER CONDITIONS STATED ON THIS BORING LOG.
FLUCTUATIONS IN THE LEVEL OF GROUNDWATER MAY OCCUR DUE TO OTHER FACTORS THAN THOSE PRESENT AT THE TIME MEASUREMENTS ARE MADE.

BORING Co. New England Boring Contractors **BORING LOCATION** Fairview Drive - See attached plan
FOREMAN Matt Soucy **GROUND SURFACE ELEV.** 67 ft. +/- **DATUM** NAVD88
WSE GEOLOGIST: Jesse Hofmann **DATE START** 12/16/15 **DATE END** 12/16/15

SAMPLER: 2 IN. OD SPLIT SPOON SAMPLER (SPT) DRIVEN 24 INCHES
USING A 140 lb. CATHEAD OPERATED SAFETY HAMMER.
CASING: HOLLOW STEM AUGER DRILLING METHODS
CASING SIZE: 2 1/4" INSIDE DIAMETER

GROUNDWATER READINGS				
DATE	TIME	WATER AT	CASING AT	STABILIZATION TIME
12/16/15		11 ft. +/-	13.5 ft.	10 minutes

DEPTH (feet)	CASING (blows/ft)	SAMPLE				PID (ppm)	SAMPLE DESCRIPTION	NOTES	STRATUM DESCRIPTION
		No.	REC/PEN (in)	DEPTH (ft)	BLOWS/6"				
0		S-1	12/24	0.5-2.5	17-14-10-5		Medium dense, dark brown to brown, fine to coarse SAND FILL, little gravel, trace to little silt; moist.	1	6" AC PAVEMENT
									SAND FILL
5		S-2	18/24	4-6	23-50-36-31		Very dense, light brown, fine to medium SAND, little silt, trace gravel; moist.		SAND
10		S-3	18/24	9-11	19-34-21-26		Very dense, brown, fine to medium SAND, little silt, trace gravel; moist.		
15							Auger Refusal at 13.5 ft.		
20									
25									

GRANULAR SOILS		COHESIVE SOILS		NOTES: 1. Gray, cobble fragments observed in middle 6" of sample.
BLOWS/FT	DENSITY	BLOWS/FT	DENSITY	
0-4	V. LOOSE	0-2	V. SOFT	
4-10	LOOSE	2-4	SOFT	
10-30	M. DENSE	4-8	M. STIFF	
30-50	DENSE	8-15	STIFF	
> 50	V. DENSE	15-30	V. STIFF	
		> 30	HARD	

GENERAL NOTES: i) THE STRATIFICATION LINES REPRESENT THE APPROXIMATE BOUNDARY BETWEEN SOIL TYPES. TRANSITIONS MAY BE GRADUAL.
ii) WATER LEVEL READINGS HAVE BEEN MADE IN THE DRILL HOLES AT TIMES AND UNDER CONDITIONS STATED ON THIS BORING LOG.
FLUCTUATIONS IN THE LEVEL OF GROUNDWATER MAY OCCUR DUE TO OTHER FACTORS THAN THOSE PRESENT AT THE TIME MEASUREMENTS ARE MADE.

BORING Co. New England Boring Contractors **BORING LOCATION** Fairview Drive - See attached plan
FOREMAN Matt Soucy **GROUND SURFACE ELEV.** 75 ft. +/- **DATUM** NAVD88
WSE GEOLOGIST: Jesse Hofmann **DATE START** 12/16/15 **DATE END** 12/16/15

SAMPLER: 2 IN. OD SPLIT SPOON SAMPLER (SPT) DRIVEN 24 INCHES
USING A 140 lb. CATHEAD OPERATED SAFETY HAMMER.
CASING: HOLLOW STEM AUGER DRILLING METHODS
CASING SIZE: 2 1/4" INSIDE DIAMETER

GROUNDWATER READINGS				
DATE	TIME	WATER AT	CASING AT	STABILIZATION TIME
12/16/15		9 ft. +/-	14 ft.	34 minutes

DEPTH (feet)	CASING (blows/ft)	SAMPLE				PID (ppm)	SAMPLE DESCRIPTION	NOTES	STRATUM DESCRIPTION
		No.	REC/PEN (in)	DEPTH (ft)	BLOWS/6"				
0		S-1	4/24	0.6-2.6	10-11-7-7		Medium dense, dark brown, fine to coarse SAND FILL, some gravel, trace silt; moist.	1	7" AC PAVEMENT
									BASE COURSE FILL
									SAND FILL
5		S-2	16/24	4-6	3-3-7-9		Medium dense, dark brown, fine SAND FILL, little silt; moist. Bottom 8": Medium dense, light brown, fine to medium SAND, little gravel, trace silt; moist.	1	SAND
10		S-3	8/24	9-11	35-44-43-31		Very dense, brown fine to medium SAND, little gravel, little silt; wet.	2	GLACIAL TILL
15		S-4	12/24	14-16	54-31-28-41		Very dense, brown, fine to medium SAND, some silt, little gravel; wet.		
20							Boring Terminated at 16 ft.		
25									

GRANULAR SOILS		COHESIVE SOILS		NOTES:
BLOWS/FT	DENSITY	BLOWS/FT	DENSITY	
0-4	V. LOOSE	0-2	V. SOFT	
4-10	LOOSE	2-4	SOFT	
10-30	M. DENSE	4-8	M. STIFF	
30-50	DENSE	8-15	STIFF	
> 50	V. DENSE	15-30	V. STIFF	
		> 30	HARD	

GENERAL NOTES: i) THE STRATIFICATION LINES REPRESENT THE APPROXIMATE BOUNDARY BETWEEN SOIL TYPES. TRANSITIONS MAY BE GRADUAL.
ii) WATER LEVEL READINGS HAVE BEEN MADE IN THE DRILL HOLES AT TIMES AND UNDER CONDITIONS STATED ON THIS BORING LOG.
FLUCTUATIONS IN THE LEVEL OF GROUNDWATER MAY OCCUR DUE TO OTHER FACTORS THAN THOSE PRESENT AT THE TIME MEASUREMENTS ARE MADE.

BORING No. B-18

BORING Co. New England Boring Contractors **BORING LOCATION** Central Avenue - See attached plan
FOREMAN Matt Soucy **GROUND SURFACE ELEV.** 23 ft. +/- **DATUM** NAVD88
WSE GEOLOGIST: Jesse Hofmann **DATE START** 12/16/15 **DATE END** 12/16/15

SAMPLER: 2 IN. OD SPLIT SPOON SAMPLER (SPT) DRIVEN 24 INCHES
USING A 140 lb. CATHEAD OPERATED SAFETY HAMMER.
CASING: HOLLOW STEM AUGER DRILLING METHODS
CASING SIZE: 2 1/4" INSIDE DIAMETER

GROUNDWATER READINGS				
DATE	TIME	WATER AT	CASING AT	STABILIZATION TIME
12/16/15		9 ft. +/-	NA	NA

DEPTH (feet)	CASING (blows/ft)	SAMPLE				PID (ppm)	SAMPLE DESCRIPTION	NOTES	STRATUM DESCRIPTION	
		No.	REC/PEN (in)	DEPTH (ft)	BLOWS/6"					
0		S-1	12/24	0.8-2.8	8-5-2-4		Loose, light brown, fine to coarse SAND FILL, little gravel, trace silt; moist. Bottom 6": Medium Stiff, gray, SILTY CLAY, trace gravel, trace fine sand; moist.	1	9" AC PAVEMENT	
						BASE COURSE FILL				
5		S-2	12/24	4-6	1-3-2-2				Medium stiff, gray, SILTY CLAY, trace gravel, trace fine to coarse sand; moist.	SILTY CLAY
10		S-3	24/24	9-11	1/24"		Very soft, gray, SILTY CLAY, trace fine sand; wet.			
15		S-4	24/24	14-16	1-1-2-5		Soft, gray, SILTY CLAY, trace to little fine sand; wet.			
							Boring Terminated at 16 ft.			
20										
25										

GRANULAR SOILS		COHESIVE SOILS		NOTES: 1. Groundwater level based on observation of wet sample.
BLOWS/FT	DENSITY	BLOWS/FT	DENSITY	
0-4	V. LOOSE	0-2	V. SOFT	
4-10	LOOSE	2-4	SOFT	
10-30	M. DENSE	4-8	M. STIFF	
30-50	DENSE	8-15	STIFF	
> 50	V. DENSE	15-30	V. STIFF	
		> 30	HARD	

GENERAL NOTES: i) THE STRATIFICATION LINES REPRESENT THE APPROXIMATE BOUNDARY BETWEEN SOIL TYPES. TRANSITIONS MAY BE GRADUAL.
ii) WATER LEVEL READINGS HAVE BEEN MADE IN THE DRILL HOLES AT TIMES AND UNDER CONDITIONS STATED ON THIS BORING LOG.
FLUCTUATIONS IN THE LEVEL OF GROUNDWATER MAY OCCUR DUE TO OTHER FACTORS THAN THOSE PRESENT AT THE TIME MEASUREMENTS ARE MADE.

BORING Co. New England Boring Contractors **BORING LOCATION** Central Avenue - See attached plan
FOREMAN Matt Soucy **GROUND SURFACE ELEV.** 23 ft. +/- **DATUM** NAVD88
WSE GEOLOGIST: Jesse Hofmann **DATE START** 12/17/15 **DATE END** 12/17/15

SAMPLER: 2 IN. OD SPLIT SPOON SAMPLER (SPT) DRIVEN 24 INCHES
USING A 140 lb. CATHEAD OPERATED SAFETY HAMMER.
CASING: HOLLOW STEM AUGER DRILLING METHODS
CASING SIZE: 2 1/4" INSIDE DIAMETER

GROUNDWATER READINGS				
DATE	TIME	WATER AT	CASING AT	STABILIZATION TIME
12/17/15		6 ft. +/-	14 ft.	15 minutes

DEPTH (feet)	CASING (blows/ft)	SAMPLE				PID (ppm)	SAMPLE DESCRIPTION	NOTES	STRATUM DESCRIPTION
		No.	REC/PEN (in)	DEPTH (ft)	BLOWS/6"				
0		S-1	8/24	0.5-2.5	14-5-5-6		Medium dense, brown, fine to coarse SAND FILL, little gravel, trace to little silt; moist.	6" AC PAVEMENT	
								SAND FILL	
5		S-2	14/24	4-6	1-1-3-2			Soft, gray, CLAYEY SILT, trace gravel, trace fine to coarse sand; moist.	SILTY CLAY
10		S-3	20/24	9-11	WOH/6"-1-1-6		Very soft, brown to gray, SILTY CLAY, trace fine sand; wet.	SAND	
15		S-4	18/24	14-16	12-18-16-27		Dense, light brown, fine to coarse SAND, trace silt; wet. Bottom 10": Brown, fine to medium SAND, some silt, little gravel; wet.	GLACIAL TILL	
20							Boring Terminated at 16 ft.		
25									

GRANULAR SOILS		COHESIVE SOILS		NOTES: 1. WOH = weight of hammer.
BLOWS/FT	DENSITY	BLOWS/FT	DENSITY	
0-4	V. LOOSE	0-2	V. SOFT	
4-10	LOOSE	2-4	SOFT	
10-30	M. DENSE	4-8	M. STIFF	
30-50	DENSE	8-15	STIFF	
> 50	V. DENSE	15-30	V. STIFF	
		> 30	HARD	

GENERAL NOTES: i) THE STRATIFICATION LINES REPRESENT THE APPROXIMATE BOUNDARY BETWEEN SOIL TYPES. TRANSITIONS MAY BE GRADUAL.
ii) WATER LEVEL READINGS HAVE BEEN MADE IN THE DRILL HOLES AT TIMES AND UNDER CONDITIONS STATED ON THIS BORING LOG.
FLUCTUATIONS IN THE LEVEL OF GROUNDWATER MAY OCCUR DUE TO OTHER FACTORS THAN THOSE PRESENT AT THE TIME MEASUREMENTS ARE MADE.

BORING Co. New England Boring Contractors **BORING LOCATION** Central Avenue - See attached plan
FOREMAN Matt Soucy **GROUND SURFACE ELEV.** 33 ft. +/- **DATUM** NAVD88
WSE GEOLOGIST: Jesse Hofmann **DATE START** 12/17/15 **DATE END** 12/17/15

SAMPLER: 2 IN. OD SPLIT SPOON SAMPLER (SPT) DRIVEN 24 INCHES
USING A 140 lb. CATHEAD OPERATED SAFETY HAMMER.
CASING: HOLLOW STEM AUGER DRILLING METHODS
CASING SIZE: 2 1/4" INSIDE DIAMETER

GROUNDWATER READINGS				
DATE	TIME	WATER AT	CASING AT	STABILIZATION TIME
Groundwater not encountered.				

DEPTH (feet)	CASING (blows/ft)	SAMPLE				PID (ppm)	SAMPLE DESCRIPTION	NOTES	STRATUM DESCRIPTION
		No.	REC/PEN (in)	DEPTH (ft)	BLOWS/6"				
0		S-1	16/24	0.4-2.4	16-8-6-7		Medium dense, brown, fine to coarse SAND FILL, little to trace gravel, trace silt; moist. Bottom 8": Brown, fine to medium SAND FILL, little silt, trace gravel; moist.	5" AC PAVEMENT	
								SAND FILL	
5		S-2	15/24	4-6	15-30-29-24		Very dense, brown to orange, fine SAND, little silt, trace gravel; moist.	SAND	
10							Auger Refusal at 9 ft.		
15									
20									
25									

GRANULAR SOILS		COHESIVE SOILS		NOTES: 1. Possible concrete between about 5" and 15".
BLOWS/FT	DENSITY	BLOWS/FT	DENSITY	
0-4	V. LOOSE	0-2	V. SOFT	
4-10	LOOSE	2-4	SOFT	
10-30	M. DENSE	4-8	M. STIFF	
30-50	DENSE	8-15	STIFF	
> 50	V. DENSE	15-30	V. STIFF	
		> 30	HARD	

GENERAL NOTES: i) THE STRATIFICATION LINES REPRESENT THE APPROXIMATE BOUNDARY BETWEEN SOIL TYPES. TRANSITIONS MAY BE GRADUAL.
ii) WATER LEVEL READINGS HAVE BEEN MADE IN THE DRILL HOLES AT TIMES AND UNDER CONDITIONS STATED ON THIS BORING LOG.
FLUCTUATIONS IN THE LEVEL OF GROUNDWATER MAY OCCUR DUE TO OTHER FACTORS THAN THOSE PRESENT AT THE TIME MEASUREMENTS ARE MADE.

BORING Co. New England Boring Contractors **BORING LOCATION** Cutts Street - See attached plan
FOREMAN Matt Soucy **GROUND SURFACE ÉLEV.** 19 ft. +/- **DATUM** NAVD88
WSE GEOLOGIST: Jesse Hofmann **DATE START** 12/17/15 **DATE END** 12/17/15

SAMPLER: 2 IN. OD SPLIT SPOON SAMPLER (SPT) DRIVEN 24 INCHES
USING A 140 lb. CATHEAD OPERATED SAFETY HAMMER.
CASING: HOLLOW STEM AUGER DRILLING METHODS
CASING SIZE: 2 1/4" INSIDE DIAMETER

GROUNDWATER READINGS				
DATE	TIME	WATER AT	CASING AT	STABILIZATION TIME
Groundwater not encountered.				

DEPTH (feet)	CASING (blows/ft)	SAMPLE				PID (ppm)	SAMPLE DESCRIPTION	NOTES	STRATUM DESCRIPTION
		No.	REC/PEN (in)	DEPTH (ft)	BLOWS/6"				
0		S-1	11/24	0.5-2.5	16-17-14-30		Dense, brown, fine to coarse SAND FILL, little gravel, trace silt; moist.		6" AC PAVEMENT
								1	BASE COURSE FILL
								2	
5		S-2	9/24	4-6	33-23-39-16		Very dense, brown, fine to coarse SAND FILL, little gravel, trace silt, trace debris (asphalt); moist.		SAND FILL
								3	
								4	
10							Boring Terminated at 9 ft.		
15									
20									
25									

GRANULAR SOILS		COHESIVE SOILS		NOTES:
BLOWS/FT	DENSITY	BLOWS/FT	DENSITY	
0-4	V. LOOSE	0-2	V. SOFT	
4-10	LOOSE	2-4	SOFT	
10-30	M. DENSE	4-8	M. STIFF	
30-50	DENSE	8-15	STIFF	
> 50	V. DENSE	15-30	V. STIFF	
		> 30	HARD	

GENERAL NOTES: i) THE STRATIFICATION LINES REPRESENT THE APPROXIMATE BOUNDARY BETWEEN SOIL TYPES. TRANSITIONS MAY BE GRADUAL.
 ii) WATER LEVEL READINGS HAVE BEEN MADE IN THE DRILL HOLES AT TIMES AND UNDER CONDITIONS STATED ON THIS BORING LOG.
 FLUCTUATIONS IN THE LEVEL OF GROUNDWATER MAY OCCUR DUE TO OTHER FACTORS THAN THOSE PRESENT AT THE TIME MEASUREMENTS ARE MADE.

BORING No. B-23

BORING Co. New England Boring Contractors **BORING LOCATION** Cutts Street - See attached plan
FOREMAN Matt Soucy **GROUND SURFACE ÉLEV.** 28 ft. +/- **DATUM** NAVD88
WSE GEOLOGIST: Jesse Hofmann **DATE START** 12/17/15 **DATE END** 12/17/15

SAMPLER: 2 IN. OD SPLIT SPOON SAMPLER (SPT) DRIVEN 24 INCHES
USING A 140 lb. CATHEAD OPERATED SAFETY HAMMER.
CASING: HOLLOW STEM AUGER DRILLING METHODS
CASING SIZE: 2 1/4" INSIDE DIAMETER

GROUNDWATER READINGS				
DATE	TIME	WATER AT	CASING AT	STABILIZATION TIME
Groundwater not encountered.				

DEPTH (feet)	CASING (blows/ft)	SAMPLE				PID (ppm)	SAMPLE DESCRIPTION	NOTES	STRATUM DESCRIPTION
		No.	REC/PEN (in)	DEPTH (ft)	BLOWS/6"				
0		S-1	13/24	0.4-2.4	5-9-13-11		Medium dense, brown, fine to coarse SAND FILL, little gravel, trace silt; moist. Bottom 3": Very stiff, dark gray, SILT, little fine to coarse sand, little gravel; moist.	1	5" AC PAVEMENT
						BASE COURSE FILL			
5		S-2	18/24	4-6	4-4-6-5		Stiff, light brown to gray, SILT, trace fine sand; moist.		SILT
10		S-3	4/24	9-11	22-31-18-20		Dense, brown, fine to coarse SAND, little to some silt, little gravel; moist.		GLACIAL TILL
							Boring Terminated at 11 ft.		
15									
20									
25									

GRANULAR SOILS		COHESIVE SOILS		NOTES: 1. Cobble fragment was observed in tip of spoon sampler.
BLOWS/FT	DENSITY	BLOWS/FT	DENSITY	
0-4	V. LOOSE	0-2	V. SOFT	
4-10	LOOSE	2-4	SOFT	
10-30	M. DENSE	4-8	M. STIFF	
30-50	DENSE	8-15	STIFF	
> 50	V. DENSE	15-30	V. STIFF	
		> 30	HARD	

GENERAL NOTES: i) THE STRATIFICATION LINES REPRESENT THE APPROXIMATE BOUNDARY BETWEEN SOIL TYPES. TRANSITIONS MAY BE GRADUAL.
ii) WATER LEVEL READINGS HAVE BEEN MADE IN THE DRILL HOLES AT TIMES AND UNDER CONDITIONS STATED ON THIS BORING LOG.
FLUCTUATIONS IN THE LEVEL OF GROUNDWATER MAY OCCUR DUE TO OTHER FACTORS THAN THOSE PRESENT AT THE TIME MEASUREMENTS ARE MADE.

BORING No. B-24

BORING Co. New England Boring Contractors **BORING LOCATION** Beechwood Street - See attached plan
FOREMAN Matt Soucy **GROUND SURFACE ELEV.** 17 ft. +/- **DATUM** NAVD88
WSE GEOLOGIST: Jesse Hofmann **DATE START** 12/17/15 **DATE END** 12/17/15

SAMPLER: 2 IN. OD SPLIT SPOON SAMPLER (SPT) DRIVEN 24 INCHES
USING A 140 lb. CATHEAD OPERATED SAFETY HAMMER.
CASING: HOLLOW STEM AUGER DRILLING METHODS
CASING SIZE: 2 1/4" INSIDE DIAMETER

GROUNDWATER READINGS				
DATE	TIME	WATER AT	CASING AT	STABILIZATION TIME
12/17/15		5 ft. +/-	14 ft.	15 minutes

DEPTH (feet)	CASING (blows/ft)	SAMPLE				PID (ppm)	SAMPLE DESCRIPTION	NOTES	STRATUM DESCRIPTION
		No.	REC/PEN (in)	DEPTH (ft)	BLOWS/6"				
0		S-1	10/24	0.3-2.3	12-13-29-16		Dense, dark brown, fine-coarse SAND FILL, some gravel, some silt; moist. Bottom 5": with grades to brown, little silt.		4" AC PAVEMENT
									SAND FILL
5		S-2	0/24	4-6	3-5-5-3		No recovery.	1	
10		S-3	24/24	9-11	WOH/24"		Very soft, gray, SILTY CLAY; wet.	2	SILTY CLAY
15		S-4	24/24	14-16	WOH/12"-1-2		Very soft, gray, SILTY CLAY, trace fine sand; wet.		
							Boring Terminated at 16 ft.		
20									
25									

GRANULAR SOILS		COHESIVE SOILS		NOTES: 1. Possible cobble fragments observed in tip of spoon sample. 2. WOH = Weight of hammer.
BLOWS/FT	DENSITY	BLOWS/FT	DENSITY	
0-4	V. LOOSE	0-2	V. SOFT	
4-10	LOOSE	2-4	SOFT	
10-30	M. DENSE	4-8	M. STIFF	
30-50	DENSE	8-15	STIFF	
> 50	V. DENSE	15-30	V. STIFF	
		> 30	HARD	

GENERAL NOTES: i) THE STRATIFICATION LINES REPRESENT THE APPROXIMATE BOUNDARY BETWEEN SOIL TYPES. TRANSITIONS MAY BE GRADUAL.
ii) WATER LEVEL READINGS HAVE BEEN MADE IN THE DRILL HOLES AT TIMES AND UNDER CONDITIONS STATED ON THIS BORING LOG. FLUCTUATIONS IN THE LEVEL OF GROUNDWATER MAY OCCUR DUE TO OTHER FACTORS THAN THOSE PRESENT AT THE TIME MEASUREMENTS ARE MADE.

BORING No. B-25

BORING Co. New England Boring Contractors **BORING LOCATION** Leslie Drive - See attached plan
FOREMAN Patrick Schild **GROUND SURFACE ELEV.** 42 ft. +/- **DATUM** NAVD88
WSE GEOLOGIST: Jesse Hofmann **DATE START** 1/5/2016 **DATE END** 1/5/2016

SAMPLER: 2 IN. OD SPLIT SPOON SAMPLER (SPT) DRIVEN 24 INCHES
USING A 140 lb. CATHEAD OPERATED SAFETY HAMMER.
CASING: HOLLOW STEM AUGER DRILLING METHODS
CASING SIZE: 4 1/4" INSIDE DIAMETER

GROUNDWATER READINGS				
DATE	TIME	WATER AT	CASING AT	STABILIZATION TIME
1/5/2016		10 ft. +/-	10 ft.	15 minutes

DEPTH (feet)	CASING (blows/ft)	SAMPLE				PID (ppm)	SAMPLE DESCRIPTION	NOTES	STRATUM DESCRIPTION
		No.	REC/PEN (in)	DEPTH (ft)	BLOWS/6"				
0								2" AC PAVEMENT	
		S-1	13/24	1-3	10-6-6-8		Medium dense, brown, fine to medium SAND FILL, little to some silt, little gravel; moist.	SAND FILL	
5								SAND	
		S-2	24/24	5-7	11-18-20-22		Dense, brown to orange, fine to medium SAND, trace to little silt, trace gravel; moist.		
10							Auger Refusal at 10 ft.		
15									
20									
25									

GRANULAR SOILS		COHESIVE SOILS		NOTES:
BLOWS/FT	DENSITY	BLOWS/FT	DENSITY	
0-4	V. LOOSE	0-2	V. SOFT	
4-10	LOOSE	2-4	SOFT	
10-30	M. DENSE	4-8	M. STIFF	
30-50	DENSE	8-15	STIFF	
> 50	V. DENSE	15-30	V. STIFF	
		> 30	HARD	

GENERAL NOTES: i) THE STRATIFICATION LINES REPRESENT THE APPROXIMATE BOUNDARY BETWEEN SOIL TYPES. TRANSITIONS MAY BE GRADUAL.
ii) WATER LEVEL READINGS HAVE BEEN MADE IN THE DRILL HOLES AT TIMES AND UNDER CONDITIONS STATED ON THIS BORING LOG.
FLUCTUATIONS IN THE LEVEL OF GROUNDWATER MAY OCCUR DUE TO OTHER FACTORS THAN THOSE PRESENT AT THE TIME MEASUREMENTS ARE MADE.

BORING No. B-27

BORING Co. New England Boring Contractors **BORING LOCATION** Leslie Drive - See attached plan
FOREMAN Patrick Schild **GROUND SURFACE ELEV.** 26 ft. +/- **DATUM** NAVD88
WSE GEOLOGIST: Jesse Hofmann **DATE START** 1/5/2016 **DATE END** 1/5/2016

SAMPLER: 2 IN. OD SPLIT SPOON SAMPLER (SPT) DRIVEN 24 INCHES
USING A 140 lb. CATHEAD OPERATED SAFETY HAMMER.
CASING: HOLLOW STEM AUGER DRILLING METHODS
CASING SIZE: 4 1/4" INSIDE DIAMETER

GROUNDWATER READINGS				
DATE	TIME	WATER AT	CASING AT	STABILIZATION TIME
Groundwater not encountered.				

DEPTH (feet)	CASING (blows/ft)	SAMPLE				PID (ppm)	SAMPLE DESCRIPTION	NOTES	STRATUM DESCRIPTION
		No.	REC/PEN (in)	DEPTH (ft)	BLOWS/6"				
0							Medium dense, brown, fine to medium SAND FILL, little gravel, little silt; moist. Bottom 5": Medium dense, brown to gray, fine SAND, little to some silt, trace gravel; moist.	5.5" AC PAVEMENT	
		S-1	12/24	1-3	3-13-10-8				SAND FILL
5							Dense, brown, fine to medium SAND, some gravel, little silt; moist.	1 2 SAND	
		S-2	16/24	5-7	8-15-25-31				
10							Very dense, brown, fine to medium SAND, little gravel, little silt; moist. Auger Refusal at 11 ft.		
		S-3	5/9	10-10.8	9-100/3"				
15									
20									
25									

GRANULAR SOILS		COHESIVE SOILS		NOTES: 1. Possible cobble fragment in tip of spoon sample. 2. Auger grinding about from 8 ft. to 10 ft.
BLOWS/FT	DENSITY	BLOWS/FT	DENSITY	
0-4	V. LOOSE	0-2	V. SOFT	
4-10	LOOSE	2-4	SOFT	
10-30	M. DENSE	4-8	M. STIFF	
30-50	DENSE	8-15	STIFF	
> 50	V. DENSE	15-30	V. STIFF	
		> 30	HARD	

GENERAL NOTES: i) THE STRATIFICATION LINES REPRESENT THE APPROXIMATE BOUNDARY BETWEEN SOIL TYPES. TRANSITIONS MAY BE GRADUAL.
ii) WATER LEVEL READINGS HAVE BEEN MADE IN THE DRILL HOLES AT TIMES AND UNDER CONDITIONS STATED ON THIS BORING LOG.
FLUCTUATIONS IN THE LEVEL OF GROUNDWATER MAY OCCUR DUE TO OTHER FACTORS THAN THOSE PRESENT AT THE TIME MEASUREMENTS ARE MADE.

BORING Co. New England Boring Contractors **BORING LOCATION** Leslie Drive - See attached plan
FOREMAN Patrick Schild **GROUND SURFACE ELEV.** 24 ft. +/- **DATUM** NAVD88
WSE GEOLOGIST: Jesse Hofmann **DATE START** 1/5/2016 **DATE END** 1/5/2016

SAMPLER: 2 IN. OD SPLIT SPOON SAMPLER (SPT) DRIVEN 24 INCHES
USING A 140 lb. CATHEAD OPERATED SAFETY HAMMER.
CASING: HOLLOW STEM AUGER DRILLING METHODS
CASING SIZE: 2 1/4" INSIDE DIAMETER

GROUNDWATER READINGS				
DATE	TIME	WATER AT	CASING AT	STABILIZATION TIME
1/5/2016		9 ft. +/-	15 ft.	10 minutes

DEPTH (feet)	CASING (blows/ft)	SAMPLE				PID (ppm)	SAMPLE DESCRIPTION	NOTES	STRATUM DESCRIPTION
		No.	REC/PEN (in)	DEPTH (ft)	BLOWS/6"				
0									5" AC PAVEMENT
		S-1	10/24	1-3	7-10-8-8		Medium dense, brown, fine to coarse SAND FILL, little gravel, trace silt; moist.		BASE COURSE FILL
5									SAND
		S-2	15/24	5-7	12-17-95-56		Very dense, brown, fine to medium SAND, little silt; moist.	1	
10									
		S-3	17/24	10-12	19-49-40-40		Very dense, brown, fine to medium SAND, little silt, trace gravel; wet.		
15							Auger Refusal at 15 ft.	2	
20									
25									

GRANULAR SOILS		COHESIVE SOILS		NOTES: 1. Possible cobble fragments observed in sample. 2. Auger grinding at 15 ft.
BLOWS/FT	DENSITY	BLOWS/FT	DENSITY	
0-4	V. LOOSE	0-2	V. SOFT	
4-10	LOOSE	2-4	SOFT	
10-30	M. DENSE	4-8	M. STIFF	
30-50	DENSE	8-15	STIFF	
> 50	V. DENSE	15-30	V. STIFF	
		> 30	HARD	

GENERAL NOTES: i) THE STRATIFICATION LINES REPRESENT THE APPROXIMATE BOUNDARY BETWEEN SOIL TYPES. TRANSITIONS MAY BE GRADUAL.
ii) WATER LEVEL READINGS HAVE BEEN MADE IN THE DRILL HOLES AT TIMES AND UNDER CONDITIONS STATED ON THIS BORING LOG.
FLUCTUATIONS IN THE LEVEL OF GROUNDWATER MAY OCCUR DUE TO OTHER FACTORS THAN THOSE PRESENT AT THE TIME MEASUREMENTS ARE MADE.

BORING Co. New England Boring Contractors **BORING LOCATION** Leslie Drive - See attached plan
FOREMAN Patrick Schild **GROUND SURFACE ELEV.** 37 ft. +/- **DATUM** NAVD88
WSE GEOLOGIST: Jesse Hofmann **DATE START** 1/5/2016 **DATE END** 1/5/2016

SAMPLER: 2 IN. OD SPLIT SPOON SAMPLER (SPT) DRIVEN 24 INCHES
USING A 140 lb. CATHEAD OPERATED SAFETY HAMMER.
CASING: HOLLOW STEM AUGER DRILLING METHODS
CASING SIZE: 2 1/4" INSIDE DIAMETER

GROUNDWATER READINGS				
DATE	TIME	WATER AT	CASING AT	STABILIZATION TIME
Groundwater not encountered.				

DEPTH (feet)	CASING (blows/ft)	SAMPLE				PID (ppm)	SAMPLE DESCRIPTION	NOTES	STRATUM DESCRIPTION
		No.	REC/PEN (in)	DEPTH (ft)	BLOWS/6"				
0		S-1	2/24	0.4-2.4	15-26-16-14		Dense, brown, gravelly, fine to coarse SAND FILL, trace silt; moist.		5" AC PAVEMENT BASE COURSE FILL
5		S-2	18/24	5-7	10-18-24-29		Dense, brown, fine to coarse SAND, little gravel, little silt; moist.		SAND
10							Auger Refusal at 9 ft.		
15									
20									
25									

GRANULAR SOILS		COHESIVE SOILS		NOTES:
BLOWS/FT	DENSITY	BLOWS/FT	DENSITY	
0-4	V. LOOSE	0-2	V. SOFT	
4-10	LOOSE	2-4	SOFT	
10-30	M. DENSE	4-8	M. STIFF	
30-50	DENSE	8-15	STIFF	
> 50	V. DENSE	15-30	V. STIFF	
		> 30	HARD	

GENERAL NOTES: i) THE STRATIFICATION LINES REPRESENT THE APPROXIMATE BOUNDARY BETWEEN SOIL TYPES. TRANSITIONS MAY BE GRADUAL.
ii) WATER LEVEL READINGS HAVE BEEN MADE IN THE DRILL HOLES AT TIMES AND UNDER CONDITIONS STATED ON THIS BORING LOG.
FLUCTUATIONS IN THE LEVEL OF GROUNDWATER MAY OCCUR DUE TO OTHER FACTORS THAN THOSE PRESENT AT THE TIME MEASUREMENTS ARE MADE.

BORING Co. New England Boring Contractors **BORING LOCATION** Leslie Drive - See attached plan
FOREMAN Patrick Schild **GROUND SURFACE ÉLEV.** 54 ft. +/- **DATUM** NAVD88
WSE GEOLOGIST: Jesse Hofmann **DATE START** 1/4/2016 **DATE END** 1/4/2016

SAMPLER: 2 IN. OD SPLIT SPOON SAMPLER (SPT) DRIVEN 24 INCHES
USING A 140 lb. CATHEAD OPERATED SAFETY HAMMER.
CASING: HOLLOW STEM AUGER DRILLING METHODS
CASING SIZE: 2 1/4" INSIDE DIAMETER

GROUNDWATER READINGS				
DATE	TIME	WATER AT	CASING AT	STABILIZATION TIME
Groundwater not encountered.				

DEPTH (feet)	CASING (blows/ft)	SAMPLE				PID (ppm)	SAMPLE DESCRIPTION	NOTES	STRATUM DESCRIPTION
		No.	REC/PEN (in)	DEPTH (ft)	BLOWS/6"				
0		S-1	2/11	0.3-1.2	11-100/5"		Very dense, brown, fine to coarse SAND FILL, little gravel, trace silt; moist.		3" AC PAVEMENT BASE COURSE FILL
							Auger Refusal at 1.5 ft.		
5									
10									
15									
20									
25									

GRANULAR SOILS		COHESIVE SOILS		NOTES:
BLOWS/FT	DENSITY	BLOWS/FT	DENSITY	
0-4	V. LOOSE	0-2	V. SOFT	
4-10	LOOSE	2-4	SOFT	
10-30	M. DENSE	4-8	M. STIFF	
30-50	DENSE	8-15	STIFF	
> 50	V. DENSE	15-30	V. STIFF	
		> 30	HARD	

GENERAL NOTES: i) THE STRATIFICATION LINES REPRESENT THE APPROXIMATE BOUNDARY BETWEEN SOIL TYPES. TRANSITIONS MAY BE GRADUAL.
ii) WATER LEVEL READINGS HAVE BEEN MADE IN THE DRILL HOLES AT TIMES AND UNDER CONDITIONS STATED ON THIS BORING LOG.
FLUCTUATIONS IN THE LEVEL OF GROUNDWATER MAY OCCUR DUE TO OTHER FACTORS THAN THOSE PRESENT AT THE TIME MEASUREMENTS ARE MADE.

BORING No. B-31



PROJECT
 Maplewood Avenue
 Utility Improvements
 Portsmouth, NH

REPORT OF BORING No. B-101
SHEET 1 OF 1
Project No. 2150737.C.2
CHKD BY Thomas J. Strike, PE

BORING Co. New England Boring Contractors, Inc. **BORING LOCATION** Woodbury Avenue - See attached plan
FOREMAN Patrick Schofield **GROUND SURFACE ELEVATION** 70 ft. +/- **DATUM** NAVD88
WSE REP: Tyler Dow **DATE START** 4/10/17 **DATE END** 4/10/17

METHODS: Drive-and-wash drilling methods with standard penetration tests (SPTs) at 2-ft. and 5-ft. intervals.
SAMPLER: Split-spoon sampler (2" OD, 1-3/8" ID) driven 24 inches with a 140-lb. automatic hammer falling 30 inches.
EQUIPMENT: Truck-mounted drill; 4" ID pipe casing.

GROUNDWATER OBSERVATIONS				
DATE	TIME	WATER AT	CASING AT	STABILIZATION TIME
4/10/17	-	8 ft. +/-	-	-

DEPTH (feet)	CASING (blows/ft)	SAMPLE				PID (ppm)	SAMPLE DESCRIPTION	NOTES	STRATUM DESCRIPTION
		No.	REC/PEN (in)	DEPTH (ft)	BLOWS/6"				
0								3" AC PAVEMENT	
		S-1	8/18	1-2.5	9-9-12	1.0	Medium dense, brown, sandy GRAVEL FILL, little silt; moist.	7" CONCRETE	
								BASE COURSE FILL	
		S-2	10/24	2.5-4.5	5-8-8-5	0.0	Medium dense, brown, gravelly SAND FILL, little silt; moist.	SAND FILL	
5		S-3	11/24	4.5-6.5	6-7-23-24	0.2	Top 6" - Medium dense, brown, gravelly SAND, little silt; moist. Bottom 5" - Medium dense, brown, fine to medium SAND, some silt; moist.	GLACIAL TILL	
10		S-4	15/24	9-11	24-30-38-33	0.0	Very dense, brown, fine to medium SAND, some silt; wet.		
15		S-5	12/18	14-15.5	7-9-11-50/0"	0.0	Medium dense, brown to gray, SANDY SILT; wet.	(1)	
							Roller bit refusal at 16 ft. End of boring at 16 ft.		
20									
25									
30									
35									

GRANULAR SOILS		COHESIVE SOILS		NOTES:
BLOWS/FT	DENSITY	BLOWS/FT	DENSITY	
0-4	V. LOOSE	0-2	V. SOFT	(1) Rock fragment in tip of sampler.
4-10	LOOSE	2-4	SOFT	
10-30	M. DENSE	4-8	M. STIFF	
30-50	DENSE	8-15	STIFF	
> 50	V. DENSE	15-30	V. STIFF	
		> 30	HARD	

GENERAL NOTES: i) THE STRATIFICATION LINES REPRESENT THE APPROXIMATE BOUNDARY BETWEEN SOIL TYPES. TRANSITIONS MAY BE GRADUAL.
 ii) WATER LEVEL READINGS HAVE BEEN MADE IN THE DRILL HOLES AT TIMES AND UNDER CONDITIONS STATED ON THIS BORING LOG.
 FLUCTUATIONS IN THE LEVEL OF GROUNDWATER MAY OCCUR DUE TO OTHER FACTORS THAN THOSE PRESENT AT THE TIME MEASUREMENTS ARE MADE.

BORING No. B-101



PROJECT
 Maplewood Avenue
 Utility Improvements
 Portsmouth, NH

REPORT OF BORING No. B-102
SHEET 1 OF 1
Project No. 2150737.C.2
CHKD BY Thomas J. Strike, PE

BORING Co. New England Boring Contractors, Inc. **BORING LOCATION** Maplewood Avenue - See attached plan
FOREMAN Patrick Schofield **GROUND SURFACE ELEVATION** 82 ft. +/- **DATUM** NAVD88
WSE REP: Tyler Dow **DATE START** 4/10/17 **DATE END** 4/10/17

METHODS: Drive-and-wash drilling methods and NX rock coring methods.
SAMPLER: Standard soil sampling not completed. Rock core sample obtained using a double-tube NX core barrel.
EQUIPMENT: Truck-mounted drill; 4" ID pipe casing.

GROUNDWATER OBSERVATIONS				
DATE	TIME	WATER AT	CASING AT	STABILIZATION TIME
Groundwater not observed.				

DEPTH (feet)	CASING (blows/ft)	SAMPLE				PID (ppm)	SAMPLE DESCRIPTION	NOTES	STRATUM DESCRIPTION
		No.	REC/PEN (in)	DEPTH (ft)	BLOWS/6"				
0								8" AC PAVEMENT 1.5" CRUSHED STONE	
		C-1	60/60	2-7	9 min/ft.		Gray, hard, slightly weathered SANDSTONE. Top 18" highly fractured. RQD = 60%		
					9 min/ft.				
					7 min/ft.			BEDROCK	
5					6 min/ft.				
					6 min/ft.				
							End of boring at 7 ft.		
10									
15									
20									
25									
30									
35									

GRANULAR SOILS		COHESIVE SOILS		NOTES:
BLOWS/FT	DENSITY	BLOWS/FT	DENSITY	
0-4	V. LOOSE	0-2	V. SOFT	(1) Drilled into bedrock (roller bit) about 12 inches.
4-10	LOOSE	2-4	SOFT	(2) Vertical seam from 3.5 ft. to 5 ft.
10-30	M. DENSE	4-8	M. STIFF	
30-50	DENSE	8-15	STIFF	
> 50	V. DENSE	15-30	V. STIFF	
		> 30	HARD	

GENERAL NOTES: i) THE STRATIFICATION LINES REPRESENT THE APPROXIMATE BOUNDARY BETWEEN SOIL TYPES. TRANSITIONS MAY BE GRADUAL.
 ii) WATER LEVEL READINGS HAVE BEEN MADE IN THE DRILL HOLES AT TIMES AND UNDER CONDITIONS STATED ON THIS BORING LOG. FLUCTUATIONS IN THE LEVEL OF GROUNDWATER MAY OCCUR DUE TO OTHER FACTORS THAN THOSE PRESENT AT THE TIME MEASUREMENTS ARE MADE.

BORING No. B-102



PROJECT
 Maplewood Avenue
 Utility Improvements
 Portsmouth, NH

REPORT OF BORING No. B-103
SHEET 1 OF 1
Project No. 2150737.C.2
CHKD BY Thomas J. Strike, PE

BORING Co. New England Boring Contractors, Inc. **BORING LOCATION** Maplewood Avenue - See attached plan
FOREMAN Patrick Schofield **GROUND SURFACE ELEVATION** 55 ft. +/- **DATUM** NAVD88
WSE REP: Julie Eaton E.I.T. **DATE START** 4/11/17 **DATE END** 4/11/17

METHODS: Drive-and-wash drilling methods and NX rock coring methods.
SAMPLER: Standard soil sampling not completed. Rock core sample obtained using a double-tube NX core barrel.
EQUIPMENT: Truck-mounted drill; 4" ID pipe casing.

GROUNDWATER OBSERVATIONS				
DATE	TIME	WATER AT	CASING AT	STABILIZATION TIME
Groundwater not observed.				

DEPTH (feet)	CASING (blows/ft)	SAMPLE				PID (ppm)	SAMPLE DESCRIPTION	NOTES	STRATUM DESCRIPTION
		No.	REC/PEN (in)	DEPTH (ft)	BLOWS/6"				
0							Stratum description below pavement and above 4 ft. assumed based on subsurface conditions encountered in adjacent boring B10.	7" AC PAVEMENT	
									SAND FILL
5		C-1	57/57	4-8.8	7 min/ft. 7 min/ft. 10 min/ft. 8 min/ft. 9 min/0.8 ft.		Gray, hard, moderately fractured (approximately every 2 ft.), very slightly weathered SANDSTONE. RQD = 79%	BEDROCK	
10							End of boring at 8.8 ft.		
15									
20									
25									
30									
35									

GRANULAR SOILS		COHESIVE SOILS		NOTES:
BLOWS/FT	DENSITY	BLOWS/FT	DENSITY	
0-4	V. LOOSE	0-2	V. SOFT	(1) Casing and roller bit refusal at 3 ft. Attempted to drive 6" through fractured rock (dark gray wash) circulation loss; drove casing to 3.5 ft. and drilled to 4 ft. (roller bit refusal) (2) Core barrel jammed at 6.5 ft.
4-10	LOOSE	2-4	SOFT	
10-30	M. DENSE	4-8	M. STIFF	
30-50	DENSE	8-15	STIFF	
> 50	V. DENSE	15-30	V. STIFF	
		> 30	HARD	

GENERAL NOTES: i) THE STRATIFICATION LINES REPRESENT THE APPROXIMATE BOUNDARY BETWEEN SOIL TYPES. TRANSITIONS MAY BE GRADUAL.
 ii) WATER LEVEL READINGS HAVE BEEN MADE IN THE DRILL HOLES AT TIMES AND UNDER CONDITIONS STATED ON THIS BORING LOG. FLUCTUATIONS IN THE LEVEL OF GROUNDWATER MAY OCCUR DUE TO OTHER FACTORS THAN THOSE PRESENT AT THE TIME MEASUREMENTS ARE MADE.

BORING No. B-103



PROJECT
Maplewood Avenue
Utility Improvements
Portsmouth, NH

REPORT OF BORING No. B-104
SHEET 1 OF 1
Project No. 2150737.C.2
CHKD BY Thomas J. Strike, PE

BORING Co. New England Boring Contractors, Inc. **BORING LOCATION** Maplewood Avenue - See attached plan
FOREMAN Patrick Schofield **GROUND SURFACE ELEVATION** 38 ft. +/- **DATUM** NAVD88
WSE REP: Julie Eaton E.I.T. **DATE START** 4/11/17 **DATE END** 4/11/17

METHODS: Drive-and-wash drilling methods and NX rock coring methods.
SAMPLER: Standard soil sampling not completed. Rock core sample obtained using a double-tube NX core barrel.
EQUIPMENT: Truck-mounted drill; 4" ID pipe casing.

GROUNDWATER OBSERVATIONS				
DATE	TIME	WATER AT	CASING AT	STABILIZATION TIME
4/11/17	-	4.5 ft. +/-	-	20 Minutes

DEPTH (feet)	CASING (blows/ft)	SAMPLE				PID (ppm)	SAMPLE DESCRIPTION	NOTES	STRATUM DESCRIPTION
		No.	REC/PEN (in)	DEPTH (ft)	BLOWS/6"				
0							Stratum description below pavement and above 6.5 ft. assumed based on subsurface conditions encountered in adjacent boring B11.	5" AC PAVEMENT	
								SAND FILL	
5		C-1	52/60	6.5-11.5	6 min/ft. 12 min/ft. 6 min/ft. 9 min/ft.		Hard, gray, highly fractured, slightly weathered SANDSTONE. Bottom 18": vertical seam (partially healed) RQD = 8%	BEDROCK	
10					9 min/ft.		End of boring at 11.5 ft.		
15									
20									
25									
30									
35									

GRANULAR SOILS		COHESIVE SOILS		NOTES:
BLOWS/FT	DENSITY	BLOWS/FT	DENSITY	
0-4	V. LOOSE	0-2	V. SOFT	(1) Casing refusal at 5.5 ft. (2) Core barrel jammed at 8 ft. and at 9.6 ft.
4-10	LOOSE	2-4	SOFT	
10-30	M. DENSE	4-8	M. STIFF	
30-50	DENSE	8-15	STIFF	
> 50	V. DENSE	15-30	V. STIFF	
		> 30	HARD	

GENERAL NOTES: i) THE STRATIFICATION LINES REPRESENT THE APPROXIMATE BOUNDARY BETWEEN SOIL TYPES. TRANSITIONS MAY BE GRADUAL.
ii) WATER LEVEL READINGS HAVE BEEN MADE IN THE DRILL HOLES AT TIMES AND UNDER CONDITIONS STATED ON THIS BORING LOG.
FLUCTUATIONS IN THE LEVEL OF GROUNDWATER MAY OCCUR DUE TO OTHER FACTORS THAN THOSE PRESENT AT THE TIME MEASUREMENTS ARE MADE.

BORING No. B-104



PROJECT
Maplewood Avenue
Utility Improvements
Portsmouth, NH

REPORT OF BORING No. B-105
SHEET 1 OF 1
Project No. 2150737.C.2
CHKD BY Thomas J. Strike, PE

BORING Co. New England Boring Contractors, Inc. **BORING LOCATION** Maplewood Avenue - See attached plan
FOREMAN Patrick Schofield **GROUND SURFACE ELEVATION** 34 ft. +/- **DATUM** NAVD88
WSE REP: Brian Toner **DATE START** 4/19/17 **DATE END** 4/19/17

METHODS: Drive-and-wash drilling methods with standard penetration tests (SPTs) at 2-ft. intervals.
SAMPLER: Split-spoon sampler (2" OD, 1-3/8" ID) driven 24 inches with a 140-lb. automatic hammer falling 30 inches.
EQUIPMENT: Truck-mounted drill; 4" ID pipe casing.

GROUNDWATER OBSERVATIONS				
DATE	TIME	WATER AT	CASING AT	STABILIZATION TIME
Groundwater not observed.				

DEPTH (feet)	CASING (blows/ft)	SAMPLE				PID (ppm)	SAMPLE DESCRIPTION	NOTES	STRATUM DESCRIPTION
		No.	REC/PEN (in)	DEPTH (ft)	BLOWS/6"				
0							Stratum description below pavement and above 4 ft. assumed based on subsurface conditions encountered in adjacent boring B12.		8" AC PAVEMENT
5		S-1	10/24	4-6	12-9-6-6		Medium dense, brown, GRAVEL FILL, some fine to coarse sand, some silt; wet.	(1)	SAND FILL
		S-2	4/24	6-8	9-4-7-8		Medium dense, brown, fine to coarse SAND FILL, little gravel; wet.	(2)	
		S-3	20/24	8-10	5-14-11-11		Very stiff, brown, SILTY CLAY, trace gravel; wet.		
10		S-4	12/24	10-12	10-13-11-8		Very stiff, brown, SILTY CLAY, trace fine to medium sand; wet.		SILTY CLAY
15							End of boring at 12 ft.		
20									
25									
30									
35									

GRANULAR SOILS		COHESIVE SOILS		NOTES:
BLOWS/FT	DENSITY	BLOWS/FT	DENSITY	
0-4	V. LOOSE	0-2	V. SOFT	(1) Bottom 6": Medium dense, brown, SILTY SAND FILL, trace gravel; wet.
4-10	LOOSE	2-4	SOFT	(2) Bottom 2": Medium dense, brown, SILTY SAND FILL, trace gravel; wet.
10-30	M. DENSE	4-8	M. STIFF	
30-50	DENSE	8-15	STIFF	
> 50	V. DENSE	15-30	V. STIFF	
		> 30	HARD	

GENERAL NOTES: i) THE STRATIFICATION LINES REPRESENT THE APPROXIMATE BOUNDARY BETWEEN SOIL TYPES. TRANSITIONS MAY BE GRADUAL.
ii) WATER LEVEL READINGS HAVE BEEN MADE IN THE DRILL HOLES AT TIMES AND UNDER CONDITIONS STATED ON THIS BORING LOG. FLUCTUATIONS IN THE LEVEL OF GROUNDWATER MAY OCCUR DUE TO OTHER FACTORS THAN THOSE PRESENT AT THE TIME MEASUREMENTS ARE MADE.

BORING No. B-105



PROJECT
 Maplewood Avenue
 Utility Improvements
 Portsmouth, NH

REPORT OF BORING No. B-106
SHEET 1 OF 1
Project No. 2150737.C.2
CHKD BY Thomas J. Strike, PE

BORING Co. New England Boring Contractors, Inc. **BORING LOCATION** Central Avenue - See attached plan
FOREMAN Patrick Schofield **GROUND SURFACE ELEVATION** 23 ft. +/- **DATUM** NAVD88
WSE REP: Julie Eaton E.I.T. **DATE START** 4/13/17 **DATE END** 4/13/17

METHODS: Drive-and-wash drilling methods with standard penetration tests (SPTs) at 2-ft. and 5-ft. intervals.
SAMPLER: Split-spoon sampler (2" OD, 1-3/8" ID) driven 24 inches with a 140-lb. automatic hammer falling 30 inches.
EQUIPMENT: Truck-mounted drill; 4" ID pipe casing.

GROUNDWATER OBSERVATIONS				
DATE	TIME	WATER AT	CASING AT	STABILIZATION TIME
4/13/17	-	9 ft. +/-	-	20 minutes

DEPTH (feet)	CASING (blows/ft)	SAMPLE				PID (ppm)	SAMPLE DESCRIPTION	NOTES	STRATUM DESCRIPTION
		No.	REC/PEN (in)	DEPTH (ft)	BLOWS/6"				
0								4" AC PAVEMENT	
		S-1	6/18	0.5-2	8-9-7	0.4	Medium dense, brown, fine to coarse, SAND FILL, little silt, little debris (asphalt), trace gravel; wet. Stiff, brown-gray CLAYEY SILT, little sand; wet.	(1)	SAND FILL
		S-2	13/24	2-4	4-3-6-9	0.3		(2)	
5		S-3	18/24	4-6	3-6-6-7	0.4	Stiff, gray, CLAYEY SILT, little fine sand; wet.	(3)	CLAYEY SILT
10		S-4	24/24	9-11	WOH/24"	0.2	Very soft, gray, SILTY CLAY, trace silt; wet.		SILTY CLAY
15		S-5	24/24	14-16	WOH/18"-4		Very soft, gray, SILTY CLAY, trace fine sand; wet.	(4)	
20		S-6	4/6	18-18.5	51-50/0"		Very dense, gray, GRAVEL, trace sand, trace silt; wet. (WEATHERED BEDROCK)		GLACIAL TILL
							Drilling refusal at 18.5 ft. End of boring at 18.5 ft.		
25									
30									
35									

GRANULAR SOILS		COHESIVE SOILS		NOTES:
BLOWS/FT	DENSITY	BLOWS/FT	DENSITY	
0-4	V. LOOSE	0-2	V. SOFT	(1) Drive and wash methods resulted in wet soil samples. (2) Top 2": dark brown, fine to coarse SAND FILL, some debris (asphalt), trace gravel; wet. Middle 3": gray, SILT, little organics (roots), little sand, trace clay; wet. (3) Open hole drilling methods below 4 ft. (4) Roller bit grinding from 16.5 to 18 ft.
4-10	LOOSE	2-4	SOFT	
10-30	M. DENSE	4-8	M. STIFF	
30-50	DENSE	8-15	STIFF	
> 50	V. DENSE	15-30	V. STIFF	
		> 30	HARD	

GENERAL NOTES: i) THE STRATIFICATION LINES REPRESENT THE APPROXIMATE BOUNDARY BETWEEN SOIL TYPES. TRANSITIONS MAY BE GRADUAL.
 ii) WATER LEVEL READINGS HAVE BEEN MADE IN THE DRILL HOLES AT TIMES AND UNDER CONDITIONS STATED ON THIS BORING LOG.
 FLUCTUATIONS IN THE LEVEL OF GROUNDWATER MAY OCCUR DUE TO OTHER FACTORS THAN THOSE PRESENT AT THE TIME MEASUREMENTS ARE MADE.

BORING No. B-106



PROJECT
 Maplewood Avenue
 Utility Improvements
 Portsmouth, NH

REPORT OF BORING No. B-107
SHEET 1 OF 1
Project No. 2150737.C.2
CHKD BY Thomas J. Strike, PE

BORING Co. New England Boring Contractors, Inc. **BORING LOCATION** Cutts Street - See attached plan
FOREMAN Patrick Schofield **GROUND SURFACE ELEVATION** 30 ft. +/- **DATUM** NAVD88
WSE REP: Julie Eaton E.I.T. **DATE START** 4/12/17 **DATE END** 4/12/17

METHODS: Drive-and-wash drilling methods with standard penetration tests (SPTs) at 2-ft. intervals.
SAMPLER: Split-spoon sampler (2" OD, 1-3/8" ID) driven 24 inches with a 140-lb. automatic hammer falling 30 inches.
EQUIPMENT: Truck-mounted drill; 4" ID pipe casing.

GROUNDWATER OBSERVATIONS				
DATE	TIME	WATER AT	CASING AT	STABILIZATION TIME
4/12/17	-	5 ft. +/-	-	20 minutes

DEPTH (feet)	CASING (blows/ft)	SAMPLE				PID (ppm)	SAMPLE DESCRIPTION	NOTES	STRATUM DESCRIPTION
		No.	REC/PEN (in)	DEPTH (ft)	BLOWS/6"				
0							Stratum description below pavement and above 8 ft. assumed based on subsurface conditions encountered in boring B24.	9" AC PAVEMENT BASE COURSE FILL	
5						Adjacent probe P25 encountered auger refusal at 4.5 ft.			
10		S-1	14/24	8-10	4-4-6-6	0.1	Stiff, brown to gray, SILT, trace sand, trace gravel; wet.	SILT	
10		S-2	8/24	10-12	9-7-7-10	0.0	Medium dense, brown, fine to medium SAND, little silt, trace gravel; wet.		
15							End of boring at 12 ft.	SAND	
20									
25									
30									
35									

GRANULAR SOILS		COHESIVE SOILS		NOTES:
BLOWS/FT	DENSITY	BLOWS/FT	DENSITY	
0-4	V. LOOSE	0-2	V. SOFT	(1) Roller bit grinding from 0.5 to 1 ft.
4-10	LOOSE	2-4	SOFT	(2) Wash turned black from approximately 3.5 ft. to 3.7 ft.
10-30	M. DENSE	4-8	M. STIFF	(3) Top 4": Stiff, brown to gray, SILTY CLAY, trace sand, trace gravel; wet.
30-50	DENSE	8-15	STIFF	
> 50	V. DENSE	15-30	V. STIFF	
		> 30	HARD	

GENERAL NOTES: i) THE STRATIFICATION LINES REPRESENT THE APPROXIMATE BOUNDARY BETWEEN SOIL TYPES. TRANSITIONS MAY BE GRADUAL.
 ii) WATER LEVEL READINGS HAVE BEEN MADE IN THE DRILL HOLES AT TIMES AND UNDER CONDITIONS STATED ON THIS BORING LOG. FLUCTUATIONS IN THE LEVEL OF GROUNDWATER MAY OCCUR DUE TO OTHER FACTORS THAN THOSE PRESENT AT THE TIME MEASUREMENTS ARE MADE.

BORING No. B-107



PROJECT
Maplewood Avenue
Utility Improvements
Portsmouth, NH

REPORT OF BORING No. B-110
SHEET 1 OF 1
Project No. 2150737.C.2
CHKD BY Thomas J. Strike, PE

BORING Co. New England Boring Contractors, Inc. **BORING LOCATION** Maplewood Avenue - See attached plan
FOREMAN Patrick Schofield **GROUND SURFACE ELEVATION** 64 ft. +/- **DATUM** NAVD88
WSE REP: Julie Eaton E.I.T. **DATE START** 4/14/17 **DATE END** 4/14/17

METHODS: Drive-and-wash drilling methods with standard penetration tests (SPTs) at 2-ft. and 5-ft. intervals.
SAMPLER: Split-spoon sampler (2" OD, 1-3/8" ID) driven 24 inches with a 140-lb. automatic hammer falling 30 inches.
EQUIPMENT: Truck-mounted drill; 4" ID pipe casing.

GROUNDWATER OBSERVATIONS				
DATE	TIME	WATER AT	CASING AT	STABILIZATION TIME
4/14/17		4 ft. +/-	N/A	20 minutes

DEPTH (feet)	CASING (blows/ft)	SAMPLE				PID (ppm)	SAMPLE DESCRIPTION	NOTES	STRATUM DESCRIPTION		
		No.	REC/PEN (in)	DEPTH (ft)	BLOWS/6"						
0		S-1	12/24	0-2	3-5-4-3	0.1	Loose, dark brown, SILTY SAND FILL, some organics (roots); moist.	(1)	7" TOPSOIL		
		S-2	17/24	2-4	4-3-3-2	0.1			Loose, brown, fine to medium SAND FILL, trace silt; moist.	(2)	SAND FILL
		S-3	14/24	4-6	2-1-3-6	0.4			Medium stiff, brown, SILT, some sand, trace organics (fine roots); wet. Bottom 4": without organics.	(3)	BURIED TOPSOIL
5							Drilling refusal at 8.3 ft. End of boring at 8.3 ft.	(4)	SILT		
10											
15											
20											
25											
30											
35											

GRANULAR SOILS		COHESIVE SOILS		NOTES:
BLOWS/FT	DENSITY	BLOWS/FT	DENSITY	
0-4	V. LOOSE	0-2	V. SOFT	(1) Bottom 7": Loose, brown, fine to medium SAND FILL, trace silt; moist.
4-10	LOOSE	2-4	SOFT	(2) Bottom 3": Dark brown, SILTY SAND, trace organics (fine roots); moist.
10-30	M. DENSE	4-8	M. STIFF	(3) Top 3": Very loose, dark brown, SILTY SAND, trace organics (fine roots); moist.
30-50	DENSE	8-15	STIFF	(4) Roller bit grinding 6.5 ft - 8.3 ft.
> 50	V. DENSE	15-30	V. STIFF	
		> 30	HARD	

GENERAL NOTES: i) THE STRATIFICATION LINES REPRESENT THE APPROXIMATE BOUNDARY BETWEEN SOIL TYPES. TRANSITIONS MAY BE GRADUAL.
ii) WATER LEVEL READINGS HAVE BEEN MADE IN THE DRILL HOLES AT TIMES AND UNDER CONDITIONS STATED ON THIS BORING LOG. FLUCTUATIONS IN THE LEVEL OF GROUNDWATER MAY OCCUR DUE TO OTHER FACTORS THAN THOSE PRESENT AT THE TIME MEASUREMENTS ARE MADE.

BORING No. B-110



PROJECT
Maplewood Avenue
Utility Improvements
Portsmouth, NH

REPORT OF BORING No. C-1
SHEET 1 OF 1
Project No. 2150737.C.2
CHKD BY Thomas J. Strike, PE

BORING Co. New England Boring Contractors, Inc. **BORING LOCATION** Maplewood Avenue - See attached plan
FOREMAN Patrick Schofield **GROUND SURFACE ELEVATION** - **DATUM** -
WSE REP: TJ Blair, EIT **DATE START** 4/21/17 **DATE END** 4/21/17

METHODS: Pavement coring; hand auger excavation; standard penetration tests (SPTs).
SAMPLER: Split-spoon sampler (2" OD, 1-3/8" ID) driven 24 inches with a 140-lb. automatic hammer falling 30 inches.
EQUIPMENT: Truck-mounted drill; 4" ID coring shoe; 3" ID hand auger.

GROUNDWATER OBSERVATIONS				
DATE	TIME	WATER AT	CASING AT	STABILIZATION TIME
Groundwater not observed.				

DEPTH (feet)	CASING (blows/ft)	SAMPLE				PID (ppm)	SAMPLE DESCRIPTION	NOTES	STRATUM DESCRIPTION
		No.	REC/PEN (in)	DEPTH (ft.)	BLOWS/6"				
0		C-1	-	0-0.3	NA	-	3.5 inches asphalt concrete (AC) pavement.	(1)	3.5" AC PAVEMENT
		G-1	-	0.3-1	NA	0.3	Gray, fine to coarse angular GRAVEL FILL; moist.	(2) (3)	8.5" BASE COURSE
		S-1	10/24	1-3	13-15-9-7	0	Medium dense, brown, fine to medium silty SAND, some gravel; moist.		SAND
2									
4							End of boring at 3 ft.		
6									
8									
10									
12									
14									
16									
18									

GRANULAR SOILS		COHESIVE SOILS		NOTES:
BLOWS/FT	DENSITY	BLOWS/FT	DENSITY	
0-4	V. LOOSE	0-2	V. SOFT	(1) Pavement cored with drill rig using a 4-inch diameter coring shoe.
4-10	LOOSE	2-4	SOFT	(2) Hand auger and steel wrecking bar used to advance to a depth of 1 ft.
10-30	M. DENSE	4-8	M. STIFF	(3) Grab samples collected from 0.3 ft. to 1 ft. and from 1 ft. to 3 ft.
30-50	DENSE	8-15	STIFF	
> 50	V. DENSE	15-30	V. STIFF	
		> 30	HARD	

GENERAL NOTES: i) THE STRATIFICATION LINES REPRESENT THE APPROXIMATE BOUNDARY BETWEEN SOIL TYPES. TRANSITIONS MAY BE GRADUAL.
ii) WATER LEVEL READINGS HAVE BEEN MADE IN THE DRILL HOLES AT TIMES AND UNDER CONDITIONS STATED ON THIS BORING LOG. FLUCTUATIONS IN THE LEVEL OF GROUNDWATER MAY OCCUR DUE TO OTHER FACTORS THAN THOSE PRESENT AT THE TIME MEASUREMENTS ARE MADE.

BORING No. C-1



PROJECT
Maplewood Avenue
Utility Improvements
Portsmouth, NH

REPORT OF BORING No. C-2
SHEET 1 OF 1
Project No. 2150737.C.2
CHKD BY Thomas J. Strike, PE

BORING Co. New England Boring Contractors, Inc. **BORING LOCATION** Maplewood Avenue - See attached plan
FOREMAN Patrick Schofield **GROUND SURFACE ELEVATION** - **DATUM** -
WSE REP: TJ Blair, EIT **DATE START** 4/21/17 **DATE END** 4/21/17

METHODS: Pavement coring and hand auger excavation.
SAMPLER: No standard soil sampling completed.
EQUIPMENT: Truck-mounted drill; 4" ID coring shoe; 3" ID hand auger.

GROUNDWATER OBSERVATIONS				
DATE	TIME	WATER AT	CASING AT	STABILIZATION TIME
Groundwater not observed.				

DEPTH (feet)	CASING (blows/ft)	SAMPLE				PID (ppm)	SAMPLE DESCRIPTION	NOTES	STRATUM DESCRIPTION
		No.	REC/PEN (in)	DEPTH (ft.)	BLOWS/6"				
0		C-1	-	0-0.6	NA	-	7.5 inches asphalt concrete (AC) pavement.	(1) (2)	7.5" AC PAVEMENT
		G-1	-	0.6-1	NA	0..2	Gray, fine to coarse angular GRAVEL FILL; moist.	(3)	BASE COURSE FILL
							End of boring at 1 ft.		
2									
4									
6									
8									
10									
12									
14									
16									
18									

GRANULAR SOILS		COHESIVE SOILS		NOTES:
BLOWS/FT	DENSITY	BLOWS/FT	DENSITY	
0-4	V. LOOSE	0-2	V. SOFT	(1) Pavement cored with drill rig using a 4-inch diameter coring shoe.
4-10	LOOSE	2-4	SOFT	(2) Non-mechanical horizontal break in pavement core 3 inches from top.
10-30	M. DENSE	4-8	M. STIFF	(3) Hand auger and steel wrecking bar used to advance boring below pavement.
30-50	DENSE	8-15	STIFF	
> 50	V. DENSE	15-30	V. STIFF	
		> 30	HARD	

GENERAL NOTES: i) THE STRATIFICATION LINES REPRESENT THE APPROXIMATE BOUNDARY BETWEEN SOIL TYPES. TRANSITIONS MAY BE GRADUAL.
ii) WATER LEVEL READINGS HAVE BEEN MADE IN THE DRILL HOLES AT TIMES AND UNDER CONDITIONS STATED ON THIS BORING LOG.
FLUCTUATIONS IN THE LEVEL OF GROUNDWATER MAY OCCUR DUE TO OTHER FACTORS THAN THOSE PRESENT AT THE TIME MEASUREMENTS ARE MADE.

BORING No. C-2



PROJECT
Maplewood Avenue
Utility Improvements
Portsmouth, NH

REPORT OF BORING No. C-4
SHEET 1 OF 1
Project No. 2150737.C.2
CHKD BY Thomas J. Strike, PE

BORING Co. New England Boring Contractors, Inc. **BORING LOCATION** Maplewood Avenue - See attached plan
FOREMAN Patrick Schofield **GROUND SURFACE ELEVATION** - **DATUM** -
WSE REP: TJ Blair, EIT **DATE START** 4/21/17 **DATE END** 4/21/17

METHODS: Pavement coring and hand auger excavation.
SAMPLER: No standard soil sampling completed.
EQUIPMENT: Truck-mounted drill; 4" ID coring shoe; 3" ID hand auger.

GROUNDWATER OBSERVATIONS				
DATE	TIME	WATER AT	CASING AT	STABILIZATION TIME
Groundwater not observed.				

DEPTH (feet)	CASING (blows/ft)	SAMPLE				PID (ppm)	SAMPLE DESCRIPTION	NOTES	STRATUM DESCRIPTION
		No.	REC/PEN (in)	DEPTH (ft.)	BLOWS/6"				
0		C-1	-	0-0.5	NA	-	6 inches asphalt concrete (AC) pavement.	(1) (2)	6" AC PAVEMENT
		G-1	-	0.5-1	NA	0.3	Gray, fine to coarse angular GRAVEL FILL; moist.	(3) (4)	BASE COURSE FILL
							End of boring at 1 ft.		
2									
4									
6									
8									
10									
12									
14									
16									
18									

GRANULAR SOILS		COHESIVE SOILS		NOTES:
BLOWS/FT	DENSITY	BLOWS/FT	DENSITY	
0-4	V. LOOSE	0-2	V. SOFT	(1) Pavement cored with drill rig using a 4-inch diameter coring shoe. (2) Non-mechanical horizontal break in pavement core 3 inches from top. (3) Hand auger and steel wrecking bar used to advance boring below pavement. (4) Grab sample collected from 0.5 ft. to 1 ft.
4-10	LOOSE	2-4	SOFT	
10-30	M. DENSE	4-8	M. STIFF	
30-50	DENSE	8-15	STIFF	
> 50	V. DENSE	15-30	V. STIFF	
		> 30	HARD	

GENERAL NOTES: i) THE STRATIFICATION LINES REPRESENT THE APPROXIMATE BOUNDARY BETWEEN SOIL TYPES. TRANSITIONS MAY BE GRADUAL.
 ii) WATER LEVEL READINGS HAVE BEEN MADE IN THE DRILL HOLES AT TIMES AND UNDER CONDITIONS STATED ON THIS BORING LOG.
 FLUCTUATIONS IN THE LEVEL OF GROUNDWATER MAY OCCUR DUE TO OTHER FACTORS THAN THOSE PRESENT AT THE TIME MEASUREMENTS ARE MADE.

BORING No. C-4



PROJECT
Maplewood Avenue
Utility Improvements
Portsmouth, NH

REPORT OF BORING No. C-5
SHEET 1 OF 1
Project No. 2150737.C.2
CHKD BY Thomas J. Strike, PE

BORING Co. New England Boring Contractors, Inc. **BORING LOCATION** Maplewood Avenue - See attached plan
FOREMAN Patrick Schofield **GROUND SURFACE ELEVATION** - **DATUM** -
WSE REP: Brian Toner **DATE START** 4/19/17 **DATE END** 4/19/17

METHODS: Pavement coring; hand auger excavation; standard penetration tests (SPTs).
SAMPLER: Split-spoon samplers (3" OD, 2.5" ID and 2" OD, 1-3/8" ID) driven with a 140-lb. automatic hammer falling 30 inches.
EQUIPMENT: Truck-mounted drill; 4" ID coring shoe; 3" ID hand auger.

GROUNDWATER OBSERVATIONS				
DATE	TIME	WATER AT	CASING AT	STABILIZATION TIME
Groundwater not observed.				

DEPTH (feet)	CASING (blows/ft)	SAMPLE				PID (ppm)	SAMPLE DESCRIPTION	NOTES	STRATUM DESCRIPTION
		No.	REC/PEN (in)	DEPTH (ft.)	BLOWS/6"				
0		C-1	-	0-0.4	NA		5 inches asphalt concrete (AC) pavement.	(1)	5" AC PAVEMENT
		S-1	14/24	0.4-2.5	NA		Top 5" - Very dense, fine to coarse SAND FILL, some gravel, trace silt; moist. Bottom 3" - Very dense, brown, fine to coarse SAND FILL, little gravel, trace silt; moist.	(2) (3)	5" BASE COURSE FILL
2		S-2	12/24	2-4	4-10-27-5		Dense, brown, fine to coarse gravelly SAND FILL, little silt; moist.		SAND FILL
4		S-3	13/24	4-6	3-3-3-13		Loose, brown, fine to medium silty SAND FILL, trace gravel, trace debris (shingles); moist.		
6						End of boring at 6 ft.			
8									
10									
12									
14									
16									
18									

GRANULAR SOILS		COHESIVE SOILS		NOTES:
BLOWS/FT	DENSITY	BLOWS/FT	DENSITY	
0-4	V. LOOSE	0-2	V. SOFT	(1) Pavement cored with drill rig using a 4-inch diameter coring shoe. (2) 3" OD split-spoon sampler and hand auger sampler used to obtain S-1 sample. (3) Grab samples collected from 0.4 ft. to 0.9 ft. and from 2 ft. to 4 ft.
4-10	LOOSE	2-4	SOFT	
10-30	M. DENSE	4-8	M. STIFF	
30-50	DENSE	8-15	STIFF	
> 50	V. DENSE	15-30	V. STIFF	
		> 30	HARD	

GENERAL NOTES: i) THE STRATIFICATION LINES REPRESENT THE APPROXIMATE BOUNDARY BETWEEN SOIL TYPES. TRANSITIONS MAY BE GRADUAL.
ii) WATER LEVEL READINGS HAVE BEEN MADE IN THE DRILL HOLES AT TIMES AND UNDER CONDITIONS STATED ON THIS BORING LOG. FLUCTUATIONS IN THE LEVEL OF GROUNDWATER MAY OCCUR DUE TO OTHER FACTORS THAN THOSE PRESENT AT THE TIME MEASUREMENTS ARE MADE.

BORING No. C-5



PROJECT
 Maplewood Avenue
 Utility Improvements
 Portsmouth, NH

REPORT OF BORING No. C-6
SHEET 1 OF 1
Project No. 2150737.C.2
CHKD BY Thomas J. Strike, PE

BORING Co. New England Boring Contractors, Inc. **BORING LOCATION** Maplewood Avenue - See attached plan
FOREMAN Patrick Schofield **GROUND SURFACE ELEVATION** - **DATUM** -
WSE REP: Brian Toner **DATE START** 4/19/17 **DATE END** 4/19/17

METHODS: Pavement coring; hand auger excavation; standard penetration tests (SPTs).
SAMPLER: Split-spoon sampler (3" OD, 2.5" ID) driven 12 inches with an automatic hammer falling 30 inches.
EQUIPMENT: Truck-mounted drill; 4" ID coring shoe; 3" ID hand auger.

GROUNDWATER OBSERVATIONS				
DATE	TIME	WATER AT	CASING AT	STABILIZATION TIME
Groundwater not observed.				

DEPTH (feet)	CASING (blows/ft)	SAMPLE				PID (ppm)	SAMPLE DESCRIPTION	NOTES	STRATUM DESCRIPTION
		No.	REC/PEN (in)	DEPTH (ft.)	BLOWS/6"				
0		C-1	-	0-0.6	NA	-	7 inches asphalt concrete (AC) pavement.	(1)	7" AC PAVEMENT
		S-1	6/12	0.6-1.6	NA	3.0	Brown, fine to coarse gravelly SAND FILL, trace silt; moist.	(2)	
2		S-2	9/12	1.6-2.6	NA	0	Brown, fine to coarse gravelly SAND FILL, trace silt; moist.		BASE COURSE FILL
							End of boring at 2.5 ft.		
4									
6									
8									
10									
12									
14									
16									
18									

GRANULAR SOILS		COHESIVE SOILS		NOTES:
BLOWS/FT	DENSITY	BLOWS/FT	DENSITY	
0-4	V. LOOSE	0-2	V. SOFT	(1) Pavement cored with drill rig using a 4-inch diameter coring shoe.
4-10	LOOSE	2-4	SOFT	
10-30	M. DENSE	4-8	M. STIFF	
30-50	DENSE	8-15	STIFF	
> 50	V. DENSE	15-30	V. STIFF	
		> 30	HARD	

GENERAL NOTES: i) THE STRATIFICATION LINES REPRESENT THE APPROXIMATE BOUNDARY BETWEEN SOIL TYPES. TRANSITIONS MAY BE GRADUAL.
 ii) WATER LEVEL READINGS HAVE BEEN MADE IN THE DRILL HOLES AT TIMES AND UNDER CONDITIONS STATED ON THIS BORING LOG. FLUCTUATIONS IN THE LEVEL OF GROUNDWATER MAY OCCUR DUE TO OTHER FACTORS THAN THOSE PRESENT AT THE TIME MEASUREMENTS ARE MADE.

BORING No. C-6



PROJECT
Maplewood Avenue
Utility Improvements
Portsmouth, NH

REPORT OF BORING No. C-7
SHEET 1 OF 1
Project No. 2150737.C.2
CHKD BY Thomas J. Strike, PE

BORING Co. New England Boring Contractors, Inc. **BORING LOCATION** Maplewood Avenue - See attached plan
FOREMAN Patrick Schofield **GROUND SURFACE ELEVATION** - **DATUM** -
WSE REP: Brian Toner **DATE START** 4/19/17 **DATE END** 4/19/17

METHODS: Pavement coring; hand auger excavation; standard penetration tests (SPTs).
SAMPLER: Split-spoon sampler (3" OD, 2.5" ID) driven 12 inches with an automatic hammer falling 30 inches.
EQUIPMENT: Truck-mounted drill; 4" ID coring shoe; 3" ID hand auger.

GROUNDWATER OBSERVATIONS				
DATE	TIME	WATER AT	CASING AT	STABILIZATION TIME
Groundwater not observed.				

DEPTH (feet)	CASING (blows/ft)	SAMPLE				PID (ppm)	SAMPLE DESCRIPTION	NOTES	STRATUM DESCRIPTION
		No.	REC/PEN (in)	DEPTH (ft.)	BLOWS/6"				
0		C-1	-	0-0.5	NA	-	5.8 inches asphalt concrete (AC) pavement.	(1)	5.8" AC PAVEMENT
		S-1	6/12	0.5-1.5	NA	1.3	Brown, fine to coarse gravelly SAND FILL, trace silt; moist.	(2)	
2							End of boring at 1.5 ft.		
4									
6									
8									
10									
12									
14									
16									
18									

GRANULAR SOILS		COHESIVE SOILS		NOTES:
BLOWS/FT	DENSITY	BLOWS/FT	DENSITY	
0-4	V. LOOSE	0-2	V. SOFT	(1) Pavement cored with drill rig using a 4-inch diameter coring shoe. (2) Grab sample collected from 0.5 ft. to 1.5 ft.
4-10	LOOSE	2-4	SOFT	
10-30	M. DENSE	4-8	M. STIFF	
30-50	DENSE	8-15	STIFF	
> 50	V. DENSE	15-30	V. STIFF	
		> 30	HARD	

GENERAL NOTES: i) THE STRATIFICATION LINES REPRESENT THE APPROXIMATE BOUNDARY BETWEEN SOIL TYPES. TRANSITIONS MAY BE GRADUAL.
ii) WATER LEVEL READINGS HAVE BEEN MADE IN THE DRILL HOLES AT TIMES AND UNDER CONDITIONS STATED ON THIS BORING LOG. FLUCTUATIONS IN THE LEVEL OF GROUNDWATER MAY OCCUR DUE TO OTHER FACTORS THAN THOSE PRESENT AT THE TIME MEASUREMENTS ARE MADE.

BORING No. C-7



PROJECT
 Maplewood Avenue
 Utility Improvements
 Portsmouth, NH

REPORT OF BORING No. C-8
SHEET 1 OF 1
Project No. 2150737.C.2
CHKD BY Thomas J. Strike, PE

BORING Co. New England Boring Contractors, Inc. **BORING LOCATION** Central Avenue - See attached plan
FOREMAN Patrick Schofield **GROUND SURFACE ELEVATION** - **DATUM** -
WSE REP: Brian Toner **DATE START** 4/19/17 **DATE END** 4/19/17

METHODS: Pavement coring; hand auger excavation; standard penetration tests (SPTs).
SAMPLER: Split-spoon sampler (3" OD, 2.5" ID) driven 12 inches with an automatic hammer falling 30 inches.
EQUIPMENT: Truck-mounted drill; 4" ID coring shoe; 3" ID hand auger.

GROUNDWATER OBSERVATIONS				
DATE	TIME	WATER AT	CASING AT	STABILIZATION TIME
Groundwater not observed.				

DEPTH (feet)	CASING (blows/ft)	SAMPLE				PID (ppm)	SAMPLE DESCRIPTION	NOTES	STRATUM DESCRIPTION
		No.	REC/PEN (in)	DEPTH (ft.)	BLOWS/6"				
0		C-1	-	0-0.5	NA		6 inches asphalt concrete (AC) pavement.	(1)	6" AC PAVEMENT
		S-1	8/12	0.5-1.5	NA		Top 5" - Brown, sandy GRAVEL FILL, trace silt; wet. Bottom 3" - Dark brown, fine to coarse SAND FILL, some gravel, little silt; wet.	(2)	5" BASE COURSE FILL
2							End of boring at 1.5 ft.		SAND FILL
4									
6									
8									
10									
12									
14									
16									
18									

GRANULAR SOILS		COHESIVE SOILS		NOTES:
BLOWS/FT	DENSITY	BLOWS/FT	DENSITY	
0-4	V. LOOSE	0-2	V. SOFT	(1) Pavement cored with drill rig using a 4-inch diameter coring shoe.
4-10	LOOSE	2-4	SOFT	(2) Bottom 3" - Dark brown, fine to coarse SAND FILL, some gravel, little silt; wet.
10-30	M. DENSE	4-8	M. STIFF	(2) Grab sample collected from 0.5 ft. to 0.9 ft.
30-50	DENSE	8-15	STIFF	
> 50	V. DENSE	15-30	V. STIFF	
		> 30	HARD	

GENERAL NOTES: i) THE STRATIFICATION LINES REPRESENT THE APPROXIMATE BOUNDARY BETWEEN SOIL TYPES. TRANSITIONS MAY BE GRADUAL.
 ii) WATER LEVEL READINGS HAVE BEEN MADE IN THE DRILL HOLES AT TIMES AND UNDER CONDITIONS STATED ON THIS BORING LOG.
 FLUCTUATIONS IN THE LEVEL OF GROUNDWATER MAY OCCUR DUE TO OTHER FACTORS THAN THOSE PRESENT AT THE TIME MEASUREMENTS ARE MADE.

BORING No. C-8



PROJECT
 Maplewood Avenue
 Utility Improvements
 Portsmouth, NH

REPORT OF BORING No. C-9
SHEET 1 OF 1
Project No. 2150737.C.2
CHKD BY Thomas J. Strike, PE

BORING Co. New England Boring Contractors, Inc. **BORING LOCATION** Cutts Street - See attached plan
FOREMAN Patrick Schofield **GROUND SURFACE ELEVATION** - **DATUM** -
WSE REP: Brian Toner **DATE START** 4/19/17 **DATE END** 4/19/17

METHODS: Pavement coring; hand auger excavation; standard penetration tests (SPTs).
SAMPLER: Split-spoon sampler (3" OD, 2.5" ID) driven 12 inches with an automatic hammer falling 30 inches.
EQUIPMENT: Truck-mounted drill; 4" ID coring shoe; 3" ID hand auger.

GROUNDWATER OBSERVATIONS				
DATE	TIME	WATER AT	CASING AT	STABILIZATION TIME
Groundwater not observed.				

DEPTH (feet)	CASING (blows/ft)	SAMPLE				PID (ppm)	SAMPLE DESCRIPTION	NOTES	STRATUM DESCRIPTION
		No.	REC/PEN (in)	DEPTH (ft.)	BLOWS/6"				
0		C-1	-	0-0.25	NA		2.5 inches asphalt concrete (AC) pavement.	(1)	2.5" AC PAVEMENT
		S-1	9/12	0.25-1.25	NA		Top 6" - Gray, GRAVEL with bituminous coating; moist. Bottom 3" - Brown, fine to coarse gravelly SAND FILL, trace silt; moist.		6" BASE COURSE FILL
2							End of boring at 1.25 ft.		SAND FILL
4									
6									
8									
10									
12									
14									
16									
18									

GRANULAR SOILS		COHESIVE SOILS		NOTES:
BLOWS/FT	DENSITY	BLOWS/FT	DENSITY	(1) Pavement cored with drill rig using a 4-inch diameter coring shoe.
0-4	V. LOOSE	0-2	V. SOFT	
4-10	LOOSE	2-4	SOFT	
10-30	M. DENSE	4-8	M. STIFF	
30-50	DENSE	8-15	STIFF	
> 50	V. DENSE	15-30	V. STIFF	
		> 30	HARD	

GENERAL NOTES: i) THE STRATIFICATION LINES REPRESENT THE APPROXIMATE BOUNDARY BETWEEN SOIL TYPES. TRANSITIONS MAY BE GRADUAL.
 ii) WATER LEVEL READINGS HAVE BEEN MADE IN THE DRILL HOLES AT TIMES AND UNDER CONDITIONS STATED ON THIS BORING LOG. FLUCTUATIONS IN THE LEVEL OF GROUNDWATER MAY OCCUR DUE TO OTHER FACTORS THAN THOSE PRESENT AT THE TIME MEASUREMENTS ARE MADE.

BORING No. C-9



PROJECT
Maplewood Avenue
Utility Improvements
Portsmouth, NH

REPORT OF BORING No. C-10
SHEET 1 OF 1
Project No. 2150737.C.2
CHKD BY Thomas J. Strike, PE

BORING Co. New England Boring Contractors, Inc. **BORING LOCATION** Cutts Street - See attached plan
FOREMAN Patrick Schofield **GROUND SURFACE ELEVATION** - **DATUM** -
WSE REP: Brian Toner **DATE START** 4/19/17 **DATE END** 4/19/17

METHODS: Pavement coring; hand auger excavation; standard penetration tests (SPTs).
SAMPLER: Split-spoon sampler (3" OD, 2.5" ID) driven 12 inches with an automatic hammer falling 30 inches.
EQUIPMENT: Truck-mounted drill; 4" ID coring shoe; 3" ID hand auger.

GROUNDWATER OBSERVATIONS				
DATE	TIME	WATER AT	CASING AT	STABILIZATION TIME
Groundwater not observed.				

DEPTH (feet)	CASING (blows/ft)	SAMPLE				PID (ppm)	SAMPLE DESCRIPTION	NOTES	STRATUM DESCRIPTION
		No.	REC/PEN (in)	DEPTH (ft.)	BLOWS/6"				
0		C-1	-	0-0.33	NA		4 inches asphalt concrete (AC) pavement.	(1)	4" AC PAVEMENT
		S-1	8/12	0.33-1.33	NA		Brown, fine to coarse gravelly SAND FILL, little silt; wet.	(2)	BASE COURSE FILL
2							End of boring at 1.33 ft.		
4									
6									
8									
10									
12									
14									
16									
18									

GRANULAR SOILS		COHESIVE SOILS		NOTES:
BLOWS/FT	DENSITY	BLOWS/FT	DENSITY	
0-4	V. LOOSE	0-2	V. SOFT	(1) Pavement cored with drill rig using a 4-inch diameter coring shoe. (2) Grab sample collected from 0.33 ft. to 1.33 ft.
4-10	LOOSE	2-4	SOFT	
10-30	M. DENSE	4-8	M. STIFF	
30-50	DENSE	8-15	STIFF	
> 50	V. DENSE	15-30	V. STIFF	
		> 30	HARD	

GENERAL NOTES: i) THE STRATIFICATION LINES REPRESENT THE APPROXIMATE BOUNDARY BETWEEN SOIL TYPES. TRANSITIONS MAY BE GRADUAL.
ii) WATER LEVEL READINGS HAVE BEEN MADE IN THE DRILL HOLES AT TIMES AND UNDER CONDITIONS STATED ON THIS BORING LOG. FLUCTUATIONS IN THE LEVEL OF GROUNDWATER MAY OCCUR DUE TO OTHER FACTORS THAN THOSE PRESENT AT THE TIME MEASUREMENTS ARE MADE.

BORING No. C-10



PROJECT
 Maplewood Avenue
 Utility Improvements
 Portsmouth, NH

REPORT OF BORING No. C-11
SHEET 1 OF 1
Project No. 2150737.C.2
CHKD BY Thomas J. Strike, PE

BORING Co. New England Boring Contractors, Inc. **BORING LOCATION** Leslie Drive - See attached plan
FOREMAN Patrick Schofield **GROUND SURFACE ELEVATION** - **DATUM** -
WSE REP: Julie Eaton E.I.T. **DATE START** 4/17/17 **DATE END** 4/17/17

METHODS: Pavement coring; hand auger excavation; standard penetration tests (SPTs).
SAMPLER: Split-spoon sampler (3" OD, 2.5" ID) driven 12 inches with an automatic hammer falling 30 inches.
EQUIPMENT: Truck-mounted drill; 4" ID coring shoe; 3" ID hand auger.

GROUNDWATER OBSERVATIONS				
DATE	TIME	WATER AT	CASING AT	STABILIZATION TIME
Groundwater not observed.				

DEPTH (feet)	CASING (blows/ft)	SAMPLE				PID (ppm)	SAMPLE DESCRIPTION	NOTES	STRATUM DESCRIPTION
		No.	REC/PEN (in)	DEPTH (ft.)	BLOWS/6"				
0		C-1	-	0.6	NA	-	7 inches asphalt concrete (AC) pavement.	(1)	7" AC PAVEMENT
		S-1	12/12	0.6-1.6	NA	0.7	Brown, sandy GRAVEL FILL, trace silt; moist. Bottom 3": Brown, fine to medium SAND, little gravel, little silt; moist.	(2)	9" BASE COURSE FILL SAND
2						End of boring at 1.6 ft.			
4									
6									
8									
10									
12									
14									
16									
18									

GRANULAR SOILS		COHESIVE SOILS		NOTES:
BLOWS/FT	DENSITY	BLOWS/FT	DENSITY	
0-4	V. LOOSE	0-2	V. SOFT	(1) Pavement cored with drill rig using a 4-inch diameter coring shoe. (2) Grab sample collected from 0.6 ft. to 1.6 ft.
4-10	LOOSE	2-4	SOFT	
10-30	M. DENSE	4-8	M. STIFF	
30-50	DENSE	8-15	STIFF	
> 50	V. DENSE	15-30	V. STIFF	
		> 30	HARD	

GENERAL NOTES: i) THE STRATIFICATION LINES REPRESENT THE APPROXIMATE BOUNDARY BETWEEN SOIL TYPES. TRANSITIONS MAY BE GRADUAL.
 ii) WATER LEVEL READINGS HAVE BEEN MADE IN THE DRILL HOLES AT TIMES AND UNDER CONDITIONS STATED ON THIS BORING LOG.
 FLUCTUATIONS IN THE LEVEL OF GROUNDWATER MAY OCCUR DUE TO OTHER FACTORS THAN THOSE PRESENT AT THE TIME MEASUREMENTS ARE MADE.

BORING No. C-11



PROJECT
Maplewood Avenue
Utility Improvements
Portsmouth, NH

REPORT OF BORING No. C-12
SHEET 1 OF 1
Project No. 2150737.C.2
CHKD BY Thomas J. Strike, PE

BORING Co. New England Boring Contractors, Inc. **BORING LOCATION** Leslie Drive - See attached plan
FOREMAN Patrick Schofield **GROUND SURFACE ELEVATION** - **DATUM** -
WSE REP: Julie Eaton E.I.T. **DATE START** 4/17/17 **DATE END** 4/17/17

METHODS: Pavement coring; hand auger excavation; standard penetration tests (SPTs).
SAMPLER: Split-spoon samplers (3" OD, 2.5" ID and 2" OD, 1-3/8" ID) driven with a 140-lb. automatic hammer falling 30 inches.
EQUIPMENT: Truck-mounted drill; 4" ID coring shoe; 3" ID hand auger.

GROUNDWATER OBSERVATIONS				
DATE	TIME	WATER AT	CASING AT	STABILIZATION TIME
Groundwater not observed.				

DEPTH (feet)	CASING (blows/ft)	SAMPLE				PID (ppm)	SAMPLE DESCRIPTION	NOTES	STRATUM DESCRIPTION
		No.	REC/PEN (in)	DEPTH (ft.)	BLOWS/6"				
0		C-1	-	0-0.4	NA	-	5 inches asphalt concrete (AC) pavement.	(1)	5" AC PAVEMENT
		S-1	11/12	0.4 - 1.4	NA	0.2	Brown, GRAVEL FILL, some sand, little silt; moist.	(2)	3" BASE COURSE FILL
		S-2	13/24	1.4 - 3.4	5-8-6-10	0.2	Medium dense, brown, fine to coarse gravelly SAND, trace silt; moist, grades to orange with iron staining over bottom 3 inches.	(3) (4) (5)	SAND
2									
4							End of boring at 3.4 ft.		
6									
8									
10									
12									
14									
16									
18									

GRANULAR SOILS		COHESIVE SOILS		NOTES:
BLOWS/FT	DENSITY	BLOWS/FT	DENSITY	
0-4	V. LOOSE	0-2	V. SOFT	(1) Pavement cored with drill rig using a 4-inch diameter coring shoe.
4-10	LOOSE	2-4	SOFT	(2) Bottom 8": Brown, fine to coarse SAND, some silt, trace gravel; moist.
10-30	M. DENSE	4-8	M. STIFF	(3) 3-inch OD split-spoon sampler used to obtain S-1 sample.
30-50	DENSE	8-15	STIFF	(4) 2-inch OD split-spoon sampler used to obtain S-2 sample.
> 50	V. DENSE	15-30	V. STIFF	(5) Grab sample collected from 1.4 ft. to 3.4 ft.
		> 30	HARD	

GENERAL NOTES: i) THE STRATIFICATION LINES REPRESENT THE APPROXIMATE BOUNDARY BETWEEN SOIL TYPES. TRANSITIONS MAY BE GRADUAL.
ii) WATER LEVEL READINGS HAVE BEEN MADE IN THE DRILL HOLES AT TIMES AND UNDER CONDITIONS STATED ON THIS BORING LOG. FLUCTUATIONS IN THE LEVEL OF GROUNDWATER MAY OCCUR DUE TO OTHER FACTORS THAN THOSE PRESENT AT THE TIME MEASUREMENTS ARE MADE.

BORING No. C-12



PROJECT
Maplewood Avenue
Utility Improvements
Portsmouth, NH

REPORT OF BORING No. C-13
SHEET 1 OF 1
Project No. 2150737.C.2
CHKD BY Thomas J. Strike, PE

BORING Co. New England Boring Contractors, Inc. **BORING LOCATION** Leslie Drive - See attached plan
FOREMAN Patrick Schofield **GROUND SURFACE ELEVATION** - **DATUM** -
WSE REP: Julie Eaton E.I.T. **DATE START** 4/17/17 **DATE END** 4/17/17

METHODS: Pavement coring; hand auger excavation; standard penetration tests (SPTs).
SAMPLER: Split-spoon samplers (3" OD, 2.5" ID and 2" OD, 1-3/8" ID) driven with a 140-lb. automatic hammer falling 30 inches.
EQUIPMENT: Truck-mounted drill; 4" ID coring shoe; 3" ID hand auger.

GROUNDWATER OBSERVATIONS				
DATE	TIME	WATER AT	CASING AT	STABILIZATION TIME
Groundwater not observed.				

DEPTH (feet)	CASING (blows/ft)	SAMPLE				PID (ppm)	SAMPLE DESCRIPTION	NOTES	STRATUM DESCRIPTION
		No.	REC/PEN (in)	DEPTH (ft.)	BLOWS/6"				
0		C-1	-	0-0.3	NA	-	4 inches asphalt concrete (AC) pavement.	(1)	4" AC PAVEMENT
		S-1	12/12	0.3-1.3	NA	0.6	Brown, sandy GRAVEL FILL, trace silt; moist.	(2) (3)	12" BASE COURSE FILL
		S-2	2/24	1.3-3.3	7-8-8-5	0.2	Medium dense, brown, gravelly SAND, little silt; moist.	(4)	
2								(5)	SAND
4							End of boring at 3.3 ft.		
6									
8									
10									
12									
14									
16									
18									

GRANULAR SOILS		COHESIVE SOILS		NOTES:
BLOWS/FT	DENSITY	BLOWS/FT	DENSITY	
0-4	V. LOOSE	0-2	V. SOFT	(1) Pavement cored with drill rig using a 4-inch diameter coring shoe.
4-10	LOOSE	2-4	SOFT	(2) 3-inch OD split-spoon sampler used to obtain S-1 sample.
10-30	M. DENSE	4-8	M. STIFF	(3) Few cobbles (4" in diamter).
30-50	DENSE	8-15	STIFF	(4) 2-inch OD split-spoon sampler used to obtain S-2 sample.
> 50	V. DENSE	15-30	V. STIFF	(5) Grab sample collected from 0.3 ft. to 1.3 ft.
		> 30	HARD	

GENERAL NOTES: i) THE STRATIFICATION LINES REPRESENT THE APPROXIMATE BOUNDARY BETWEEN SOIL TYPES. TRANSITIONS MAY BE GRADUAL.
ii) WATER LEVEL READINGS HAVE BEEN MADE IN THE DRILL HOLES AT TIMES AND UNDER CONDITIONS STATED ON THIS BORING LOG.
FLUCTUATIONS IN THE LEVEL OF GROUNDWATER MAY OCCUR DUE TO OTHER FACTORS THAN THOSE PRESENT AT THE TIME MEASUREMENTS ARE MADE.

BORING No. C-13



PROJECT
 Maplewood Avenue
 Utility Improvements
 Portsmouth, NH

REPORT OF BORING No. C-14
SHEET 1 OF 1
Project No. 2150737.C.2
CHKD BY Thomas J. Strike, PE

BORING Co. New England Boring Contractors, Inc. **BORING LOCATION** Beechwood Street - See attached plan
FOREMAN Patrick Schofield **GROUND SURFACE ELEVATION** - **DATUM** -
WSE REP: Brian Toner **DATE START** 4/17/17 **DATE END** 4/17/17

METHODS: Pavement coring; hand auger excavation; standard penetration tests (SPTs).
SAMPLER: Split-spoon sampler (3" OD, 2.5" ID) driven 12 inches with an automatic hammer falling 30 inches.
EQUIPMENT: Truck-mounted drill; 4" ID coring shoe; 3" ID hand auger.

GROUNDWATER OBSERVATIONS				
DATE	TIME	WATER AT	CASING AT	STABILIZATION TIME
Groundwater not observed.				

DEPTH (feet)	CASING (blows/ft)	SAMPLE				PID (ppm)	SAMPLE DESCRIPTION	NOTES	STRATUM DESCRIPTION
		No.	REC/PEN (in)	DEPTH (ft.)	BLOWS/6"				
0		C-1	-	0-0.25	-		3.3 inches asphalt concrete (AC) pavement.	(1)	3.3" AC PAVEMENT
		S-1	11/12	0.25-1.25	NA		Brown, fine to coarse sandy GRAVEL FILL, trace silt; wet.	(2)	BASE COURSE FILL
2						End of boring at 1.5 ft.			
4									
6									
8									
10									
12									
14									
16									
18									

GRANULAR SOILS		COHESIVE SOILS		NOTES:
BLOWS/FT	DENSITY	BLOWS/FT	DENSITY	
0-4	V. LOOSE	0-2	V. SOFT	(1) Pavement cored with drill rig using a 4-inch diameter coring shoe. (2) Grab sample collected from 0.25 ft. to 1.25 ft.
4-10	LOOSE	2-4	SOFT	
10-30	M. DENSE	4-8	M. STIFF	
30-50	DENSE	8-15	STIFF	
> 50	V. DENSE	15-30	V. STIFF	
		> 30	HARD	

GENERAL NOTES: i) THE STRATIFICATION LINES REPRESENT THE APPROXIMATE BOUNDARY BETWEEN SOIL TYPES. TRANSITIONS MAY BE GRADUAL.
 ii) WATER LEVEL READINGS HAVE BEEN MADE IN THE DRILL HOLES AT TIMES AND UNDER CONDITIONS STATED ON THIS BORING LOG. FLUCTUATIONS IN THE LEVEL OF GROUNDWATER MAY OCCUR DUE TO OTHER FACTORS THAN THOSE PRESENT AT THE TIME MEASUREMENTS ARE MADE.

BORING No. C-14



PROJECT
 Maplewood Avenue
 Utility Improvements
 Portsmouth, NH

REPORT OF BORING No. C-15
SHEET 1 OF 1
Project No. 2150737.C.2
CHKD BY Thomas J. Strike, PE

BORING Co. New England Boring Contractors, Inc. **BORING LOCATION** Ashland Street - See attached plan
FOREMAN Patrick Schofield **GROUND SURFACE ELEVATION** - **DATUM** -
WSE REP: Brian Toner **DATE START** 4/17/17 **DATE END** 4/17/17

METHODS: Pavement coring; hand auger excavation; standard penetration tests (SPTs).
SAMPLER: Split-spoon sampler (3" OD, 2.5" ID) driven 12 inches with an automatic hammer falling 30 inches.
EQUIPMENT: Truck-mounted drill; 4" ID coring shoe; 3" ID hand auger.

GROUNDWATER OBSERVATIONS				
DATE	TIME	WATER AT	CASING AT	STABILIZATION TIME
Groundwater not observed.				

DEPTH (feet)	CASING (blows/ft)	SAMPLE				PID (ppm)	SAMPLE DESCRIPTION	NOTES	STRATUM DESCRIPTION
		No.	REC/PEN (in)	DEPTH (ft.)	BLOWS/6"				
0		C-1	-	0-0.3	-		4 inches asphalt concrete (AC) pavement.	(1)	4" AC PAVEMENT
		S-1	12/12	0.3-1.3	NA		Brown, fine to coarse sandy GRAVEL FILL, trace silt; wet.	(2)	
2							End of boring at 1.3 ft.		
4									
6									
8									
10									
12									
14									
16									
18									

GRANULAR SOILS		COHESIVE SOILS		NOTES:
BLOWS/FT	DENSITY	BLOWS/FT	DENSITY	
0-4	V. LOOSE	0-2	V. SOFT	(1) Pavement cored with drill rig using a 4-inch diameter coring shoe. (2) Grab sample collected from 0.3 ft. to 1.3 ft.
4-10	LOOSE	2-4	SOFT	
10-30	M. DENSE	4-8	M. STIFF	
30-50	DENSE	8-15	STIFF	
> 50	V. DENSE	15-30	V. STIFF	
		> 30	HARD	

GENERAL NOTES: i) THE STRATIFICATION LINES REPRESENT THE APPROXIMATE BOUNDARY BETWEEN SOIL TYPES. TRANSITIONS MAY BE GRADUAL.
 ii) WATER LEVEL READINGS HAVE BEEN MADE IN THE DRILL HOLES AT TIMES AND UNDER CONDITIONS STATED ON THIS BORING LOG. FLUCTUATIONS IN THE LEVEL OF GROUNDWATER MAY OCCUR DUE TO OTHER FACTORS THAN THOSE PRESENT AT THE TIME MEASUREMENTS ARE MADE.

BORING No. C-15



PROJECT
Maplewood Avenue
Utility Improvements
Portsmouth, NH

REPORT OF BORING No. C-16
SHEET 1 OF 1
Project No. 2150737.C.2
CHKD BY Thomas J. Strike, PE

BORING Co. New England Boring Contractors, Inc. **BORING LOCATION** Fairview Drive - See attached plan
FOREMAN Patrick Schofield **GROUND SURFACE ELEVATION** - **DATUM** -
WSE REP: Brian Toner **DATE START** 4/17/17 **DATE END** 4/17/17

METHODS: Pavement coring; hand auger excavation; standard penetration tests (SPTs).
SAMPLER: Split-spoon samplers (3" OD, 2.5" ID and 2" OD, 1-3/8" ID) driven with a 140-lb. automatic hammer falling 30 inches.
EQUIPMENT: Truck-mounted drill; 4" ID coring shoe; 3" ID hand auger.

GROUNDWATER OBSERVATIONS				
DATE	TIME	WATER AT	CASING AT	STABILIZATION TIME
Groundwater not observed.				

DEPTH (feet)	CASING (blows/ft)	SAMPLE				PID (ppm)	SAMPLE DESCRIPTION	NOTES	STRATUM DESCRIPTION
		No.	REC/PEN (in)	DEPTH (ft.)	BLOWS/6"				
0		C-1	-	0-0.5	-		5 inches asphalt concrete (AC) pavement.	(1)	5" AC PAVEMENT
		S-1	11/24	0.5-2.5	NA		Top 5" - Medium dense, brown sandy GRAVEL FILL, trace silt; wet. Bottom 6" - Brown, fine silty SAND, trace gravel; wet.	(2)	5" BASE COURSE FILL
2									SAND
		S-2	18/24	2.5-4.5	2-4-10-8		Medium dense, brown, fine to medium, silty SAND, little gravel; wet.		
4									GLACIAL TILL
		S-3	24/24	4.5-6.5	6-13-16-19		Medium dense, brown, fine to medium SAND, little silt, trace gravel; moist.		
6						End of boring at 6.5 ft.			
8									
10									
12									
14									
16									
18									

GRANULAR SOILS		COHESIVE SOILS		NOTES:
BLOWS/FT	DENSITY	BLOWS/FT	DENSITY	
0-4	V. LOOSE	0-2	V. SOFT	(1) Pavement cored with drill rig using a 4-inch diameter coring shoe. (2) Grab sample collected from 0.5 ft. to 0.9 ft.
4-10	LOOSE	2-4	SOFT	
10-30	M. DENSE	4-8	M. STIFF	
30-50	DENSE	8-15	STIFF	
> 50	V. DENSE	15-30	V. STIFF	
		> 30	HARD	

GENERAL NOTES: i) THE STRATIFICATION LINES REPRESENT THE APPROXIMATE BOUNDARY BETWEEN SOIL TYPES. TRANSITIONS MAY BE GRADUAL.
ii) WATER LEVEL READINGS HAVE BEEN MADE IN THE DRILL HOLES AT TIMES AND UNDER CONDITIONS STATED ON THIS BORING LOG. FLUCTUATIONS IN THE LEVEL OF GROUNDWATER MAY OCCUR DUE TO OTHER FACTORS THAN THOSE PRESENT AT THE TIME MEASUREMENTS ARE MADE.

BORING No. C-16



PROJECT
 Maplewood Avenue
 Utility Improvements
 Portsmouth, NH

REPORT OF BORING No. C-17
SHEET 1 OF 1
Project No. 2150737.C.2
CHKD BY Thomas J. Strike, PE

BORING Co. New England Boring Contractors, Inc. **BORING LOCATION** Fairview Drive - See attached plan
FOREMAN Patrick Schofield **GROUND SURFACE ELEVATION** - **DATUM** -
WSE REP: Brian Toner **DATE START** 4/17/17 **DATE END** 4/17/17

METHODS: Pavement coring; hand auger excavation; standard penetration tests (SPTs).
SAMPLER: Split-spoon sampler (3" OD, 2.5" ID) driven 12 inches with an automatic hammer falling 30 inches.
EQUIPMENT: Truck-mounted drill; 4" ID coring shoe; 3" ID hand auger.

GROUNDWATER OBSERVATIONS				
DATE	TIME	WATER AT	CASING AT	STABILIZATION TIME
Groundwater not observed.				

DEPTH (feet)	CASING (blows/ft)	SAMPLE				PID (ppm)	SAMPLE DESCRIPTION	NOTES	STRATUM DESCRIPTION
		No.	REC/PEN (in)	DEPTH (ft.)	BLOWS/6"				
0		C-1	-	0-0.67	NA		8 inches asphalt concrete (AC) pavement.	(1)	8" AC PAVEMENT
		S-1	7/12	0.67-1.67	NA		Brown, fine to coarse sandy GRAVEL FILL, trace silt; moist.	(2)	BASE COURSE FILL
2							End of boring 1.67 ft.		
4									
6									
8									
10									
12									
14									
16									
18									

GRANULAR SOILS		COHESIVE SOILS		NOTES:
BLOWS/FT	DENSITY	BLOWS/FT	DENSITY	
0-4	V. LOOSE	0-2	V. SOFT	(1) Pavement cored with drill rig using a 4-inch diameter coring shoe. (2) Grab sample collected from 0.67 to 1.67 ft.
4-10	LOOSE	2-4	SOFT	
10-30	M. DENSE	4-8	M. STIFF	
30-50	DENSE	8-15	STIFF	
> 50	V. DENSE	15-30	V. STIFF	
		> 30	HARD	

GENERAL NOTES: i) THE STRATIFICATION LINES REPRESENT THE APPROXIMATE BOUNDARY BETWEEN SOIL TYPES. TRANSITIONS MAY BE GRADUAL.
 ii) WATER LEVEL READINGS HAVE BEEN MADE IN THE DRILL HOLES AT TIMES AND UNDER CONDITIONS STATED ON THIS BORING LOG. FLUCTUATIONS IN THE LEVEL OF GROUNDWATER MAY OCCUR DUE TO OTHER FACTORS THAN THOSE PRESENT AT THE TIME MEASUREMENTS ARE MADE.

BORING No. C-17



PROJECT
 Maplewood Avenue
 Utility Improvements
 Portsmouth, NH

REPORT OF BORING No. C-18
SHEET 1 OF 1
Project No. 2150737.C.2
CHKD BY Thomas J. Strike, PE

BORING Co. New England Boring Contractors, Inc. **BORING LOCATION** Emery Street - See attached plan
FOREMAN Patrick Schofield **GROUND SURFACE ELEVATION** - **DATUM** -
WSE REP: Brian Toner **DATE START** 4/17/17 **DATE END** 4/17/17

METHODS: Pavement coring and continuous standard penetration tests (SPTs).
SAMPLER: Split-spoon sampler (3" OD, 2.5" ID and 2" OD, 1-3/8" ID) driven with a 140-lb. automatic hammer falling 30 inches.
EQUIPMENT: Truck-mounted drill; 4" ID coring shoe.

GROUNDWATER OBSERVATIONS				
DATE	TIME	WATER AT	CASING AT	STABILIZATION TIME
Groundwater not observed.				

DEPTH (feet)	CASING (blows/ft)	SAMPLE				PID (ppm)	SAMPLE DESCRIPTION	NOTES	STRATUM DESCRIPTION
		No.	REC/PEN (in)	DEPTH (ft.)	BLOWS/6"				
0		C-1	-	0-0.5	-	-	5 inches asphalt concrete (AC) pavement.	(1)	5" AC PAVEMENT
		S-1	18/24	0.5-2.5	NA	0.4	Top 3" - Dense, dark brown, GRAVEL FILL with bituminous coating, some fine to coarse sand; moist. Bottom 15" - Medium dense, brown, fine to medium SILTY SAND FILL, little gravel; moist.	(2)	3" BASE COURSE FILL
2									SAND FILL
		S-2	14/24	2.5-4.5	9-8-13-121	1.8	Medium dense, brown, fine to medium silty SAND FILL, little gravel; moist.		
4									
6									
8									
10									
12									
14									
16									
18									
							End of boring 4.5 ft.		

GRANULAR SOILS		COHESIVE SOILS		NOTES:
BLOWS/FT	DENSITY	BLOWS/FT	DENSITY	
0-4	V. LOOSE	0-2	V. SOFT	(1) Pavement cored with drill rig using a 4-inch diameter coring shoe. (2) 3-inch OD split-spoon sampler and hand augering used to obtain S-1 sample. (3) 2-inch OD split-spoon sampler used to obtain S-2 sample.
4-10	LOOSE	2-4	SOFT	
10-30	M. DENSE	4-8	M. STIFF	
30-50	DENSE	8-15	STIFF	
> 50	V. DENSE	15-30	V. STIFF	
		> 30	HARD	

GENERAL NOTES: i) THE STRATIFICATION LINES REPRESENT THE APPROXIMATE BOUNDARY BETWEEN SOIL TYPES. TRANSITIONS MAY BE GRADUAL.
 ii) WATER LEVEL READINGS HAVE BEEN MADE IN THE DRILL HOLES AT TIMES AND UNDER CONDITIONS STATED ON THIS BORING LOG.
 FLUCTUATIONS IN THE LEVEL OF GROUNDWATER MAY OCCUR DUE TO OTHER FACTORS THAN THOSE PRESENT AT THE TIME MEASUREMENTS ARE MADE.

BORING No. C-18



PROJECT
 Maplewood Avenue
 Utility Improvements
 Portsmouth, NH

REPORT OF BORING No. P-101
SHEET 1 OF 1
Project No. 2150737.C.2
CHKD BY Thomas J. Strike, PE

BORING Co. New England Boring Contractors, Inc. **BORING LOCATION** Central Avenue - See attached plan
FOREMAN Patrick Schofield **GROUND SURFACE ELEVATION** - **DATUM** -
WSE REP: Julie Eaton, EIT **DATE START** 4/12/17 **DATE END** 4/12/17

METHODS: Uncased rotary wash drilling methods.
SAMPLER: No standard soil sampling completed.
EQUIPMENT: Truck-mounted drill; 3-7/8" diameter roller bit.

GROUNDWATER OBSERVATIONS				
DATE	TIME	WATER AT	CASING AT	STABILIZATION TIME
4/12/17	-	8 ft. +/-	-	-

DEPTH (feet)	CASING (blows/ft)	SAMPLE				PID (ppm)	SAMPLE DESCRIPTION / OBSERVATIONS	NOTES	STRATUM DESCRIPTION
		No.	REC/PEN (in)	DEPTH (ft)	BLOWS/6"				
0							Stratum description below pavement assumed based on subsurface conditions encountered in adjacent boring B20 and observed changes in drill cuttings and advancement rate.	2" AC PAVEMENT	
								SAND FILL	
5							Wash/cutting change (likely to clay).	SILTY CLAY	
10								GLACIAL TILL	
							Roller bit grinding at 13 ft. and rock fragments observed in wash.		
15							End of probe at 14 ft.		
20									
25									
30									
35									

GRANULAR SOILS		COHESIVE SOILS		NOTES:
BLOWS/FT	DENSITY	BLOWS/FT	DENSITY	
0-4	V. LOOSE	0-2	V. SOFT	
4-10	LOOSE	2-4	SOFT	
10-30	M. DENSE	4-8	M. STIFF	
30-50	DENSE	8-15	STIFF	
> 50	V. DENSE	15-30	V. STIFF	
		> 30	HARD	

GENERAL NOTES: i) THE STRATIFICATION LINES REPRESENT THE APPROXIMATE BOUNDARY BETWEEN SOIL TYPES. TRANSITIONS MAY BE GRADUAL.
 ii) WATER LEVEL READINGS HAVE BEEN MADE IN THE DRILL HOLES AT TIMES AND UNDER CONDITIONS STATED ON THIS BORING LOG.
 FLUCTUATIONS IN THE LEVEL OF GROUNDWATER MAY OCCUR DUE TO OTHER FACTORS THAN THOSE PRESENT AT THE TIME MEASUREMENTS ARE MADE.

BORING No. P-101

Probe Co. New England Boring Contractors PROBE LOCATION Maplewood Ave - See attached plan
FOREMAN Matt Soucy GROUND SURFACE ELEV. 73 ft. +/- DATUM NAVD88
WSE GEOLOGIST: Jesse Hofmann DATE START 12/18/15 DATE END 12/18/15

SAMPLER:	NO SAMPLES TAKEN	GROUNDWATER READINGS				
		DATE	TIME	WATER AT	CASING AT	STABILIZATION TIME
CASING:	HOLLOW STEM AUGERS					
CASING SIZE:	2 1/4" INSIDE DIAMETER					

DEPTH (feet)	CASING (blows/ft)	SAMPLE				PID (ppm)	SAMPLE DESCRIPTION	NOTES	STRATUM DESCRIPTION
		No.	REC/PEN (in)	DEPTH (ft)	BLOWS/6"				
0									
5									
10									
15							Probe Terminated at 14 ft.		
20									
25									

GRANULAR SOILS		COHESIVE SOILS		NOTES:
BLOWS/FT	DENSITY	BLOWS/FT	DENSITY	
0-4	V. LOOSE	0-2	V. SOFT	
4-10	LOOSE	2-4	SOFT	
10-30	M. DENSE	4-8	M. STIFF	
30-50	DENSE	8-15	STIFF	
> 50	V. DENSE	15-30	V. STIFF	
		> 30	HARD	

GENERAL NOTES: i) THE STRATIFICATION LINES REPRESENT THE APPROXIMATE BOUNDARY BETWEEN SOIL TYPES. TRANSITIONS MAY BE GRADUAL.
ii) WATER LEVEL READINGS HAVE BEEN MADE IN THE DRILL HOLES AT TIMES AND UNDER CONDITIONS STATED ON THIS PROBE LOG.
FLUCTUATIONS IN THE LEVEL OF GROUNDWATER MAY OCCUR DUE TO OTHER FACTORS THAN THOSE PRESENT AT THE TIME MEASUREMENTS ARE MADE.

Probe Co. New England Boring Contractors
FOREMAN Matt Soucy
WSE GEOLOGIST: Jesse Hofmann
PROBE LOCATION Maplewood Ave - See attached plan
GROUND SURFACE ELEV. 66 ft. +/- **DATUM** NAVD88
DATE START 12/18/15 **DATE END** 12/18/15

SAMPLER:	NO SAMPLES TAKEN	GROUNDWATER READINGS				
		DATE	TIME	WATER AT	CASING AT	STABILIZATION TIME
CASING:	HOLLOW STEM AUGERS					
CASING SIZE:	2 1/4" INSIDE DIAMETER					

DEPTH (feet)	CASING (blows/ft)	SAMPLE				PID (ppm)	SAMPLE DESCRIPTION	NOTES	STRATUM DESCRIPTION
		No.	REC/PEN (in)	DEPTH (ft)	BLOWS/6"				
0									
5									
10									
15							Probe Terminated at 14 ft.		
20									
25									

GRANULAR SOILS		COHESIVE SOILS		NOTES:
BLOWS/FT	DENSITY	BLOWS/FT	DENSITY	
0-4	V. LOOSE	0-2	V. SOFT	
4-10	LOOSE	2-4	SOFT	
10-30	M. DENSE	4-8	M. STIFF	
30-50	DENSE	8-15	STIFF	
> 50	V. DENSE	15-30	V. STIFF	
		> 30	HARD	

GENERAL NOTES: i) THE STRATIFICATION LINES REPRESENT THE APPROXIMATE BOUNDARY BETWEEN SOIL TYPES. TRANSITIONS MAY BE GRADUAL.
ii) WATER LEVEL READINGS HAVE BEEN MADE IN THE DRILL HOLES AT TIMES AND UNDER CONDITIONS STATED ON THIS PROBE LOG.
FLUCTUATIONS IN THE LEVEL OF GROUNDWATER MAY OCCUR DUE TO OTHER FACTORS THAN THOSE PRESENT AT THE TIME MEASUREMENTS ARE MADE.

Probe Co. New England Boring Contractors
FOREMAN Matt Soucy
WSE GEOLOGIST: Jesse Hofmann
PROBE LOCATION Maplewood Ave - See attached plan
GROUND SURFACE ELEV. 64 ft. +/- **DATUM** NAVD88
DATE START 12/18/15 **DATE END** 12/18/15

SAMPLER:	NO SAMPLES TAKEN	GROUNDWATER READINGS				
		DATE	TIME	WATER AT	CASING AT	STABILIZATION TIME
CASING:	HOLLOW STEM AUGERS					
CASING SIZE:	2 1/4" INSIDE DIAMETER					

DEPTH (feet)	CASING (blows/ft)	SAMPLE				PID (ppm)	SAMPLE DESCRIPTION	NOTES	STRATUM DESCRIPTION
		No.	REC/PEN (in)	DEPTH (ft)	BLOWS/6"				
0									
								1, 3	
5									
								2	
10									
15							Probe Terminated at 14 ft.		
20									
25									

GRANULAR SOILS		COHESIVE SOILS		NOTES:
BLOWS/FT	DENSITY	BLOWS/FT	DENSITY	
0-4	V. LOOSE	0-2	V. SOFT	1 Auger grinding from about 3 to 5 ft. 2 Auger grinding at about 9 ft. 3 Auger spoils wet at about 2 ft.
4-10	LOOSE	2-4	SOFT	
10-30	M. DENSE	4-8	M. STIFF	
30-50	DENSE	8-15	STIFF	
> 50	V. DENSE	15-30	V. STIFF	
		> 30	HARD	

GENERAL NOTES: i) THE STRATIFICATION LINES REPRESENT THE APPROXIMATE BOUNDARY BETWEEN SOIL TYPES. TRANSITIONS MAY BE GRADUAL.
 ii) WATER LEVEL READINGS HAVE BEEN MADE IN THE DRILL HOLES AT TIMES AND UNDER CONDITIONS STATED ON THIS PROBE LOG.
 FLUCTUATIONS IN THE LEVEL OF GROUNDWATER MAY OCCUR DUE TO OTHER FACTORS THAN THOSE PRESENT AT THE TIME MEASUREMENTS ARE MADE.

Probe Co. New England Boring Contractors PROBE LOCATION Maplewood Ave - See attached plan
FOREMAN Ken Smith GROUND SURFACE ELEV. 74 ft. +/- DATUM NAVD88
WSE GEOLOGIST: Jesse Hofmann DATE START 12/21/15 DATE END 12/21/15

SAMPLER: NO SAMPLES TAKEN GROUNDWATER READINGS
CASING: HOLLOW STEM AUGERS DATE TIME WATER AT CASING AT STABILIZATION TIME
CASING SIZE: 2 1/4" INSIDE DIAMETER

DEPTH (feet)	CASING (blows/ft)	SAMPLE				PID (ppm)	SAMPLE DESCRIPTION	NOTES	STRATUM DESCRIPTION
		No.	REC/PEN (in)	DEPTH (ft)	BLOWS/6"				
0									
5									
10									
15									
20									
25									

Probe Terminated at 12 ft.

GRANULAR SOILS		COHESIVE SOILS		NOTES:
BLOWS/FT	DENSITY	BLOWS/FT	DENSITY	
0-4	V. LOOSE	0-2	V. SOFT	
4-10	LOOSE	2-4	SOFT	
10-30	M. DENSE	4-8	M. STIFF	
30-50	DENSE	8-15	STIFF	
> 50	V. DENSE	15-30	V. STIFF	
		> 30	HARD	

GENERAL NOTES: i) THE STRATIFICATION LINES REPRESENT THE APPROXIMATE BOUNDARY BETWEEN SOIL TYPES. TRANSITIONS MAY BE GRADUAL.
ii) WATER LEVEL READINGS HAVE BEEN MADE IN THE DRILL HOLES AT TIMES AND UNDER CONDITIONS STATED ON THIS PROBE LOG.
FLUCTUATIONS IN THE LEVEL OF GROUNDWATER MAY OCCUR DUE TO OTHER FACTORS THAN THOSE PRESENT AT THE TIME MEASUREMENTS ARE MADE.

Probe Co. New England Boring Contractors PROBE LOCATION Maplewood Ave - See attached plan
FOREMAN Ken Smith GROUND SURFACE ELEV. 62 ft. +/- DATUM NAVD88
WSE GEOLOGIST: Jesse Hofmann DATE START 12/21/15 DATE END 12/21/15

SAMPLER: NO SAMPLES TAKEN GROUNDWATER READINGS
CASING: HOLLOW STEM AUGERS DATE TIME WATER AT CASING AT STABILIZATION TIME
CASING SIZE: 2 1/4" INSIDE DIAMETER

DEPTH (feet)	CASING (blows/ft)	SAMPLE				PID (ppm)	SAMPLE DESCRIPTION	NOTES	STRATUM DESCRIPTION
		No.	REC/PEN (in)	DEPTH (ft)	BLOWS/6"				
0									
5									
10									
15							Auger Refusal at 14 ft.		
20									
25									

GRANULAR SOILS		COHESIVE SOILS		NOTES:
BLOWS/FT	DENSITY	BLOWS/FT	DENSITY	
0-4	V. LOOSE	0-2	V. SOFT	
4-10	LOOSE	2-4	SOFT	
10-30	M. DENSE	4-8	M. STIFF	
30-50	DENSE	8-15	STIFF	
> 50	V. DENSE	15-30	V. STIFF	
		> 30	HARD	

GENERAL NOTES: i) THE STRATIFICATION LINES REPRESENT THE APPROXIMATE BOUNDARY BETWEEN SOIL TYPES. TRANSITIONS MAY BE GRADUAL.
ii) WATER LEVEL READINGS HAVE BEEN MADE IN THE DRILL HOLES AT TIMES AND UNDER CONDITIONS STATED ON THIS PROBE LOG.
FLUCTUATIONS IN THE LEVEL OF GROUNDWATER MAY OCCUR DUE TO OTHER FACTORS THAN THOSE PRESENT AT THE TIME MEASUREMENTS ARE MADE.

Probe Co. New England Boring Contractors PROBE LOCATION Maplewood Ave - See attached plan
FOREMAN Sam Shaw GROUND SURFACE ELEV. 55 ft. +/- DATUM NAVD88
WSE GEOLOGIST: Jesse Hofmann DATE START 12/22/15 DATE END 12/22/15

SAMPLER:	NO SAMPLES TAKEN	GROUNDWATER READINGS				
		DATE	TIME	WATER AT	CASING AT	STABILIZATION TIME
CASING:	HOLLOW STEM AUGERS					
CASING SIZE:	2 1/4" INSIDE DIAMETER					

DEPTH (feet)	CASING (blows/ft)	SAMPLE				PID (ppm)	SAMPLE DESCRIPTION	NOTES	STRATUM DESCRIPTION
		No.	REC/PEN (in)	DEPTH (ft)	BLOWS/6"				
0									
5									
10									
15							Probe Terminated at 15 ft.		
20									
25									

GRANULAR SOILS		COHESIVE SOILS		NOTES:
BLOWS/FT	DENSITY	BLOWS/FT	DENSITY	
0-4	V. LOOSE	0-2	V. SOFT	
4-10	LOOSE	2-4	SOFT	
10-30	M. DENSE	4-8	M. STIFF	
30-50	DENSE	8-15	STIFF	
> 50	V. DENSE	15-30	V. STIFF	
		> 30	HARD	

GENERAL NOTES: i) THE STRATIFICATION LINES REPRESENT THE APPROXIMATE BOUNDARY BETWEEN SOIL TYPES. TRANSITIONS MAY BE GRADUAL.
ii) WATER LEVEL READINGS HAVE BEEN MADE IN THE DRILL HOLES AT TIMES AND UNDER CONDITIONS STATED ON THIS PROBE LOG.
FLUCTUATIONS IN THE LEVEL OF GROUNDWATER MAY OCCUR DUE TO OTHER FACTORS THAN THOSE PRESENT AT THE TIME MEASUREMENTS ARE MADE.

Probe Co. New England Boring Contractors PROBE LOCATION Maplewood Ave - See attached plan
FOREMAN Sam Shaw GROUND SURFACE ELEV. 54 ft. +/- DATUM NAVD88
WSE GEOLOGIST: Jesse Hofmann DATE START 12/22/15 DATE END 12/22/15

SAMPLER:	NO SAMPLES TAKEN	GROUNDWATER READINGS				
		DATE	TIME	WATER AT	CASING AT	STABILIZATION TIME
CASING:	HOLLOW STEM AUGERS					
CASING SIZE:	2 1/4" INSIDE DIAMETER					

DEPTH (feet)	CASING (blows/ft)	SAMPLE				PID (ppm)	SAMPLE DESCRIPTION	NOTES	STRATUM DESCRIPTION
		No.	REC/PEN (in)	DEPTH (ft)	BLOWS/6"				
0									
								1	
								2	
5									
						Auger Refusal at 6 ft.			
10									
15									
20									
25									

GRANULAR SOILS		COHESIVE SOILS		NOTES:
BLOWS/FT	DENSITY	BLOWS/FT	DENSITY	
0-4	V. LOOSE	0-2	V. SOFT	1 Auger gridding from about 1 to 3 ft. 2 Auger gridding from about 5 to 6 ft.
4-10	LOOSE	2-4	SOFT	
10-30	M. DENSE	4-8	M. STIFF	
30-50	DENSE	8-15	STIFF	
> 50	V. DENSE	15-30	V. STIFF	
		> 30	HARD	

GENERAL NOTES: i) THE STRATIFICATION LINES REPRESENT THE APPROXIMATE BOUNDARY BETWEEN SOIL TYPES. TRANSITIONS MAY BE GRADUAL.
ii) WATER LEVEL READINGS HAVE BEEN MADE IN THE DRILL HOLES AT TIMES AND UNDER CONDITIONS STATED ON THIS PROBE LOG.
FLUCTUATIONS IN THE LEVEL OF GROUNDWATER MAY OCCUR DUE TO OTHER FACTORS THAN THOSE PRESENT AT THE TIME MEASUREMENTS ARE MADE.

Probe Co. New England Boring Contractors
FOREMAN Sam Shaw
WSE GEOLOGIST: Jesse Hofmann
PROBE LOCATION Maplewood Ave - See attached plan
GROUND SURFACE ELEV. 44 ft. +/- **DATUM** NAVD88
DATE START 12/22/15 **DATE END** 12/22/15

SAMPLER:	NO SAMPLES TAKEN	GROUNDWATER READINGS				
		DATE	TIME	WATER AT	CASING AT	STABILIZATION TIME
CASING:	HOLLOW STEM AUGERS					
CASING SIZE:	2 1/4" INSIDE DIAMETER					

DEPTH (feet)	CASING (blows/ft)	SAMPLE				PID (ppm)	SAMPLE DESCRIPTION	NOTES	STRATUM DESCRIPTION
		No.	REC/PEN (in)	DEPTH (ft)	BLOWS/6"				
0									
5									
10							Probe Terminated at 10 ft.		
15									
20									
25									

GRANULAR SOILS		COHESIVE SOILS		NOTES:
BLOWS/FT	DENSITY	BLOWS/FT	DENSITY	
0-4	V. LOOSE	0-2	V. SOFT	
4-10	LOOSE	2-4	SOFT	
10-30	M. DENSE	4-8	M. STIFF	
30-50	DENSE	8-15	STIFF	
> 50	V. DENSE	15-30	V. STIFF	
		> 30	HARD	

GENERAL NOTES: i) THE STRATIFICATION LINES REPRESENT THE APPROXIMATE BOUNDARY BETWEEN SOIL TYPES. TRANSITIONS MAY BE GRADUAL.
ii) WATER LEVEL READINGS HAVE BEEN MADE IN THE DRILL HOLES AT TIMES AND UNDER CONDITIONS STATED ON THIS PROBE LOG. FLUCTUATIONS IN THE LEVEL OF GROUNDWATER MAY OCCUR DUE TO OTHER FACTORS THAN THOSE PRESENT AT THE TIME MEASUREMENTS ARE MADE.

Probe Co. New England Boring Contractors PROBE LOCATION Maplewood Ave - See attached plan
 FOREMAN Sam Shaw GROUND SURFACE ELEV. 37 ft. +/- DATUM NAVD88
 WSE GEOLOGIST: Jesse Hofmann DATE START 12/22/15 DATE END 12/22/15

SAMPLER:	NO SAMPLES TAKEN	GROUNDWATER READINGS				
		DATE	TIME	WATER AT	CASING AT	STABILIZATION TIME
CASING:	HOLLOW STEM AUGERS					
CASING SIZE:	2 1/4" INSIDE DIAMETER					

DEPTH (feet)	CASING (blows/ft)	SAMPLE				PID (ppm)	SAMPLE DESCRIPTION	NOTES	STRATUM DESCRIPTION
		No.	REC/PEN (in)	DEPTH (ft)	BLOWS/6"				
0									
5									
10									
15									
20									
25									

Auger Refusal at 8 ft.

GRANULAR SOILS		COHESIVE SOILS		NOTES:
BLOWS/FT	DENSITY	BLOWS/FT	DENSITY	
0-4	V. LOOSE	0-2	V. SOFT	
4-10	LOOSE	2-4	SOFT	
10-30	M. DENSE	4-8	M. STIFF	
30-50	DENSE	8-15	STIFF	
> 50	V. DENSE	15-30	V. STIFF	
		> 30	HARD	

GENERAL NOTES: i) THE STRATIFICATION LINES REPRESENT THE APPROXIMATE BOUNDARY BETWEEN SOIL TYPES. TRANSITIONS MAY BE GRADUAL.
 ii) WATER LEVEL READINGS HAVE BEEN MADE IN THE DRILL HOLES AT TIMES AND UNDER CONDITIONS STATED ON THIS PROBE LOG.
 FLUCTUATIONS IN THE LEVEL OF GROUNDWATER MAY OCCUR DUE TO OTHER FACTORS THAN THOSE PRESENT AT THE TIME MEASUREMENTS ARE MADE.

planning, permitting,
design, construction,
operation, maintenance



PROJECT
Maplewood Avenue
Utility Improvements
Portsmouth, NH

REPORT OF PROBE No. P-12
SHEET 1 OF 1
Project No. 2150737
CHKD BY Thomas J. Strike, PE

Probe Co. New England Boring Contractors
FOREMAN Sam Shaw
WSE GEOLOGIST: Jesse Hofmann
PROBE LOCATION Maplewood Ave - See attached plan
GROUND SURFACE ELEV. 34 ft. +/- **DATUM** NAVD88
DATE START 12/22/15 **DATE END** 12/22/15

SAMPLER:	NO SAMPLES TAKEN	GROUNDWATER READINGS				
		DATE	TIME	WATER AT	CASING AT	STABILIZATION TIME
CASING:	HOLLOW STEM AUGERS					
CASING SIZE:	2 1/4" INSIDE DIAMETER					

DEPTH (feet)	CASING (blows/ft)	SAMPLE				PID (ppm)	SAMPLE DESCRIPTION	NOTES	STRATUM DESCRIPTION
		No.	REC/PEN (in)	DEPTH (ft)	BLOWS/6"				
0									
							Auger Refusal at 3 ft.		
5									
10									
15									
20									
25									

GRANULAR SOILS		COHESIVE SOILS		NOTES:
BLOWS/FT	DENSITY	BLOWS/FT	DENSITY	
0-4	V. LOOSE	0-2	V. SOFT	
4-10	LOOSE	2-4	SOFT	
10-30	M. DENSE	4-8	M. STIFF	
30-50	DENSE	8-15	STIFF	
> 50	V. DENSE	15-30	V. STIFF	
		> 30	HARD	

GENERAL NOTES: i) THE STRATIFICATION LINES REPRESENT THE APPROXIMATE BOUNDARY BETWEEN SOIL TYPES. TRANSITIONS MAY BE GRADUAL.
ii) WATER LEVEL READINGS HAVE BEEN MADE IN THE DRILL HOLES AT TIMES AND UNDER CONDITIONS STATED ON THIS PROBE LOG.
FLUCTUATIONS IN THE LEVEL OF GROUNDWATER MAY OCCUR DUE TO OTHER FACTORS THAN THOSE PRESENT AT THE TIME MEASUREMENTS ARE MADE.

PROBE No. P-12

Probe Co. New England Boring Contractors PROBE LOCATION Maplewood Ave - See attached plan
FOREMAN Sam Shaw GROUND SURFACE ELEV. 31 ft. +/- DATUM NAVD88
WSE GEOLOGIST: Jesse Hofmann DATE START 12/22/15 DATE END 12/24/15

SAMPLER:	NX CORE BARREL	GROUNDWATER READINGS				
		DATE	TIME	WATER AT	CASING AT	STABILIZATION TIME
CASING:	HOLLOW STEM AUGERS THEN DRIVEN 4" CASING USING A 300 POUND					
	HAMMER FALLING 30 IN. AND THE DRIVE AND WASH TECHNIQUE					
CASING SIZE:	2 1/4 IN. HSA AND 4 IN. INSIDE DIAMETER FJC					

DEPTH (feet)	CASING (blows/ft)	SAMPLE				PID (ppm)	SAMPLE DESCRIPTION	NOTES	STRATUM DESCRIPTION
		No.	REC/PEN (in)	DEPTH (ft)	BLOWS/6"				
0								SAND FILL TO SAND	
5									
		C-1	34/42	6 - 9	2 min./ft.		Hard, moderately weathered, intensely fractured, gray PHYLLITE. RQD = 48%	BEDROCK	
					2 min./ft.				
					7 min./ft.				
10		C-2	6/18	9 - 10.5	8 min./ft.		Hard, moderately weathered, very intensely fractured, gray PHYLLITE. RQD = 0%		
					5 min./0.5 ft.				
							Core Terminated at 10.5 ft.		
15									
20									
25									

GRANULAR SOILS		COHESIVE SOILS		NOTES:
BLOWS/FT	DENSITY	BLOWS/FT	DENSITY	
0-4	V. LOOSE	0-2	V. SOFT	1 Auger refusal at 4.5 ft.; redrill on 12.24.15 and obtain rock core sample. 2 Lost circulation from 6 to 9.5 ft. Core barrel jammed at 9.5 ft. 3 Hole collapsed at 9 ft. Lost circulation from 9 to 10.5 ft. Core barrel jammed at 10.5 ft.
4-10	LOOSE	2-4	SOFT	
10-30	M. DENSE	4-8	M. STIFF	
30-50	DENSE	8-15	STIFF	
> 50	V. DENSE	15-30	V. STIFF	
		> 30	HARD	

GENERAL NOTES: i) THE STRATIFICATION LINES REPRESENT THE APPROXIMATE BOUNDARY BETWEEN SOIL TYPES. TRANSITIONS MAY BE GRADUAL.
 ii) WATER LEVEL READINGS HAVE BEEN MADE IN THE DRILL HOLES AT TIMES AND UNDER CONDITIONS STATED ON THIS PROBE LOG.
 FLUCTUATIONS IN THE LEVEL OF GROUNDWATER MAY OCCUR DUE TO OTHER FACTORS THAN THOSE PRESENT AT THE TIME MEASUREMENTS ARE MADE.

Probe Co. New England Boring Contractors PROBE LOCATION Maplewood Ave - See attached plan
FOREMAN Sam Shaw GROUND SURFACE ELEV. NA DATUM NA
WSE GEOLOGIST: Jesse Hofmann DATE START 12/23/15 DATE END 12/23/15

SAMPLER:	NO SAMPLES TAKEN	GROUNDWATER READINGS				
		DATE	TIME	WATER AT	CASING AT	STABILIZATION TIME
CASING:	HOLLOW STEM AUGERS					
CASING SIZE:	2 1/4" INSIDE DIAMETER					

DEPTH (feet)	CASING (blows/ft)	SAMPLE				PID (ppm)	SAMPLE DESCRIPTION	NOTES	STRATUM DESCRIPTION
		No.	REC/PEN (in)	DEPTH (ft)	BLOWS/6"				
0									
5									
10									
15									
20									
25									

Auger Refusal at 13 ft.

GRANULAR SOILS		COHESIVE SOILS		NOTES:
BLOWS/FT	DENSITY	BLOWS/FT	DENSITY	
0-4	V. LOOSE	0-2	V. SOFT	
4-10	LOOSE	2-4	SOFT	
10-30	M. DENSE	4-8	M. STIFF	
30-50	DENSE	8-15	STIFF	
> 50	V. DENSE	15-30	V. STIFF	
		> 30	HARD	

GENERAL NOTES: i) THE STRATIFICATION LINES REPRESENT THE APPROXIMATE BOUNDARY BETWEEN SOIL TYPES. TRANSITIONS MAY BE GRADUAL.
ii) WATER LEVEL READINGS HAVE BEEN MADE IN THE DRILL HOLES AT TIMES AND UNDER CONDITIONS STATED ON THIS PROBE LOG.
FLUCTUATIONS IN THE LEVEL OF GROUNDWATER MAY OCCUR DUE TO OTHER FACTORS THAN THOSE PRESENT AT THE TIME MEASUREMENTS ARE MADE.

Probe Co. New England Boring Contractors
FOREMAN Matt Soucy
WSE GEOLOGIST: Jesse Hofmann
PROBE LOCATION Fairview Drive - See attached plan
GROUND SURFACE ELEV. 66 ft. +/- **DATUM** NAVD88
DATE START 12/16/15 **DATE END** 12/16/15

SAMPLER:	NO SAMPLES TAKEN	GROUNDWATER READINGS				
		DATE	TIME	WATER AT	CASING AT	STABILIZATION TIME
CASING:	HOLLOW STEM AUGERS					
CASING SIZE:	2 1/4" INSIDE DIAMETER					

DEPTH (feet)	CASING (blows/ft)	SAMPLE				PID (ppm)	SAMPLE DESCRIPTION	NOTES	STRATUM DESCRIPTION
		No.	REC/PEN (in)	DEPTH (ft)	BLOWS/6"				
0									
5									
10									
15							Auger Refusal at 15 ft.		
20									
25									

GRANULAR SOILS		COHESIVE SOILS		NOTES:
BLOWS/FT	DENSITY	BLOWS/FT	DENSITY	
0-4	V. LOOSE	0-2	V. SOFT	
4-10	LOOSE	2-4	SOFT	
10-30	M. DENSE	4-8	M. STIFF	
30-50	DENSE	8-15	STIFF	
> 50	V. DENSE	15-30	V. STIFF	
		> 30	HARD	

GENERAL NOTES: i) THE STRATIFICATION LINES REPRESENT THE APPROXIMATE BOUNDARY BETWEEN SOIL TYPES. TRANSITIONS MAY BE GRADUAL.
ii) WATER LEVEL READINGS HAVE BEEN MADE IN THE DRILL HOLES AT TIMES AND UNDER CONDITIONS STATED ON THIS PROBE LOG. FLUCTUATIONS IN THE LEVEL OF GROUNDWATER MAY OCCUR DUE TO OTHER FACTORS THAN THOSE PRESENT AT THE TIME MEASUREMENTS ARE MADE.

Probe Co. New England Boring Contractors
FOREMAN Matt Soucy
WSE GEOLOGIST: Jesse Hofmann
PROBE LOCATION Fairview Drive - See attached plan
GROUND SURFACE ELEV. 70 ft. +/- **DATUM** NAVD88
DATE START 12/16/15 **DATE END** 12/16/15

SAMPLER:	NO SAMPLES TAKEN	GROUNDWATER READINGS				
		DATE	TIME	WATER AT	CASING AT	STABILIZATION TIME
CASING:	HOLLOW STEM AUGERS					
CASING SIZE:	2 1/4" INSIDE DIAMETER					

DEPTH (feet)	CASING (blows/ft)	SAMPLE				PID (ppm)	SAMPLE DESCRIPTION	NOTES	STRATUM DESCRIPTION
		No.	REC/PEN (in)	DEPTH (ft)	BLOWS/6"				
0									
5									
10									
15							Auger Refusal at 13.5 ft.		
20									
25									

GRANULAR SOILS		COHESIVE SOILS		NOTES:
BLOWS/FT	DENSITY	BLOWS/FT	DENSITY	
0-4	V. LOOSE	0-2	V. SOFT	
4-10	LOOSE	2-4	SOFT	
10-30	M. DENSE	4-8	M. STIFF	
30-50	DENSE	8-15	STIFF	
> 50	V. DENSE	15-30	V. STIFF	
		> 30	HARD	

GENERAL NOTES: i) THE STRATIFICATION LINES REPRESENT THE APPROXIMATE BOUNDARY BETWEEN SOIL TYPES. TRANSITIONS MAY BE GRADUAL.
ii) WATER LEVEL READINGS HAVE BEEN MADE IN THE DRILL HOLES AT TIMES AND UNDER CONDITIONS STATED ON THIS PROBE LOG. FLUCTUATIONS IN THE LEVEL OF GROUNDWATER MAY OCCUR DUE TO OTHER FACTORS THAN THOSE PRESENT AT THE TIME MEASUREMENTS ARE MADE.

Probe Co. New England Boring Contractors PROBE LOCATION Fairview Drive - See attached plan
FOREMAN Matt Soucy GROUND SURFACE ELEV. 83 ft. +/- DATUM NAVD88
WSE GEOLOGIST: Jesse Hofmann DATE START 12/16/15 DATE END 12/16/15

SAMPLER:	NO SAMPLES TAKEN	GROUNDWATER READINGS				
		DATE	TIME	WATER AT	CASING AT	STABILIZATION TIME
CASING:	HOLLOW STEM AUGERS					
CASING SIZE:	2 1/4" INSIDE DIAMETER					

DEPTH (feet)	CASING (blows/ft)	SAMPLE				PID (ppm)	SAMPLE DESCRIPTION	NOTES	STRATUM DESCRIPTION
		No.	REC/PEN (in)	DEPTH (ft)	BLOWS/6"				
0									
5									
10									
15									
20									
25									

GRANULAR SOILS		COHESIVE SOILS		NOTES:
BLOWS/FT	DENSITY	BLOWS/FT	DENSITY	
0-4	V. LOOSE	0-2	V. SOFT	
4-10	LOOSE	2-4	SOFT	
10-30	M. DENSE	4-8	M. STIFF	
30-50	DENSE	8-15	STIFF	
> 50	V. DENSE	15-30	V. STIFF	
		> 30	HARD	

- 1 Auger grinding from about 2 to 3 ft.
- 2 Auger grinding at about 5 ft.
- 3 Auger grinding at about 8.5 ft.

GENERAL NOTES: i) THE STRATIFICATION LINES REPRESENT THE APPROXIMATE BOUNDARY BETWEEN SOIL TYPES. TRANSITIONS MAY BE GRADUAL.
ii) WATER LEVEL READINGS HAVE BEEN MADE IN THE DRILL HOLES AT TIMES AND UNDER CONDITIONS STATED ON THIS PROBE LOG.
FLUCTUATIONS IN THE LEVEL OF GROUNDWATER MAY OCCUR DUE TO OTHER FACTORS THAN THOSE PRESENT AT THE TIME MEASUREMENTS ARE MADE.

Probe Co. New England Boring Contractors PROBE LOCATION Central Avenue - See attached plan
FOREMAN Sam Shaw GROUND SURFACE ELEV. 32 ft. +/- DATUM NAVD88
WSE GEOLOGIST: Jesse Hofmann DATE START 12/22/15 DATE END 12/22/15

SAMPLER:	NO SAMPLES TAKEN	GROUNDWATER READINGS				
		DATE	TIME	WATER AT	CASING AT	STABILIZATION TIME
CASING:	HOLLOW STEM AUGERS					
CASING SIZE:	2 1/4" INSIDE DIAMETER					

DEPTH (feet)	CASING (blows/ft)	SAMPLE				PID (ppm)	SAMPLE DESCRIPTION	NOTES	STRATUM DESCRIPTION
		No.	REC/PEN (in)	DEPTH (ft)	BLOWS/6"				
0									
5									
10									
15						Probe Terminated at 15 ft.			
20									
25									

GRANULAR SOILS		COHESIVE SOILS		NOTES:
BLOWS/FT	DENSITY	BLOWS/FT	DENSITY	
0-4	V. LOOSE	0-2	V. SOFT	
4-10	LOOSE	2-4	SOFT	
10-30	M. DENSE	4-8	M. STIFF	
30-50	DENSE	8-15	STIFF	
> 50	V. DENSE	15-30	V. STIFF	
		> 30	HARD	

GENERAL NOTES: i) THE STRATIFICATION LINES REPRESENT THE APPROXIMATE BOUNDARY BETWEEN SOIL TYPES. TRANSITIONS MAY BE GRADUAL.
ii) WATER LEVEL READINGS HAVE BEEN MADE IN THE DRILL HOLES AT TIMES AND UNDER CONDITIONS STATED ON THIS PROBE LOG.
FLUCTUATIONS IN THE LEVEL OF GROUNDWATER MAY OCCUR DUE TO OTHER FACTORS THAN THOSE PRESENT AT THE TIME MEASUREMENTS ARE MADE.

Probe Co. New England Boring Contractors
FOREMAN Sam Shaw
WSE GEOLOGIST: Jesse Hofmann
PROBE LOCATION Central Avenue - See attached plan
GROUND SURFACE ELEV. 21 ft. +/- **DATUM** NAVD88
DATE START 12/22/15 **DATE END** 12/22/15

SAMPLER: NO SAMPLES TAKEN
CASING: HOLLOW STEM AUGERS
CASING SIZE: 2 1/4" INSIDE DIAMETER

GROUNDWATER READINGS				
DATE	TIME	WATER AT	CASING AT	STABILIZATION TIME

DEPTH (feet)	CASING (blows/ft)	SAMPLE				PID (ppm)	SAMPLE DESCRIPTION	NOTES	STRATUM DESCRIPTION
		No.	REC/PEN (in)	DEPTH (ft)	BLOWS/6"				
0									
5									
10									
15									
20						Probe Terminated at 20 ft.			
25									

GRANULAR SOILS		COHESIVE SOILS		NOTES:
BLOWS/FT	DENSITY	BLOWS/FT	DENSITY	
0-4	V. LOOSE	0-2	V. SOFT	
4-10	LOOSE	2-4	SOFT	
10-30	M. DENSE	4-8	M. STIFF	
30-50	DENSE	8-15	STIFF	
> 50	V. DENSE	15-30	V. STIFF	
		> 30	HARD	

GENERAL NOTES: i) THE STRATIFICATION LINES REPRESENT THE APPROXIMATE BOUNDARY BETWEEN SOIL TYPES. TRANSITIONS MAY BE GRADUAL.
ii) WATER LEVEL READINGS HAVE BEEN MADE IN THE DRILL HOLES AT TIMES AND UNDER CONDITIONS STATED ON THIS PROBE LOG.
FLUCTUATIONS IN THE LEVEL OF GROUNDWATER MAY OCCUR DUE TO OTHER FACTORS THAN THOSE PRESENT AT THE TIME MEASUREMENTS ARE MADE.

Probe Co. New England Boring Contractors PROBE LOCATION Central Avenue - See attached plan
FOREMAN Matt Soucy GROUND SURFACE ELEV. 28 ft. +/- DATUM NAVD88
WSE GEOLOGIST: Jesse Hofmann DATE START 12/17/15 DATE END 12/17/15

SAMPLER:	NO SAMPLES TAKEN	GROUNDWATER READINGS				
		DATE	TIME	WATER AT	CASING AT	STABILIZATION TIME
CASING:	HOLLOW STEM AUGERS					
CASING SIZE:	2 1/4" INSIDE DIAMETER					

DEPTH (feet)	CASING (blows/ft)	SAMPLE				PID (ppm)	SAMPLE DESCRIPTION	NOTES	STRATUM DESCRIPTION
		No.	REC/PEN (in)	DEPTH (ft)	BLOWS/6"				
0									
5									
10									
15									
20									
25									

GRANULAR SOILS		COHESIVE SOILS		NOTES: 1 Auger grinding from about 11 to 13 ft.
BLOWS/FT	DENSITY	BLOWS/FT	DENSITY	
0-4	V. LOOSE	0-2	V. SOFT	
4-10	LOOSE	2-4	SOFT	
10-30	M. DENSE	4-8	M. STIFF	
30-50	DENSE	8-15	STIFF	
> 50	V. DENSE	15-30	V. STIFF	
		> 30	HARD	

GENERAL NOTES: i) THE STRATIFICATION LINES REPRESENT THE APPROXIMATE BOUNDARY BETWEEN SOIL TYPES. TRANSITIONS MAY BE GRADUAL.
ii) WATER LEVEL READINGS HAVE BEEN MADE IN THE DRILL HOLES AT TIMES AND UNDER CONDITIONS STATED ON THIS PROBE LOG.
FLUCTUATIONS IN THE LEVEL OF GROUNDWATER MAY OCCUR DUE TO OTHER FACTORS THAN THOSE PRESENT AT THE TIME MEASUREMENTS ARE MADE.

Probe Co. New England Boring Contractors PROBE LOCATION Cutts Street - See attached plan
FOREMAN Sam Shaw GROUND SURFACE ELEV. 34 ft. +/- DATUM NAVD88
WSE GEOLOGIST: Jesse Hofmann DATE START 12/22/15 DATE END 12/22/15

SAMPLER:	NO SAMPLES TAKEN	GROUNDWATER READINGS				
		DATE	TIME	WATER AT	CASING AT	STABILIZATION TIME
CASING:	HOLLOW STEM AUGERS					
CASING SIZE:	2 1/4" INSIDE DIAMETER					

DEPTH (feet)	CASING (blows/ft)	SAMPLE				PID (ppm)	SAMPLE DESCRIPTION	NOTES	STRATUM DESCRIPTION
		No.	REC/PEN (in)	DEPTH (ft)	BLOWS/6"				
0								1	
5									
10								2	
15						Auger Refusal at 13 ft.			
20									
25									

GRANULAR SOILS		COHESIVE SOILS		NOTES:
BLOWS/FT	DENSITY	BLOWS/FT	DENSITY	
0-4	V. LOOSE	0-2	V. SOFT	1 About 3.5" of concrete below pavement 2 Auger grinding from about 11 to 13 ft.
4-10	LOOSE	2-4	SOFT	
10-30	M. DENSE	4-8	M. STIFF	
30-50	DENSE	8-15	STIFF	
> 50	V. DENSE	15-30	V. STIFF	
		> 30	HARD	

GENERAL NOTES: i) THE STRATIFICATION LINES REPRESENT THE APPROXIMATE BOUNDARY BETWEEN SOIL TYPES. TRANSITIONS MAY BE GRADUAL.
 ii) WATER LEVEL READINGS HAVE BEEN MADE IN THE DRILL HOLES AT TIMES AND UNDER CONDITIONS STATED ON THIS PROBE LOG.
 FLUCTUATIONS IN THE LEVEL OF GROUNDWATER MAY OCCUR DUE TO OTHER FACTORS THAN THOSE PRESENT AT THE TIME MEASUREMENTS ARE MADE.

Probe Co. New England Boring Contractors
FOREMAN Matt Soucy
WSE GEOLOGIST: Jesse Hofmann
PROBE LOCATION Cutts Street - See attached plan
GROUND SURFACE ELEV. 25 ft. +/- **DATUM** NAVD88
DATE START 12/17/15 **DATE END** 12/17/15

SAMPLER: NO SAMPLES TAKEN	GROUNDWATER READINGS				
	DATE	TIME	WATER AT	CASING AT	STABILIZATION TIME
CASING: HOLLOW STEM AUGERS					
CASING SIZE: 2 1/4" INSIDE DIAMETER					

DEPTH (feet)	CASING (blows/ft)	SAMPLE				PID (ppm)	SAMPLE DESCRIPTION	NOTES	STRATUM DESCRIPTION
		No.	REC/PEN (in)	DEPTH (ft)	BLOWS/6"				
0								1	
5								2	
10						Auger Refusal at 8.5 ft.			
15									
20									
25									

GRANULAR SOILS		COHESIVE SOILS		NOTES:
BLOWS/FT	DENSITY	BLOWS/FT	DENSITY	
0-4	V. LOOSE	0-2	V. SOFT	1 About 12" of concrete below pavement 2 Auger grinding from about 6 to 8 ft.
4-10	LOOSE	2-4	SOFT	
10-30	M. DENSE	4-8	M. STIFF	
30-50	DENSE	8-15	STIFF	
> 50	V. DENSE	15-30	V. STIFF	
		> 30	HARD	

GENERAL NOTES: i) THE STRATIFICATION LINES REPRESENT THE APPROXIMATE BOUNDARY BETWEEN SOIL TYPES. TRANSITIONS MAY BE GRADUAL.
ii) WATER LEVEL READINGS HAVE BEEN MADE IN THE DRILL HOLES AT TIMES AND UNDER CONDITIONS STATED ON THIS PROBE LOG.
FLUCTUATIONS IN THE LEVEL OF GROUNDWATER MAY OCCUR DUE TO OTHER FACTORS THAN THOSE PRESENT AT THE TIME MEASUREMENTS ARE MADE.

Probe Co. New England Boring Contractors
FOREMAN Matt Soucy
WSE GEOLOGIST: Jesse Hofmann
PROBE LOCATION Cutts Street - See attached plan
GROUND SURFACE ELEV. 24 ft. +/- **DATUM** NAVD88
DATE START 12/17/15 **DATE END** 12/17/15

SAMPLER: NO SAMPLES TAKEN
CASING: HOLLOW STEM AUGERS
CASING SIZE: 2 1/4" INSIDE DIAMETER

GROUNDWATER READINGS				
DATE	TIME	WATER AT	CASING AT	STABILIZATION TIME

DEPTH (feet)	CASING (blows/ft)	SAMPLE				PID (ppm)	SAMPLE DESCRIPTION	NOTES	STRATUM DESCRIPTION
		No.	REC/PEN (in)	DEPTH (ft)	BLOWS/6"				
0									
5									
10									
15							Probe Terminated at 14 ft.		
20									
25									

GRANULAR SOILS		COHESIVE SOILS		NOTES:
BLOWS/FT	DENSITY	BLOWS/FT	DENSITY	
0-4	V. LOOSE	0-2	V. SOFT	
4-10	LOOSE	2-4	SOFT	
10-30	M. DENSE	4-8	M. STIFF	
30-50	DENSE	8-15	STIFF	
> 50	V. DENSE	15-30	V. STIFF	
		> 30	HARD	

GENERAL NOTES: i) THE STRATIFICATION LINES REPRESENT THE APPROXIMATE BOUNDARY BETWEEN SOIL TYPES. TRANSITIONS MAY BE GRADUAL.
ii) WATER LEVEL READINGS HAVE BEEN MADE IN THE DRILL HOLES AT TIMES AND UNDER CONDITIONS STATED ON THIS PROBE LOG. FLUCTUATIONS IN THE LEVEL OF GROUNDWATER MAY OCCUR DUE TO OTHER FACTORS THAN THOSE PRESENT AT THE TIME MEASUREMENTS ARE MADE.

Probe Co. New England Boring Contractors PROBE LOCATION Cutts Street - See attached plan
FOREMAN Sam Shaw GROUND SURFACE ELEV. 31 ft. +/- DATUM NAVD88
WSE GEOLOGIST: Jesse Hofmann DATE START 12/23/15 DATE END 12/23/15

SAMPLER:	NO SAMPLES TAKEN	GROUNDWATER READINGS				
		DATE	TIME	WATER AT	CASING AT	STABILIZATION TIME
CASING:	HOLLOW STEM AUGERS					
CASING SIZE:	2 1/4" INSIDE DIAMETER					

DEPTH (feet)	CASING (blows/ft)	SAMPLE				PID (ppm)	SAMPLE DESCRIPTION	NOTES	STRATUM DESCRIPTION
		No.	REC/PEN (in)	DEPTH (ft)	BLOWS/6"				
0									
5						Auger Refusal at 4.5 ft.			
10									
15									
20									
25									

GRANULAR SOILS		COHESIVE SOILS		NOTES:
BLOWS/FT	DENSITY	BLOWS/FT	DENSITY	
0-4	V. LOOSE	0-2	V. SOFT	
4-10	LOOSE	2-4	SOFT	
10-30	M. DENSE	4-8	M. STIFF	
30-50	DENSE	8-15	STIFF	
> 50	V. DENSE	15-30	V. STIFF	
		> 30	HARD	

GENERAL NOTES: i) THE STRATIFICATION LINES REPRESENT THE APPROXIMATE BOUNDARY BETWEEN SOIL TYPES. TRANSITIONS MAY BE GRADUAL.
ii) WATER LEVEL READINGS HAVE BEEN MADE IN THE DRILL HOLES AT TIMES AND UNDER CONDITIONS STATED ON THIS PROBE LOG.
FLUCTUATIONS IN THE LEVEL OF GROUNDWATER MAY OCCUR DUE TO OTHER FACTORS THAN THOSE PRESENT AT THE TIME MEASUREMENTS ARE MADE.

Probe Co. New England Boring Contractors PROBE LOCATION Beechwood Street - See attached plan
FOREMAN Matt Soucy GROUND SURFACE ELEV. 19 ft. +/- DATUM NAVD88
WSE GEOLOGIST: Jesse Hofmann DATE START 12/16/15 DATE END 12/16/15

SAMPLER:	NO SAMPLES TAKEN	GROUNDWATER READINGS				
		DATE	TIME	WATER AT	CASING AT	STABILIZATION TIME
CASING:	HOLLOW STEM AUGERS					
CASING SIZE:	2 1/4" INSIDE DIAMETER					

DEPTH (feet)	CASING (blows/ft)	SAMPLE				PID (ppm)	SAMPLE DESCRIPTION	NOTES	STRATUM DESCRIPTION
		No.	REC/PEN (in)	DEPTH (ft)	BLOWS/6"				
0									
5									
10									
15									
20									
25									

Probe Terminated at 16 ft.

GRANULAR SOILS		COHESIVE SOILS		NOTES:
BLOWS/FT	DENSITY	BLOWS/FT	DENSITY	
0-4	V. LOOSE	0-2	V. SOFT	
4-10	LOOSE	2-4	SOFT	
10-30	M. DENSE	4-8	M. STIFF	
30-50	DENSE	8-15	STIFF	
> 50	V. DENSE	15-30	V. STIFF	
		> 30	HARD	

GENERAL NOTES: i) THE STRATIFICATION LINES REPRESENT THE APPROXIMATE BOUNDARY BETWEEN SOIL TYPES. TRANSITIONS MAY BE GRADUAL.
ii) WATER LEVEL READINGS HAVE BEEN MADE IN THE DRILL HOLES AT TIMES AND UNDER CONDITIONS STATED ON THIS PROBE LOG.
FLUCTUATIONS IN THE LEVEL OF GROUNDWATER MAY OCCUR DUE TO OTHER FACTORS THAN THOSE PRESENT AT THE TIME MEASUREMENTS ARE MADE.

Probe Co. New England Boring Contractors
FOREMAN Matt Soucy
WSE GEOLOGIST: Jesse Hofmann
PROBE LOCATION Ashland Street - See attached plan
GROUND SURFACE ELEV. 32 ft. +/- **DATUM** NAVD88
DATE START 12/17/15 **DATE END** 12/17/15

SAMPLER:	NO SAMPLES TAKEN	GROUNDWATER READINGS				
		DATE	TIME	WATER AT	CASING AT	STABILIZATION TIME
CASING:	HOLLOW STEM AUGERS					
CASING SIZE:	2 1/4" INSIDE DIAMETER					

DEPTH (feet)	CASING (blows/ft)	SAMPLE				PID (ppm)	SAMPLE DESCRIPTION	NOTES	STRATUM DESCRIPTION
		No.	REC/PEN (in)	DEPTH (ft)	BLOWS/6"				
0								1	
5									
10							Auger Refusal at 7.5 ft.		
15									
20									
25									

GRANULAR SOILS		COHESIVE SOILS		NOTES:
BLOWS/FT	DENSITY	BLOWS/FT	DENSITY	
0-4	V. LOOSE	0-2	V. SOFT	1 Periodic auger grinding from about 0.5 to 7.5 ft.
4-10	LOOSE	2-4	SOFT	
10-30	M. DENSE	4-8	M. STIFF	
30-50	DENSE	8-15	STIFF	
> 50	V. DENSE	15-30	V. STIFF	
		> 30	HARD	

GENERAL NOTES: i) THE STRATIFICATION LINES REPRESENT THE APPROXIMATE BOUNDARY BETWEEN SOIL TYPES. TRANSITIONS MAY BE GRADUAL.
ii) WATER LEVEL READINGS HAVE BEEN MADE IN THE DRILL HOLES AT TIMES AND UNDER CONDITIONS STATED ON THIS PROBE LOG. FLUCTUATIONS IN THE LEVEL OF GROUNDWATER MAY OCCUR DUE TO OTHER FACTORS THAN THOSE PRESENT AT THE TIME MEASUREMENTS ARE MADE.

Probe Co. New England Boring Contractors
FOREMAN Patrick Schild
WSE GEOLOGIST: Jesse Hofmann
PROBE LOCATION Leslie Drive - See attached plan
GROUND SURFACE ELEV. 46 ft. +/- **DATUM** NAVD88
DATE START 1/4/16 **DATE END** 1/4/16

SAMPLER:	NO SAMPLES TAKEN	GROUNDWATER READINGS				
		DATE	TIME	WATER AT	CASING AT	STABILIZATION TIME
CASING:	HOLLOW STEM AUGERS					
CASING SIZE:	2 1/4" INSIDE DIAMETER					

DEPTH (feet)	CASING (blows/ft)	SAMPLE				PID (ppm)	SAMPLE DESCRIPTION	NOTES	STRATUM DESCRIPTION
		No.	REC/PEN (in)	DEPTH (ft)	BLOWS/6"				
0									
5									
10									
15									
20									
25									

Auger Refusal at 8 ft.

GRANULAR SOILS		COHESIVE SOILS		NOTES:
BLOWS/FT	DENSITY	BLOWS/FT	DENSITY	
0-4	V. LOOSE	0-2	V. SOFT	
4-10	LOOSE	2-4	SOFT	
10-30	M. DENSE	4-8	M. STIFF	
30-50	DENSE	8-15	STIFF	
> 50	V. DENSE	15-30	V. STIFF	
		> 30	HARD	

GENERAL NOTES: i) THE STRATIFICATION LINES REPRESENT THE APPROXIMATE BOUNDARY BETWEEN SOIL TYPES. TRANSITIONS MAY BE GRADUAL.
ii) WATER LEVEL READINGS HAVE BEEN MADE IN THE DRILL HOLES AT TIMES AND UNDER CONDITIONS STATED ON THIS PROBE LOG. FLUCTUATIONS IN THE LEVEL OF GROUNDWATER MAY OCCUR DUE TO OTHER FACTORS THAN THOSE PRESENT AT THE TIME MEASUREMENTS ARE MADE.

Probe Co. New England Boring Contractors
FOREMAN Patrick Schofield
WSE GEOLOGIST: Jesse Hofmann
PROBE LOCATION Leslie Drive - See attached plan
GROUND SURFACE ELEV. 55 ft. +/- **DATUM** NAVD88
DATE START 1/4/16 **DATE END** 1/4/16

SAMPLER: NO SAMPLES TAKEN	GROUNDWATER READINGS				
	DATE	TIME	WATER AT	CASING AT	STABILIZATION TIME
CASING: HOLLOW STEM AUGERS					
CASING SIZE: 2 1/4" INSIDE DIAMETER					

DEPTH (feet)	CASING (blows/ft)	SAMPLE				PID (ppm)	SAMPLE DESCRIPTION	NOTES	STRATUM DESCRIPTION
		No.	REC/PEN (in)	DEPTH (ft)	BLOWS/6"				
0									
5						Auger Refusal at 5 ft.			
10									
15									
20									
25									

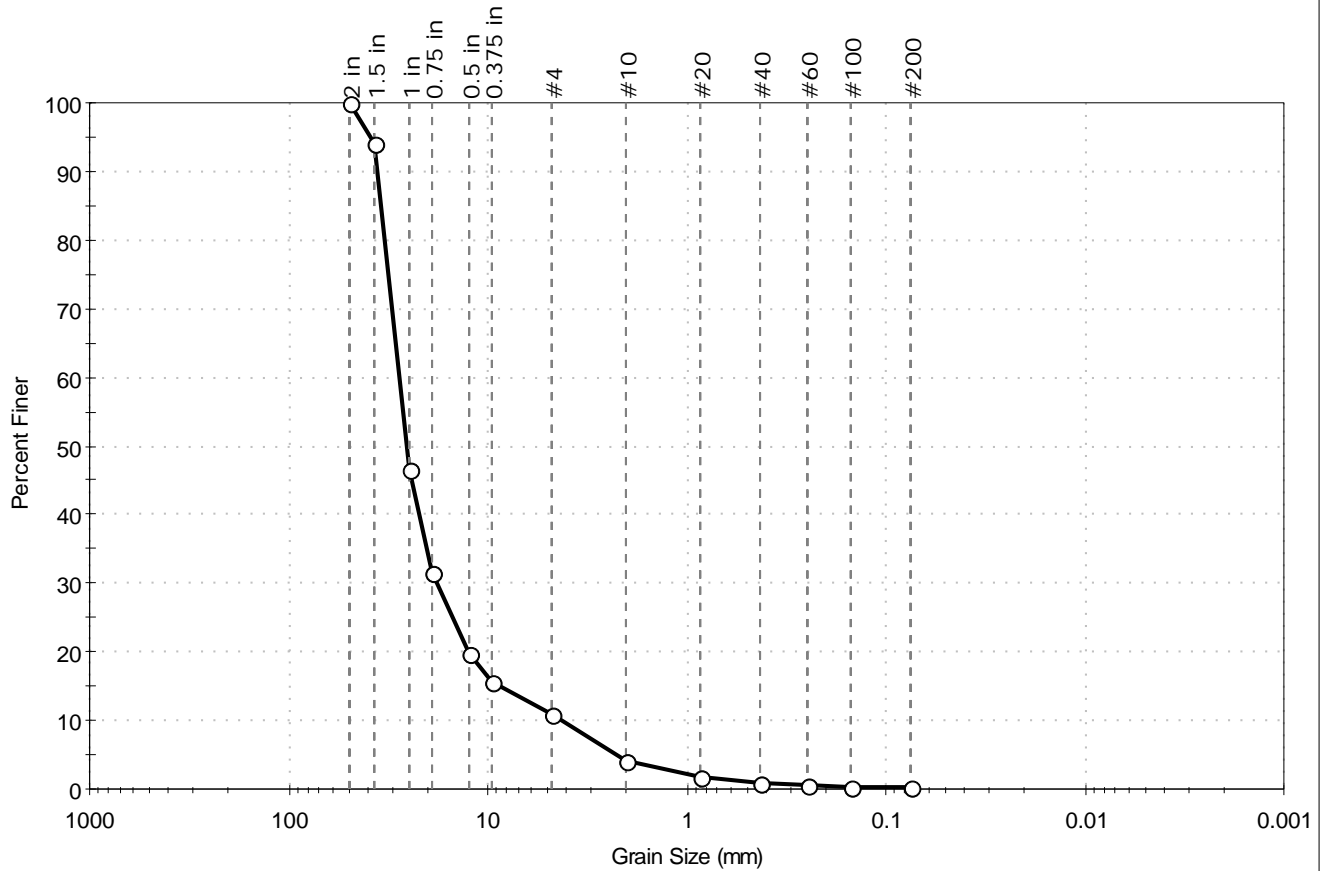
GRANULAR SOILS		COHESIVE SOILS		NOTES:
BLOWS/FT	DENSITY	BLOWS/FT	DENSITY	
0-4	V. LOOSE	0-2	V. SOFT	
4-10	LOOSE	2-4	SOFT	
10-30	M. DENSE	4-8	M. STIFF	
30-50	DENSE	8-15	STIFF	
> 50	V. DENSE	15-30	V. STIFF	
		> 30	HARD	

GENERAL NOTES: i) THE STRATIFICATION LINES REPRESENT THE APPROXIMATE BOUNDARY BETWEEN SOIL TYPES. TRANSITIONS MAY BE GRADUAL.
ii) WATER LEVEL READINGS HAVE BEEN MADE IN THE DRILL HOLES AT TIMES AND UNDER CONDITIONS STATED ON THIS PROBE LOG.
FLUCTUATIONS IN THE LEVEL OF GROUNDWATER MAY OCCUR DUE TO OTHER FACTORS THAN THOSE PRESENT AT THE TIME MEASUREMENTS ARE MADE.



Client:	Weston & Sampson Engineers		
Project:	Maplewood Ave Utility Imp.		
Location:	Portsmouth, NH	Project No:	GTX-306487
Boring ID:	C-1	Sample Type:	bag
Sample ID:	G-1	Test Date:	05/30/17
Depth:	0.3-1	Checked By:	emm
Test Comment:	---		
Visual Description:	Moist, gray gravel		
Sample Comment:	---		

Particle Size Analysis - ASTM D422



% Cobble	% Gravel	% Sand	% Silt & Clay Size
--	89.0	10.8	0.2

Sieve Name	Sieve Size, mm	Percent Finer	Spec. Percent	Complies
2 in	50.00	100		
1.5 in	37.50	94		
1 in	25.00	47		
0.75 in	19.00	32		
0.5 in	12.50	20		
0.375 in	9.50	16		
#4	4.75	11		
#10	2.00	4		
#20	0.85	2		
#40	0.42	1		
#60	0.25	0		
#100	0.15	0		
#200	0.075	0.2		

<u>Coefficients</u>	
D ₈₅ = 34.6773 mm	D ₃₀ = 17.9569 mm
D ₆₀ = 28.0348 mm	D ₁₅ = 8.7549 mm
D ₅₀ = 25.7489 mm	D ₁₀ = 4.2111 mm
C _u = 6.657	C _c = 2.731

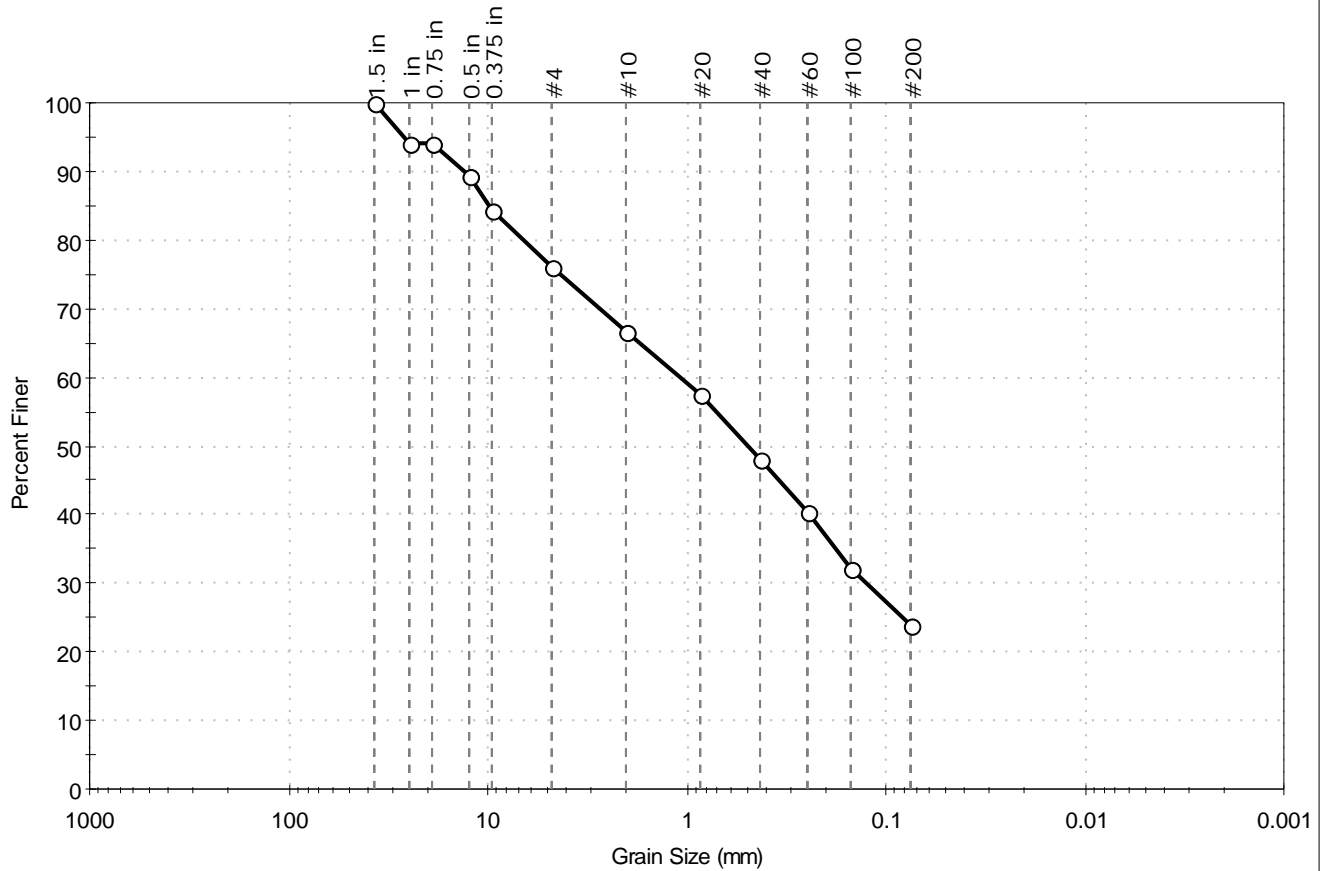
<u>Classification</u>	
<u>ASTM</u>	Well-graded gravel (GW)
<u>AASHTO</u>	Stone Fragments, Gravel and Sand (A-1-a (1))

Sample/Test Description
 Sand/Gravel Particle Shape : ANGULAR
 Sand/Gravel Hardness : HARD



Client:	Weston & Sampson Engineers		
Project:	Maplewood Ave Utility Imp.		
Location:	Portsmouth, NH	Project No:	GTX-306487
Boring ID:	C-1	Sample Type:	bag
Sample ID:	S-1	Test Date:	05/30/17
Depth :	1-3	Test Id:	412472
Test Comment:	---		
Visual Description:	Moist, olive brown silty sand with gravel		
Sample Comment:	---		

Particle Size Analysis - ASTM D422



% Cobble	% Gravel	% Sand	% Silt & Clay Size
--	23.9	52.3	23.8

Sieve Name	Sieve Size, mm	Percent Finer	Spec. Percent	Complies
1.5 in	37.50	100		
1 in	25.00	94		
0.75 in	19.00	94		
0.5 in	12.50	90		
0.375 in	9.50	84		
#4	4.75	76		
#10	2.00	67		
#20	0.85	57		
#40	0.42	48		
#60	0.25	40		
#100	0.15	32		
#200	0.075	24		

<u>Coefficients</u>	
D ₈₅ = 9.8918 mm	D ₃₀ = 0.1257 mm
D ₆₀ = 1.0699 mm	D ₁₅ = N/A
D ₅₀ = 0.4876 mm	D ₁₀ = N/A
C _u = N/A	C _c = N/A

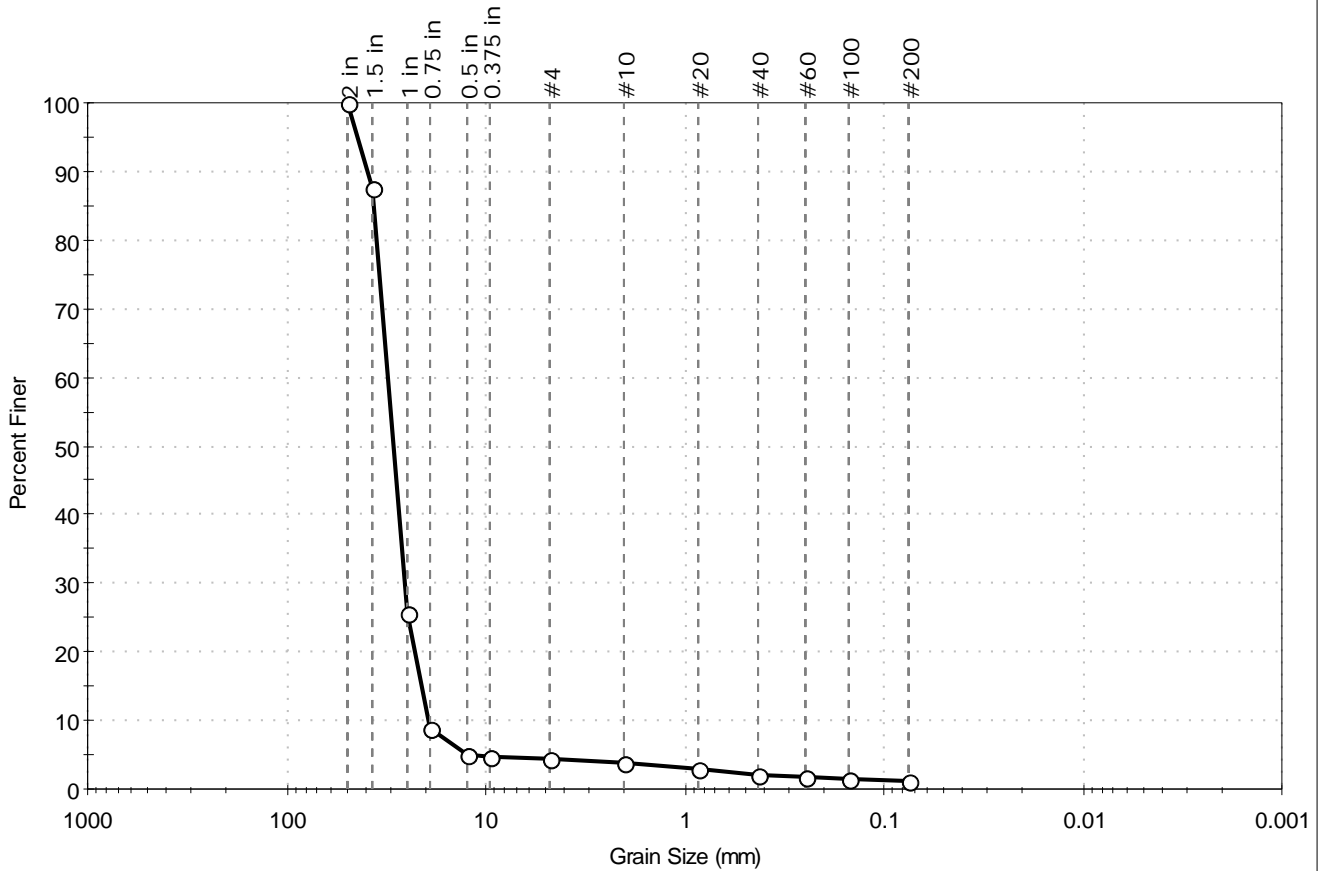
<u>Classification</u>	
ASTM	N/A
AASHTO	Stone Fragments, Gravel and Sand (A-1-b (0))

<u>Sample/Test Description</u>
Sand/Gravel Particle Shape : ANGULAR
Sand/Gravel Hardness : HARD



Client:	Weston & Sampson Engineers		
Project:	Maplewood Ave Utility Imp.		
Location:	Portsmouth, NH	Project No:	GTX-306487
Boring ID:	C-4	Sample Type:	bag
Sample ID:	G-1	Test Date:	05/30/17
Depth :	0.5-1	Checked By:	emm
		Test Id:	412474
Test Comment:	---		
Visual Description:	Moist, dark gray gravel		
Sample Comment:	---		

Particle Size Analysis - ASTM D422



% Cobble	% Gravel	% Sand	% Silt & Clay Size
--	95.5	3.4	1.1

Sieve Name	Sieve Size, mm	Percent Finer	Spec. Percent	Complies
2 in	50.00	100		
1.5 in	37.50	88		
1 in	25.00	26		
0.75 in	19.00	9		
0.5 in	12.50	5		
0.375 in	9.50	5		
#4	4.75	5		
#10	2.00	4		
#20	0.85	3		
#40	0.42	2		
#60	0.25	2		
#100	0.15	1		
#200	0.075	1.1		

<u>Coefficients</u>	
D ₈₅ = 36.8842 mm	D ₃₀ = 25.7073 mm
D ₆₀ = 31.3022 mm	D ₁₅ = 21.0184 mm
D ₅₀ = 29.3136 mm	D ₁₀ = 19.3891 mm
C _u = 1.614	C _c = 1.089

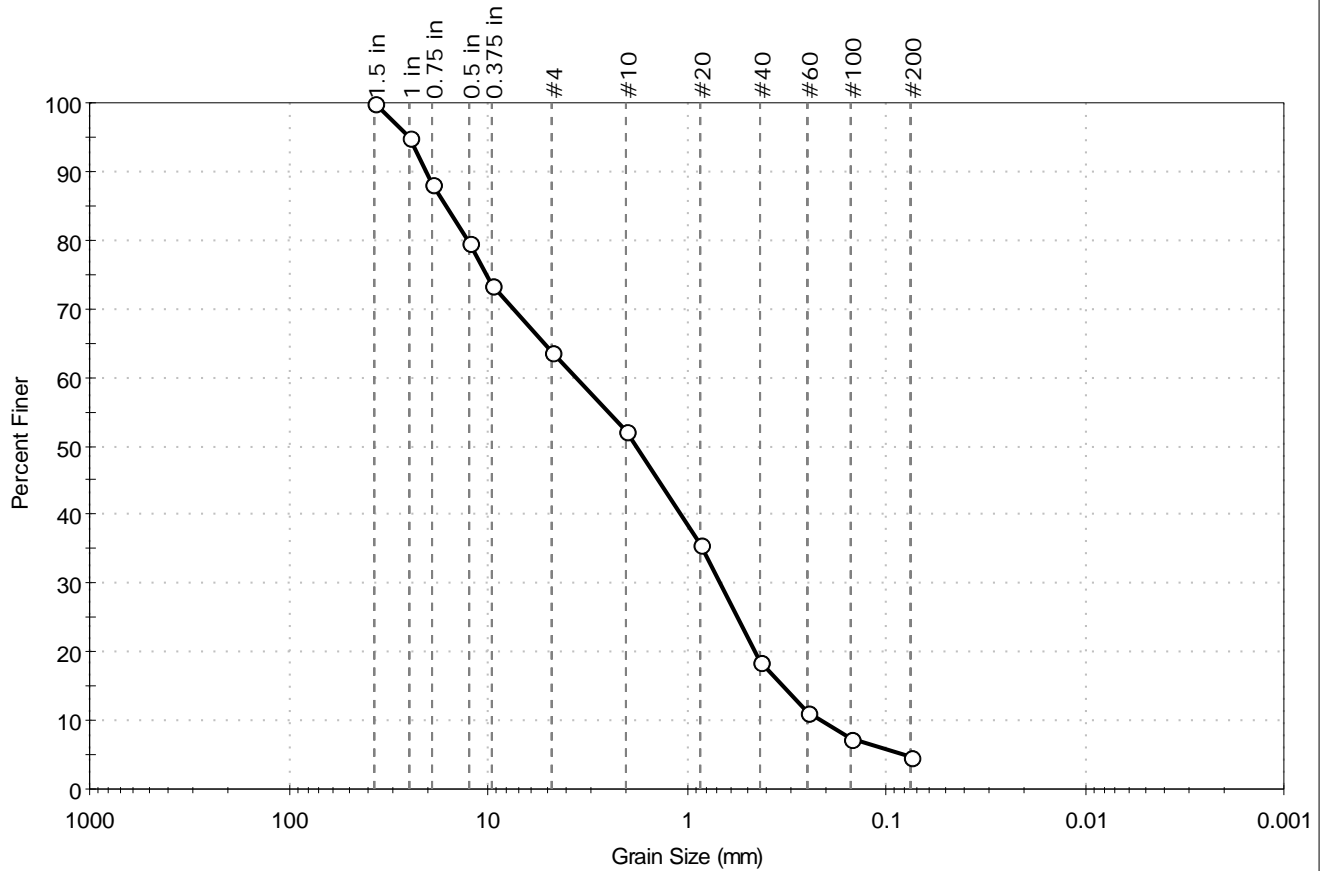
<u>Classification</u>	
<u>ASTM</u>	Poorly graded gravel (GP)
<u>AASHTO</u>	Stone Fragments, Gravel and Sand (A-1-a (1))

<u>Sample/Test Description</u>	
Sand/Gravel Particle Shape : ANGULAR	
Sand/Gravel Hardness : HARD	



Client:	Weston & Sampson Engineers		
Project:	Maplewood Ave Utility Imp.		
Location:	Portsmouth, NH	Project No:	GTX-306487
Boring ID:	C-5	Sample Type:	bag
Sample ID:	S-1	Test Date:	06/02/17
Depth:	TOP 0-2	Checked By:	emm
Test Comment:	---		
Visual Description:	Moist, brownish yellow sand with gravel		
Sample Comment:	---		

Particle Size Analysis - ASTM D422



% Cobble	% Gravel	% Sand	% Silt & Clay Size
--	36.2	59.2	4.6

Sieve Name	Sieve Size, mm	Percent Finer	Spec. Percent	Complies
1.5 in	37.50	100		
1 in	25.00	95		
0.75 in	19.00	88		
0.5 in	12.50	80		
0.375 in	9.50	73		
#4	4.75	64		
#10	2.00	52		
#20	0.85	36		
#40	0.42	19		
#60	0.25	11		
#100	0.15	7		
#200	0.075	4.6		

<u>Coefficients</u>	
D ₈₅ = 16.1864 mm	D ₃₀ = 0.6724 mm
D ₆₀ = 3.5570 mm	D ₁₅ = 0.3299 mm
D ₅₀ = 1.7712 mm	D ₁₀ = 0.2156 mm
C _u = 16.498	C _c = 0.590

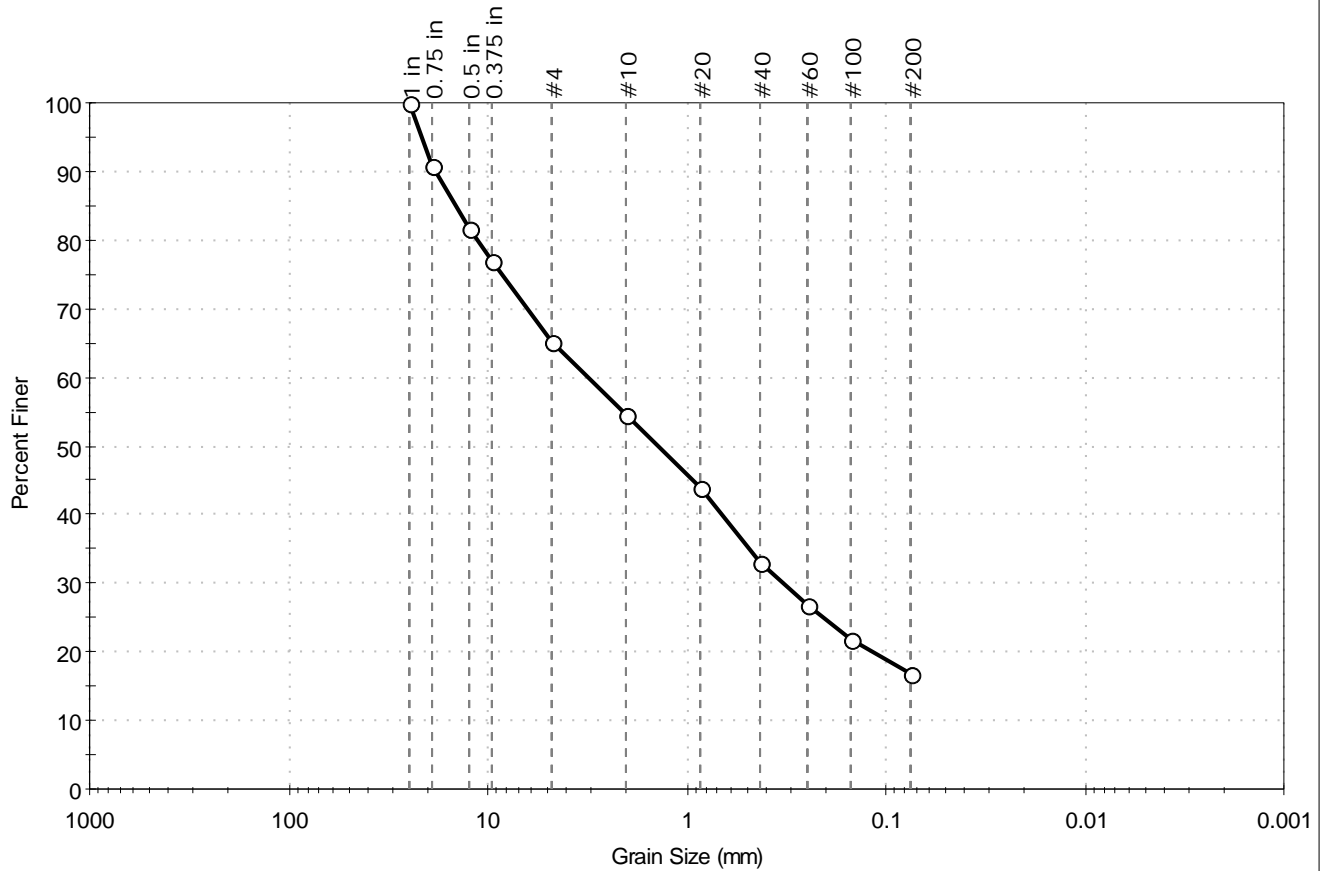
<u>Classification</u>	
<u>ASTM</u>	Poorly graded sand with gravel (SP)
<u>AASHTO</u>	Stone Fragments, Gravel and Sand (A-1-b (1))

<u>Sample/Test Description</u>	
Sand/Gravel Particle Shape : ANGULAR	
Sand/Gravel Hardness : HARD	



Client:	Weston & Sampson Engineers		
Project:	Maplewood Ave Utility Imp.		
Location:	Portsmouth, NH	Project No:	GTX-306487
Boring ID:	C-5	Sample Type:	bag
Sample ID:	S-2	Test Date:	06/02/17
Depth :	2-4	Test Id:	412476
Test Comment:	---		
Visual Description:	Moist, light gray silty sand with gravel		
Sample Comment:	---		

Particle Size Analysis - ASTM D422



% Cobble	% Gravel	% Sand	% Silt & Clay Size
--	34.7	48.4	16.9

Sieve Name	Sieve Size, mm	Percent Finer	Spec. Percent	Complies
1 in	25.00	100		
0.75 in	19.00	91		
0.5 in	12.50	82		
0.375 in	9.50	77		
#4	4.75	65		
#10	2.00	54		
#20	0.85	44		
#40	0.42	33		
#60	0.25	27		
#100	0.15	22		
#200	0.075	17		

<u>Coefficients</u>	
D ₈₅ = 14.5539 mm	D ₃₀ = 0.3264 mm
D ₆₀ = 3.1168 mm	D ₁₅ = N/A
D ₅₀ = 1.3916 mm	D ₁₀ = N/A
C _u = N/A	C _c = N/A

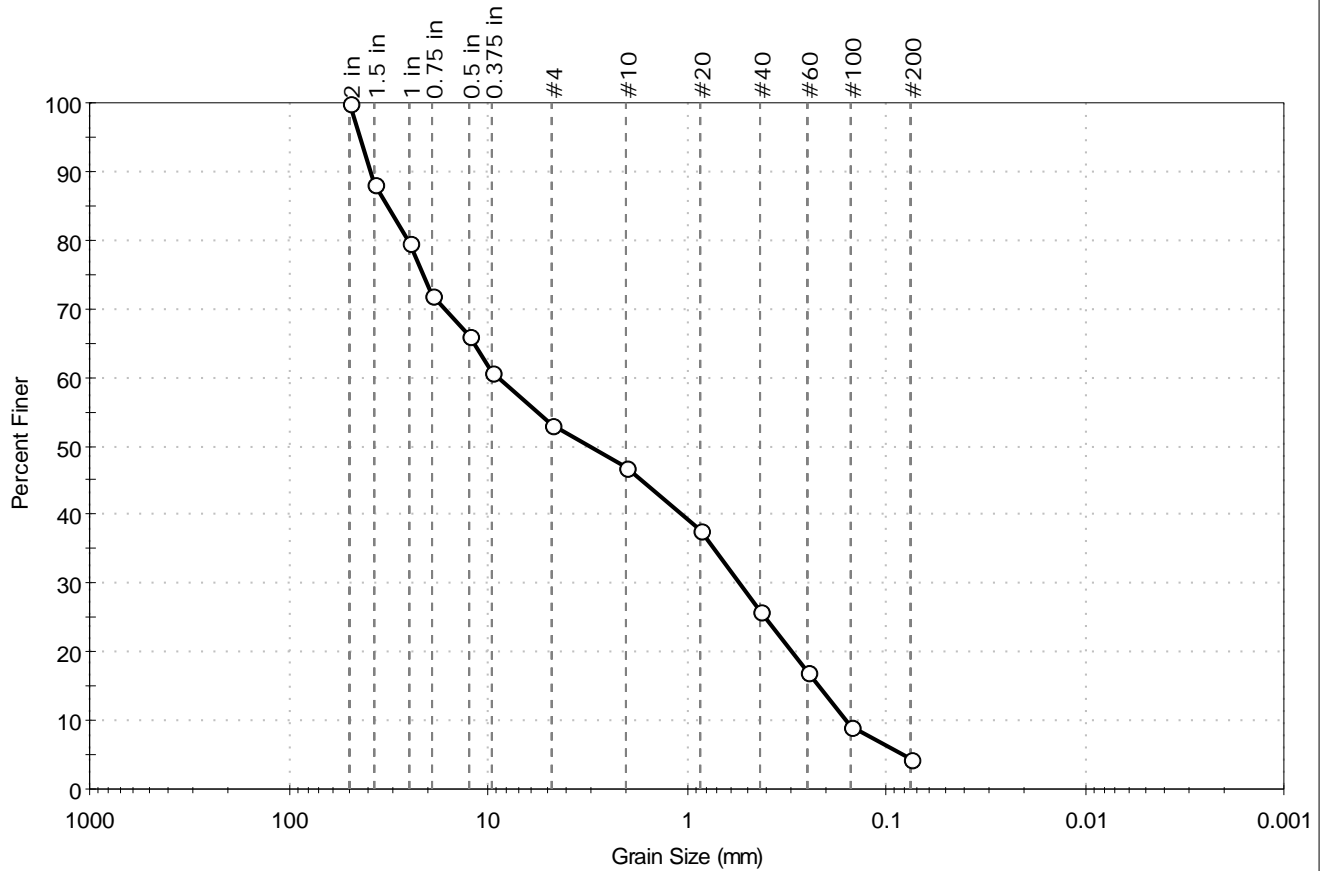
<u>Classification</u>	
<u>ASTM</u>	N/A
<u>AASHTO</u>	Stone Fragments, Gravel and Sand (A-1-b (0))

<u>Sample/Test Description</u>
Sand/Gravel Particle Shape : ANGULAR
Sand/Gravel Hardness : HARD



Client:	Weston & Sampson Engineers		
Project:	Maplewood Ave Utility Imp.		
Location:	Portsmouth, NH	Project No:	GTX-306487
Boring ID:	C-7	Sample Type:	bag
Sample ID:	S-1	Test Date:	06/01/17
Depth :	0.5-1.5	Test Id:	412477
Test Comment:	---		
Visual Description:	Moist, pale brown sand with gravel		
Sample Comment:	---		

Particle Size Analysis - ASTM D422



% Cobble	% Gravel	% Sand	% Silt & Clay Size
--	46.8	48.7	4.5

Sieve Name	Sieve Size, mm	Percent Finer	Spec. Percent	Complies
2 in	50.00	100		
1.5 in	37.50	88		
1 in	25.00	80		
0.75 in	19.00	72		
0.5 in	12.50	66		
0.375 in	9.50	61		
#4	4.75	53		
#10	2.00	47		
#20	0.85	38		
#40	0.42	26		
#60	0.25	17		
#100	0.15	9		
#200	0.075	4.5		

<u>Coefficients</u>	
D ₈₅ = 32.3997 mm	D ₃₀ = 0.5376 mm
D ₆₀ = 8.9048 mm	D ₁₅ = 0.2176 mm
D ₅₀ = 3.0799 mm	D ₁₀ = 0.1576 mm
C _u = 56.503	C _c = 0.206

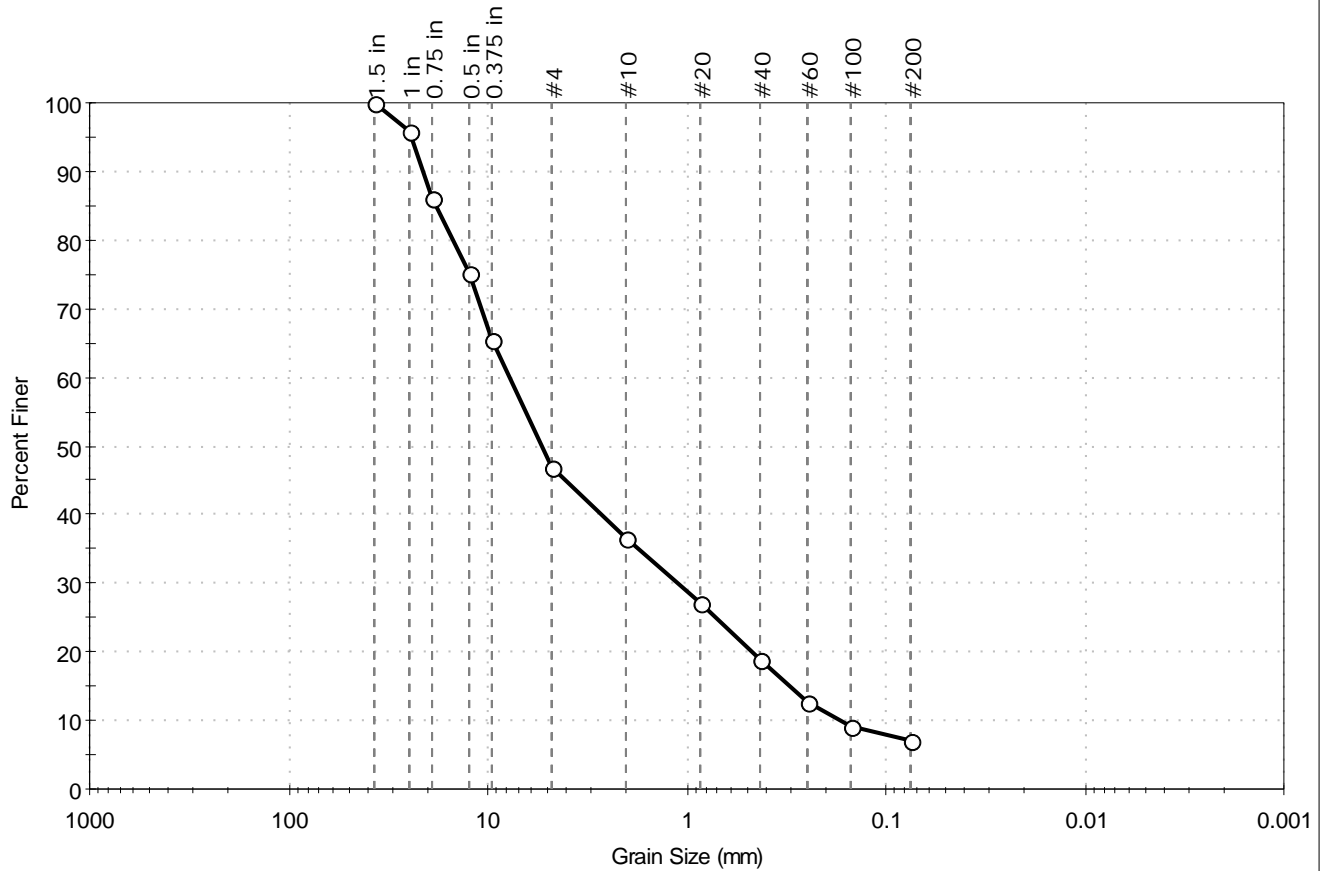
<u>Classification</u>	
<u>ASTM</u>	Poorly graded sand with gravel (SP)
<u>AASHTO</u>	Stone Fragments, Gravel and Sand (A-1-a (1))

<u>Sample/Test Description</u>	
Sand/Gravel Particle Shape : ANGULAR	
Sand/Gravel Hardness : HARD	



Client:	Weston & Sampson Engineers		
Project:	Maplewood Ave Utility Imp.		
Location:	Portsmouth, NH	Project No:	GTX-306487
Boring ID:	C-8	Sample Type:	bag
Sample ID:	S-1	Test Date:	06/02/17
Depth:	TOP 0.5-1.5	Checked By:	emm
Test Comment:	---		
Visual Description:	Moist, dark gray gravel with silt and sand		
Sample Comment:	---		

Particle Size Analysis - ASTM D422



% Cobble	% Gravel	% Sand	% Silt & Clay Size
--	53.1	39.8	7.1

Sieve Name	Sieve Size, mm	Percent Finer	Spec. Percent	Complies
1.5 in	37.50	100		
1 in	25.00	96		
0.75 in	19.00	86		
0.5 in	12.50	75		
0.375 in	9.50	65		
#4	4.75	47		
#10	2.00	36		
#20	0.85	27		
#40	0.42	19		
#60	0.25	13		
#100	0.15	9		
#200	0.075	7.1		

<u>Coefficients</u>	
D ₈₅ = 18.1711 mm	D ₃₀ = 1.1056 mm
D ₆₀ = 7.7569 mm	D ₁₅ = 0.3033 mm
D ₅₀ = 5.3336 mm	D ₁₀ = 0.1686 mm
C _u = 46.008	C _c = 0.935

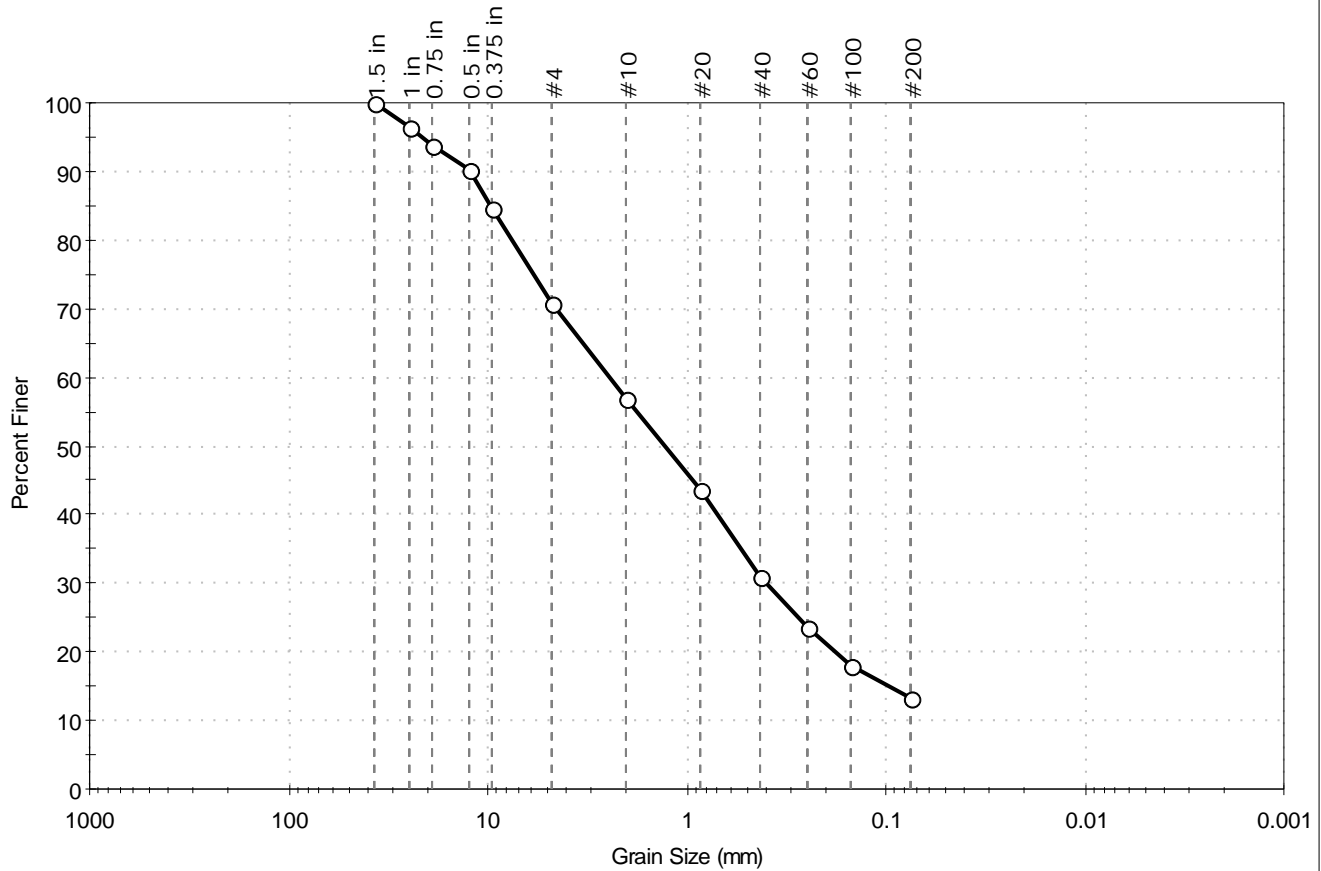
<u>Classification</u>	
ASTM	N/A
AASHTO	Stone Fragments, Gravel and Sand (A-1-a (1))

<u>Sample/Test Description</u>
Sand/Gravel Particle Shape : ANGULAR
Sand/Gravel Hardness : HARD



Client:	Weston & Sampson Engineers		
Project:	Maplewood Ave Utility Imp.		
Location:	Portsmouth, NH	Project No:	GTX-306487
Boring ID:	C-10	Sample Type:	bag
Sample ID:	S-1	Test Date:	06/01/17
Depth :	0.33-1.33	Checked By:	emm
		Test Id:	412479
Test Comment:	---		
Visual Description:	Moist, dark gray silty sand with gravel		
Sample Comment:	---		

Particle Size Analysis - ASTM D422



% Cobble	% Gravel	% Sand	% Silt & Clay Size
--	29.3	57.3	13.4

Sieve Name	Sieve Size, mm	Percent Finer	Spec. Percent	Complies
1.5 in	37.50	100		
1 in	25.00	96		
0.75 in	19.00	94		
0.5 in	12.50	90		
0.375 in	9.50	85		
#4	4.75	71		
#10	2.00	57		
#20	0.85	44		
#40	0.42	31		
#60	0.25	23		
#100	0.15	18		
#200	0.075	13		

<u>Coefficients</u>	
D ₈₅ = 9.6504 mm	D ₃₀ = 0.3995 mm
D ₆₀ = 2.4243 mm	D ₁₅ = 0.0962 mm
D ₅₀ = 1.2839 mm	D ₁₀ = N/A
C _u = N/A	C _c = N/A

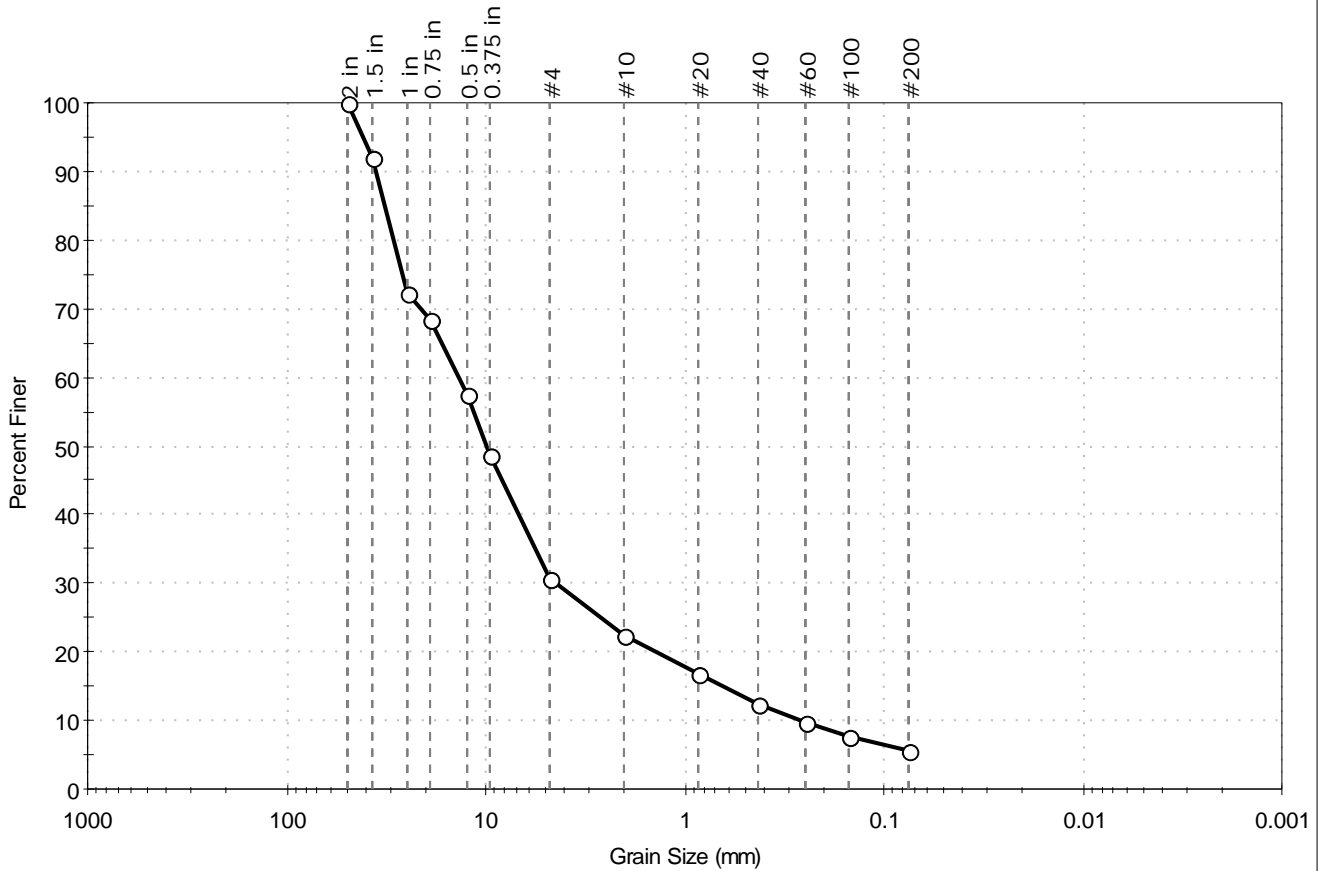
<u>Classification</u>	
<u>ASTM</u>	N/A
<u>AASHTO</u>	Stone Fragments, Gravel and Sand (A-1-b (0))

<u>Sample/Test Description</u>
Sand/Gravel Particle Shape : ANGULAR
Sand/Gravel Hardness : HARD



Client:	Weston & Sampson Engineers		
Project:	Maplewood Ave Utility Imp.		
Location:	Portsmouth, NH	Project No:	GTX-306487
Boring ID:	C-11	Sample Type:	bag
Sample ID:	S-1	Test Date:	05/30/17
Depth:	7-16 in	Checked By:	emm
		Test Id:	412480
Test Comment:	---		
Visual Description:	Moist, olive brown gravel with silt and sand		
Sample Comment:	---		

Particle Size Analysis - ASTM D422



% Cobble	% Gravel	% Sand	% Silt & Clay Size
--	69.3	25.2	5.5

Sieve Name	Sieve Size, mm	Percent Finer	Spec. Percent	Complies
2 in	50.00	100		
1.5 in	37.50	92		
1 in	25.00	72		
0.75 in	19.00	69		
0.5 in	12.50	58		
0.375 in	9.50	49		
#4	4.75	31		
#10	2.00	22		
#20	0.85	17		
#40	0.42	12		
#60	0.25	10		
#100	0.15	8		
#200	0.075	5.5		

<u>Coefficients</u>	
D ₈₅ = 32.4392 mm	D ₃₀ = 4.4068 mm
D ₆₀ = 13.7023 mm	D ₁₅ = 0.6463 mm
D ₅₀ = 9.8904 mm	D ₁₀ = 0.2630 mm
C _u = 52.100	C _c = 5.389

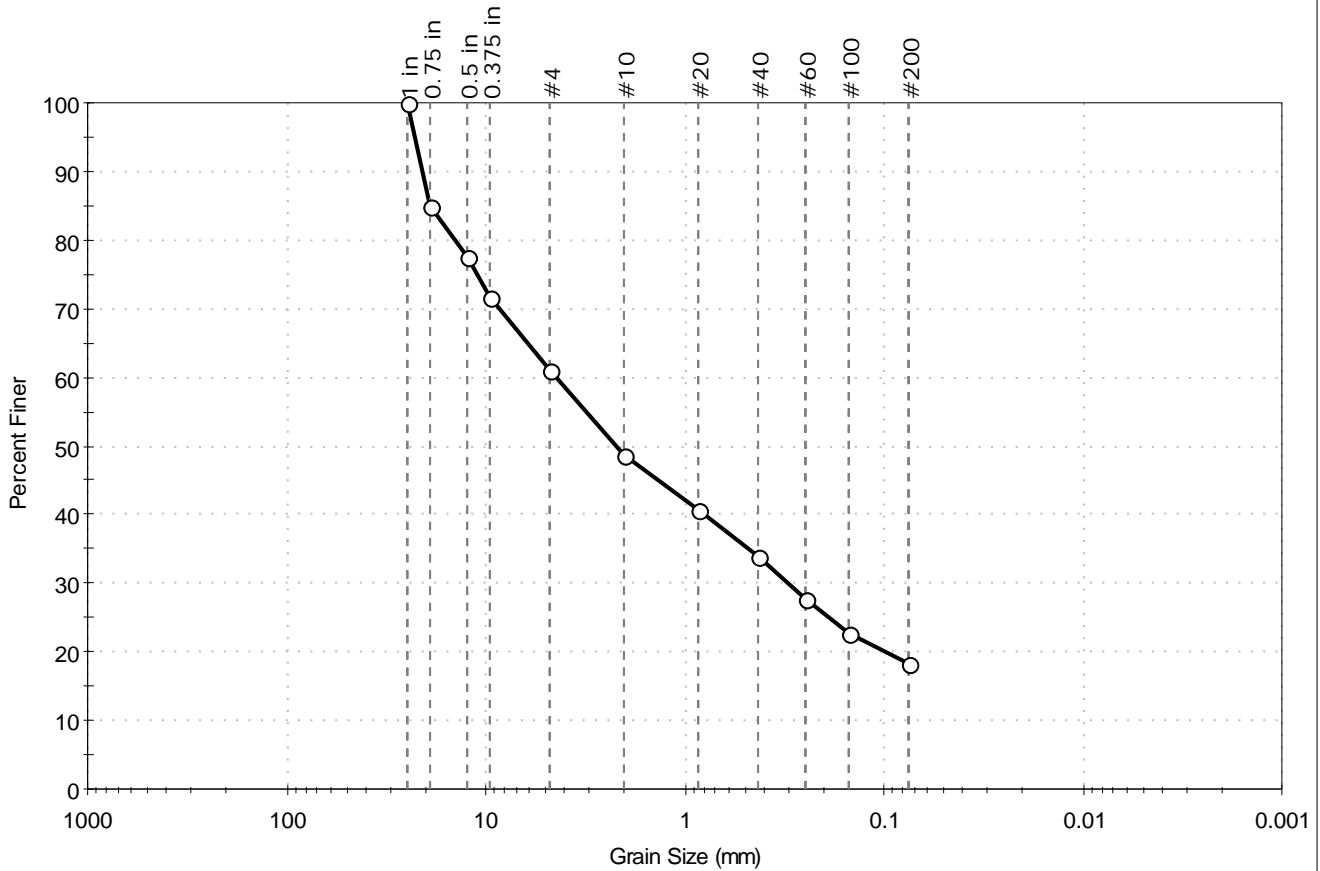
<u>Classification</u>	
ASTM	N/A
AASHTO	Stone Fragments, Gravel and Sand (A-1-a (1))

<u>Sample/Test Description</u>	
Sand/Gravel Particle Shape : ANGULAR	
Sand/Gravel Hardness : HARD	



Client:	Weston & Sampson Engineers		
Project:	Maplewood Ave Utility Imp.		
Location:	Portsmouth, NH	Project No:	GTX-306487
Boring ID:	C-12	Sample Type:	bag
Sample ID:	S-2	Test Date:	05/30/17
Depth:	1.5-3.5	Test Id:	412486
Test Comment:	---		
Visual Description:	Moist, light olive silty sand with gravel		
Sample Comment:	---		

Particle Size Analysis - ASTM D422



% Cobble	% Gravel	% Sand	% Silt & Clay Size
--	39.0	42.7	18.3

Sieve Name	Sieve Size, mm	Percent Finer	Spec. Percent	Complies
1 in	25.00	100		
0.75 in	19.00	85		
0.5 in	12.50	78		
0.375 in	9.50	72		
#4	4.75	61		
#10	2.00	49		
#20	0.85	41		
#40	0.42	34		
#60	0.25	28		
#100	0.15	23		
#200	0.075	18		

<u>Coefficients</u>	
D ₈₅ = 19.0657 mm	D ₃₀ = 0.3064 mm
D ₆₀ = 4.4252 mm	D ₁₅ = N/A
D ₅₀ = 2.2038 mm	D ₁₀ = N/A
C _u = N/A	C _c = N/A

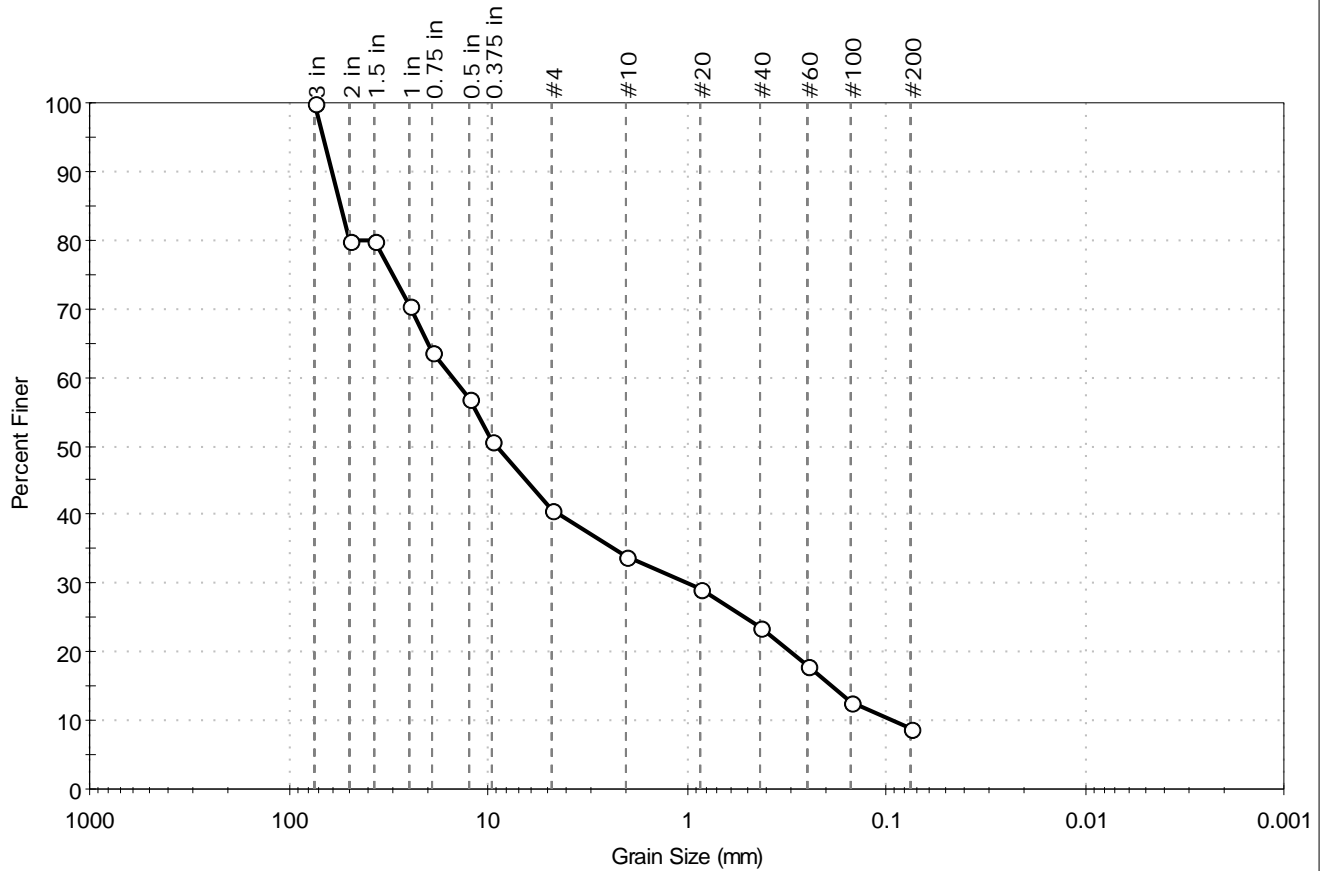
<u>Classification</u>	
<u>ASTM</u>	N/A
<u>AASHTO</u>	Stone Fragments, Gravel and Sand (A-1-b (0))

<u>Sample/Test Description</u>
Sand/Gravel Particle Shape : ANGULAR
Sand/Gravel Hardness : HARD



Client:	Weston & Sampson Engineers		
Project:	Maplewood Ave Utility Imp.		
Location:	Portsmouth, NH	Project No:	GTX-306487
Boring ID:	C-13	Sample Type:	bag
Sample ID:	S-1	Test Date:	06/02/17
Depth:	0.3-1.3	Test Id:	412481
Test Comment:	---		
Visual Description:	Moist, brown gravel with silt and sand		
Sample Comment:	---		

Particle Size Analysis - ASTM D422



% Cobble	% Gravel	% Sand	% Silt & Clay Size
--	59.3	31.8	8.9

Sieve Name	Sieve Size, mm	Percent Finer	Spec. Percent	Complies
3 in	75.00	100		
2 in	50.00	80		
1.5 in	37.50	80		
1 in	25.00	71		
0.75 in	19.00	64		
0.5 in	12.50	57		
0.375 in	9.50	51		
#4	4.75	41		
#10	2.00	34		
#20	0.85	29		
#40	0.42	24		
#60	0.25	18		
#100	0.15	13		
#200	0.075	8.9		

<u>Coefficients</u>	
D ₈₅ = 55.3020 mm	D ₃₀ = 0.9666 mm
D ₆₀ = 15.0912 mm	D ₁₅ = 0.1899 mm
D ₅₀ = 9.0451 mm	D ₁₀ = 0.0918 mm
C _u = 164.392	C _c = 0.674

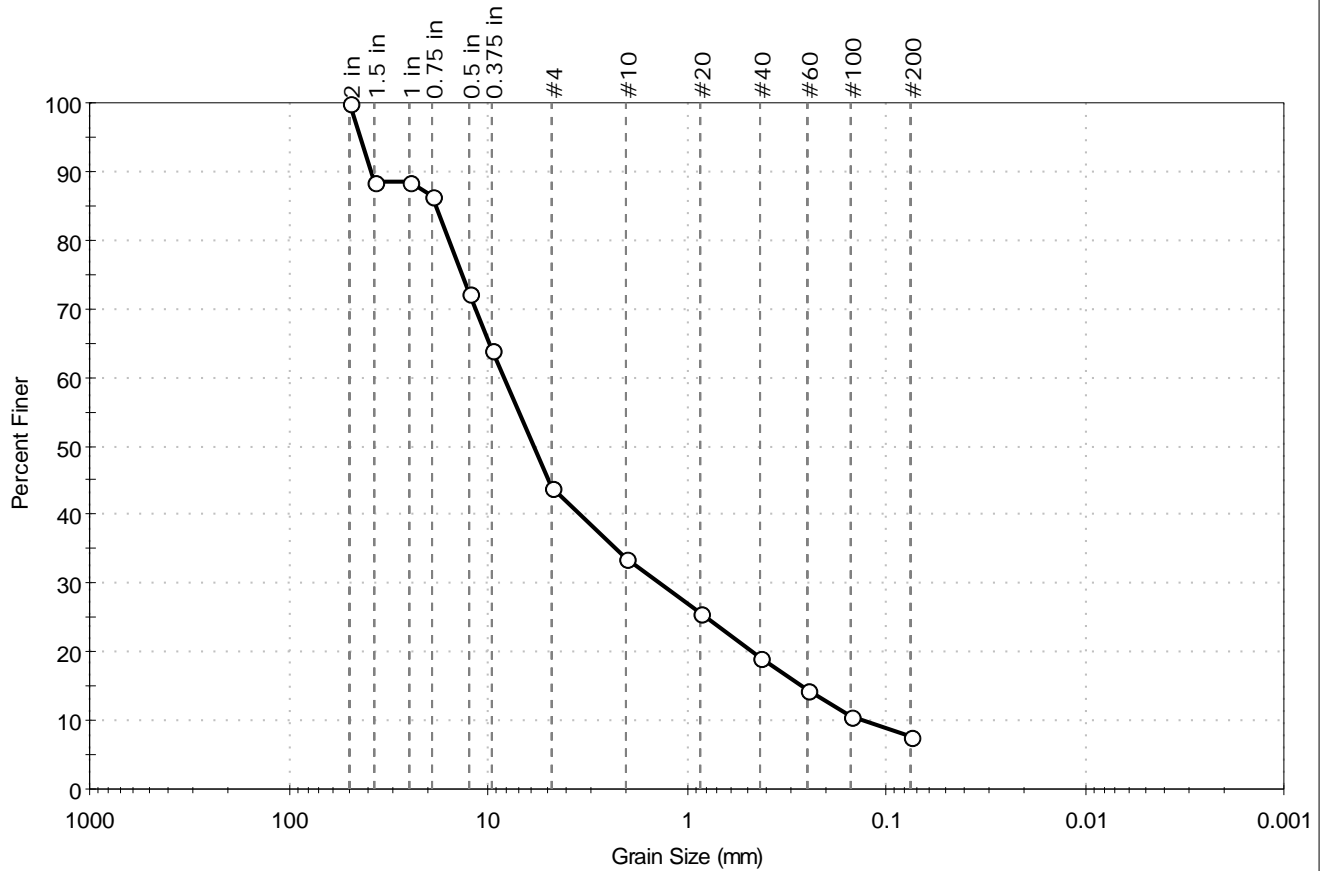
<u>Classification</u>	
ASTM	N/A
AASHTO	Stone Fragments, Gravel and Sand (A-1-a (1))

<u>Sample/Test Description</u>	
Sand/Gravel Particle Shape :	ANGULAR
Sand/Gravel Hardness :	HARD



Client:	Weston & Sampson Engineers		
Project:	Maplewood Ave Utility Imp.		
Location:	Portsmouth, NH	Project No:	GTX-306487
Boring ID:	C-14	Sample Type:	bag
Sample ID:	S-1	Test Date:	05/30/17
Depth :	0.25-1.25	Checked By:	emm
		Test Id:	412482
Test Comment:	---		
Visual Description:	Moist, olive brown gravel with silt and sand		
Sample Comment:	---		

Particle Size Analysis - ASTM D422



% Cobble	% Gravel	% Sand	% Silt & Clay Size
--	56.2	36.2	7.6

Sieve Name	Sieve Size, mm	Percent Finer	Spec. Percent	Complies
2 in	50.00	100		
1.5 in	37.50	89		
1 in	25.00	89		
0.75 in	19.00	86		
0.5 in	12.50	72		
0.375 in	9.50	64		
#4	4.75	44		
#10	2.00	34		
#20	0.85	26		
#40	0.42	19		
#60	0.25	15		
#100	0.15	11		
#200	0.075	7.6		

<u>Coefficients</u>	
D ₈₅ = 18.2440 mm	D ₃₀ = 1.3569 mm
D ₆₀ = 8.2458 mm	D ₁₅ = 0.2643 mm
D ₅₀ = 5.8613 mm	D ₁₀ = 0.1318 mm
C _u = 62.563	C _c = 1.694

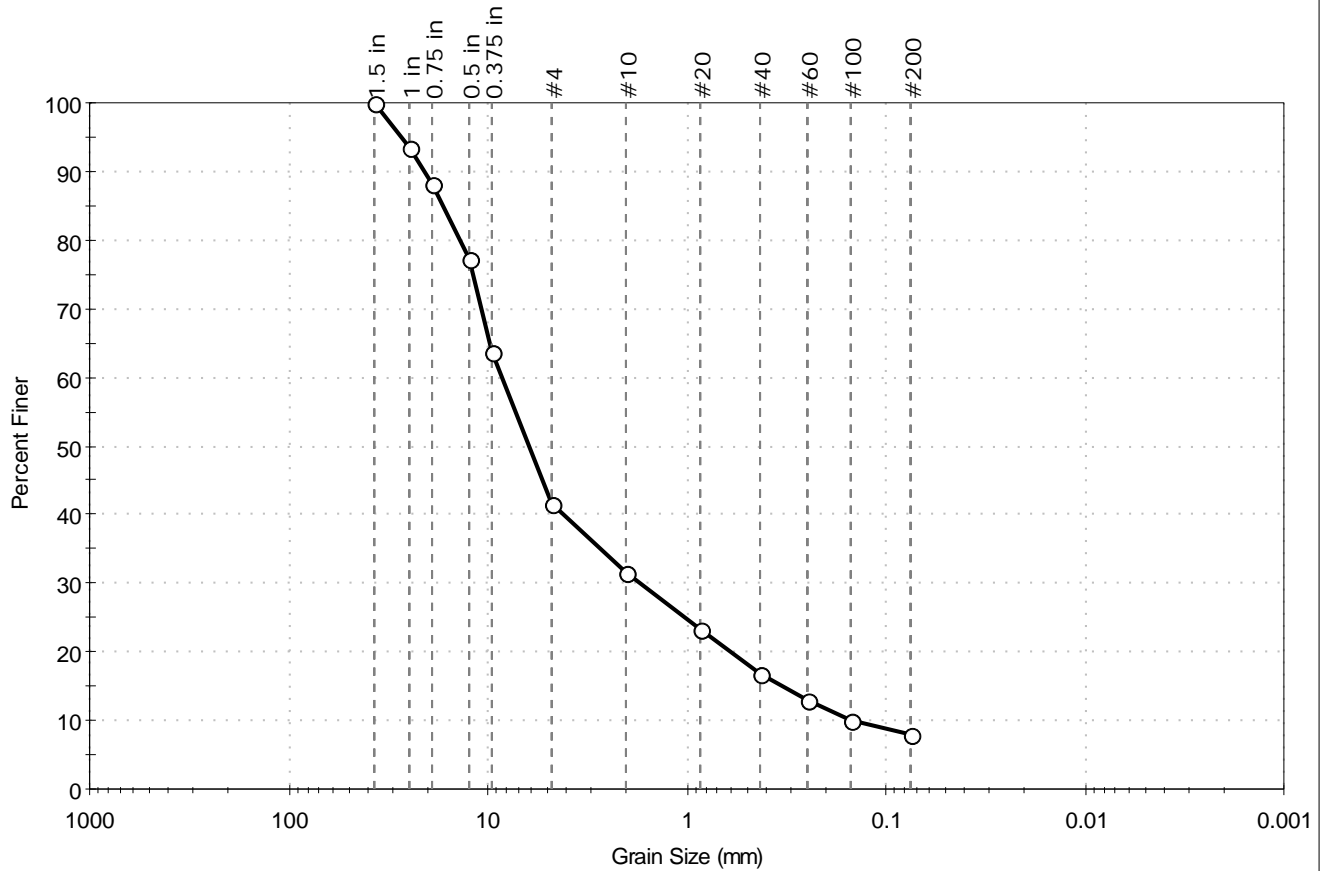
<u>Classification</u>	
<u>ASTM</u>	N/A
<u>AASHTO</u>	Stone Fragments, Gravel and Sand (A-1-a (1))

<u>Sample/Test Description</u>
Sand/Gravel Particle Shape : ANGULAR
Sand/Gravel Hardness : HARD



Client:	Weston & Sampson Engineers		
Project:	Maplewood Ave Utility Imp.		
Location:	Portsmouth, NH	Project No:	GTX-306487
Boring ID:	C-15	Sample Type:	bag
Sample ID:	S-1	Test Date:	05/31/17
Depth :	0.3-1.3	Checked By:	emm
		Test Id:	412483
Test Comment:	---		
Visual Description:	Moist, olive brown gravel with silt and sand		
Sample Comment:	---		

Particle Size Analysis - ASTM D422



% Cobble	% Gravel	% Sand	% Silt & Clay Size
--	58.3	33.7	8.0

Sieve Name	Sieve Size, mm	Percent Finer	Spec. Percent	Complies
1.5 in	37.50	100		
1 in	25.00	94		
0.75 in	19.00	88		
0.5 in	12.50	77		
0.375 in	9.50	64		
#4	4.75	42		
#10	2.00	32		
#20	0.85	23		
#40	0.42	17		
#60	0.25	13		
#100	0.15	10		
#200	0.075	8.0		

<u>Coefficients</u>	
D ₈₅ = 16.8811 mm	D ₃₀ = 1.7036 mm
D ₆₀ = 8.4718 mm	D ₁₅ = 0.3307 mm
D ₅₀ = 6.1774 mm	D ₁₀ = 0.1426 mm
C _u = 59.410	C _c = 2.402

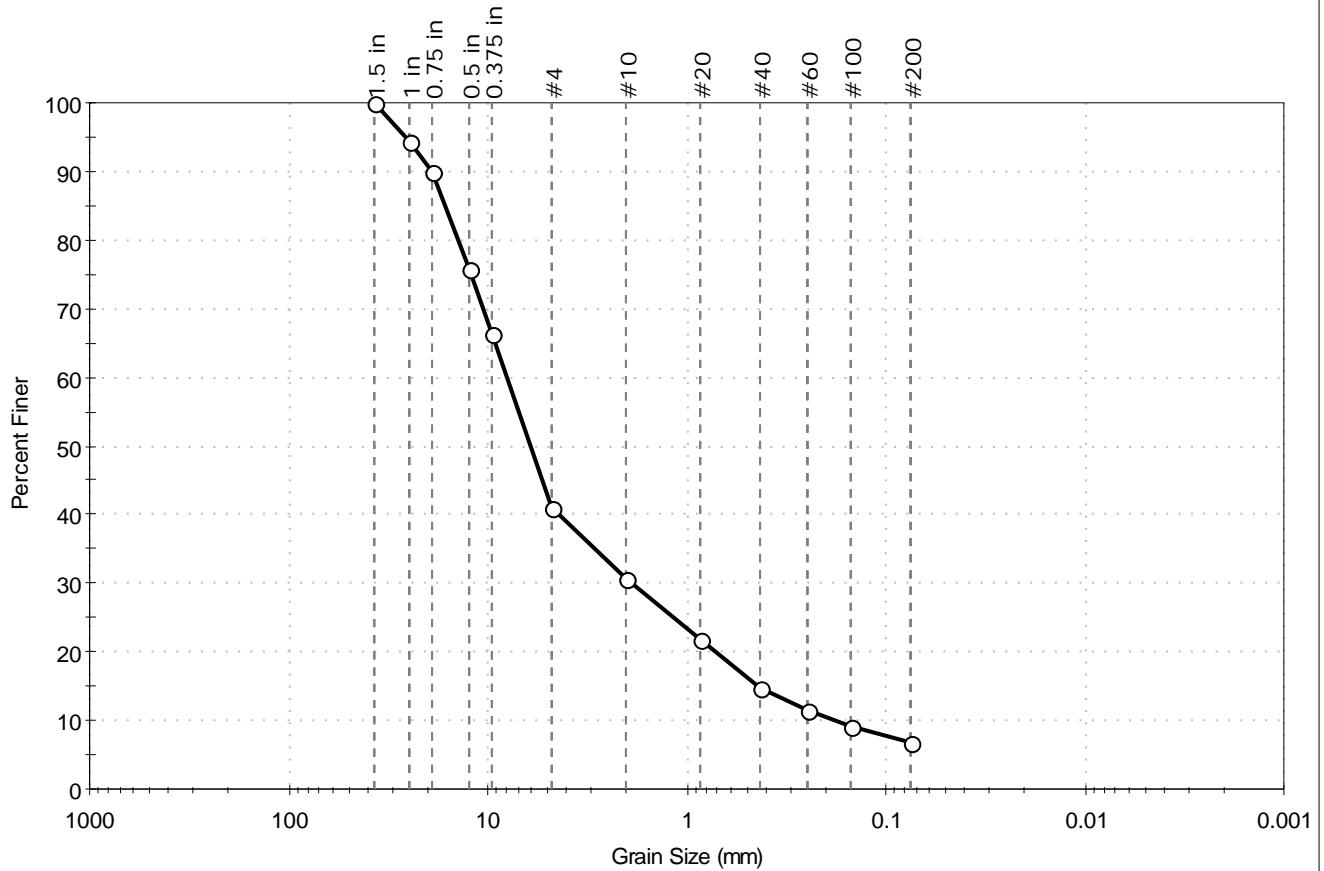
<u>Classification</u>	
<u>ASTM</u>	N/A
<u>AASHTO</u>	Stone Fragments, Gravel and Sand (A-1-a (1))

<u>Sample/Test Description</u>
Sand/Gravel Particle Shape : ANGULAR
Sand/Gravel Hardness : HARD



Client:	Weston & Sampson Engineers		
Project:	Maplewood Ave Utility Imp.		
Location:	Portsmouth, NH	Project No:	GTX-306487
Boring ID:	C-16	Sample Type:	bag
Sample ID:	S-1	Test Date:	05/30/17
Depth:	TOP 0.5-2.5	Checked By:	emm
Test Comment:	---		
Visual Description:	Moist, light olive brown gravel with silt and sand		
Sample Comment:	---		

Particle Size Analysis - ASTM D422



% Cobble	% Gravel	% Sand	% Silt & Clay Size
--	58.8	34.5	6.7

Sieve Name	Sieve Size, mm	Percent Finer	Spec. Percent	Complies
1.5 in	37.50	100		
1 in	25.00	94		
0.75 in	19.00	90		
0.5 in	12.50	76		
0.375 in	9.50	66		
#4	4.75	41		
#10	2.00	31		
#20	0.85	22		
#40	0.42	15		
#60	0.25	12		
#100	0.15	9		
#200	0.075	6.7		

<u>Coefficients</u>	
D ₈₅ = 16.4304 mm	D ₃₀ = 1.8810 mm
D ₆₀ = 7.9838 mm	D ₁₅ = 0.4296 mm
D ₅₀ = 6.0631 mm	D ₁₀ = 0.1824 mm
C _u = 43.771	C _c = 2.430

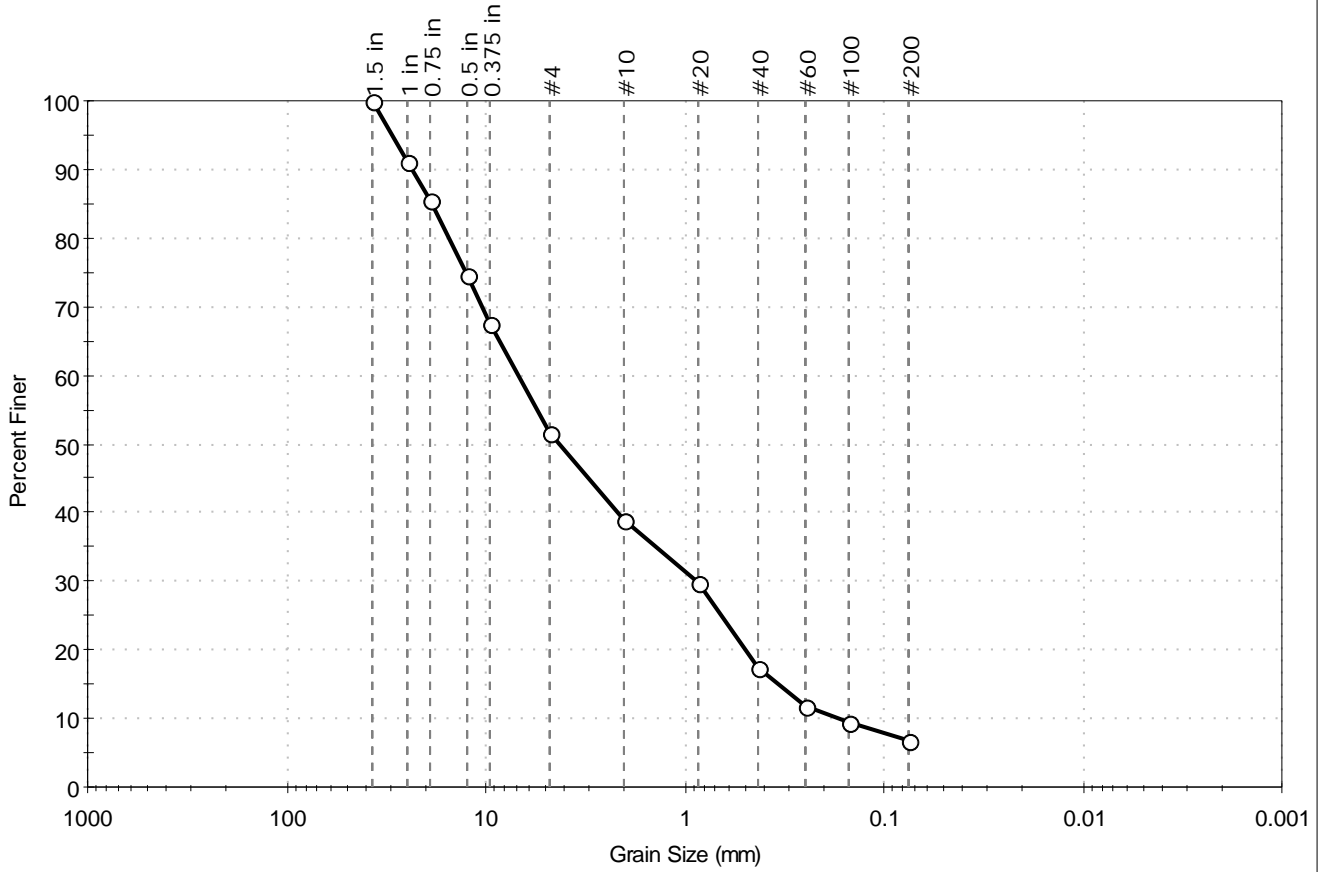
<u>Classification</u>	
<u>ASTM</u>	N/A
<u>AASHTO</u>	Stone Fragments, Gravel and Sand (A-1-a (1))

<u>Sample/Test Description</u>
Sand/Gravel Particle Shape : ANGULAR
Sand/Gravel Hardness : HARD



Client:	Weston & Sampson Engineers		
Project:	Maplewood Ave Utility Imp.		
Location:	Portsmouth, NH	Project No:	GTX-306487
Boring ID:	C-17	Sample Type:	bag
Sample ID:	S-1	Test Date:	06/01/17
Depth :	0.67-1.67	Checked By:	emm
		Test Id:	412485
Test Comment:	---		
Visual Description:	Moist, yellowish brown gravel with silt and sand		
Sample Comment:	---		

Particle Size Analysis - ASTM D422



% Cobble	% Gravel	% Sand	% Silt & Clay Size
--	48.5	44.6	6.9

Sieve Name	Sieve Size, mm	Percent Finer	Spec. Percent	Complies
1.5 in	37.50	100		
1 in	25.00	91		
0.75 in	19.00	86		
0.5 in	12.50	75		
0.375 in	9.50	67		
#4	4.75	51		
#10	2.00	39		
#20	0.85	30		
#40	0.42	17		
#60	0.25	12		
#100	0.15	9		
#200	0.075	6.9		

<u>Coefficients</u>	
D ₈₅ = 18.6293 mm	D ₃₀ = 0.8679 mm
D ₆₀ = 6.8706 mm	D ₁₅ = 0.3352 mm
D ₅₀ = 4.2934 mm	D ₁₀ = 0.1688 mm
C _u = 40.703	C _c = 0.649

<u>Classification</u>	
ASTM	N/A
AASHTO	Stone Fragments, Gravel and Sand (A-1-a (1))

<u>Sample/Test Description</u>
Sand/Gravel Particle Shape : ANGULAR
Sand/Gravel Hardness : HARD

REF.: 2015086.00

June 21, 2017

Mr. Raymond Pezzullo, P.E.
Department of Public Works
City of Portsmouth
680 Peverly Hill Road
Portsmouth, NH 03801

SUBJECT: Improvements to Maplewood Avenue & Adjacent Areas
Pavement Design Recommendation

Dear Mr. Pezzullo:

Greenman-Pedersen, Inc. (GPI) is pleased to submit our recommended pavement design for the Improvements to Maplewood Avenue & Adjacent Areas Project.

Existing Traffic Information and Design

GPI collected 48 hours of traffic volumes using automatic traffic recorders (ATR's) in January 2016. Vehicle classification counts (using FHWA Vehicle Types) were included as part of this data collection. To account for seasonal adjustment, the volumes were increased by 30% to reflect peak month conditions. The base year average daily traffic (ADT) was determined to be 2,960. Given that there is a truck restriction along much of the Maplewood Avenue corridor, the percentage of trucks is very low. The daily truck percentage was calculated to be 0.5% which includes buses and any vehicle that has more than 2 axles. Using the New Hampshire Department of Transportation (NHDOT) spreadsheet to calculate an equivalent single axle load (ESAL), an Average Daily Load (ADL) of 46 was determined for Maplewood Avenue. Using this information, the required Structural Number (SN) was calculated for each of the pavement layers. These calculations are attached for reference.

Subsurface Investigation

Pavement cores and subsurface samples were taken along Maplewood Avenue and each side street by New England Boring Contractors, under the supervision of Weston & Sampson, in April 2017. All samples taken throughout the project limits have been classified as A1-a or A1-b according to the AASHTO soil classification system. When the sieve analysis of each sample was compared to the NHDOT Standard Specification for gravel (Item 304.2), samples C-5 and C-7 satisfy the required gradation. Given the favorable AASHTO soil classification, it is GPI's recommendation that the existing roadway be reclaimed and the existing reclaimed base material remain in place. The recommended pavement treatment includes reclamation to a depth of 14" and to grade the base material to the proposed lines and grades in the contract documents, with a minimum of 8" of reclaimed stabilized base. Localized areas will require the material to be removed and re-handled to achieve the proposed profile. This work shall be performed according to Section 306-Reclaimed Stabilized Base of the NHDOT Standard Specifications for Road and Bridge Construction, 2016 Edition. Windrowed or graded reclaimed base material shall be used on the project

Mr. Raymond Pezzullo, P.E.
June 21, 2017
Page 2 of 2

under walks, driveways, islands and for leveling. Surplus reclaimed base will be removed in accordance with project specifications.

Proposed Pavement Section

Maplewood Avenue

1-1/2"	Hot Bituminous Concrete, Wearing Course
4"	Hot Bituminous Concrete, Binder Course (Placed in 2-2" lifts)
8"	Reclaimed Stabilized Base

Side Streets

1-1/2"	Hot Bituminous Concrete, Wearing Course
2-1/2"	Hot Bituminous Concrete, Binder Course
8"	Reclaimed Stabilized Base

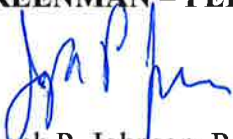
Asphalt emulsion for tack coat shall be applied at a rate between 0.05 gallons per square yard over tight paved surfaces and 0.07 gallons per square yard over milled surfaces per section 410. All longitudinal joints shall be treated with pavement joint adhesive.

All pavement work shall be performed according to "Section 401 -- Plant Mix Pavements – General" of the NHDOT Standard Specifications for Road and Bridge Construction, 2016 Edition.

Should you have any questions, or require additional information, please contact me directly at 766-8245 or Christopher Stairs at 766-8246.

Sincerely,

GREENMAN – PEDERSEN, INC.



Joseph P. Johnson, P.E., PTOE
Assistant Vice President/Senior Project Manager

Christopher Stairs, P.E.
Project Manager

enclosure(s)

ESAL Calculator (fill in shaded fields)

ADL = Average Daily Load

Design Period (in years) :

Percent Growth Factor (as decimal):

20
0.005

Vehicle Classification	Base Year AADT (2-way)	Flexible ESAL Factors	Base Year ADL	Growth Factor	Design Year AADT (2 way)	Design ADL
Cars and pickups	2805	0.0007	1.9635	1.005	3099	2
2 axle, 6 tire SU	131	0.25	32.75	1.005	145	36
3+ axle SU	0	0.58	0	1.005	0	0
3 axle TST	0	0.39	0	1.005	0	0
4 axle TST	0	0.51	0	1.005	0	0
5+ axle TST	0	1.13	0	1.005	0	0
Buses, trucks w/trailers	15	0.57	8.55	1.005	17	9
Twin trailers	0	2.4	0	1.005	0	0
Total	2951		43.2635		3261	48

Average ADL

46

No. of days in design period

7300

Design lane factor

149574.5086

Cumulative design lane flexible ESAL

167523.4496

FLEXIBLE PAVEMENT DESIGN

PROJECT: _____
GPI NUMBER: Maplewood Avenue
2015086
MEAN YEAR ADL: 46
REGION FACTOR: 2.5

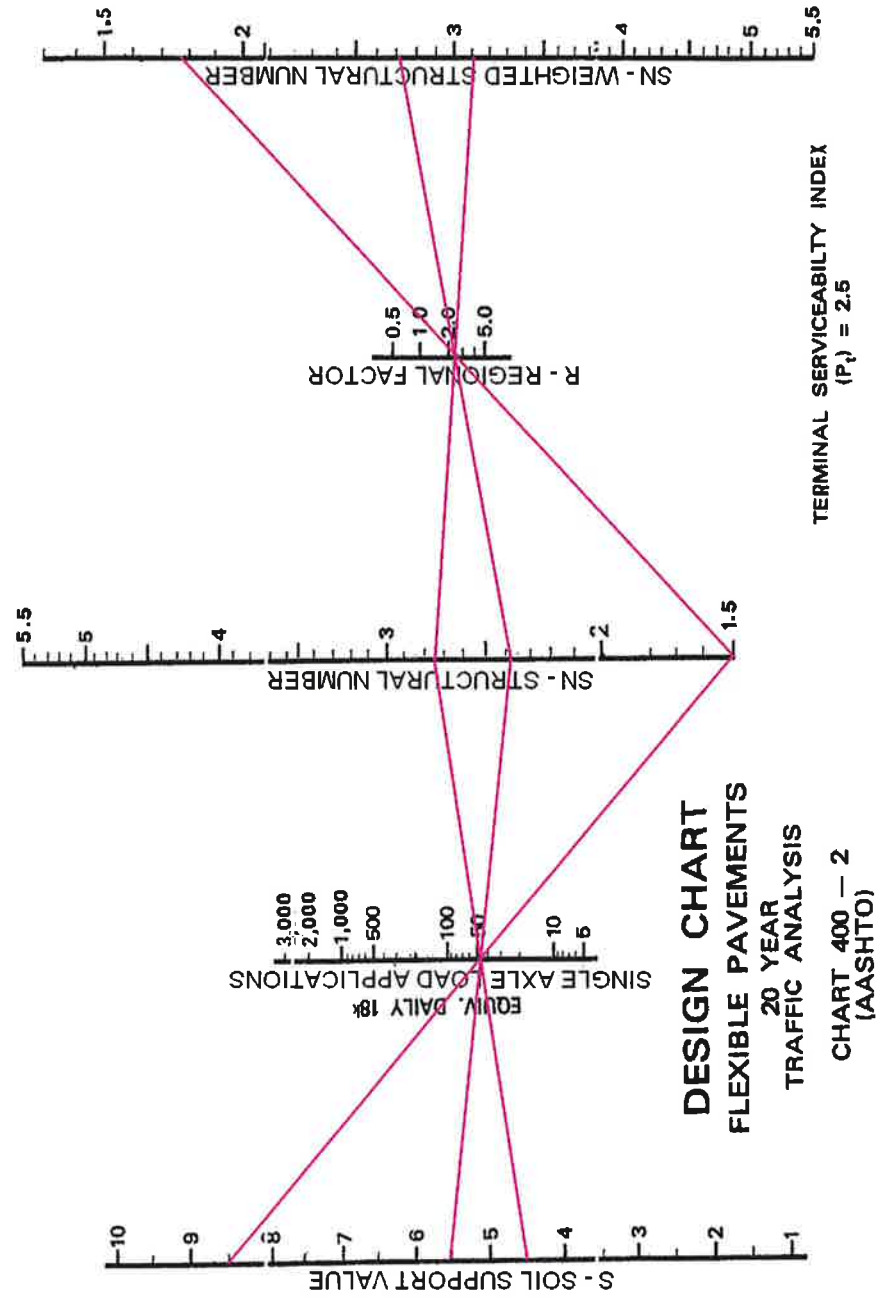
DESCRIPTION:
Roadway Reconstruction, reclaimed base

COMPILED BY: CLS
CHECKED BY: JPJ

COURSE	DEPTH	SN/in	SN		SOIL SUPPORT FACTOR	REQ'D SN
			LAYER	CUMULATIVE		
Wearing Course	1.50	0.38	0.57	0.57		
Binder Course Pavement (2 Lifts)	4.00	0.34	1.36	1.93	8.50	1.78
Reclaimed Base	8.00	0.14	1.12	3.05	5.50	2.70
Sand*	12.00	0.05	0.60	3.65	4.50	3.10

REMARKS:

* Suitable Material to remain in place.



APPENDIX B: ENVIRONMENTAL PERMITS

Please mail 2 copies of the completed form and required material to:

Cultural Resources Staff
Bureau of Environment
NH Department of Transportation
7 Hazen Drive
Concord, NH 03302

RECEIVED

JUN 19 2017

DHR Use Only	8803
R&C #	
Log In Date	6/19/17
Response Date	7/10/17
Sent Date	7/11/17

Request for Project Review by the
New Hampshire Division of Historical Resources
for **Transportation** Projects

- This is a new submittal.
 This is additional information relating to DHR Review and Compliance (R&C)#:

GENERAL PROJECT INFORMATION

DOT Project Name & Number N/A - City of Portsmouth managed and funded project
Brief Descriptive Project Title City of Portsmouth Maplewood Avenue Corridor Reconstruction
Project Location Parts of Maplewood Ave, Woodbury Ave, Fairview Dr, and Leslie Dr neighborhoods
City/Town Portsmouth, NH
Lead Federal Agency and Contact (if applicable) EPA, NPDES Program
(Agency providing funds, licenses, or permits) Permit Type and Permit or Job Reference # NPDES Phase II
DOT Environmental Manager (if applicable) N/A *No DOT involvement*

PROJECT SPONSOR INFORMATION

Project Sponsor Name Portsmouth, NH Department of Public Works, c/o Mr. Ray Pezzullo
Mailing Address 680 Peverly Hill Rd Phone Number 603-427-1530
City Portsmouth State NH Zip 03801 Email rpezzullo@cityofportsmouth.com

CONTACT PERSON TO RECEIVE RESPONSE

Name/Company Tidewater Community Development, LLC
Mailing Address PO Box 22331 Phone Number 770-3758
City Portsmouth State NH Zip 03802 Email info@tidewatercd.com

This form is updated periodically. Please download the current form at <http://www.nh.gov/nhdhr/review>. Please refer to the Request for Project Review for Transportation Projects Instructions for direction on completing this form. Submit 2 copies of this project review form for each project for which review is requested. Include 1 self-addressed stamped envelope to expedite review response. Project submissions will not be accepted via facsimile or e-mail. This form is required. Review request form must be complete for review to begin. Incomplete forms will be sent back to the applicant without comment. Please be aware that this form may only initiate consultation. For some projects, additional information will be needed to complete the Section 106 review. All items and supporting documentation submitted with a review request, including photographs and publications, will be retained by the DOT and the DHR as part of its review records. Items to be kept confidential should be clearly identified. For questions regarding the DHR review process and the DHR's role in it, please visit our website at: <http://www.nh.gov/nhdhr/review> or contact the R&C Specialist at christina.st.louis@dcr.nh.gov or 603.271.3558.

PROJECTS CANNOT BE PROCESSED WITHOUT THIS INFORMATION

Project Boundaries and Description

- Attach the relevant portion of a 7.5' USGS Map (photocopied or computer-generated) **indicating the defined project boundary.** (See RPR Instructions and R&C FAQs for guidance.)
- Attach a detailed narrative description of the proposed project.
- Attach a site plan. The site plan should include the project boundaries and areas of proposed excavation.
- Attach photos of the project area (overview of project location and area adjacent to project location, and specific areas of proposed impacts and disturbances.) (Informative photo captions are requested.)
- A DHR file review must be conducted to identify properties within or adjacent to the project area. Provide file review results in **Table 1** or within project narrative description. (Blank table forms are available on the DHR website.)
File review conducted on / /

Architecture

Are there any buildings, structures (bridges, walls, culverts, etc.) objects, districts or landscapes within the project area? Yes No
If no, skip to Archaeology section. If yes, submit all of the following information:

Approximate age(s):

- Photographs of **each** resource or streetscape located within the project area, with captions, along with a photo key. (Digital photographs are accepted. All photographs must be clear, crisp and focused.)
- If the project involves rehabilitation, demolition, additions, or alterations to existing buildings or structures, provide additional photographs showing detailed project work locations. (i.e. Detail photo of windows if window replacement is proposed.)

Archaeology

Does the proposed undertaking involve ground-disturbing activity? Yes No
If yes, submit all of the following information:

- Description of current and previous land use and disturbances.
- Available information concerning known or suspected archaeological resources within the project area (such as cellar holes, wells, foundations, dams, etc.)

Please note that for many projects an architectural and/or archaeological survey or other additional information may be needed to complete the Section 106 process.

DHR Comment/Finding Recommendation *This Space for Division of Historical Resources Use Only*

- Insufficient information to initiate review. Additional information is needed in order to complete review.
- No Potential to cause Effects No Historic Properties Affected No Adverse Effect Adverse Effect

Comments: Please contact the DHR immediately
should project plans significantly change or if
public concerns are raised regarding impacts to
historic properties. We prefer unbound submissions without un-
necessary pages. Thank You

If plans change or resources are discovered in the course of this project, you must contact the Division of Historical Resources as required by federal law and regulation.

Authorized Signature: EJM Date: 7/10/17



CITY OF PORTSMOUTH

Community Development Department
(603) 610-7281

Planning Department
(603) 610-7216

PLANNING BOARD

September 25, 2017

John P. Bohenko, City Manager
City of Portsmouth
1 Junkins Avenue
Portsmouth, NH 03801

Erin Bakom, President
Heritage Hill Condominium Association
1275 Maplewood Avenue, Unit 12
Portsmouth, NH 03801

RE: Conditional Use Permit Application for Property Located at 1275 Maplewood Avenue

Dear Mr. Bohenko and Ms. Bakom:

The Planning Board, at its regularly scheduled meeting of September 21, 2017, considered your application for a Conditional Use Permit under Section 10.1017 of the Zoning Ordinance for work within the inland wetland and wetland buffer to separate the combined sewer/water system by creating a new drain outfall to the east of the driveway; a second 15" reinforced concrete pipe (RCP) with disturbance to the roadway, grassed area and sidewalk; and a new drain outfall at the low point of Maplewood Avenue, with $282 \pm$ s.f. of temporary impact and $17 \pm$ s.f. of permanent impact to the inland wetland and $14,215 \pm$ s.f. of permanent impact to the inland wetland buffer. As a result of said consideration, the Board voted to **grant** Conditional Use Permit approval with the following stipulation:

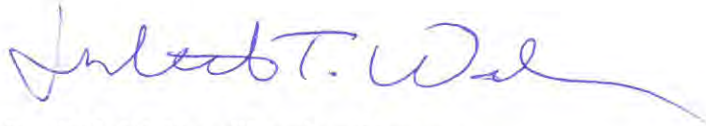
- 1) That the applicant will consider adding an additional tree along Maplewood Avenue near the Heritage Condominium driveway.

Article 10, Section 10.1017.70 of the Zoning Ordinance provides that a Conditional Use Permit shall expire one year after the date of approval by the Planning Board unless a building permit is issued prior to that date. The Planning Board may grant a one year extension of a Conditional Use Permit if the applicant submits a written request to the Planning Board prior to the expiration date. Any other extension may be granted only after a new public hearing on the reconsideration of the application.

Page two.
RE: 1275 Maplewood Avenue
September 25, 2017

The minutes and audio recording of this meeting are available through the Planning Department.

Very truly yours,



Juliet T.H. Walker, Planning Director
for Dexter Legg, Chairman of the Planning Board
JTHW:jms

cc: Robert Marsilia, Building Inspector
Rosann Maurice-Lentz, City Assessor
Raymond Pezzullo, Assistant City Engineer
Joseph Johnson, Greenman –Pedersen, Inc.



The State of New Hampshire

Department of Environmental Services



Robert R. Scott, Commissioner

October 19, 2017

HERITAGE HILL CONDOMINIUMS
ATTN: ERIN BAKKOM
1275 MAPLEWOOD AVE MB #50
PORTSMOUTH NH 03801

RE: NHDES Wetlands File #2017-02909, 1275 Maplewood Ave/Heritage Hill Condominium Driveway, Portsmouth Tax Map/Lot # 219 / 40

Dear Ms. Bakkom:

Attached please find Wetlands Permit # 2017-02909 to dredge and fill a total of 299 square feet, 17 square permanent and 282 square feet temporary, of wetlands to install a 18 inch x 25 foot culvert adjacent to an existing culvert associated with a combined sewer/stormwater separation project.

The decision to approve this application was based on the following findings:

1. This is a minimum impact project per Administrative Rule Env-Wt 303.04(f), alteration of less than 3,000 square feet in swamps and wet meadows.
2. The need for the proposed impacts has been demonstrated by the applicant per Env-Wt 302.01. The applicant has demonstrated that wetland impact is necessary to install an additional culvert adjacent to an existing culvert under an existing roadway to alleviate an increase in stormwater associated with a combined sewer/stormwater separation project.
3. The applicant has provided evidence which demonstrates that this proposal is the alternative with the least adverse impact to areas and environments under the department's jurisdiction per Env-Wt 302.03.
4. The applicant has demonstrated by plan and example that each factor listed in Env-Wt 302.04(b) Requirements for Application Evaluation, has been considered in the design of the project.
5. The NH Natural Heritage Bureau has no record of sensitive species present within the vicinity of the project area.
6. The Portsmouth Conservation Commission signed the DES application and has no objection to permitting the proposed work.

Any person aggrieved by this decision may appeal to the New Hampshire Wetlands Council (the Council) by filing an appeal that meets the requirements specified in RSA 482-A:10, RSA 21-O:14, and the rules adopted by the Council, Env-WtC 100-200. The appeal must be filed **directly with the Council within 30 days** of the date of this decision and must set forth fully **every ground** upon which it is claimed that the decision complained of is unlawful or unreasonable. Only those grounds set forth in the notice of appeal can be considered by the Council.

Information about the Council, including a link to the Council's rules, is available at <http://nhec.nh.gov/> (or more directly at <http://nhec.nh.gov/wetlands/index.htm>.) Copies of the rules also are available from the New Hampshire Department of Environmental Services (NHDES) Public Information Center at (603) 271-2975.

www.des.nh.gov

29 Hazen Drive • PO Box 95 • Concord, NH 03302-0095
(603) 271-3503 • Fax: 271-7894 TDD Access: Relay NH 1-800-735-2964

Your permit must be signed, and a copy must be posted in a prominent location on site during construction.
If you have any questions, please contact our office at (603) 271-2147.

Sincerely,

A handwritten signature in cursive script that reads "David Price".

David Price
East Region Inspector
NHDES Land Resources Management

cc: Raymond Pezzullo, Portsmouth Department of Public Works, Applicant
Portsmouth Conservation Commission
Portsmouth Municipal Clerk
Portsmouth Environmental Planner
Greenman-Pederson, Inc.



Department of Environmental Services



Robert R. Scott, Commissioner

=====

WETLANDS AND NON-SITE SPECIFIC PERMIT 2017-02909

Permittee:	HERITAGE HILL CONDOMINIUMS	NOTE CONDITIONS
	1275 MAPLEWOOD AVE MB #50	
	PORTSMOUTH NH 03801	
Applicant:	CITY OF PORTSMOUTH – DEPARTMENT OF PUBLIC WORKS	
	680 PEVERLY HILL ROAD	
	PORTSMOUTH NH 03801	
Project Location:	1275 MAPLEWOOD AVENUE MB #50, PORTSMOUTH	
	TAX MAP/LOT NO: 219 / 40	
Waterbody:	UNNAMED WETLAND	

APPROVAL DATE: OCTOBER 19, 2017 EXPIRATION DATE: OCTOBER 19, 2022

=====

Based upon review of the above referenced application, in accordance with RSA 482-A and RSA 485-A:17, a Wetlands Permit and Non-Site Specific Permit was issued. This permit shall not be considered valid unless signed as specified below.

PERMIT DESCRIPTION: Dredge and fill a total of 299 square feet, 17 square permanent and 282 square feet temporary, of wetlands to install a 18 inch x 25 foot culvert adjacent to an existing culvert associated with a combined sewer/stormwater separation project.

THIS APPROVAL IS SUBJECT TO THE FOLLOWING PROJECT SPECIFIC CONDITIONS:

1. All work shall be in accordance with plans by Greenman-Pederson, Inc., dated August 30, 2017 as received by the NH Department of Environmental Services (NHDES) on September 26, 2017.
2. No person undertaking any activity shall cause or contribute to, or allow the activity to cause or contribute to, any violations of the surface water quality standards in RSA 485-A and Env-Wq 1700.
3. Appropriate siltation and erosion controls shall be in place prior to construction, shall be maintained during construction, and shall remain until the area is stabilized. Temporary controls shall be removed once the area has been stabilized.
4. The contractor responsible for completion of the work shall use techniques described in the New Hampshire Stormwater Manual, Volume 3, Erosion and Sediment Controls During Construction (December 2008).
5. Extreme precautions shall be taken within riparian areas to prevent unnecessary removal of vegetation during construction. Areas cleared of vegetation must be revegetated with like native species within three days of the completion of the disturbance.
6. Discharge from dewatering of work areas shall be to sediment basins that are: a) located in uplands; b) lined with hay bales or other acceptable sediment trapping liners; c) set back as far as possible from wetlands and surface waters, with a preferred undisturbed vegetated buffer of at least 50 feet and a minimum undisturbed vegetative buffer of 20 feet.
7. Construction equipment shall be inspected daily for leaking fuel, oil, and hydraulic fluid prior to entering surface waters or wetlands or operating in an area where such fluids could reach groundwater, surface waters, or wetlands.
8. The permittee's contractor shall maintain appropriate oil/diesel fuel spill kits on site that are readily accessible at all

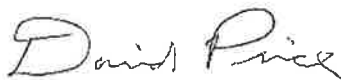
times during construction, and shall train each operator in the use of the kits.

9. All refueling of equipment shall occur outside of surface waters or wetlands during construction. Machinery shall be staged and refueled in upland areas only.
10. Within three days of final grading or temporary suspension of work in an area that is in or adjacent to wetlands or surface waters, all exposed soil areas shall be stabilized by seeding and mulching during the growing season, or if not within the growing season, by mulching with tackifiers on slopes less than 3:1 or netting and pinning on slopes steeper than 3:1.

GENERAL CONDITIONS THAT APPLY TO ALL NHDES WETLANDS PERMITS:

1. A copy of this permit shall be posted on site during construction in a prominent location visible to inspecting personnel;
2. This permit does not convey a property right, nor authorize any injury to property of others, nor invasion of rights of others;
3. The Wetlands Bureau shall be notified upon completion of work;
4. This permit does not relieve the applicant from the obligation to obtain other local, state or federal permits, and/or consult with other agencies as may be required (including US EPA, US Army Corps of Engineers, NH Department of Transportation, NH Division of Historical Resources (NH Department of Cultural Resources), NHDES-Alteration of Terrain, etc.);
5. Transfer of this permit to a new owner shall require notification to and approval by NHDES;
6. This project has been screened for potential impacts to **known** occurrences of protected species and exemplary natural communities in the immediate area. Since many areas have never been surveyed, or have only received cursory inventories, unidentified sensitive species or communities may be present. This permit does not absolve the permittee from due diligence in regard to state, local or federal laws regarding such communities or species.
7. Review enclosed sheet for status of the US Army Corps of Engineers' federal wetlands permit.

APPROVED:



David Price
NHDES Wetlands Bureau

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BY SIGNING BELOW I HEREBY CERTIFY THAT I HAVE FULLY READ THIS PERMIT AND AGREE TO ABIDE BY ALL PERMIT CONDITIONS.

OWNER'S SIGNATURE (required)

CONTRACTOR'S SIGNATURE (required)



The State of New Hampshire
Department of Environmental Services



Clark B. Freise, Assistant Commissioner

**NOTICE TO RECIPIENTS OF
MINIMUM IMPACT NH WETLANDS PERMITS**

Your permit was approved by the New Hampshire Wetlands Bureau as a minimum impact project, and your project is automatically approved under the Army Corp's New Hampshire Programmatic General Permit.

For the purpose of the NH PGP, Minimum Impact Projects do not include new construction of:

- Dams;
- Dikes;
- Water withdrawal or diversion projects which require fill in wetlands or surface waters;
- Wetlands restoration projects, or any projects which involve work in other than low flow conditions (July 1 – September 30);
- Any projects involving more than 3,000 square feet of a water body or wetland fill and secondary impacts.

Also, not included under Minimum Impact Projects are those projects that include the reconstruction or replacement of currently unserviceable structures/fills. The projects must be reviewed through the screening procedures of minor impact projects. The activities in section 10 waters not regulated by the Wetlands Bureau formerly authorized under the Nationwide Permit Program and listed in Appendix A of this document are designated non-reporting activities.

These approvals do not relieve you from obtaining any necessary local permits that may be required by your town.

If you have any questions, feel free to give us a call at 603-271-2147.

This notice was sent with minimum impact permit.