

CONTRACT DOCUMENTS AND SPECIFICATIONS FOR

UNION STREET AREA IMPROVEMENT PROJECT

Bid # 27-23

Portsmouth, New Hampshire

Karen Conard, City Manager

January 2023

City of Portsmouth,
New Hampshire
Public Works
Department



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SPECIAL CONDITIONS

PROSECUTION OF WORK

The PROSECUTION OF WORK summarizes selected project requirements for the Contractor's easy reference. It is not intended to provide all requirements. Refer to Technical Specifications and Drawings for details.

1. DESCRIPTION OF WORK

This City funded project involves the construction of separate Base Bid and Bid Alternate work as described below:

Base Bid: Middle Street from Miller Avenue to Union Street. The Work consists of sewer main and drain replacement on Middle St from Miller Avenue and Union Street, with a permanent trench patch repair and reconstruction of the brick sidewalk; and water, sewer, and drain replacement on Union St from Middle Street to Austin Street. On Union St, the Work includes roadway, curbing and sidewalk reconstruction and all utility improvements as shown on the Contract Plans and Documents.

Bid Alternate A: Coffins Court and Cabot Street from Middle Street to Coffins Court. The Work consists of water main replacement and sewer main installation on Coffins Court; and water, sewer, and drain replacement on Cabot Street from Middle Street to Coffins Court. The Work includes roadway, curbing and sidewalk reconstruction and all utility improvements as shown on the Contract Plans and Documents.

Bid Alternate B: Union Street from Austin Street to State Street. The Work consists of water, sewer, drain, roadway, curbing and sidewalk reconstruction and all utility improvements as shown on the Contract Plans and Documents.

Bid Alternate C: Austin Street from Union Street to Cabot Street. The Work consists of water, sewer, drain, roadway, curbing and sidewalk reconstruction and all utility improvements as shown on the Contract Plans and Documents.

Bid Alternate D: Middle Street from Miller Avenue to Union Street. The Work consists of pavement milling and wearing course pavement on Middle Street.

2. CONTRACT TIME

As required by the City's Consent Decree with the Environmental Protection Agency, there is an **intermediate substantial** completion of date of **October 31, 2023**, to separate the sewer and stormwater drainage flows on Union Street. The contractor must complete the required sewer and stormwater drainage improvements to meet this requirement by the intermediate substantial completion date (see the Utility and Drainage and Utility Sequencing Plan for additional requirements and constraints).

From the start date of the Notice to Proceed, the entire project work must be substantially completed within:

- [250](#) calendar days for the Base Bid

With added days if bid alternates are selected:

- [120](#) calendar days for Bid Alternate A
- [75](#) calendar days for Bid Alternate B
- [60](#) calendar days for Bid Alternate C
- [30](#) calendar days for Bid Alternate D

The CONTRACTOR should note that liquidated damages in the amount of \$1,500/day will be levied for every calendar day in excess of the specified contract time.

3. WORK HOURS

The Work shall be completed Monday through Friday during daylight hours (7 AM to 5 PM) unless specifically noted otherwise. No work shall be allowed on Holidays or the day after Thanksgiving. Requests to perform nighttime or weekend operations must be approved by the City at least two weeks prior to the anticipated construction operations. Additional costs associated with nighttime or weekend operations will be at the Contractor's expense.

4. SUBSTANTIAL COMPLETION

Prior to the issuance of a Certificate of Substantial Completion, all Work must be complete and tested except final wearing course paving, pavement striping, and minor site cleanup.

5. SPECIAL CONSTRUCTION SEQUENCING

The Contractor shall be prepared to commence work no later than the date on the Notice to Proceed. If required, a designated winter shutdown will be established that will not be included as Contract Time during which the Contractor will not complete significant field work but remain responsible for all other provisions of the Contract. Any work required to meet this sequencing, including winter demobilization and spring mobilization is incidental to the contract.

The active construction in 2023 is anticipated to run between April and December. If a winter shutdown is required, the contract time (construction) will restart by April 15, 2024, unless previously approved by the OWNER.

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. **Temporary Paving:** On Middle Street, roadway areas disturbed during construction must have a temporary pavement patch installed at the end of each work week (every Friday). If the Owner or Engineer does not allow paving (inclement weather, etc.) on the scheduled paving day, the contractor shall schedule paving for the next workday.

- B. Utility and Drainage:** This project consists of complex pipe sequencing issues. The Contractor shall 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 combined sewer and drain systems 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. In some areas, new sewer mains will need to be operation before internal plumbing in homes can be reconfigured and existing sewers taken out of service (see the Utility and Drainage and Utility Sequencing Plan for additional requirements and constraints). 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 systems drain and sewer installed by the Contractor to maintain flows or protect utilities from damage are subsidiary and will not be measured for payment.
- C. Unutil Gas Main:** In the spring of 2023, Unutil plans to construct new relocated gas mains on Union Street between Middle Street to Austin Street, and on Austin Street. This work may be ongoing during construction of this project. The Contractor shall conduct the Work without interfering or hindering the progress or completion of the gas main installation. The Contractor shall anticipate excavation, backfilling, and protection of the new gas mains and service laterals while preparing bid and during construction. This work is subsidiary to the Contractor's work and will not be measure for payment.
- a. Coffins Court Gas Main:** Because of limited space, Unutil plans to install their new gas main over the newly constructed water main; however, this work must be sequenced in multiple steps to provide continuous gas service throughout construction. The Contractor shall install the new water main from Union Street to 37 Coffins Court then before roadway construction is completed on Coffins Court, allow three weeks for Unutil to install their new gas main over the new water main.

6. HIERARCHY OF DOCUMENTS

1. Plans will govern Technical Specifications;
2. Technical Specifications and Plans will govern Supplementary Conditions and General Conditions;
3. Supplementary Conditions shall govern General Conditions;
4. Special Conditions and Prosecution of Work will govern Technical Specifications, Plans, Supplementary Conditions, and Modified General Conditions;
5. The Agreement supersedes all other Contract Documents.

7. 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. 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 TRAFFIC CONTROL AND PRICING. Contractor shall provide all portable message signs required for traffic control.
- E. For the duration of the work on Middle St, the Contractor shall provide a minimum of **two portable message boards** for this project and will be responsible for locating message boards as designated, and for maintenance of the messages throughout construction (Item 619.253).
- F. Two-way traffic shall be maintained during construction on Middle Street.
- G. 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.
- H. 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.

8. COORDINATION WITH OTHERS:

- A. The Contractor shall coordinate with all other utilities, homeowners, businesses 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.

- 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) 427-1552 (Primary contact, DPW Dispatch) Dispatch (City Emergency Services)
(603) 427-1500
Jim Tow (Water and Sewer) (603) 427-1530

- c. City of Portsmouth: Power, Cable, Gas and Phone
 - i. The Contractor shall coordinate and provide temporary utilities (power, phone, internet) to the construction site, as necessary.
 - ii. The Contractor shall coordinate 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 Contractor shall protect all existing gas mains in close proximity to the prosed work.
 - iv. The Contractor's shall 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.
 - v. Service pipes for gas, sewer and water utilities may not be shown on the drawings but are to be expected for each building unit. Where buildings have multiple units, multiple services can be expected. Sewer service locations are unknown. 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.
 - vi. 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

City of Portsmouth DPW
Department

600 Peaverly Hill Road
Portsmouth, NH 03801

Attn: David Desfosses
(603) 766-1411

djdesfosses@cityofportsmouth.com

Water/Sewer Department

City of Portsmouth Water/Sewer

600 Peaverly Hill Road
Portsmouth, NH 03801

Attn: Jim Tow
(603) 427-1530

jvtow@cityofportsmouth.com

Highway

City of Portsmouth DPW
600 Peaverly Hill Road
Portsmouth, NH 03801

Attn: Brian Goetz
(603) 427-1530

bfgoetz@cityofportsmouth.com

Engineer

CMA Engineers, Inc.
35 Bow Street
Portsmouth, NH 03801

Attn: Phil Corbett, P.E.
(603) 431-6196

pcorbett@cmaengineers.com

Electric

Eversource (PSNH)
Nickolai Kosko

(603) 332-42276

Nickolai.kosko@eversource.com

Gas

Unitil

325 West Road
Portsmouth, NH 03801

(603) 294-5157

Telephone

Fairpoint
1575 Greenland Road
Greenland, NH

Attn: Joseph Considine
(603) 427-5525

jconsidine@fairpoint.com

Cable

Comcast
334B Calef Highway
Epping, NH 03042

Attn: Ted Quint
(603) 773-6048

The Contractor's shall investigate the site 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.

- d. The Contractor shall coordinate and sequence daily operations with the City school bus company.
- e. 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.

9. RIGHT-OF-WAY:

- A. As indicated on the drawings, the Work is limited to the City right-of-way and areas of private property where Memorandum of Understanding (MOU's) have been obtained for minimal impact. The Contractor has no rights outside of the City right-of-way 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. The City right-of-way 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 adjacent to the City right-of-way, to minimize disruption and inconvenience to property owners.

10. CONSTRUCTION LAYOUT

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, considering 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.

11. 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.

12. 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 workday. Backfilling or use of steel plates (with prior permission of Owner) of adequate strength to carry traffic shall be used.

13. 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.

14. 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.

15. 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, PROJECT CLEANING.

16. PIPE LOCATIONS

- D. 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.

- E. 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.

17. TEMPORARY WATER

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

The Contractor will be required to submit a plan for temporary water systems to the Engineer for review. Plans for water installations and/or temporary systems are subject to and approval by the City Water Department. Interruptions to homeowners and businesses need to be scheduled one week (5 business days) in advance and be conducted in manners that will not inconvenience or impact property owners. Two (2) business days (48-hours) verbal and written notice shall be given to homeowners and businesses prior to scheduled interruptions in service.

18. RAISING STRUCTURE COVERS AND GRATES

The Contractor shall include one initial structure and casting (sewer, water, drainage, etc.) adjustment to be considered subsidiary to the bid items. The City may request additional adjustment of structures following placement of the pavement binding course. This second adjustment, if requested, will be paid under adjustment bid items included in the bid schedule.

19. 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.

20. 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.

21. 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.

22. 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.

23. ABANDONMENT OF EXISTING PIPE

All pipes to be abandoned (water, sewer, drain, etc.) smaller than 12-inch diameter shall be cut and capped, unless shown otherwise on the Drawings. Existing pipe 12-inches or larger (8-inches and larger for clay/VCP pipes) and structures located outside normal excavation limits, to be abandoned, shall be filled with flowable fill or removed. All pipes and structures within the excavation limits shall be removed and disposed of by the Contractor at his own cost.

24. SALVAGE OF MATERIALS

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.

25. REUSE OF MATERIALS

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.

26. SEWER SERVICE CONNECTIONS:

- A. All sewer service connections shall be identified and located prior to each segment replacement to expedite reconnection. This investigation may require a video locator, dye testing and test pits.
- 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. Flow from the existing sewer services shall be bypass pumped as specified in Section 01535 TEMPORARY BYPASS PUMPING SYSTEM.
- D. 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.

27. SIDEWALKS

The project includes the reconstruction of existing, and construction of new sidewalks. The Contractor shall protect from damages sidewalks designated to remain, to the extent that is possible. Sidewalks damaged because 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 base materials are placed.

28. GRANITE CURBING

Granite curbing over 3.5' long and at least 18" high 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.

29. GEOTECHNICAL INFORMATION (refer to Appendix 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.

30. 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.

31. 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.

32. VIBRATION MONITORING

Vibration Monitoring in addition to the vibration monitoring for ledge removal, will be provided by the Contractor upon request, if deemed necessary to monitor vibration resulting from the Contractor's equipment, ledge removal, 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>.

33. TREE REMOVAL

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.

34. 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. A penalty will be assessed to the Contractor for damage to trees as follows:
 - a. Limbs damaged following trimming: \$100/limb (in addition, limbs will require further trimming by Contractor as directed)
 - b. Tree bark or surface scarring: \$10/sq. in. of impact area (\$100 min. and \$1000 max)
 - c. In addition, the Contractor shall remove trees that are, in the opinion of the Owner, significantly altered or cosmetically impaired to terminally damaged by the Contractor at no cost to the City. The Contractor shall be responsible for the value of the tree as determined by the Engineer.

35. 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).
 - a. That structures are placed no sooner than one (1) week preceding installation.
 - b. Sidewalks and driveways are unimpeded and a minimum of 20 feet of roadway is maintained as a smooth traveling surface for vehicular traffic.
 - c. That the Contractor will relocate structures upon notification by the City, if deemed necessary to maintain public relations and/or public safety.
 - d. The contractor shall not park in individual driveways or parking areas not owed by the City. Any damage to private areas will be paid for entirely by the contractor.

36. ARCHEOLOGICAL SENSITIVITY

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

37. WORK ON PRIVATE PROPERTY & INTERNAL PLUMBING MODIFICATIONS

- A. There are properties where plumbing modifications are required (both interior and exterior) to re-route sewer services from the rear of a structure to new sewer in the street. Any buildings requiring plumbing modifications will be confirmed following additional field evaluations during construction.
- B. The City will obtain homeowner authorization through a Memorandum of understanding (MOU) 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.
- C. Internal plumbing modifications will be required for homes currently connected to cross country sewers to be abandoned and on the section of Union Street where the proposed sewer will be at a higher elevation than the existing sewer main. The Contractor will be responsible for coordinating with a licensed plumber to complete any required internal modifications. Internal plumbing modifications will be deemed necessary to minimize excavations within the yard area, or to prevent unnecessary bends in buried piping.
- D. Work requiring access to buildings will need to be coordinated with the Owner of the property, the Engineer and/or the Portsmouth Sewer Department. Interior 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.

38. 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/shore 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 cleanup 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** (refer to Section 01562): Due to the proximity of homes to the work zone, the Contractor is required to use a **mechanically enclosed street sweeper** on paved surfaces when necessary to control dust. Water and/or Calcium Chloride are required on unpaved surfaces to control dust. The City will enforce a strict dust control policy for this project as described in the above referenced section.

39. MEETINGS (ALSO SEE SECTION 1200)

- A. Public Information Meetings: The Contractor, together with City Officials and the Engineer, shall schedule and attend one public information meeting with residents and business owners prior to the start of construction and at the beginning of construction following any temporary disruptions of the work (i.e., winter shutdown).
- B. Project Meetings: Regularly scheduled meetings will be held with Owner's Representatives, Contractor, sub-contractors and regulatory representatives will be held at a frequency of twice monthly, unless weekly meetings are considered necessary by the Contractor, Owner or Engineer.
- C. Coordination Meetings: 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.

END OF SECTION

A. BIDDING REQUIREMENTS

Advertisement for Bids

Owner Name: City of Portsmouth	Project Number: 4143
Project Address: Union Street Area	Portsmouth NH 03801

Separate sealed BIDS for the construction of: water, sewer, drainage and roadway improvements to Union Street from Austin Street to Middle Street, and Middle Street from Union Street to Miller Avenue, and including add alternatives to the base bid contract to include Cabot Street from Middle Street to Coffins Court, Coffins Court, Union Street from Austin Street to State Street, and Austin Street from Union Street to Cabot Street will be received by **City of Portsmouth Purchasing Department** at City Hall, 1 Junkins Avenue, Portsmouth, NH 03801 until **2:00 p.m.** Local Time on **March 2, 2023**, and then at said office publicly opened and read aloud.

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

There is an intermediate substantial completion of **October 31, 2023**, for a portion of the base bid work. Substantial completion time for the base bid project will be calculated as calendar days (exclusive of winter shut down) as specified in the agreement, from the date specified in the Notice to Proceed. Additional time will be granted in accordance with the Bid Form if any of the Bid Alternatives are selected.

Liquidated damages will be in the amount of \$1,500, for each calendar day of delay from the date established for substantial completion, and \$1,500 for each calendar day of delay from the date established for final completion.

2. Each General Bid shall be accompanied by a Bid Security in the amount of 5% of the Total Bid Price.
3. The successful Bidder must furnish 100% Performance and Payment Bonds and will be required to execute the Contract Agreement within 10 days following notification of the acceptance of their Bid.
4. Any contract or contracts awarded under this Advertisement for Bids are expected to be funded in whole or in part by: **(Select all appropriate.)**
 - A loan from the NH Clean Water State Revolving Fund.
 - A loan from the NH Drinking Water State Revolving Fund.
 - A loan from the NH Drinking Water and Groundwater Trust Fund.
 - A grant from the NH Drinking Water and Groundwater Trust Fund.
 - A State Aid Grant from the NH Department of Environmental Services (SAG).
 - A grant from the American Rescue Plan Act from the NH Department of Environmental Services (ARPA).
 - A loan or grant from USDA Rural Development.
 - A Community Development Block Grant (CDBG) from the NH Community Development Finance Authority.
5. No Bidder may withdraw a Bid within 60 days after the actual date of opening thereof
6. There will be a **mandatory pre-bid meeting on February 16, 2023, at 11:00 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.
7. The Contract Documents may be downloaded from the City's website:
<https://www.cityofportsmouth.com/finance/purchasing-bids-and-proposals>
8. 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 24, 2023. 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).
9. 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 20, 2023.
10. Technical questions regarding the plans and specifications shall be directed to Philip A. Corbett, P.E., CMA Engineers, at (603) 828-9365 or pcorbett@cmaengineers.com. Questions must be received by 1:00 pm on February 20, 2023.

Information for Bidders
All Contracts

Bids will be received by: **City of Portsmouth** herein called the "OWNER" at:

Address: City Hall, 1 Junkins Avenue **Portsmouth** **NH** **03801**

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 **Union Street Area Improvement Project** 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. 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 them from fulfilling any of the conditions of the contract.

Each BID must be accompanied by a BID BOND payable to the OWNER in the amount of five percent (5%) of the total amount of the BID. As soon as the BID prices have been compared, the OWNER will return the BONDS of all except the three lowest responsive 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 PAYMENT BOND and PERFORMANCE 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 their 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 their 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 their BID.

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

MANUFACTURER'S EXPERIENCE

Wherever it may be written that an equipment manufacturer must have a specified period of experience with their 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.

PROJECT SIGN

The Contractor shall construct a sign in accordance with the Standard Detail included in these specifications. The sign shall be erected in a location selected by the Engineer or Owner in coordination with NHDES. The Contractor shall maintain the sign throughout the duration of the contract.

SAFETY AND HEALTH REGULATIONS

This project is subject to all 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.

NONDISCRIMINATION IN EMPLOYMENT

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

STATE INSPECTION

Work performed on this project shall be subject to inspection by representatives of the New Hampshire Department of Environmental Services (NHDES). Such inspection shall in no sense make the State Government a party to this contract, unless said Government is also the Owner, and will in no way interfere with the rights of either party hereunder.

Representatives of NHDES shall be given Right of Access to all portions of the proposed work, including but not limited to actual work site, storage yards, offsite manufacturing and fabricating location and job records.

COPIES OF THE CONTRACT

There shall be at least five (5) executed copies of the Contract to be distributed as follows:

- a) One (1) copy each to the Owner, Engineer and Contractor.
- b) One electronic copy in PDF format to NHDES.
- c) Additional copies as required for other federal or state agencies contributing to or participating in project costs.

NON-RESIDENT CONTRACTORS

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

The successful bidder, if not a resident of New Hampshire, and not a corporation, shall file, at the time of execution of the contract, with the Owner a written appointment of a resident of the state of New Hampshire, having an office or place of business therein, to be their true and lawful attorney upon whom all lawful processes in any actions or proceedings against them may be served; and in such writing, which shall set forth said attorney's place of residence, shall agree that any lawful process against them which is served on said attorney shall be of the same legal force and validity as if served on them and that the authority shall continue in force so long as any liability remains outstanding against them 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. He 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. He shall maintain a permanent place of business.
- C. He shall have adequate personnel and equipment to perform the work expeditiously.
- D. He shall have suitable financial status to meet obligations incidental to the work.
- E. He shall have appropriate technical experience satisfactory to the Engineer and the Division in the class of work involved.
- F. He shall be registered with the Secretary of State to do business in New Hampshire.
- G. He shall have performed to the satisfaction of the Engineer and the Division on previous contracts of a similar nature.
- H. He shall not have failed to complete previous contracts on time, including approved time extensions.

WITHDRAWAL OF BIDS

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

Bid

Proposal of _____ [company](hereinafter called the “BIDDER”, organized and existing under the laws of the State of __ doing business as Corporation, Partnership, Individual to the **City of Portsmouth** (herein after called “OWNER”).

In compliance with your Advertisement for Bids, BIDDER hereby proposes to perform all WORK For the construction of **Union Street Area Improvement Project** 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 their 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 complete the intermediate substantial completion work (separate the sewer and stormwater drainage flows on Union Street) by **October 31, 2023**, and 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:

_____ 250 _____ calendar days to substantial completion (Inclusive of Intermediate Completion)

_____ 290 _____ calendar days to final completion (Inclusive of Intermediate Completion and Substantial 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.

_____ 130 _____ calendar days for final completion (Inclusive of Substantial Completion).

If the project includes the work associated with **Bid Alternate B**, 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:

_____ 75 _____ calendar days for substantial completion.

_____ 80 _____ calendar days for final completion (Inclusive of Substantial Completion).

If the project includes the work associated with **Bid Alternate C**, 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:

_____ 60 _____ calendar days for substantial completion.

_____ 65 _____ calendar days for final completion (Inclusive of Substantial Completion).

If the project includes the work associated with **Bid Alternate D**, 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:

_____ 30 _____ calendar days for substantial completion.

35 calendar days for final completion (Inclusive of Substantial Completion).

Liquidated damages will be in the amount of \$ **1,500** for each calendar day of delay from the date established for substantial completion and **\$1,500** for each calendar day of delay from the date established for final completion, as provided in Section 18 of the General Conditions.

BIDDER acknowledges receipt of the following ADDENDUM:

- 1 _____
- 2 _____
- 3 _____
- 4 _____
- 5 _____

The Bidder shall state below what works of a similar character to that of the proposed contract they have performed and provide such references as will enable the Owner to judge their 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.

Bidder Name:			
Permanent Main Office Address:			
	Street # and name	City/Town	State ZIP
When was it organized?		Where incorporated?	
<input type="checkbox"/> Yes	<input type="checkbox"/> No	Is the bidder registered with the Secretary of State to do business in NH?	
For how many years has your firm engaged in the contracting business under its present name? Please list previous firm names and dates if applicable.			
Years	Previous Name		
Contracts on hand, attach a schedule or list showing gross amount of each contract and the approximate anticipated dates of completion.			
Describe the general character of work performed by your company.			
<input type="checkbox"/> Yes	<input type="checkbox"/> No	Have you ever failed to complete any work awarded you in the scheduled contract time, including approved time extensions? If so where and why?	
<input type="checkbox"/> Yes	<input type="checkbox"/> No	Have you ever defaulted on a contract? If so where and why?	
<input type="checkbox"/> Yes	<input type="checkbox"/> No	Have you ever had liquidated damages assessed on a contract? If so where and why?	
List the more important contracts recently executed by your company:			
Recent Contract Name	Approximate Cost	Month/Year Completed	
List your major equipment available for this contract: (Attach additional sheets as necessary.)			
List your key personnel available for this contract: (Attach additional sheets as necessary.)			
Staff Name	Role (i.e. Project Superintendent, Foreman)		

List any subcontractors whom you would expect to use for the following (unless this work is to be done by your own organization)		
Civil Engineering		
Utility Installation		
Other please describe:		
Please list banks with whom you conduct business.		
<input type="checkbox"/> Yes	<input type="checkbox"/> No	Do you grant the Engineer permission to contact this (these) institutions?
NOTE: Bidders may be required to furnish their latest financial statement as part of the award process.		
Respectfully Submitted:		
Signature: _____		Date: _____
Printed Name: _____		Title: _____
Street # and name		City/Town
		State ZIP
[Signed Name] Being duly sworn, deposes and says that they are [Position Title] of [Organization]		
and all the answers to the foregoing questions and all statement contained therein are true and correct.		
Sworn to before me this _____ day of _____, 20____		
_____, Notary Public		
My Commission Expires _____		
Seal		
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.		

BID SCHEDULE

BIDDER:

PROJECT: Union Street Area Improvement Project
City of Portsmouth, New Hampshire

OWNER: City of Portsmouth, New Hampshire

Unit prices or lump sum:
BIDS shall include sales tax and all other applicable taxes and fees.

PRICES WRITTEN IN WORDS SHALL GOVERN AND UNIT PRICES SHALL GOVERN OVER EXTENDED TOTALS WHEN DISCREPANCIES OCCUR.
ALL prices shall be typewritten or written by hand in black ink.

The BIDDER must submit the following additional documents with the bid.

- a. Bid Bond (or certified check) - (page A 4.1)

The OWNER reserves the right to determine the lowest BID based on any combination of the Base BID and any of the Alternatives.

PART I - BASE BID					
Bid Item No.	Est. Qty.	Units	Bid Item Description and Unit Price in Words	Unit Price in Figures (Dollars and Cents)	Extended Total in Figures (Dollars and Cents)
1.01A	815	LF	Furnish and Install 6" PVC SDR 35 Sewer Service Pipe: _____ Dollars and _____ Cents per Linear Foot		
1.02A	600	LF	Furnish and Install 8" PVC SDR 35 Sewer Pipe: _____ Dollars and _____ Cents per Linear Foot		
1.03	350	LF	Furnish and Install 12" PVC SDR 35 Sewer Pipe: _____ Dollars and _____ Cents per Linear Foot		
1.04A	32.4	VF	Furnish and Install 4' Diameter Sewer Manholes: _____ Dollars and _____ Cents per Vertical Foot		
1.05	25.3	VF	Furnish and Install 5' Diameter Sewer Manholes: _____ Dollars and _____ Cents per Vertical Foot		
1.06	12	EA	Locate Existing Sewer Service By Video Inspection, Transmitter and Locator: _____ Dollars and _____ Cents per Each		
1.07	945	LF	Post Construction Video of Sewers: _____ Dollars and _____ Cents per Linear Foot		
1.08	20,000	ALLOW	Rework Interior Plumbing Allowance: Twenty Thousand Dollars and Zero Cents	\$20,000.00	\$20,000.00
1.09	1	EA	Furnish and Install Grinder Pump Station: _____ Dollars and _____ Cents per Each		
1.1	10	EA*	Furnish and Install Cast Iron Cleanout Covers: _____ Dollars and _____ Cents per Each		
1.11	5	EA	Field Core Foundations (For Relocated Services) Including Pipe Connection System: _____ Dollars and _____ Cents per Each		

A-3.6

<i>Bid Item No.</i>	<i>Est. Qty.</i>	<i>Units</i>	<i>Bid Item Description and Unit Price in Words</i>	<i>Unit Price in Figures (Dollars and Cents)</i>	<i>Extended Total in Figures (Dollars and Cents)</i>
2.01	60	LF	Furnish and Install 6" Cement Lined (CL) Ductile Iron Water Pipe: _____ Dollars and _____ Cents per Linear Foot		
2.02	580	LF	Furnish and Install 8" Cement Lined (CL) Ductile Iron Water Pipe: _____ Dollars and _____ Cents per Linear Foot		
2.03A	15	EA	Furnish and Install 1" Water Service Connection: _____ Dollars and _____ Cents per Each		
2.03B	3	EA	Furnish and Install 2" Copper Water Service Connection: _____ Dollars and _____ Cents per Each		
2.04A	360	LF	Furnish and Install 1" Copper Water Service Pipe: _____ Dollars and _____ Cents per Linear Foot		
2.04B	30	LF	Furnish and Install 2" Copper Water Service Pipe: _____ Dollars and _____ Cents per Linear Foot		
2.06	4	EA	Furnish and Install Water Main Connection: _____ Dollars and _____ Cents per Each		
2.08	4	EA	Furnish and Install 8" Gate Valve Assembly: _____ Dollars and _____ Cents per Each		
2.11A	1	EA	Furnish and Install Fire Hydrant Assembly: _____ Dollars and _____ Cents per Each		
2.11B	1	EA	Furnish and Install Blowoff Hydrant Assembly: _____ Dollars and _____ Cents per Each		
2.12	550	LF	Temporary Potable Water System: _____ Dollars and _____ Cents per Linear Foot		
2.13	18	EA	Temporary Water Service Connections: _____ Dollars and _____ Cents per Each		
3.01	1	LS	Site Work - Includes Site Preparation, Tree Clearing & Grubbing, Landscaping & Hardscape, Cleanup & Restoration, and Turf Establishment (Specification Section 02100): _____ Dollars and _____ Cents per Lump Sum		
3.02	5	EA*	Repair of Unknown Utilities or Mismarked Utilities: _____ Dollars and _____ Cents per Each		
3.03	2,900	SF	Furnish and Install Rigid Insulation: _____ Dollars and _____ Cents per Square Foot		
3.04	1	ALLOW	Contingency: Thirty Thousand Dollars and Zero Cents	\$30,000.00	\$30,000.00
201.9	5	EA	Tree Protection: _____ Dollars and _____ Cents per Each		

A-3.7

<i>Bid Item No.</i>	<i>Est. Qty.</i>	<i>Units</i>	<i>Bid Item Description and Unit Price in Words</i>	<i>Unit Price in Figures (Dollars and Cents)</i>	<i>Extended Total in Figures (Dollars and Cents)</i>
202.31	30	CY	Fill Abandoned Pipe: _____ Dollars and _____ Cents per Cubic Yard		
202.32	30	CY	Fill and Abandon Structure: _____ Dollars and _____ Cents per Cubic Yard		
202.43	100	LF*	Remove and Dispose of Asbestos Cement Pipe (Where Encountered): _____ Dollars and _____ Cents per Linear Foot		
202.5	1	EA	Removal of Drainage or Sewer Structure: _____ Dollars and _____ Cents per Each		
203.1	1,675	CY	Common Excavation (F): _____ Dollars and _____ Cents per Cubic Yard		
203.2	200	CY*	Rock Excavation: _____ Dollars and _____ Cents per Cubic Yard		
203.41	100	CY*	Unsuitable Excavation and Replacement with Screened Gravel: _____ Dollars and _____ Cents per Cubic Yard		
206.19	100	CY*	Common Structure Excavation - Exploratory: _____ Dollars and _____ Cents per Cubic Yard		
206.2	670	CY	Rock Structure Excavation: _____ Dollars and _____ Cents per Cubic Yard		
211.1	1	LS	Vibration Monitoring Analysis: _____ Dollars and _____ Cents per Lump Sum		
211.11	435	HR	Vibration Monitoring Services: _____ Dollars and _____ Cents per Hour		
214	1	U	Fine Grading: _____ Dollars and _____ Cents per Lump Sum		
304.4	1,250	CY	Furnish and Install Crushed Stone (Fine Gradation)(F): _____ Dollars and _____ Cents per Cubic Yard		
304.45	130	CY	Furnish and Install Crushed Stone For Drives: _____ Dollars and _____ Cents per Cubic Yard		
403.11A	290	T	Furnish and Install Hot Bituminous Pavement - Machine Method, Binder: _____ Dollars and _____ Cents per Ton		
403.11B	150	T	Furnish and Install Hot Bituminous Pavement - Machine Method, Wearing: _____ Dollars and _____ Cents per Ton		
403.12	70	T	Furnish and Install Hot Bituminous Pavement - Hand Method: _____ Dollars and _____ Cents per Ton		
403.7	1,875	LF	Temporary Trench Patch: _____ Dollars and _____ Cents per Ton		

<i>Bid Item No.</i>	<i>Est. Qty.</i>	<i>Units</i>	<i>Bid Item Description and Unit Price in Words</i>	<i>Unit Price in Figures (Dollars and Cents)</i>	<i>Extended Total in Figures (Dollars and Cents)</i>
403.8	1,250	LF	Permanent Trench Patch: _____ Dollars and _____ Cents per Ton		
417	220	SY	Cold Planing Bituminous Surfaces: _____ Dollars and _____ Cents per Square Yard		
593.331	100	SY*	Furnish and Install Geotextile Fabric, Where Directed: _____ Dollars and _____ Cents per Square Yard		
603.8126	480	LF	Furnish and Install 6" CPDT Drain Service: _____ Dollars and _____ Cents per Linear Foot		
603.8128	18	LF	Furnish and Install 8" CPDT Drain Service: _____ Dollars and _____ Cents per Linear Foot		
603.82212	140	LF	Furnish and Install 12" HDPE Pipe: _____ Dollars and _____ Cents per Linear Foot		
603.82215	175	LF	Furnish and Install 15" HDPE Pipe: _____ Dollars and _____ Cents per Linear Foot		
603.82218	270	LF	Furnish and Install 18" HDPE Pipe: _____ Dollars and _____ Cents per Linear Foot		
603.82224	65	LF	Furnish and Install 24" HDPE Pipe: _____ Dollars and _____ Cents per Linear Foot		
603.83215	255	LF	Furnish and Install 15" HDPE, Double Wall, Pipe: _____ Dollars and _____ Cents per Linear Foot		
604.12	138.9	VF	Furnish and Install Standard 4' Diameter Catch Basin: _____ Dollars and _____ Cents per Vertical Foot		
604.32	50.7	VF	Furnish and Install 4' Diameter Drain Manhole: _____ Dollars and _____ Cents per Vertical Foot		
604.48	1	EA*	Connect to Existing Structure (Core & Boot): _____ Dollars and _____ Cents per Each		
604.5A	31	EA	Additional Adjustment of Drain and Sewer Structures (To Final Pavement Elevation): _____ Dollars and _____ Cents per Each		
604.5B	4	EA	Additional Adjustment of Gate Valve Boxes and Water Curb Stops (To Final Pavement Elevation): _____ Dollars and _____ Cents per Each		
604.6	2	EA	Furnish and Install Sewer or Drain Frame & Cover: _____ Dollars and _____ Cents per Each		
604.72	1	EA	Furnish and Install Catch Basin Frame & Grate, Type B: _____ Dollars and _____ Cents per Each		
605.524	665	LF	Furnish and Install 24" Perforated CPE Pipe Underdrain: _____ Dollars and _____ Cents per Linear Foot		

<i>Bid Item No.</i>	<i>Est. Qty.</i>	<i>Units</i>	<i>Bid Item Description and Unit Price in Words</i>	<i>Unit Price in Figures (Dollars and Cents)</i>	<i>Extended Total in Figures (Dollars and Cents)</i>
608.34	460	SY	Furnish and Install 4" Concrete Sidewalks (Fiber Reinforced): _____ Dollars and _____ Cents per Square Foot		
608.36	100	SY	Furnish and Install 6" Concrete Sidewalks (Fiber Reinforced with Accessible Ramps and Detectable Warning Plates): _____ Dollars and _____ Cents per Each		
608.5A	380	SY	Furnish and Install Brick Sidewalk: _____ Dollars and _____ Cents per Square Yard		
609.01	740	LF	Furnish and Install Straight Granite Curb: _____ Dollars and _____ Cents per Linear Foot		
609.02	25	LF	Furnish and Install Curved Granite Curb: _____ Dollars and _____ Cents per Linear Foot		
609.5	730	LF	Remove & Reset Granite Curb: _____ Dollars and _____ Cents per Linear Foot		
615.0301	15	SF	Traffic Sign Type C: _____ Dollars and _____ Cents per Each		
615.0601	5	SF	Traffic Sign Type CC: _____ Dollars and _____ Cents per Each		
615.033	2	U	Removing Traffic Sign, Type C: _____ Dollars and _____ Cents per Each		
615.034	3	U	Relocating Traffic Sign, Type C: _____ Dollars and _____ Cents per Each		
615.074	1	EA	Remove and Reset Wayfinding Sign: _____ Dollars and _____ Cents per Each		
618.6	105,000	ALLOW	Uniformed Officer: One Hundred Five Thousand Dollars and Zero Cents	\$105,000.00	\$105,000.00
618.7	2,775	HR	Flaggers: _____ Dollars and _____ Cents per Hour		
619.1	1	U	Maintenance of Traffic: _____ Dollars and _____ Cents per Lump Sum		
619.11	4,700	LB	Calcium Chloride for Dust Control: _____ Dollars and _____ Cents per Pound		
619.253	60	UWK	Furnish and Install Portable Changeable Message Sign (Unit Week): _____ Dollars and _____ Cents per Week		
632.0104	1,350	LF	Furnish and Install Retroreflective Paint Pave. Marking, 4" Line: _____ Dollars and _____ Cents per Linear Foot		
632.3106	190	LF	Furnish and Install Retroreflective Paint Pave. Marking, 6" Line: _____ Dollars and _____ Cents per Linear Foot		

<i>Bid Item No.</i>	<i>Est. Qty.</i>	<i>Units</i>	<i>Bid Item Description and Unit Price in Words</i>	<i>Unit Price in Figures (Dollars and Cents)</i>	<i>Extended Total in Figures (Dollars and Cents)</i>
632.3112	740	LF	Furnish and Install Retroreflective Thermoplas. Pave. Marking 12" Line: _____ Dollars and _____ Cents per Linear Foot		
632.3118	25	LF	Furnish and Install Retroreflective Thermoplas. Pave. Marking, 18" Line: _____ Dollars and _____ Cents per Linear Foot		
632.32	95	SF	Furnish and Install Retroreflective Thermoplas. Pave. Marking, Symbol or Word: _____ Dollars and _____ Cents per Square Foot		
632.911	450	LF	Obliterate Pavement Marking Line, 12" Wide and Under: _____ Dollars and _____ Cents per Linear Foot		
632.92	40	SF	Obliterate Pavement Marking, Symbol or Word: _____ Dollars and _____ Cents per Square Foot		
645	20	EA	Furnish and Install Catch Basin Silt Sack: _____ Dollars and _____ Cents per Each		
645.512	50	LF*	Furnish and Install Compost Sock for Perimeter Berm: _____ Dollars and _____ Cents per Linear Foot		
645.7	1	LS	Stormwater Pollution Prevention Plan (SWPPP): _____ Dollars and _____ Cents per Lump Sum		
645.71	85	HR	SWPPP Inspections: _____ Dollars and _____ Cents per Hour		
692	1	U	Mobilization General (8%): _____ Dollars and _____ Cents per Lump Sum		
699	30,000	ALLOW	Miscellaneous Temporary Erosion and Sediment Control: Thirty Thousand Dollars and Zero Cents	\$30,000.00	\$30,000.00
1010.2	5,500	ALLOW	Asphalt Cement Adjustment: Five Thousand Five Hundred Dollars and Zero Cents	\$5,500.00	\$5,500.00
				Total:	
(*) Denotes indeterminate quantity assumed for comparison of bids					
PROJECT BASE BID PRICE (Items 1.01A-1010.2):					
					dollars
(written)					\$
					(figures)

<i>Bid Item No.</i>	<i>Est. Qty.</i>	<i>Units</i>	<i>Bid Item Description and Unit Price in Words</i>	<i>Unit Price in Figures (Dollars and Cents)</i>	<i>Extended Total in Figures (Dollars and Cents)</i>
PART II - ALTERNATES					
BID ALTERNATE A - Coffins and Cabot					
<i>Bid Item No.</i>	<i>Est. Qty.</i>	<i>Units</i>	<i>Bid Item Description and Unit Price in Words</i>	<i>Unit Price in Figures (Dollars and Cents)</i>	<i>Extended Total in Figures (Dollars and Cents)</i>
1.01A	670	LF	Furnish and Install 6" PVC SDR 35 Sewer Service Pipe: _____ Dollars and _____ Cents per Linear Foot		
1.01B	50	LF	Furnish and Install 6" PVC SDR 35 Sewer Service Pipe Coffins Ct: _____ Dollars and _____ Cents per Linear Foot		
1.02A	350	LF	Furnish and Install 8" PVC SDR 35 Sewer Pipe: _____ Dollars and _____ Cents per Linear Foot		
1.02B	190	LF	Furnish and Install 8" PVC SDR 26 Sewer Pipe Coffins Ct: _____ Dollars and _____ Cents per Linear Foot		
1.04A	15.1	VF	Furnish and Install 4' Diameter Sewer Manholes: _____ Dollars and _____ Cents per Vertical Feet		
1.04B	13.3	VF	Furnish and Install 4' Diameter Sewer Manholes Coffins Ct: _____ Dollars and _____ Cents per Vertical Feet		
1.06	14	EA	Locate Existing Sewer Service By Video Inspection, Transmitter and Locator: _____ Dollars and _____ Cents per Each		
1.07	540	LF	Post Construction Video of Sewers: _____ Dollars and _____ Cents per Linear Foot		
1.08	30,000	ALLOW	Rework Interior Plumbing Allowance: Thirty Thousand Dollars and Zero Cents	\$30,000.00	\$30,000.00
1.1	8	EA*	Furnish and Install Cast Iron Covers for Sewer Service Cleanouts: _____ Dollars and _____ Cents per Each		
1.11	6	EA	Field Core Foundations (For Relocated Services) Including Pipe Connection System: _____ Dollars and _____ Cents per Each		
2.00	220	LF	Furnish and Install 4" Cement Lined (CL) Ductile Iron Water Pipe Coffins Ct: _____ Dollars and _____ Cents per Linear Foot		
2.02	355	LF	Furnish and Install 8" Cement Lined (CL) Ductile Iron Water Pipe: _____ Dollars and _____ Cents per Linear Foot		
2.03A	20	EA	Furnish and Install 1" Copper Water Service Connection: _____ Dollars and _____ Cents per Each		
2.04A	375	LF	Furnish and Install 1" Copper Water Service Pipe: _____ Dollars and _____ Cents per Linear Foot		
2.05	45	LF	Furnish and Install 1" Copper Water Service Pipe Coffins Ct: _____ Dollars and _____ Cents per Linear Foot		

Bid Item No.	Est. Qty.	Units	Bid Item Description and Unit Price in Words	Unit Price in Figures (Dollars and Cents)	Extended Total in Figures (Dollars and Cents)
2.06	1	EA	Furnish and Install Water Main Connection: _____ Dollars and _____ Cents per Each		
2.07	2	EA	Furnish and Install 4" Gate Valve Assembly: _____ Dollars and _____ Cents per Each		
2.08	2	EA	Furnish and Install 8" Gate Valve Assembly: _____ Dollars and _____ Cents per Each		
2.12	640	LF	Temporary Potable Water System: _____ Dollars and _____ Cents per Linear Foot		
2.13	20	EA	Temporary Water Service Connections: _____ Dollars and _____ Cents per Each		
3.01	1	LS	Site Work - Includes Site Preparation, Tree Clearing & Grubbing, Landscaping & Hardscape, Cleanup & Restoration, and Turf Establishment (Specification Section 02100): _____ Dollars and _____ Cents per Lump Sum		
3.02	5	EA*	Repair of Unknown Utilities or Mismarked Utilities: _____ Dollars and _____ Cents per Each		
3.03	3,750	SF	Furnish and Install Rigid Insulation: _____ Dollars and _____ Cents per Square Foot		
3.04	1	ALLOW	Contingency: Ten Thousand Dollars and Zero Cents	\$10,000.00	\$10,000.00
203.1	900	CY	Common Excavation (F): _____ Dollars and _____ Cents per Cubic Yard		
203.2	100	CY*	Rock Excavation: _____ Dollars and _____ Cents per Cubic Yard		
206.19	80	CY*	Common Structure Excavation - Exploratory: _____ Dollars and _____ Cents per Cubic Yard		
206.2	545	CY	Rock Structure Excavation: _____ Dollars and _____ Cents per Cubic Yard		
206.2A	205	CY	Rock Structure Excavation - Coffins Court: _____ Dollars and _____ Cents per Cubic Yard		
211.1	0.5	LS	Vibration Monitoring Analysis: _____ Dollars and _____ Cents per Lump Sum		
211.11	425	HR	Vibration Monitoring Services: _____ Dollars and _____ Cents per Hour		
214	1	U	Fine Grading: _____ Dollars and _____ Cents per Lump Sum		

Bid Item No.	Est. Qty.	Units	Bid Item Description and Unit Price in Words	Unit Price in Figures (Dollars and Cents)	Extended Total in Figures (Dollars and Cents)
304.4	840	CY	Furnish and Install Crushed Stone (Fine Gradation)(F): _____ Dollars and _____ Cents per Cubic Yard		
403.11A	210	T	Furnish and Install Hot Bituminous Pavement - Machine Method, Binder: _____ Dollars and _____ Cents per Ton		
403.11B	95	T	Furnish and Install Hot Bituminous Pavement - Machine Method, Wearing: _____ Dollars and _____ Cents per Ton		
403.12	80	T	Furnish and Install Hot Bituminous Pavement - Hand Method: _____ Dollars and _____ Cents per Ton		
417	-5	SY	Cold Planing Bituminous Surfaces: _____ Dollars and _____ Cents per Square Yard		
593.331	50	SY*	Furnish and Install Geotextile Fabric, Where Directed: _____ Dollars and _____ Cents per Square Yard		
603.8126	235	LF	Furnish and Install 6" CPDT Drain Service: _____ Dollars and _____ Cents per Linear Foot		
603.82212	40	LF	Furnish and Install 12" HDPE Pipe: _____ Dollars and _____ Cents per Linear Foot		
603.82215	125	LF	Furnish and Install 15" HDPE Pipe: _____ Dollars and _____ Cents per Linear Foot		
604.12	15.0	VF	Furnish and Install Standard 4' Diameter Catch Basin: _____ Dollars and _____ Cents per Vertical Feet		
604.242	1.0	EA	Furnish and Install Drop Inlet Type D-B: _____ Dollars and _____ Cents per Vertical Feet		
604.32	13	VF	Furnish and Install 4' Diameter Drain Manhole: _____ Dollars and _____ Cents per Vertical Feet		
604.5A	8	EA	Additional Adjustment of Drain and Sewer Structures (To Final Pavement Elevation): _____ Dollars and _____ Cents per Each		
604.5B	8	EA	Additional Adjustment of Gate Valve Boxes and Water Curb Stops (To Final Pavement Elevation): _____ Dollars and _____ Cents per Each		
604.6	1	EA	Furnish and Install Sewer or Drain Frame & Cover: _____ Dollars and _____ Cents per Each		
608.5A	50	SY	Furnish and Install Brick Sidewalk: _____ Dollars and _____ Cents per Square Yard		
609.01	10	LF	Furnish and Install Straight Granite Curb: _____ Dollars and _____ Cents per Linear Foot		
609.5	50	LF	Remove & Reset Granite Curb: _____ Dollars and _____ Cents per Linear Foot		

<i>Bid Item No.</i>	<i>Est. Qty.</i>	<i>Units</i>	<i>Bid Item Description and Unit Price in Words</i>	<i>Unit Price in Figures (Dollars and Cents)</i>	<i>Extended Total in Figures (Dollars and Cents)</i>
618.6	2,500	ALLOW	Uniformed Officer: <u>Two Thousand Five Hundred Dollars and Zero Cents</u>	\$2,500.00	\$2,500.00
618.7	1,875	HR	Flaggers: _____ Dollars and _____ Cents per Hour		
619.1	1	U	Maintenance of Traffic: _____ Dollars and _____ Cents per Lump Sum		
619.11	2,600	LB	Calcium Chloride for Dust Control: _____ Dollars and _____ Cents per Pound		
632.0104	30	LF	Retroreflective Thermoplas. Pave. Marking 4" Line: _____ Dollars and _____ Cents per Linear Foot		
632.3112	110	LF	Retroreflective Thermoplas. Pave. Marking 12" Line: _____ Dollars and _____ Cents per Linear Foot		
640	7,500	ALLOW	Landscaping Allowance: <u>Seven Thousand Five Hundred Dollars and Zero Cents</u>	\$7,500.00	\$7,500.00
645	2	EA	Furnish and Install Catch Basin Silt Sack: _____ Dollars and _____ Cents per Each		
645.512	300	LF*	Furnish and Install Compost Sock for Perimeter Berm: _____ Dollars and _____ Cents per Linear Foot		
645.71	40	HR	SWPPP Inspections: _____ Dollars and _____ Cents per Hour		
692	1	U	Mobilization General (8%): _____ Dollars and _____ Cents per Lump Sum		
699	15,000	ALLOW	Miscellaneous Temporary Erosion and Sediment Control: <u>Fifteen Thousand Dollars and Zero Cents</u>	\$15,000.00	\$15,000.00
1010.2	4,000	ALLOW	Asphalt Cement Adjustment: <u>Four Thousand Dollars and Zero Cents</u>	\$4,000.00	\$4,000.00
BID ALT A PRICE (Items 1.01A-1010.2):					
					dollars
(written)					\$
					(figures)

<i>Bid Item No.</i>	<i>Est. Qty.</i>	<i>Units</i>	<i>Bid Item Description and Unit Price in Words</i>	<i>Unit Price in Figures (Dollars and Cents)</i>	<i>Extended Total in Figures (Dollars and Cents)</i>
BID ALTERNATE B - Union (Austin to State)					
<i>Bid Item No.</i>	<i>Est. Qty.</i>	<i>Units</i>	<i>Bid Item Description and Unit Price in Words</i>	<i>Unit Price in Figures (Dollars and Cents)</i>	<i>Extended Total in Figures (Dollars and Cents)</i>
1.01A	325	LF	Furnish and Install 6" PVC SDR 35 Sewer Service Pipe: _____ Dollars and _____ Cents per Linear Foot		
1.02A	390	LF	Furnish and Install 8" PVC SDR 35 Sewer Pipe: _____ Dollars and _____ Cents per Linear Foot		
1.04A	24.2	VF	Furnish and Install 4' Diameter Sewer Manholes: _____ Dollars and _____ Cents per Vertical Feet		
1.06	6	EA	Locate Existing Sewer Service By Video Inspection, Transmitter and Locator: _____ Dollars and _____ Cents per Each		
1.07	390	LF	Post Construction Video of Sewers: _____ Dollars and _____ Cents per Linear Foot		
1.1	5	EA*	Furnish and Install Cast Iron Cleanout Covers: _____ Dollars and _____ Cents per Each		
2.01	30	LF	Furnish and Install 6" Cement Lined (CL) Ductile Iron Water Pipe: _____ Dollars and _____ Cents per Linear Foot		
2.02	420	LF	Furnish and Install 8" Cement Lined (CL) Ductile Iron Water Pipe: _____ Dollars and _____ Cents per Linear Foot		
2.03A	14	EA	Furnish and Install 1" Copper Water Service Connection: _____ Dollars and _____ Cents per Linear Foot		
2.04A	370	LF	Furnish and Install 1" Copper Water Service Pipe: _____ Dollars and _____ Cents per Linear Foot		
2.08	4	EA	Furnish and Install 8" Gate Valve Assembly: _____ Dollars and _____ Cents per Each		
2.10	1	EA	Furnish and Install Water Main Connection with 8"x8" Tapping Sleeve: _____ Dollars and _____ Cents per Each		
2.12	400	LF	Temporary Potable Water System: _____ Dollars and _____ Cents per Linear Foot		
2.13	14	EA	Temporary Water Service Connections: _____ Dollars and _____ Cents per Each		
3.01	1	LS	Site Work - Includes Site Preparation, Tree Clearing & Grubbing, Landscaping & Hardscape, Cleanup & Restoration, and Turf Establishment (Specification Section 02100): _____ Dollars and _____ Cents per Lump Sum		
3.02	5	EA*	Repair of Unknown Utilities or Mismarked Utilities: _____ Dollars and _____ Cents per Each		

Bid Item No.	Est. Qty.	Units	Bid Item Description and Unit Price in Words	Unit Price in Figures (Dollars and Cents)	Extended Total in Figures (Dollars and Cents)
3.03	50	SF	Furnish and Install Rigid Insulation: _____ Dollars and _____ Cents per Square Foot		
3.04	1	ALLOW	Contingency: Ten Thousand Dollars and Zero Cents	\$10,000.00	\$10,000.00
201.21	6	EA	Removing Small Trees: _____ Dollars and _____ Cents per Each		
201.9	5	EA	Tree Protection: _____ Dollars and _____ Cents per Each		
203.1	1,000	CY	Common Excavation (F): _____ Dollars and _____ Cents per Cubic Yard		
203.2	125	CY*	Rock Excavation: _____ Dollars and _____ Cents per Cubic Yard		
206.19	60	CY*	Common Structure Excavation - Exploratory: _____ Dollars and _____ Cents per Cubic Yard		
206.2	70	CY	Rock Structure Excavation: _____ Dollars and _____ Cents per Cubic Yard		
211.1	0.25	LS	Vibration Monitoring Analysis: _____ Dollars and _____ Cents per Lump Sum		
211.11	100	HR	Vibration Monitoring Services: _____ Dollars and _____ Cents per Hour		
214	1	U	Fine Grading: _____ Dollars and _____ Cents per Lump Sum		
304.4	830	CY	Furnish and Install Crushed Stone (Fine Gradation)(F): _____ Dollars and _____ Cents per Cubic Yard		
304.45	50	CY	Furnish and Install Crushed Stone For Drives: _____ Dollars and _____ Cents per Cubic Yard		
403.11A	220	T	Furnish and Install Hot Bituminous Pavement - Machine Method, Binder: _____ Dollars and _____ Cents per Ton		
403.11B	85	T	Furnish and Install Hot Bituminous Pavement - Machine Method, Wearing: _____ Dollars and _____ Cents per Ton		
403.12	30	T	Furnish and Install Hot Bituminous Pavement - Hand Method: _____ Dollars and _____ Cents per Ton		
403.8	60	LF	Permanent Trench Patch: _____ Dollars and _____ Cents per Ton		
417	-180	SY	Cold Planing Bituminous Surfaces: _____ Dollars and _____ Cents per Square Yard		

<i>Bid Item No.</i>	<i>Est. Qty.</i>	<i>Units</i>	<i>Bid Item Description and Unit Price in Words</i>	<i>Unit Price in Figures (Dollars and Cents)</i>	<i>Extended Total in Figures (Dollars and Cents)</i>
593.331	50	SY*	Furnish and Install Geotextile Fabric, Where Directed: _____ Dollars and _____ Cents per Square Yard		
603.8126	380	LF	Furnish and Install 6" CPDT Drain Service: _____ Dollars and _____ Cents per Linear Foot		
603.82212	310	LF	Furnish and Install 12" HDPE Pipe: _____ Dollars and _____ Cents per Linear Foot		
604.12	26.5	VF	Furnish and Install Standard 4' Diameter Catch Basin: _____ Dollars and _____ Cents per Vertical Feet		
604.242	1	EA	Furnish and Install Drop Inlet Type D-B: _____ Dollars and _____ Cents per Vertical Feet		
604.32	17.7	VF	Furnish and Install 4' Diameter Drain Manhole: _____ Dollars and _____ Cents per Vertical Feet		
604.5A	9	EA	Additional Adjustment of Drain and Sewer Structures (To Final Pavement Elevation): _____ Dollars and _____ Cents per Each		
604.5B	3	EA	Additional Adjustment of Gate Valve Boxes and Water Curb Stops (To Final Pavement Elevation): _____ Dollars and _____ Cents per Each		
604.6	1	EA	Furnish and Install Sewer or Drain Frame & Cover: _____ Dollars and _____ Cents per Each		
608.34	400	SY	Furnish and Install 4" Concrete Sidewalks (Fiber Reinforced): _____ Dollars and _____ Cents per Square Foot		
608.36	40	SY	Furnish and Install 6" Concrete Sidewalks (Fiber Reinforced with Accessible Ramps and Detectable Warning Plates): _____ Dollars and _____ Cents per Each		
609.01	530	LF	Furnish and Install Straight Granite Curb: _____ Dollars and _____ Cents per Linear Foot		
609.02	75	LF	Furnish and Install Curved Granite Curb: _____ Dollars and _____ Cents per Linear Foot		
615.0301	15	SF	Traffic Sign Type C: _____ Dollars and _____ Cents per Each		
618.6	2,500	ALLOW	Uniformed Officer: Two Thousand Five Hundred Dollars and Zero Cents	\$2,500.00	\$2,500.00
618.7	1,150	HR	Flaggers: _____ Dollars and _____ Cents per Hour		
619.1	1	U	Maintenance of Traffic: _____ Dollars and _____ Cents per Lump Sum		
619.11	3,000	LB	Calcium Chloride for Dust Control: _____ Dollars and _____ Cents per Pound		

<i>Bid Item No.</i>	<i>Est. Qty.</i>	<i>Units</i>	<i>Bid Item Description and Unit Price in Words</i>	<i>Unit Price in Figures (Dollars and Cents)</i>	<i>Extended Total in Figures (Dollars and Cents)</i>
632.3112	15	LF	Furnish and Install Retroreflective Thermoplas. Pave. Marking 12" Line: _____ Dollars and _____ Cents per Linear Foot		
640	15,000	ALLOW	Landscaping Allowance: Fifteen Thousand Dollars and Zero Cents	\$15,000.00	\$15,000.00
645	5	EA	Furnish and Install Catch Basin Silt Sack: _____ Dollars and _____ Cents per Each		
645.71	25	HR	SWPPP Inspections: _____ Dollars and _____ Cents per Hour		
692	1	U	Mobilization General (8%): _____ Dollars and _____ Cents per Lump Sum		
699	12,000	ALLOW	Miscellaneous Temporary Erosion and Sediment Control: Twelve Thousand Dollars and Zero Cents	\$12,000.00	\$12,000.00
1010.2	3,500	ALLOW	Asphalt Cement Adjustment: Three Thousand Five Hundred Dollars and Zero Cents	\$3,500.00	\$3,500.00
BID ALT B PRICE (Items 1.01A-1010.2):					
					dollars
(written)					\$
					(figures)

<i>Bid Item No.</i>	<i>Est. Qty.</i>	<i>Units</i>	<i>Bid Item Description and Unit Price in Words</i>	<i>Unit Price in Figures (Dollars and Cents)</i>	<i>Extended Total in Figures (Dollars and Cents)</i>
BID ALTERNATE C - Austin					
<i>Bid Item No.</i>	<i>Est. Qty.</i>	<i>Units</i>	<i>Bid Item Description and Unit Price in Words</i>	<i>Unit Price in Figures (Dollars and Cents)</i>	<i>Extended Total in Figures (Dollars and Cents)</i>
1.01A	240	LF	Furnish and Install 6" PVC SDR 35 Sewer Service Pipe: _____ Dollars and _____ Cents per Linear Foot		
1.02A	240	LF	Furnish and Install 8" PVC SDR 35 Sewer Pipe: _____ Dollars and _____ Cents per Linear Foot		
1.04A	8.8	VF	Furnish and Install 4' Diameter Sewer Manholes: _____ Dollars and _____ Cents per Vertical Feet		
1.06	1	EA	Locate Existing Sewer Service By Video Inspection, Transmitter and Locator: _____ Dollars and _____ Cents per Each		
1.07	240	LF	Post Construction Video of Sewers: _____ Dollars and _____ Cents per Linear Foot		
1.1	3	EA*	Furnish and Install Cast Iron Cleanout Covers: _____ Dollars and _____ Cents per Each		
2.02	325	LF	Furnish and Install 8" Cement Lined (CL) Ductile Iron Water Pipe: _____ Dollars and _____ Cents per Linear Foot		
2.03A	10	EA	Furnish and Install 1" Copper Water Service Connection: _____ Dollars and _____ Cents per Each		
2.04A	240	LF	Furnish and Install 1" Copper Water Service Pipe: _____ Dollars and _____ Cents per Linear Foot		
2.08	4	EA	Furnish and Install 8" Gate Valve Assembly: _____ Dollars and _____ Cents per Each		
2.09	1	EA	Furnish and Install Water Main Connection with 6"x8" Tapping Sleeve: _____ Dollars and _____ Cents per Each		
2.12	300	LF	Temporary Potable Water System: _____ Dollars and _____ Cents per Linear Foot		
2.13	10	EA	Temporary Water Service Connections: _____ Dollars and _____ Cents per Each		
3.01	1	LS	Site Work - Includes Site Preparation, Tree Clearing & Grubbing, Landscaping & Hardscape, Cleanup & Restoration, and Turf Establishment (Specification Section 02100): _____ Dollars and _____ Cents per Lump Sum		
3.02	5	EA*	Repair of Unknown Utilities or Mismarked Utilities: _____ Dollars and _____ Cents per Each		
3.03	50	SF	Furnish and Install Rigid Insulation: _____ Dollars and _____ Cents per Square Foot		

Bid Item No.	Est. Qty.	Units	Bid Item Description and Unit Price in Words	Unit Price in Figures (Dollars and Cents)	Extended Total in Figures (Dollars and Cents)
3.04	1	ALLOW	Contingency: Ten Thousand Dollars and Zero Cents	\$10,000.00	\$10,000.00
201.4	2	EA	Remove Stumps: _____ Dollars and _____ Cents per Each		
201.9	5	EA	Tree Protection: _____ Dollars and _____ Cents per Each		
203.1	900	CY	Common Excavation (F): _____ Dollars and _____ Cents per Cubic Yard		
203.2	100	CY*	Rock Excavation: _____ Dollars and _____ Cents per Cubic Yard		
206.19	60	CY*	Common Structure Excavation - Exploratory: _____ Dollars and _____ Cents per Cubic Yard		
211.1	0.25	LS	Vibration Monitoring Analysis: _____ Dollars and _____ Cents per Lump Sum		
211.11	50	HR	Vibration Monitoring Services: _____ Dollars and _____ Cents per Hour		
214	1	U	Fine Grading: _____ Dollars and _____ Cents per Lump Sum		
304.4	580	CY	Furnish and Install Crushed Stone (Fine Gradation)(F): _____ Dollars and _____ Cents per Cubic Yard		
304.45	65	CY	Furnish and Install Crushed Stone For Drives: _____ Dollars and _____ Cents per Cubic Yard		
403.11A	160	T	Furnish and Install Hot Bituminous Pavement - Machine Method, Binder: _____ Dollars and _____ Cents per Ton		
403.11B	60	T	Furnish and Install Hot Bituminous Pavement - Machine Method, Wearing: _____ Dollars and _____ Cents per Ton		
403.12	35	T	Furnish and Install Hot Bituminous Pavement - Hand Method: _____ Dollars and _____ Cents per Ton		
417	-180	SY	Cold Planing Bituminous Surfaces: _____ Dollars and _____ Cents per Square Yard		
593.331	50	SY*	Furnish and Install Geotextile Fabric, Where Directed: _____ Dollars and _____ Cents per Square Yard		
603.8126	240	LF	Furnish and Install 6" CPDT Drain Service: _____ Dollars and _____ Cents per Linear Foot		
603.82212	100	LF	Furnish and Install 12" HDPE Pipe: _____ Dollars and _____ Cents per Linear Foot		

<i>Bid Item No.</i>	<i>Est. Qty.</i>	<i>Units</i>	<i>Bid Item Description and Unit Price in Words</i>	<i>Unit Price in Figures (Dollars and Cents)</i>	<i>Extended Total in Figures (Dollars and Cents)</i>
603.82215	125	LF	Furnish and Install 15" HDPE Pipe: _____ Dollars and _____ Cents per Linear Foot		
604.12	18.7	VF	Furnish and Install Standard 4' Diameter Catch Basin: _____ Dollars and _____ Cents per Vertical Feet		
604.32	11	VF	Furnish and Install 4' Diameter Drain Manhole: _____ Dollars and _____ Cents per Vertical Feet		
604.5A	6	EA	Additional Adjustment of Drain and Sewer Structures (To Final Pavement Elevation): _____ Dollars and _____ Cents per Each		
604.5B	3	EA	Additional Adjustment of Gate Valve Boxes and Water Curb Stops (To Final Pavement Elevation): _____ Dollars and _____ Cents per Each		
604.6	1	EA	Furnish and Install Sewer or Drain Frame & Cover: _____ Dollars and _____ Cents per Each		
604.93	1	EA	Furnish and Install Structural BMPs: _____ Dollars and _____ Cents per Each		
608.34	210	SY	Furnish and Install 4" Concrete Sidewalks (Fiber Reinforced): _____ Dollars and _____ Cents per Square Foot		
608.36	25	SY	Furnish and Install 6" Concrete Sidewalks (Fiber Reinforced with Accessible Ramps and Detectable Warning Plates): _____ Dollars and _____ Cents per Each		
609.01	360	LF	Furnish and Install Straight Granite Curb: _____ Dollars and _____ Cents per Linear Foot		
609.02	15	LF	Furnish and Install Curved Granite Curb: _____ Dollars and _____ Cents per Linear Foot		
615.0301	15	SF	Traffic Sign Type C: _____ Dollars and _____ Cents per Each		
618.7	925	HR	Flaggers: _____ Dollars and _____ Cents per Hour		
619.1	1	U	Maintenance of Traffic: _____ Dollars and _____ Cents per Lump Sum		
619.11	2,200	LB	Calcium Chloride for Dust Control: _____ Dollars and _____ Cents per Pound		
632.3112	110	LF	Furnish and Install Retroreflective Thermoplas. Pave. Marking 12" Line: _____ Dollars and _____ Cents per Linear Foot		
645	4	EA	Furnish and Install Catch Basin Silt Sack: _____ Dollars and _____ Cents per Each		
645.71	20	HR	SWPPP Inspections: _____ Dollars and _____ Cents per Hour		

<i>Bid Item No.</i>	<i>Est. Qty.</i>	<i>Units</i>	<i>Bid Item Description and Unit Price in Words</i>	<i>Unit Price in Figures (Dollars and Cents)</i>	<i>Extended Total in Figures (Dollars and Cents)</i>
692	1	LS	Mobilization General (8%): _____ Dollars and _____ Cents per Lump Sum		
699	9,000	ALLOW	Miscellaneous Temporary Erosion and Sediment Control: <u>Nine Thousand Dollars and Zero Cents</u>	\$9,000.00	\$9,000.00
1010.2	3,000	ALLOW	Asphalt Cement Adjustment: <u>Three Thousand Dollars and Zero Cents</u>	\$3,000.00	\$3,000.00
BID ALT C PRICE (Items 1.01A-1010.2):					
					dollars
(written)				\$ _____	(figures)

<i>Bid Item No.</i>	<i>Est. Qty.</i>	<i>Units</i>	<i>Bid Item Description and Unit Price in Words</i>	<i>Unit Price in Figures (Dollars and Cents)</i>	<i>Extended Total in Figures (Dollars and Cents)</i>
BID ALTERNATE D - Overlay of Middle Street					
<i>Bid Item No.</i>	<i>Est. Qty.</i>	<i>Units</i>	<i>Bid Item Description and Unit Price in Words</i>	<i>Unit Price in Figures (Dollars and Cents)</i>	<i>Extended Total in Figures (Dollars and Cents)</i>
403.11B	350	T	Furnish and Install Hot Bituminous Pavement - Machine Method, Wearing: _____ Dollars and _____ Cents per Ton		
417	4,050	SY	Cold Planing Bituminous Surfaces: _____ Dollars and _____ Cents per Square Yard		
604.5A	14	EA	Additional Adjustment of Drain and Sewer Structures (To Final Pavement Elevation): _____ Dollars and _____ Cents per Each		
604.5B	9	EA	Additional Adjustment of Gate Valve Boxes and Water Curb Stops (To Final Pavement Elevation): _____ Dollars and _____ Cents per Each		
618.6	20,000	ALLOW	Uniformed Officer: <u>Twenty Thousand Dollars and Zero Cents</u>	\$20,000.00	\$20,000.00
618.7	80	HR	Flaggers: _____ Dollars and _____ Cents per Hour		
619.1	1	U	Maintenance of Traffic: _____ Dollars and _____ Cents per Lump Sum		
632.0104	950	LF	Furnish and Install Retroreflective Paint Pave. Marking, 4" Line: _____ Dollars and _____ Cents per Linear Foot		
632.32	170	SF	Furnish and Install Retroreflective Thermoplas. Pave. Symbol: _____ Dollars and _____ Square Foot		
645.71	10	HR	SWPPP Inspections: _____ Dollars and _____ Cents per Hour		
692	1	U	Mobilization General (8%): _____ Dollars and _____ Cents per Lump Sum		
699	2,500	ALLOW	Miscellaneous Temporary Erosion and Sediment Control: <u>Two Thousand Five Hundred Dollars and Zero Cents</u>	\$2,500.00	\$2,500.00
1010.2	3,500	ALLOW	Asphalt Cement Adjustment: <u>Three Thousand Five Hundred Dollars and Zero Cents</u>	\$3,500.00	\$3,500.00
BID ALT D PRICE (Items 403.11B-1010.2):					
					dollars
(written)					\$ _____
					(figures)

Bid Bond

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

Signed, this _____ day of _____ in the year ____.

The condition of the above obligation is such that whereas the Principal has submitted to _____ a certain BID, attached hereto and herby made a part hereof to enter into a contract in writing, for the _____

NOW, THEREFORE,

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

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

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

Principal Signature

Witnessed By:

Surety Signature

Witnessed By:

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

B. CONTRACT

NOTICE OF AWARD

Dated _____

TO: _____

ADDRESS: _____

Street Address

City/Town

State

ZIP

Project Number 4143

Owner Contract Number 27-23

Project : Union Street Area Improvement Project

Contract For: Union Street Area Improvement Project

Insert the name of the contract as it appears on the bid documents

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

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

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

__3__ 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 10 days of receiving this Notice of Award.

1. You must deliver to the OWNER all of the fully executed counterparts of the Agreement including all the Contract Documents. This includes the sets of drawings. Each of the Contract Documents must bear your signature on (the cover) (every) page.
2. You must deliver with the executed Agreement the Contract Security (Bonds) as specified in the Information for Bidders and General Conditions.
3. (List all other conditions of precedent.)
Provide insurance certificates with required coverage limits

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 10 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)

(Authorized Signature)

(Title)

ACKNOWLEDGEMENT 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**, hereinafter called "**OWNER**" and _____ doing business as _____ (an individual, 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 **Union Street Area Improvement Project**.
2. The **CONTRACTOR** will furnish all of the material, supplies, tools, equipment, labor and other services necessary for the construction and completion of the **PROJECT** described herein.
3. The **CONTRACTOR** will commence the work required by the **CONTRACT DOCUMENTS** within **10** calendar days after the date of the **NOTICE TO PROCEED** unless the period for completion is extended otherwise by the **CONTRACT DOCUMENTS**. Completion time for the project will be calculated as calendar days from the date specified in the **NOTICE TO PROCEED** as follows:

1. The **CONTRACTOR shall** complete the intermediate substantial completion work
(separate the sewer and stormwater drainage flows on Union Street) by **October 31, 2023**, and 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:

250 calendar days for substantial completion.

290 calendar days for final completion.

1.

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.

130 calendar days for final completion.

If the project includes the work associated with **Bid Alternate B**, 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

75 calendar days for substantial completion.

80 calendar days for final completion.

If the project includes the work associated with **Bid Alternate C**, 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:

60 calendar days for substantial completion.

65 calendar days for final completion.

If the project includes the work associated with **Bid Alternate D**, 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:

30 calendar days for substantial completion.

35 calendar days for final completion.

Liquidated damages will be in the amount of **\$1,500** for each calendar day of delay from the date established for the substantial completion and **\$1,500** for each calendar day of delay from the date established for final completion.

4. The **CONTRACTOR** agrees to perform all of the **WORK** described in the **CONTRACT DOCUMENTS** and comply with the terms therein for the sum of \$_____ or as shown in the **BID** schedule.
5. The term "**CONTRACT DOCUMENTS**" means and includes the following:
 - a. ADVERTISEMENT FOR BIDS
 - b. INFORMATION FOR BIDDERS
 - c. BID
 - d. BID BOND
 - e. NOTICE OF AWARD
 - f. AGREEMENT
 - g. 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. SPECIAL CONDITIONS
 - s. DRAWINGS prepared by: CMA Engineers numbered 1 through **52** and dated January 2023
 - t. SPECIFICATIONS prepared or issued by: **CMA Engineers** and dated January 2023.
 - u. ADDENDA
 - No. _____ dated _____, 20__
 - No. _____ dated _____, 20__
 - No. _____ dated _____, 20__
 - No. _____ dated _____, 20__
6. The **OWNER** will pay to the **CONTRACTOR** in the manner and at such times as set forth in the General Conditions such amounts as required by the **CONTRACT DOCUMENTS**.
7. This agreement shall be binding upon all parties hereto and their respective heirs, executors, administrators, successors and assigns.

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

OWNER: _____

By: _____

NAME: _____

(SEAL)

ATTEST: _____

NAME: _____

TITLE: _____

CONTRACTOR: _____

BY: _____

NAME: _____

ADDRESS: _____

(SEAL)

ATTEST: _____

NAME: _____

TITLE: _____

PAYMENT BOND

KNOW ALL MEN BY THESE PRESENTS: that

_____, (contractor name),
_____, (contractor address), a
_____(corporation partnership, individual), hereinafter called
Principal, and _____, (surety name),
_____, (surety address) herein after called
surety, are held and firmly bound unto _____,
(owner name), _____, (owner address)
hereinafter called OWNER and unto all persons, firms, and corporations who or which may furnish labor, or who furnish
materials to perform as described under the contract and to their successors and assigns, in the total aggregate penal
sum of _____dollars, (\$_____) in lawful money of the United States, for the payment
of which sum well and truly to be made, we bind ourselves, our heirs, executors, administrators, successors, and assigns,
jointly and severally, firmly by these presents.

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

NOW, THEREFORE, if the Principal shall promptly make payment to all persons, firms, and corporations furnishing
materials for or performing labor in the prosecution of the **WORK** provided for in such contract, and any authorized
extension or modification thereof, including all amounts due for materials, lubricants, oil, gasoline, coal and coke,
repairs on machinery, equipment and tools, consumed or used in connection with the construction of such **WORK**, and
for all labor cost incurred in such WORK including that be a subcontractor, and to any mechanic or 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.

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.

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

ATTEST:

BY: _____
(Principal) Secretary

(PRINCIPAL)

BY: _____

(ADDRESS)

BY: _____
Witness as to Principal

(ADDRESS)

(SURETY)

ATTEST:

BY: _____
Witness to 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.

PERFORMANCE BOND

KNOW ALL MEN BY THESE PRESENTS: that

_____, (contractor name),
 _____, (contractor address), a
 _____ (corporation partnership, individual), hereinafter called
 Principal, and _____, (surety name),
 _____, (surety address) herein after called
 surety, are held and firmly bound unto _____, (owner name),
 _____, (owner address) 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.

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

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

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

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

ATTEST:

BY: _____
(Principal) Secretary

BY: _____
Witness as to Principal

(ADDRESS)

ATTEST:
BY: _____
Witness to Surety

(PRINCIPAL)

BY: _____

(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. 4143

PROJECT: Union Street Area Improvement Project

OWNER'S CONTRACT NO. 27-23

CONTRACT FOR: Union Street Area Improvement Project

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

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

Copy to ENGINEER
(Use Certified Mail, return receipt Requested)

OWNER: _____

By: _____
(Authorized Representative)

NAME: _____
(Title)

ACKNOWLEDGEMENT OF NOTICE

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

(Contractor)

This the _____, day of 20__, by _____

Employee Identification Number: _____

CHANGE ORDER

No. _____

PROJECT NAME: _____ DATE OF ISSUANCE: _____

OWNER: _____ OWNER PROJECT NO. _____

OWNER ADDRESS: _____
 Street Name City/Town State ZIP

CONTRACTOR: _____

CONTRACT FOR: _____

ENGINEER: _____ ENG. PROJECT NO. _____

ENGINEER ADDRESS: _____
 Street Name City/Town State ZIP

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 date
Previous Change Orders	Net change from previous Change Orders days date
Contract Price prior to this Change Order	Contract Time prior to this Change Order days date
Net Increase (Decrease) of this Change Order	Net Increase (decrease) this Change Order days date
Contract Price with all approved Change Orders	Contract Time with all Change Orders days date

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

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

RECOMMENDED BY:	APPROVED BY:	APPROVED BY:	APPROVED BY:
_____ Engineer	_____ Owner	_____ Contractor	_____ NHDES
_____ Date	_____ Date	_____ Date	_____ Date

CERTIFICATE OF SUBSTANTIAL COMPLETION

Owner Project No. _____ Engineer Project No. _____
Project: _____
Contractor: _____
Contract For: _____ Contract Date: _____

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

To _____
(Owner)

And to _____
(Contractor)

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

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:

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

Executed by the Engineer on

_____, 20__

(Engineer)

By: _____

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

(Contractor)

By: _____

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

(Owner)

By: _____

NHDES-W-09-015



CERTIFICATE OF FINAL COMPLETION
NHDES CLEAN WATER AND DRINKING WATER
STATE REVOLVING FUND



Owner Project No. _____ Engineer Project No. _____

Project: _____

Owner: _____

Contractor: _____

Engineer: _____

Agreement Date: _____

Notice to Proceed Date: _____

Contractual Substantial Completion
date as modified by change orders: _____

Actual Substantial Completion date _____

Contractual final completion date
as modified by Change Orders _____

The work to which this certificate applies has been inspected by authorized representatives of Owner, Contractor, Engineer and NHDES, the punch list has been completed and the work of the contract is hereby declared to be Finally Complete in accordance with the Contract Documents on _____.
 (Date of Final Completion)

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

Executed by Engineer on _____, 20__

By: _____

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

By: _____

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

By: _____

NHDES Accepts this Certificate of Final Completion on _____, 20__

By: _____

CONTRACTORS AFFIDAVIT

STATE OF: _____

COUNTY OF: _____

Before me the undersigned a _____ (Notary Public, Justice of the Peace, Alderman) in and for said County and State Personally appeared _____ (Individual, partner or duly) who being duly sworn according to law deposes and says that the cost of all the Work, and outstanding claims and indebtedness of whatever nature arising out of the performance of the contract between _____ (Owner) and _____ (Contractor) 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 Name: _____
Project Address: _____
Street Name City/Town State ZIP
Owner Name: _____
Contractor Name: _____
Contractor Address: _____
Street Name City/Town State ZIP

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: _____
Title

BY: _____
Title

C. GENERAL CONDITIONS

NHDES Front End Documents Section C: General Conditions

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General Conditions

Section C: General Conditions

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General Conditions

1. Contract and Contract Documents.

The plans, information for bidders, bids, advertisement for bids, bid payment and performance bonds, agreements, change orders, notice to proceed, specifications and addenda, hereinafter enumerated in the agreement, shall form part of this Contract and the provisions thereof shall be as binding upon the parties hereto as if they were herein fully set forth. The table of contents, titles, headings, running headlines and marginal notes contained herein and in said documents are solely to facilitate reference to various provisions of the Contract Documents and in no way affect, limit or cast light on the interpretation of the provisions to which they refer.

2. Definitions.

- 2.1 "Addenda" means written or graphic instruments issued prior to the execution of the agreement which modify or interpret the Contract Documents, drawings and specifications, by additions, deletions, clarifications or corrections. Such written or graphic instruments will be issued no less than five days before the bid opening.
- 2.2 "Bid" means the offer or proposal of the bidder submitted on the prescribed form setting forth the prices for the work to be performed.
- 2.3 "Bidder" means any person, firm or corporation submitting a bid for the work.
- 2.4 "Bonds" means bid, performance, and payment bonds and other instruments of security, furnished by the Contractor and his surety in accordance with the Contract Documents.
- 2.5 "Change Order" means a written order to the Contractor authorizing an addition, deletion or revision in the work within the general scope of the Contract Documents, or authorizing an adjustment in the Contract Price or Contract Time.
- 2.6 "Contract Documents" means the Contract, including any advertisement for bids, information for bidders, bid, bid bond, agreement, payment bond, performance bond, notice of award, notice to proceed, change orders, drawings, specifications and addenda.
- 2.7 "Contract Price" means the total monies payable to the Contractor under the terms and conditions of the Contract Documents.
- 2.8 "Contract Time" means the number of calendar days stated in the Contract Documents for the completion of the work.
- 2.9 "Contractor" means the person, firm or corporation with whom the owner has executed the agreement.
- 2.10 "Division" means the state of New Hampshire Department of Environmental Services, Water Division.
- 2.11 "Drawings" mean the part of the Contract Documents which show the characteristics and scope of the work to be performed and which have been prepared or approved by the engineer.
- 2.12 "Engineer" means the person, firm or corporation named as such in the Contract Documents.
- 2.13 "Field order" means a written order effecting a change in the work not relating to an adjustment in the Contract price or an extension of the Contract time and issued by the engineer to the Contractor during construction.
- 2.14 "Notice of Award" means the written notice of the acceptance of the bid from the owner to the successful Bidder.

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- 2.15 "Notice to Proceed" means the written communication issued by the owner to the Contractor authorizing him to proceed with the Work and establishing the date of commencement of the work.
- 2.16 "Owner" means a public or quasi-public body or authority, corporation, association, partnership, or individual for whom the work is to be performed.
- 2.17 "Plans" means the Contract drawings or exact reproductions thereof which show the scope, character, dimensions and details of the work and which have been prepared or approved by the engineer.
- 2.18 "Project" means the undertaking to be performed as provided in the Contract Documents.
- 2.19 "Resident Project Representative" means the authorized representative of the owner who is assigned to the project site or any part thereof.
- 2.20 "Shop Drawings" means all drawings, diagrams, illustrations, brochures, schedules and other data which are prepared by the Contractor, a subcontractor, manufacturer, supplier or distributor, which illustrates how specific portions of the work shall be fabricated or installed.
- 2.21 "Special conditions" means revisions or additions to these general conditions, supplemental general conditions or specifications applicable to an individual project.
- 2.22 "Specifications" means a part of the Contract Documents consisting of written descriptions of a technical nature of materials, equipment, construction systems, standards and workmanship.
- 2.23 "Subcontractor" means an individual, firm or corporation having a direct Contract with the Contractor or with any other Subcontractor for the performance of a part of the work at the site.
- 2.24 "Substantial Completion" means that date as certified by the engineer when the construction of the Project or a specified part thereof is sufficiently completed, in accordance with the Contract Documents, so that the project or specified part can be utilized for the purposes for which it is intended.
- 2.25 "Supplemental General Conditions" means modifications to these general conditions required by a federal agency for participation in the Project and approved by the agency in writing prior to inclusion in the Contract Documents, or such documents that may be imposed by applicable state laws.
- 2.26 "Supplier" means any person or organization who supplies materials or equipment for the work, including that fabricated to a special design, but who does not perform labor at the site.
- 2.27 "Work" means all labor necessary to produce the construction required by the Contract Documents, and all materials and equipment incorporated or to be incorporated in the project.
- 2.28 "Written Notice" means any notice to any party of the agreement relative to any part of this agreement in writing and considered delivered and the service thereof completed, when posted by certified or registered mail to the said party at his last given address, or delivered in person to said party or his authorized representative on the work.

3. Additional Instructions and Detail Drawings.

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

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- 4. Shop or Setting Drawings.** Shop or setting drawings shall be in accordance with the following:
- 4.1 The Contractor shall furnish 6 copies of the manufacturer's shop drawings, specific design data as required in the detailed specifications, and technical literature covering all equipment and fabricated materials which he proposes to furnish under this Contract in sufficient detail to indicate full compliance with the specifications. Shop drawings shall indicate the method of installing, the exact layout dimensions of the equipment or materials, including the location, size and details of valves, pipe connections, etc.
 - 4.2 No equipment or materials shall be shipped until the manufacturer's shop drawings and specifications or other identifying data, assuring compliance with these specifications, are approved by the engineer.
 - 4.3 The Contractor shall check and verify all field measurements and shall be responsible for the prompt submission of all shop and working drawings so that there shall be no delay in the work.
 - 4.4 Regardless of corrections made in or approval given to such drawings by the engineer, the Contractor will nevertheless be responsible for the accuracy of such drawings and for their conformity to the plans and specifications. The Contractor shall notify the engineer in writing of any deviations at the time he furnishes such drawings. He shall remain responsible for the accuracy of the drawings showing the deviations but not for the acceptance of the deviations from the original design shown in the plans and specification. Approval by the engineer and the owner of any deviation in material, workmanship or equipment proposed subsequent to approval of the shop drawings or design data, shall be requested in writing by the Contractor.
 - 4.5 When submitted for the engineer's review, shop drawings shall bear the Contractor's certification that he has reviewed, checked and approved the shop drawings and that they are in conformance with the requirements of the Contract Documents.
- 5. Materials, Services, Facilities and Workmanship** shall be furnished as follows:
- 5.1 Except as otherwise specifically stated in the Contract Documents, the Contractor shall provide and pay for all materials, labor, tools, equipment, water, light, power, transportation, superintendence, temporary construction of every nature, and all other services and facilities of every nature whatsoever necessary to execute, complete, and deliver the work within the specified time.
 - 5.2 Unless otherwise specifically provided for in the specifications, all workmanship, equipment, materials and articles incorporated in the work shall be new and the best grade of the respective kinds for the purpose.
 - 5.3 The Contractor shall furnish to the engineer for approval the manufacturer's detailed specifications for all machinery, mechanical and other special equipment, which he contemplates installing together with full information as to type, performance characteristics, and all other pertinent information as required.
 - 5.4 Materials which are specified by reference to the number or symbol of a specific standard, such as an ASTM standard, a federal specification or other similar standard, shall comply with requirements in the latest revision thereof and any amendment or supplement thereto in effect on the date of the advertisement for bids, except as limited to type, class or grade, or modified in such reference. The standards referred to shall have full force and effect as though printed therein.
 - 5.5 For equipment or for materials, when requested by the engineer, the Contractor shall submit certificates of compliance from the manufacturer, certifying that the equipment or the materials comply with the requirements of the specifications or the standards.

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- 5.6 Manufactured articles, materials, and equipment shall be applied, installed, connected, erected, used, cleaned and conditioned as directed by the manufacturer.
- 5.7 Materials, supplies, and equipment shall be in accordance with samples submitted by the Contractor and approved by the engineer.

6. Contractor's Title To Materials.

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

7. Inspection and Testing of Materials shall be as follows:

- 7.1 All materials and equipment used in the construction of the project shall be subject to inspection and testing by the engineer in accordance with accepted standards at any and all times during manufacture or during the project construction and at any or all places where such manufacture is carried on.
- 7.2 The Contractor shall furnish promptly upon request by the engineer, all materials required to be tested. All tests made by the engineer shall be performed in such manner and ahead of scheduled installation, as not to delay the work of the Contractor. When required, testing of concrete, masonry, soils, pipe and pipe materials will be made in accordance with provisions in the specifications.
- 7.3 Material required to be tested which is delivered to the job site shall not be incorporated into the work until the tests have been completed and approval or acceptance given in writing by the engineer.
- 7.4 Each sample submitted by the Contractor for testing shall carry an identification label containing such information as is requested by the engineer. It shall also include a statement that the samples are representative of the remaining materials to be used on the project.
- 7.5 Approval of any materials shall be general only and shall not constitute a waiver of the owner's right to demand full compliance with the Contract requirements.
- 7.6 The engineer may, at his own discretion, undertake the inspection of materials at the source. In the event plant inspection is undertaken, the following conditions shall be met:
 - a. The engineer shall have the cooperation and assistance of the Contractor and the producer with whom he has Contracted for materials.
 - b. The engineer shall have full entry at all reasonable times to such areas as may concern the manufacture or production of the materials being furnished.

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- c. If required, the Contractor shall arrange for a building for the use of the inspector; such building to be located near the plant, independent of any building used by the material producer, in which to house and use the equipment necessary to carry on the required tests. Cost for such arrangement shall be paid by the owner as a stated allowance in the bid.
 - d. Adequate safety measures shall be provided and maintained at all times.
- 7.7 Except as otherwise specifically stated in the Contract, the costs of sampling and testing will be divided as follows:
- a. The Contractor shall furnish the engineer, without extra cost, all samples required for testing purposes. All sampling and testing including the number and selection of samples shall be determined by the engineer for his own information and use.
 - b. When testing of materials is specified in the appropriate section of the specifications, the cost of the same shall be charged to the owner or Contractor, as detailed in the specifications. However, costs of equipment performance tests shall be borne by the Contractor, as detailed in the appropriate section of the specifications.
 - c. When the Contractor proposes a material, article or component as equal to the ones specified, reasonable tests may, or may not, be required by the engineer. If the engineer requires tests of a proposed equal item, the Contractor will be required to assume all costs of such testing.
 - d. Any material, article or component which fails to pass tests required by the Engineer or by the specifications, will be rejected and shall be removed from the project site. However, if, upon request of the Contractor, retesting or further tests are permitted by the Engineer, the Contractor shall assume all costs related to such retesting or further tests.
 - e. Neither the Owner nor the Engineer will in any way be charged for the manufacturer's costs in supplying certificates of compliance.
- 7.8 If the Contract Documents, laws, ordinances, rules, regulations or orders of any public authority having jurisdiction require any Work to specifically be inspected, tested or approved by someone other than the Contractor, the Contractor will give the Engineer timely notice of readiness. The Contractor will then furnish the Engineer with the required certificates of inspection, testing or approval.
- 7.9 Inspections, tests, or approvals by the engineer or others shall not relieve the Contractor from obligations to perform the Work in accordance with the requirements of the Contract Documents.
- 8. "Or Equal " Clause, Substitutions and Contractor Options.**
- 8.1 Whenever a material, article, or piece of equipment is identified on the plans or in the specifications by reference to manufacturer's or vendor's names, trade names, catalogue numbers, etc., it is intended merely to establish a standard of quality and performance. Any material, article, or equipment of other manufacturers and vendors, which will perform satisfactorily the duties imposed by the general design, shall be considered equally acceptable provided the material, article, or equipment so proposed is, in the opinion of the Engineer, of equal quality and function. The Engineer shall determine equality based on such information, tests, or other supporting data that may be required of the Contractor.
- 8.2 Upon acceptance and approval by the Engineer of an equal product, it shall remain the responsibility of the Contractor to coordinate installation of the item with all other items to be furnished to assure proper fitting together of all items. Similar responsibility applies to items which are left to the Contractor's option. Any

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additional cost of equal items and any additional cost incidental to the coordination and/or fitting together of such items shall be borne by the Contractor at no extra cost to the Owner.

- 8.3 If a specified or equal item is not available to meet the construction schedule, the Contractor may propose a substitute item of less than equal performance and quality. If this substitute is acceptable to the Engineer, any difference in purchase cost or costs incidental to the installation of such item will be negotiated between the parties to the Contract.
- 8.4 Neither equal nor substitute items shall be installed without written approval of the Engineer.
- 8.5 The Contractor shall warrant that if substitutes are approved, no major changes in the function or general design of the Project will result.
- 9. Patents.** Patent information is as follows:
- 9.1 The Contractor shall hold and save the owner and its officers, agents, servants, and employees harmless from liability of any nature or kind, including cost and expenses for, or on account of, any patented or unpatented invention, process, article, or appliance manufactured or used in the performance of the Contract, including its use by the owner, unless otherwise specifically stipulated in the Contract Documents.
- 9.2 License and/or royalty fees for the use of a process used in wastewater plant design which is authorized by the owner for the project, must be reasonable, and paid to the holder of the patent, or his authorized licensee.
- 9.3 If the Contractor uses any design, device or materials in the construction methods for the project covered by patents or copyrights, he shall provide for such use by suitable agreement with the owner of such patented or copyrighted design, device or material. It is mutually agreed and understood, that, without exception, the Contract prices shall include all royalties or costs arising from the use of such design, device or materials, in any way involved in the work. The Contractor and/or his sureties shall indemnify and save harmless the owner of the project from any and all claims for infringement by reason of the use of such patented or copyrighted design, device or materials or any trademark or copyright in connection with work agreed to be performed under this Contract, and shall indemnify the Owner for any cost, expense or damage which it may be obliged to pay by reason of such infringement at any time during the construction of the work or after completion of the work.
- 10. Surveys. Surveys of land, property and construction** shall be as follows:
- 10.1 The owner will provide all land surveys and will establish and locate all property lines relating to the project.
- 10.2 For structures, the Engineer will establish and stake out one or more base lines as needed and will establish bench marks in and around the project site for the use of the Contractor and for the Engineer's own reference in checking the work in progress. For structures such as pipelines, the Engineer will establish the location of the pipe, manholes and other appurtenances, and will establish bench marks along the route of the pipeline at intervals for the using of the Contractor and for his own reference in checking the pipe and manhole inverts and other elevations throughout the project. The Contractor shall utilize the lines and bench marks established by the Engineer to set up whatever specific detail controls he may need for establishing location, elevation lines and grades of all structures. All this work is subject to checking, approval, and continuous surveillance by the Engineer to avoid error. The Contractor shall provide the Engineer with a qualified man or men to assist in this checking as needed and on request of the Engineer.
- 10.3 For construction other than pipelines and appurtenances in roadways and cross country, the Contractor shall be responsible for the location and setting lines and grades. The Contractor shall establish the location for pump

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station and wastewater treatment facility structures, associated yard piping including electrical conduits, internal piping and all equipment. Base lines and benchmarks for setting of the lines and grades for the above shall be provided by the Engineer.

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

11. Contractor's Obligations are as follows:

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

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

12. Weather Conditions.

In the event of temporary suspension of work, or during inclement weather, or whenever the Engineer shall direct, the Contractor and his Subcontractors shall protect their work and materials against damage or injury from the weather. If, in the opinion of the Engineer, any work or material shall have been damaged or injured by reason of failure on the part of the Contractor or any of his Subcontractors to so protect his work, such materials shall be removed and replaced at the expense of the Contractor.

13. Protection of Work and Property shall be provided as follows:

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

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

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of any person so designated shall be reported to the Engineer by the Contractor. The person so designated shall be available by phone during nonworking hours.

- 13.3 In case of emergency which threatens loss or injury of property, and/or safety of life, the Contractor is allowed to act, without previous instructions from the Engineer. He shall notify the Engineer immediately thereafter. Any claim for compensation by the Contractor due to such extra work shall be promptly submitted in writing to the Engineer for approval.
- 13.4 When the Contractor has not taken action but has notified the Engineer of an emergency threatening injury to persons or damage to the work or any adjoining property, he shall act as instructed or authorized by the Engineer.
- 13.5 The intention is not to relieve the Contractor from acting, but to provide for consultations between Engineer and Contractor in an emergency which permits time for such consultations.
- 13.6 The amount of reimbursement claimed by the Contractor on account of any emergency action shall be determined in the manner provided in Article 17 (extra work and change orders) of the general conditions.

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

- 14.1 For purposes of inspection and for any other purpose, the Owner, the Engineer, and agents and employees of the Division or of any funding agency may enter upon the work and the premises used by the Contractor, and the Contractor shall provide safe and proper facilities therefore. The Engineer shall be furnished with every facility for ascertaining that the work is in accordance with the requirements and intention of this Contract, even to the extent of uncovering or taking down portions of finished work.
- 14.2 During construction and on its completion, all work shall conform to the location, lines, levels and grades indicated on the drawings or established on the site by the Engineer and shall be built in a workmanlike manner, in accordance with the drawings and specifications and the supplementary directions given from time to time by the Engineer. In no case shall any work which exceeds the requirements of the drawings and specifications be paid for as extra work unless ordered in writing by the Engineer.
- 14.3 Unauthorized work and work not conforming to plans and specifications shall be handled as follows:
 - a. Work considered by the Engineer to be outside of or different from the plans and specifications and done without instruction by the Engineer, or in wrong location, or done without proper lines or levels, may be ordered by the Engineer to be uncovered or dismantled.
 - b. Work done in the absence of the Engineer or his agent may be ordered by the Engineer to be uncovered or dismantled.
 - c. Should the work thus exposed or examined prove satisfactory, the uncovering or dismantling and the replacement of material and rebuilding of the work shall be considered as "Extra Work" to be processed in accordance with article 17.
 - d. Should the work thus exposed or examined prove to be unsatisfactory the uncovering or dismantling and the replacement of material and rebuilding of the work shall be at the expense of the Contractor.

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

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- 16. Superintendence by Contractor** shall be furnished as follows: At the site of the work, the Contractor shall employ a competent construction superintendent or foreman who shall have full authority to act for the Contractor. The superintendent or foreman shall have been designated in writing by the Contractor as the Contractor's representative at the site. It is understood that such representative shall be acceptable to the Engineer and shall be the one who can be continued in that capacity for the particular job involved unless he ceases to be on the Contractor's payroll. Such representative shall be present on the site at all times as required to perform adequate supervision and coordination of the Work.
- 17. Extra Work and Change Orders** shall be processed as follows:
- 17.1 The Engineer may at any time by written order and without notice to the sureties require the performance of such extra work or changes in the work as may be found necessary. The amount of compensation to be paid to the Contractor for any extra work so ordered shall be made in accordance with one or more of the following methods in the order of precedence listed below:
- a. A price based on unit prices previously approved; or
 - b. A lump sum price agreed upon between the parties and stipulated in the order for the extra work;
 - c. A price determined by adding 15 percent to the "reasonable cost" of the extra work performed, such "reasonable cost" to be determined by the Engineer in accordance with the following paragraph.
- 17.2 The Engineer shall include the reasonable cost to the Contractor of all materials used, of all labor, both common and skilled, of foreman, trucks, and the fair-market rental rate for all machinery and equipment for the period employed directly on the work. The reasonable cost for extra work shall include the cost to the Contractor of any additional insurance that may be required covering public liability for injury to persons and property, the cost of workmen's compensation insurance, federal social security, and any other costs based on payrolls, and required by law. The cost of extra work shall not include any cost or rental of small tools, buildings, or any portion of the time of the Contractor, his project supervisor or his superintendent, as assessed upon the amount of extra work, these items being considered covered by the 15 percent added to the reasonable cost. The reasonable cost for extra work shall also include the premium cost, if any, for additional bonds and insurance required because of the changes in the work.
- 17.3 In the case of extra work which is done by Subcontractors under the specific Contract, or otherwise if so approved by the Engineer, the 15 percent added to the reasonable cost of the work will be allowed only to the Subcontractor performing the work. On such work an additional 5 percent for reasonable cost will be paid to the Contractor for their work in directing the operations of the Subcontractor, for administrative supervision, and for any overhead costs. If two or more tiers of Subcontractors are involved in the extra work, a maximum of 27 percent of the cost incurred by the Subcontractor actually performing the work will be allowed to be added to the reasonable cost of the work. The 27 percent maximum represents 15 percent added to the reasonable cost of the work allowed by the Subcontractor performing the work, an additional 5 percent allowed to the next tier higher subcontractor and 5 percent allowed to the Contractor for their work in directing the operations of the Subcontractor, for administrative supervision, and for any overhead costs.
- 17.4 The Engineer may authorize minor changes or alterations in the work not involving extra cost and not inconsistent with the overall intent of the Contract Documents. These shall be accomplished by a written field order. However, if the Contractor believes that any minor change or alteration authorized by the Engineer entitles him to an increase in the Contract price, he may make a claim therefore as provided in article 21.

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- 18. Time For Completion and Liquidated Damages.** The following paragraphs address time for completion and liquidated damages:
- 18.1 It is hereby understood and mutually agreed, by and between the Contractor and the Owner, that the date of beginning and the time for completion as specified in the Contract of the work to be done hereunder are Essential Conditions of this Contract; and it is further mutually understood and agreed that the work embraced in this Contract shall be commenced on a date to be specified in the "Notice to Proceed."
- 18.2 The Contractor agrees that said work shall be pursued regularly, diligently and continuously at such rate of progress as will insure full completion thereof within the time specified. It is expressly understood and agreed, by and between the Contractor and the Owner, that the time for the completion of the work described herein is a reasonable time, taking into consideration the average climatic range and usual industrial conditions prevailing in this locality.
- 18.3 If the Contractor shall neglect, fail or refuse to complete the work within the time herein specified, or any proper extension thereof granted by the Owner, then the Contractor does hereby agree, as a part consideration for the awarding of this Contract, to pay to the Owner the amount specified in the Contract, not as a penalty but as liquidated damages for such breach of Contract as hereinafter set forth, for each and every calendar day that the Contractor shall be in default after the time stipulated in the Contract for completing the work.
- 18.4 The liquidated damages amount is fixed and agreed upon by and between the Contractor and the Owner because of the impracticability and extreme difficulty of fixing and ascertaining the actual damages the Owner would in such event sustain. Said amount is agreed to be the amount of damages which the Owner would sustain and said amount shall be deducted from time to time by the owner from current periodical payments.
- 18.5 It is further agreed that "time is of the essence" of each and every portion of this Contract and of the specifications wherein a definite and certain length of time is fixed for the performance of any act whatsoever; and where under the Contract an additional time is allowed for the completion of any work, the new time limit fixed by such extension shall "be of the essence." Provided, that the Contractor shall not be charged with liquidated damages or any excess cost when the Owner determines that the Contractor is without fault and the Contractor's reasons for the time extension are acceptable to the Owner; provided, further, that the Contractor shall not be charged with liquidated damages or any excess cost when the delay in the completion of the work is due to:
- a. A preference, priority or allocation order duly issued by the government.
 - b. An unforeseeable cause beyond the control and without the fault or negligence of the Contractor, including, but not restricted to, acts of God, or of the public enemy, acts of the Owner, acts of another Contractor in the performance of a Contract with the Owner, fires, floods, epidemics, quarantine restrictions, strikes, freight embargoes and severe weather.
 - c. Any delays of Subcontractors or suppliers occasioned by any of the causes specified in subsections (a) and (b) of this article.
- 18.6 The Contractor shall promptly notify the Owner in writing of the causes of the delay. The Owner shall ascertain the facts and extent of the delay and notify the Contractor within a reasonable time of his decision in the matter.

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19. Defective Work. Defective work shall be processed as follows:

- 19.1 The Contractor shall promptly remove from the premises all materials and work condemned by the Engineer as failing to meet Contract requirements, whether incorporated in the work or not, and the Contractor shall promptly replace and re-execute his own work in accordance with the Contract and without expense to the Owner and shall bear the expense of making good all work of other Contractors which was destroyed or damaged by such removal or replacement.
- 19.2 All removal and replacement work shall be done at the Contractor's expense. If the Contractor does not take action to remove such condemned work and materials within 10 days after receipt of written notice, the Owner may remove them and store the material at the expense of the Contractor. If the Contractor does not pay the expense of such removal and storage within 10 days time thereafter, the Owner may, upon 10 days written notice, sell such materials at auction or at private sale and shall pay to the Contractor any net proceeds thereof, after deducting all the costs and expenses that should have been borne by the Contractor.

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

- 20.1 The Contractor shall promptly and before such conditions are disturbed, notify the Engineer in writing of:
- a. Subsurface or latent physical conditions at the site differing materially from those indicated in this Contract; or,
 - b. Unknown physical conditions at the site, differing materially from those ordinarily encountered and generally recognized as inherent in the type of work provided for in this Contract.
- 20.2 The Engineer shall promptly investigate the conditions. If he finds that conditions differ materially and will cause an increase or decrease in the Contractor's cost or the time required to perform any part of the work under this Contract whether or not changed as a result of such conditions, the Engineer will notify the Owner and recommend an equitable adjustment. Contractor and Owner will enter into negotiations via the Engineer to modify the contract in writing.
- 20.3 No claim of the Contractor under this clause shall be allowed unless the Contractor has given proper notice as required in paragraph 20.1 of this clause.
- 20.4 No claim by the Contractor for an equitable adjustment shall be allowed if asserted after final payment under this Contract.

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

- 21.1 No claim for extra work or cost shall be allowed unless the same was done pursuant to a written order by the Engineer, approved by the Owner and the claim presented for payment with the first estimate after the changed or extra work is done. When work is performed under the terms of article 17, the Contractor shall furnish satisfactory bills, payrolls and vouchers covering all items of cost when requested by the Owner and shall allow the Owner access to accounts relating thereto.
- 21.2 If the Contractor claims that any instructions by drawings or similar documents issued after the date of the Contract involve extra cost under the Contract, he shall give the Engineer written notice after the receipt of such instruction and before proceeding to execute the work, except in an emergency which threatens life or property, then the procedure shall be as provided for under article 17, "Extra Work & Change Orders." No claim shall be valid unless so made.

22. Right of Owner to Terminate Contract.

- 22.1 In the event that any of the provisions of this Contract are violated by the Contractor, or by any of his Subcontractors, the Owner may serve written notice upon the Contractor and the surety of its intention to terminate the Contract, and unless within 10 days after the serving of such notice upon the Contractor, such violation or delay shall cease and satisfactory arrangement for correction be made, the Contract shall, upon the expiration of said 10 days cease and terminate. In the event of any such termination, the Owner shall immediately serve notice thereof upon the surety and the Contractor and the surety shall have the right to take over and perform the Contract; provided, however, that if the surety does not commence performance thereof within 10 days from the date of the mailing to such surety of notice of termination, the Owner may take over the work and prosecute the same to completion by Contract or by force account for the account and at the expense of the Contractor and the Contractor and his surety shall be liable to the Owner for any excess cost occasioned the Owner thereby, and in such event the Owner may take possession of and utilize in completing the work, such materials, appliances, and plant as may be on the site of the work and necessary therefore.
- 22.2 If the Contractor should be adjudged bankrupt, or if he should make a general assignment for the benefit of his creditors, or if a receiver should be appointed on account of his insolvency, or if he should refuse or should fail, except in cases for which extensions of time are provided, to supply enough skilled workmen or materials, or if he should fail to make payments to Subcontractors or for material or labor, so as to affect the progress of the work, or be guilty of a violation of the Contract, then the Owner, upon the written notice of the Engineer that sufficient cause exists to justify such action may, without prejudice to any other right or remedy and after giving the Contractor and his surety 7 days' written notice, terminate the employment of the Contractor and take possession of the premises and of all materials, tools, equipment and other facilities installed on the work and paid for by the Owner, and finish the work by whatever method he may deem expedient. In the case of termination of this Contract before completion from any cause whatever, the Contractor, if notified to do so by the Owner, shall promptly remove any part or all of his equipment and supplies at the expense of the Contractor. If such expense exceeds such unpaid balance, the Contractor shall pay the difference to the Owner. The expense incurred by the Owner as herein provided, and the damage incurred through the Contractor's default, shall be approved by the Engineer.
- 22.3 Where the Contract has been terminated by the Owner, said termination shall not affect or terminate any of the rights of the Owner as against the Contractor or his surety then existing or which may thereafter accrue because of such default. Any retention or payment of monies by the Owner due the Contractor under the terms of the Contract, shall not release the Contractor or his surety from liability for his default.
- 22.4 After ten (10) days from delivery of a Written Notice to the Contractor and the Engineer, the Owner may, without cause and without prejudice to any other remedy, elect to abandon the Project and terminate the Contract. In such case the Contractor shall be paid for all Work executed and any expense sustained plus reasonable profit.
- 22.5 If through no act or fault of the Contractor, the work is suspended for a period of more than ninety (90) days by the Owner or under an order of court or other public authority, or the Engineer fails to act on any request for payment within thirty (30) days after approved by the engineer, or the Owner fails to pay the Contractor substantially the sum approved by the Engineer or awarded by arbitrators within thirty (30) days of its approval and presentation, then the Contractor may, after ten (10) days from delivery of a Written Notice to the Owner and the Engineer terminate the Contract and recover from the Owner payment for all Work executed and all expenses sustained. In addition and in lieu of terminating the Contract, if the Engineer has failed to act on a request for payment or if the Owner has failed to make any payment as aforesaid, the Contractor may upon ten (10) days written notice to the Owner and the Engineer stop the Work until paid all amounts then due, in which event and

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upon resumption of the Work Change Orders shall be issued for adjusting the Contract Price or Extending the Contract Time or both to compensate for the costs and delays attributable to the stoppage of the work.

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

23. Construction Schedule and Periodic Estimates shall provide for the following:

- 23.1 Before starting the work or upon request by the Engineer during its progress, the Contractor shall submit to the Engineer a work plan showing construction methods and the various steps he intends to take in completing the work.
- 23.2 Before the first partial payment is made, the Contractor shall prepare and submit to the Engineer:
- a. A written schedule fixing the dates for submission of drawings; and
 - b. A written schedule fixing the respective dates for the start and completion of segments of the work. Each such schedule shall be subject to review and change during the progress of the work.
 - c. Respective dates for submission of Shop Drawings and for the beginning of manufacture, the testing, and the installation of materials, supplies, and equipment.
 - d. A schedule of payments that the Contractor anticipates will be earned during the course of the Work.

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

- 24.1 Progress payments. The Owner will once each month make a progress payment to the Contractor on the basis of an estimate of the total amount of work done to the time of the estimate and its value as prepared by the Contractor and approved by the Engineer.
- 24.2 Retainage by Owner. The Owner will retain a portion of the progress payment, each month, in accordance with the following procedures:
- a. The Owner will establish an escrow account in the bank of the Owner's choosing. The account will be established such that interest on the principal will be paid to the Contractor. The principal will be the accumulated retainage paid into the account by the Owner. The principal will be held by the bank, available only to the Owner, until termination of the Contract.
 - b. Until the work is 50% complete, as determined by the Engineer, retainage shall be 10% of the monthly payments claimed. The computed amount of retainage will be deposited in the escrow account established above.
 - c. After the work is 50% complete, and provided the Contractor has satisfied the Engineer in quality and timeliness of the work, and provided further that there is no specific cause for withholding additional retainage no further amount will be withheld. The escrow account will remain at the same balance throughout the remainder of the project, unless drawn upon by the Owner in accordance with articles 19, 22, and 56.
 - d. Upon substantial or final completion (as defined in article 25), the amount of retainage will be reduced to 2% of the total Contract Price plus an additional retainage based on the Engineer's estimate of the fair value of

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the punch list items and the cost of completing and/or correcting such items of work, with specified amounts for each incomplete or defective item of work. As these items are completed or corrected, they shall be paid for out of the retainage until the entire project is declared completed (See article 25). The final 2% retainage shall be held during the one-year warranty period and released only after the Owner has accepted the project.

- 24.3 In reviewing monthly estimates for payments of the value of work done, the Engineer may accept in the estimate, prior to subtracting the retainage, the delivered cost of certain equipment and nonperishable material which have been delivered to the site or off-site location and which are properly stored and protected from damage. With the estimate, the Contractor shall submit to the Engineer invoices as evidence that the material has been delivered to the site. Prior to submitting the next monthly estimate, the Contractor shall provide the Engineer with paid invoices or other evidence that the materials have been paid for. If the Contractor fails to submit such evidence, the Engineer may then subtract the value of such materials or equipment for which the Owner has previously paid, from the next monthly estimate. The type of equipment and material eligible for payment prior to being incorporated in the work will be at the Engineer's discretion. Material and equipment made specifically for the subject job will be eligible for payment.
- 24.4 All material and work for which partial payments have been made shall thereupon become the sole property of the Owner. This provision shall not be construed as relieving the Contractor from the sole responsibility for the care and protection of materials and work upon which payments have been made or for the restoration of any damaged work, or as a waiver of the right of the Owner to require compliance with all of the terms of the Contract.
- 24.5 Owner's right to withhold payments and make application. The Contractor agrees that he will indemnify and save the Owner or the Owner's agents harmless from all claims growing out of the lawful demands of Subcontractors, laborers, workmen, mechanics, material men, and furnishers of machinery and parts, equipment, power, tools and all supplies, including commissary, incurred in the furtherance of the performance of this Contract. The Contractor shall, at the Owner's request, furnish satisfactory evidence that all claims of the nature hereinabove designated have been paid, discharged, or waived. If the Contractor fails to do so, then the Owner may, upon written notice to the Contractor either pay unpaid bills of which the Owner has written notice directly, or withhold from the Contractor's unpaid compensation a sum of money to pay any and all such lawful claims until satisfactory evidence is furnished that all liabilities have been fully discharged. Payment to the Contractor shall then be resumed in accordance with the terms of this Contract but in no event shall the above provisions be construed to impose any obligations upon the Owner to either the Contractor or his surety or any third party. In paying any unpaid bills of the Contractor, the Owner shall be deemed the agent of the Contractor, and any payment so made by the Owner shall be considered as payment made under Contract by the Owner to the Contractor and the Owner shall not be liable to the Contractor for any such payments made in good faith.
- 24.6 If the Owner fails to make payment forty-five (45) days after approval by the Engineer, in addition to other remedies available to the Contractor, there shall be added to each such payment interest at an annual rate of 10% commencing on the first day after said payment is due and continuing until the payment is received by the Contractor.
- 25. Acceptance and Final Payment** provisions shall be as follows:
- 25.1 Substantial completion and payment.
- a. Substantial completion shall be that point, as certified by the Engineer, at which the Contract or specified part thereof, has been completed to the extent that the Owner may occupy and/or make use of the work

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performed for the purposes for which it was intended. Upon substantial completion there may be minor items, such as seeding, landscaping, etc., yet to be completed or items of work to be corrected.

- b. Upon receipt of written notice from the Contractor that the work is substantially complete, the Engineer shall promptly make an inspection, and when he finds the work complies with the terms of the Contract and the Contract is substantially completed, he will issue a signed and dated certificate, and a list of all items to be completed or corrected, stating that the work required by this Contract has been substantially completed and is accepted by him.
 - c. Upon substantial completion, the entire balance due and payable to the Contractor less 2 percent of the Contract Price, and less a retention based on the Engineer's estimate of the fair value for the cost of completing or correcting listed items of work with specified amounts for each incomplete or defective item of work shall be made.
 - d. The general guarantee period for the work shall begin on the date certified by the Engineer that the work is substantially completed.
- 25.2 Final completion shall be that point at which all work has been completed and all defective work has been corrected. Unless the Engineer has issued a certificate of substantial completion, the general guarantee period shall begin upon certification by the Engineer of final completion.
- 25.3 At the end of the general guarantee period for the entire Contract which has been certified finally completed or substantially completed, the Owner, through the Engineer, shall make a guarantee inspection of all or portions of the work. When it is found that the work is satisfactory and that no work has become defective under the terms of the Contract, the Owner will accept the entire project and make final payment, including the reimbursement of monies retained pursuant to the guarantee period.
- 25.4 If the guarantee inspection discloses any work as being unsatisfactory, the Engineer will give the Contractor the necessary instructions for correction of such work, and the Contractor shall immediately execute such instructions. Upon correction of the work, another inspection will be made which shall constitute the guarantee inspection, provided the work has been satisfactorily completed.
- 25.5 Before issuance of final payment, the Contractor shall certify in writing to the Engineer that all payrolls, material bills, and other indebtedness connected with the work have been paid or otherwise satisfied; except that in case of disputed indebtedness or liens, if the Contract does not include a payment bond, the Contractor may submit in lieu of certification of payment a surety bond in the amount of the disputed indebtedness or liens, guaranteeing payment of all such disputed amounts, including all related costs and interest in connection with said disputed indebtedness or liens which the Owner may be compelled to pay upon adjudication.
- 25.6 If upon substantial completion, full completion is delayed through no fault of the Contractor, and the Engineer so certifies, the Owner may, upon certificate of the Engineer, and without termination of the Contract, make payment of the balance due for that portion of the work fully completed and accepted. Such payment shall be made under the terms and conditions governing final payment, except that it shall not constitute a waiver of claims.
- 25.7 The acceptance by the Contractor of final payment shall release the Owner from all claims and all liability to the Contractor for all things relating to this work and for every act and neglect of the Owner and others relating to or arising out of this work. No payment, however, final or otherwise, shall operate to release the Contractor or his sureties from any obligations of the performance and payment bond under this Contract.

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26. Payments by Contractor. The Contractor shall pay the costs:

- 26.1 For all transportation and utility services not later than the 20th day of the calendar month following that in which services are rendered;
- 26.2 For all materials, tools, and other expendable equipment to the extent of 90 percent of the cost thereof, not later than the 20th day of the calendar month following that in which such materials, tools and equipment are delivered at the site of the work and the balance of the cost thereof not later than the 30th day following the completion of that part of the work in or on which such materials, tools and equipment are incorporated or used; and
- 26.3 To each of his Subcontractors, not later than the 5th day following each payment to the Contractor, the respective amounts allowed the Contractor on account of the work performed by his Subcontractors to the extent of each Subcontractor's interest therein.

27. Insurance. The Contractor and any Subcontractor shall obtain all the insurance required under this article and such insurance shall be approved by the Owner.

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

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

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

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

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

- 27.3 The Contractor shall procure and shall maintain during the life of this Contract comprehensive automobile liability insurance to include all motor vehicles including owned, hired, borrowed and non-owned vehicles. Limits of liability: \$1,000,000 combined single limit for bodily injury and property damage.

- 27.4 The Contractor shall either:

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

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

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

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- 27.6 The Contractor shall furnish the Owner with certificates showing the type, amount, class of operations covered, effective dates and dates of expiration of policies. Such insurance shall not be canceled or materially altered, except after 10 days written notice has been received by the Owner.
- 27.7 For builder's risk insurance (fire and extended coverage) and until the work is completed and accepted by the Owner, the Contractor is required to maintain builder's risk type insurance on a 100 percent completed value basis on the insurable portion of the work for the benefit of the Owner, the Contractor, and Subcontractors as their interests may appear.
- 27.8 The Contractor shall take out and furnish to the Owner and maintain during the life of this Contract, complete Owner's protective liability insurance.
- Limits of Liability: \$1,000,000 each occurrence;
\$2,000,000 aggregate.
28. **Contract Security.** The Contractor shall within ten (10) days after the receipt of the Notice of Award furnish the Owner with a performance bond and a payment bond in penal sums equal to the amount of the Contract price conditioned upon the performance by the Contractor of all undertakings, covenants, terms, conditions and agreements of the Contract Documents, and upon the prompt payment by the Contractor to all persons supplying labor and materials in the prosecution of the Work provided by the Contract Documents. Such Bonds shall be executed by the Contractor and a corporate bonding company licensed to transact business in the state in which the Work is to be performed and named on the current list of "Surety Companies Acceptable on Federal Bonds" as published in the Treasury Department Circular Number 570. The expense of these Bonds shall be borne by the Contractor.
29. **Additional or Substitute Bond.** If at any time a surety on any such Bond is declared as bankrupt or loses its right to do business in the state in which the Work is to be performed, or is removed from the list of Surety Companies accepted on Federal Bonds, the Contractor shall within ten (10) days after notice from the Owner to do so, substitute an acceptable bond (or bonds) in such form and sum and signed by such other surety or sureties as may be satisfactory to the Owner. The premiums on such bond shall be paid by the Contractor. No further payments shall be deemed due nor shall be made until the new surety or sureties shall have furnished such an acceptable bond to the Owner.
30. **Assignments.** The Contractor shall not assign the whole or any part of this Contract or any monies due or to become due hereunder without written consent of the Owner. In case the Contractor assigns all or any part of any monies due or to become due under this Contract, the instrument of assignment shall contain a clause substantially to the effect that it is agreed that the right of the assignee in and to any monies due or to become due to the Contractor shall be subject to prior claims of all persons, firms and corporations for services rendered or materials supplied for the performance of the work called for in this Contract.
31. **Mutual Responsibility of Contractors.** If, through acts of neglect on the part of the Contractor, any other Contractor or any Subcontractor shall suffer loss or damage on the work site, the Contractor agrees to settle with such other Contractor or Subcontractor by agreement or arbitration if such other Contractor or Subcontractors will so settle. If such other Contractor or Subcontractors shall assert any claim against the Owner on account of any damage alleged to have been sustained, the Owner shall notify the Contractor, who shall indemnify and save harmless the Owner against any such claim.

32. Subcontracting. When subcontracting, the Contractor:

- 32.1 May utilize the services of specialty Subcontractors on those parts of the work which, under usual Contracting practices, are performed by specialty Subcontractors.
- 32.2 Shall be as fully responsible to the Owner for the acts and omissions of his Subcontractors, and of persons either directly or indirectly employed by them, as he is for the acts and omissions of persons directly employed by him.
- 32.3 Shall cause appropriate provisions to be inserted in all subcontracts relative to the work to bind Subcontractors to the Contractor by the terms of the Contract Documents insofar as applicable to the work of Subcontractors and to give the Contractor the same power as regards terminating any subcontract that the Owner may exercise over the Contractor under any provision of the Contract Documents.
- 32.4 Shall not create any Contractual relation between any Subcontractor and the Owner.
- 32.5 Shall not award Work to Subcontractor(s), in excess of fifty percent (50%) of the Contract Price, without prior written approval of the Owner.

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

- 33.1 Have the authority to suspend the work in whole or in part for such periods as he may deem necessary due to the failure of the Contractor to carry out provisions of the Contract or for failure of the Contractor to suspend work in weather conditions considered by the Engineer to be unsuitable for the prosecution of the work. The Engineer shall give all orders and directions under this Contract, relative to the execution of the work. The Engineer shall determine the amount, quality, acceptability, and fitness of the several kinds of work and materials which are to be paid for under this Contract and shall decide all questions which may arise in relation to the work. The Engineer's estimates and decisions shall be final and conclusive, except as otherwise provided. In case any question shall arise between the parties hereto relative to said Contract or specifications, the determination or decision of the Engineer shall be a condition precedent to the right of the Contractor to receive any money or payment for work under this Contract affected to any extent by such question. The Engineer shall decide the meaning and intent of any portion of the specifications and of any plans or drawings where the same may be found unclear. Any differences or conflicts in regard to their work which may arise between the Contractor under this Contract and other Contractors performing work for the Owner shall be adjusted and determined by the Engineer.
 - a. The purpose of the above article is not in any way to relieve the Contractor of his responsibilities for the safety of workmen or general public in the execution of the work. Attention is drawn to Article 13 of these Conditions which refers to the safety obligations of the Contractor.
 - b. The Engineer, acting on behalf of the Owner, has the authority to enforce corrective action for work not in accordance with the specifications.
 - c. In addition, the Engineer, acting on behalf of the Owner, is to ensure that the work is in accordance with the Contract Documents. He is not held responsible, however, for the methods of construction, sequences, schedules and procedures in the execution of the work. The Engineer does have the opportunity under 33.1 to reject the method of construction, work plan schedule, procedures, as he thinks appropriate.
- 33.2 Appoint assistants and representatives as he desires, and they shall be granted full access to the work under the Contract. They have the authority to give directions pertaining to the work, to approve or reject materials, to suspend any work that is being improperly performed, to make measurements of quantities, to keep records of

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costs, and otherwise represent the Engineer in all matters except as provided below. The Contractor may, however, appeal from their decision to the Engineer himself, but any work done pending its resolution is at the Contractor's own risk. Except as permitted and instructed by the Engineer, the assistants and representatives are not authorized to revoke, alter, enlarge, relax, or release any requirements of these specifications, nor to issue instructions contrary to the plans and specifications. They are not authorized to act as superintendents or foremen for the Contractor, or to interfere with the management of the work by the Contractor. Any advice which the assistants or representatives of the Engineer may give the Contractor shall not be construed as binding the Engineer or the Owner in any way, nor as releasing the Contractor from the fulfillment of the terms of the Contract. All transactions between the Contractor and the representatives of the Engineer which are liable to protest or where payments are involved shall be made in writing.

- 34. Stated Allowances.** The Contractor shall include in his proposal for costs of materials not shown in his bid under "cash allowances" or "allowed materials," any cash allowances stated in the supplemental general conditions or other Contract Documents. The Contractor shall purchase the "allowed materials" as directed by the Owner on the basis of the lowest and best bid of at least 3 competitive bids. If the actual price for purchasing the "allowed materials" is more or less than the "cash allowance," the Contract price shall be adjusted accordingly. The adjustment in Contract price shall be made on the basis of the purchase price without additional charges for overhead, profit, insurance or any other incidental expenses. The cost of installation of the "allowed materials" shall be included in the applicable sections of the Contract specifications covering this work.
- 35. Use of Premises, Removal of Debris, Sanitary Conditions.** In the use of premises or removal of debris, the Contractor expressly undertakes at his own expense: to take every precaution against injuries to persons or damage to property; to maintain sanitary conditions; to store his apparatus, materials, supplies and equipment in such orderly fashion at the site of the work as will not interfere with the progress of his work or the work of any other Contractors; to place upon the work or any part thereof only such loads as are consistent with the safety of that portion of the work; to clean up frequently all refuse, rubbish, scrap materials and debris caused by his operations, to the end that at all times the site of the work shall present an orderly and workmanlike appearance; before final payment to remove all surplus material falsework, temporary structures, including foundations thereof, plant of any description and debris of every nature resulting from his operations, and to put the site in an orderly condition; to effect all cutting, fitting or patching of his work required to make the same conform to the plans and specifications and, except with the consent of the Engineer, not to cut or otherwise alter the work of any other Contractor; to provide and maintain in a sanitary condition such toilet accommodations for the use of his employees as may be necessary to comply with the requirements of the state and local boards of health, or of other bodies or authorities having jurisdiction.
- 36. Quantities of Estimate.** Wherever the estimated quantities of work to be done and materials to be furnished under this Contract are shown in any of the documents including the proposal, they are given for use in comparing bids and the right is specifically reserved except as herein otherwise specifically limited, to increase or decrease them as may be deemed reasonably necessary by the Owner to complete the work contemplated by this Contract, and such increase or decrease shall in no way invalidate this Contract, nor shall any such increase or decrease give cause for claims or liability for damages. Such increases or decreases shall not exceed 25 percent of the estimated quantities of work. An increase or decrease in quantities for subsurface materials (e.g. ledge, unsuitable backfill), which overrun or underrun by 25% or more of the bid quantity may be the basis for a Contract price adjustment, at the rate of a negotiated adjusted unit rate. Negotiated unit price rates shall be equitable and shall take into account, but not be limited to the following factors; bid unit rate, distribution of rates and bid balance, and the scope of work as affected by the changed quantities. Claims for extra work resulting from changed quantities shall be processed under article 21.

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- 37. Lands and Rights-of-Way.** Acquisition and usage of lands and rights-of-way shall be as follows:
- 37.1 Prior to issuing the Notice to Proceed, the Owner shall legally obtain all lands and rights-of-way necessary for carrying out and completing the work to be performed under this Contract.
- 37.2 The Contractor shall not (except after written consent from the Owner) enter or occupy with men, tools, materials, or equipment, any land outside the rights-of-way or property of the Owner. A copy of the written consent shall be given to the Engineer.
- 37.3 The Owner shall provide to the Contractor information which delineates and describes the lands owned and the rights-of-way acquired.
- 37.4 The Contractor shall provide at its own expense and without liability to the Owner any additional land and access thereto that the Contractor may desire for temporary construction facilities, or for storage of materials.
- 38. General Guarantee.** With reference to warranties, neither the final certificate of payment nor any provision in the Contract Documents, nor partial or entire occupancy of the premises by the Owner, shall constitute an acceptance of work not done in accordance with the Contract Documents or relieve the Contractor of liability in respect to any express warranties or responsibility for faulty materials or workmanship. The Contractor shall remedy any defects in the work and pay for any damage to other work resulting therefrom, which appear within the warranty period one year or longer if required by the Contract, from the certified date of completion or substantial completion of the work. The Owner will give notice of observed defects within two working days of their discovery.
- 39. Errors and Inconsistencies.** With reference to errors and inconsistency in Contract Documents, any provisions in any of the Contract Documents which may be in conflict with the paragraphs in these general conditions shall be subject to the following order of precedence for interpretation:
- 39.1 Drawings will govern technical specifications.
- 39.2 General conditions will govern drawings and technical specifications.
- 39.3 Supplemental general conditions will govern general conditions, drawings and technical specifications.
- 39.4 Special conditions will govern supplemental general conditions, general conditions, drawings and technical specifications.
- 39.5 The Contractor shall take no advantage of any apparent error or omission in the plans or specifications. In the event the Contractor discovers such an error or omission, he shall notify the Engineer. The Engineer will then make such corrections and interpretations as may be deemed necessary for fulfilling the intent of the plans and specifications.
- 39.6 Figure dimensions on Drawings shall govern over general drawings.
- 40. Notice and Service Thereof.** Any notice to the Contractor from the Owner relative to any part of this Contract will be in writing and will be considered delivered and the service completed, when said notice is mailed, by certified registered mail, to the Contractor at his last given address, or delivered in person to the Contractor or his authorized representative on the work.
- 41. Required Provisions Deemed Inserted.** Each and every provision of law and clause required by law to be inserted in this Contract shall be deemed to be inserted herein and the Contract shall be read and enforced as though it were included herein, and if through mistake or otherwise any such provision is not inserted or is not correctly

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inserted (example; miswording, etc.), then upon the application of either party the Contract shall forthwith be physically amended to make such insertion or correction.

- 42. Protection of Lives and Health.** The work under this Contract is subject to the safety and health regulations (CRF 29, part 1926, and all subsequent amendments) as promulgated by the U.S. Department of Labor on June 24, 1974. Contractors are urged to become familiar with the requirements of these regulations.
- 43. OSHA Construction Safety Program.**
- 43.1 Pursuant to NHRSA 277:5-a, the Contractor shall provide an Occupational Health and Safety Administration (OSHA) 10-hour construction safety program for its on-site employees. All employees are required to complete the program prior to beginning work. The training program shall utilize an OSHA-approved curriculum. Graduates shall receive a card from OSHA certifying the successful completion of the training program.
- 43.2 Any employee required to complete the OSHA 10-hour construction safety program, and who cannot within 15 days provide documentation of completion of such program, shall be subject to removal from the job site.
- 43.3 The following individuals are exempt from the requirements of the 10-hour construction safety program: law enforcement officers involved with traffic control or jobsite security; flagging personnel who have completed the training required by the Department of Transportation; all relevant federal, state and municipal government employees and inspectors; and all individuals who are not considered to be on the site of work under the federal Davis-Bacon Act, including, but not limited to, construction and non-construction delivery personnel and non-trade personnel.
- 44. Equal Employment Opportunity.** Under equal employment opportunity requirements and during the performance of this Contract the Contractor agrees to the following:
- 44.1 The Contractor will not discriminate against any employee or applicant for employment because of race, creed, color, national origin, or sex. The Contractor will take affirmative action to ensure that applicants are employed, and that employees are treated during employment, without regard to their race, creed, color, national origin, or sex. Such action shall include, but not be limited to, the following: employment, upgrading, demotion, or transfer; recruitment or recruitment advertising; layoff or termination; rates of pay or other forms of compensation; and selection for training, including apprenticeship. The Contractor agrees to post in conspicuous places, available to employees and applicants for employment, notices to be provided setting forth the provisions of this nondiscrimination clause.
- 44.2 The Contractor will in all solicitations or advertisements for employees placed by or on behalf of the Contractor, state that all qualified applicants will receive consideration for employment, without regard to race, creed, color, national origin, or sex.
- 44.3 The Contractor will send to each labor union or representative of workers with which he has a collective bargaining agreement or other Contract or understanding, a notice to be provided advising the labor union or worker's representative of the Contractor's commitment under section 202 of executive order no. 11246 of September 24, 1965, and 11375 of October, 13, 1967, and shall post copies of the notice in conspicuous places available to employees and applicants for employment.
- 44.4 The Contractor will comply with all provisions of executive orders no. 11246 and 11375.
- 44.5 The Contractor will furnish all information and reports required by executive orders no. 11246 and 11375.

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- 44.6 In the event of the Contractor's noncompliance with the nondiscrimination clauses of this Contract or with any of such rules, regulations, or orders, this Contract may be canceled, terminated, or suspended in whole or in part by the Owner or the Department of Labor and the Contractor may be declared ineligible for further government Contracts or federally-assisted construction, however, that in the event the Contractor becomes involved in, or is threatened with, litigation with a Subcontractor or vendor as a result of such direction by the Department of Labor, the Contractor may request the United States to enter into such litigation to protect the interests of the United States.
- 44.7 A breach of this article may be grounds for termination of this Contract and for debarment as provided in 29 CFR 5.6.
- 45. Interest of Federal, State or Local Officials.** No federal, state or local official shall be admitted to any share or part of this Contract or to any benefit that may arise therefrom, but this provision shall not be construed to extend to this Contract if made with a corporation for its general benefit.
- 46. Other Prohibited Interests.** No official of the Owner who is authorized in such capacity and on behalf of the Owner to negotiate, make, accept or approve, or to take part in negotiating, making, accepting, or approving any architectural, Engineering, inspection, construction or material supply Contract or any subcontract in connection with the construction of the project, shall become directly or indirectly interested personally in this Contract or in any part hereof. No officer, employee, architect, attorney, Engineer or inspector of or for the Owner who is authorized in such capacity and on behalf of the Owner to exercise any legislative, executive, supervisory or other similar functions in connection with the construction of the project, shall become directly or indirectly interested personally in this Contract or in any part thereof, any material supply Contract, subcontract, insurance Contract, or any other Contract pertaining to the project.
- 47. Use and Occupancy Prior to Acceptance.** Use and occupancy of a portion or unit of the project, upon completion of that portion or unit, and before substantial completion of the project, shall be a condition of this Contract with the following provisions:
- 47.1 The Owner will make his request for use or occupancy to the Contractor in writing.
- 47.2 There must be no significant interference with the Contractor's work or performance of duties under the Contract.
- 47.3 The Engineer, upon request of the Owner and agreement by the Contractor, will make an inspection of the complete part of the work to confirm its status of completion.
- 47.4 Consent of the surety and endorsement of the insurance carrier must be obtained prior to use and/or occupancy by the Owner. Also, prior to occupancy, the Owner will secure the required insurance coverage on the building.
- 47.5 The Owner will have the right to exclude the Contractor from the subject portion of the project after the date of occupancy but will allow the Contractor reasonable access to complete or correct items.
- 47.6 The warranty period shall begin upon substantial completion.
- 48. Suspension of Work.** The Owner may, at any time and without cause, suspend the work or any portion thereof for a period of not more than 90 days by notice in writing to the Contractor and the Engineer. The Owner shall fix the date on which work shall be resumed. The Contractor will be allowed an increase in the Contract price or an extension of the Contract time, or both, directly attributable to any suspension if he makes a claim therefore as provided in articles 17 and 21.

49. [Reserved]

50. [Reserved]

51. [Reserved]

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

53. [Reserved]

54. **Public Convenience and Traffic Control** requirements:

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

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

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

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

56. **Maintenance During Construction.**

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

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

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

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57. Cooperation with Utilities.

- 57.1 The Owner will notify all utility companies, all pipe line owners, or other parties affected, and have all necessary adjustments of the public or private utility fixtures, pipe lines, and other appurtenances within or adjacent to the limits of construction made as soon as practicable.
- 57.2 Water lines, gas lines, wire lines, service connections, water and gas meter boxes, water and gas valve boxes, light standards, cableways, signals, and all other utility appurtenances within the limits of the proposed construction which are to be relocated or adjusted are to be moved by the owners of such utilities at their expense, except as may otherwise be provided for in the special conditions or as noted on the plans.
- 57.3 It is understood and agreed that the Contractor has considered in his bid all of the permanent and temporary utility appurtenances in their present or relocated positions as shown on the plans and as evident on the site, and that no additional compensation will be allowed for any delays, inconvenience, damage sustained by him due to any interference from such utility appurtenances or the operation of moving them.
- 57.4 The Contractor shall cooperate with the Owners of any underground or overhead utility lines in their removal and rearrangement operations in order that these operations may progress in a reasonable manner, that duplication of rearrangements may be reduced to a minimum, and that services rendered by those parties will be minimal.
- 57.5 In the event of interruption to a water or utility service as a result of accidental breakage or as a result of being exposed or unsupported, the Contractor shall promptly notify the proper authority and shall cooperate with said authority in the restoration of services. If water service is interrupted, repair work shall be continuous until the service is restored. No work shall be undertaken around fire hydrants until provisions for continued service have been approved by the local fire authority. If any utility service is interrupted for more than 4 hours, the Contractor shall make provisions for temporary service at his own expense until service is resumed.

58. Work Performed at Night and on Sundays and Holidays shall comply with the following:

- 58.1 No work will be permitted at night or on Sundays or holidays except as approved in writing by the Engineer, and provided such work is not in violation of a local ordinance. When working at night, the Contractor shall provide flood lighting sufficient to insure the same quality of workmanship and the same conditions regarding safety as would be achieved in daylight.
- 58.2 Whenever Memorial Day or Fourth-of-July is observed on a Friday or a Monday and during the weekend of Labor Day, the Contractor may be required to suspend work for the 3 calendar days. Prior to the close of work, the work site shall be placed in a condition acceptable to the Engineer for the comfort and safety of the traveling public. An arrangement shall be made for responsible personnel acceptable to the Engineer to maintain the project in the above conditions.

59. Laws to be Observed. With reference to laws that shall be observed:

- 59.1 The Contractor shall keep fully informed of all federal and state laws, all local laws, ordinances, and regulations, and all orders and decrees of tribunals having any jurisdiction or authority, which in any manner affect those engaged or employed on the work. He shall at all times observe and comply with all such laws, ordinances, regulations, orders, and decrees; and shall protect and indemnify the state and its representatives against any claim or liability arising from or based on the violation of any such law, ordinance, regulation, order, or decree, whether by himself or his employees.

59.2 Indemnification

The Contractor will indemnify and hold harmless the Owner and the Engineer and their agents and employees from and against all claims, damages, losses, and expenses including attorney's fees arising out of or resulting from the performance of the Work, provided that any such claims, damage, loss or expense is attributable to bodily injury, sickness, disease or death, or to injury to or destruction of tangible property including the loss of use resulting therefrom; and is caused in whole or in part by any negligent or willful act or omission of the Contractor, and Subcontractor, anyone directly or indirectly employed by any of them or anyone for whose acts any of them may be liable.

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

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

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

- 60.1 Permits and licenses of a temporary nature necessary for the prosecution of the work shall be obtained and paid for by the Contractor. Permits, licenses and easements for permanent structures or permanent changes in existing facilities will be secured and paid for by the Owner. Permits may include:
- a. New Hampshire Department of Transportation Highway Trench Permits.
 - b. RSA 485-A:17 and 483-A N.H. DES Wetlands Bureau Dredge and Fill Permit.
 - c. RSA 485-A:17 - N.H. DES Site Specific Permit (Water Quality)
 - d. RSA 149-M:10 N.H. DES Solid Waste Management Bureau - disposal of construction debris and/or demolition waste.
 - e. N.H. Department of Environmental Services Air Resources Division (burning permits).
 - f. Other permits, as required by State and Local laws and ordinances.
 - g. Notice of intent for coverage under EPA's General NPDES Permit for construction dewatering activities.

61. Control of Pollution due to construction shall comply with the following:

- 61.1 During construction, the Contractor shall take precautions sufficient to avoid the leaching or runoff of polluting substances such as silt, clay, fuels, oils, bitumens, calcium chloride and any other polluting materials which are unsightly or which may be harmful to humans, fish, or other life, into groundwaters and surface waters of the State.
- 61.2 In waters used for public water supply or used for trout, salmon, or other game or forage fish spawning or nursery, control measures must be adequate to assure that turbidity in the receiving water will be increased not more than 10 standard turbidity units (s.t.u.) in the absence of other more restrictive locally-established limitations, unless otherwise permitted by the Division. In no case shall the classification for the surface water be violated.

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

62. Use of Explosives.

- 62.1 When the use of explosives is necessary for the prosecution of the Work, exercise the utmost care not to endanger life or property. The Contractor shall be responsible for any and all damage resulting from the use of explosives.
- 62.2 Store all explosives in a secure manner, in compliance with all State and local laws and ordinances, and legally mark all such storage places. Storage shall be limited to such quantity as may be needed for the work underway.
- 62.3 Designate as a "Blasting Area" all sites where electric blasting caps are located and where explosive charges are being placed. Mark all blasting areas with signs as required by law. Place signs as required by law from each end of the blasting area and leave in place while the above conditions prevail. Immediately remove signs after blasting operations or the storage of caps is over.
- 62.4 Notify each property Owner and public utility company having structures in proximity to the site of the work sufficiently in advance to enable the companies to take such steps as they may deem necessary to protect their property. Such notice shall not relieve the Contractor of any of his responsibility for damage resulting from his blasting operation. Warn all persons within the danger zone of blasting operations and do not perform blasting work until the area is cleared. Provide sufficient flagmen outside the danger zone to stop all approaching traffic and pedestrians. Provide watchmen during the loading period and until charges have been exploded. Place adequate protective covering over all charges before being exploded.

63. Arbitration by Mutual Agreement.

- 63.1 All claims, disputes, and other matters in question arising out of, or relating to, the Contract Documents or the breach thereof, except for claims which have been waived by making an acceptance of final payment as provided in Section 25, may be decided by arbitration if the parties mutually agree. Any agreement to arbitrate shall be specifically enforceable under the prevailing arbitration law. The award rendered by the arbitrators shall be final, and judgment may be entered upon it in any court having jurisdiction thereof.
- 63.2 Notice of the request for arbitration shall be filed in writing with the other party to the Contract Documents and a copy shall be filed with the Engineer. Request for arbitration shall in no event be made on any claim, dispute, or other matter in question which would be barred by the applicable statute of limitations.
- 63.3 The Contractor will carry on the Work and maintain the progress schedule during any arbitration proceedings, unless otherwise mutually agreed in writing.

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

65 Separate Contracts.

65.1 The Owner reserves the right to let other Contracts in connection with this Project. The Contractor shall afford other Contractors reasonable opportunity for the introduction and storage of their materials and the execution of their Work, and shall properly connect and coordinate the Work with theirs. If the proper execution or results of any part of the Contractor's Work depends upon the Work of any other Contractor, the Contractor shall inspect

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and promptly report to the Engineer any defects in such Work that render it unsuitable for such proper execution and results.

- 65.2 The Owner may perform additional Work related to the Project or the Owner may let other Contracts containing provisions similar to these. The Contractor will afford the other Contractors who are parties to such Contracts (or the Owner, if the Owner is performing the additional Work) reasonable opportunity for the introduction and storage of materials and equipment and the execution of the Work, and shall properly connect and coordinate the Work with theirs.
- 65.3 If the performance of the additional Work by other Contractors or the Owner is not noted in the Contract Documents prior to the execution of the Contract, written notice shall thereof be given to the Contractor prior to starting such additional Work. If the Contractor believes that the performance of such additional Work by the Owner or others involves it in additional expense or entitles it to an extension of the Contract Time, the Contractor may make a claim thereof as provided in Sections 17 and 18.

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EXHIBIT 1

Project Sign Detail

[Insert project sign detail here - Contact NHDES for appropriate detail]

D. GENERAL REQUIREMENTS

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 prices. Work itemized with NHDOT item numbers shall be in accordance with NHDOT Standard Specifications. Additional General Requirements, Supplemental Specifications and Special Provisions for this project are included in Sections D, E & F. All other work not described in Sections D, E & F shall be performed in accordance with the Standard Specifications.

SECTION 00890

PERMITS

1. General Requirements

- A. The Contractor shall obtain and pay for all required permits, as defined under the Permits subsection of Section 6.08 of the General Conditions, and as amended by the Supplementary Conditions.
- B. The Contractor shall prepare a Stormwater Pollution Prevention Plan (SWPPP) 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 01010
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 Special Conditions, 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) Union Street, from Austin to Middle (Base Bid)
- (2) Middle Street, from Union to Miller (Base Bid)
- (3) Cabot Street, from Middle to Coffins (Bid Alternate A)
- (4) Coffins Court (Bid Alternate A)
- (5) Union Street, from Austin to State (Bid Alternate B)
- (6) Austin Street, from Union to Cabot (Bid Alternate C)

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 Water Distribution
 - a. 4" and 8" CLDI 52 water mains
 - b. Replacement of all water service laterals
 - c. Maintenance of water system without interruption of service to users

- d. Temporary Water Systems
- (2) New Storm Sewer Drains
 - a. 12" to 24" pipes, all depths with catch basins, manholes, and a structural BMP
 - b. Modifications to the existing combined sewer system, to separate combined flows
 - c. Maintain drainage until completion of new systems
 - (3) New Sanitary Sewer
 - a. 8" and 12" PVC SDR35 and 8" PVC SDR26 pipes with manholes, all depths
 - b. Replacement to all sanitary sewer service laterals to homes identified
 - c. Maintain sewer until completion of new system
 - d. Sewer main rehabilitation as directed
 - (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. Brick and 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 2023 are 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 in to the temporary system can take place.
- (5) 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.
- (6) Repair trenches each night with either reclaimed based (if construction phasing allows), or crushed gravel. The trench(es) shall be flat and compacted firm each night. Trench(es) shall not be left gravel over the weekend, Contractor shall place temporary pavement prior to each weekend.

- (7) Restore road drainage at night prior to leaving the site.
- (8) Finish grading, loam and seed disturbed areas and back up pavement with gravel immediately following pavement repairs.
- (9) Remove all temporary erosion control devices as soon as vegetation is established and areas are stabilized.
- (10) On Middle Street, roadway areas disturbed during construction must have a temporary pavement patch installed at the end of each work week (every Friday). In the event that the Owner or Engineer does not allow paving (inclement weather, etc.) on the scheduled paving day, the contractor shall schedule paving for the next work day.

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 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 measured 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 01202)

- (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.

D. Special Requirements

- (1) Excavation shall be backfilled at the end of each day and paved with a temporary trench patch on Middle Street at the end of each work week (every Friday), unless approved otherwise.

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, NH 03801

2023 Holidays

HOLIDAY

OBSERVED

New Year's Day	Monday, January 2
Dr. Martin Luther King Jr. Day	Monday, January 16
Presidents' Day	Monday, February 20
Good Friday (Half Day)	Friday, April 7 (Open 9AM-12PM)
Easter Sunday	Sunday, April 16
Memorial Day	Saturday, May 29
Independence Day	Monday, July 5
Labor Day	Saturday, September 4
Columbus/Indigenous Peoples' Day	Monday, October 9
Veterans' Day	Monday, November 10
Thanksgiving Day and DayAfter	Thursday, November 23 Friday, November 24
Christmas Day	Monday, December 25

SECTION 01020

COORDINATION

PART 1 – GENERAL

1.1 DESCRIPTION

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

PART 2 - PRODUCTS

(NOT PART OF THIS SECTION)

PART 3 - EXECUTION

(NOT PART OF THIS SECTION)

END OF SECTION

SECTION 01025

MEASUREMENT AND PAYMENT

PART 1 - GENERAL

1.1 DESCRIPTION

- A. For all items other than those to be paid for by lump sum amounts, after the work is completed and before final payment is made therefore, the Owner's Resident Project Representative (RPR) shall make final measurements to determine the quantities of various items of work accepted as the basis for final settlement. The Contractor, in the case of unit price items, will be paid for the actual amount of work accepted and for the actual amount of materials in place, as shown by the final measurements.
- B. All units of measurement shall be standard United States convention as applied to the specific items of work by tradition and as interpreted by the Engineer.
- C. At the end of each day's work, the Contractor's Superintendent or other authorized representative of the Contractor shall meet with the Owner's RPR and determine and agree upon the quantities of unit price work accomplished and/or completed during the workday.
- D. The RPR will then prepare a "Field Report" which shall be signed by both the RPR and Contractor's Representative indicating complete agreement and approval of the quantities listed.
- E. Once each month the RPR and the Contractor's representative will review a "Monthly Progress Summation" based upon the month's accumulation of "Field Reports." The summation shall be signed by both the RPR and Contractor's Representative indicating complete agreement and approval of quantities listed.
- F. These completed forms will provide the basis of the Contractor's monthly quantity estimate upon which payment will be made. Items not appearing on both the Field Report and Monthly Progress Summation will not be included for payment. Items appearing on forms not properly signed by the Contractor will not be included for payment.
- G. The Contractor shall submit a cost breakdown of all lump sum items for payment purposes. This cost breakdown shall be submitted prior to Contract signing and shall be approved by the Engineer.
- H. Payment Application will only be prepared in a form acceptable to the Owner and approved by the Engineer. The form shall be in a computer spreadsheet format and exportable to MS EXCEL. (Sample Forms attached).
- I. Submit **four (4) signed** copies to the Engineer for approval. **All four (4) copies** shall have an original contractor and notary signatures and notary stamp.

1.2 SCOPE OF PAYMENT

- A. Payments to the Contractor will be made for the actual quantities of Contract items performed and accepted in accordance with the plans and specifications. Upon

completion of the construction, if these actual quantities show either an increase or decrease from the quantities given in the Bid (form), the Contract unit prices will still prevail, except as provided hereinafter.

- B. The Contractor shall accept compensation, as herein provided, in full payment for furnishing all materials, labor, tools, equipment and incidentals necessary to complete the work and for performing all work included in the Contract; for all loss or damage arising from the nature of the work, or from the action of the elements; or from any unforeseen difficulties which may be encountered during the prosecution of the work and until its final acceptance by the Engineer; and for all risks of every description connected with the prosecution of the work, except as provided herein, also for all expenses incurred in consequence of the suspension of the work as herein authorized.
- C. The payment of any partial estimate or of any retained percentage except by and under the approved final invoice, in no way shall affect the obligation of the Contractor to repair or replace any defective parts of the construction or to be responsible for damage due to such defects.

1.3 PAYMENT FOR INCREASED OR DECREASED QUANTITIES

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

1.4 ELIMINATED ITEMS

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

1.5 PARTIAL PAYMENTS

- A. Partial payments shall be made monthly as the work progresses. All partial payments shall be subject to correction in the final quantity invoice and payment.
- B. No monthly payment shall be required to be made when, in the judgment of the Engineer, the work is not proceeding in accordance with the provisions of the Contract, or when, in his judgment, the total value of the work done since the last payment amounts to less than \$10,000.00.
- C. The partial payments will be based upon invoices prepared by the Engineer of the value of the work performed, and materials complete in place in accordance with the Contract. Retainage shall be as specified in Paragraph 24.2 of the General Conditions as modified by the Supplemental General Conditions. The Owner shall pay the Contractor within 45 days of receipt of the Engineer approved invoiced amount.

1.6 PAYMENT FOR MATERIAL DELIVERED ON LUMP-SUM PROJECTS

- A. At the discretion of the Owner, the Engineer may act upon the request of the Contractor, prepare an invoice, accompanied by receipted bills for payment of all or

part of the value of acceptable, nonperishable materials and equipment which are to be incorporated into lump sum type contracts, and which have been delivered to the site of the work or in acceptable storage places, and not used at the time of such invoice. Materials, when so paid for by the Owner, shall become the property of the Owner, and in the event of default on the part of the Contractor, the Owner may use, or cause to be used, these materials in the construction of the work provided for in the Contract. The Contractor shall be responsible for any damage to, or loss of, these materials in accordance with Contract insurance requirements. The amount thus paid by the Owner shall go to reduce estimated amounts due the Contractor as the material is used in the work.

- B. No partial payment shall be made upon fuels, supplies, lumber, false work, or other materials, or on temporary structures of any kind which are not a permanent part of this Contract.

1.7 SUBSTANTIATING DATA

- A. If a question arises as to the reasoning for a particular line item, the Contractor shall provide the necessary backup information to substantiate the item line. The Contractor shall continue to provide data until the justification for the line items quantity and amount is addressed to the satisfaction of the Owner and Engineer.
- B. Attached to the current application for payment, the Contractor shall submit documentation that subcontractors and suppliers that were due money from previous applications have been paid.

1.8 FINAL PAYMENT

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

1.9 INCIDENTAL OR SUBSIDIARY WORK

- A. **Subsidiary or Incidental Work:** These terms are used to indicate work for which no direct payment will be made. Such work is incidental to Contract pay items, and the bid prices submitted by the Contractor shall be sufficient to absorb the cost of all work designated as subsidiary or as subsidiary items.
- B. Any work shown or described on the drawings or in the Contract Documents, for which

no pay item exists, shall be considered subsidiary to the project and will not constitute additional payment.

- C. Incidental work items for which separate payment is not measured includes the following items:
1. Clean Up.
 2. Restoration of property or repairs to any facilities that are impacted from construction performed by the Contractor unless otherwise paid for.
 3. Cooperation with utility companies, Owner's representatives, or other Contractors employed by the Owner.
 4. Utility crossings, unless otherwise paid for.
 5. Utility and structure protection and relocation unless otherwise paid for.
 6. Minor items - Such as replacement/relocation of mailboxes, guard rails, rock walls, etc.
 7. Dewatering, unless otherwise paid for.
 8. Steel and/or wood sheeting utilized by the Contractor including sheeting left in place or removed when directed by the Engineer, as specified in Section 02252 – SUPPORT OF EXCAVATION.
 9. Repair to utilities damaged as a result of Contractor operations
 10. **Temporary water systems exceeding the quantity provided for on the Bid Schedule**, necessary for the Contractor to perform the work without disruption to the existing facilities, will not be measured for payment.
 11. Maintenance of Sanitary/Storm Sewerage flows (by-pass pumping) is subsidiary to sewer construction, unless otherwise included in the bid schedule for payment.
 12. Temporary roadway stabilization materials (crushed gravel or reclaimed asphalt product) unless paid for under separate items.
 13. Prosecution of Work in accordance with project specifications.
 14. Dust control is included in Erosion Control and is required daily.
- D. Refer to Division E NHDOT Technical Specifications, and Amendments for Measurement and Payment of unit items not described in this Section.
- E. Measurement and Payment of unit items that are not included in the NHDOT Standard Specifications or Amended Sections and Special Provisions of Division E are described, as follows:

1.10 FINAL PAY QUANTITY:

- A. 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 for 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.

- B. The estimated quantity for each item of work is 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 which 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 quantity based on computations does not equal the estimated quantity except under the following condition:
 - 1. If either the actual quantity is more than 125 percent or less than 75 percent of the estimated bid quantity for roadway items, or the value of the actual quantity is \$10,000.00 more than or less than the estimated bid quantity value, the actual quantity will be paid.
 - C. Once the Contract has been awarded, the CONTRACTOR may review the computations of final pay quantity items upon request to ENGINEER. The computations requested will be available within five working days after a request.
 - D. In case of discrepancy between the quantity shown in the Bid Schedule for a final pay item and the quantity or summations of quantities for the same item shown on the plans or in the proposal, payment will be based on the quantity shown in the Bid Schedule.
- 1.11 EARTHWORK:
- A. 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.
 - B. 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.
 - C. 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.
- 1.12 WARRANTY INSPECTION:
- A. All warranty inspections and related work shall not be separately measured for payment but shall be considered incidental to the project.

1.13 DESCRIPTION OF PAY ITEMS

- A. The following sections describe the measurement of and payment for the work to be done under the respective items listed in the Bid (form).
- B. Each unit or lump sum price stated in the Bid (form) shall constitute full compensation, as herein specified, for each item of the work completed.

Item Nos. 1.01A & 1.01B – PVC SEWER SERVICE PIPE:

- A. Method of Measurement:
 - 1. The length of pipe for service laterals shall be measured by the linear foot horizontally along the top of the completed pipe over its centerline from the right-of-way to the centerline of the sanitary sewer main, as indicated on the drawings. Vertical cleanout pipe, and fittings will be considered subsidiary to the service lateral items and will not be measured for additional payment
- B. Basis of Payment:
 - 1. Sewer Service Pipe shall be paid for at the Contract price per linear foot.
 - 2. Said unit price shall constitute full compensation for furnishing and installing all labor, equipment and materials associated with installing and testing the sewer pipe in accordance with the Contract Drawings and Specifications, including fittings and adapters, plugs, stubs with cap ends, sewer lateral cleanouts and covers. Said unit price shall include all materials, labor, equipment and tools necessary for hauling, handling, laying, jointing and testing pipe.
 - 3. Said unit price payment will also be considered full compensation for all necessary clearing and grubbing, sawcutting pavement to approved limits, pavement removal, earth excavation (except ledge and rock), providing excavation supports, removal of existing structures, existing (non-asbestos) pipe removal and disposal, crushed stone bedding, backfill, detectable tape, insulation, compaction, cleaning and other incidental items, such as, segregation of suitable backfill materials, disposal of excess fill material, stockpiling of existing roadway base material for reinstallation in utility trench and disturbed road bed prior to paving and furnishing and installing gravel and crushed gravel in accordance with the utility trench details and pay limits shown on the Plans prior to paving.
 - 4. Said unit price shall also be considered full compensation for all construction dewatering work required to pre-drain soils prior to final excavation, and to install the pipe in the dry including furnishing, installing, operating and removing of dewatering systems (if required).
 - 5. Said unit prices for each pipe bid item shall also constitute full compensation for the following:
 - a. Maintenance of existing sewer service through temporary connections or bypass pumping. This item shall also include all work required to plug and/or bypass pump sewer flows while connections to the accepted new sewer line are being made. The Contractor shall keep the existing sewer line in service during construction of other utilities to the fullest extent practical to minimize

- required bypass pumping. Sewer services shall not be interrupted.
- b. Restoration of all property to pre-construction conditions.
 - c. Restoration of curb to pre-construction conditions (unless expressly shown as paid for under a separate bid item).
6. Said unit price shall also include manhole corings, fittings, adapters, and joining not covered under a separate bid item.
 7. Said unit price shall also include any fittings or adapters required to repair existing sewer damaged during construction.
 8. Said unit price shall also include full compensation for holding utility poles and coordination with utility companies for the relocation of utilities, including but not limited to water service pipes (less than 6 inch in diameter), gas, drain, electric and telephone, which interfere with the proposed sewer, unless payment is provided for under another item.
 9. Said unit price shall also constitute full compensation for the removal and replacement of bushes and plantings, sidewalk and curb replacement, unless payment is provided for under another item.

Item Nos. 1.02A, 1.02B & 1.03 – 8” and 12” PVC SANITARY SEWER MAIN & FITTINGS:

- A. Method of Measurement:
 1. The quantity to be measured for payment shall be on a linear foot along the completed sewers, including wyes and tees.
 2. Measurement shall be along the centerline of the pipe from the inside edge of manhole to inside edge of manhole with no deduction for fittings.
- B. Basis of Payment:
 1. Sewer pipe shall be paid for at the Contract linear foot unit price.
 2. Said unit price shall constitute full compensation for the furnishing of all labor, equipment and materials associated with installing and testing the sewer pipe in accordance with the Contract Drawings and Specifications.
 3. Said unit price shall include, but not be limited to; all necessary earth excavation (except ledge and rock); sawcutting pavement to approved limits; removal/relocation of existing structures; removal and proper disposal of existing pipe; plugging the abandoned pipe with grout; temporarily holding utility poles; providing excavation supports; sheeting/bracing; dewatering; furnishing and installing crushed stone bedding material, sand blanket material, select material, insulation, fittings, gaskets, joints, hardware, plugs, caps, thrust blocks; connection to municipal sewer (stub); backfilling; detectable tape; segregation of suitable backfill materials; disposal of excess fill material; compacting all lifts; cleaning; testing; and all other work required for or incidental to the satisfactory completion of this item.
 4. Said unit price shall constitute full compensation for the removal and replacement of curbs, drives (paved and gravel), sidewalks, fences, bushes,

- plantings, and all necessary grading of grassed areas disturbed by the Contractor's operations, not paid for under separate unit items.
5. Said unit price shall constitute full compensation for the connection of existing sewer main into proposed sewer main and structures as indicated on the Contract Drawings.
 6. The Contractor shall keep the existing sewer line in service or shall provide bypass pumping. Bypass pumping and plugging or blockage of sewer flow shall be considered incidental to the work and shall not be measured separately for payment.
 7. Payment for sewer mains shall be broken down in accordance with the following percentages:
 - a. Sewer main line in place and backfilled - 90%
 - b. Sewer main line successfully cleaned and tested - 10%. A sewer main will only be considered tested when pressure, deflection and lamping tests have all been completed and accepted by the City and Engineer.

Item Nos. 1.04A, 1.04B, & 1.05 – 4' AND 5' DIAMETER PRECAST SANITARY SEWER MANHOLES:

A. Method of Measurement:

1. The quantity to be measured for payment shall be on a "per each" basis for furnishing and installing precast concrete sewer manholes, as measured and approved by the Engineer.

B. Basis of Payment:

1. Manholes shall be paid at the Contract per each unit price.
2. Said unit price does not include frames and covers. The City has their own Ergo-XL covers. The contractor can pick up sewer manhole covers with no charge.
3. Said unit price shall be considered full compensation for furnishing and installing precast sections or cast in place structures with penetrations and boots, connections and couplings, sealant, screened gravel subbase, concrete and masonry materials, water-proofing as specified, construction fabric, manhole testing, and all work incidental thereto.
4. Said unit price shall include, but not limited to excavation (except ledge and rock) and backfill, sawcutting pavement to approved limits, crushed stone bedding, joints, brickwork, constructing channels, providing excavation supports; dewatering and testing.
5. Said unit price shall be considered full compensation for the furnishing of materials, labor, tools and equipment necessary to complete the above described work.
6. Said unit price shall constitute full payment to raise structures to the finish grade elevation.
7. Said unit price shall also constitute payment for all field core penetrations, sealing devices, (i.e., boots) and stub pipes and caps for future connections of the size and type as shown on the drawings and as specified herein unless paid for under

- separate items.
8. Said unit price shall include full compensation for additional concrete or brick masonry as necessary to construct inverts and special structures as shown on the Drawings.
 9. Said unit price shall be considered full compensation for maintenance of sewer flows through bypass pumping and plugging or blocking of sewer flow, unless paid for under a separate item.
 10. Said unit price shall include full compensation for all construction dewatering work required to pre-drain soils prior to final excavation and to install the manholes in the dry including furnishing, installing, operating and removing of dewatering systems unless paid for under separate items.
 11. Said unit price shall include, but not be limited to; removal and disposal of existing structures for the installation of new structures, including removing old frame and covers and delivering to the City.
 12. Actual payment for these shall be broken down in accordance with the following percentages:
 - a. Manhole in place and backfilled - 80%.
 - b. Manhole successfully tested - 10%.
 - c. Manhole cleaned and invert built – 10%.

Item No. 1.06 – LOCATE EXISTING SEWER SERVICE BY VIDEO INSPECTION, TRANSMITTER AND LOCATOR:

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

- measured separately, as approved by the Engineer).
5. If it is not possible to gain access, the Contractor will notify the Engineer of this and other means of locating the sewer service may be necessary (including but not limited to test pits, measured separately, as approved by the Engineer).

Item No. 1.07 – POST CONSTRUCTION VIDEO OF SEWERS:

- A. Method of Measurement:
 1. Post-construction video of sewers, where directed, will be measured per the linear foot.
- B. Basis of Payment:
 1. Video inspection will be paid for at the Contract unit price per linear foot upon completion and submittal of DVD video record in accordance with Section 01382.

Item No. 1.08 – REWORK INTERIOR PLUMBING ALLOWANCE:

- A. Method of Measurement:
 1. Measurement shall be the actual number of working hours by Contractor at sites preapproved by OWNER, and for which the hourly work is approved by OWNER.
- B. Basis of Payment:
 1. Rework Interior Plumbing Allowance specifically ordered by OWNER based on conditions uncovered during the course of the project, which may include re-routing water lines and sewer lines inside and under homes to make service connections at the most advantageous location to the resident and Owner as determined by the Owner and Engineer. This item shall be paid based on the actual hours worked, which must be agreed upon by OWNER and Contractor before the work is performed. Unused hours will not be paid to the Contractor.

Item No. 1.09 – GRINDER PUMP STATION:

- A. Method of Measurement:
 1. The quantity to be measured for payment shall be on a “per each” basis for furnishing and installing Grinder Pump Station, as measured and approved by the Engineer.
- B. Basis of Payment:
 1. Grinder Pump Station shall be paid at the Contract per each unit price.
 2. Said unit price shall be considered full compensation for furnishing and installing Environment One DH071 Station with penetrations and boots, Environment One lateral kit, Bal-Last Ballast System, supply cable, connections and couplings, and all work incidental thereto.
 3. Said unit price shall include, but not limited to excavation (except ledge and rock) and backfill, sawcutting pavement to approved limits, crushed stone bedding,

- joints, providing excavation supports; and dewatering.
4. Said unit price shall be considered full compensation for the furnishing of materials, labor, tools and equipment necessary to complete the above described work.
 5. Said unit price shall constitute full payment to raise structures to the finish grade elevation.
 6. Said unit price shall be considered full compensation for maintenance of sewer flows through bypass pumping and plugging or blocking of sewer flow, unless paid for under a separate item.
 7. Said unit price shall include full compensation for all construction dewatering work required to pre-drain soils prior to final excavation and to install the Grinder Pump Station in the dry including furnishing, installing, operating and removing of dewatering systems unless paid for under separate items.

Item No. 1.10 – CAST IRON COVERS FOR SEWER SERVICE CLEANOUTS:

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

Item No. 1.11 – FIELD CORE FOUNDATIONS (FOR RELOCATED SERVICES) INCLUDING PIPE CONNECTION SYSTEM:

- A. Method of Measurement:
 1. The coring shall be measured for each field coring as noted on the Drawings or at the direction of the Engineer.
 2. Foundation cores shall only be measured for payment after successful inspection by the City of Portsmouth Plumbing Inspector.
- B. Basis of Payment:
 1. Payment under this item shall be at the Contract unit price for each coring in the appropriate diameter range.
 2. Payment under this item shall constitute full compensation for all materials,

- equipment, labor and tools necessary to complete the work described.
3. Said payment shall be considered full compensation for coordination with homeowners to schedule work and to coordinate inspection of foundation core by the City of Portsmouth Plumbing Inspector.

Item Nos. 2.00, 2.01 & 2.02 – 4”, 6”, AND 8” CEMENT LINED DUCTILE IRON WATER MAIN:

- A. Method of Measurement:
 1. The quantity to be measured for payment shall be on the linear foot basis for furnishing and installing water main and appurtenant fittings as measured and approved by the Engineer.
 2. Measurement shall be along the centerline of the pipe with no deduction for fittings, between gate valves. Measurement shall not include valves.

- B. Basis of Payment:
 1. Water mains shall be paid for at the Contract linear foot unit price shall constitute full compensation for the furnishing of all labor, equipment and materials associated with installing, cleaning, sealing and testing the water main in accordance with the Contract Drawings and Specifications.
 2. Said unit price shall include all MJ restrained DI fittings and thrust blocks required to complete the water main installation, including but not limited to: tees; bends; reducers; and couplings.
 3. Said unit price shall include, but not be limited to; excavating (except ledge and rock); storing existing roadway base material for reuse; pavement sawcutting; temporarily holding utility poles; providing excavation supports; dewatering; furnishing and installing sand bedding material, pipe, polyethylene encasement, insulation, fittings, and sand blanket materials; joining; backfilling; detectable tape; reinstalling existing roadway base material (includes furnishing and installing additional crushed gravel or crushed stone material to maintain a suitable travel surface); compacting all lifts; pressure testing; disinfecting; flushing; and all other work required for or incidental to the satisfactory completion of this item.
 4. Said unit price shall include, but not be limited to; all fittings used to provide clearance beneath existing utilities or hydrant laterals are considered incidental to the pipe pay item and will not be measured for payment
 5. Said unit price shall include, but not be limited to; the cost of fittings required for testing and disinfection shall be considered incidental to the project.
 6. Said unit price shall include, but not be limited to; removal and disposal of existing water main for the installation of new water main, including plugs, caps, removal of valves, and valve boxes as required.
 7. Payment for water mains shall be broken down in accordance with the following percentages:
 - a. Water main in place and backfilled - 90%
 - b. Water main successfully cleaned and tested - 10%. A water main will only be

considered tested when pressure, deflection and bacteria tests have all been completed and accepted by the City and Engineer.

Item Nos. 2.03A & 2.03B – 1" AND 2" WATER SERVICE CONNECTIONS (CORP, SERVICE SADDLE, INSULATION, HEAT TAPE, CURB STOP):

- A. Method of Measurement:
 - 1. The quantity to be measured for payment shall be on a "per each" basis for furnishing and installing water service connections, connecting the water services at the main and at each home as measured and approved by the Engineer.

- B. Basis of Payment:
 - 1. Water service connections complete in place shall be paid at the Contract price for each.
 - 2. Said unit price shall constitute payment for tapping water main wet or dry; furnishing and installing corporation, service saddle, and connection to the existing service at the home by a license plumber as shown on the Drawings and as specified herein.
 - 3. Said unit price shall be considered compensation for all work to connect the service to existing homes as shown in the details, including furnishing any fittings, tees, wyes, adapters, couplings, insulation, heat tape, curb stops, etc. not covered under separate bid items which are required to connect the proposed water main to the existing house service, including work done by the contractor's plumber, where indicated on the Drawings.
 - 4. Said unit price payment will also be considered full compensation for all necessary clearing and grubbing, sawcutting pavement to approved limits, pavement removal, earth excavation (except ledge and rock), providing excavation supports, dewatering; removal of existing structures, existing (non-asbestos) pipe removal and disposal, bedding, backfill, compaction, cleaning, testing and other incidental items, such as, segregation of suitable backfill materials, disposal of excess fill material, stockpiling of existing roadway base material for reinstallation in utility trench and disturbed road bed prior to paving and furnishing and installing gravel and crushed gravel in accordance with the utility trench details and pay limits shown on the Plans prior to paving.
 - 5. Said unit price shall also constitute full compensation for the removal and replacement of curbs, drives (paved and gravel), bushes, plantings, and all necessary grading of grassed areas disturbed by the Contractor's operations.

Item Nos. 2.04A, 2.04B & 2.05 – 1" AND 2" WATER SERVICE PIPE:

- A. Method of Measurement:
 - 1. Water service pipe shall be measured per linear foot, from the homes to the water main, as indicated on the drawings.
 - 2. Measurement shall be along the centerline of the pipe including the tapping

saddle, corporation stop, through the curb stop to the connection to the existing service line.

B. Basis of Payment:

1. Pipe shall be paid for at the Contract price per linear foot.
2. Said unit price shall constitute full compensation for furnishing and installing all materials, labor, equipment, and tools necessary for hauling, handling, laying, jointing, and testing pipe.
3. Said unit price payment will also be considered full compensation for all necessary clearing and grubbing, sawcutting pavement to approved limits, pavement removal, earth excavation (except ledge and rock), providing excavation supports, dewatering; removal of existing structures, existing (non-asbestos) pipe removal and disposal, sand bedding, backfill, detectable tape, insulation, compaction, cleaning and other incidental items, such as, segregation of suitable backfill materials, disposal of excess fill material, stockpiling of existing roadway base material for reinstallation in utility trench and disturbed road bed prior to paving and furnishing and installing gravel and crushed gravel in accordance with the utility trench details and pay limits shown on the Plans prior to paving.
4. Said unit price will also be considered full compensation for all pressure testing; disinfecting; flushing; and all other work required for or incidental to the satisfactory completion of this item.
5. Said unit price shall also constitute full compensation for the removal and replacement of sidewalks and curbs, drives (paved and gravel), bushes, plantings, and all necessary grading of grassed areas disturbed by the Contractor's operations.

Item No. 2.06 – WATER MAIN CONNECTION:

A. Method of Measurement:

1. The quantity to be measured for payment shall be on a "per each" basis completed during each pay period.

B. Basis of Payment:

1. Water main connections shall be paid for at the Contract per each unit price including the necessary fittings to properly connect the new water main to the existing water main.
2. Said unit price shall constitute full compensation for the furnishing of all labor, equipment and materials associated with connecting the proposed water main to the existing water main in accordance with the Contract Drawings and Specifications.
3. Said unit price shall include the cost of: dewatering and cleaning existing water main; furnishing and using all temporary plugs; disinfectant to prevent contamination of the existing water main; connecting the new water main to the

existing water main; furnishing and placing all pipe, gaskets, fittings, joints, hardware and thrust blocks; reducers; protective coating; restrained joints; pavement sawcutting; testing; and furnishing all labor, material and equipment necessary to complete the work.

4. Said unit price shall include, but not be limited to: excavating (except ledge and rock); storing existing roadway base material for reuse; temporary holding utility poles; providing excavation supports; furnishing and installing bedding material, and sand blanket materials; joining; backfilling; reinstalling existing roadway base material (includes furnishing and installing additional crushed gravel or crushed stone material to maintain a suitable travel surface); compacting all lifts; and all other work required for or incidental to the satisfactory completion of this item.

Item Nos. 2.07 & 2.08 – 4" AND 8" GATE VALVE ASSEMBLY:

A. Method of Measurement:

1. The quantity to be measured for payment shall be on a "per each" basis completed during each pay period.

B. Basis of Payment:

1. Said unit price shall constitute full compensation for the furnishing of all labor, equipment and materials associated with installing the gate valves; valve boxes; mechanical joint fittings; pavement sawcutting; thrust restraint; polywrap; and associated reducers; couplings; elbows; tees; and other fittings to accomplish the installation in full conformance with the Contract Drawings and Specifications.
2. Said unit price shall constitute full compensation for removing abandoned valves and/or valve boxes.
3. Said unit price shall constitute full compensation for making connections to existing mains; testing; and furnishing joint restraints, couplings and concrete backing.
4. Said unit price shall constitute full compensation for adjustments from binder to final grade for all water gate boxes.

Item Nos. 2.09 & 2.10 – WATER MAIN CONNECTION WITH TAPPING SLEEVES (6"x8" AND 8"x8"):

A. Method of Measurement:

1. The quantity to be measured for payment shall be on a "per each" basis completed during each pay period.

B. Basis of Payment:

1. Water main connections with tapping sleeves shall be paid for at the Contract per each unit price including the necessary fittings to properly connect the new water main to the existing water main.
2. Said unit price shall constitute full compensation for the furnishing of all labor, equipment and materials associated with connecting the proposed water main to

the existing water main in accordance with the Contract Drawings and Specifications.

3. Said unit price shall include the cost of: furnishing and installing stainless steel tapping sleeve with valve on existing water main; dewatering and cleaning existing water main; furnishing and using all temporary plugs; disinfectant to prevent contamination of the existing water main; connecting the new water main to the existing water main; furnishing and placing all pipe, gaskets, fittings, joints, hardware and thrust blocks; reducers; protective coating; restrained joints; pavement sawcutting; testing; and furnishing all labor, material and equipment necessary to complete the work.
4. Said unit price shall include, but not be limited to: excavating (except ledge and rock); storing existing roadway base material for reuse; temporary holding utility poles; providing excavation supports; furnishing and installing bedding material, and sand blanket materials; joining; backfilling; reinstalling existing roadway base material (includes furnishing and installing additional crushed gravel or crushed stone material to maintain a suitable travel surface); compacting all lifts; and all other work required for or incidental to the satisfactory completion of this item.

Item No. 2.11A & 2.11B – FIRE HYDRANT AND BLOWOFF HYDRANT ASSEMBLY:

A. Method of Measurement:

1. The quantity to be measured for payment shall be on a “per each” basis for furnishing and installing hydrant assemblies, as indicated on the Drawings or in a location as directed by the Engineer.

B. Basis of Payment:

1. Hydrant assemblies shall be paid at the Contract price per each assembly, including the branch piping from the main to the hydrant, gate valve, valve box, tee, mechanical joint fittings, pavement sawcutting; thrust restraint, tapping sleeve, hydrant, hydrant riser regardless of the length, polywrap, cleaning, testing, and painting as shown on the Contract Drawings and as specified herein.
2. Said unit price shall also constitute full compensation for tools, materials, labor and equipment necessary for excavation, dewatering, backfill, compaction, sheeting, bracing, cleaning and other incidental work not specifically included for payment under other items.
3. Said unit price shall constitute full compensation for the removal and replacement of curbs, drives (paved and gravel), bushes, plantings, and all necessary grading of grassed areas disturbed by the Contractor’s operations, not paid for under separate unit items.

Item No. 2.12 – TEMPORARY POTABLE WATER SYSTEM:

A. Method of Measurement:

1. Measurement for payment shall be by linear foot of street serviced by temporary

systems, up to the quantity provided for in the bid schedule, for furnishing, installing, maintaining, and removing the temporary water system as measured along the roadway as described.

2. Temporary water systems or piping exceeding the quantity provided for on the Bid Schedule will not be measured for payment.
3. Measurement shall be to the nearest foot. Parallel temporary water mains will not be measured separately for payment

B. Basis of Payment:

1. The temporary water system shall be paid for at the Contract unit price per linear foot of roadway where temporary systems are used.
2. Said unit price shall constitute full compensation for the furnishing of all labor, equipment and materials associated with installing, maintaining, and removing the temporary water system in accordance with the Contract Drawings and Specifications.
3. Said unit price shall include, but not be limited to; furnishing a detailed temporary water system design (including required submittals or resubmittals); excavating and backfilling to install mains across streets and driveways, including furnishing and installing temporary pavement; furnishing, installing, and removing hard-pack for driveway crossings; furnishing, installing, disinfecting, and maintaining the system; providing 24- hour maintenance of the system; removing of the system; furnishing and installing bituminous pavement for street and driveway crossings; restoring all surfaces to their original condition; and all other work required for or incidental to the satisfactory completion of this item.
4. Twenty-five percent of the unit price shall be held until the entire system has been removed and all surfaces have been successfully restored.

Item No. 2.13 – TEMPORARY WATER SERVICE CONNECTIONS:

A. Method of Measurement:

1. Measurement of temporary water service connections shall be per each service successfully connected to the tested temporary water main.

B. Basis of Payment:

1. Payment of temporary water service connections shall be per each.
2. Said unit price shall constitute full compensation for the furnishing of all labor, equipment and materials (as approved in the temporary water system design, Item 2.12) associated with each temporary connection in accordance with the Contract Drawings and Specification, including connection of temporary service underground at the existing curb stop.
3. Said unit price shall include, but not be limited to; excavating and backfilling to install temporary services across sidewalks and driveways to prevent tripping and/or driving hazards, including furnishing and installing temporary pavement; furnishing, installing, and removing hard-pack to stabilize areas with pedestrian or vehicular traffic; flushing, restoring all surfaces to their original condition; and all

- other work required for or incidental to the satisfactory completion of this item.
4. Payment shall be considered compensation for notification and coordination with property owners of the interruption in water service while the services are being transferred to and from the temporary water system. Additional payment will not be considered for any time lost or crew down time due to lack of notification and coordination with the owner.
 5. Said unit price shall include protection of any temporary piping that is placed on the surface or buried and repair of said tubing upon notification
 6. Twenty-five percent of the unit price shall be held until the entire system has been removed and all surfaces have been successfully restored.

Item No. 3.01 – SITE WORK (INCLUDES SITE PREPARATION, TREE CLEARING & GRUBBING, LANDSCAPING & HARDSCAPING, CLEANUP & RESTORATION, AND TURF ESTABLISHMENT):

- A. Method of Measurement:
 1. The quantity to be measured for payment shall be an estimated percentage of the site preparation, earthwork, landscaping & hardscape, cleanup, restoration, and turf establishment of all disturbed property during each pay period in conformance with Section 02100, as measured and approved by the ENGINEER. Work includes weekly cleanup of the project area to be completed on Friday before the weekend.
- B. Basis of Payment:
 1. Site work (see Section 02100) will be paid for on a lump sum basis as a percentage of the work completed. The ENGINEER shall have final determination as to the percentage of work completed.
 2. Said lump sum price shall constitute full compensation for all labor, equipment and materials required to complete site preparation, tree clearing, grubbing, landscaping, hardscaping, cleanup, restoration, and turf establishment in accordance with the Contract Drawings and Specifications and as described in Section 02100. Work shall include removal of accumulated sediment from areas impacted from construction at the end of each work week.

Item No. 3.02 – REPAIR OF UNKNOWN OR MISMARKED UTILITIES:

- A. Method of Measurement:
 1. Repair of unknown utilities or mismarked utilities will be measured as a single unit for each utility pipe that requires repair, regardless of the size or material of the utility conduit.
 2. To be eligible for measurement under this item, the Contractor shall review the utility discovered with the Owner's Representative to determine that the utility repairs are required.
 3. Repair of utilities that are marked by Dig-Safe or indicated on the drawings will not be measured for payment, unless they are 6-feet beyond the locations

indicated as determined and measured by the Engineer.

B. Basis of Payment:

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

Item No. 3.03 – RIGID INSULATION:

A. Method of Measurement:

1. Rigid polystyrene insulation installed as directed by the Engineer shall be measured by the square foot.
2. Rigid polystyrene insulation installed in areas other than that shown on the drawings or not previously approved by the Engineer will not be measured for payment.

B. Basis of Payment:

1. Rigid polystyrene insulation shall be paid at the contract price per square foot.
2. Said unit price shall constitute full compensation for furnishing and installing all materials, labor, equipment, and tools necessary for installation of insulation.

Item No. 3.04 – CONTINGENCY:

A. Method of Measurement:

1. Extra work to be measured for payment shall be on an allowance basis and shall only be authorized by Change Order. This amount or a portion of this amount may only be used if additional scope and cost is required and only if it is authorized in advance by an executed Change Order.
2. The actual amount approved will be as stated in the Change Order.

B. Basis of Payment:

1. Payment will be made for extra work as stipulated in the Change Order.

Item No. 201.21 – REMOVING SMALL TREES:

1. Refer to NHDOT Standard Specification and/or Special Provisions for the corresponding pay items for Work completed under Section 201.

Item No. 201.4 – REMOVING STUMPS:

1. Refer to NHDOT Standard Specification and/or Special Provisions for the corresponding pay items for Work completed under Section 201.

Item No. 201.9 – PROTECT TREES:

1. Refer to NHDOT Standard Specification and/or Special Provisions for the corresponding pay items for Work completed under Section 201.

Item No. 202.31 – FILL ABANDONED PIPE:

1. Refer to NHDOT Standard Specification and/or Special Provisions for the corresponding pay items for Work completed under Section 202.
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. Work shall be measured and paid for under pay item 202.31.

Item No. 202.32 – FILL AND ABANDON STRUCTURE:

1. Refer to NHDOT Standard Specification and/or Special Provisions for the corresponding pay items for Work completed under Section 202.

Item No. 202.43 – REMOVE AND DISPOSE OF ASBESTOS CEMENT PIPE (WHERE ENCOUNTERED):

1. Refer to NHDOT Standard Specification and/or Special Provisions for the corresponding pay items for Work completed under Section 202.

Item No. 202.5 – REMOVAL OF DRAINAGE OR SEWER STRUCTURE:

1. Refer to NHDOT Standard Specification and/or Special Provisions for the corresponding pay items for Work completed under Section 202.
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. Work shall be measured and paid for under pay item 202.5.

Item No. 203.1 – COMMON EXCAVATION (F):

1. Refer to NHDOT Standard Specification and/or Special Provisions for the corresponding pay items for Work completed under Section 203.

Item No. 203.2 – ROCK EXCAVATION:

1. Refer to NHDOT Standard Specification and/or Special Provisions for the corresponding pay items for Work completed under Section 203.

Item No. 203.41 – UNSUITABLE EXCAVATION AND REPLACEMENT WITH SCREENED GRAVEL:

1. Refer to NHDOT Standard Specification and/or Special Provisions for the corresponding pay items for Work completed under Section 203.

Item No. 206.19 – COMMON STRUCTURE EXCAVATION - EXPLORATORY:

1. Refer to NHDOT Standard Specification and/or Special Provisions for the corresponding pay items for Work completed under Section 206.

Item Nos. 206.2 & 206.2A – ROCK STRUCTURE EXCAVATION:

1. Refer to NHDOT Standard Specification and/or Special Provisions for the corresponding pay items for Work completed under Section 206.

Item No. 211.1 – VIBRATORY MONITORING ANALYSIS:

1. Refer to NHDOT Standard Specification and/or Special Provisions for the corresponding pay items for Work completed under Section 211.

Item No. 211.11 – VIBRATORY MONITORING SERVICES:

1. Refer to NHDOT Standard Specification and/or Special Provisions for the corresponding pay items for Work completed under Section 211.

Item No. 214 – FINE GRADING:

1. Refer to NHDOT Standard Specification and/or Special Provisions for the corresponding pay items for Work completed under Section 214.

Item No. 304.4 – CRUSHED STONE (FINE GRADATION) (F):

1. Refer to NHDOT Standard Specification and/or Special Provisions for the corresponding pay items for Work completed under Section 304.

Item No. 304.45 – CRUSHED STONE FOR DRIVES:

1. Refer to NHDOT Standard Specification and/or Special Provisions for the corresponding pay items for Work completed under Section 304.

Item No. 403.11A – HOT BITUMINOUS PAVEMENT – MACHINE METHOD, BINDER:

1. Refer to NHDOT Standard Specification and/or Special Provisions for the corresponding pay items for Work completed under Section 403.

Item No. 403.11B – HOT BITUMINOUS PAVEMENT – MACHINE METHOD, WEARING:

1. Refer to NHDOT Standard Specification and/or Special Provisions for the corresponding pay items for Work completed under Section 403.

Item No. 403.12 – HOT BITUMINOUS PAVEMENT – HAND METHOD:

1. Refer to NHDOT Standard Specification and/or Special Provisions for the corresponding pay items for Work completed under Section 403.

Item No. 403.7 – TEMPORARY TRENCH PATCH:

1. Refer to NHDOT Standard Specification and/or Special Provisions for the corresponding pay items for Work completed under Section 403.

Item No. 403.8 – PERMANENT TRENCH PATCH:

1. Refer to NHDOT Standard Specification and/or Special Provisions for the corresponding pay items for Work completed under Section 403.

Item No. 417 – COLD PLANING BITUMINOUS SURFACES:

1. Refer to NHDOT Standard Specification and/or Special Provisions for the corresponding pay items for Work completed under Section 417.

Item No. 593.331 – GEOTEXTILE FABRIC, WHERE DIRECTED:

1. Refer to NHDOT Standard Specification and/or Special Provisions for the corresponding pay items for Work completed under Section 593.

Item No. 603.8126 – 6" CPDT DRAIN SERVICE:

1. Refer to NHDOT Standard Specification and/or Special Provisions for the corresponding pay items for Work completed under Section 603.

Item No. 603.8128 – 8” CPDT DRAIN SERVICE:

1. Refer to NHDOT Standard Specification and/or Special Provisions for the corresponding pay items for Work completed under Section 603.

Item No. 603.82212 – 12” HDPE PIPE:

1. Refer to NHDOT Standard Specification and/or Special Provisions for the corresponding pay items for Work completed under Section 603.

Item No. 603.82215 – 15” HDPE PIPE:

1. Refer to NHDOT Standard Specification and/or Special Provisions for the corresponding pay items for Work completed under Section 603.

Item No. 603.82218 – 18” HDPE PIPE:

1. Refer to NHDOT Standard Specification and/or Special Provisions for the corresponding pay items for Work completed under Section 603.

Item No. 603.82224 – 24” HDPE PIPE:

1. Refer to NHDOT Standard Specification and/or Special Provisions for the corresponding pay items for Work completed under Section 603.

Item No. 603.83215 – 15” HDPE PIPE, DOUBLE WALL:

1. Refer to NHDOT Standard Specification and/or Special Provisions for the corresponding pay items for Work completed under Section 603.

Item No. 604.12 – STANDARD 4’ DIAMETER CATCH BASIN:

1. Refer to NHDOT Standard Specification and/or Special Provisions for the corresponding pay items for Work completed under Section 604.

Item No. 604.242 – DROP INLET TYPE D-B:

1. Refer to NHDOT Standard Specification and/or Special Provisions for the corresponding pay items for Work completed under Section 604.

Item No. 604.32 – 4’ DIAMETER DRAIN MANHOLE:

1. Refer to NHDOT Standard Specification and/or Special Provisions for the corresponding pay items for Work completed under Section 604.
2. This item does include frames and covers. The City has their own Ergo-XL covers. The contractor must pay the City for the drainage manhole covers.

Item No. 604.48 – CORE & CONNECT TO EXISTING STRUCTURE:

1. Refer to NHDOT Standard Specification and/or Special Provisions for the corresponding pay items for Work completed under Section 604.

Item No. 604.5A – ADDITIONAL ADJUSTMENT OF DRAIN AND SEWER STRUCTURES (TO FINAL PAVEMENT ELEVATION):

1. Refer to NHDOT Standard Specification and/or Special Provisions for the corresponding pay items for Work completed under Section 604.

Item No. 604.5B – ADDITIONAL ADJUSTMENT OF GATE VALVE BOXES AND WATER CURB STOPS (TO FINAL PAVEMENT ELEVATION):

1. Refer to NHDOT Standard Specification and/or Special Provisions for the corresponding pay items for Work completed under Section 604.

Item No. 604.6 – SEWER OR DRAIN FRAME & COVER:

1. Refer to NHDOT Standard Specification and/or Special Provisions for the corresponding pay items for Work completed under Section 604.

Item No. 604.72 – CATCH BASIN FRAME AND GRATE, TYPE B:

1. Refer to NHDOT Standard Specification and/or Special Provisions for the corresponding pay items for Work completed under Section 604.

Item No. 604.93 – STRUCTURAL BMPS:

1. Refer to NHDOT Standard Specification and/or Special Provisions for the corresponding pay items for Work completed under Section 604.

Item No. 605.524 – 24” PERFORATED CPE PIPE UNDERDRAIN:

1. Refer to NHDOT Standard Specification and/or Special Provisions for the corresponding pay items for Work completed under Section 605.

Item No. 608.34 – 4” CONCRETE SIDEWALKS (FIBER REINFORCED) (F):

1. Refer to NHDOT Standard Specification and/or Special Provisions for the corresponding pay items for Work completed under Section 608.

Item No. 608.36 – 6” CONCRETE SIDEWALKS (FIBER REINFORCED WITH ACCESSIBLE RAMPS AND DETECTABLE WARNING PLATES) (F):

1. Refer to NHDOT Standard Specification and/or Special Provisions for the corresponding pay items for Work completed under Section 608.

Item No. 608.5A – BRICK SIDEWALK (F):

1. Refer to NHDOT Standard Specification and/or Special Provisions for the corresponding pay items for Work completed under Section 608.

Item No. 609.01 – STRAIGHT GRANITE CURB:

1. Refer to NHDOT Standard Specification and/or Special Provisions for the corresponding pay items for Work completed under Section 609.

Item No. 609.02 – CURVED GRANITE CURB:

1. Refer to NHDOT Standard Specification and/or Special Provisions for the corresponding pay items for Work completed under Section 609.

Item No. 609.5 – REMOVE & RESET GRANITE CURB:

1. Refer to NHDOT Standard Specification and/or Special Provisions for the corresponding pay items for Work completed under Section 609.

Item No. 615.0301 – TRAFFIC SIGN TYPE C:

1. Refer to NHDOT Standard Specification and/or Special Provisions for the corresponding pay items for Work completed under Section 615.

Item No. 615.033 – REMOVING TRAFFIC SIGN, TYPE C:

1. Refer to NHDOT Standard Specification and/or Special Provisions for the corresponding pay items for Work completed under Section 615.

Item No. 615.034 – RELOCATING TRAFFIC SIGN, TYPE C:

1. Refer to NHDOT Standard Specification and/or Special Provisions for the

corresponding pay items for Work completed under Section 615.

Item No. 615.0601 – TRAFFIC SIGN TYPE CC:

1. Refer to NHDOT Standard Specification and/or Special Provisions for the corresponding pay items for Work completed under Section 615.

Item No. 615.074 – REMOVE AND RESET WAYFINDING SIGN:

1. Refer to NHDOT Standard Specification and/or Special Provisions for the corresponding pay items for Work completed under Section 615.

Item No. 618.6 – UNIFORMED OFFICER:

1. Refer to NHDOT Standard Specification and/or Special Provisions for the corresponding pay items for Work completed under Section 618.

Item No. 618.7 – FLAGGERS:

1. Refer to NHDOT Standard Specification and/or Special Provisions for the corresponding pay items for Work completed under Section 618.

Item No. 619.1 – MAINTENANCE OF TRAFFIC:

1. Refer to NHDOT Standard Specification and/or Special Provisions for the corresponding pay items for Work completed under Section 619.

Item No. 619.11 – CALCIUM CHLORIDE FOR DUST CONTROL:

1. Refer to NHDOT Standard Specification and/or Special Provisions for the corresponding pay items for Work completed under Section 619.
2. 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 619.11.

Item No. 619.253 – PORTABLE CHANGEABLE MESSAGE SIGN (UNIT WEEK):

1. Refer to NHDOT Standard Specification and/or Special Provisions for the corresponding pay items for Work completed under Section 619.

Item No. 632.0104 – RETROREFLECTIVE THERMOPLASTIC PAVEMENT MARKING, 4" LINE:

1. Refer to NHDOT Standard Specification and/or Special Provisions for the corresponding pay items for Work completed under Section 632.

Item No. 632.3112 – RETROREFLECTIVE THERMOPLASTIC PAVEMENT MARKING, 12” LINE:

1. Refer to NHDOT Standard Specification and/or Special Provisions for the corresponding pay items for Work completed under Section 632.

Item No. 632.3118 – RETROREFLECTIVE THERMOPLASTIC PAVEMENT MARKING, 18” LINE:

1. Refer to NHDOT Standard Specification and/or Special Provisions for the corresponding pay items for Work completed under Section 632.

Item No. 632.32– RETROREFLECTIVE THERMOPLASTIC PAVEMENT SYMBOL:

1. Refer to NHDOT Standard Specification and/or Special Provisions for the corresponding pay items for Work completed under Section 632.

Item No. 632.911– OBLITERATE PAVEMENT MARKING LINE, 12” WIDE & UNDER:

1. Refer to NHDOT Standard Specification and/or Special Provisions for the corresponding pay items for Work completed under Section 632.

Item No. 632.92– OBLITERATE PAVEMENT MARKING, SYMBOL OR WORD:

1. Refer to NHDOT Standard Specification and/or Special Provisions for the corresponding pay items for Work completed under Section 632.

Item No. 640 – LANDSCAPING ALLOWANCE:

1. Refer to NHDOT Standard Specification and/or Special Provisions for the corresponding pay items for Work completed under Section 640.

Item No. 645 – CATCH BASIN SILT SACK:

1. Refer to NHDOT Standard Specification and/or Special Provisions for the corresponding pay items for Work completed under Section 645.

Item No. 645.512 – COMPOST SOCK FOR PERIMETER BERM:

1. Refer to NHDOT Standard Specification and/or Special Provisions for the corresponding pay items for Work completed under Section 645.

Item No. 645.7 – STORMWATER POLLUTION PREVENTION PLAN (SWPPP):

1. Refer to NHDOT Standard Specification and/or Special Provisions for the corresponding pay items for Work completed under Section 645.

Item No. 645.71 – SWPPP INSPECTIONS:

1. Refer to NHDOT Standard Specification and/or Special Provisions for the corresponding pay items for Work completed under Section 645.

Item No. 692 – MOBILIZATION GENERAL (8%):

1. Refer to NHDOT Standard Specification and/or Special Provisions for the corresponding pay items for Work completed under Section 692.
2. 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 8 percent of the total of all bid items excluding this item.

Item No. 699 – MISCELLANEOUS TEMPORARY EROSION AND SEDIMENT CONTROL:

1. Refer to NHDOT Standard Specification and/or Special Provisions for the corresponding pay items for Work completed under Section 699.

Item No. 1010.20 – ASPHALT CEMENT ADJUSTMENT:

1. Refer to NHDOT Standard Specification and Special Attention for Asphalt Adjustment, Item 1010.2.
2. The fixed base price for Asphalt Cement, as published for **December 2022**.

END SECTION

SECTION 01070

ABBREVIATIONS AND SYMBOLS

PART 1 - GENERAL

1.1 DESCRIPTION

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

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

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ft.	Feet
gal.	Gallons
gpd	Gallons Per Day
gpm	Gallons Per Minute
HDPE	High Density Polyethylene
HP	Horsepower
IBR	Institute of Boiler and Radiator Manufacturers
in.	Inches
inter.	Interlock
ISA	Instrument Society of America
kva	Kilovolt-ampere
kw	Kilowatt
lb.	Pound
max.	Maximum
MCB	Master Circuit Board
MGD	Million Gallons Per Day
Min.	Minimum
NBS	National Bureau of Standards
NEC	National Electrical Code, Latest Edition
NEMA	National Electrical Manufacturers Association
NEWWA	New England Water Works Association
NPT	National Pipe Thread
OS&Y	Outside Screw and Yoke
PCA	Portland Cement Association
PE	Polyethylene
ppm	Parts Per Million
%	Percent
psi	Pounds Per Square Inch
psig	Pounds Per Square Inch Gage
PVC	Polyvinyl Chloride
R.D.	Rural Development (Formerly FmHA)
rpm	Revolutions Per Minute
s.f.	Square Foot
STL.W.G.	U.S. Steel Wire, Washburn and Moen, American Steel and Wire Cos., or Roebling Gage
s.y.	Square Yard
TDH	Total Dynamic Head
USAS	Standards of the United States of America Standards Institute (formerly American Standards Association)
USS GAGE	United States Standard Gage
VC	Vitrified Clay
WSP	Working Steam Pressure
Fed. Spec.	Federal Specifications issued by the Federal Supply Service of the General Service Administration, Washington, D.C.

END OF SECTION

SECTION 01090

REFERENCE STANDARDS

PART 1 - GENERAL

1.1 QUALITY ASSURANCE

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

1.2 SCHEDULE OF REFERENCES

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

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

PART 2 - PRODUCTS

(NOT PART OF THIS SECTION)

PART 3 - EXECUTION

(NOT PART OF THIS SECTION)

END OF SECTION

01090-1

SECTION 01200

PROJECT MEETINGS

PART 1 - GENERAL

1.1 INTRODUCTION

- A. Project meeting requirements

1.2 PUBLIC INFORMATION MEETINGS:

- A. 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).

1.3 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 weekly.
- 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

1.4 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)

SECTION 01201

PRECONSTRUCTION MEETING

PART 1 - GENERAL

1.1 INTRODUCTION

A. Preconstruction meeting requirements.

1.2 PROJECT MEETINGS

A. The Contractor shall attend preconstruction meetings prior to the commencement of work.

B. The following representatives of the Contractor shall attend:

1. Project Manager and Superintendent
2. Representative of major subcontractors (when requested)
3. Representatives of major suppliers (when requested)
4. Representatives of utility companies, as applicable.
5. Other representatives as appropriate to agenda topics

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

D. Sample Agenda

1. Submittal of executed bonds and insurance certificates
2. Execution and Distribution of the Contracts
3. Designation of responsible personnel
4. Contractor's submittals:
 - a. List of subcontractors
 - b. Project Schedule
 - c. Schedule of Values
 - d. Shop drawings
5. Description of Procedures:
 - a. Submittals
 - b. Substitutions
 - c. Field decisions
 - d. Applications for payment
 - e. Certified payroll
 - f. Proposal requests
 - g. Change orders
 - h. Contract closeout procedures
6. Critical work scheduling (i.e. night work and tie-ins)
7. Work of other Contracts
8. Requirements of various agencies:
 - a. Labor
 - b. Funding agency
 - c. NHDOT/public works
9. Preconstruction and preblast surveys
10. Field Engineering

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11. Project Inspection
12. Right-of-Way and easements
13. Utility coordination
14. Security
15. Housekeeping procedures
16. Erosion control plan
17. Chlorination and dechlorination plan
18. Testing procedures
19. Winter maintenance
20. Record drawings
21. Substantial completion
22. Final completion

PART 2 -- PRODUCTS

(NOT PART OF THIS SECTION)

PART 3 -- EXECUTION

(NOT PART OF THIS SECTION)

END OF SECTION

SECTION 01202

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 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 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 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, 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

SECTION 01381

PRE-CONSTRUCTION VIDEO RECORDS

PART 1 - GENERAL

1.01 DESCRIPTION

A. Work Included:

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

PART 2 - PRODUCTS

2.01 QUALITY

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

PART 3 - EXECUTION

3.01 SUBMITTAL OF VIDEO RECORDS

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

END OF SECTION

SECTION 01382

VIDEO INSPECTION

PART 1 - GENERAL

1.1 DESCRIPTION

- A. Post Construction Video Recording of new sewers shall include the following work:
 - 1. Television inspection following the completion new sewer mains and service laterals will be required where directed.
 - 2. Sewer lines shall be cleaned and flushed prior to television inspection.
 - 3. Pipe shall be inspected for cracks, joint gaps, deformation, and other visual defects.
 - 4. A written report shall be provided. Condition of the sewer shall be documented.
 - 5. A video shall be provided in DVD formats, complete with audio narrative. Both video and audio will be reviewed for clarity. Indiscernible portions of the DVD will not be accepted.
 - 6. Documentation shall include any feature specifically requested by the Engineer.
 - 7. Finish pavement courses shall not be completed until video is reviewed and accepted.
- B. Location of Existing Sewer Services by Video Inspection shall include the following work:
 - 1. Coordinating with the property owner/homeowner to gain access to the sewer service from inside a home or business. The Engineer shall be present for all inspections.
 - 2. Trace the location and depth of the service lines by television inspection.
 - 3. Record the location and depth of the service lines.
 - 4. A video shall be provided in DVD formats. If VHS recording equipment is used for the work, the Contractor must then convert the video to DVD format before submitting to the City.
 - 5. Restore all private property and sewer service access point to existing conditions.
 - 6. Obtain City photo identification badges from City Resources Department, prior to entering properties.

1.2. SUBMITTALS

- A. Post Construction Video Recording:
 - 1. Submit all reports and video (DVD format) to the Engineer following the completion of the sewer.
 - 2. TV inspection required prior to substantial completion certification.
- B. Location of Sewer Services by Video Inspection:
 - 1. Before the work begins:
 - a) Submit the names of all personnel completing the work.
 - b) Submit the schedule and procedure for entering properties (photo identification badges required).
 - 2. After the work is completed:

- a) Submit location information, include on Record Drawings.
- b) Submit video record (DVD format) of services that are located with property locations clearly identified. (Payment may be withheld until video record is submitted to the Engineer.)

PART 2 - PRODUCTS

2.1 QUALITY

- A. Post Construction Video Recording:
 1. Quality of video records (DVD format) shall be such that the condition of the sewer following construction can be readily determined. The DVD shall include an audio narrative.
 2. The Video shall be able to verify the quality of the pipe installation and not be limited by poor lighting, poor picture quality, water flow, or pipe length.
 3. Necessary sewer repair identified during the TV inspection shall be corrected by the Contractor at no cost to the owner.
 4. Any video record (DVD format) considered to be poor quality must be re-recorded and re-submitted for review at no additional cost to the Owner.
 5. Payment (if a separate item is provided) may be withheld if video record (DVD format) is considered by the Owner or the Engineer to be poor quality.
- B. Location of Sewer Services by Video Inspection:
 1. The camera must have a transmitter that can be traced by a locator outside the house.
 2. Equipment shall be capable of locating the sewer line within twelve inches (12") of it actual horizontal and vertical.

PART 3 - EXECUTION

3.1 GENERAL

- A. Post Construction Video Recording:
 1. The color camera shall be moved through the line in either direction at a moderate rate, stopping when necessary to permit proper documentation of the sewer's condition. In no case will the television camera be pulled at a speed greater than 30 feet per minute. Manual winches, power winches, TV cable, and powered rewinds or other devices that do not obstruct the camera view or interfere with proper documentation of the sewer conditions shall be used to move the camera through the sewer line. If, during the inspection operation, the television camera will not pass through the entire manhole section, the Contractor shall set up his equipment so that the inspection can be performed from the opposite manhole. If, again, the camera fails to pass through the entire manhole section, the inspection shall be considered complete and no additional inspection will be required.
 2. When manually operated winches are used to pull the television camera through the line, telephones, radios or other suitable means of communication shall be set up between two manholes of the section being inspected to insure good

communications between members of the crew.

3. The importance of accurate distance measurements is emphasized. Measurement for location of defects shall be above ground by means of a meter device. Marking on the cable, or the like, which would require interpolation for depth of manhole, will not be allowed. Accuracy of the distance meter shall be checked by use of a walking meter, roll-a-tape, or other suitable device, and the accuracy shall be satisfactory to the Owner's Representative.
 4. Documentation of the television results shall be as follows:
 - a. Television Inspection Logs: Printed location records shall be kept by the Contractor and will clearly show the location in relation to an adjacent manhole of each cracked or offset joint observed during inspection. In addition, other points of significance such as locations of building sewers, cracked or broken pipe, protruding service connections, roots, storm sewer connections, and other discernable features will be recorded and a copy of such records will be supplied to the Owner.
 - b. Videotape Recordings: The Contractor shall furnish all equipment for color video tape recordings. All sewer inspections shall be recorded on DVD formatting and compatible software for viewing on a DVD computer drive.
- B. Location of Sewer Services by Video Inspection:
1. Cleaning of the existing sewer service is not considered part of this work. If the sewer service cannot be televised due to obstructions, or if the sewer service is not accessible from the basement (i.e. no cleanout), it may be necessary to use other means to locate the sewer service, such as test pits. The use of test pits to locate a sewer service will be considered with approval of the Engineer if sewer service is not accessible.
 2. The sewer service must be located on the ground and recorded on the plans, both horizontally and vertically at the following locations:
 - a. As it exits the foundation (or passes the vertical plane of the foundation if sewer exits below basement floor level)
 - b. The property line
 - c. At the sewer main
 - d. At bends
 3. Ties and depth shall be recorded by the Contractor at each of the above listed locations and provided to the Engineer on an approved form. The Engineer will provide a sample format for the required documentation.
 4. This work shall be coordinated well in advance of sewer installation so that wye connections can be installed at the appropriate location

END OF SECTION

SECTION 01400

QUALITY CONTROL AND QUALITY ASSURANCE

PART 1 -- GENERAL

1.1 REQUIREMENTS INCLUDED

- A. General Quality Control and Quality Assurance.
- B. Workmanship.
- C. Manufacturer's Instructions.
- D. Manufacturer's Certificates.
- E. Testing Laboratory Services.

1.2 RELATED REQUIREMENTS

- A. General Conditions
- B. Section 01330 - Submittals

1.3 GENERAL QUALITY CONTROL AND QUALITY ASSURANCE

- A. The Contractor shall maintain quality control over the suppliers, manufacturers, products, services, site conditions, and workmanship, to produce work of specified quality.
- B. The Contractor will employ and pay for consultant or other services to provide quality assurance (QA) tests or reviews. Should the results of QA testing or reviews indicate defective or otherwise non-complying work, the costs for removal and replacement with complying work, and any follow-up QA testing or review shall be borne by the Contractor.

1.4 WORKMANSHIP

The Contractor shall:

- A. Comply with industry standards except when more restrictive tolerances or specified requirements indicate more rigid standards or more precise workmanship.
- B. Perform work by persons qualified to produce workmanship of specified quality.
- C. Secure products in place with positive anchorage devices designed and sized to withstand stresses, vibration, and racking.

1.5 MANUFACTURERS' INSTRUCTIONS

- A. The Contractor shall comply with instructions in full detail, including each step in sequence. Should instructions conflict with Contract Documents, request clarification from the Engineer before proceeding.

1.6 MANUFACTURERS' CERTIFICATES

- A. When required by the individual Specifications Section, the Contractor shall submit manufacturer's certificate, in duplicate, that products meet or exceed specified requirements.

1.7 TESTING LABORATORY SERVICES

- A. The Contractor shall employ and pay for services of an Independent Testing Laboratory to perform scheduled quality assurance inspections, tests, and other services required to perform the specified material testing.
- B. The services will be performed in accordance with the requirements of governing authorities and with specified standards.
- C. The reports will be submitted to the Engineer and Contractor giving observations and results of the tests, indicating the compliance or non-compliance with specified standards and with the Contract Documents.
- D. The Contractor shall cooperate with Testing Laboratory personnel, i.e., furnish tools, samples of materials, design mix, equipment, storage and assistance as requested.
 - 1. Notify the Engineer 72 hours prior to expected time for operations requiring testing services.
 - 2. Make arrangements with the Engineer and pay for additional samples and tests for Contractor's convenience and pay for any additional tests or retests required due to noncompliance.

PART 2 -- PRODUCTS

Not Used

PART 3 -- EXECUTION

Not Used
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 01330 - SUBMITTALS

SECTION 01571 - 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, stormwater flows, and combined sewage/drainage 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 01010, SUMMARY

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

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 comply 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 – PROJECT CLEANING

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.

2.02 WARNING SIGNS AND BARRICADES

- A. An overview plan of the work area has been provided following this specification for the Contractor's use in developing the traffic control plan.
- B. Do not perform work without providing adequate warning signs, barricades, signal lights, watchmen and take other necessary precautions for the safety of the public.
- C. Provide and illuminate suitable warning signs to show where construction, barricades or detours exist.
- D. Provide barricades of substantial construction and painted with a finish that increases visibility at night.
- E. Keep signal lights illuminated at all barricades and obstructions from sunset to sunrise.
- F. Maintain all necessary signs, barricades, lights, watchmen and other safety precautions during authorized suspension of the Work, weekends, holidays or other times when the Work is not in progress.

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 schedule and maintain work so that one-lane traffic is maintained at all times, unless road closures are approved by the Public Works Department.
- C. Revise the plan of work if it will create a traffic hazard.
- D. Do not start work in any new location without the permission of the Engineer.
- E. The Contractor shall provide temporary lighting to properly illuminate the work area and approaches in the event of nighttime work.
- F. Notify all police and fire departments of all scheduled detours and when streets are reopened.

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.

3.03 DETOURS

- A. Detours will only be allowed with pre-approval from the owner at least 48 hours in advance.
- B. Notify the Public Works Department who will coordinate with the Police and Fire Departments of all scheduled detours and when streets are reopened.
- C. Provide, identify and maintain suitable detours when the project, or any part thereof, is closed to public travel. Closure of public travel on any portion of the project shall be coordinated with the City Police and Fire Departments as well as the Department of Public Works. A minimum of 48-hours notice shall be provided for planned shutdowns and detours are required to complete the work.
- D. When the closed part of the project is reopened, restore the detour area and any other disturbed areas to the original condition and immediately

3.04 INCONVENIENCE TO RESIDENTS OF VICINITY

- A. Whenever a traveled way is closed, perform the Work in such a manner that local travel and residents in the vicinity of the Work will be inconvenienced as little as possible.

- B. Allow access to residents and abutting landowners along the project to driveways and other normal outlets from their property.

3.05 UNIFORMED POLICE OFFICERS

- A. The Contractor shall use uniformed police officers in locations required by the Owner.
- B. Arrange police detail with the local Chief of Police.
- C. Any police officers, whether regular, reserve, special or otherwise, shall be employed by the Contractor.

3.06 PEDESTRIANS

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

END OF SECTION

SECTION 01575

HANDLING EXISTING FLOWS

PART 1 - GENERAL

1.01 WORK INCLUDED:

This Section covers all materials, equipment, and labor required to handle existing sanitary, stormwater, 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 02440, SEWER CLEANING, INSPECTION, TESTING AND SEALING

Section 02443, SERVICE CONNECTION REHABILITATION

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

An electronic PDF, 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 freshwater 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 auto dialer that shall send an alarm condition to the Contractor's Superintendent. The auto dialer shall also alert a designated "on-call" employee of the Contractor, should the Superintendent fail to acknowledge the call.

END OF SECTION

SECTION 01611

OWNER'S RIGHT TO MATERIAL

PART 1 - GENERAL

1.1 DESCRIPTION

- A. Work Included:
 - 1. The Owner retains the right to claim all suitable and unsuitable material.
 - 2. 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 01630

SUBSTITUTIONS AND PRODUCT OPTIONS

PART 1 - DESCRIPTION

1.1 DESCRIPTION

- A. If stated in these Specifications that a substitute that is equal to any material or equipment specified may be furnished, and if the Contractor wishes to furnish or use a substitute, submit a written request to the Engineer for approval of the substitute.
- B. The Engineer shall be the judge of equality.

1.2 SUBMITTALS

- A. Submit approval request promptly after the award of the Contract.
- B. Completely describe the proposed substitution including, as applicable:
 - 1. Manufacturer's catalog data,
 - 2. Illustrations,
 - 3. Specifications,
 - 4. Samples,
 - 5. Copies of previous approvals,
 - 6. Other data that may be requested by the Engineer to determine equality.

PART 2 - PRODUCTS

2.1 CRITERIA

- A. The following criteria will be used by the Engineer in determining the equality of the proposed substitutions:
 - 1. Adaptability to the design,
 - 2. Functional performance,
 - 3. Appearance (when applicable)
 - 4. Quality of materials,
 - 5. Strength of materials,
 - 6. Complexity, frequency and cost of maintenance.

PART 3 - EXECUTION

3.1 ORDERING AND INSTALLING

- A. Do not order and do not install any substituted material or equipment without the written approval of the Engineer.

3.2 RESULTING CHANGES

- A. If proposed substitutions are judged as being acceptable, make all changes to structures, buildings, piping, electrical, and other items necessary to accommodate substitutions, at no additional cost to the Owner.
- B. Whenever it may be written that a manufacturer must have a specified period of

experience with his product, a product which does not meet the specified experience period can be considered if the manufacturer is willing to provide a bond or cash deposit for the duration of the specified time period which will guarantee replacement of that product in the event of failure.

3.3 ENGINEERING SERVICES

- A. If the Contractor requests substitutions which require design or other engineering services, the services will be provided only by a Professional Engineer registered in the state in which the project is located.
- B. All engineering services for substitutions shall be performed at the expense of the Contractor.

END OF SECTION

SECTION 01701

PROJECT CLOSE-OUT PROCEDURES

PART 1 – GENERAL

1.1 INTRODUCTION:

- A. Contractor's requirements of the Contract to 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 warranties

PART 2 - PRODUCTS

(NOT PART OF THIS SECTION)

PART 3- EXECUTION

(NOT PART OF THIS SECTION)

END OF SECTION

SECTION 01710

PROJECT CLEANING

PART 1 - GENERAL

1.1 DESCRIPTION

- A. Work Included:
1. Maintain premises and public properties free from accumulations of waste, debris, and rubbish, caused by operations.
 2. 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.
 3. 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.
 4. At completion of Work, remove waste materials, tools, equipment, machinery, and surplus materials, and clean all sight exposed surfaces. Leave project clean and ready for use.

1.2 QUALITY ASSURANCE

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

PART 2 - PRODUCTS

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

PART 3 - EXECUTION

3.1 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.

3.2 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.

3.3 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.

3.4 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.

3.5 PERFORMANCE

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

B. Control of Hazards:

1. Store volatile wastes in covered metal containers and remove from premises daily.
2. Prevent accumulation of wastes which may create hazardous conditions.
3. Provide adequate ventilation during use of volatile or noxious substances.

C. Disposal:

1. Do not burn or bury rubbish and waste material on project site.
2. Do not dispose of hazardous wastes, such as mineral spirits, oil, or paint thinner, in storm or sanitary drains.
3. Do not dispose of wastes into streams or waterways.

D. Final Cleaning (where applicable):

1. Employ experienced and/or professional cleaners for final cleaning.
2. Remove grease, dust, dirt, stains, labels, fingerprints, and other foreign materials, from all sight exposed interior and exterior finished surfaces.
3. Repair, patch and touch up marred surfaces to specified finishes.
4. Broom clean paved surfaces.
5. Rake clean non paved surfaces on the project site.
6. 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

SECTION 01720

PROJECT RECORD DOCUMENTS

PART 1 – GENERAL

1.1 DESCRIPTION:

- A. Work Included: Keep accurate record documents for all additions, demolition, changes of material or equipment (from that shown on the Drawings), variations in work, and any other additions or revisions to the Contract (via Change Order, Work Change Directive, Field Order or Clarification).
- B. Provide field survey of the completed work including GPS coordinates and elevations of pipe, fittings, changes in slope and other utilities encountered. Pipe locations shall be recorded daily. The following information shall be recorded by the Contractor and provided to the Engineer.
 - 1. GPS coordinates of the installed pipe locations
 - 2. Elevation of pipelines as installed
 - 3. GPS coordinates and elevations of changes in pipe slope and/or alignment
 - 4. Elevation and designation of utilities at crossings
 - 5. Final centerline and gutter lines of road reconstruction areas and where grading has changed from existing
 - 6. Paving repairs or pavement restoration limits
 - 7. Field ties to pipe fittings, bends, structures, gate valves, etc.
 - 8. Field ties to any changes in materials

PART 2 - PRODUCTS

2.2 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.
- B. At the completion of the project, and prior to the release of retainage, deliver record documents to the Engineer. Record drawings shall be provided as a bound, red-line paper set and an electronic file (pdf format) consisting of a full scan of the bound paper set.
- C. Accompany submittal with transmittal letter, in duplicate, containing:
 - 1. Date, project title and number.
 - 2. Contractor's name and address.
 - 3. Title and number of each Record Document with certification that each document is completed and accurate.
 - 4. Signature of Contractor, or his authorized representative.
- D. Failure to record these locations on the Project Record Drawings shall result in non-approval of the final payment to the Contractor and/or if contract time (as specified in the Contract and/or modified in accordance with the Standard General Conditions of the Construction Contract) has elapsed, this shall be

grounds for the assessment of the liquidated damages as specified.

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.
 4. Whenever any existing utility line is uncovered during excavation for new utility installation, record the location dimensions of such lines. 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.
 5. General Field Recording Issues:
 - a. All swing ties shall be taken from existing, permanent features such as utility poles, corners of buildings and hydrants. Porches, sheds or other house additions shall be avoided as they could be torn down. A minimum of three swing ties shall be taken. Survey grade GPS coordinates are also acceptable.
 - b. Stations shall be recorded to the nearest foot.
 - c. Inverts shall be recorded to the nearest hundredth of a foot.
 - d. Elevations shall be recorded to the nearest hundredth of a foot.
 - e. Building dimensions shall be recorded to the nearest 1/4".
 - f. Equipment and Piping shall be recorded to the nearest tenth of a foot, and the overall dimensions and layout of the equipment shall be adjusted to reflect the equipment provided.
- D. Project Record Drawings - Legibly mark Contract Drawings to record existing utilities and actual construction of all work, including but not limited to the following (where applicable):
 1. Existing Utilities
 - a. Water mains and services, water main gate valves, sewer mains and services, storm drains, culverts, steam lines, gas lines, tanks and other existing utilities encountered

- during construction must be accurately located and shown on the Drawings. In congested areas supplemental drawings or enlargements may be required.
- b. Show any existing utilities encountered in plan and profile and properly labeled showing size, material and type of utility. Ties shall be shown on plan. Utility shall be drawn to scale in section (horizontally and vertically) and an elevation shall be called out to the nearest hundredth of a foot.
 - c. When existing utility lines are broken and repaired, ties shall be taken to these locations.
 - d. If existing water lines are replaced or relocated, document the area involved and pipe materials, size, etc. in a note, and with ties.
2. Manholes, Catch Basins, Valve Pits and other structures.
 - a. Renumber structure stationing to reflect changes.
 - b. Show ties to center of structure covers or hatches.
 - c. In general, show inverts at center of structures. However, for manholes with drop structures, or steep channels (greater than 0.2' change on slope), show inverts at face of manhole.
 - d. Show inverts for other structures at the face of the structure.
 - e. Draw any new structures that are added on plan and profile.
 - f. Show any field or office redesigns.
 - g. Redraw plan if the structure's location is moved more than 5 feet in any direction. Note: It is important to show existing utilities, as outlined in Paragraph 1 above, especially if they were one reason for relocating the sewer, manholes and other structures.
 - h. Redraw profile if inverts changed by more than 6 inches.
 3. Gravity Sewer Line
 - a. Change sewer line slopes indicated on Drawings if inverts are changed. Draw any new gravity lines that are added on plan and profile.
 - b. Show any field or office redesigns.
 - c. Redraw the sewer line profile if manhole inverts are redrawn.
 - d. Redraw the sewer line on plan corresponding to relocated manholes.
 4. Water Mains and Force Mains
 - a. Show ties to the location of all valves, bends (horizontal and vertical), tees and other fittings. The use of thrust blocks shall be recorded.
 - b. Revise elevations indicated on the Drawings to reflect actual construction.
 5. House Services
 - a. Draw all house services (even to empty lots) on plan, and show ties.
 - b. Show ties or distances to wyes from manhole.
 - c. Show chimneys heights in the profile.
 - d. The "Sanitary Sewer Service Location" forms and "Water Service Location" forms shall be used to record sewer and water service information. A copy of these forms shall be provided to the Owner, along with the Record Drawing Set.
 6. Grinder Pump Stations
 - a. Show ties to center of pump station covers.
 - b. Label size of grinder pump that are other than standard sized 70 gallon capacity.
 - c. The "Sanitary Sewer Service Location" forms shall be used to record grinder pump information. A copy of these forms shall be provided to the Owner, along with the Record Drawing Set.
 7. Ledge
 - a. Ledge profiles shall be shown. Note whether the plotted ledge profile reflects undisturbed or expanded conditions.
 8. Roads

- a. Show centerline road profile and level spot elevations.
 - b. Show pavement widths.
 - c. On road cross sections, show the pavement cross slope.
 - d. Show any deviations from the design plans.
9. Specifications and Addenda - Legibly mark up each section to record:
- a. Manufacturer, trade name, catalog number, and supplier of each product and item of equipment actually installed.
 - b. Changes made by Change Order, Field Order, or other method.

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

E. SUPPLEMENTAL SPECIFICATIONS

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 prices. Work itemized with NHDOT item numbers shall be in accordance with NHDOT Standard Specifications. Additional General Requirements, Supplemental Specifications and Special Provisions for this project are included in Sections D, E & F. All other work not described in Sections D, E & F shall be performed in accordance with the Standard Specifications.

SUPPLEMENTAL SPECIFICATION

SECTION 01520

TEMPORARY FACILITIES

PART 1 -GENERAL

1.01 SCOPE OF WORK:

- A. The Contractor shall provide and pay for all temporary applicable facilities required to properly perform the Work, as described in this Section, at no additional cost to the Owner including the placement and removal of the utilities.
- B. Completely remove all temporary equipment and materials upon completion of the Work and repair all damage caused by the installation of temporary utilities.
- C. Make all necessary applications and arrangements for electric power, light, water, telephone and other utilities with the local utility companies. Notify the local electric power company if unusually heavy loads, such as welders, will be connected.

1.02 QUALITY ASSURANCE

- A. Requirements of Regulatory Agencies:
 - 1. Obtain permits as required by local governmental authorities.
 - 2. Obtain easements, when required, across private property other than that of the Owner for temporary power service.
 - 3. Comply with the latest National Electrical Code.
 - 4. Comply with all local, State and Federal codes, laws, and regulations.

1.03 TEMPORARY TOILETS:

- A. Furnish, install, and maintain one standard portable sanitary facility including appurtenances. for use during the entire construction period.
- B. Provide facilities prior to the start of construction.
- C. Pay for all cost associated with furnishing these facilities.
- D. Maintain facilities in a clean and operable sanitary condition.
- E. Pump out waste and clean the interior of the facilities on a weekly basis.
- F. Provide adequate supplies.
- G. Remove facilities after all construction activities have been successfully completed.
- H. Repair all damage to, and caused by, the temporary facility.
- I. Meet all local, state, and federal regulations.

1.04 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.

1.05 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

2.1 MATERIALS

- A. Electrical:
 - 1. Provide all required facilities, including as applicable, but not limited to, transformers, conductors, poles, conduits, raceways, fuses, switches, fixtures, and lamps.
 - 2. Use new or used material adequate in capacity for the purposes intended.
 - 3. Materials must not create unsafe conditions or violate the requirements of applicable codes.
 - 4. Conductors:
 - a. Wire, cable or busses of appropriate type, sized in accordance with the latest National Electrical Code for the applied loads.
 - b. Use only UL approved wire.
 - 5. Conduit:
 - a. Rigid steel, galvanized: ANSI C80.1.
 - b. Electrical metallic tubing: ANSI C80.3.
 - c. Other material approved by NEC
 - 6. Equipment: Provide appropriate enclosures for the environment in which used in compliance with NEMA Standards.
 - B. Heating:
 - 1. When heat is required for the protection of the Work, provide and install a non-hazardous type of heating apparatus, and provide adequate and proper fuel.
 - 2. Use heating equipment and materials that are in proper condition.
 - C. Water:
 - 1. Provide drinking water equipment and material that will prevent contamination and health hazards.
 - D. Sanitary Accommodations:
 - 2. Comply with all local, State and Federal codes, laws and regulations.
-

PART 3 - EXECUTION

3.1 PERFORMANCE

- A. Electrical:
1. Provide electrical energy to:
 - a. All necessary points on the construction site so that power can be obtained at any desired point with extension cords no longer than 100 feet.
 - b. Construction site offices.
 - c. Lighting as required for safe working conditions at any location on the construction site.
 - d. Night security lights.
 - e. When applicable, Owner's present facilities during the changeover of electrical equipment.
 2. Maintain electrical energy throughout the entire construction period
 3. Capacity:
 - a. Provide and maintain adequate electrical service for construction use by all trades during the construction period at the locations necessary.
 4. Installation:
 - a. Install all work with a neat and orderly appearance.
 - b. Have all installations performed by qualified electricians.
 - c. Locate all installations to avoid interference with construction and materials handling equipment, storage areas, traffic areas and other Work.
- B. Heating:
1. Maintain a heated environment for the Work at the temperature and for the length of time specified and as otherwise needed.
 2. Precaution:
 - a. Operate temporary heating apparatus in a manner that finished Work will not be damaged.
 - b. Repair all damage, caused by temporary heating operations, to the complete satisfaction of the Engineer, at no additional cost to the Owner.
- C. Water:
1. Provide and maintain a safe water supply for drinking and construction purposes as required for the proper execution of the Work.
- D. Sanitary Accommodations:
1. Provide and maintain sanitary accommodations for the use of the employees of the Contractor, subcontractors, and Engineer.
 2. Sanitary accommodations shall meet the requirements of all local, State and Federal health codes, laws and regulations.

END OF SECTION

SUPPLEMENTAL SPECIFICATION

SECTION 01544

TREE PROTECTION

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.

- 32** 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.
- 33** 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.
- 34** 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.
- 35** 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.

END OF SECTION

SUPPLEMENTAL SPECIFICATION

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 01567, POLLUTION CONTROL AND 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

SUPPLEMENTAL SPECIFICATION

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 02514, HYDRANTS AND VALVES
- C. Section 02515, SERVICE CONNECTIONS
- D. 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	22-½° Bends	11-¼° 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.

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 3 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

SUPPLEMENTAL SPECIFICATION

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. 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

02080

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

An electronic PDF 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 non-pressure 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 non-pressure 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	Minimum Time	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	
6	5:40	398	0.854 L	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

SUPPLEMENTAL SPECIFICATION

SECTION 02100

SITE WORK

A. WORK INCLUDED

1. Work under this Section includes all work specified herein including Site Preparation, any Earthwork not included in Common Excavation, Sawcutting pavement and concrete, Landscaping & Hardscape, and Cleanup & Restoration upon completion of such construction to the extent practicable. Site work shall consist of all work necessary to complete the project that is not covered under a separate bid item but that is indicated or reasonably implied in the drawings, including but not limited to Items B through E described below.

B. SITE PREPARATION

1. Clearing & Grubbing shall be done in accordance with NHDOT Section 201 as modified herein.
2. Clearing shall be carefully controlled, and exact limits shall be laid out and approved before any clearing is done, including along the roadways. Methods shall ensure against damage to trees to remain. Clearing in easements shall be at an absolute minimum of tree removals. Damaged or scarred trees to remain shall be trimmed of damaged branches and treated with wood paint promptly. Burning and/or chipping shall conform to all applicable State and Town regulations.
3. Clearing & Grubbing shall include tree removal for trees less than 12-inch in circumference.
4. The stumps of all trees and brush cleared shall be removed, together with all major roots and satisfactorily disposed of away from the project.
5. All clean loam grubbed from the work area shall be stockpiled and used for loaming and seeding at project clean up. The Contractor shall stockpile at a location approved by the Engineer.
6. Demolition, Removal, & Replacement
 - a. Where required, the CONTRACTOR will remove and replace existing fencing. All fence removal and replacement shall be coordinated with the OWNER and the landowner, prior to proceeding.

- b. Where required, the CONTRACTOR will remove and reset electrical guy wires. All guy wire removal and resetting shall be coordinated with the OWNER and the utility company, prior to proceeding.
- c. All materials encountered/removed that are not wanted (salvaged) by the Cooperative are to be removed and legally disposed of by the Contractor.

C. EARTHWORK

Earthwork shall be done in accordance with applicable technical specifications and as required on the project plans.

1. Earthwork & Miscellaneous Site Work

- a. This work shall consist of excavation of all material (not paid under Item 203.1 Common Excavation (F)), excavation support (sheeting and shoring if required); dewatering; placement and compaction of all material required for the work, and necessary disposal of all other material. Embankment-in-place shall consist of furnishing common borrow, placing and compacting the total volume of embankment material required to construct fills below subgrade and within template lines as shown on the plans.
- b. Earthwork and miscellaneous site work shall consist of support or replacement of existing utilities, sawcutting pavement, stripping and stockpiling of topsoil, excavation of all materials, backfill, cut and fill, providing borrow, compaction and grading required to complete the project in a manner that will promote positive drainage along roadsides and curb lines to drainage receptacles, including but not limited to excavation to subgrade, embankment in place, base gravel preparation, swales and blending in of slopes.
- c. Other earthwork not mentioned here but indicated or reasonably implied in the drawings shall be included in the work of this section. Any sawcutting of pavement and concrete shall be considered incidental to the site work.

D. LANDSCAPING & HARDSCAPE

- 1. All landscaping and hardscape work shown on the plans not covered by another pay item shall be incidental to Site Work, including connecting to and reconstruction of walkways (brick, concrete, stone & other) and non-paved driveways, removing and replanting of landscaping and other landscape work, protecting trees and plants, pruning, protecting porches when installing utilities in close proximity, removing and resetting of steps, removing and resetting of mailboxes.

E. CLEANUP & RESTORATION

Cleanup & Restoration shall be done in accordance with applicable technical specifications and as required on the project plans. Restoration shall include items such as turf establishment, project cleanup, performing miscellaneous work and restoring all disturbed property, removal and replacement of existing signs and similar construction as required for all equipment, materials, labor and incidental work necessary for the satisfactory completion of the work. Work shall include removal of accumulated sediment from areas impacted from construction at the end of each work week. Any restoration item not specifically mentioned

here, but necessary to restore conditions to their original form, is considered incidental to this item.

1. Turf Establishment

Turf Establishment shall include grading; preparation of subgrade and surface; placement, spreading, and furnishing and grading of loam; application of seed, fertilizer, lime & mulch (hydraulic); watering seeded areas on a regular basis; ensuring proper growth of grass; and all work required for turf establishment.

END OF SECTION

SUPPLEMENTAL SPECIFICATION

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 workarea.
- 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. SPECIAL CONDITIONS
- B. Section 00890, PERMITS
- C. Section 01567, POLLUTION CONTROL AND ENVIRONMENTAL PROTECTION
- D. Section 01710, PROJECT CLEANING
- 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 Contractor 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, Anthophyllite, 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 01567. 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

SUPPLEMENTAL SPECIFICATION

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

02221

SUPPLEMENTAL SPECIFICATION

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

SUPPLEMENTAL SPECIFICATION

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 01567, POLLUTION CONTROL AND ENVIRONMENTAL PROTECTION
- C. Section 02252, SUPPORT OF EXCAVATION
- D. Section 02300, EARTHWORK

1.03 SYSTEM DESCRIPTION:

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 01567 POLLUTION CONTROL AND 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

02222

SUPPLEMENTAL SPECIFICATION

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

SUPPLEMENTAL SPECIFICATION

SECTION 02275 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:

PART 2 – PRODUCTS

2.1 MATERIALS

- A. Construction fabrics shall be divided into four categories:
1. Soil Stabilization - Geogrid (TRIAX)
 2. Erosion Control
 3. Sediment Control
 4. Drainage/Soil Separation (trench)

2.2 SOIL STABILIZATION (GEOGRID)

- A. The geogrid material shall be manufactured from a polypropylene sheet, oriented in three (3) equilateral directions.
- B. The fabric shall be inert to commonly encountered chemicals, liquids and other material, and shall be resistant to ultraviolet light, mildew, rot or other deterioration.
- C. The fabric shall have the following physical characteristics:
- | | | |
|-----------------------|-----------------------------|----------------|
| 1. Rib pitch | 1.6 inches (nominal) | |
| 2. Radial stiffenings | 20,000 lb/ft at 0.5% strain | ASTM D 6637-01 |
| | (at low strain) | |
- D. Acceptable manufacturers:
1. Tensar International
 2. or equivalent

2.3 PERMANENT EROSION CONTROL

- A. The fabric specified herein is suitable for medium duty applications beneath riprap or revetments.
- B. Material shall be a woven or non-woven fabric made of polypropylene or polyester fabric.
- C. The fabric shall be inert to commonly encountered chemicals, liquids and other material, and shall be resistant to ultraviolet light, mildew, rot or other deterioration.
- D. The fabric shall have the following physical characteristics:
- | | | | | |
|----|-----------------------|--------------------|-----|-------------|
| 1. | Grab Tensile Strength | lbs. | 150 | ASTM D 4632 |
| 2. | Apparent Opening Size | US Standard Sieve | 100 | ASTM D 4751 |
| 3. | Water Flow Rate | gal/min/SF | 100 | ASTM D 4491 |
| 4. | Grab Elongation | % | 40 | ASTM D 4632 |
| 5. | Trap Tear Strength | lbs. | 90 | ASTM D 4533 |
| 6. | Mullen Burst Strength | psi | 300 | ASTM D 3786 |
| 7. | Permittivity | sec. ⁻¹ | 1.5 | ASTM D 4491 |
| 8. | Weight | oz./sy | 7.0 | |
- E. Acceptable manufacturers:
1. Amoco
 2. Mirafi
 3. or equivalent

2.4 SEDIMENT CONTROL

- A. The fabric specified herein is suitable for general purpose siltation fencing.
- B. Material shall be a woven fabric made of polypropylene or polyester mono-filaments.
- C. The fabric shall be inert to commonly encountered chemicals, liquids and other material, and shall be resistant to ultraviolet light, mildew, rot or other deterioration.
- D. The fabric shall have the following physical characteristics:
- | | | | | |
|----|-----------------------|--------------------|-----|-------------|
| 1. | Grab Tensile Strength | lbs. | 100 | ASTM D 4632 |
| 2. | Water Flow Rate | gal/min/SF | 35 | ASTM D 4491 |
| 3. | Grab Elongation | % | 30 | ASTM D 4632 |
| 4. | Trap Tear Strength | lbs. | 70 | ASTM D 4533 |
| 5. | Mullen Burst Strength | psi | 300 | ASTM D 3786 |
| 6. | Permittivity | sec. ⁻¹ | 1 | ASTM D 4491 |
- E. The fabric shall be supported on a 1 1/2 inch hardwood stake spaced a 6 foot (max) intervals.
- F. Fabric may be stapled or fastened to the stake with loops designed to adequately support the weight of the fabric and siltation load.
- G. Acceptable manufacturers:
1. Amoco
 2. Mirafi
 3. or equivalent

2.5 DRAINAGE AND SOIL SEPARATION (TRENCH)

- A. The fabric specified herein is suitable for medium duty applications to sequester drainage stone or retain bedding stone around a pipe.
- B. Material shall be a non-woven fabric made of polypropylene or polyester fabric.

C. The fabric shall be inert to commonly encountered chemicals, liquids and other material, and shall be resistant to ultraviolet light, mildew, rot or other deterioration.

D. The fabric shall have the following physical characteristics:

1.	Grab Tensile Strength	lbs.	160	ASTM D 4632
2.	Apparent Opening Size	US Standard Sieve	70	ASTM D 4751
3.	Water Flow Rate	gal/min/SF	130	ASTM D 4491
4.	Grab Elongation	%	50	ASTM D 4632
5.	Trap Tear Strength	lbs.	80	ASTM D 4533
6.	Mullen Burst Strength	psi	350	ASTM D 3786
7.	Permittivity	sec. ⁻¹	2	ASTM D 4491
8.	Weight	oz./sy	8.0	

E. Acceptable manufacturers:

1. Amoco
2. Mirafi
3. or equivalent

2.6. GEOTEXTILE FABRIC – OVERLAY ON POROUS MEDIA TRENCH LINER

A. Material shall be a non-woven fabric made of polypropylene or polyester fabric.

B. The fabric shall be inert to commonly encountered chemicals, liquids and other material, and shall be resistant to ultraviolet light, mildew, rot or other deterioration.

C. The fabric shall have the following physical characteristics:

1.	Grab Tensile Strength	lbs.	230	ASTM D 4632
2.	Apparent Opening Size	US Standard Sieve	100	ASTM D 4751
3.	Puncture Strength	lb	120	ASTM D 4833
4.	Grab Elongation	%	50	ASTM D 4632
5.	Trap Tear Strength	lbs.	95	ASTM D 4533
6.	Mullen Burst Strength	psi	350	ASTM D 3786
7.	Permittivity	sec. ⁻¹	0.70mi	ASTM D 4491
			n	
8.	Weight	oz./sy	10.0	

D. Acceptable manufacturers:

1. Amoco
2. Mirafi
3. or equivalent

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

SUPPLEMENTAL SPECIFICATION

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. SPECIAL CONDITIONS
- B. Section 02240, DEWATERING
- C. Section 203, EXCAVATION AND EMBANKMENT
- D. Section 206, STRUCTURE EXCAVATION
- E. Section 02275, GEOTEXTILE FABRICS
- F. 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 Construction1.04 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
No. 200	0-15

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

SUPPLEMENTAL SPECIFICATIONS

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 01330, SUBMITTALS
- B. Section 01331, TELEVISION INSPECTION LOGS FOR SEWER
- C. Section 01535, TEMPORARY BYPASS PUMPING
- D. 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 01535, TEMPORARY BYPASS PUMPING. 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, TELEVISION INSPECTION LOGS FOR SEWER for required documentation to be submitted.

1.07 WARRANTY:

- A. The joint and circular crack sealing shall be warranted 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). 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, TELEVISION INSPECTION LOGS FOR SEWER, 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.
- B. Flow control shall be in accordance with Section 01535, TEMPORARY BYPASS PUMPING.
- E. 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.
- F. Removal of obstruction caused by protruding taps shall be in accordance with Section 02443, SERVICE CONNECTION REHABILITATION.
- G. 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

SUPPLEMENTAL SPECIFICATION

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

SUPPLEMENTAL SPECIFICATION

SECTION 02512

RIGID INSULATION

PART 1 GENERAL

1.01 REQUIREMENTS INCLUDED

Furnish and install rigid insulation for protecting pipes and structures from freezing conditions where minimum separation distances between pipes or between pipes and structures is not provided, and in pipe trenches when minimum cover of 6-ft to crown of pipe cannot be achieved. Commercially available insulation products shall be utilized.

1.02 RELATED REQUIREMENTS

- A. Section 01330 – Submittals
- B. Section 02080 – Ductile Iron Pipe and Fittings
- C. Section 02085 – Polyvinyl Chloride Gravity Pipe and Fittings

1.03 SUBMITTALS

- A. Provide all required manufacturer's certifications and test results in accordance with Section 01400 prior to delivery of the rigid insulation.

PART 2 PRODUCTS

2.01 ACCEPTABLE MANUFACTURES

- A. Owens Corning
- B. Dow TUFF-R
- C. Approved product of equal or superior quality.

2.02 MATERIALS

- A. Insulation shall be extruded polystyrene insulation which meets ASTM C578 requirements and shall have the following physical properties as determined by the appropriate test method.

Property	Test Method ²	Required
Thermal Resistance		
minimum R, °F x ft ² x h/btu (RSI, °C x m ² /W)	ASTM C 518	
@ 75°F (24°C) mean temperature		5.0 (0.88)
@ 40°F (4.4°C) mean temperature		5.4 (0.95)
Thermal conductivity		
maximum, k, Btu x in/hr x ft ² x °F	ASTM C 518	

@ 75°F (24°C) mean temperature		0.20
@ 40°F (4.4°C) mean temperature		0.18

Compressive Strength

minimum, lb/in ² (kPa)	ASTM D 1621	15 (103)
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Flexural Strength

minimum, lb/in ² (kPa)	ASTM C 203	60 (414)
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Water Absorption

maximum, % by volume	ASTM C 272	0.10
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Water Vapor Permeance

maximum, perm (ng/Pa•s•m ²)	ASTM E 96	1.1 (63)
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Dimensional Stability

maximum, % linear change	ASTM D 2126	2.0
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Flame Spread

ASTM E 84	5
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Smoke Developed

ASTM E 84	45-175
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Oxygen Index

minimum, % by volume	ASTM D 2863	24
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Service Temperature

maximum, °F (°C)	—	165 (74)
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PART 3 EXECUTION**3.01 DELIVERY AND STORAGE**

- A. Insulation delivered on site shall be clean, new, and bear the manufacturer's identification. Insulation shall be unloaded and stored on site on pallets in accordance with the manufacturer's recommendations.
- B. Insulation damaged en route to the site or during the unloading will be rejected and shall be removed from the site and replaced with new piping insulation meeting specification.

3.02 INSTALLATION OF RIGID INSULATION**A. GENERAL:**

- 1. Place rigid insulation in locations shown on the Plans. Any deviation from the layout shown must be approved by the Engineer.

2. Rigid insulation (minimum 2") shall be installed over (or between) utilities mains and services when there is:
 - a. Less than 2' of separation between storm sewer and sewer utilities
 - b. Less than 3' of separation between storm sewer and water main utilities
 - c. Less than 4' of cover over sewer services
 - d. Less than 3' of cover over storm drains
 - e. Less than 6' of cover over sewer mains in paved areas
 - f. Less than 4' of cover over cross country sewer mains
 - g. Less than 5' of cover over water services

3. Insulation is not allowed for insufficient cover over water mains without prior approval. Water mains require 5' of cover over the crown of the pipe.

END OF SECTION

SUPPLEMENTAL SPECIFICATION

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		

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

SUPPLEMENTAL SPECIFICATION

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
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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 Buffalo Box in sidewalk and gate box in the street.

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

SUPPLEMENTAL SPECIFICATION

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

SUPPLEMENTAL SPECIFICATION

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 PublicWorks 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

SUPPLEMENTAL SPECIFICATION

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, TELEVISION INSPECTION LOGS FOR SEWER
- C. Section 01535, TEMPORARY BYPASS PUMPING
- B. Section 01535, TEMPORARY BYPASS PUMPING SYSTEM
- C. Section 02085, POLYVINYL CHLORIDE GRAVITY PIPE AND FITTINGS
- F. Section 02300, EARTHWORK
- G. Section 02518, TRACER TAPE
- H. Section 02531, SEWER CLEANOUTS
- I. Section 02533, CONNECTIONS TO EXISTING STRUCTURES
- J. Section 02631, PRECAST SEWER MANHOLES
- K. 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 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 Contractor shall supply all material, labor, tools, and equipment to modify the existing plumbing to accommodate the new relocation of sewer service. The Contractor 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 homeowner in writing 48 hours in advance.
 4. The Contractor 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 homeowner 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

SUPPLEMENTAL SPECIFICATION

SECTION 02531

SEWER CLEANOUTS

PART 1 - GENERAL

1.01 WORK INCLUDED:

This Section covers furnishing all equipment, materials and labor to provide and install sewer cleanouts as shown on the Drawings and described herein. Final locations of the cleanouts shall be as determined in the field by the Engineer.

1.02 RELATED WORK:

- A. Section 02080, DUCTILE IRON PIPE AND FITTINGS FOR SEWERS
- B. Section 02085, POLYVINYL CHLORIDE GRAVITY PIPE AND FITTINGS
- C. Section 02300, EARTHWORK
- D. Section 02530, BUILDING CONNECTIONS AND DROP CONNECTIONS

1.03 SYSTEM DESCRIPTION:

The sewer cleanout 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 cleanout 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.
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ASTM	D3034	Specification for Type PSM Poly (Vinyl-Chloride) (PVC) Sewer Pipe and Fittings.
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American Water Works Association (AWWA)

AWWA	C900	Polyvinyl Chloride (PVC) Pressure Pipe, 4-inch through 12 inch, for Water Distribution.
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AWWA	C110	Ductile -Iron and Gray-Iron Fittings
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- 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 CLEANOUTS:

- A. Cleanouts 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.
- 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 cleanout considered for payment.
- C. Building connection piping from the cleanout 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 cleanouts, 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 cleanout piping and then backfill carefully to avoid dislocating or damaging the cleanout piping.
- C. The completed cleanout shall be tested with and subject to the same test requirements as the sewer main to which it is attached.

END OF SECTION

SUPPLEMENTAL SPECIFICATION

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 02630, BUILD MANHOLE INVERT

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 APPLICABLEPART 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 02630, BUILD MANHOLE INVERT.

END OF SECTION

SUPPLEMENTAL SPECIFICATION

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

SUPPLEMENTAL SPECIFICATION

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, TELEVISION INSPECTION LOGS FOR SEWER
- D. Section 01535, TEMPORARY BYPASS PUMPING

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

SUPPLEMENTAL SPECIFICATIONS

SECTION 02631

PRECAST SEWER 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, sand holes, 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 pick up 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 E.J. 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

Depth (Feet)	Diameter (Inches)		
	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

SUPPLEMENTAL SPECIFICATION

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 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.

1.03 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 Other	3 min.	90%
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

SUPPLEMENTAL SPECIFICATION

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 Portland Cement	20 lb.
Ground Granulated Blast 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

F. SUPPLEMENTAL SPECIFICATIONS

NHDOT TECHNICAL SPECIFICATIONS, AMENDMENTS & 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 prices. Work itemized with NHDOT item numbers shall be in accordance with NHDOT Standard Specifications. Additional General Requirements, Supplemental Specifications and Special Provisions for this project are included in Sections D, E & F. All other work not described in Sections D, E & F shall be performed in accordance with the Standard Specifications.

SPECIAL PROVISION

AMENDMENT TO SECTION 201

TREE CLEARING, TRIMMING & RELOCATION AND GRUBBING

Amend Section 201 to include:

Construction:

Add 3.1.9: Contractor to obtain approval from the City and homeowners prior to any tree work.

Add 3.1.10: Trees shown for removal, or identified as requiring removal due to Contractor’s methods, shall be replaced with a similar type of tree. Tree size shall match the removed tree, to a maximum of 5” caliper

Add 3.1.11: Relocation of small trees shall be coordinated with the City prior to relocating.

Add 3.5: Tree Protection - Refer to SPECIAL CONDITIONS, PROSECUTION OF WORK for protection of existing trees and penalties for tree damage.

Add 3.5.1: The Contractor shall be held responsible for the health and survival of the existing trees in the immediate vicinity 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.

Method of Measure

Amend 4.1: Tree Clearing & Relocation, Grubbing will subsidiary to the Site Work pay item 3.01 (see Section 02100).

Basis of Payment

Amend 5.1: Tree Clearing & Relocation, Grubbing will subsidiary to the Site Work pay item 3.01

<u>Pay item</u>		<u>Pay unit</u>
3.01	Sitework	Lump Sum
201.21	Removing Small Trees	Each
201.4	Removing Stumps	Each
201.9	Tree Protection	Each

SPECIAL PROVISION

AMENDMENT TO SECTION 202

REMOVAL OF STRUCTURES AND OBSTRUCTIONS

Amend Section 202 to include:

Construction:

Add 3.3.4: Contractor shall remove and dispose of asbestos cement pipe where encountered in the trench, as directed by the Engineer. If Contractor chooses to abandon the pipe in place, the cost is subsidiary to utility installation and the Contractor will not be paid separately.

Method of Measure:

Add 4.7: Remove and dispose of asbestos cement pipe (where encountered) will be measured by the linear foot to the nearest 1 ft., measured in place prior to removal if practicable; otherwise, the length of pipe removed will be computed as the product of the number of commercial lengths and the nominal lengths.

Basis of Payment:

Add 5.10: Remove and dispose of asbestos cement pipe (where encountered) will be paid for at the Contract unit price per linear foot.

<u>Pay item</u>		<u>Pay unit</u>
202.31	Fill Abandoned Pipe	Cubic Yard
202.32	Fill and Abandon Structure	Cubic Yard
202.43	Remove and Dispose of Asbestos Cement Pipe (Where Encountered)	Linear Foot
202.5	Removal of Drainage or Sewer Structure	Each

SPECIAL PROVISION

AMENDMENT TO SECTION 203

EXCAVATION AND EMBANKMENT

Amend Section 203 to include:

Classification of Material

Amend 2.2: Rock excavation shall consist of all solid rock that cannot be removed without blasting, ripping or hammering with hoe ram. It shall also consist of boulders, masonry structures and concrete slabs when found to be greater than 6 inches in thickness and 2 cubic yards in volume.

Amend 2.4: Muck shall consist of deposits of saturated or unsaturated organic soils having an organic content of 20 percent or greater by weight as determined by AASHTO T 267 and is greater than 2 feet thick when in the upper soil profile (topsoil) and is determined to be unsuitable for foundation material. The material contains partially decayed organic matter, is fibrous in texture, dark brown or black in color, and has an odor of decay. Muck is considered unsuitable material.

Amend 2.7: Unsuitable material shall consist of any saturated or unsaturated natural or man-made material such as, but not limited to, stumps, vegetation, muck, demolition debris and structures encountered during the work that the Engineer determines to be unsuitable for foundation material.

Basis of Payment

Amend 5.1.8: Excavation of unsuitable material beneath embankment areas or at subgrade will be paid for as Unsuitable Excavation and Replacement with Screened Gravel, unless material is classified as rock, structure, or other excavation item. When the excavation is classified the payment for underlying unsuitable material will be made under the classified item

Amend 5.1.9: Gravel backfill material as specified in 3.6.1 (1), or (3) used to backfill unsuitable material excavation beneath embankment areas or at subgrade will be subsidiary to Unsuitable Excavation and Replacement with Screened Gravel and will not be paid for separately. Rock backfill as specified in 3.6.1 (2) or (3) will be subsidiary to Rock Excavation and will not be paid for separately.

Amend 5.7: When no item for muck excavation is contained in the Contract, muck encountered and verified as meeting that definition will be paid for under Unsuitable Excavation and Replacement with Screened Gravel.

Amend to Pay Items and Units

Pay Item

203.1 Common Excavation (F)

203.2 Rock Excavation

203.41 Unsuitable Excavation and Replacement with Screened Gravel

Pay unit

Cubic Yard

Cubic Yard

Cubic Yard

SPECIAL PROVISION

AMENDMENT TO SECTION 206

STRUCTURE EXCAVATION

Amend Section 206 to include:

Construction Requirements

Amend 3.4: Blasting will not be permitted.

Add 3.5: Contractor shall submit a Ledge Removal Plan for approval a minimum of 10 working days prior to beginning Rock Structure Excavation. The plan must include Vibration Monitoring Plan and a pre-construction condition survey of adjacent public and private structures as described in Section 211. The Ledge Removal Plan must provide the proposed removal techniques for rock excavation activities that comply with vibration limits established by the Vibration Monitoring Plan. A post-construction condition survey is required at the end of the Rock Structure Excavation work.

Method of Measure

Amend 4.4: Common Structure Excavation - Exploratory shall constitute full compensation for all excavation, backfill, pavement repair, surface restoration, or other work incidental to excavation or restoration of test pits. The pay item units include a crew and equipment necessary to complete the work, size of crew and equipment must be adequate for the work. Duration of work shall begin once excavation begins and conclude when backfill is complete.

Add 4.5: The Ledge Removal Plan will not be measured for payment and is considered subsidiary to the removal pay item. Refer to Section 211 for Vibration Monitoring.

Add 4.6: 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.

Basis of Payment

Add 5.7: Payment for Item 206.2 and 206.3 includes rock excavation and disposal; furnishing and installing gravel borrow in its place, and providing all required documentation.

Add 5.8: 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.

<u>Pay Item</u>		<u>Pay unit</u>
206.19	Common Structure Excavation - Exploratory	Cubic Yard
206.2	Rock Structure Excavation	Cubic Yard
206.2A	Rock Structure Excavation – Coffins Court	Cubic Yard

SPECIAL PROVISION

AMENDMENT TO SECTION 211

VIBRATION MONITORING

Amend Section 211 to include:

Description:

Amend 1.1.1: Sources of construction related vibrations which are covered by this specification include Rock Structure Excavation. The Engineer may expand monitoring to include other construction related vibrations at their discretion.

Add 1.3: Contractor shall be responsible for any and all damage resulting from construction activity vibrations.

Materials

Add 2.1: All and any equipment necessary for monitoring seismic activity as part of vibration monitoring activities.

Construction Requirements

Add 3.2.2(f): Recommendations of rock excavation techniques to implement where vibration limits are identified.

Method of Measurement

Amend 4.1: Vibration monitoring services will be measured by the hour for accountable time on site to the nearest one-quarter hour. The hourly rate is all inclusive of the equipment and personnel necessary to perform the vibration monitoring service. The hourly rate is also all inclusive of equipment and personnel necessary to measure or monitor for potential deformation in structures.

Add 4.2: Vibration Monitoring Plan (VMP) will be measured as a lump sum. The pay item is all inclusive of the equipment and personnel necessary to conduct the pre-construction condition survey, vibration test program, development and implementation of VMP, and post-construction condition survey.

Basis of Payment

Delete 5.1.1 and 5.1.3

Add 5.2: Payment for Vibration Monitoring Report, vibration test program, pre- and post-construction condition surveys will be paid for at the Contract unit price.

Pay Item

211.1	Vibration Monitoring Analysis
211.11	Vibration Monitoring Services

Pay unit

Lump Sum
Hours

SPECIAL PROVISION

AMENDMENT TO SECTION 304

AGGREGATE BASE COURSE

Amend Section 304 to include:

Material Requirements

Add 2.12: Sources of Aggregate and preliminary test results shall be submitted ten working days prior to any placement of material on the job. Failure of these preliminary tests will be grounds for rejection of material from that source. Aggregates will be tested on the job and shall meet these specifications as the material is incorporated into the work. All Measurements shall be in-place compacted quantities in accordance with the plans and specifications.

Add 2.13: ADA Path Crushed Aggregates

- 2.13.1 No combination of shale, clay, coal, or soft particles shall exceed 3.5% by weight.
- 2.13.2 The material shall contain enough binder fines for applicable compaction.
- 2.13.3 The liquid limit for the portion of fines passing the No. 40 sieve shall not exceed 25 and the plasticity index shall be between 5 and 10.
- 2.13.4 Base Aggregates shall meet the following gradation:

Sieve	% Passing by Weight
1"	100%
No. 4	25-60%
No. 200	6-12%

- 2.13.5 Tread Aggregates shall meet the following gradation:

Sieve	% Passing by Weight
3/8"	100%
No. 4	50-80%
No. 10	35-70%
No. 200	8-15%

- 2.13.4 Contractor shall submit sieve analysis of material with written certification from an approved testing laboratory stating the material proposed meets or exceeds the specifications.

Method of Measurement

Amend 4.1: Roadbed base course materials of sand, crushed aggregate for shoulders, crushed stone (fine and course gradation) shall be measured by the cubic yard using average lengths, widths and depths of the areas to be filled to the nearest 0.1 cubic yard, or as determined by the engineer. Measurement shall be compacted, complete in place.

Amend 4.4: Crushed stone for drives will be measured by the cubic yard of compacted materials placed within the limits shown on the plans.

Basis of Payment

Amend 5.1: Roadbed base course materials of sand, crushed aggregate for shoulders, crushed stone (fine and course gradation) shall be measured and paid for by the Contract unit price, by the cubic yard.

Amend 5.3: The accepted quantity of crushed stone for drives will be paid for at the Contract unit price per cubic yard complete in place.

Add 5.4: The cost of all laboratory testing including compaction testing at 1 test per 100' in areas to be designated by the Engineer, shall be the responsibility of the Contractor and subsidiary to the pay item.

Amend and Add Pay Item

Pay unit

304.4	Crushed Stone (Fine Gradation) (F)	Cubic Yard
304.45	Crushed Stone for Drives	Cubic Yard

SPECIAL PROVISION

AMENDMENT TO SECTIONS 401 and 403

ASPHALT PAVEMENT

Description

- 1.1 This work shall consist of furnishing and installing bituminous 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.
- 1.2 All references to NHDOT, NHDOT Personnel or the Department may be construed as the Engineer, the City of Portsmouth, their agents and representatives.
- 1.3 Work shall conform to NHDOT Section 401, Tier 2 except as noted herein:
 - 1.3.1 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.
 - 1.3.2 Ride smoothness: Section 401.3.17.3.4.4 shall apply except high points **0.5** inches in 25 shall be corrected.

Materials:

- 2.1 **Materials:** Materials shall conform to NHDOT 401 except the following:
 - 2.1.1 **The maximum amount of Total Reused Binder (TRB) in the pavement mix shall be 0.5% and the mix shall meet all volumetric mix design criteria.**
 - 2.1.2 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.
 - 2.1.3 All ¾" (19mm) and 1 inch (25mm) pavement mixes shall be designed using the 50 gyration N design, unless otherwise specified.
 - 2.1.4 Liquid asphalt cement binder shall have Performance Grade (PG) of PG64-28 for all standard bituminous and PG 64-E for all high strength bituminous pavements. NHDOT QC/QA Specifications shall be followed for high strength mixes.
 - 2.1.5 All high strength asphalt, when specified, shall be 50 gyration unless otherwise specified.
- 2.2 **Pavement Mix Designs:** Pavement mix designs shall meet NHDOT Section 401.2.5.1 except the following:
 - 2.2.1 Minimum asphalt binder content shall be as follows:

Minimum Asphalt Binder Content		
Mix Type	50 Gyration	75 Gyration*
3/8-in (9.5mm)		6.0%
1/2-in (12.5mm)	5.9%	*
3/4-in (19.0mm)	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 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 with stone size above 3/8" not allowed without expressed written permission of the Engineer.

2.2.2 Method requirements NHDOT Section 401.2.6 shall include the following:

2.2.2.1 Coarse Aggregate: Stockpiled coarse aggregate shall meet the requirements of 2.6.1, Table 2.

2.2.2.2 Tolerances: All mixtures shall conform within range of tolerances provided in NHDOT Section 401.2.6.2.

2.2.2.3 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 Section 401 of the NHDOT Standard Specifications **and** as specified in this section.

3.1 Prior to placing any mix, a pre-paving conference shall be held with the Owner, Contractor, and Engineer to discuss the proposed paving schedule, source 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.

3.2 The Contractor shall notify the Engineer one week in advance of paving operations to allow sufficient time for scheduling personnel.

3.3 Any pavement course four inches (compacted depth) or greater shall be placed and compacted in two lifts.

3.4 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.

- 3.5 Surfaces of any pavement course shall have a tack coat of emulsified asphalt applied in accordance with NHDOT Specifications. Application of emulsified asphalt shall be between 0.02 and 0.05 gal/yd².
- 3.6 **Joint adhesive shall be used for all transverse and lateral seams when placing more than 100 tons of asphalt or more. Pavement Joint Adhesive shall be considered included in the price for hot bituminous pavement and no additional compensation will be allowed.**
- 3.7 Utility covers, frames and grates, valves and other castings shall be set and raised. Contact surfaces of the drainage and utility castings shall be painted with a thin coating of suitable bituminous material. Surface pavement shall be removed from covers and casting immediately following pavement operations. Open grates shall be covered to ensure pavement material does not fall into structure.
- 3.8 Method requirements NHDOT Section 401.3.1.2 shall apply.
- 3.9 In addition to 3.7 above, refer to Section 1.3 for additional QC/QA requirements.
- 3.10 Contractor shall place 1-1/2" (compacted thickness - minimum) of temporary pavement at all trench locations at the end of each week.
- 3.11 In the event of an unanticipated long-term shut-down (Winter, etc.), the Contractor shall place 2" (compacted thickness) of temporary pavement as required. Contractor shall submit request to the City for approval. Upon approval, the Engineer will determine the extent and limits of temporary pavement required.
- 3.12 Contractor shall place 2" (compacted thickness) of temporary pavement on Middle Street at the end of each work week.
- 3.13 Contractor shall place 4" (compacted thickness) of permanent pavement on side roads and 5" (compacted thickness) of permanent pavement on Middle Street once utility work is complete.

Method of Measurement:

Amend 4.1: Hot bituminous pavement will be measured as prescribed in 401.4, except that joint adhesive will not be measured separately for payment.

Add 4.2: Hot bituminous pavement - machine method binder will be measured by the ton compacted in place, to the nearest 0.1 ton as measured and approved by the Engineer.

Add 4.3: Hot bituminous pavement - machine method wearing will be measured by the ton compacted in place, to the nearest 0.1 ton as measured and approved by the Engineer.

Add 4.4: Temporary trench patch will be measured by the linear foot compacted in place using hand methods, to the nearest foot as measured and approved by the Engineer.

Add 4.5: Permanent trench patch will be measured by the linear foot compacted in place using hand methods, to the nearest foot as measured and approved by the Engineer.

Add 4.6: Both temporary and permanent trench patch shall be measured along the horizontal centerline of the trench, regardless of the width of the trench patch. Measurement for lateral

trench patches (Example water service off water main) shall be measured from the edge (3 foot off centerline) of the trench.

Basis of Payment:

Amend 5.1: The accepted quantities of hot bituminous pavement – machine method binder and hot bituminous pavement – machine method wearing will be paid for at the Item Bid Price per ton for the bituminous mixture, complete in place.

Amend 5.3: The accepted quantity of temporary and permanent trench patch shall be paid for at the contract unit price per linear foot (regardless of width).

Add 5.3.2: Temporary and permanent trench patch unit price shall constitute full compensation for the furnishing of all labor, equipment and materials associated with installing bituminous trench patches via hand method in accordance with the Drawings and Specifications. Trench patch shall include installing new road base crushed stone at the thickness and material types shown on the trench patch detail.

Add 5.3.3: Temporary and permanent trench patch unit price shall include, but not limited to; saw cutting pavement to create sharp stable edges; excavating and disposing of existing pavement and base material; backfilling; installing new roadway base material (includes furnishing and installing additional crushed stone material to maintain a suitable travel surface); cleaning existing pavement edges; coating existing pavement edges with emulsified asphalt prior to and after placement of asphalt; tack coating; furnishing and installing bituminous pavement; compacting; and all other work required for or incidental to the satisfactory completion of this item.

<u>Pay item</u>		<u>Pay unit</u>
403.11A	Machine Method, Binder	Ton
403.11B	Machine Method, Wearing	Ton
403.12	Hand Method	Ton
403.7	Temporary Trench Patch	Linear Foot
403.8	Permanent Trench Patch	Linear Foot

SPECIAL PROVISION

AMENDMENT TO SECTION 603

CULVERTS AND STORM DRAINS

Amend Section 603 to include:

Description

1.2 Work shall also include constructing 6" PE drain laterals to each property and provide a 6" PE riser or a cast iron downspout boot as shown on the drawings or where directed.

Materials

2.13 Cast Iron downspout boot for PE drain laterals shall be "A Series –Angular Downspout Boots" as manufactured by J.R. Hoe and Sons, Inc. or approved equal.

Construction Requirements

Replace 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 3.11.1 Cast iron downspout boots shall be secured to the foundation using stainless steel bolts and anchoring inserts sized as specified by the manufacturer.

Add 3.11.2 Provide PE bends and fittings as required to connect 6" PE pipe at the required angle to the downspout boot with a flexible coupling.

Add 3.2: 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.

Method of Measurement

Basis of Payment

Replace 5.8: Backfill, including crushed stone bedding material shall be subsidiary to the pipe item.

<u>Pay item</u>	<u>Pay unit</u>
603.8126 6" Dia. CPDT Drain Service	Linear Foot
603.8128 8" Dia. CPDT Drain Service	Linear Foot
603.82212 12" Dia. HDPE Drain Pipe	Linear Foot
603.82215 15" Dia. HDPE Drain Pipe	Linear Foot
603.82218 18" Dia. HDPE Drain Pipe	Linear Foot
603.82224 24" Dia. HDPE Drain Pipe	Linear Foot
603.83215 15" Dia. HDPE Drain Pipe, Double Wall	Linear Foot

SPECIAL PROVISION

AMENDMENT TO SECTION 604

CATCH BASINS, DROP INLETS, AND MANHOLES

Amend Section 604 to include:

Description

Add 1.4: All structures throughout the project shall be constructed of the same materials.

Materials

Amend 2.4 All brick used for casting adjustment and invert tables shall be clay brick conforming to AASHTOM32 Grade SS. Maximum water absorption shall be 3%-4% during the five-hour boil test. The use of concrete brick will not be permitted.

Amend 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: Castings shall be gray iron, Class 30, conforming to AASHTO M105, unless otherwise specified.

Add 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 EastJordan.

Amend 2.9: Prefabricated adjustment rings are not allowed.

Add 2.11: Catch basin frames and grates either new or to be replaced shall be NHDOT Type B and be fabricated in the USA. All catch basin frames (single and double) installed at granite curbing locations shall be 3-flanged. All catch basin frames (single and double) installed with no granite curbing shall be 4-flanged.

Add 2.12: Drain manhole frames and covers shall be dual hinged, Ergo XL from EJIW – 41421043L01 with “DRAIN” lettering on cover. 32” Hinged and gasketed with locking cam and be fabricated in the USA.

Add 2.12.1 CB hoods (oil and debris separators) shall be “Snout” as manufactured by Best Management Products, “The Eliminator” as manufactured by Ground Water Rescue, Inc, or approved equal.

Add 2.13: Sewer manhole frames and covers shall be dual hinged Ergo XL from EJIW – 32” Hinged and gasketed with locking cam and be fabricated in the USA. Covers shall have the City Logo and will be purchased from the City at cost then installed normally.

Add 2.14: Composite hood devices shall be constructed of molded High Density Polyethylene (HDPE) with an Anti-syphon opening.

2.14.1 Install composite hood devices in structures in accordance with manufacturer’s instructions. Only install hoods as directed by Engineer.

2.14.2 Multiple piece construction will not be allowed.

2.14.3 Mounting hardware shall be used as needed or provided by the manufacturer.

2.14.4 Composite hood devices shall be manufactured by Kleanstream.

Add 2.15: The Contractor shall submit Shop Drawings and manufacturer's literature in conformance with the standard General Conditions of the construction contract.

Construction

Add 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.

Add 3.1.4: All Catch Basins shall be provided with polyethylene liners.

Add 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.

Add 3.11: All drain and sewer manholes shall have brick inverts as shown on the drawings and specified in Section 02630 of the Supplemental Specifications.

Method of Measurement

Delete paragraph 4.1 and **replace** with the following:

4.1 Catch basins or manholes will be measured per vertical foot to the nearest tenth of a foot.

4.1.1 Catch basins and manholes will be measured from the top of the concrete structure to the bottom of the sump.

4.1.2 Drain manholes will be measured from the top of the concrete structure to the inside bottom of the structure.

Amend 4.2: Additional adjustment of drain and sewer structures will be measured per each structure adjusted to final grade.

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 sewer manhole frames and covers will be measured by the number of units installed.

Delete paragraph 4.4 and **replace** with the following:

4.4 Catch basin hoods and polyethylene liners shall be subsidiary to the structure it is being used in.

Add 4.5: Field cores completed of the type and size specified will be measured per each.

Add 4.6: Structural BMPs will be measured per each structure installed.

Basis of Payment

Delete paragraph 5.1 in its entirety and replace with the following:

5.1 The accepted quantities of catch basins and drain manholes, which includes the necessary frames and grates or covers, of the type and diameter specified will be paid at the Contract unit price per **vertical foot** complete and in place. Drop inlets, which include the necessary frames and grates, of the type and diameter specified will be paid at the Contract unit price per **each** complete in place. Installing catch basins, drain manholes, and drop inlets include sawed pavement, common structure excavation and setting to final grade to depth specified on the drawings, bedding if required, backfill, removal of existing structures within the limit of excavation, and systems installed to pre-drain soils not paid for under separate items.

5.1.1 All rock structure excavation, any common structure excavation below the depth specified on the drawings, and excavation of unsuitable material below the bottom of each catch basin, drop inlet, and manhole will be paid under the respective pay items.

5.1.2 Payment will include adjustment of structures to binder grade.

5.1.3 Water repellent treatment for new drainage structures will be subsidiary.

5.1.4 Construction of brick inverts in manholes (or removal and replacement of brick inverts) invert and replacement of the existing casting with new type including final adjustment of frames is subsidiary to manholes.

Add 5.3.1: Removal and disposal of existing frames and grates shall be subsidiary.

5.4 The accepted quantities of frames and grates or manhole covers will be paid for at the Contract unit complete in place, including setting to final grade and necessary brick adjustment (new or existing).

5.4.1 Removal and disposal of existing non-conforming or damaged units shall be subsidiary to this item.

Delete paragraph 5.5 and **replace** with the following:

5.5 Catch basin hoods Polyethylene liners installed in new catch basins and drop inlets will be subsidiary to those items.

Add the following paragraphs:

5.6 Accepted quantities for the replacement of existing catch basin frame and grates with new drain manhole frame and covers or curb inlet assemblies will be paid at the contract unit price per each complete and in place including common structure excavation to expose existing castings, removal and disposal of existing casting (or returning casting to the owner if requested), preparation of concrete for adjustment to grade as required, placement of new assemblies, and placement and compaction of suitable backfill (gravels

if within the roadway cross section).

5.7 Accepted quantities of field cores of existing structures will be paid at the contract unit price per each field core complete and in place, including the boot.

5.7.1 Any common structure excavation, rock structure excavation, and backfill (even if core is completed at a different time than pipe installation, will be subsidiary to respective pipe item for which the field core is intended.

5.8: Adjustments from binder to final grade for all existing drop inlets, catch basins, drain manholes, sewer manholes, gate valves, and water curb stops shall be paid for under respective pay items. All adjustments to new drop inlets, catch basins, drain manholes, sewer manholes, gate valves, and water curb stops to binder grade shall be subsidiary to the cost of the structure. No extra payment shall be made for lowering or raising structures for reclaiming activities.

5.9: Structural BMPs will be paid at the contract unit price per each structural BMP complete and in place.

<u>Pay Item</u>		<u>Pay unit</u>
604.12	New Catch Basin Type B, 4' I.D.	Each
604.242	Drop Inlet Type D-B	Each
604.32	New Drain Manhole, 4' I.D.	Each
604.48	Connect to Existing Structure (Core & Boot)	Each
604.5A	Additional Adjustment of Drain and Sewer Structures	Each
604.5B	Additional Adjustment of Gate Valve and Water Curb Stops	Each
604.6	Sewer or Drain Frame & Cover	Each
604.72	Catch Basin Frame & Grate, Type B	Each
604.93	Structural BMPs	Each

SPECIAL PROVISION

AMENDMENT TO SECTION 605

UNDERDRAINS

Amend Section 605 to include:

Construction

Add 3.3.1: 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.

Basis of Payment

Replace 5.1: The accepted quantities of underdrain of the type specified will be paid for at the Contract unit price per linear foot in place, including geotextile fabric, common structure excavation, crushed stone bedding material and backfill.

Pay item

605.524 24" Perforated Corrugated Polyethylene
Pipe Underdrain

Pay unit

Linear Foot

SPECIAL PROVISION

SECTION 608

SIDEWALKS

Amend Section 608 to include:

Description

Amend 1.1: This work shall consist of constructing sidewalks of either hot bituminous pavement, Portland cement concrete, reinforced when specified, Brick, or Pavers. Portland cement concrete sidewalks shall receive a protective coating unless otherwise directed.

Materials

Amend 2.2: Portland cement concrete shall be Class AA (4000 psi) conforming to Section 520.

Add 2.3.1: Curb ramps (at crosswalk locations) shall be 6" deep, class AA 4000 psi synthetic fiber reinforced.

Add 2.3.2: 4" sidewalks shall be reinforced with synthetic fibers.

Add 2.6: New bricks shall be manufactured by Pine Hall Brick and shall be Traditional edge, Pathway, Full Range. The bricks shall not be cored or have frogs and shall be of a standard size (2.25" x 4" x 8"). The Engineer will have 5 working days to approve the brick submittals before they are installed. It is the responsibility of the Contractor to provide suitable brick samples for approval.

Add 2.6.4: Detectable warning surfaces for straight curb ramps shall consist of panels from Neenah Foundry, East Jordan Iron Works, or approved equal. Detectable warning surfaces for radius curb ramps shall consist of a combination of straight and wedge panels from Tuftile or approved equal. The units shall be cast into Portland cement or other owner approved material, as recommended by the manufacturer. The panels shall be of cast iron.

Add 2.6.5: Straight curb ramps shall use panels with a minimum width of 24". Cutting of panels is prohibited. Radius curb ramps shall consist of a combination of straight and wedge panels matching the curvature of the curb ramp. Calculation of panel sizes, types and quantities shall be determined by the manufacturer. All panels shall be a minimum of 24" in depth and shall span the entire width of the ramp.

Construction Requirements

Amend 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.

Amend 3.3.3: Install detectable warning devices and any anchoring hardware in accordance with manufacturer's instructions. Panel shall be set in a bed of 6" wet concrete.

Add 3.4 Brick and Paver Sidewalks

- 3.4.1 Excavation for sidewalks shall be at a depth of 13 inches below finish grade. In areas not butting curbing or buildings, the excavation shall be 6 inches wider than the finished sidewalk width. At all drive crossings, the depth of excavation shall be increased accordingly. The Contractor's price shall include neat and square cutting of existing asphalt road surface as needed. All unsuitable material shall be removed and disposed of off-site at the Contractor's own expense.
- 3.4.2 The base material for sidewalks shall consist of 304.4 crushed stone (fine gradation) to a minimum depth of 8". Base material to extend past edge of sidewalk 6" in areas not adjacent to walls, curb or buildings.
- 3.4.3 A 3/8" bituminous asphalt hot mix pavement shall be placed parallel to grade and compacted to a minimum thickness of 2". Asphalt base to be extended 6" in areas where edging is to be used. Bituminous pavement shall be paid for under pay item 403.12.
- 3.4.4 Place a 1:3 Portland cement / course sand mix on the asphalt base to a thickness of 1". Pavers to be dry laid on the mixture.
- 3.4.5 The Contractor shall lay the bricks so that approximately 4.5 bricks shall cover one square foot (tight joints).
- 3.4.6 The sidewalk shall pitch 1/4 inch per foot towards the street or as directed.
- 3.4.7 In areas where the edge of the brick sidewalk is not adjacent to granite curbing or buildings, the Contractor shall install edging to hold the bricks in place. Such edging shall be installed per the manufacturer's recommendations and incidental to the pay item.
- 3.4.8 In areas with a closed drainage system, the contractor shall provide "silt sacks" to prevent brick dust from entering the collection system. The area shall be swept daily to keep dust levels as low as possible.
- 3.4.9 All half bricks needed for running bond work will be snapped if possible and all efforts will be made to keep brick dust to a minimum. All cuts not made by snapping will be wet cut.
- 3.4.10 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

Amend 4.3: ADA Detectable warning panels will not be measured.

Basis of Payment

Amend 5.4: ADA Detectable warning panels will be subsidiary to Item 608.36.

<u>Pay item</u>		<u>Pay unit</u>
608.34	4" Concrete Sidewalks (Fiber Reinforced) (F)	Square Yard
608.36	6" Concrete Sidewalks (Fiber Reinforced with Accessible Ramps and Detectable Warning Plates) (F)	Square Yard
608.5A	Brick Sidewalk (F)	Square Yard

SPECIAL PROVISION

SECTION 609

CURBING

Amend Section 609 to include:

Materials

Add to 2.1: Curbing shall be manufactured by Swenson Granite Works, Concord, NH.

Construction:

Amend 3.3.1: Curbing to be reset shall be carefully removed and stored. Curb shall be removed in such a manner as to not chip the ends when lifting. The contractor shall replace any curbing damaged or lost because of his negligence. All exposed portions or reset curbing shall be cleaned by sand blasting.

Add 3.3.2: Granite curb to be reset shall be 3.5 feet in length (minimum) and 18" height (minimum) and in good condition.

Basis of Payment

Amend 5.3: Class A Concrete backfill will be used for curb installation and will be subsidiary.

<u>Pay item</u>		<u>Pay unit</u>
609.01	New Straight Vertical Granite Curb	Linear Foot
609.02	New Curved Vertical Granite Curb	Linear Foot
609.5	Remove & Reset Granite Curb	Linear Foot

SPECIAL PROVISION**AMENDMENT TO SECTION 615 – TRAFFIC SIGNALS****Sign Material and Post Requirements**

This special provision, in addition to other issues, removes demountable copy, emphasizes that digital printing is not allowed, updates reference documents, updates the concrete class for bases, and removes the final pay designation for signs. For further information with respect to overhead sign structures, see the additional special provision to Section 615.

Amend 1.2.3 to read:

1.2.3 Traffic Signs Type C and Type CC shall be flat sheet aluminum signs with retroreflective sheeting background and non-embossed copy unless otherwise shown on plans. Type C signs shall include steel 2" square tube post mounts with 2 ¼" anchors.

Amend 2.5.1.1 to read:

2.5.1.1 Blank.

Add 2.5.3.1 to read:

2.5.3.1 Steel "U" posts with breakaway support systems may be used. See Section 2.8.1.

Add 2.5.4 to read:

2.5.4 Steel 2" square tube posts shall be rail steel conforming to the requirements of ASTM A 499, Grade 60 or ASTM A 576, Grade 1070-1080, minimum yield strength of 60,000 psi. Posts shall be galvanized in accordance with AASHTO M 111. Steel shall be 12 gauge, minimum. The posts shall have 7/16" holes drilled or punched, before painting, along the center line of all sides.

Amend 2.8.1 (including the addition of 2.8.1.1) to read:

2.8.1 All sign supports and breakaway support systems shall conform to the AASHTO "Standard Specifications for Structural Supports for Highway Signs, Luminaires and Traffic Signals" and shall conform to the testing and evaluation criteria of NCHRP Report 350. Devices not conforming to the criteria shall be replaced with conforming devices at no expense to the Department.

2.8.1.1 The Contractor shall provide a Certificate of Compliance for each sign support and breakaway support system being supplied, stating it meets the testing and evaluation criteria

of NCHRP Report 350 and has been approved by FHWA for use in weak and strong soils. A copy of the FHWA Eligibility Letter for breakaway sign supports shall be submitted with the sign shop drawings.

Amend 2.8.2 to read:

2.8.2 Concrete for bases shall be Class A and shall conform to Section 520. Reinforcing steel shall conform to Section 544.

Add 2.8.6 to read:

2.5.4 Steel 2" square tube posts shall use 2 ¼" anchors for installation.

Amend 2.9, 2.9.1.1, and 2.9.1.3 to read:

2.9 Copy (Words, Logos, Pictographs, Symbols, Arrows) and Borders

2.9.1.1 The design, size, arrangement, color, and spacing of copy and borders shall be in accordance with the current NHDOT Standard Plans for Road Construction, the adopted MUTCD, and the FHWA "Standard Highway Signs".

2.9.1.3 Demountable copy and border will not be accepted.

Add 2.9.1.4 and 2.9.1.5 to read:

2.9.1.4 All sign sheeting, copy, and border materials shall be fabricated from components of compatible systems warranted by the same manufacturer in accordance with the Qualified Products List Product Qualification Criteria/Acceptance Criteria.

2.9.1.5 Digitally printed copy and border will not be accepted.

Amend 2.9.2.1 and 2.9.2.2 to read:

2.9.2.1 The copy and borders shall be constructed using sheeting conforming to 718 - Retroreflective Sheeting. Interstate and Turnpike route shields shall not be silk screened.

2.9.2.2 Blank.

Amend 2.9.3.1 to read:

2.9.3.1 The copy and borders shall be constructed using sheeting conforming to 718 - Retroreflective Sheeting. Interstate and Turnpike route shields shall not be silk screened.

Amend 2.9.4.1 to read:

2.9.4.1 The copy and borders shall be constructed using sheeting conforming to 718 - Retroreflective Sheeting. Acceptable methods of construction include cut-out, overlay film, or silk screening. Interstate and Turnpike route shields shall not be silk screened.

Amend 2.10.1.1 to read:

2.10.1.1 All background sheeting shall conform to Section 718 - Retroreflective Sheeting. Overlay film shall be a product listed on the Qualified Products List.

Add 2.10.1.3 to read:

2.10.1.3 Digitally printed background will not be accepted.

Amend 3.1.3 to read:

3.1.3 Traffic sign details not shown on the plans shall conform to current NHDOT Standard Plans for Road Construction, the adopted MUTCD, and the FHWA "Standard Highway Signs". Traffic sign supports and framing members shall be in accordance with the AASHTO "Standard Specifications for Structural Supports for Highway Signs, Luminaires and Traffic Signals".

Amend 3.2.2 to read:

3.2.2 Preparation of aluminum sheets. Prior to the application of the retroreflective sheeting, the aluminum sheet shall be one piece cut to the required size with the corners at the prescribed radii. All aluminum sheets shall have true and smooth edges, and shall be free of burrs or ragged breaks.

Amend 3.2.4 to read:

3.2.4 Unless otherwise indicated on the sign text layout sheet, the Contractor shall submit shop drawings for all signs for approval showing arrangements, spacing, arrow sizes, corner radii, border widths, indent spacing and colors of copy, and manufacturer. The shop drawings shall also list the types of retroreflective sheeting, overlay, and/or non-reflective materials that are to be used for the background, copy, and borders, in accordance with Section 105.02.

Amend 3.2.5 to read:

3.2.5 Application of Retroreflective Sheeting to Aluminum Plank. The sheeting shall be applied to the face of the extruded aluminum planks by a squeeze roller applicator in accordance with the recommendations of the sheeting manufacturer. The face of the planks shall be completely covered by the retroreflective sheeting. All signs shall contain the date of manufacture and sign size, located in the lower left corner of the front face of the sign (e.g., 3-15 10'x15'). Letters and numbers shall be 2-inch white adhesive pressure copy.

Amend 3.2.6 to read:

3.2.6 Application of Retroreflective Sheeting to Aluminum Sheets. The sheets shall conform to the provisions of 3.2.5, except that the sheeting shall be applied to the aluminum either by the heat vacuum applicator method or by mechanical roller application in accordance with the recommendations of the sheeting manufacturer. All Type C aluminum sheet signs larger than 4' x 4' shall contain the date of manufacture and sign size, located in the lower left corner of the front face of the sign (e.g., 3-15 4'x6'). Letters and numbers shall be 1-inch white adhesive pressure copy. All aluminum sheet signs 4' x 4' and smaller shall contain the date of manufacture and sign size located in the lower right corner on the back of the sign, applied with permanent marker or paint in a legible size (e.g., 3-15, 3'x3').

Delete entire 3.2.7 section.

Add 3.2.7 to read:

3.2.7 Application of Sign Copy and Border. Sign copy and border shall be applied in accordance with manufacturer's recommendations.

Amend 3.3.3 to read:

3.3.3 All sign heights shall be in accordance with the MUTCD or NHDOT Standard Plans for Road Construction.

Delete entire 3.4 section. (See additional Special Provision for Section 615, if necessary.)

Add 3.5.9 to read:

3.5.9 Overhead mounted signs shall be attached to the overhead structure with all new mounting hardware unless otherwise noted on the plans.

Amend 4.2 and 4.3 to read:

4.2 Traffic sign Type C will be measured by the square foot, including all necessary posts, footings, bases, and mounting hardware.

4.3 Traffic sign Type 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. Removing traffic signs Type CC shall be subsidiary unless otherwise noted.

Amend 5.2 and 5.2.1 to read:

5.2 Traffic signs Type C or CC will be paid for at the Contract unit price per square foot, complete in place.

5.2.1 The accepted quantities of removing traffic sign Type C or relocating traffic sign Type C or CC will be paid for at the Contract unit price per each unit.

Add 5.3 to read:

5.3 Removing and resetting Wayfinding Sign shall be measure by the unit. Contractor is responsible for any theft or damage during construction.

Delete all final pay items from the Pay Item and Units section.

<u>Pay item</u>		<u>Pay unit</u>
615.0301	Traffic Signs Type C	Square Feet
615.0601	Traffic Signs Type CC	Square Feet
615.033	Removing Traffic Sign, Type C	Unit
615.034	Relocating Traffic Sign, Type C	Unit
615.074	Remove and Reset Wayfinding Sign	Unit

SPECIAL PROVISION

SECTION 618

UNIFORMED OFFICERS AND FLAGGERS

Amend Section 618 to include:

Description

Add 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

Amend 4.1: Uniformed Officers and Flaggers shall be measured as an allowance based on the dollar amount of invoices, 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.

Basis of Payment

Amend 5.1: Uniformed Officers and Flaggers will be paid by the invoices provided. 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.

Pay Item

618.6 Uniformed Officers
618.7 Flaggers

Pay unit

Dollar
Hour

SPECIAL PROVISION

SECTION 619

MAINTENANCE OF TRAFFIC

Amend Section 619 to include:

Construction Requirements

Add 3.4: All work shall be prosecuted so pedestrian and traffic flow can be maintained. 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 Department prior to its implementation. It should be expected that detours will not be typically allowed for day to day work except for non-preventable road closures caused by the installation of certain structures or systems that would make one-way reversible traffic impossible or unsafe. Two-way traffic must be maintained throughout construction on Middle Street, except for non-preventable lane closures.

Add 3.5: The Contractor will develop a construction staging plan for the project. The plan shall be submitted to be approved by the Engineer.

Add 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.

Add 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

Add 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.

Method of Measurement

Add 4.4: Calcium chloride for dust control will be measured by the pound, based on material slips provided by the Contractor.

Basis of Payment

Amend 5.1.3: The material cost of calcium chloride will be paid for by the pound. The labor and equipment necessary for material application will be subsidiary.

Amend 5.1.4: The material cost of permanent construction signs is subsidiary to the Pay Item.

Add 5.1.10: The following items are subsidiary to the 619.1 Pay Item: Traffic control, construction signs (permanent and temporary), temporary message boards, temporary traffic loops, traffic control plans, traffic cones and barrels and other methods of dust control as ordered by the Engineer.

Pay item

619.1 Maintenance of Traffic

Pay Unit

Unit

619.11	Calcium Chloride for Dust Control	Pound
619.253	Portable Message Boards	Unit Week

END OF SECTION

SPECIAL PROVISION

SECTION 640

LANDSCAPING

Description

1.1 This work shall consist of removal of landscaping items and reconstructing to as good as or better condition. Landscaping items shall include, but not limited to, plantings, landscaping retaining walls, stepping stones, etc. Contractor shall familiarize themselves with the areas of construction to determine the extent of necessary reconstruction.

Materials

2.1 Existing material may be re-used if in good condition.

2.2 If the Engineer has determined the existing materials are not in good condition, or items were damaged during removal, then replacement materials will be required.

Construction Requirements

3.1 The Contractor may carefully remove landscaping items, store and re-install without damage. Items that are in poor condition will require replacement materials. Otherwise, the Contractor shall reconstruct the landscaped areas with new materials.

3.2 Work shall be completed in as good or better condition than the items removed.

3.3 Reconstructed items shall be installed in such a manner as to comply with NHDOT Standard Specifications for the specific item being installed.

3.4 Tree Protection - Refer to SPECIAL CONDITIONS, Prosecution of Work No. 34 for protection of existing trees and penalties for tree damage.

Method of Measurement

4.1: The work shall be measured as an allowance based on the dollar amount of invoices submitted.

Basis of Payment

5.1: Reconstruct Existing Landscaping will be paid by the invoices provided. 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 reconstructing existing landscaping shall be the actual hours spent landscaping.

Pay item

640 Landscaping Allowance

Pay unit

Dollar

END OF SECTION

SPECIAL PROVISION

SECTION 645

EROSION CONTROL

Amend Section 645 to include:

Materials

Add 2.12: Catch basin silt sacks shall be Mirafi Dandy Sack or equal with lift straps, dumping straps, and a manageable 2-foot containment area.

Add 2.13: Compost sock for perimeter berm shall be Filtrexx SiltSoxx Original or equal.

Construction Requirements

Add 3.1.14: Catch basin silt sacks shall be installed and maintained at catch basins until pavement is installed. Sediment and debris shall be removed following each storm event.

Add 3.1.15: Compost sock for perimeter berm shall be installed and maintained on site in areas that have been disturbed outside the roadway limits and are susceptible to erosion. Remove sediment before it has accumulated to one-half of the above-ground height of the silt sock. After a storm event, if there is evidence of stormwater flowing around or undercutting the control, extend the control and/or repair undercut areas.

Method of Measurement

Add 4.10: Catch basin silt sacks will be measured per each silt sack complete in place, as measured and approved by the Engineer.

Add 4.11: Compost sock for perimeter berm will be measure per linear foot, to the nearest foot, of compost sock complete in place as measured and approved by the Engineer.

Basis of Payment

Add 5.11: The accepted quantities of catch basin silt sacks of the type specified will be paid for at the Contract unit price per each in place.

Add 5.12: The accepted quantities of compost sock for perimeter berm of the type specified will be paid for at the Contract unit price per linear foot in place, including anchor stakes and excavation.

<u>Pay item</u>		<u>Pay Unit</u>
645	Catch Basin Silt Sack	Each
645.512	Compost Sock for Perimeter Berm	Linear Foot

END OF SECTION

SPECIAL PROVISION

SECTION 699

MISCELLANEOUS TEMPORARY EROSION AND SEDIMENT CONTROL

Amend Section 699 to include:

Description

Add 1.5: 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

Add 2.1.1: 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

Add 3.1.1: 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.

Pay item

699 Miscellaneous Temporary Erosion and Sediment Control

Pay unit

Dollar

END OF SECTION

APPENDIX A:
GEOTECHNICAL REPORT



GEOTECHNICAL DATA REPORT

20-1734 S

April 4, 2022

Revised April 12, 2022

Proposed Reconstruction of Union Street
& Willard Avenue Areas
Portsmouth, New Hampshire

Prepared For:

CMA Engineers

Attention: Philip A. Corbett, P.E.

35 Bow Street

Portsmouth, NH 03801

Prepared By:

S. W. Cole Engineering, Inc.

10 Centre Road

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Appendix D	Laboratory Test Results

20-1734 S

April 4, 2022
Revised April 12, 2022

CMA Engineers
Attention: Phillip A. Corbett, P.E.
35 Bow Street
Portsmouth, NH 03801

Subject: Geotechnical Data Report
Proposed Reconstruction of Union Street and Willard Avenue Areas
Portsmouth, New Hampshire

Dear Phil:

In accordance with our Revised Proposal dated December 16, 2020, we have performed subsurface explorations for the subject project and prepared this Geotechnical Data Report. This report summarizes our findings, and its contents are subject to the limitations set forth in Attachment A.

1.0 INTRODUCTION

1.1 Scope and Purpose

The purpose of our work was to perform subsurface explorations and testing services for the proposed reconstruction project for the Union Street and Willard Avenue Areas (RFP 16-21) in Portsmouth, New Hampshire. Our scope of services included test boring and test probe explorations, soils laboratory testing, and preparation of this Geotechnical Data Report.

1.2 Site and Proposed Construction

Based on the RFP, we understand the scope of services is located in two primary areas; streets in the Union Street area and streets in the Willard Avenue area. The reconstruction project includes new numerous underground utilities and reconstruction of approximately 5,900 linear feet of roadway for the following locations:

Union Street Area

- Union Street between State Street and Middle Street,
- Austin Street between Union Street and Cabot Street,
- Coffin's Court between Union Street and Cabot Street,
- Middle Street between Union Street and Miller Avenue.

Willard Avenue Area

- Willard Avenue between Lafayette Road and Marston Avenue,
- Orchard Street between Willard Avenue to Wibird Street,
- Ash Street between Orchard Street to its termination to the south, and
- Orchard Court between Willard Avenue to its termination to the south.

2.0 EXPLORATION AND TESTING

2.1 Explorations

Explorations were performed on the roadways between March 7 and 15, 2022 by S. W. Cole Explorations, LLC and included the following:

- Borings (B-1 through B-4) and probes (LP-1 through LP-4, LP-1A, LP-1B, ~~B-1A~~, and ~~B-1B~~) on Union Street,
- Borings (B-5 through B-8) and nine probes (LP-5 through LP-8, LP-5A, LP-6B, ~~B-5A~~, LP-6A, ~~B-6A~~, LP-8A, and ~~B-8A~~) on Middle Street,
- Probe (LP-9) on Austin Street, LP-8B
- Boring (B-11) and probe (LP-10) on Cabot Street,
- Borings (B-12 through B-17) and probes (LP-12 through LP-17) on Willard Avenue,
- Borings (B-18 through B-22, and B-24) and probes (LP-18 through LP-22, LP-20A, LP-20B, B-20A, B-20B, B-20C, B-21A, B-21B, LP-22A, B-22A, and LP-24) on Orchard Street,
- Borings (B-25 and B-26) and probes (LP-25, LP-26, LP-26A, B-26A, and B-19A) on Ash Street,
- Boring (B-23) and probe (LP-23) on Orchard Court.

Test boring B-9 on Austin Street and explorations on Coffins Court were not able to be performed due to underground utility conflicts.

The explorations were typically taken to the planned depth between 12 and 17 feet or to refusal, if shallower.

The exploration locations were selected by CMA Engineers and established in the field by S. W. Cole Engineering, Inc. (S.W.COLE) using taped measurements from existing site features. The approximate test boring locations are shown on the “Exploration Location Plan” attached in Appendix B. Logs of the explorations and a key to the notes and symbols used on the logs are attached in Appendix C. Elevations presented are based on topographic information shown on the “Exploration Location Plan”.

2.2 Field Testing

The test borings were advanced using solid-stem auger drilling techniques. The soils were sampled at 2 to 5 foot intervals using a split spoon sampler and Standard Penetration Testing (SPT) methods. SPT blow counts are shown on the logs.

2.3 Laboratory Testing

Soil samples obtained from the explorations were returned to our laboratory for further classification and testing. Moisture content test results are noted on the logs. The results of fourteen soil gradation tests are attached in Appendix D.

3.0 SUBSURFACE CONDITIONS

3.1 Soil and Bedrock

The test borings made in the Union Street area (B-1 through B-11) encountered a surficial 6 to 10 inches of asphalt pavement overlying a soils profile generally consisting of loose to very dense granular fill to depths ranging from 2.5 to 7.7 feet overlying native deposits generally consisting of medium dense to dense sand and silt to depths ranging from 5 to 11 feet, overlying dense to very dense glacial till soils. Refusal surfaces (probable boulder or bedrock) were encountered at depths ranging from 2.5 to 12 feet in the test borings with the exception of borings B-3 and B-4 that were terminated within native strata at a depth of 10 feet.

The test borings made in the Willard Avenue area (B-12 through B-26) encountered a surficial 4 to 10 inches of asphalt pavement overlying a soils profile generally consisting of loose to dense granular fill to depths ranging from 1.3 to 10 feet overlying native deposits generally consisting of loose to medium dense sand and silt to depths ranging from 5 to 17

feet, overlying medium dense to very dense glacial till to depths ranging from 8 to 16.5 feet. Refusal surfaces (probable boulder or bedrock) was encountered in test borings B-18 through B-23, and B-25 at depths ranging from 5.5 to 11.9 feet. Test boring B-13 encountered refusal at 0.9 feet within a surficial concrete layer. This location was abandoned due to possible buried utility conflict.

For more detailed subsurface information, refer to the attached boring logs.

Refusal data from test probes and test borings is as follows:

REFULAL DATA						
Exploration	Exploration Type	Road/Street	Elevation (ft)	Planned Depth (ft)	Refusal Depth (ft)	Refusal Elevation (ft)
B-1	Boring	Union	27	12	3.5	23.5
B-2	Boring	Union	23	12	9.5	13.5
B-3	Boring	Union	14	10	-	-
B-4	Boring	Union	15	10	-	-
B-5	Boring	Middle	20	18	7.7	21.3
B-6	Boring	Middle	20	20	5.6	14.4
B-7	Boring	Middle	20	18	7.7	12.3
B-8	Boring	Middle	19	18	12	7
B-11	Boring	Cabot	17	10	2.5	14.5
B-12	Boring	Willard	46	16	-	-
B-13	Boring	Willard	40	10	0.9 (Possible Utility)	39.1
B-14	Boring	Willard	36	10	-	-
B-15	Boring	Willard	36	12	-	-
B-16	Boring	Willard	36	15	-	-
B-17	Boring	Willard	40	12	-	-
B-18	Boring	Orchard	40	12	11.9	28.1
B-19	Boring	Orchard	37	15	9	28
B-20	Boring	Orchard	35	15	9.5	25.5
B-21	Boring	Orchard	36	15	11	25
B-22	Boring	Orchard	36	15	5.5	30.5
B-23	Boring	Orchard Ct.	48	12	11.7	36.3
B-24	Boring	Orchard	35	10	-	-
B-25	Boring	Ash	44	12	11.5	32.5
B-26	Boring	Ash	34	12	8	26

LP-1	Probe	Union	24	12	-	-
LP-2	Probe	Union	28	11	8.9	19.1
LP-3	Probe	Union	16	10	-	-
LP-4	Probe	Union	14	8	-	-
LP-5	Probe	Middle	20	15	-	-
LP-6	Probe	Middle	20	20	12	8
LP-7	Probe	Middle	20	16	10	10
LP-8	Probe	Middle	20	18	14.5	3.5
LP-9	Probe	Austin	24	12	10.6	13.4
LP-10	Probe	Cabot	27	10	-	-
LP-12	Probe	Willard	42	10	-	-
LP-13	Probe	Willard	38	10	-	-
LP-14	Probe	Willard	36	12	-	-
LP-15	Probe	Willard	36	12	-	-
LP-16	Probe	Willard	37	12	-	-
LP-17	Probe	Willard	40	15	-	-
LP-18	Probe	Orchard	42	15	-	-
LP-19	Probe	Orchard	42	12	11.2	30.8
LP-20	Probe	Orchard	36	15	8.7	27.3
LP-21	Probe	Orchard	36	15	12	24
LP-22	Probe	Orchard	36	15	-	-
LP-23	Probe	Orchard Ct.	41	12	-	-
LP-24	Probe	Orchard	35	10	-	-
LP-25	Probe	Ash	40	12	-	-
LP-26	Probe	Ash	35	12	-	-
LP-27	Probe	Lafayette	47	20	-	-
LP-1A	Probe	Union	26	12	7.2	18.8
LP-1B	Probe	Union	26	12	6.5	19.5
LP-5A	Probe	Middle	20	18	9.2	10.8
LP-6A	Probe	Middle	20	20	10	10
LP-6B	Probe	Middle	20	20	2.7	17.3
LP-8A	Probe	Middle	20	18	8.5	11.5
LP-8B	Probe	Middle	20	18	10	10
B-19A	Probe	Orchard	36	15	8.7	27.3
LP-20A	Probe	Orchard	35	15	5	30
LP-20B	Probe	Orchard	35	15	8.7	26.3
B-20A	Probe	Orchard	36	15	10	26
B-20B	Probe	Orchard	36	15	10	26
B-20C	Probe	Orchard	35	15	11	24

B-21A	Probe	Orchard	36	15	12.7	23.3
B-21B	Probe	Orchard	36	15	13	23
LP-22A	Probe	Orchard	36	15	-	-
B-22A	Probe	Orchard	35	15	7.5	27.5
LP-26A	Probe	Ash	35	12	-	-
B-26A	Probe	Ash	34	12	11.5	22.5

3.2 Groundwater

Saturated soils were encountered below depths ranging from 5 to 10 feet in the test borings. Long term groundwater information is not available. It should be anticipated that groundwater levels will fluctuate, particularly in response to periods of snowmelt and precipitation, as well as changes in site use.

4.0 CLOSURE

It has been a pleasure to be of assistance to you with this phase of your project. If you have any questions or we may be of further assistance, please do not hesitate to contact us.

Sincerely,

S. W. Cole Engineering, Inc.

Tyler S Demers, P.E.
 Project Geotechnical Engineer

TSD:cbm

APPENDIX A

Limitations

This report has been prepared for the exclusive use of CMA Engineers for specific application to the Proposed Union Street and Willard Avenue Reconstruction project in Portsmouth, New Hampshire. S. W. Cole Engineering, Inc. (S.W.COLE) has endeavored to conduct our services in accordance with generally accepted soil and foundation engineering practices. No warranty, expressed or implied, is made.

The soil profiles described in the report are intended to convey general trends in subsurface conditions. The boundaries between strata are approximate and are based upon interpretation of exploration data and samples.

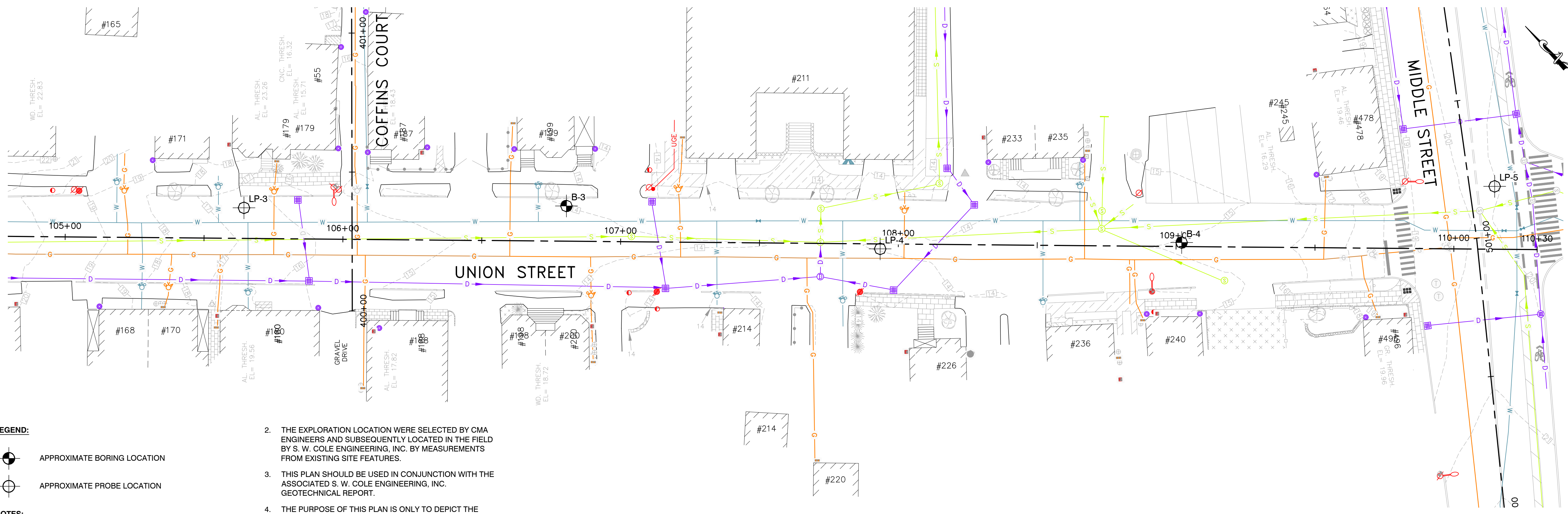
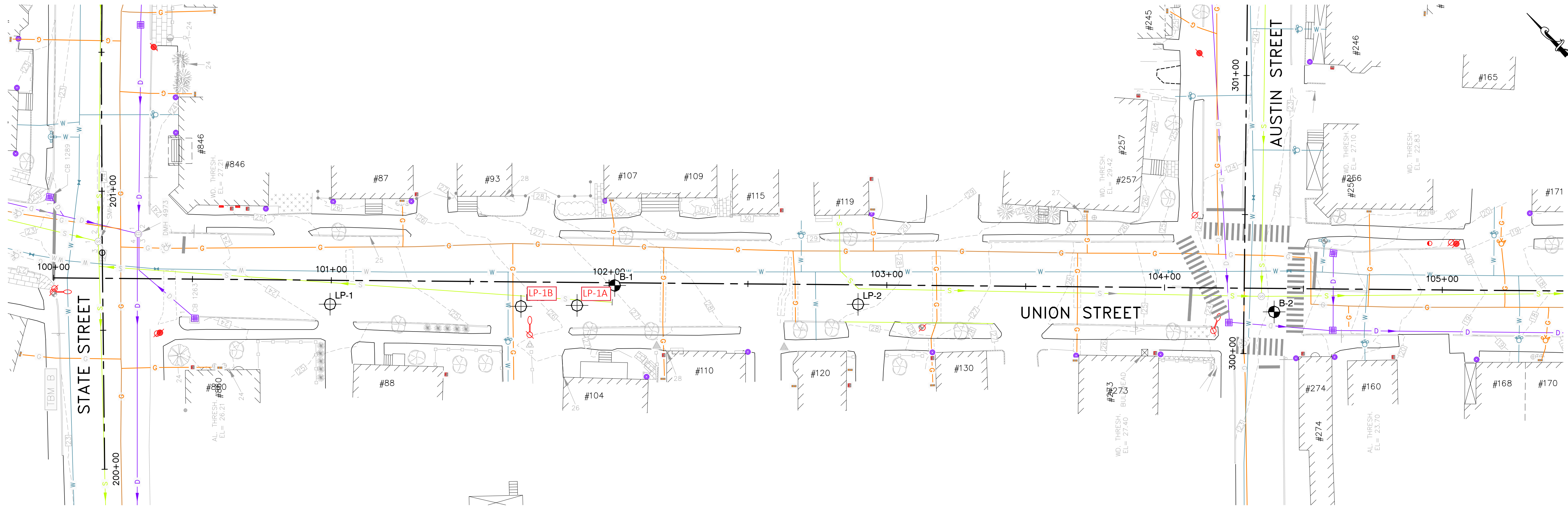
Variations in subsurface conditions may occur between explorations and may not become evident until construction.

Observations have been made during exploration work to assess site groundwater levels. Fluctuations in water levels will occur due to variations in rainfall, temperature, and other factors.

S.W.COLE's scope of services has not included the investigation, detection, or prevention of any Biological Pollutants at the project site or in any existing or proposed structure at the site. The term "Biological Pollutants" includes, but is not limited to, molds, fungi, spores, bacteria, and viruses, and the byproducts of any such biological organisms.

APPENDIX B

Figures



UNION STREET BORINGS

- LEGEND:**
- APPROXIMATE BORING LOCATION
 - APPROXIMATE PROBE LOCATION

NOTES:

1. EXPLORATION LOCATION PLAN WAS PREPARED FROM A SCALE PLAN OF THE SITE ENTITLED "UNION STREET BORINGS," PREPARED BY CMA ENGINEERS, DATED FEBRUARY 2022.

2. THE EXPLORATION LOCATION WERE SELECTED BY CMA ENGINEERS AND SUBSEQUENTLY LOCATED IN THE FIELD BY S. W. COLE ENGINEERING, INC. BY MEASUREMENTS FROM EXISTING SITE FEATURES.
3. THIS PLAN SHOULD BE USED IN CONJUNCTION WITH THE ASSOCIATED S. W. COLE ENGINEERING, INC. GEOTECHNICAL REPORT.
4. THE PURPOSE OF THIS PLAN IS ONLY TO DEPICT THE LOCATION OF THE EXPLORATIONS IN RELATION TO THE EXISTING CONDITIONS AND PROPOSED CONSTRUCTION AND IS NOT TO BE USED FOR CONSTRUCTION.

S.W. COLE
ENGINEERING, INC.

Geotechnical Engineering
Construction Materials Testing

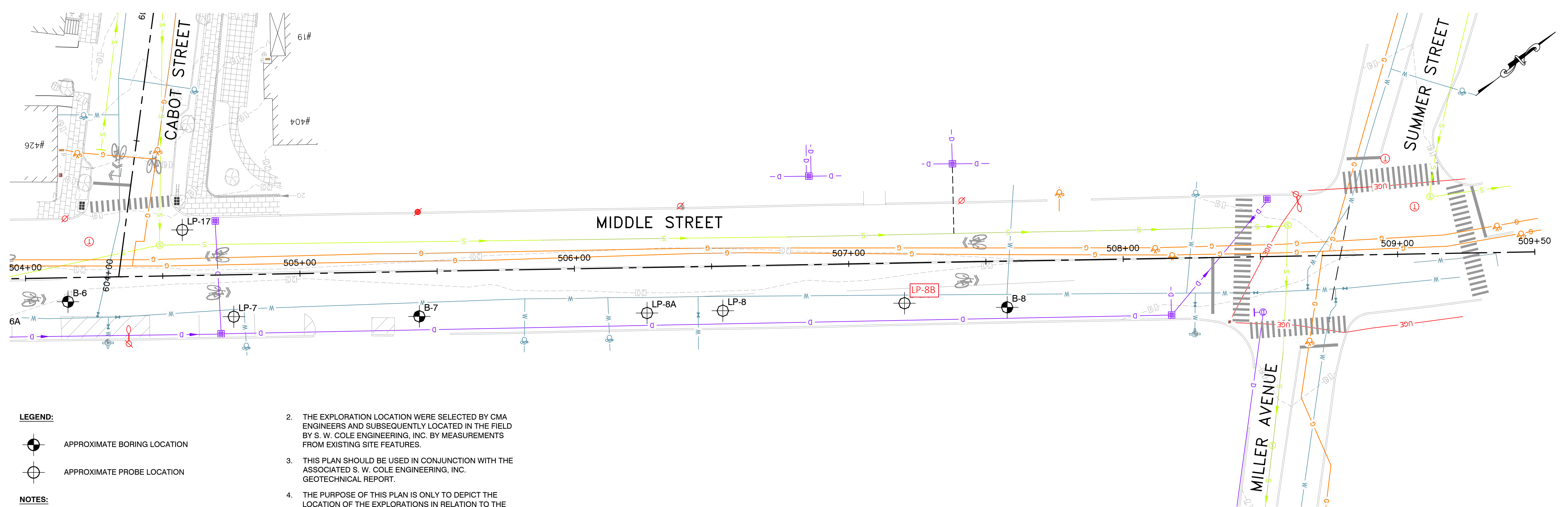
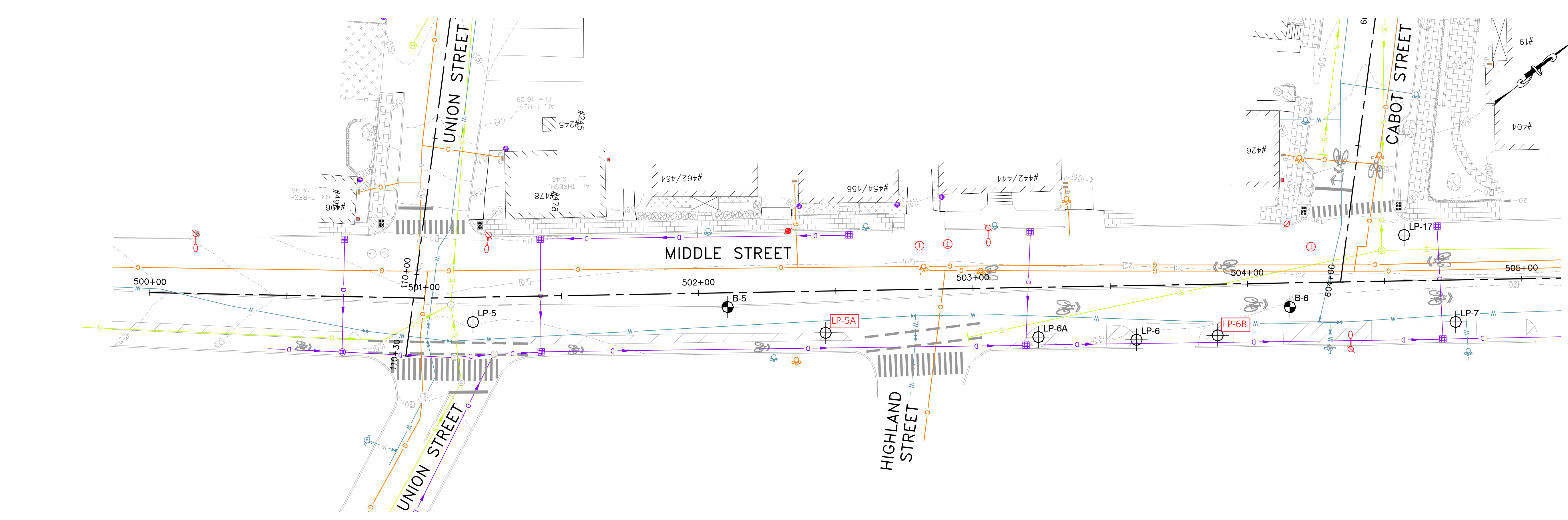
www.swcole.com
Test Boring Services
Special Inspections

NO.	DATE	DESCRIPTION	BY

**UNION STREET - EXPLORATION
LOCATION PLAN**

CMA ENGINEERS
PROPOSED UNION STREET AND WILLARD AVENUE
RECONSTRUCTION
UNION STREET AND WILLARD AVENUE
PORTSMOUTH, NEW HAMPSHIRE

JOB NO.: 20-1734
DATE: 04/04/2022
SCALE: 1" = 20'
SHEET: 1 OF 7



- LEGEND:**
- APPROXIMATE BORING LOCATION
 - APPROXIMATE PROBE LOCATION
- NOTES:**
1. EXPLORATION LOCATION PLAN WAS PREPARED FROM A SCALE PLAN OF THE SITE ENTITLED "MIDDLE STREET BORINGS," PREPARED BY CMA ENGINEERS, DATED FEBRUARY 2022.
 2. THE EXPLORATION LOCATION WERE SELECTED BY CMA ENGINEERS AND SUBSEQUENTLY LOCATED IN THE FIELD BY S. W. COLE ENGINEERING, INC. BY MEASUREMENTS FROM EXISTING SITE FEATURES.
 3. THIS PLAN SHOULD BE USED IN CONJUNCTION WITH THE ASSOCIATED S. W. COLE ENGINEERING, INC. GEOTECHNICAL REPORT.
 4. THE PURPOSE OF THIS PLAN IS ONLY TO DEPICT THE LOCATION OF THE EXPLORATIONS IN RELATION TO THE EXISTING CONDITIONS AND PROPOSED CONSTRUCTION AND IS NOT TO BE USED FOR CONSTRUCTION.

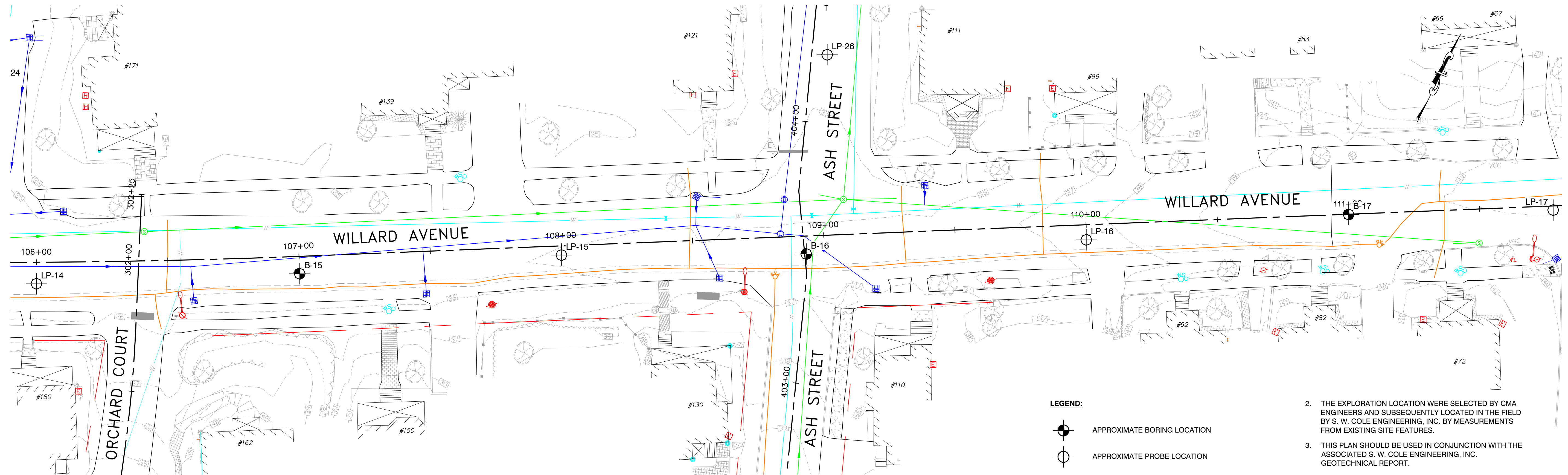
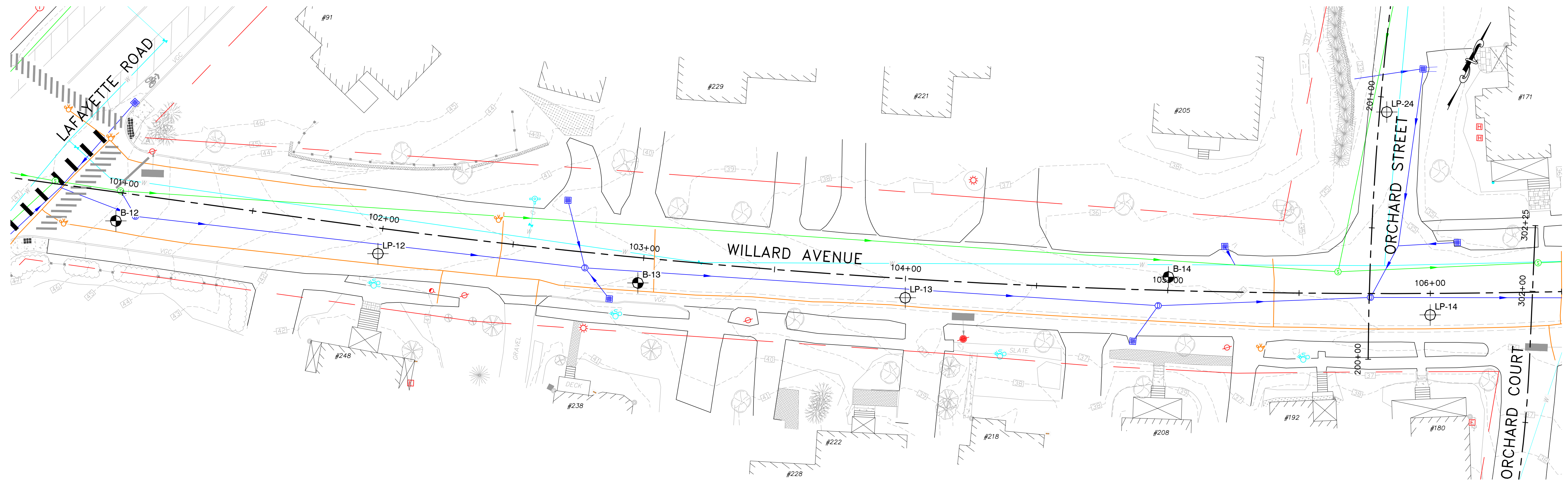
MIDDLE STREET BORINGS

NO.	DATE	DESCRIPTION	BY

MIDDLE STREET - EXPLORATION
LOCATION PLAN


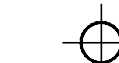
CMA ENGINEERS
PROPOSED UNION STREET AND WILLARD AVENUE
RECONSTRUCTION
UNION STREET AND WILLARD AVENUE
PORTSMOUTH, NEW HAMPSHIRE

JOB NO: 20-1734
DATE: 04/04/2022
SCALE: VALUE
SHEET: 2 OF 7



WILLARD AVENUE BORINGS

LEGEND:

-  APPROXIMATE BORING LOCATION
-  APPROXIMATE PROBE LOCATION

NOTES:

1. EXPLORATION LOCATION PLAN WAS PREPARED FROM A SCALE PLAN OF THE SITE ENTITLED "WILLARD AVENUE BORINGS," PREPARED BY CMA ENGINEERS, DATED FEBRUARY 2022.

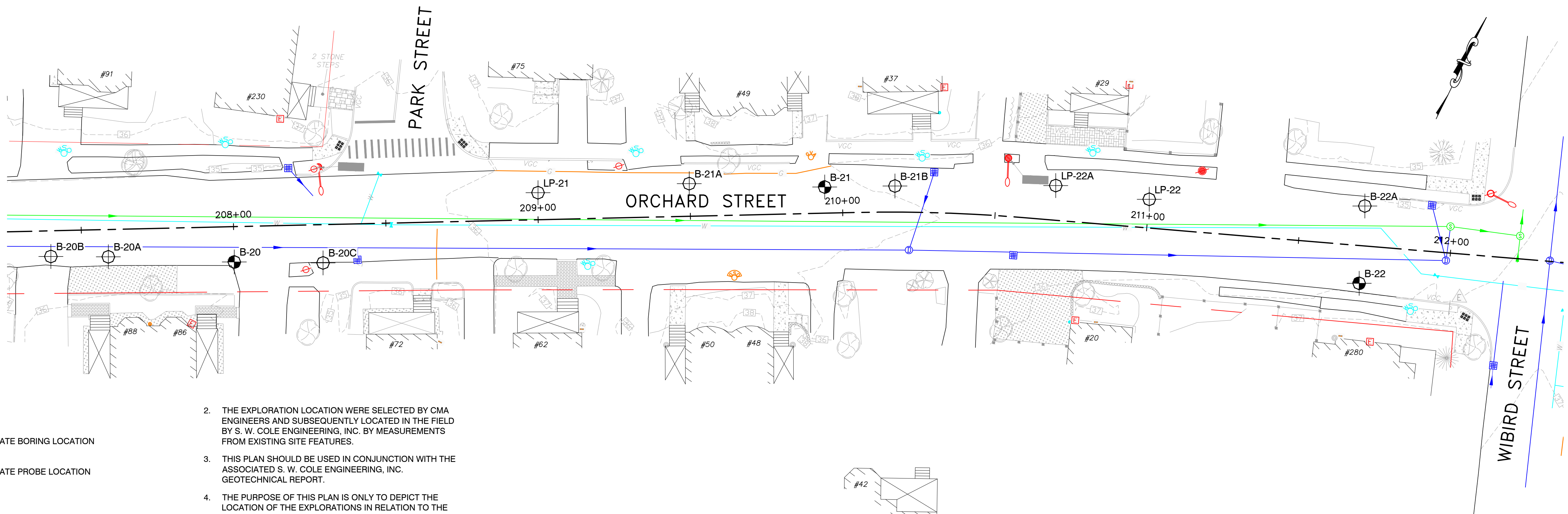
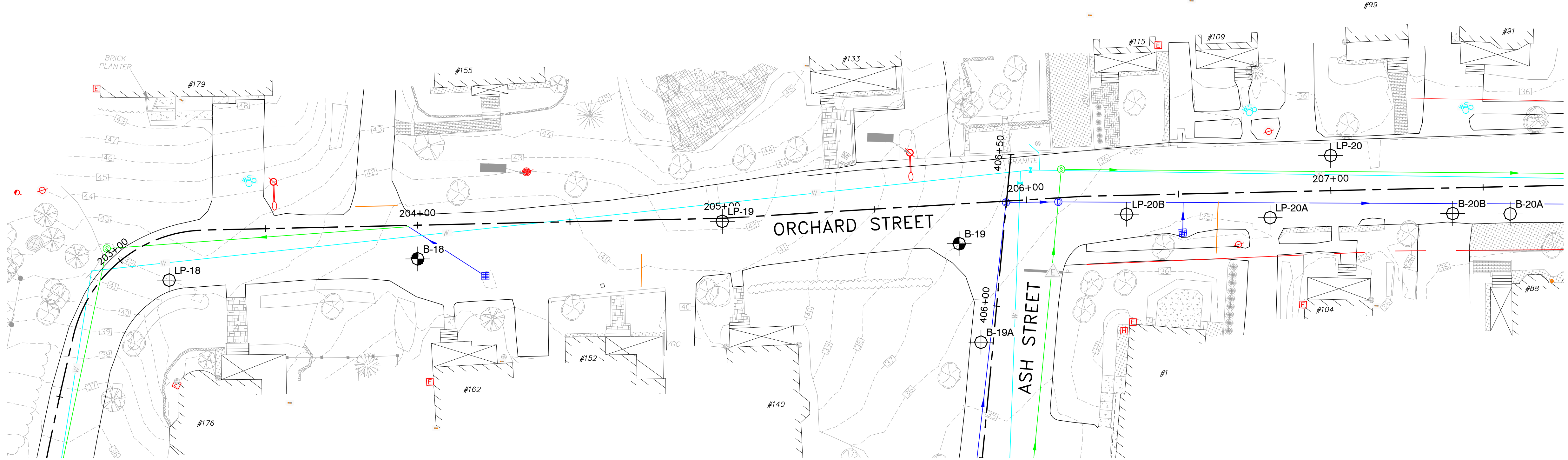
- 2. THE EXPLORATION LOCATION WERE SELECTED BY CMA ENGINEERS AND SUBSEQUENTLY LOCATED IN THE FIELD BY S. W. COLE ENGINEERING, INC. BY MEASUREMENTS FROM EXISTING SITE FEATURES.
- 3. THIS PLAN SHOULD BE USED IN CONJUNCTION WITH THE ASSOCIATED S. W. COLE ENGINEERING, INC. GEOTECHNICAL REPORT.
- 4. THE PURPOSE OF THIS PLAN IS ONLY TO DEPICT THE LOCATION OF THE EXPLORATIONS IN RELATION TO THE EXISTING CONDITIONS AND PROPOSED CONSTRUCTION AND IS NOT TO BE USED FOR CONSTRUCTION.



NO.	DATE	DESCRIPTION	BY

WILLARD AVENUE - EXPLORATION
LOCATION PLAN

CMA ENGINEERS
PROPOSED UNION STREET AND WILLARD AVENUE
RECONSTRUCTION
UNION STREET AND WILLARD AVENUE
PORTSMOUTH, NEW HAMPSHIRE

JOB NO: 20-1734
DATE: 04/04/2022
SCALE: VALUE
SHEET: 4 OF 7



- LEGEND:**
-  APPROXIMATE BORING LOCATION
 -  APPROXIMATE PROBE LOCATION

NOTES:

1. EXPLORATION LOCATION PLAN WAS PREPARED FROM A SCALE PLAN OF THE SITE ENTITLED "ORCHARD STREET BORINGS," PREPARED BY CMA ENGINEERS, DATED FEBRUARY 2022.

2. THE EXPLORATION LOCATION WERE SELECTED BY CMA ENGINEERS AND SUBSEQUENTLY LOCATED IN THE FIELD BY S. W. COLE ENGINEERING, INC. BY MEASUREMENTS FROM EXISTING SITE FEATURES.
3. THIS PLAN SHOULD BE USED IN CONJUNCTION WITH THE ASSOCIATED S. W. COLE ENGINEERING, INC. GEOTECHNICAL REPORT.
4. THE PURPOSE OF THIS PLAN IS ONLY TO DEPICT THE LOCATION OF THE EXPLORATIONS IN RELATION TO THE EXISTING CONDITIONS AND PROPOSED CONSTRUCTION AND IS NOT TO BE USED FOR CONSTRUCTION.

ORCHARD STREET BORINGS



NO.	DATE	DESCRIPTION	BY

**ORCHARD STREET - EXPLORATION
LOCATION PLAN**

CMA ENGINEERS
PROPOSED UNION STREET AND WILLARD AVENUE
RECONSTRUCTION
UNION STREET AND WILLARD AVENUE
PORTSMOUTH, NEW HAMPSHIRE

JOB NO: 20-1734
DATE: 04/04/2022
SCALE: VALUE
SHEET: 5 7

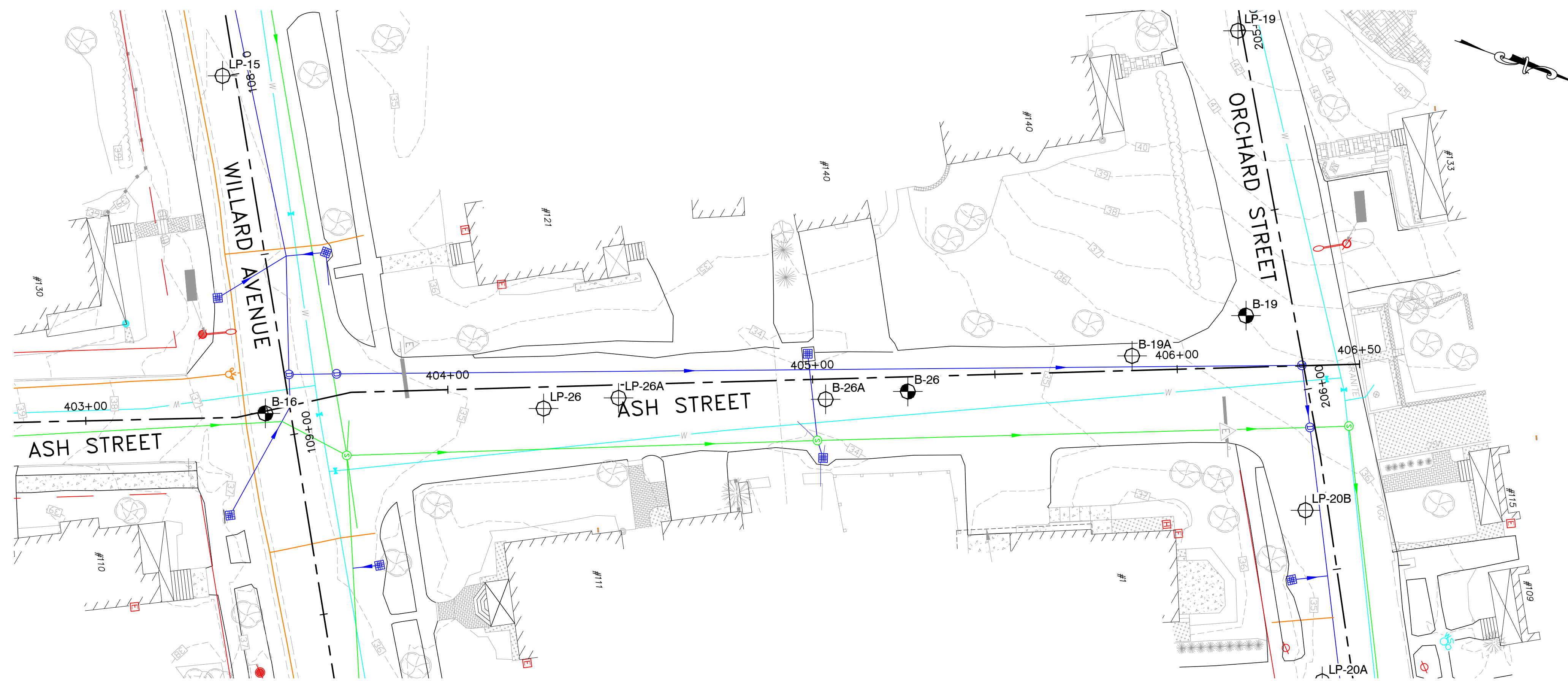
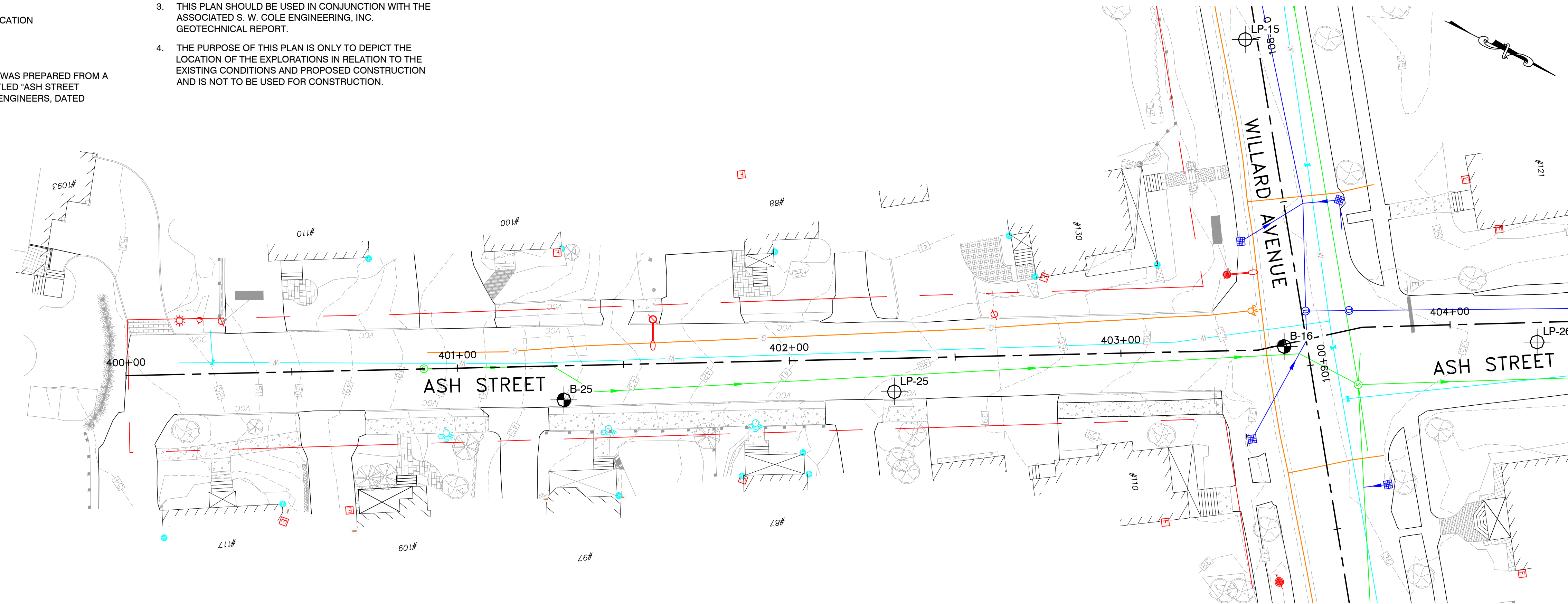
LEGEND:

-  APPROXIMATE BORING LOCATION
-  APPROXIMATE PROBE LOCATION

NOTES:

1. EXPLORATION LOCATION PLAN WAS PREPARED FROM A SCALE PLAN OF THE SITE ENTITLED "ASH STREET BORINGS," PREPARED BY CMA ENGINEERS, DATED FEBRUARY 2022.

2. THE EXPLORATION LOCATION WERE SELECTED BY CMA ENGINEERS AND SUBSEQUENTLY LOCATED IN THE FIELD BY S. W. COLE ENGINEERING, INC. BY MEASUREMENTS FROM EXISTING SITE FEATURES.
3. THIS PLAN SHOULD BE USED IN CONJUNCTION WITH THE ASSOCIATED S. W. COLE ENGINEERING, INC. GEOTECHNICAL REPORT.
4. THE PURPOSE OF THIS PLAN IS ONLY TO DEPICT THE LOCATION OF THE EXPLORATIONS IN RELATION TO THE EXISTING CONDITIONS AND PROPOSED CONSTRUCTION AND IS NOT TO BE USED FOR CONSTRUCTION.



ASH STREET BORINGS

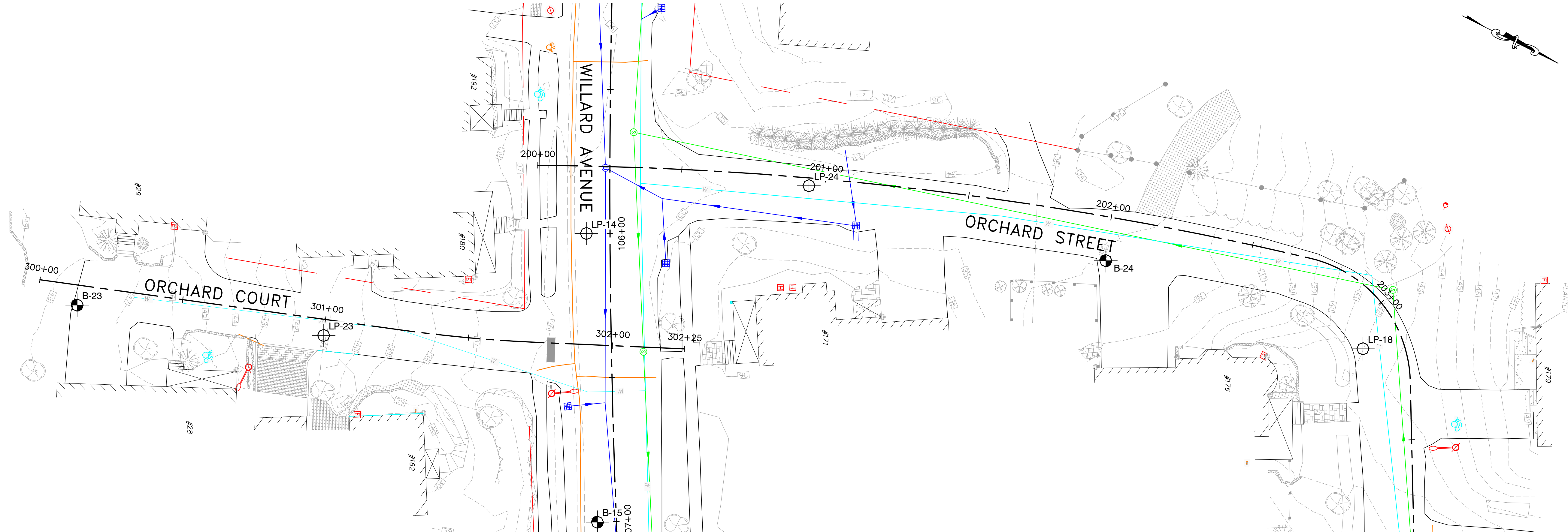
NO.	DATE	DESCRIPTION	BY

ASH STREET - EXPLORATION
LOCATION PLAN

CMA ENGINEERS
PROPOSED UNION STREET AND WILLARD AVENUE
RECONSTRUCTION
UNION STREET AND WILLARD AVENUE
PORTSMOUTH, NEW HAMPSHIRE



JOB NO: 20-1734
DATE: 04/04/2022
SCALE: VALUE
SHEET: 6 OF 7

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ORCHARD COURT AND ORCHARD STREET BORINGS

LEGEND:

-  APPROXIMATE BORING LOCATION
-  APPROXIMATE PROBE LOCATION

NOTES:

1. EXPLORATION LOCATION PLAN WAS PREPARED FROM A SCALE PLAN OF THE SITE ENTITLED "ORCHARD COURT & ORCHARD STREET BORINGS," PREPARED BY CMA ENGINEERS, DATED FEBRUARY 2022.
2. THE EXPLORATION LOCATION WERE SELECTED BY CMA ENGINEERS AND SUBSEQUENTLY LOCATED IN THE FIELD BY S. W. COLE ENGINEERING, INC. BY MEASUREMENTS FROM EXISTING SITE FEATURES.
3. THIS PLAN SHOULD BE USED IN CONJUNCTION WITH THE ASSOCIATED S. W. COLE ENGINEERING, INC. GEOTECHNICAL REPORT.
4. THE PURPOSE OF THIS PLAN IS ONLY TO DEPICT THE LOCATION OF THE EXPLORATIONS IN RELATION TO THE EXISTING CONDITIONS AND PROPOSED CONSTRUCTION AND IS NOT TO BE USED FOR CONSTRUCTION.

NO.	DATE	DESCRIPTION	BY

**ORCHARD CT & ORCHARD ST -
EXPLORATION LOCATION PLAN**

CMA ENGINEERS
PROPOSED UNION STREET AND WILLARD AVENUE
RECONSTRUCTION
UNION STREET AND WILLARD AVENUE
PORTSMOUTH, NEW HAMPSHIRE

JOB NO.: 20-1734
DATE: 04/04/2022
SCALE: VALUE
SHEET: 7 OF 7

APPENDIX C

Exploration Logs and Key



BORING LOG

BORING NO.: B-1
SHEET: 1 of 1
PROJECT NO.: 20-1734
DATE START: 3/7/2022
DATE FINISH: 3/7/2022

CLIENT: CMA Engineers
PROJECT: Proposed Union St & Willard Ave Reconstruction
LOCATION: Multiple Streets, Portsmouth, NH

Drilling Information

LOCATION: See Exploration Location Plan **ELEVATION (FT):** 27' +/- **TOTAL DEPTH (FT):** 3.5 **LOGGED BY:** Bryce Walker
DRILLING CO.: S. W. Cole Explorations, LLC **DRILLER:** Matty Bussey **DRILLING METHOD:** Solid Stem Auger
RIG TYPE: Truck Mounted Acker **AUGER ID/OD:** N/A / 4 1/2 in **SAMPLER:** Standard Split-Spoon
HAMMER TYPE: Safety **HAMMER WEIGHT (lbs):** 140 **CASING ID/OD:** N/A /N/A **CORE BARREL:** _____
HAMMER EFFICIENCY FACTOR: _____ **HAMMER DROP (inch):** 30
WATER LEVEL DEPTHS (ft): No free-water observed.

GENERAL NOTES:

KEY TO NOTES AND SYMBOLS:
 Water Level
 At time of Drilling
 At Completion of Drilling
 After Drilling
D = Split Spoon Sample Pen. = Penetration Length
U = Thin Walled Tube Sample Rec. = Recovery Length
R = Rock Core Sample bpf = Blows per Foot
V = Field Vane Shear mpf = Minute per Foot
WOR = Weight of Rods S_v = Field Vane Shear Strength, kips/sq.ft.
WOH = Weight of Hammer q_u = Unconfined Compressive Strength, kips/sq.ft.
RQD = Rock Quality Designation Ø = Friction Angle (Estimated)
PID = Photoionization Detector N/A = Not Applicable

Elev. (ft)	Depth (ft)	Casing Pen. (bpf)	SAMPLE INFORMATION					Graphic Log	Sample Description & Classification	H ₂ O Depth	Remarks
			Sample No.	Type	Depth (ft)	Pen./ Rec. (in)	Blow Count or RQD				
25			1D		0.6-2.4	21/6	25-14-19-50/3"		0.6' 7 inches Asphalt Pavement Dense, brown-gray Gravelly Silty SAND (Glacial Till)		

Auger Refusal at 3.5 feet
(Probable Boulder or Bedrock)

Stratification lines represent approximate boundary between soil types, transitions may be gradual. Water level readings have been made at times and under conditions stated. Fluctuations of groundwater may occur due to other factors than those present at the time measurements were made.

BORING NO.: B-1



BORING LOG

BORING NO.: B-2
SHEET: 1 of 1
PROJECT NO.: 20-1734
DATE START: 3/7/2022
DATE FINISH: 3/7/2022

CLIENT: CMA Engineers
PROJECT: Proposed Union St & Willard Ave Reconstruction
LOCATION: Multiple Streets, Portsmouth, NH

Drilling Information

LOCATION: See Exploration Location Plan **ELEVATION (FT):** 23' +/- **TOTAL DEPTH (FT):** 9.5 **LOGGED BY:** Bryce Walker
DRILLING CO.: S. W. Cole Explorations, LLC **DRILLER:** Matty Bussey **DRILLING METHOD:** Solid Stem Auger
RIG TYPE: Truck Mounted Acker **AUGER ID/OD:** N/A / 4 1/2 in **SAMPLER:** Standard Split-Spoon
HAMMER TYPE: Safety **HAMMER WEIGHT (lbs):** 140 **CASING ID/OD:** N/A / N/A **CORE BARREL:** _____
HAMMER EFFICIENCY FACTOR: _____ **HAMMER DROP (inch):** 30
WATER LEVEL DEPTHS (ft): 9 ft Soil appears saturated below 9.0 feet.

GENERAL NOTES:

KEY TO NOTES AND SYMBOLS:
 Water Level: ▽ At time of Drilling, ▽ At Completion of Drilling, ▽ After Drilling
 D = Split Spoon Sample, U = Thin Walled Tube Sample, R = Rock Core Sample, V = Field Vane Shear
 Pen. = Penetration Length, Rec. = Recovery Length, bpf = Blows per Foot, mpf = Minute per Foot
 WOR = Weight of Rods, WOH = Weight of Hammer, RQD = Rock Quality Designation, PID = Photoionization Detector
 S_v = Field Vane Shear Strength, kips/sq.ft., q_u = Unconfined Compressive Strength, kips/sq.ft., Ø = Friction Angle (Estimated), N/A = Not Applicable

Elev. (ft)	Depth (ft)	Casing Pen. (bpf)	SAMPLE INFORMATION					Graphic Log	Sample Description & Classification	H ₂ O Depth	Remarks
			Sample No.	Type	Depth (ft)	Pen./ Rec. (in)	Blow Count or RQD				
								9 inches Asphalt Pavement			
			1D		0.8-2.8	24/10	12-12-15-10	ID 21592s w = 8.3 %	0.8	Medium dense, brown Gravelly Silty SAND (Fill)	
			2D		2.8-4.8	24/15	6-6-7-11		2.8	Medium dense, brown-gray fine Sandy Clayey SILT some gravel with brick (Fill)	
	5		3D		5-7	24/12	6-15-18-23	ID 21541s w = 12.9 %	5.5	Dense, brown-gray Gravelly SILT and fine SAND	
			4D		9-9.5	6/1	50			▽	

Split Spoon Refusal at 9.5 feet
(Probable Boulder or Bedrock)

Stratification lines represent approximate boundary between soil types, transitions may be gradual. Water level readings have been made at times and under conditions stated. Fluctuations of groundwater may occur due to other factors than those present at the time measurements were made.

BORING NO.: B-2

BORING / WELL 20-1734.GPJ SWCE TEMPLATE.GDT 4/12/22



BORING LOG

BORING NO.: B-3
SHEET: 1 of 1
PROJECT NO.: 20-1734
DATE START: 3/7/2022
DATE FINISH: 3/7/2022

CLIENT: CMA Engineers
PROJECT: Proposed Union St & Willard Ave Reconstruction
LOCATION: Multiple Streets, Portsmouth, NH

Drilling Information

LOCATION: See Exploration Location Plan **ELEVATION (FT):** 14' +/- **TOTAL DEPTH (FT):** 10.0 **LOGGED BY:** Bryce Walker
DRILLING CO.: S. W. Cole Explorations, LLC **DRILLER:** Matty Bussey **DRILLING METHOD:** Solid Stem Auger
RIG TYPE: Truck Mounted Acker **AUGER ID/OD:** N/A / 4 1/2 in **SAMPLER:** Standard Split-Spoon
HAMMER TYPE: Safety **HAMMER WEIGHT (lbs):** 140 **CASING ID/OD:** N/A /N/A **CORE BARREL:** _____
HAMMER EFFICIENCY FACTOR: _____ **HAMMER DROP (inch):** 30
WATER LEVEL DEPTHS (ft): 5 ft Soil appears saturated below 5.0 feet.

GENERAL NOTES:

KEY TO NOTES AND SYMBOLS: Water Level
∇ At time of Drilling D = Split Spoon Sample Pen. = Penetration Length WOR = Weight of Rods S_v = Field Vane Shear Strength, kips/sq.ft.
∇ At Completion of Drilling U = Thin Walled Tube Sample Rec. = Recovery Length WOH = Weight of Hammer q_u = Unconfined Compressive Strength, kips/sq.ft.
∇ After Drilling R = Rock Core Sample bpf = Blows per Foot RQD = Rock Quality Designation Ø = Friction Angle (Estimated)
V = Field Vane Shear mpf = Minute per Foot PID = Photoionization Detector N/A = Not Applicable

Elev. (ft)	Depth (ft)	Casing Pen. (bpf)	SAMPLE INFORMATION					Graphic Log	Sample Description & Classification	H ₂ O Depth	Remarks
			Sample No.	Type	Depth (ft)	Pen./ Rec. (in)	Blow Count or RQD				
			1D		0.8-2.8	24/6	12-12-9-17		10 inches Asphalt Pavement		
			2D		2.8-4.8	24/3	4-4-4-4	0.8	Loose to medium dense, dark brown-black Gravelly Silty SAND (Fill)		
	5		3D		5-7	24/8	1-2-3-4	5.0	Medium, gray fine Sandy SILT and CLAY	∇	
	10		4D		8-10	24/24	2-3-3-3				

Bottom of Exploration at 10.0 feet

BORING / WELL 20-1734.GPJ SWCE TEMPLATE.GDT 4/12/22

Stratification lines represent approximate boundary between soil types, transitions may be gradual. Water level readings have been made at times and under conditions stated. Fluctuations of groundwater may occur due to other factors than those present at the time measurements were made.

BORING NO.: B-3



BORING LOG

BORING NO.: B-5
SHEET: 1 of 1
PROJECT NO.: 20-1734
DATE START: 3/7/2022
DATE FINISH: 3/7/2022

CLIENT: CMA Engineers
PROJECT: Proposed Union St & Willard Ave Reconstruction
LOCATION: Multiple Streets, Portsmouth, NH

Drilling Information

LOCATION: See Exploration Location Plan **ELEVATION (FT):** 20' +/- **TOTAL DEPTH (FT):** 7.7 **LOGGED BY:** Bryce Walker
DRILLING CO.: S. W. Cole Explorations, LLC **DRILLER:** Matty Bussey **DRILLING METHOD:** Solid Stem Auger
RIG TYPE: Truck Mounted Acker **AUGER ID/OD:** N/A / 4 1/2 in **SAMPLER:** Standard Split-Spoon
HAMMER TYPE: Safety **HAMMER WEIGHT (lbs):** 140 **CASING ID/OD:** N/A /N/A **CORE BARREL:** _____
HAMMER EFFICIENCY FACTOR: _____ **HAMMER DROP (inch):** 30
WATER LEVEL DEPTHS (ft): No free-water observed.

GENERAL NOTES:

KEY TO NOTES AND SYMBOLS:
 Water Level
 At time of Drilling
 At Completion of Drilling
 After Drilling
D = Split Spoon Sample
U = Thin Walled Tube Sample
R = Rock Core Sample
V = Field Vane Shear
Pen. = Penetration Length
Rec. = Recovery Length
bpf = Blows per Foot
mpf = Minute per Foot
WOR = Weight of Rods
WOH = Weight of Hammer
RQD = Rock Quality Designation
PID = Photoionization Detector
S_v = Field Vane Shear Strength, kips/sq.ft.
q_u = Unconfined Compressive Strength, kips/sq.ft.
Ø = Friction Angle (Estimated)
N/A = Not Applicable

Elev. (ft)	Depth (ft)	Casing Pen. (bpf)	SAMPLE INFORMATION					Graphic Log	Sample Description & Classification	H ₂ O Depth	Remarks
			Sample No.	Type	Depth (ft)	Pen./ Rec. (in)	Blow Count or RQD				
15	5		1D		0.8-2.4	19/10	28-40-40-50/1"		9 inches Asphalt Pavement		
			2D		2.4-4.4	24/8	20-17-15-14		0.8 Medium dense to dense, brown Gravelly Silty SAND (Fill)		
			3D		5-7	24/7	7-11-14-20				

Auger Refusal at 7.7 feet
(Probable Boulder or Bedrock)

Stratification lines represent approximate boundary between soil types, transitions may be gradual. Water level readings have been made at times and under conditions stated. Fluctuations of groundwater may occur due to other factors than those present at the time measurements were made.

BORING NO.: B-5



BORING LOG

BORING NO.: B- 6
SHEET: 1 of 1
PROJECT NO.: 20-1734
DATE START: 3/11/2022
DATE FINISH: 3/11/2022

CLIENT: CMA Engineers
PROJECT: Proposed Union St & Willard Ave Reconstruction
LOCATION: Multiple Streets, Portsmouth, NH

Drilling Information

LOCATION: See Exploration Location Plan **ELEVATION (FT):** 20' +/- **TOTAL DEPTH (FT):** 5.6 **LOGGED BY:** Bryce Walker
DRILLING CO.: S. W. Cole Explorations, LLC **DRILLER:** Matty Bussey **DRILLING METHOD:** Solid Stem Auger
RIG TYPE: Truck Mounted Acker **AUGER ID/OD:** N/A / 4 1/2 in **SAMPLER:** Standard Split-Spoon
HAMMER TYPE: Safety **HAMMER WEIGHT (lbs):** 140 **CASING ID/OD:** N/A /N/A **CORE BARREL:** _____
HAMMER EFFICIENCY FACTOR: _____ **HAMMER DROP (inch):** 30
WATER LEVEL DEPTHS (ft): No free-water observed.

GENERAL NOTES:

KEY TO NOTES AND SYMBOLS:
D = Split Spoon Sample
Pen. = Penetration Length
WOR = Weight of Rods
S_v = Field Vane Shear Strength, kips/sq.ft.
U = Thin Walled Tube Sample
Rec. = Recovery Length
WOH = Weight of Hammer
q_u = Unconfined Compressive Strength, kips/sq.ft.
▼ At Completion of Drilling
R = Rock Core Sample
RQD = Rock Quality Designation
Ø = Friction Angle (Estimated)
▽ After Drilling
V = Field Vane Shear
mpf = Blows per Foot
PID = Photoionization Detector
N/A = Not Applicable

Elev. (ft)	Depth (ft)	Casing Pen. (bpf)	SAMPLE INFORMATION					Graphic Log	Sample Description & Classification	H ₂ O Depth	Remarks	
			Sample No.	Type	Depth (ft)	Pen./ Rec. (in)	Blow Count or RQD					Field / Lab Test Data
15	5		1D		0.5-2.5	24/10	20-13-8-8	ID 21543s w =10 %	0.5	6 inches Asphalt Pavement Loose to medium dense, brown Silty SAND and GRAVEL (Fill)		
			2D		2.5-4.5	24/7	6-3-5-6		5.0	Very dense, gray Gravelly Silty SAND (Glacial Till)		
			3D		5-5.6	7/3	3-50/1"					

Auger Refusal at 5.6 feet
(Probable Boulder or Bedrock)

Stratification lines represent approximate boundary between soil types, transitions may be gradual. Water level readings have been made at times and under conditions stated. Fluctuations of groundwater may occur due to other factors than those present at the time measurements were made.

BORING NO.: B- 6

BORING / WELL 20-1734.GPJ SWCE TEMPLATE.GDT 4/12/22



BORING LOG

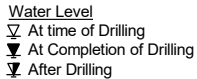
BORING NO.: B-7
SHEET: 1 of 1
PROJECT NO.: 20-1734
DATE START: 3/11/2022
DATE FINISH: 3/11/2022


CLIENT: CMA Engineers
PROJECT: Proposed Union St & Willard Ave Reconstruction
LOCATION: Multiple Streets, Portsmouth, NH

Drilling Information

LOCATION: See Exploration Location Plan **ELEVATION (FT):** 20' +/- **TOTAL DEPTH (FT):** 7.7 **LOGGED BY:** Bryce Walker
DRILLING CO.: S. W. Cole Explorations, LLC **DRILLER:** Matty Bussey **DRILLING METHOD:** Solid Stem Auger
RIG TYPE: Truck Mounted Acker **AUGER ID/OD:** N/A / 4 1/2 in **SAMPLER:** Standard Split-Spoon
HAMMER TYPE: Safety **HAMMER WEIGHT (lbs):** 140 **CASING ID/OD:** N/A /N/A **CORE BARREL:** _____
HAMMER EFFICIENCY FACTOR: _____ **HAMMER DROP (inch):** 30
WATER LEVEL DEPTHS (ft): No free-water observed.

GENERAL NOTES:

KEY TO NOTES AND SYMBOLS:

D = Split Spoon Sample Pen. = Penetration Length WOR = Weight of Rods S_v = Field Vane Shear Strength, kips/sq.ft.
U = Thin Walled Tube Sample Rec. = Recovery Length WOH = Weight of Hammer q_u = Unconfined Compressive Strength, kips/sq.ft.
R = Rock Core Sample bpf = Blows per Foot RQD = Rock Quality Designation Ø = Friction Angle (Estimated)
V = Field Vane Shear mpf = Minute per Foot PID = Photoionization Detector N/A = Not Applicable

Elev. (ft)	Depth (ft)	Casing Pen. (bpf)	SAMPLE INFORMATION					Graphic Log	Sample Description & Classification	H ₂ O Depth	Remarks	
			Sample No.	Type	Depth (ft)	Pen./ Rec. (in)	Blow Count or RQD					Field / Lab Test Data
			1D		0.7-2.7	24/12	10-10-10-10	ID 21593s w = 6.9 %	8 inches Asphalt Pavement			
			2D		2.7-4.7	24/15	7-6-6-7		0.7	Medium dense, brown SAND and GRAVEL some silt (Fill)		
			3D		5-7	24/16	5-8-10-15		3.5	Medium dense, brown Silty fine SAND trace gravel		
15	5							5.0	Medium dense, brown Gravelly Silty SAND			

Auger Refusal at 7.7 feet
(Probable Boulder or Bedrock)

Stratification lines represent approximate boundary between soil types, transitions may be gradual. Water level readings have been made at times and under conditions stated. Fluctuations of groundwater may occur due to other factors than those present at the time measurements were made.

BORING NO.: B-7

BORING / WELL 20-1734.GPJ SWCE TEMPLATE.GDT 4/12/22



BORING LOG

BORING NO.: B- 8
SHEET: 1 of 1
PROJECT NO.: 20-1734
DATE START: 3/11/2022
DATE FINISH: 3/11/2022

CLIENT: CMA Engineers
PROJECT: Proposed Union St & Willard Ave Reconstruction
LOCATION: Multiple Streets, Portsmouth, NH

Drilling Information

LOCATION: See Exploration Location Plan **ELEVATION (FT):** 19' +/- **TOTAL DEPTH (FT):** 12.0 **LOGGED BY:** Bryce Walker
DRILLING CO.: S. W. Cole Explorations, LLC **DRILLER:** Matty Bussey **DRILLING METHOD:** Solid Stem Auger
RIG TYPE: Truck Mounted Acker **AUGER ID/OD:** N/A / 4 1/2 in **SAMPLER:** Standard Split-Spoon
HAMMER TYPE: Safety **HAMMER WEIGHT (lbs):** 140 **CASING ID/OD:** N/A /N/A **CORE BARREL:** _____
HAMMER EFFICIENCY FACTOR: _____ **HAMMER DROP (inch):** 30
WATER LEVEL DEPTHS (ft): No free-water observed.

GENERAL NOTES:

KEY TO NOTES AND SYMBOLS:
 Water Level: ▽ At time of Drilling, ▽ At Completion of Drilling, ▽ After Drilling
 D = Split Spoon Sample, U = Thin Walled Tube Sample, R = Rock Core Sample, V = Field Vane Shear
 Pen. = Penetration Length, Rec. = Recovery Length, bpf = Blows per Foot, mpf = Minute per Foot
 WOR = Weight of Rods, WOH = Weight of Hammer, RQD = Rock Quality Designation, PID = Photoionization Detector
 S_v = Field Vane Shear Strength, kips/sq.ft., q_u = Unconfined Compressive Strength, kips/sq.ft., Ø = Friction Angle (Estimated), N/A = Not Applicable

Elev. (ft)	Depth (ft)	Casing Pen. (bpf)	SAMPLE INFORMATION					Graphic Log	Sample Description & Classification	H ₂ O Depth	Remarks
			Sample No.	Type	Depth (ft)	Pen./ Rec. (in)	Blow Count or RQD				
								7 inches Asphalt Pavement			
			1D		0.6-2.6	24/14	12-7-11-14	0.6 Medium dense, brown Gravelly Silty SAND (Fill)			
			2D		2.6-4.6	24/1	10-7-6-7				
15	5		3D		5-7	24/15	6-4-6-7				
								6.5 Medium dense, brown fine SAND and SILT trace gravel			
10	10		4D		10-11.5	18/14	10-19-21				
								11.0 Dense, brown Gravelly Silty SAND (Glacial Till)			

Auger Refusal at 12.0 feet
(Probable Boulder or Bedrock)

BORING / WELL 20-1734.GPJ SWCE TEMPLATE.GDT 4/12/22

Stratification lines represent approximate boundary between soil types, transitions may be gradual. Water level readings have been made at times and under conditions stated. Fluctuations of groundwater may occur due to other factors than those present at the time measurements were made.

BORING NO.: B- 8



BORING LOG

BORING NO.: B-11
SHEET: 1 of 1
PROJECT NO.: 20-1734
DATE START: 3/11/2022
DATE FINISH: 3/11/2022

CLIENT: CMA Engineers
PROJECT: Proposed Union St & Willard Ave Reconstruction
LOCATION: Multiple Streets, Portsmouth, NH

Drilling Information

LOCATION: See Exploration Location Plan **ELEVATION (FT):** 17' +/- **TOTAL DEPTH (FT):** 2.5 **LOGGED BY:** Bryce Walker
DRILLING CO.: S. W. Cole Explorations, LLC **DRILLER:** Matty Bussey **DRILLING METHOD:** Solid Stem Auger
RIG TYPE: Truck Mounted Acker **AUGER ID/OD:** N/A / 4 1/2 in **SAMPLER:** Standard Split-Spoon
HAMMER TYPE: Safety **HAMMER WEIGHT (lbs):** 140 **CASING ID/OD:** N/A /N/A **CORE BARREL:** _____
HAMMER EFFICIENCY FACTOR: _____ **HAMMER DROP (inch):** 30
WATER LEVEL DEPTHS (ft): No free-water observed.

GENERAL NOTES:

KEY TO NOTES AND SYMBOLS:
D = Split Spoon Sample
Pen. = Penetration Length
WOR = Weight of Rods
S_v = Field Vane Shear Strength, kips/sq.ft.
U = Thin Walled Tube Sample
Rec. = Recovery Length
WOH = Weight of Hammer
q_u = Unconfined Compressive Strength, kips/sq.ft.
R = Rock Core Sample
bpf = Blows per Foot
RQD = Rock Quality Designation
Ø = Friction Angle (Estimated)
V = Field Vane Shear
mpf = Minute per Foot
PID = Photoionization Detector
N/A = Not Applicable

Elev. (ft)	Depth (ft)	Casing Pen. (bpf)	SAMPLE INFORMATION					Graphic Log	Sample Description & Classification	H ₂ O Depth	Remarks
			Sample No.	Type	Depth (ft)	Pen./ Rec. (in)	Blow Count or RQD				
15			1D	X	1.5-2.5	12/10	24-50		0.5 6 inches Asphalt Pavement Dense, brown Gravelly Silty SAND (Fill)		

Auger Refusal at 2.5 feet
(Probable Boulder or Bedrock)

Stratification lines represent approximate boundary between soil types, transitions may be gradual. Water level readings have been made at times and under conditions stated. Fluctuations of groundwater may occur due to other factors than those present at the time measurements were made.

BORING NO.: B-11



BORING LOG

BORING NO.: B-12
SHEET: 1 of 1
PROJECT NO.: 20-1734
DATE START: 3/10/2022
DATE FINISH: 3/10/2022

CLIENT: CMA Engineers
PROJECT: Proposed Union St & Willard Ave Reconstruction
LOCATION: Multiple Streets, Portsmouth, NH

Drilling Information

LOCATION: See Exploration Location Plan **ELEVATION (FT):** 46' +/- **TOTAL DEPTH (FT):** 16.5 **LOGGED BY:** Bryce Walker
DRILLING CO.: S. W. Cole Explorations, LLC **DRILLER:** Matty Bussey **DRILLING METHOD:** Solid Stem Auger
RIG TYPE: Truck Mounted Acker **AUGER ID/OD:** N/A / 4 1/2 in **SAMPLER:** Standard Split-Spoon
HAMMER TYPE: Safety **HAMMER WEIGHT (lbs):** 140 **CASING ID/OD:** N/A /N/A **CORE BARREL:** _____
HAMMER EFFICIENCY FACTOR: _____ **HAMMER DROP (inch):** 30
WATER LEVEL DEPTHS (ft): ∇ 10 ft Soil appears saturated below 10.0 feet.

GENERAL NOTES:

KEY TO NOTES AND SYMBOLS:
 ∇ Water Level
 ∇ At time of Drilling
 ∇ At Completion of Drilling
 ∇ After Drilling
D = Split Spoon Sample
U = Thin Walled Tube Sample
R = Rock Core Sample
V = Field Vane Shear
Pen. = Penetration Length
Rec. = Recovery Length
bpf = Blows per Foot
mpf = Minute per Foot
WOR = Weight of Rods
WOH = Weight of Hammer
RQD = Rock Quality Designation
PID = Photoionization Detector
S_v = Field Vane Shear Strength, kips/sq.ft.
q_u = Unconfined Compressive Strength, kips/sq.ft.
Ø = Friction Angle (Estimated)
N/A = Not Applicable

Elev. (ft)	Depth (ft)	Casing Pen. (bpf)	SAMPLE INFORMATION					Graphic Log	Sample Description & Classification	H ₂ O Depth	Remarks
			Sample No.	Type	Depth (ft)	Pen./ Rec. (in)	Blow Count or RQD				
45			1D		0.8-2.8	24/9	10-5-6-5		10 inches Asphalt Pavement		
			2D		2.8-4.8	24/5	5-5-3-2	0.8	Loose to medium dense, brown Gravelly Silty SAND (Fill)		
	5		3D		5-7	24/6	2-2-2-1				
40			4D		10-12	24/10	3-8-10-11	10.0	Medium dense, brown fine Sandy SILT	∇	
35			5D		15-16.5	18/15	14-34-50	15.0	Very dense, brown Gravelly Silty SAND (Glacial Till)		
Bottom of Exploration at 16.5 feet											

Stratification lines represent approximate boundary between soil types, transitions may be gradual. Water level readings have been made at times and under conditions stated. Fluctuations of groundwater may occur due to other factors than those present at the time measurements were made.

BORING NO.: B-12

BORING / WELL 20-1734.GPJ SWCE TEMPLATE.GDT 4/12/22



BORING LOG

BORING NO.: B-13
SHEET: 1 of 1
PROJECT NO.: 20-1734
DATE START: 3/10/2022
DATE FINISH: 3/10/2022

CLIENT: CMA Engineers
PROJECT: Proposed Union St & Willard Ave Reconstruction
LOCATION: Multiple Streets, Portsmouth, NH

Drilling Information

LOCATION: See Exploration Location Plan **ELEVATION (FT):** 40' +/- **TOTAL DEPTH (FT):** 0.9 **LOGGED BY:** Bryce Walker
DRILLING CO.: S. W. Cole Explorations, LLC **DRILLER:** Matty Bussey **DRILLING METHOD:** Solid Stem Auger
RIG TYPE: Truck Mounted Acker **AUGER ID/OD:** N/A / 4 1/2 in **SAMPLER:** Standard Split-Spoon
HAMMER TYPE: Safety **HAMMER WEIGHT (lbs):** 140 **CASING ID/OD:** N/A /N/A **CORE BARREL:** _____
HAMMER EFFICIENCY FACTOR: _____ **HAMMER DROP (inch):** 30
WATER LEVEL DEPTHS (ft): No free-water observed.

GENERAL NOTES:

KEY TO NOTES AND SYMBOLS:
 Water Level
 ▽ At time of Drilling
 ▼ At Completion of Drilling
 ▾ After Drilling
 D = Split Spoon Sample
 U = Thin Walled Tube Sample
 R = Rock Core Sample
 V = Field Vane Shear
 Pen. = Penetration Length
 Rec. = Recovery Length
 bpf = Blows per Foot
 mpf = Minute per Foot
 WOR = Weight of Rods
 WOH = Weight of Hammer
 RQD = Rock Quality Designation
 PID = Photoionization Detector
 S_v = Field Vane Shear Strength, kips/sq.ft.
 q_u = Unconfined Compressive Strength, kips/sq.ft.
 Ø = Friction Angle (Estimated)
 N/A = Not Applicable

Elev. (ft)	Depth (ft)	Casing Pen. (bpf)	SAMPLE INFORMATION					Graphic Log	Sample Description & Classification	H ₂ O Depth	Remarks
			Sample No.	Type	Depth (ft)	Pen./ Rec. (in)	Blow Count or RQD				
									6 inches Asphalt Pavement		
								0.5	4 inches of Probable Concrete		

Auger Refusal at 0.9 feet
(Possible Buried Utility)

BORING / WELL: 20-1734.GPJ SWCE TEMPLATE.GDT 4/12/22

Stratification lines represent approximate boundary between soil types, transitions may be gradual. Water level readings have been made at times and under conditions stated. Fluctuations of groundwater may occur due to other factors than those present at the time measurements were made.

BORING NO.: B-13



BORING LOG

BORING NO.: B-14
SHEET: 1 of 1
PROJECT NO.: 20-1734
DATE START: 3/10/2022
DATE FINISH: 3/10/2022

CLIENT: CMA Engineers
PROJECT: Proposed Union St & Willard Ave Reconstruction
LOCATION: Multiple Streets, Portsmouth, NH

Drilling Information

LOCATION: See Exploration Location Plan **ELEVATION (FT):** 36' +/- **TOTAL DEPTH (FT):** 12.0 **LOGGED BY:** Bryce Walker
DRILLING CO.: S. W. Cole Explorations, LLC **DRILLER:** Matty Bussey **DRILLING METHOD:** Solid Stem Auger
RIG TYPE: Truck Mounted Acker **AUGER ID/OD:** N/A / 4 1/2 in **SAMPLER:** Standard Split-Spoon
HAMMER TYPE: Safety **HAMMER WEIGHT (lbs):** 140 **CASING ID/OD:** N/A / N/A **CORE BARREL:** _____
HAMMER EFFICIENCY FACTOR: _____ **HAMMER DROP (inch):** 30
WATER LEVEL DEPTHS (ft): ∇ 10 ft Soil appears saturated below 10.0 feet.

GENERAL NOTES:

KEY TO NOTES AND SYMBOLS:
 Water Level
 At time of Drilling
 At Completion of Drilling
 After Drilling
D = Split Spoon Sample U = Thin Walled Tube Sample Pen. = Penetration Length WOR = Weight of Rods S_v = Field Vane Shear Strength, kips/sq.ft.
R = Rock Core Sample Rec. = Recovery Length WOH = Weight of Hammer q_u = Unconfined Compressive Strength, kips/sq.ft.
V = Field Vane Shear bpf = Blows per Foot RQD = Rock Quality Designation Ø = Friction Angle (Estimated)
mpf = Minute per Foot PID = Photoionization Detector N/A = Not Applicable

Elev. (ft)	Depth (ft)	Casing Pen. (bpf)	SAMPLE INFORMATION					Graphic Log	Sample Description & Classification	H ₂ O Depth	Remarks
			Sample No.	Type	Depth (ft)	Pen./ Rec. (in)	Blow Count or RQD				
35	5		1D		0.6-2.6	24/14	14-9-5-6	ID 21545s w = 22.4 %	7 inches Asphalt Pavement	∇	
					2.6-4.6	24/12	12-10-8-7		0.6 Medium dense, brown-black Gravelly Silty SAND (Fill)		
			2D		5-7	24/15	3-3-3-5		2.6 Medium dense, gray-brown SILT and fine SAND some gravel (Reworked - Fill)		
30			3D		10-12	24/20	2-3-5-8	5.0 Loose, gray SILT some fine sand			
25	10		4D								

Bottom of Exploration at 12.0 feet

BORING / WELL 20-1734.GPJ SWCE TEMPLATE.GDT 4/12/22

Stratification lines represent approximate boundary between soil types, transitions may be gradual. Water level readings have been made at times and under conditions stated. Fluctuations of groundwater may occur due to other factors than those present at the time measurements were made.

BORING NO.: B-14



BORING LOG

BORING NO.: B-15
SHEET: 1 of 1
PROJECT NO.: 20-1734
DATE START: 3/10/2022
DATE FINISH: 3/10/2022

CLIENT: CMA Engineers
PROJECT: Proposed Union St & Willard Ave Reconstruction
LOCATION: Multiple Streets, Portsmouth, NH

Drilling Information

LOCATION: See Exploration Location Plan **ELEVATION (FT):** 36' +/- **TOTAL DEPTH (FT):** 12.0 **LOGGED BY:** Bryce Walker
DRILLING CO.: S. W. Cole Explorations, LLC **DRILLER:** Matty Bussey **DRILLING METHOD:** Solid Stem Auger
RIG TYPE: Truck Mounted Acker **AUGER ID/OD:** N/A / 4 1/2 in **SAMPLER:** Standard Split-Spoon
HAMMER TYPE: Safety **HAMMER WEIGHT (lbs):** 140 **CASING ID/OD:** N/A /N/A **CORE BARREL:** _____
HAMMER EFFICIENCY FACTOR: _____ **HAMMER DROP (inch):** 30
WATER LEVEL DEPTHS (ft): ∇ 10 ft Soil appears saturated below 10.0 feet.

GENERAL NOTES:

KEY TO NOTES AND SYMBOLS:
 Water Level ∇ At time of Drilling
 At Completion of Drilling ▾
 After Drilling ▿
 D = Split Spoon Sample
 U = Thin Walled Tube Sample
 R = Rock Core Sample
 V = Field Vane Shear
 Pen. = Penetration Length
 Rec. = Recovery Length
 bpf = Blows per Foot
 mpf = Minute per Foot
 WOR = Weight of Rods
 WOH = Weight of Hammer
 RQD = Rock Quality Designation
 PID = Photoionization Detector
 S_v = Field Vane Shear Strength, kips/sq.ft.
 q_u = Unconfined Compressive Strength, kips/sq.ft.
 Ø = Friction Angle (Estimated)
 N/A = Not Applicable

Elev. (ft)	Depth (ft)	Casing Pen. (bpf)	SAMPLE INFORMATION					Graphic Log	Sample Description & Classification	H ₂ O Depth	Remarks
			Sample No.	Type	Depth (ft)	Pen./ Rec. (in)	Blow Count or RQD				
35			1D		0.7-2.7	24/15	12-9-3-3		8 inches Asphalt Pavement		
			2D		2.7-4.7	24/10	3-3-6-11		0.8 Medium dense, dark brown-black Gravelly Silty SAND (Fill)		
	5		3D		5-7	24/20	2-2-2-3		3.0 Loose, gray fine Sandy SILT some clay		
30							ID 21546s w =21.5 %				
	10		4D		10-12	24/14	5-11-8-3		10.0 Medium dense, brown Silty fine SAND	∇	
25											

Bottom of Exploration at 12.0 feet

BORING / WELL 20-1734.GPJ SWCE TEMPLATE.GDT 4/12/22

Stratification lines represent approximate boundary between soil types, transitions may be gradual. Water level readings have been made at times and under conditions stated. Fluctuations of groundwater may occur due to other factors than those present at the time measurements were made.

BORING NO.: B-15



BORING LOG

BORING NO.: B-17
SHEET: 1 of 1
PROJECT NO.: 20-1734
DATE START: 3/9/2022
DATE FINISH: 3/9/2022

CLIENT: CMA Engineers
PROJECT: Proposed Union St & Willard Ave Reconstruction
LOCATION: Multiple Streets, Portsmouth, NH

Drilling Information

LOCATION: See Exploration Location Plan **ELEVATION (FT):** 40' +/- **TOTAL DEPTH (FT):** 12.0 **LOGGED BY:** Bryce Walker
DRILLING CO.: S. W. Cole Explorations, LLC **DRILLER:** Matty Bussey **DRILLING METHOD:** Solid Stem Auger
RIG TYPE: Truck Mounted Acker **AUGER ID/OD:** N/A / 4 1/2 in **SAMPLER:** Standard Split-Spoon
HAMMER TYPE: Safety **HAMMER WEIGHT (lbs):** 140 **CASING ID/OD:** N/A / N/A **CORE BARREL:** _____
HAMMER EFFICIENCY FACTOR: _____ **HAMMER DROP (inch):** 30
WATER LEVEL DEPTHS (ft): ∇ 10 ft Soil appears saturated below 10.0 feet.

GENERAL NOTES:

KEY TO NOTES AND SYMBOLS:
 Water Level
 At time of Drilling
 At Completion of Drilling
 After Drilling
D = Split Spoon Sample U = Thin Walled Tube Sample Pen. = Penetration Length WOR = Weight of Rods S_v = Field Vane Shear Strength, kips/sq.ft.
R = Rock Core Sample Rec. = Recovery Length WOH = Weight of Hammer q_u = Unconfined Compressive Strength, kips/sq.ft.
V = Field Vane Shear bpf = Blows per Foot RQD = Rock Quality Designation Ø = Friction Angle (Estimated)
mpf = Minute per Foot PID = Photoionization Detector N/A = Not Applicable

Elev. (ft)	Depth (ft)	Casing Pen. (bpf)	SAMPLE INFORMATION					Graphic Log	Sample Description & Classification	H ₂ O Depth	Remarks
			Sample No.	Type	Depth (ft)	Pen./ Rec. (in)	Blow Count or RQD				
			1D		0.5-2.5	24/16	6-7-13-10		6 inches Asphalt Pavement		
			2D		2.5-4.5	24/13	13-12-20-17		0.5 Medium dense, dark brown Gravelly Silty SAND (Fill)		
35	5		3D		5-7	24/20	14-15-16-11	ID 21547s w = 8.5 %	2.5 Dense, brown Gravelly SILT and SAND (Glacial Till)		
30	10		4D		10-12	24/17	15-21-25-20			∇	

Bottom of Exploration at 12.0 feet

BORING / WELL 20-1734.GPJ SWCE TEMPLATE.GDT 4/12/22

Stratification lines represent approximate boundary between soil types, transitions may be gradual. Water level readings have been made at times and under conditions stated. Fluctuations of groundwater may occur due to other factors than those present at the time measurements were made.

BORING NO.: B-17



BORING LOG

BORING NO.: B-18
SHEET: 1 of 1
PROJECT NO.: 20-1734
DATE START: 3/8/2022
DATE FINISH: 3/8/2022

CLIENT: CMA Engineers
PROJECT: Proposed Union St & Willard Ave Reconstruction
LOCATION: Multiple Streets, Portsmouth, NH

Drilling Information

LOCATION: See Exploration Location Plan **ELEVATION (FT):** 40' +/- **TOTAL DEPTH (FT):** 11.9 **LOGGED BY:** Bryce Walker
DRILLING CO.: S. W. Cole Explorations, LLC **DRILLER:** Matty Bussey **DRILLING METHOD:** Solid Stem Auger
RIG TYPE: Truck Mounted Acker **AUGER ID/OD:** N/A / 4 1/2 in **SAMPLER:** Standard Split-Spoon
HAMMER TYPE: Safety **HAMMER WEIGHT (lbs):** 140 **CASING ID/OD:** N/A /N/A **CORE BARREL:** _____
HAMMER EFFICIENCY FACTOR: _____ **HAMMER DROP (inch):** 30
WATER LEVEL DEPTHS (ft): ∇ 10 ft Soil appears saturated below 10.0 feet.

GENERAL NOTES:

KEY TO NOTES AND SYMBOLS:
 Water Level ∇ At time of Drilling
 At Completion of Drilling ▾
 After Drilling ▿
 D = Split Spoon Sample
 U = Thin Walled Tube Sample
 R = Rock Core Sample
 V = Field Vane Shear
 Pen. = Penetration Length
 Rec. = Recovery Length
 bpf = Blows per Foot
 mpf = Minute per Foot
 WOR = Weight of Rods
 WOH = Weight of Hammer
 RQD = Rock Quality Designation
 PID = Photoionization Detector
 S_v = Field Vane Shear Strength, kips/sq.ft.
 q_u = Unconfined Compressive Strength, kips/sq.ft.
 Ø = Friction Angle (Estimated)
 N/A = Not Applicable

Elev. (ft)	Depth (ft)	Casing Pen. (bpf)	SAMPLE INFORMATION					Graphic Log	Sample Description & Classification	H ₂ O Depth	Remarks
			Sample No.	Type	Depth (ft)	Pen./ Rec. (in)	Blow Count or RQD				
			1D	0.8-2.8	24/10	3-2-3-8		9 inches Asphalt Pavement			
			2D	2.8-4.8	24/18	17-19-18-16		0.8 Loose to dense, brown SAND and GRAVEL some silt			
35	5		3D	5-7	24/14	18-17-17-17	ID 21548s w = 5.7 %				
30	10		4D	10-11.8	21/15	14-24-35-50/3"		10.0 Very dense, gray Gravelly Silty SAND (Glacial Till)	∇		

Auger Refusal at 11.9 feet
(Probable Boulder or Bedrock)

Stratification lines represent approximate boundary between soil types, transitions may be gradual. Water level readings have been made at times and under conditions stated. Fluctuations of groundwater may occur due to other factors than those present at the time measurements were made.

BORING / WELL 20-1734.GPJ SWCE TEMPLATE.GDT 4/12/22



BORING LOG

BORING NO.: B-19
SHEET: 1 of 1
PROJECT NO.: 20-1734
DATE START: 3/8/2022
DATE FINISH: 3/8/2022

CLIENT: CMA Engineers
PROJECT: Proposed Union St & Willard Ave Reconstruction
LOCATION: Multiple Streets, Portsmouth, NH

Drilling Information

LOCATION: See Exploration Location Plan **ELEVATION (FT):** 37' +/- **TOTAL DEPTH (FT):** 9.0 **LOGGED BY:** Bryce Walker
DRILLING CO.: S. W. Cole Explorations, LLC **DRILLER:** Matty Bussey **DRILLING METHOD:** Solid Stem Auger
RIG TYPE: Truck Mounted Acker **AUGER ID/OD:** N/A / 4 1/2 in **SAMPLER:** Standard Split-Spoon
HAMMER TYPE: Safety **HAMMER WEIGHT (lbs):** 140 **CASING ID/OD:** N/A /N/A **CORE BARREL:** _____
HAMMER EFFICIENCY FACTOR: _____ **HAMMER DROP (inch):** 30
WATER LEVEL DEPTHS (ft): 5 ft Soil appears saturated below 5.0 feet.

GENERAL NOTES:

KEY TO NOTES AND SYMBOLS:
 Water Level
 At time of Drilling
 At Completion of Drilling
 After Drilling
D = Split Spoon Sample U = Thin Walled Tube Sample R = Rock Core Sample V = Field Vane Shear
Pen. = Penetration Length Rec. = Recovery Length bpf = Blows per Foot mpf = Minute per Foot
WOR = Weight of Rods WOH = Weight of Hammer RQD = Rock Quality Designation PID = Photoionization Detector
S_v = Field Vane Shear Strength, kips/sq.ft. q_u = Unconfined Compressive Strength, kips/sq.ft. Ø = Friction Angle (Estimated) N/A = Not Applicable

Elev. (ft)	Depth (ft)	Casing Pen. (bpf)	SAMPLE INFORMATION					Graphic Log	Sample Description & Classification	H ₂ O Depth	Remarks
			Sample No.	Type	Depth (ft)	Pen./ Rec. (in)	Blow Count or RQD				
35	5		1D		0.8-2.8	24/14	8-8-8-12		9 inches Asphalt Pavement	5.0	
								0.8	Medium dense, dark brown-black Silty SAND some gravel (Fill)		
								1.8	Dense, gray-brown Gravelly SAND some silt (Fill)		
30			2D		2.8-4.8	24/8	14-16-19-18				
			3D		5-6.3	16/9	18-26-50/4"		Very dense, brown-orange Gravelly Silty SAND (Glacial Till)		

Auger Refusal at 9.0 feet
(Probable Boulder or Bedrock)

Stratification lines represent approximate boundary between soil types, transitions may be gradual. Water level readings have been made at times and under conditions stated. Fluctuations of groundwater may occur due to other factors than those present at the time measurements were made.

BORING / WELL 20-1734.GPJ SWCE TEMPLATE.GDT 4/12/22



BORING LOG

BORING NO.: B-20
SHEET: 1 of 1
PROJECT NO.: 20-1734
DATE START: 3/8/2022
DATE FINISH: 3/8/2022

CLIENT: CMA Engineers
PROJECT: Proposed Union St & Willard Ave Reconstruction
LOCATION: Multiple Streets, Portsmouth, NH

Drilling Information

LOCATION: See Exploration Location Plan **ELEVATION (FT):** 35' +/- **TOTAL DEPTH (FT):** 9.5 **LOGGED BY:** Bryce Walker
DRILLING CO.: S. W. Cole Explorations, LLC **DRILLER:** Matty Bussey **DRILLING METHOD:** Solid Stem Auger
RIG TYPE: Truck Mounted Acker **AUGER ID/OD:** N/A / 4 1/2 in **SAMPLER:** Standard Split-Spoon
HAMMER TYPE: Safety **HAMMER WEIGHT (lbs):** 140 **CASING ID/OD:** N/A /N/A **CORE BARREL:** _____
HAMMER EFFICIENCY FACTOR: _____ **HAMMER DROP (inch):** 30
WATER LEVEL DEPTHS (ft): No free-water observed.

GENERAL NOTES:

KEY TO NOTES AND SYMBOLS:
 Water Level
 At time of Drilling
 At Completion of Drilling
 After Drilling
D = Split Spoon Sample Pen. = Penetration Length
U = Thin Walled Tube Sample Rec. = Recovery Length
R = Rock Core Sample bpf = Blows per Foot
V = Field Vane Shear mpf = Minute per Foot
WOR = Weight of Rods WOH = Weight of Hammer
RQD = Rock Quality Designation PID = Photoionization Detector
S_v = Field Vane Shear Strength, kips/sq.ft.
q_u = Unconfined Compressive Strength, kips/sq.ft.
Ø = Friction Angle (Estimated)
N/A = Not Applicable

Elev. (ft)	Depth (ft)	Casing Pen. (bpf)	SAMPLE INFORMATION					Graphic Log	Sample Description & Classification	H ₂ O Depth	Remarks
			Sample No.	Type	Depth (ft)	Pen./ Rec. (in)	Blow Count or RQD				
			1D		0.7-2.7	24/13	6-20-8-5		8 inches Asphalt Pavement		
			2D		2.7-4.7	24/2	6-4-5-5	0.7	Loose to medium dense, brown Gravelly Silty SAND with wood (Fill)		
30	5		3D		5-7	24/4	3-4-13-10	5.0	Medium dense, brown Gravelly Silty SAND (Glacial Till)		

Split Spoon Refusal at 9.5 feet
(Probable Boulder or Bedrock)

Stratification lines represent approximate boundary between soil types, transitions may be gradual. Water level readings have been made at times and under conditions stated. Fluctuations of groundwater may occur due to other factors than those present at the time measurements were made.

BORING / WELL 20-1734.GPJ SWCE TEMPLATE.GDT 4/12/22



BORING LOG

BORING NO.: B-21
SHEET: 1 of 1
PROJECT NO.: 20-1734
DATE START: 3/9/2022
DATE FINISH: 3/9/2022

CLIENT: CMA Engineers
PROJECT: Proposed Union St & Willard Ave Reconstruction
LOCATION: Multiple Streets, Portsmouth, NH

Drilling Information

LOCATION: See Exploration Location Plan **ELEVATION (FT):** 36' +/- **TOTAL DEPTH (FT):** 11.0 **LOGGED BY:** Bryce Walker
DRILLING CO.: S. W. Cole Explorations, LLC **DRILLER:** Matty Bussey **DRILLING METHOD:** Solid Stem Auger
RIG TYPE: Truck Mounted Acker **AUGER ID/OD:** N/A / 4 1/2 in **SAMPLER:** Standard Split-Spoon
HAMMER TYPE: Safety **HAMMER WEIGHT (lbs):** 140 **CASING ID/OD:** N/A / N/A **CORE BARREL:** _____
HAMMER EFFICIENCY FACTOR: _____ **HAMMER DROP (inch):** 30
WATER LEVEL DEPTHS (ft): ∇ 10 ft Soil appears saturated below 10.0 feet.

GENERAL NOTES:

KEY TO NOTES AND SYMBOLS:
 Water Level ∇ At time of Drilling
 ∇ At Completion of Drilling
 ∇ After Drilling
 D = Split Spoon Sample
 U = Thin Walled Tube Sample
 R = Rock Core Sample
 V = Field Vane Shear
 Pen. = Penetration Length
 Rec. = Recovery Length
 bpf = Blows per Foot
 mpf = Minute per Foot
 WOR = Weight of Rods
 WOH = Weight of Hammer
 RQD = Rock Quality Designation
 PID = Photoionization Detector
 S_v = Field Vane Shear Strength, kips/sq.ft.
 q_u = Unconfined Compressive Strength, kips/sq.ft.
 Ø = Friction Angle (Estimated)
 N/A = Not Applicable

Elev. (ft)	Depth (ft)	Casing Pen. (bpf)	SAMPLE INFORMATION					Graphic Log	Sample Description & Classification	H ₂ O Depth	Remarks
			Sample No.	Type	Depth (ft)	Pen./ Rec. (in)	Blow Count or RQD				
35	5		1D		0.6-2.6	24/8	19-11-4-3		7 inches Asphalt Pavement	∇	
					2.6-4.6	24/14	5-6-10-12		0.6 Medium dense, dark brown Gravelly Silty SAND with asphalt (Fill)		
			2D		5-7	24/19	11-11-10-17		2.6 Medium dense, Brown-orange Gravelly Silty SAND (Glacial Till)		
30			4D		10-10.8	10/10	16-50/4"				

Auger Refusal at 11.0 feet
(Probable Boulder or Bedrock)

Stratification lines represent approximate boundary between soil types, transitions may be gradual. Water level readings have been made at times and under conditions stated. Fluctuations of groundwater may occur due to other factors than those present at the time measurements were made.

BORING NO.: B-21

BORING / WELL 20-1734.GPJ SWCE TEMPLATE.GDT 4/12/22



BORING LOG

BORING NO.: B-22
SHEET: 1 of 1
PROJECT NO.: 20-1734
DATE START: 3/9/2022
DATE FINISH: 3/9/2022

CLIENT: CMA Engineers
PROJECT: Proposed Union St & Willard Ave Reconstruction
LOCATION: Multiple Streets, Portsmouth, NH

Drilling Information

LOCATION: See Exploration Location Plan **ELEVATION (FT):** 36' +/- **TOTAL DEPTH (FT):** 5.5 **LOGGED BY:** Bryce Walker
DRILLING CO.: S. W. Cole Explorations, LLC **DRILLER:** Matty Bussey **DRILLING METHOD:** Solid Stem Auger
RIG TYPE: Truck Mounted Acker **AUGER ID/OD:** N/A / 4 1/2 in **SAMPLER:** Standard Split-Spoon
HAMMER TYPE: Safety **HAMMER WEIGHT (lbs):** 140 **CASING ID/OD:** N/A / N/A **CORE BARREL:**
HAMMER EFFICIENCY FACTOR: **HAMMER DROP (inch):** 30
WATER LEVEL DEPTHS (ft): No free-water observed.

GENERAL NOTES:

KEY TO NOTES AND SYMBOLS:
 Water Level
 At time of Drilling
 At Completion of Drilling
 After Drilling
D = Split Spoon Sample U = Thin Walled Tube Sample
R = Rock Core Sample V = Field Vane Shear
Pen. = Penetration Length Rec. = Recovery Length
bpf = Blows per Foot mpf = Minute per Foot
WOR = Weight of Rods WOH = Weight of Hammer
RQD = Rock Quality Designation PID = Photoionization Detector
S_v = Field Vane Shear Strength, kips/sq.ft.
q_u = Unconfined Compressive Strength, kips/sq.ft.
Ø = Friction Angle (Estimated)
N/A = Not Applicable

Elev. (ft)	Depth (ft)	Casing Pen. (bpf)	SAMPLE INFORMATION					Graphic Log	Sample Description & Classification	H ₂ O Depth	Remarks	
			Sample No.	Type	Depth (ft)	Pen./ Rec. (in)	Blow Count or RQD					Field / Lab Test Data
35			1D		0.4-2.4	24/9	11-12-7-9	ID 21595 w = 8.1 %	0.4	5 inches Asphalt Pavement Medium dense, brown Silty SAND and GRAVEL (Fill)		
			2D		2.4-4.4	24/12	10-11-12-20	ID 21549s w = 12.3 %	2.4	Medium dense, brown-gray Gravelly Silty SAND		

Auger Refusal at 5.5 feet
(Probable Boulder or Bedrock)

Stratification lines represent approximate boundary between soil types, transitions may be gradual. Water level readings have been made at times and under conditions stated. Fluctuations of groundwater may occur due to other factors than those present at the time measurements were made.

BORING NO.: B-22



BORING LOG

BORING NO.: B-24
SHEET: 1 of 1
PROJECT NO.: 20-1734
DATE START: 3/8/2022
DATE FINISH: 3/8/2022

CLIENT: CMA Engineers
PROJECT: Proposed Union St & Willard Ave Reconstruction
LOCATION: Multiple Streets, Portsmouth, NH

Drilling Information

LOCATION: See Exploration Location Plan **ELEVATION (FT):** 35' +/- **TOTAL DEPTH (FT):** 12.0 **LOGGED BY:** Bryce Walker
DRILLING CO.: S. W. Cole Explorations, LLC **DRILLER:** Matty Bussey **DRILLING METHOD:** Solid Stem Auger
RIG TYPE: Truck Mounted Acker **AUGER ID/OD:** N/A / 4 1/2 in **SAMPLER:** Standard Split-Spoon
HAMMER TYPE: Safety **HAMMER WEIGHT (lbs):** 140 **CASING ID/OD:** N/A /N/A **CORE BARREL:** _____
HAMMER EFFICIENCY FACTOR: _____ **HAMMER DROP (inch):** 30
WATER LEVEL DEPTHS (ft): ∇ 5 ft Soil appears saturated below 5.0 feet.

GENERAL NOTES:

KEY TO NOTES AND SYMBOLS:
 Water Level ∇ At time of Drilling
 ∇ At Completion of Drilling
 ∇ After Drilling
 D = Split Spoon Sample
 U = Thin Walled Tube Sample
 R = Rock Core Sample
 V = Field Vane Shear
 Pen. = Penetration Length
 Rec. = Recovery Length
 bpf = Blows per Foot
 mpf = Minute per Foot
 WOR = Weight of Rods
 WOH = Weight of Hammer
 RQD = Rock Quality Designation
 PID = Photoionization Detector
 S_v = Field Vane Shear Strength, kips/sq.ft.
 q_u = Unconfined Compressive Strength, kips/sq.ft.
 Ø = Friction Angle (Estimated)
 N/A = Not Applicable

Elev. (ft)	Depth (ft)	Casing Pen. (bpf)	SAMPLE INFORMATION					Graphic Log	Sample Description & Classification	H ₂ O Depth	Remarks
			Sample No.	Type	Depth (ft)	Pen./ Rec. (in)	Blow Count or RQD				
			1D		0.6-2.6	24/5	12-5-7-6		7 inches Asphalt Pavement		
			2D		2.6-4.6	24/12	5-5-5-5		0.6 Medium dense, dark brown-black Silty SAND some gravel with asphalt (Fill)		
			3D		5-7	24/16	8-3-4-5		3.0 Loose, gray Clayey SILT and fine SAND		
30	5								5.0 Loose, gray Silty fine SAND	∇	
25	10		4D		10-12	24/10	8-11-12-11	ID 21550s w =26.4 %	10.2 Medium dense, brown-orange Gravelly Silty SAND (Glacial Till)		

Bottom of Exploration at 12.0 feet

BORING / WELL 20-1734.GPJ SWCE TEMPLATE.GDT 4/12/22

Stratification lines represent approximate boundary between soil types, transitions may be gradual. Water level readings have been made at times and under conditions stated. Fluctuations of groundwater may occur due to other factors than those present at the time measurements were made.

BORING NO.: B-24



BORING LOG

BORING NO.: B-25
SHEET: 1 of 1
PROJECT NO.: 20-1734
DATE START: 3/8/2022
DATE FINISH: 3/8/2022

CLIENT: CMA Engineers
PROJECT: Proposed Union St & Willard Ave Reconstruction
LOCATION: Multiple Streets, Portsmouth, NH

Drilling Information

LOCATION: See Exploration Location Plan **ELEVATION (FT):** 44' +/- **TOTAL DEPTH (FT):** 11.5 **LOGGED BY:** Bryce Walker
DRILLING CO.: S. W. Cole Explorations, LLC **DRILLER:** Matty Bussey **DRILLING METHOD:** Solid Stem Auger
RIG TYPE: Truck Mounted Acker **AUGER ID/OD:** N/A / 4 1/2 in **SAMPLER:** Standard Split-Spoon
HAMMER TYPE: Safety **HAMMER WEIGHT (lbs):** 140 **CASING ID/OD:** N/A /N/A **CORE BARREL:** _____
HAMMER EFFICIENCY FACTOR: _____ **HAMMER DROP (inch):** 30
WATER LEVEL DEPTHS (ft): ∇ 10 ft Soil appears saturated below 10.0 feet.

GENERAL NOTES:

KEY TO NOTES AND SYMBOLS:
 Water Level ∇ At time of Drilling
 ∇ At Completion of Drilling
 ∇ After Drilling
 D = Split Spoon Sample
 U = Thin Walled Tube Sample
 R = Rock Core Sample
 V = Field Vane Shear
 Pen. = Penetration Length
 Rec. = Recovery Length
 bpf = Blows per Foot
 mpf = Minute per Foot
 WOR = Weight of Rods
 WOH = Weight of Hammer
 RQD = Rock Quality Designation
 PID = Photoionization Detector
 S_v = Field Vane Shear Strength, kips/sq.ft.
 q_u = Unconfined Compressive Strength, kips/sq.ft.
 Ø = Friction Angle (Estimated)
 N/A = Not Applicable

Elev. (ft)	Depth (ft)	Casing Pen. (bpf)	SAMPLE INFORMATION					Graphic Log	Sample Description & Classification	H ₂ O Depth	Remarks
			Sample No.	Type	Depth (ft)	Pen./ Rec. (in)	Blow Count or RQD				
								8 inches Asphalt Pavement			
			1D		0.7-2.7	24/8	24-10-6-4		0.7 Medium dense, brown Gravelly Silty SAND with concrete (Fill)		
			2D		2.7-4.7	24/12	6-10-14-14		2.7 Medium dense to dense, brown Gravelly Silty SAND		
40	5		3D		5-7	24/10	19-20-17-17				
35											
	10		4D		10-10.9	11/7	12-50/5"			∇	

Auger Refusal at 11.5 feet
 (Probable Boulder or Bedrock)

BORING / WELL 20-1734.GPJ SWCE TEMPLATE.GDT 4/12/22

Stratification lines represent approximate boundary between soil types, transitions may be gradual. Water level readings have been made at times and under conditions stated. Fluctuations of groundwater may occur due to other factors than those present at the time measurements were made.

BORING NO.: B-25

KEY TO NOTES & SYMBOLS

Test Boring and Test Pit Explorations

Stratification lines represent the approximate boundary between soil types and the transition may be gradual.

Key to Symbols Used:

w	-	water content, percent (dry weight basis)
q _u	-	unconfined compressive strength, kips/sq. ft. - laboratory test
S _v	-	field vane shear strength, kips/sq. ft.
L _v	-	lab vane shear strength, kips/sq. ft.
q _p	-	unconfined compressive strength, kips/sq. ft. – pocket penetrometer test
O	-	organic content, percent (dry weight basis)
W _L	-	liquid limit - Atterberg test
W _P	-	plastic limit - Atterberg test
WOH	-	advance by weight of hammer
WOM	-	advance by weight of man
WOR	-	advance by weight of rods
HYD	-	advance by force of hydraulic piston on drill
RQD	-	Rock Quality Designator - an index of the quality of a rock mass.
γ _T	-	total soil weight
γ _B	-	buoyant soil weight

Description of Proportions:

Trace:	0 to 5%
Some:	5 to 12%
“Y”	12 to 35%
And	35+%
With	Undifferentiated

Description of Stratified Soils

Parting:	0 to 1/16” thickness
Seam:	1/16” to 1/2” thickness
Layer:	½” to 12” thickness
Varved:	Alternating seams or layers
Occasional:	one or less per foot of thickness
Frequent:	more than one per foot of thickness

REFUSAL: Test Boring Explorations - Refusal depth indicates that depth at which, in the drill foreman's opinion, sufficient resistance to the advance of the casing, auger, probe rod or sampler was encountered to render further advance impossible or impracticable by the procedures and equipment being used.

REFUSAL: Test Pit Explorations - Refusal depth indicates that depth at which sufficient resistance to the advance of the backhoe bucket was encountered to render further advance impossible or impracticable by the procedures and equipment being used.

Although refusal may indicate the encountering of the bedrock surface, it may indicate the striking of large cobbles, boulders, very dense or cemented soil, or other buried natural or man-made objects or it may indicate the encountering of a harder zone after penetrating a considerable depth through a weathered or disintegrated zone of the bedrock.

APPENDIX D

Laboratory Test Results



Report of Gradation

ASTM C-117 & C-136

Project Name PORTSMOUTH NH - UNION STEET AND WILLARD AVENUE AREA
RECONSTRUCTION - GEOTECHNICAL ENGINEERING SERVICES

Project Number 20-1734

Client ALTUS ENGINEERING, INC.

Lab ID 21541S

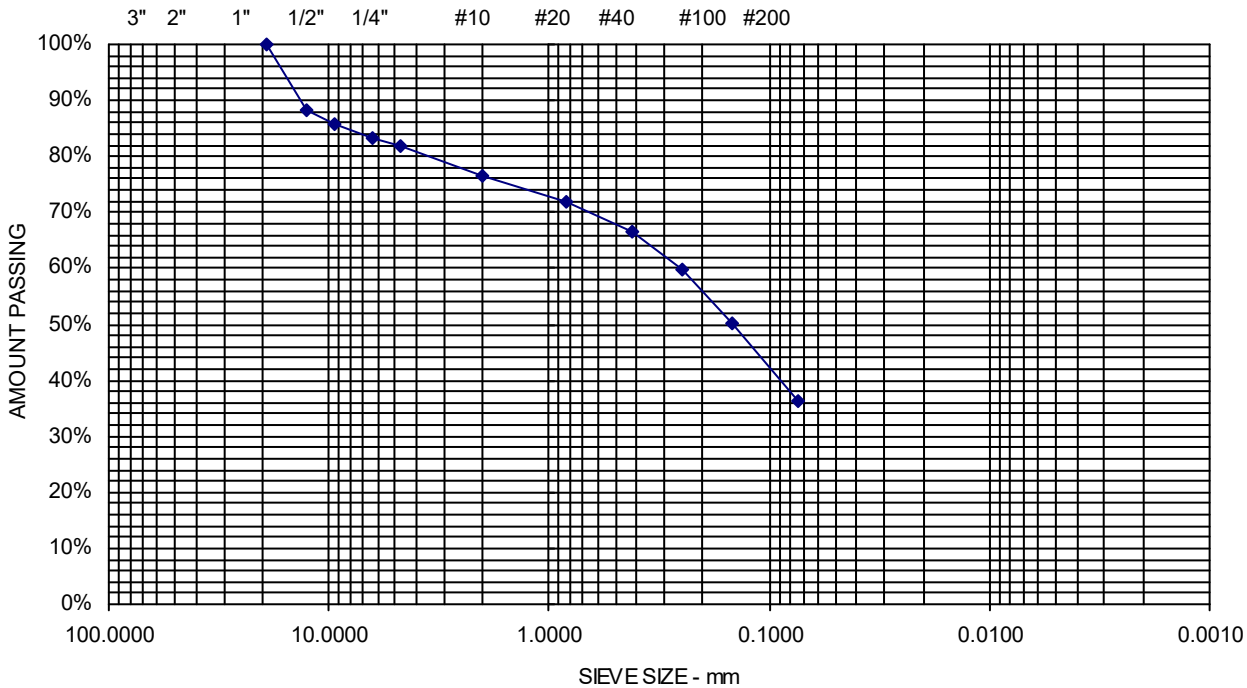
Date Received 3/18/2022

Date Completed 3/22/2022

Material Source B-2, 3D, 5.5'-7.0'

Tested By BRADLEY GERSCHWILER

<u>STANDARD DESIGNATION (mm/μm)</u>	<u>SIEVE SIZE</u>	<u>AMOUNT PASSING (%)</u>	
19.0 mm	3/4"	100	
12.5 mm	1/2"	88	
9.5 mm	3/8"	86	
6.3 mm	1/4"	83	
4.75 mm	No. 4	82	18.3% Gravel
2.00 mm	No. 10	77	
850 μm	No. 20	72	
425 μm	No. 40	66	45.5% Sand
250 μm	No. 60	60	
150 μm	No. 100	50	
75 μm	No. 200	36.2	36.2% Fines



Comments: Moisture Content = 12.9%

Sheet



Report of Gradation

ASTM C-117 & C-136

Project Name PORTSMOUTH NH - UNION STEET AND WILLARD AVENUE AREA
RECONSTRUCTION - GEOTECHNICAL ENGINEERING SERVICES

Project Number 20-1734

Client ALTUS ENGINEERING, INC.

Lab ID 21542S

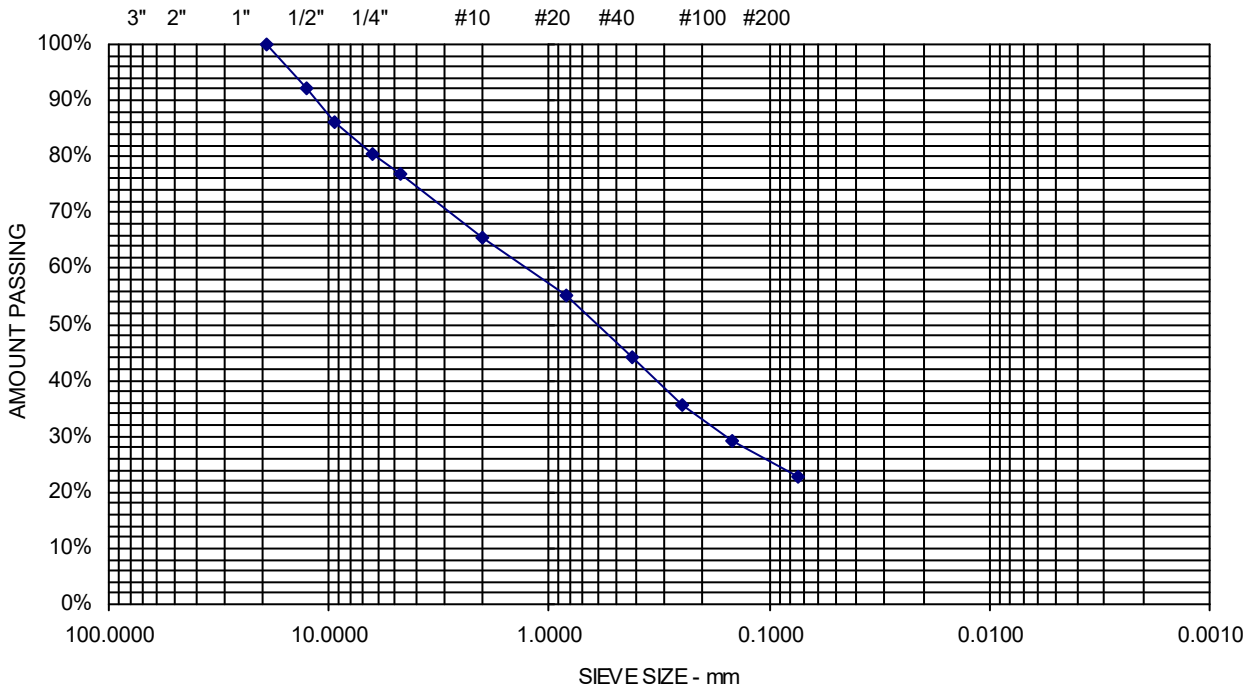
Date Received 3/18/2022

Date Completed 3/22/2022

Material Source B-4, 2D, 3.0'-4.5'

Tested By BRADLEY GERSCHWILER

<u>STANDARD DESIGNATION (mm/μm)</u>	<u>SIEVE SIZE</u>	<u>AMOUNT PASSING (%)</u>	
19.0 mm	3/4"	100	
12.5 mm	1/2"	92	
9.5 mm	3/8"	86	
6.3 mm	1/4"	80	
4.75 mm	No. 4	77	23.2% Gravel
2.00 mm	No. 10	66	
850 μm	No. 20	55	
425 μm	No. 40	44	53.9% Sand
250 μm	No. 60	36	
150 μm	No. 100	29	
75 μm	No. 200	22.9	22.9% Fines



Comments: Moisture Content = 12.0%

Sheet



Report of Gradation

ASTM C-117 & C-136

Project Name PORTSMOUTH NH - UNION STEET AND WILLARD AVENUE AREA
RECONSTRUCTION - GEOTECHNICAL ENGINEERING SERVICES

Project Number 20-1734

Client ALTUS ENGINEERING, INC.

Lab ID 21543S

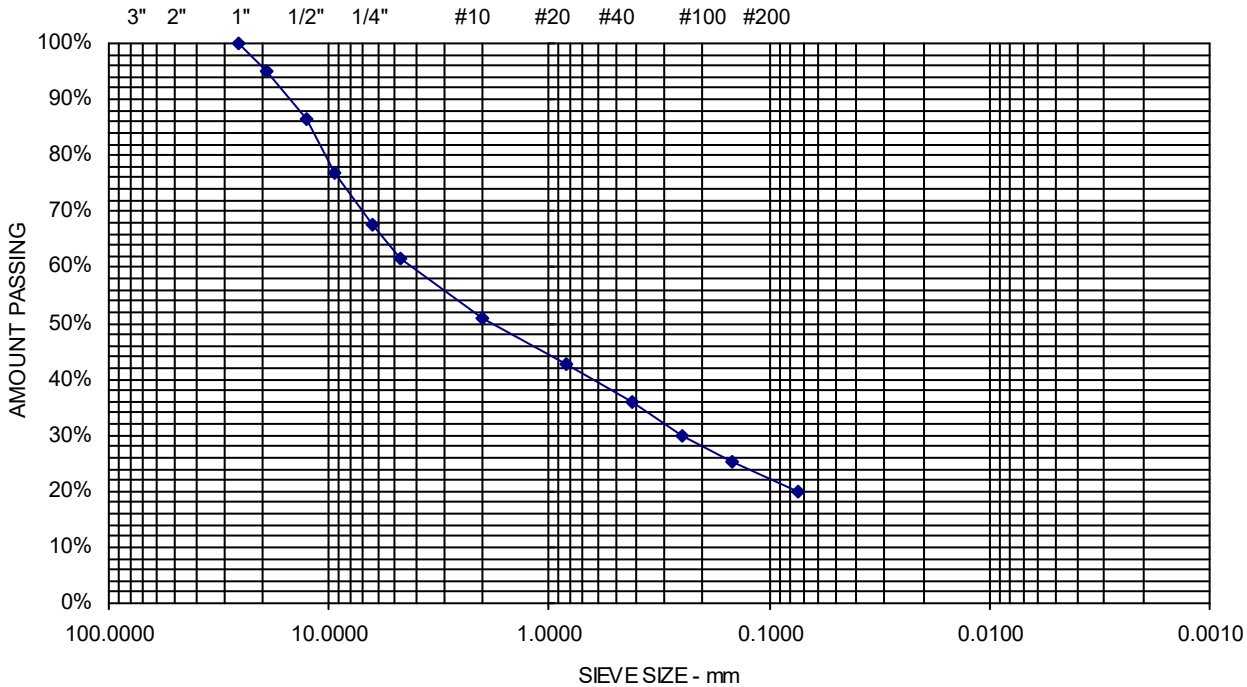
Date Received 3/18/2022

Date Completed 3/22/2022

Material Source B-6, 2D, 2.5'-4.5'

Tested By BRADLEY GERSCHWILER

<u>STANDARD DESIGNATION (mm/μm)</u>	<u>SIEVE SIZE</u>	<u>AMOUNT PASSING (%)</u>	
25.0 mm	1"	100	
19.0 mm	3/4"	95	
12.5 mm	1/2"	87	
9.5 mm	3/8"	77	
6.3 mm	1/4"	67	
4.75 mm	No. 4	62	38.5% Gravel
2.00 mm	No. 10	51	
850 μm	No. 20	43	
425 μm	No. 40	36	41.7% Sand
250 μm	No. 60	30	
150 μm	No. 100	25	
75 μm	No. 200	19.9	19.9% Fines



Comments: Moisture Content = 10.0%

Sheet



Report of Gradation

ASTM C-117 & C-136

Project Name PORTSMOUTH NH - UNION STEET AND WILLARD AVENUE AREA
RECONSTRUCTION - GEOTECHNICAL ENGINEERING SERVICES

Project Number 20-1734

Client ALTUS ENGINEERING, INC.

Lab ID 21544S

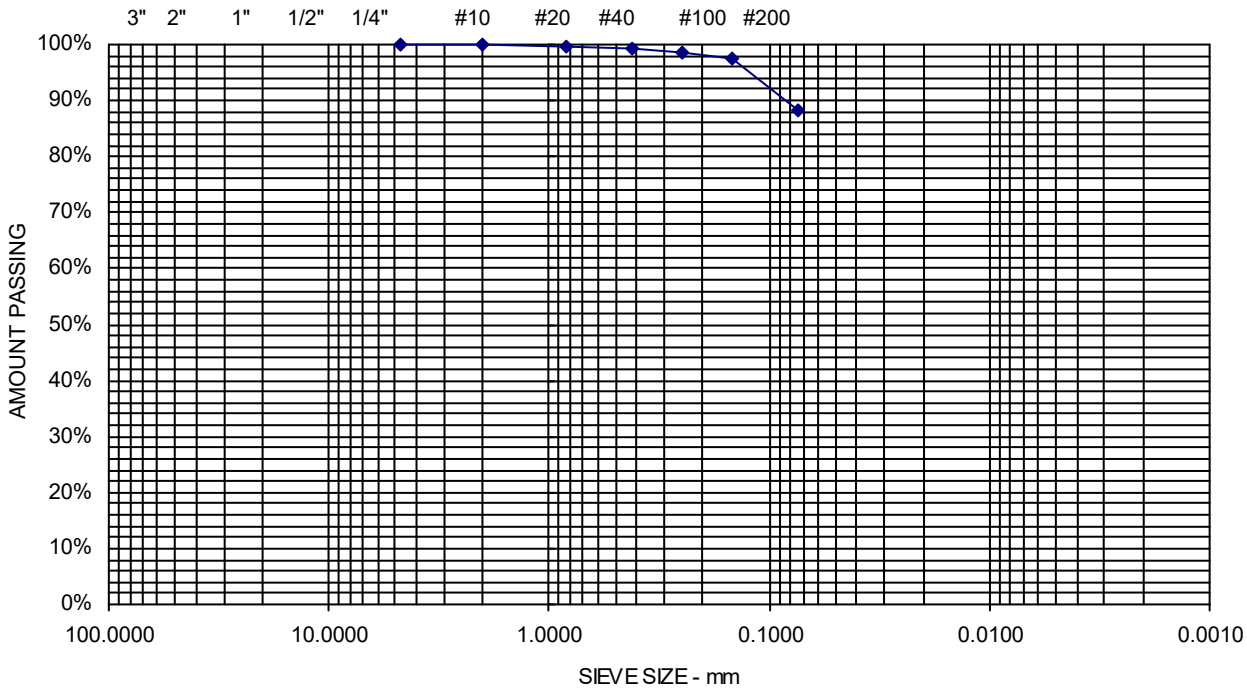
Date Received 3/18/2022

Date Completed 3/22/2022

Material Source **B-12, 4D, 10.0'-12.0'**

Tested By BRADLEY GERSCHWILER

<u>STANDARD DESIGNATION (mm/μm)</u>	<u>SIEVE SIZE</u>	<u>AMOUNT PASSING (%)</u>	
4.75 mm	No. 4	100	0% Gravel
2.00 mm	No. 10	100	
850 μm	No. 20	100	
425 μm	No. 40	99	11.9% Sand
250 μm	No. 60	99	
150 μm	No. 100	98	
75 μm	No. 200	88.1	88.1% Fines



Comments: Moisture Content = 22.9%

Sheet



Report of Gradation

ASTM C-117 & C-136

Project Name PORTSMOUTH NH - UNION STEET AND WILLARD AVENUE AREA
RECONSTRUCTION - GEOTECHNICAL ENGINEERING SERVICES

Project Number 20-1734

Client ALTUS ENGINEERING, INC.

Lab ID 21545S

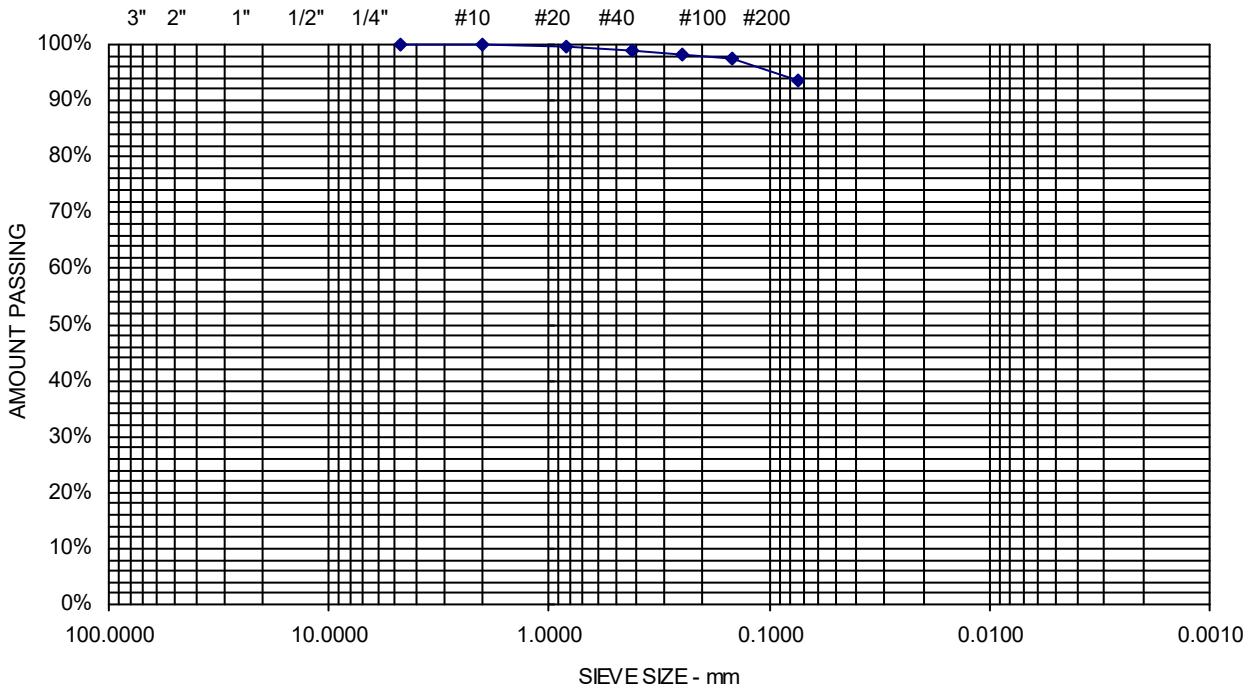
Date Received 3/18/2022

Date Completed 3/22/2022

Material Source B-14, 3D, 5.0'-7.0'

Tested By BRADLEY GERSCHWILER

<u>STANDARD DESIGNATION (mm/μm)</u>	<u>SIEVE SIZE</u>	<u>AMOUNT PASSING (%)</u>	
4.75 mm	No. 4	100	0% Gravel
2.00 mm	No. 10	100	
850 μm	No. 20	100	
425 μm	No. 40	99	6.5% Sand
250 μm	No. 60	98	
150 μm	No. 100	97	
75 μm	No. 200	93.5	93.5% Fines



Comments: Moisture Content = 22.4%

Sheet



Report of Gradation

ASTM C-117 & C-136

Project Name PORTSMOUTH NH - UNION STEET AND WILLARD AVENUE AREA
RECONSTRUCTION - GEOTECHNICAL ENGINEERING SERVICES

Project Number 20-1734

Client ALTUS ENGINEERING, INC.

Lab ID 21546S

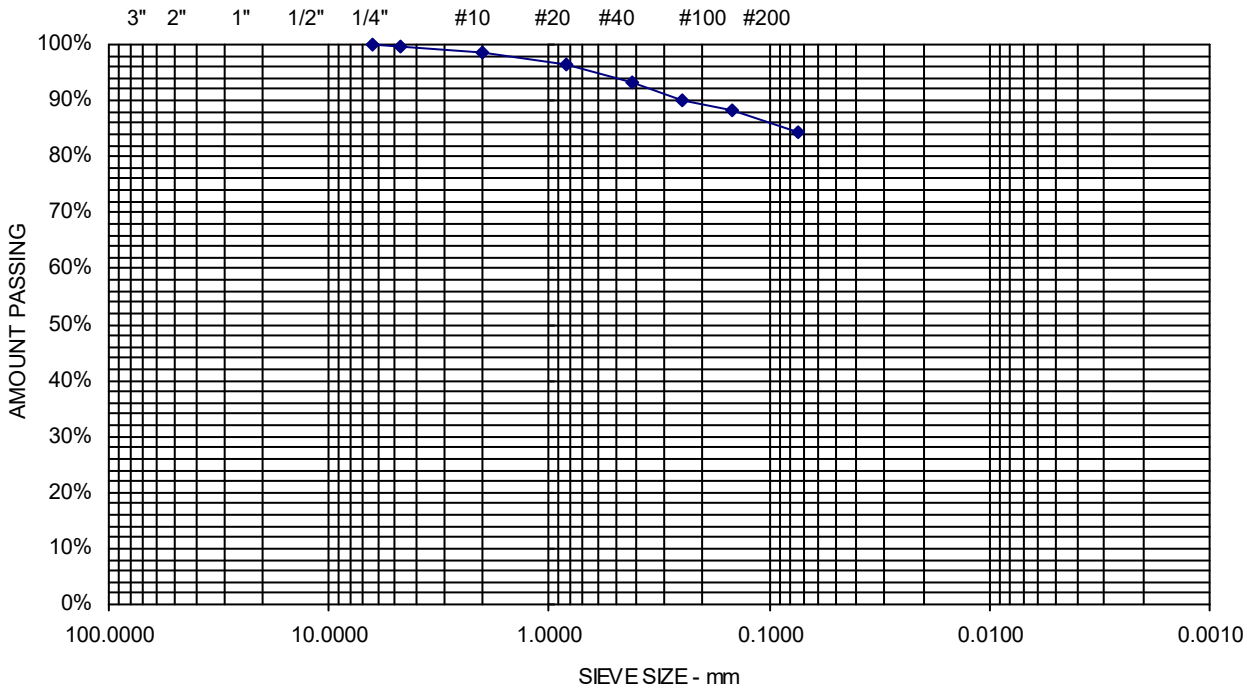
Date Received 3/18/2022

Date Completed 3/22/2022

Material Source B-15, 3D, 5.0'-7.0'

Tested By BRADLEY GERSCHWILER

<u>STANDARD DESIGNATION (mm/μm)</u>	<u>SIEVE SIZE</u>	<u>AMOUNT PASSING (%)</u>	
6.3 mm	1/4"	100	
4.75 mm	No. 4	99	0.5% Gravel
2.00 mm	No. 10	99	
850 μm	No. 20	96	
425 μm	No. 40	93	15.2% Sand
250 μm	No. 60	90	
150 μm	No. 100	88	
75 μm	No. 200	84.3	84.3% Fines



Comments: Moisture Content = 21.5%

Sheet



Report of Gradation

ASTM C-117 & C-136

Project Name PORTSMOUTH NH - UNION STEET AND WILLARD AVENUE AREA
RECONSTRUCTION - GEOTECHNICAL ENGINEERING SERVICES

Project Number 20-1734

Client ALTUS ENGINEERING, INC.

Lab ID 21547S

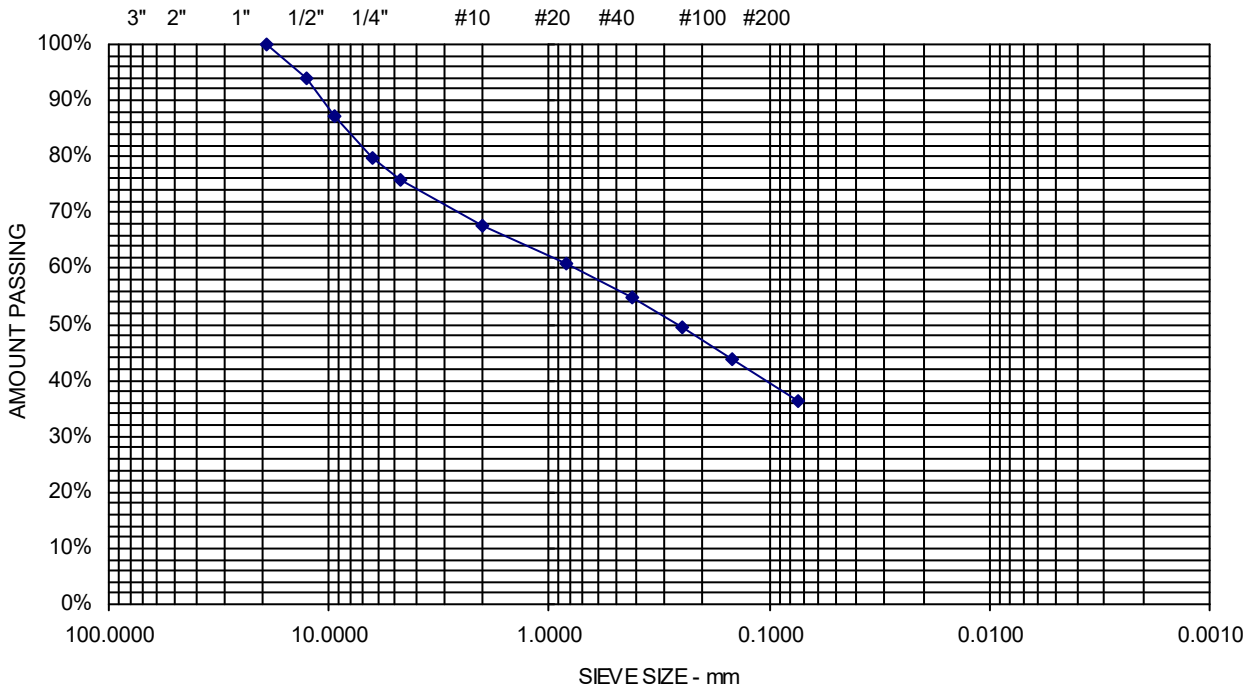
Date Received 3/18/2022

Date Completed 3/22/2022

Material Source B-17, 3D, 5.0'-7.0'

Tested By BRADLEY GERSCHWILER

<u>STANDARD DESIGNATION (mm/μm)</u>	<u>SIEVE SIZE</u>	<u>AMOUNT PASSING (%)</u>	
19.0 mm	3/4"	100	
12.5 mm	1/2"	94	
9.5 mm	3/8"	87	
6.3 mm	1/4"	80	
4.75 mm	No. 4	76	24.3% Gravel
2.00 mm	No. 10	67	
850 μm	No. 20	61	
425 μm	No. 40	55	39.5% Sand
250 μm	No. 60	49	
150 μm	No. 100	44	
75 μm	No. 200	36.2	36.2% Fines



Comments: Moisture Content = 8.5%

Sheet



Report of Gradation

ASTM C-117 & C-136

Project Name PORTSMOUTH NH - UNION STEET AND WILLARD AVENUE AREA
RECONSTRUCTION - GEOTECHNICAL ENGINEERING SERVICES

Project Number 20-1734

Client ALTUS ENGINEERING, INC.

Lab ID 21548S

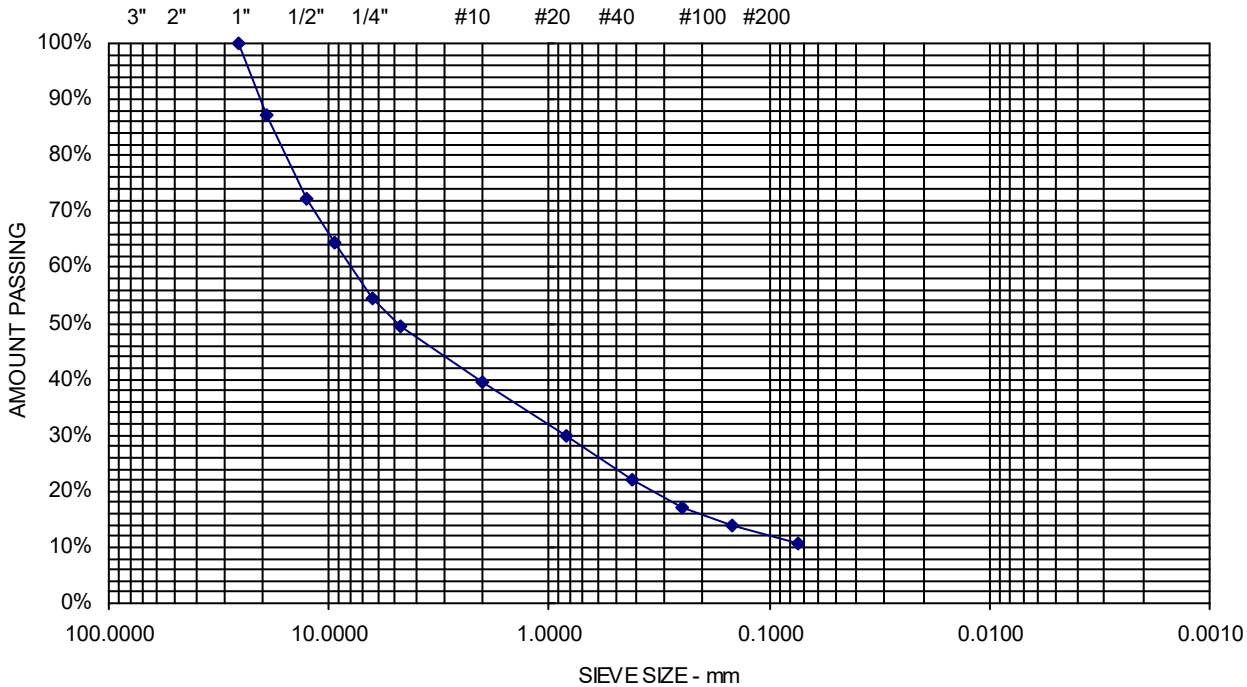
Date Received 3/18/2022

Date Completed 3/22/2022

Material Source B-18, 3D, 5.0'-7.0'

Tested By BRADLEY GERSCHWILER

<u>STANDARD DESIGNATION (mm/μm)</u>	<u>SIEVE SIZE</u>	<u>AMOUNT PASSING (%)</u>	
25.0 mm	1"	100	
19.0 mm	3/4"	87	
12.5 mm	1/2"	72	
9.5 mm	3/8"	64	
6.3 mm	1/4"	54	
4.75 mm	No. 4	49	50.7% Gravel
2.00 mm	No. 10	39	
850 μm	No. 20	30	
425 μm	No. 40	22	38.6% Sand
250 μm	No. 60	17	
150 μm	No. 100	14	
75 μm	No. 200	10.7	10.7% Fines



Comments: Moisture Content = 5.7%

Sheet



Report of Gradation

ASTM C-117 & C-136

Project Name PORTSMOUTH NH - UNION STEET AND WILLARD AVENUE AREA
RECONSTRUCTION - GEOTECHNICAL ENGINEERING SERVICES

Project Number 20-1734

Client ALTUS ENGINEERING, INC.

Lab ID 21549S

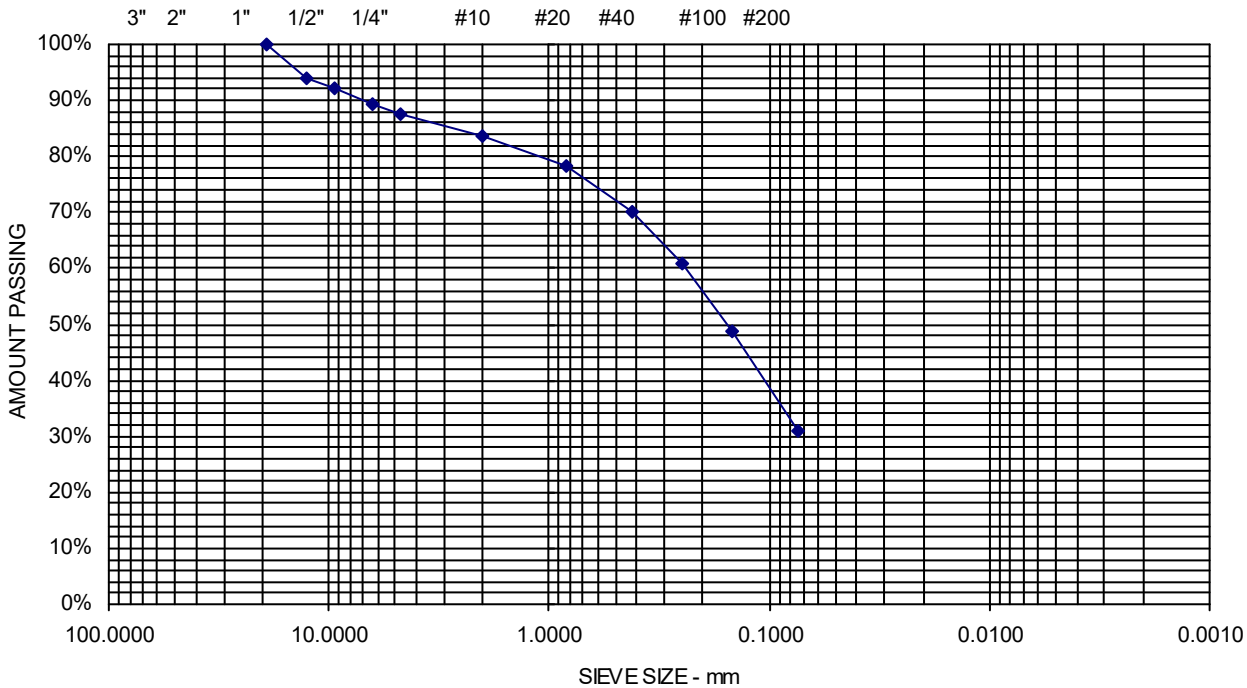
Date Received 3/18/2022

Date Completed 3/22/2022

Material Source B-22, 2D, 2.4'-4.4'

Tested By BRADLEY GERSCHWILER

<u>STANDARD DESIGNATION (mm/μm)</u>	<u>SIEVE SIZE</u>	<u>AMOUNT PASSING (%)</u>	
19.0 mm	3/4"	100	
12.5 mm	1/2"	94	
9.5 mm	3/8"	92	
6.3 mm	1/4"	89	
4.75 mm	No. 4	88	12.4% Gravel
2.00 mm	No. 10	84	
850 μm	No. 20	78	
425 μm	No. 40	70	56.6% Sand
250 μm	No. 60	61	
150 μm	No. 100	49	
75 μm	No. 200	31.0	31% Fines



Comments: Moisture Content = 12.3%

Sheet



Report of Gradation

ASTM C-117 & C-136

Project Name PORTSMOUTH NH - UNION STEET AND WILLARD AVENUE AREA
RECONSTRUCTION - GEOTECHNICAL ENGINEERING SERVICES

Project Number 20-1734

Client ALTUS ENGINEERING, INC.

Lab ID 21550S

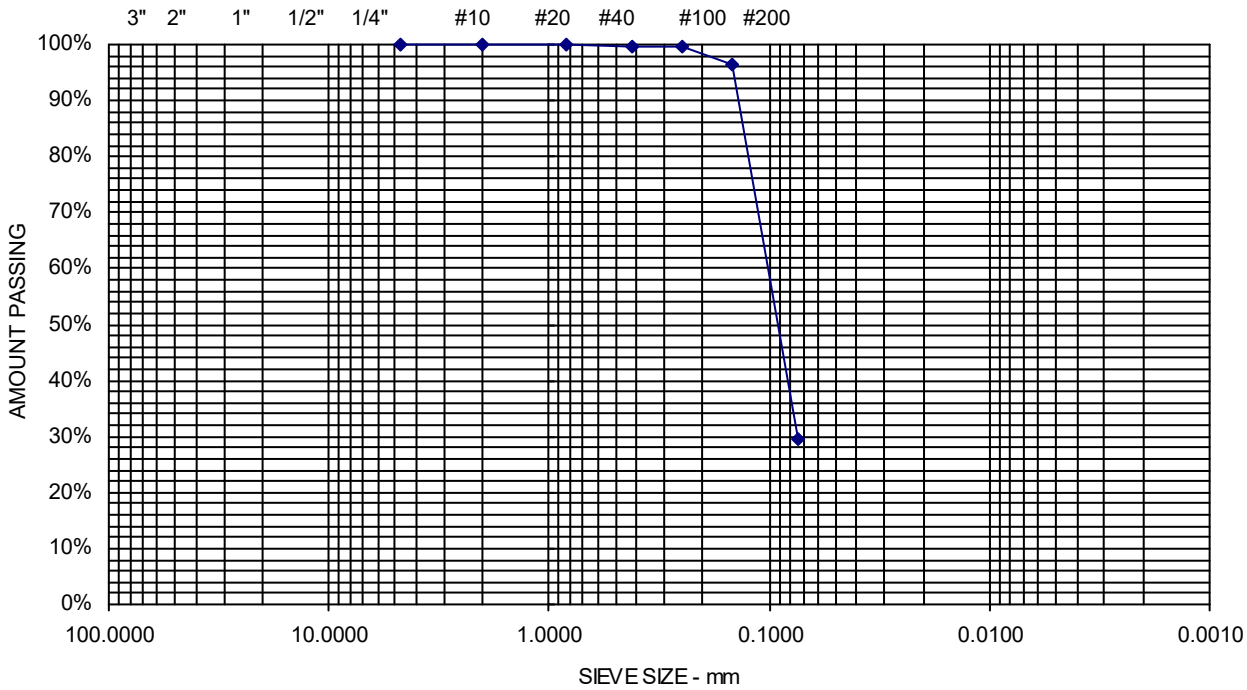
Date Received 3/18/2022

Date Completed 3/22/2022

Material Source B-24, 3D, 5.0'-7.0'

Tested By BRADLEY GERSCHWILER

<u>STANDARD DESIGNATION (mm/μm)</u>	<u>SIEVE SIZE</u>	<u>AMOUNT PASSING (%)</u>	
4.75 mm	No. 4	100	0% Gravel
2.00 mm	No. 10	100	
850 μm	No. 20	100	
425 μm	No. 40	100	70.5% Sand
250 μm	No. 60	100	
150 μm	No. 100	96	
75 μm	No. 200	29.5	29.5% Fines



Comments: Moisture Content = 26.4%

Sheet



Report of Gradation

ASTM C-117 & C-136

Project Name PORTSMOUTH NH - UNION STEET AND WILLARD AVENUE AREA
RECONSTRUCTION - GEOTECHNICAL ENGINEERING SERVICES

Project Number 20-1734

Client CMA ENGINEERS, INC.

Lab ID 21592S

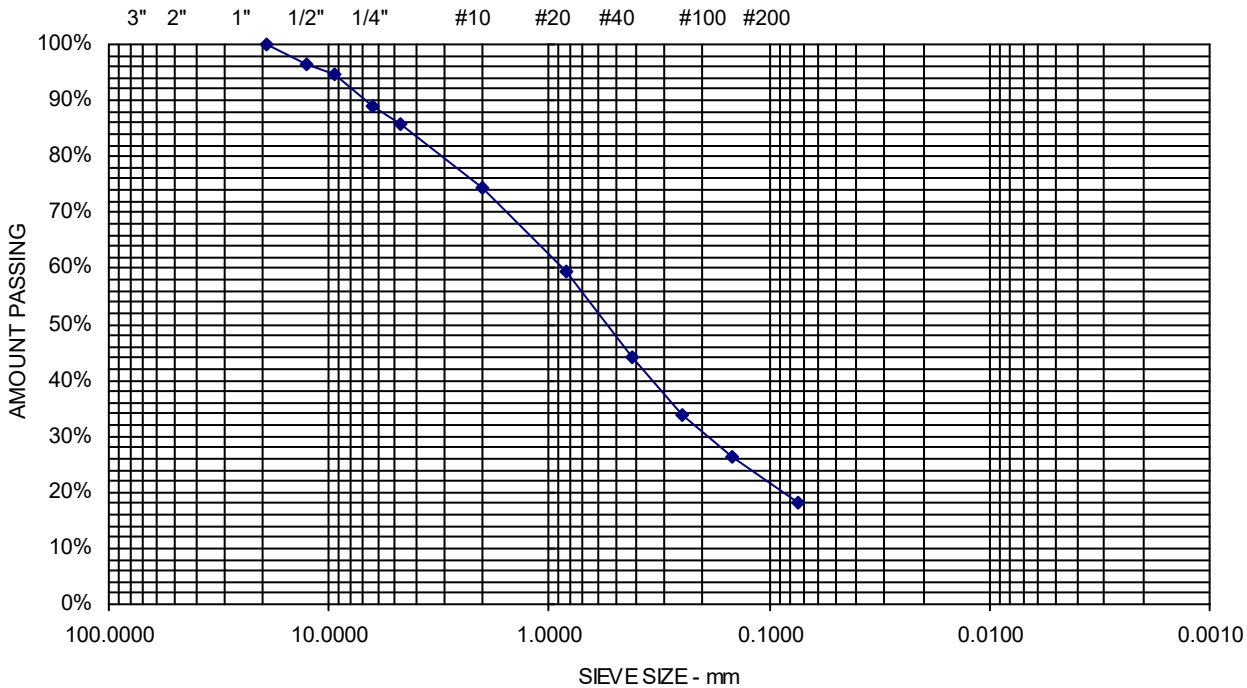
Date Received 4/6/2022

Date Completed 4/12/2022

Material Source B-2, 1D, 0.8'-2.8'

Tested By BRADLEY GERSCHWILER

<u>STANDARD DESIGNATION (mm/μm)</u>	<u>SIEVE SIZE</u>	<u>AMOUNT PASSING (%)</u>	
19.0 mm	3/4"	100	
12.5 mm	1/2"	97	
9.5 mm	3/8"	95	
6.3 mm	1/4"	89	
4.75 mm	No. 4	86	14.4% Gravel
2.00 mm	No. 10	74	
850 μm	No. 20	60	
425 μm	No. 40	44	67.4% Sand
250 μm	No. 60	34	
150 μm	No. 100	26	
75 μm	No. 200	18.3	18.3% Fines



Comments: Moisture Content = 8.3%

Sheet



Report of Gradation

ASTM C-117 & C-136

Project Name PORTSMOUTH NH - UNION STEET AND WILLARD AVENUE AREA
RECONSTRUCTION - GEOTECHNICAL ENGINEERING SERVICES

Project Number 20-1734

Client CMA ENGINEERS, INC.

Lab ID 21593S

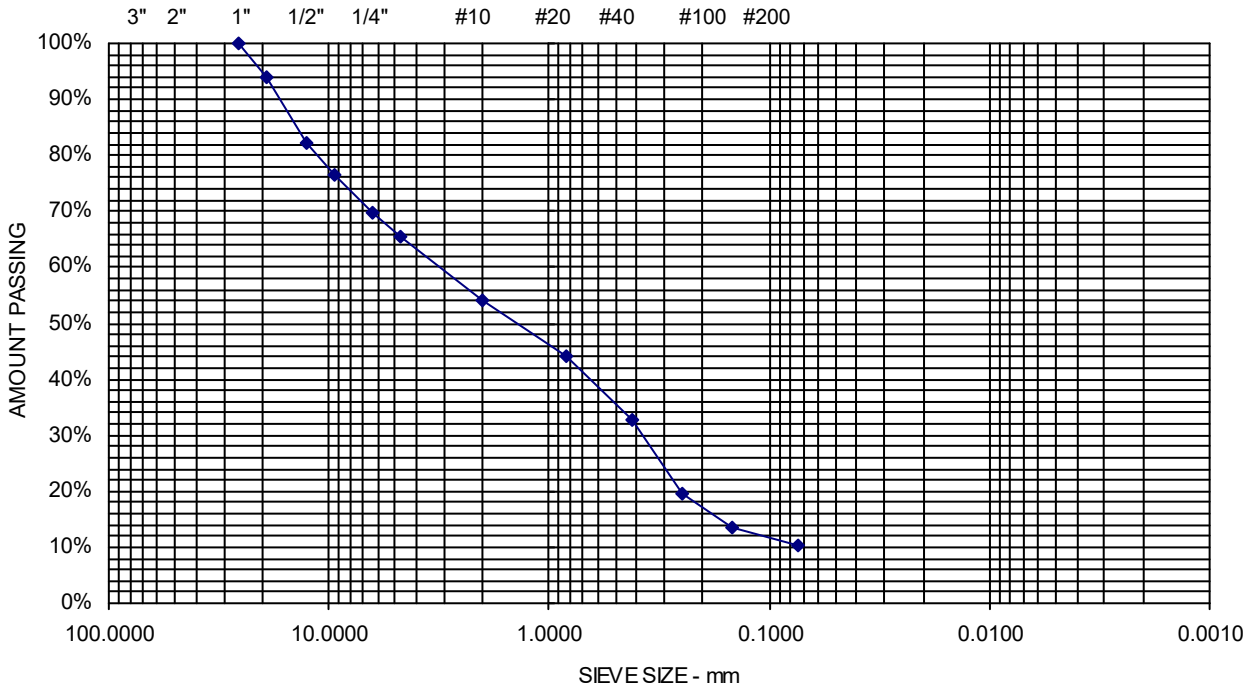
Date Received 4/6/2022

Date Completed 4/12/2022

Material Source B-7, 1D, 0.7'-2.7'

Tested By BRADLEY GERSCHWILER

<u>STANDARD DESIGNATION (mm/μm)</u>	<u>SIEVE SIZE</u>	<u>AMOUNT PASSING (%)</u>	
25.0 mm	1"	100	
19.0 mm	3/4"	94	
12.5 mm	1/2"	82	
9.5 mm	3/8"	77	
6.3 mm	1/4"	70	
4.75 mm	No. 4	65	34.6% Gravel
2.00 mm	No. 10	54	
850 μm	No. 20	44	
425 μm	No. 40	33	55.2% Sand
250 μm	No. 60	19	
150 μm	No. 100	14	
75 μm	No. 200	10.3	10.3% Fines



Comments: Moisture Content = 6.9%

Sheet

Project Name PORTSMOUTH NH - UNION STEET AND WILLARD AVENUE AREA
RECONSTRUCTION - GEOTECHNICAL ENGINEERING SERVICES

Project Number 20-1734

Client CMA ENGINEERS, INC.

Lab ID 21594S

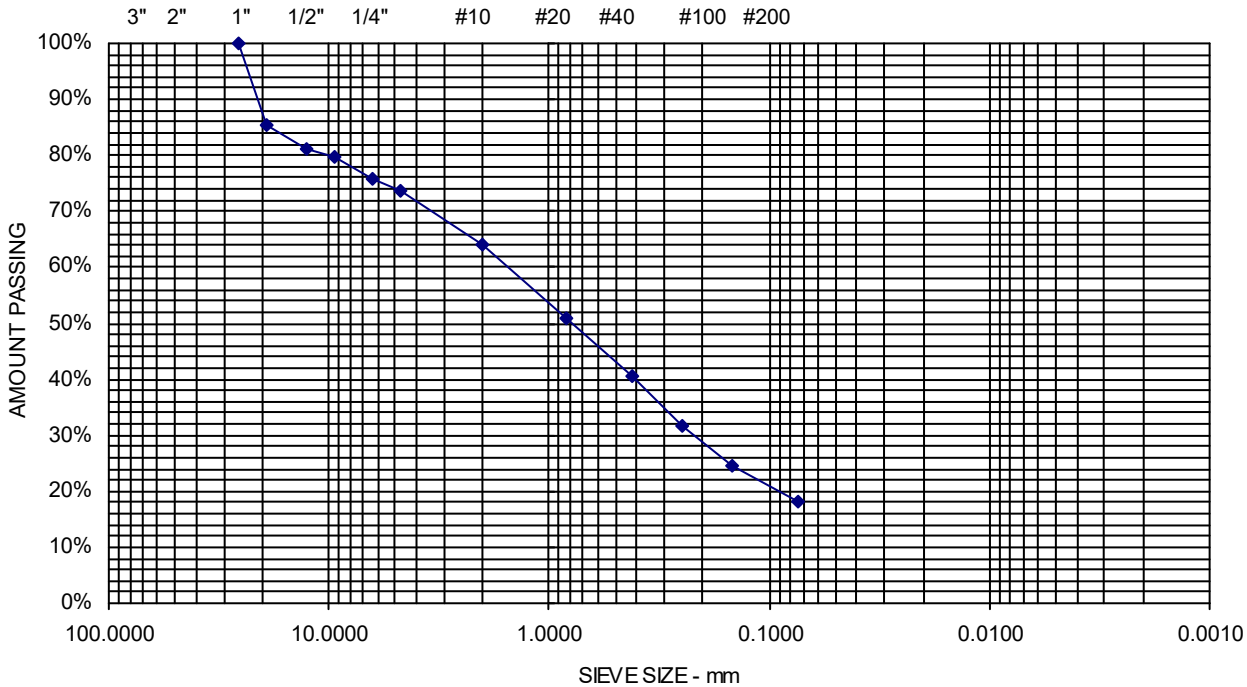
Date Received 4/6/2022

Date Completed 4/12/2022

Material Source **B-16, 1D, 0.5'-2.5'**

Tested By BRADLEY GERSCHWILER

<u>STANDARD DESIGNATION (mm/μm)</u>	<u>SIEVE SIZE</u>	<u>AMOUNT PASSING (%)</u>	
25.0 mm	1"	100	
19.0 mm	3/4"	85	
12.5 mm	1/2"	81	
9.5 mm	3/8"	80	
6.3 mm	1/4"	76	
4.75 mm	No. 4	74	26.4% Gravel
2.00 mm	No. 10	64	
850 μm	No. 20	51	
425 μm	No. 40	41	55.6% Sand
250 μm	No. 60	32	
150 μm	No. 100	25	
75 μm	No. 200	18.0	18% Fines



Comments: Moisture Content = 8.7%



Report of Gradation

ASTM C-117 & C-136

Project Name PORTSMOUTH NH - UNION STEET AND WILLARD AVENUE AREA
RECONSTRUCTION - GEOTECHNICAL ENGINEERING SERVICES

Project Number 20-1734

Client CMA ENGINEERS, INC.

Lab ID 21595S

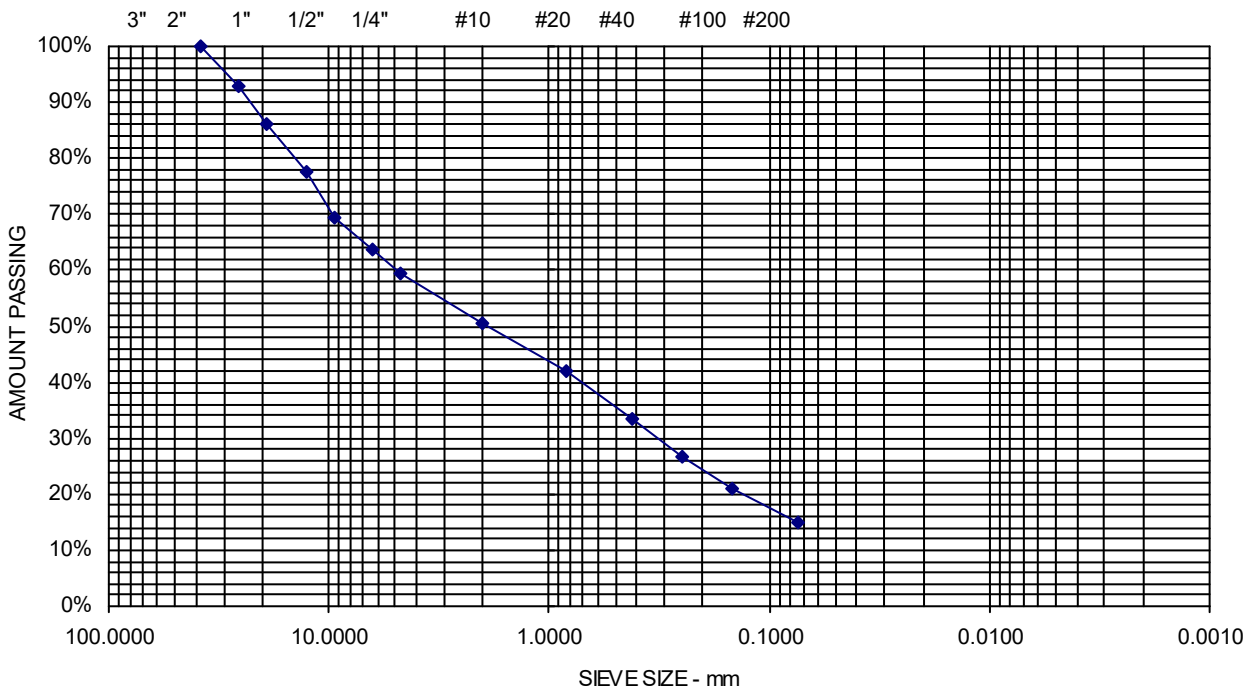
Date Received 4/6/2022

Date Completed 4/12/2022

Material Source B-22, 1D, 0.4'-2.4'

Tested By BRADLEY GERSCHWILER

<u>STANDARD DESIGNATION (mm/μm)</u>	<u>SIEVE SIZE</u>	<u>AMOUNT PASSING (%)</u>	
38.1 mm	1-1/2"	100	
25.0 mm	1"	93	
19.0 mm	3/4"	86	
12.5 mm	1/2"	78	
9.5 mm	3/8"	69	
6.3 mm	1/4"	64	
4.75 mm	No. 4	60	40.4% Gravel
2.00 mm	No. 10	51	
850 μm	No. 20	42	
425 μm	No. 40	34	44.5% Sand
250 μm	No. 60	27	
150 μm	No. 100	21	
75 μm	No. 200	15.1	15.1% Fines



Comments: Moisture Content = 8.1%