Revised 11/29/22
Addendum No. 1

BID FORM Section 00400

City of Trenton, Department of Water and Sewer

Request for Bid: Furnishing and Installing Flusher Assemblies

Bid form unit prices shall include all materials and labor as per the Specifications. Bid form unit prices shall include traffic control costs. Uniformed police for traffic control shall be invoiced separately with no markup applied.

PRICE SCHEDULE
FURNISHING AND INSTALLING DEAD-END FLUSHERS ASSEMBLIES
BID 2022-76
BASE BID

Item No.	Description	Unit Price (EA)	QTY	Total
1	Flusher Assembly (Furnish and Install)		170	
2	Allowance for Uniformed Police (Traffic Control)			$20,000.00
3	Allowance for Supplementary Work/Unforeseen Conditions			$50,000.00

Total Base Bid in Figures $ _____

Total Base Bid in Words $ _____

PRICE SCHEDULE
FURNISHING AND INSTALLING DEAD-END FLUSHERS ASSEMBLIES
BID 2022-76
SUPPLEMENTAL BID

ID	ITEM	QTY	UNIT	UNIT PRICE IN FIGURES	TOTAL PRICE IN FIGURES
S1-1	Concrete _____ (write unit price in words)	60	CY	_____	_____

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S1-2	Clean Stone _____ (write unit price in words)	60	CY	_____	_____
S1-3	Dense Graded Aggregate _____ (write unit price in words)	120	CY	_____	_____
S1-4	Furnishing and installing 2 inch Superpave Top course (MHS 12.5M76) NJDOT Rd _____ (write unit price in words)	200	SY	_____	_____
S1-5	Furnishing and installing 2 inch Super Pave (HMA9.5M64) top course in Mercer County Roads _____ (write unit price in words)	200	SY	_____	_____
S1-6	Final Road Restoration in Township and City Roads _____ (write unit price in words)	400	SY	_____	_____
S1-7	Credit for Dry Tap Installation (CREDIT PRICE SHALL BE DEDUCTED FROM BID PRICE SCHEDULE) _____ (write unit price in words)	60	EACH	_____	_____

Total Supplemental Bid in Figures $ _____

Total Supplemental Bid in Words $ _____

Total Base Bid Plus Supplemental Bid in Figures $ _____

Total Base Bid Plus Supplemental Bid in Figures $ _____

BID PROPOSAL FORM
VENDOR MUST COMPLETE

The undersigned bidder declares that he/she has read the Notice to Bidders, Instructions to Bidders, Affidavits and Specifications attached, that he/she has determined the conditions affecting the bid agrees, if this proposal is accepted, to furnish and deliver the following:

_____

(SIGNATURE BY AUTHORIZED REPRESENTATIVE)

The undersigned is a Corporation, Partnership or Individual under the laws of the State of

_____having its principal office at_____

COMPANY _____

ADDRESS_____

ADDRESS_____

FED. ID # _____

NAME_____

TELEPHONE _____

FAX _____

EMAIL_____

DATE_____

IF AWARDED A CONTRACT, PLEASE PROVIDE CONTACT, ADDRESSES FOR PURCHASE ORDERS AND CHECK REMIT TO INFORMATION, COPY OF YOUR W9 AND UPON AWARD, FORWARD TO THE CITY OF TRENTON, ACCOUNTS AND CONTROL DEPARTMENT, 319 EAST STATE STREET, TRENTON, NJ 08608 (609) 989-3043.

CONTRACT

_____

COMPANY

_____

PURCHASE ORDER MAILED TO:

_____

_____

_____

CHECK REMIT TO:

_____

_____

_____

TELEPHONE

_____

FAX

OR EQUIVALENT LIST
(ATTACH ADDITIONAL DOCUMENTS AS NECESSARY)

EXCEPTIONS
(MATERIAL DEVIATIONS ARE NOT ALLOWED)

SECTION 01010
SUMMARY OF WORK

PART I GENERAL

1.1 LOCATION OF WORK

A. The work of this Contract is at various locations throughout the distribution system in the City of Trenton, and the Townships of Ewing, Hamilton, Hopewell, and Lawrence, as well as areas under the jurisdiction of the State of New Jersey and Mercer County within Trenton Water Works' service area. A list of potential work locations is provided in Appendix B of the Specifications. There are a total of 185 dead-end mains that require flusher assemblies, or other infrastructure (i.e. looped mains) to reduce water stagnation. The dead-end mains in question are divided into the municipalities of the TWW franchise area as follows:

Municipality	Dead-End Mains w/o Flusher Assemblies
City of Trenton	17
Ewing Township	49
Hamilton Township	106
Hopewell Township	1
Lawrence Township	12

GIS Mapping showing the location of existing water main dead-ends is shown in the GIS map. The location of each individual site and their GIS screenshots and atlas pages are available upon request at Trenton Water Works.

All locations specified in Appendix B may not require or suitable for flusher assembly installation and determination will be made by TWW after award. Within seven (7) days upon to Notice to Proceed (NTP), TWW will provide a list of one hundred (100) PRIORITY locations that require flusher installation. TWW reserves the right to add additional flusher assembly locations to the work scope during the course of the contract. Any additional (non-priority) flusher locations shall be communicated by the Owner to the Contractor in writing within one hundred and eighty (180) days after the Notice to Proceed.

1.2 MOBILIZATION

A. At the start of this contract, the Contractor shall be required to mobilize and begin flushing device installation work within sixty (60) days from Notice to Proceed. The Contractor shall work on a continuous basis to complete the job unless otherwise directed by the Owner in writing.

1.2 WORK HOURS

A. Work shall be performed during normal working hours, 8:30 AM – 4:30 PM Monday thru Friday. Work shall NOT be conducted in overtime hours, on Saturdays, Sundays and/or City Holidays unless specifically approved by the Owner. If it is found that a job location is better performed

during hours outside the normal working hours, the Contractor must receive authorization from the Owner in advance. Work performed outside normal working hours shall not add to the lump sum price bid.

1.3 SCOPE OF WORK

A. The Contractor shall furnish all labor, tools, equipment, traffic control devices and incidentals required for the installation of flusher assemblies. The Contractor shall supply all relevant piping, valves, parts, backfill, gravel, asphalt base course, concrete, and materials.

B. The Contractor shall be responsible for transport and disposal of materials to and from the project site and shall then provide all materials and parts necessary to complete the flusher assembly installation.

C. The Contractor shall complete all other work to properly install flusher assemblies, including but not limited to; all specified special provisions; environmental protection; erosion and sedimentation control; site preparation; rock excavation; removal of concrete road base, trenching, backfilling and compaction; excavation support and protection; decking; furnishing and installing granular fill materials; pipeline cleaning, and flushing; dust control; temporary pavement and road restoration; miscellaneous work and cleanup; and all else incidentals required for successful completion of the work as specified.

D. Install flusher assemblies in locations as directed by Trenton Water Works in accordance with the Specifications and details provided in Appendix B. A mark out defining the proposed flusher location will be provided by Trenton Water Works in advance of the work. The Work includes, but is not necessarily limited to, the following:

1. Permit acquisition, as required by the Specifications
2. Locating affected water mains and water services
3. Removal of pavement, sidewalk and grass
4. Tapping of active water main
5. Excavation and Backfilling
6. Dewatering and Shoring
7. Supply of all equipment and materials necessary to perform the flusher assembly installation
8. Installation of flusher assembly
9. Maintaining and recessing steel plates covering excavations
10. Temporary restoration of the local, the County, and/or the State roads and grassed areas, which includes, but is not limited to, sweeping, cleaning, preparing and placing the base course surface; traffic control, traffic signage, and traffic flaggers; including all labor, materials and necessary equipment
11. Testing and disinfection
12. Traffic Control on an as needed basis
13. All other incidental work to complete the project as specified herein and as shown on the Details
14. Preparation and maintenance of record drawings.

1.4 CONTRACTOR'S RESPONSIBILITIES AND PAYMENT FOR WORK PERFORMED

A. It will be the Contractor's responsibility to call for proper mark-out before excavation consistent with the law and to locate the services and mains in the work area. Owner will furnish the Contractor with available records to assist with the flusher assembly installation. If TWW Records are incomplete; the Contractor shall utilize an M-Scope or other electronic equipment to locate the water main and services. The Contractor will be held totally responsible for correctly locating the water main and service locations.

B. The flusher assembly work is designed to limit the impact to customers. As such, the work is expected to take place on water mains that are in operation. In the event a water main shut down is necessary to complete the work, Contractor shall communicate the concerns to the TWW Field Representative a minimum three (3) business days prior to commencing the excavation. This provides TWW with ample time to evaluate the request, prepare customer notifications, verify line valve operability, etc.

   Prior to the water main shut down, TWW shall provide notices to all customers affected by the shutdown at least 24 hours in advance. The water main shutdown process, if necessary, shall not be considered as an unforeseen circumstance. The Contractor shall consider any efforts related to a shutdown as part of the overall lump sum unit price for flusher assembly installation and consider it as a determining factor that may occur when they work at any of the locations (known and unknown) in the course of the contract.

   No water main shall be shut down and the pipe cut before the Contractor takes all the necessary measures to confirm that he/she has at the job site all the materials, equipment and personnel needed to completely perform the work. TWW's main shutdown procedure is noted as follows.

C. The contractors shall maintain telephone number(s) at which he or she can be reached during normal business hours so that the owner (TWW) is able to contact him or her regarding such issue as the scheduling of activities to be performed under the contract.

1.9 CONTRACTOR'S USE OF PREMISES

A. Contractor shall always maintain one lane of traffic and shall limit the use of the premises for the Work and for storage to allow for:

   1. Work by other Contractors or by Owner.
   2. Access of public to homes and businesses.
   3. Public use.
   4. Fire Protection.

B. Coordinate use of premises with Engineer and appropriate municipality.

1.15 MATERIAL SAFETY

A. Contractor shall assume full responsibility for security of all their and their Subcontractors' materials and equipment stored at the site.

B. No explosives are to be used at any time for any reason in this work.

1.16 STORED ITEMS

A. If directed by the Owner and Engineer, move any stored items or containers that interfere with operations of Owner, other Contractors, or public.

1.17 ADDITIONAL STORAGE

A. Obtain and pay for use of additional storage or work areas if needed to perform the Work.

1.18 WORK SEQUENCE

A. Perform the Work in sequence to accommodate any occupancy during the construction period and to ensure completion of the Work. Maintain adjacent water main flows as deemed by the Trenton Water Works in a manner acceptable to the Engineer.

1.19 WATER USAGE DURING CONSTRUCTION

A. Contractor shall coordinate all construction operations to minimize conflict and to facilitate usage of water by residents, business owners and the applicable municipal Fire Department.

END OF SECTION

SECTION 01025
MEASUREMENT AND PAYMENT

PART1 GENERAL

1.01 FLUSHER ASSEMBLIES (Item 1)

A. Measurement

1. Measurement for installation of flusher assemblies shall be on a unit price basis for the actual installed quantity of item 1 in the Bid form.

B. Payment

1. Payment for installation of flusher assemblies will be made for unit price bid for Item 1 on the Bid Form. This price and payment shall be full compensation for, but not limited to, the following:
   a. All labor, materials and equipment required to locate water utilities and excavate down to existing water main and trenching as directed by Engineer/Owner; clean exposed surfaces; removal of pavement sidewalk/curb and grass, dewatering provide and install backfill, crushed stone base, couplings, pipe, valves, tees, clamps, valve boxes and appurtenances for the flusher assembly, including plugging, tapping, cutting, jointing, shoring, dewatering, disinfection and testing to the satisfaction of the Engineer; and all else incidental to the Work associated with installation of flushers for which separate payment is not provided under other items.

   b. Temporary pavement repair and resurfacing of local roads including restoring the trench surface to grade; installation of temporary pavement (base course); any concrete sidewalk repair/replacement work, arising solely from flusher assembly work.

   c. Permitting, traffic control, recordkeeping, cleanup, as well as all else incidental to the Work associated with the flusher assembly for which separate payment is not provided under other items.

1.02 TRAFFIC CONTROL EXPENSES (Item 2)

A. Measurement

1. Measurement will include any special assignment of personnel from corresponding municipal Police Departments that are necessary for traffic control around the bid item work being performed by the Contractor.

B. Payment

1. Payment for the special assignments of personnel of the corresponding municipal Police Department for traffic control will be made based on the actual amount invoiced to the Contractor by the corresponding municipal Police Department. The Contractor shall not mark up the payment for traffic control services. Traffic control expenses shall be passed through directly to Trenton Water Works. Unit prices in the bid form will exclude any cost associated with traffic control.

1.08 FOR FINAL PAVEMENT, CONCRETE REPAIR AND MATERIALS (Supplementary Bid Item S1)

A Measurement

1. Measurement shall be by the cubic yard for item S1-1 (Concrete), item S1-2 (Clean Stone), and item S1-3 (Dense Graded Aggregate).

2. Measurement shall be by the square yard for item S1-4 (Furnishing and installing 2 inch Superpave Top course (MHS 12.5M76) in NJDOT Roads), item S1-5 (Furnishing and installing 2 inch Super Pave (HMA9.5M64) top course in Mercer County Roads) and item S1-6 (Final Road Restoration in Township and City Roads). Thickness shall be as noted on the Construction Details.

3. Measurement shall be on a per item basis for item S1-7 (Credit for Dry Tap). This will apply when TWW is able to shut down the main in preparation of the work to eliminate a wet tap installation.

B. Payment

1. Payment shall be made for unit price bid for item S1-1 (Concrete), item S1-2 (Clean Stone), and item S1-3 (Dense Graded Aggregate) in the Supplementary Bid List items. Price and payment shall be full compensation for, but not limited to, form work, purchasing and transporting all concrete used for the Work; all labor, material (including expansion joints) and equipment required to properly place, prepare, finish, and protect the concrete, concrete testing; and all other incidentals to the Work for which separate payment is not provided under other items in the Bid Form.

2. Payment for shall be made by the square yard for item S1-4 (Furnishing and installing 2 inch Superpave Top course (MHS 12.5M76) in NJDOT Roads), item S1-5 (Furnishing and installing 2 inch Super Pave (HMA9.5M64) top course in Mercer County Roads) and item S1-6 (Final Road Restoration in Township and City Roads). Price and payment shall be full compensation for, but not limited to: sweeping, cleaning, preparing and placing the base course surface; traffic control, traffic signage, and traffic flaggers; cutting back existing pavement milling, installation of tack coat, furnishing, hauling, heating, raking mixing and placing the final pavement, compacting, pavement marking restoration, including all labor, materials and necessary equipment; all work required for or incidental to the satisfactory completion of the Items for which payment is not provided under other items in the Bid Form

3. A credit shall apply when a dry tap installation is completed in lieu of a wet tap. The credit shall be applied at the unit price bid for item S1-7 (Credit for Dry Tap).

1.09 LABOR AND EQUIPMENT RATES (Supplementary Item S2)

1. Measurement
   1. Measurement for additional labor shall be made by the hour, rounding up to one hour from ½ hour and above, rounding down to 0, for below ½ hour.

   2. Overtime rates apply to work performed between the hours of 5:30 PM – 7:30 AM, and Legal Holidays.

   3. Measurement for additional equipment shall be made by the hour, rounding up to one hour from ½ hour and above, rounding down to 0, for below ½ hour.

2. Payment
   1. For labor and equipment performed outside the Summary of Work, payment shall be made on a job by job basis, as approved by Trenton Water Works.

END OF SECTION

SECTION 01026

APPLICATION FOR PAYMENT

PART 1 GENERAL

1.1 REQUIREMENTS INCLUDED

A. Submit Applications for Payment to the Owner/Engineer in accordance with the schedule established by Conditions of the Contract and Agreement between Owner and Contractor.

B. Payment applications shall be submitted no less than 30 calendar days apart.

1.2 RELATED WORK

A. Standard General Conditions of the Construction Contract are included in Section 00700.

B. Contract Closeout is included in Section 01700.

1.3 SUBMITTALS

A. Submit applications typed on forms provided by the Owner, Application for Payment, with itemized data typed on 8-1/2-in by 11-in or 8-1/2-in by 14-in white paper continuation sheets. Application shall be submitted on paper and PDF form.

B. Provide itemized data on a continuation sheet.

1. Format, schedules, line items, and values: Those of the Schedule of Values accepted by the Engineer.

1.4 PREPARATION OF APPLICATION FOR EACH PROGRESS PAYMENT

A. Application Form

1. Fill in the required information, including that for Change Orders executed prior to the date of submittal of application.

2. Fill in the summary of dollar values to agree with respective totals indicated on continuation sheets.

3. Execute certification with the signature of the responsible officer of Contractor's firm.

B. Continuation Sheets

1. Fill in the total list of all scheduled component items of Work, with item number and scheduled dollar value for each item.

2. Fill in dollar value in each column for each scheduled line item when work has been performed or products stored.
   a Round off values to the nearest dollar, or as specified for Schedule of Values.

3. List each Change Order executed prior to the date of submission, at the end of the continuation sheets.

a. List by Change Order Number and description, as for an original component item of work.

4. To receive approval for payment on component material stored on site, submit copies of the original paid invoices with the application for payment.

1.5 SUBSTANTIATING DATA FOR PROGRESS PAYMENTS

A. When the Owner or the Engineer requires substantiating data, submit suitable information, with a cover letter identifying.

1. Project name and location.

2. Detailed list of enclosures

3. For stored products:
   a. Item number and identification as shown on the application
   b. Description of specific material

B. Submit one copy of data and cover letter for each copy of the application.

C. Maintain an updated set of record documents in accordance with Sections 01700 Contract Closeout and 01720 Project Record Documents. As a prerequisite for monthly progress payments, exhibit the updated record documents for review by the Owner and the Engineer. No payment will be made to Contractor unless all record information is submitted by the Contractor to the Engineer and reviewed and accepted by the Engineer.

1.6 PREPARATION OF APPLICATION FOR FINAL PAYMENT

A. Fill in the Application form as specified for progress payments.

B. Use a continuation sheet for presenting the final statement of accounting as specified in Section 01700.

C. Submit all Project Record Documents in accordance with Section 01720.

1.7 SUBMITTAL PROCEDURE

A. Submit Applications for Payment to the Engineer for work completed.

PART 2 PRODUCTS (NOT USED)

PART 3 EXECUTION (NOT USED)

END OF SECTION

SECTION 01045

CUTTING, CORING AND PATCHING

PART 1 GENERAL

1.1 SCOPE OF WORK

A. This Section covers the cutting, coring, rough and finished patching of holes and openings. Holes and opening made in existing construction, or in parts of new construction. Procedures for cutting and patching will be the same for either condition.

B. All cutting, coring, and rough patching shall be performed by the Contractor. Finish patching shall be the responsibility of the Contractor.

C. Provide all cutting, fitting and patching, including attendant excavation and backfill, required to complete the work or to:

1. Make its several parts fit together properly.

2. Uncover portions of the work to provide for installation of ill-timed or improperly scheduled work.

3. Remove and replace defective work.

4. Remove and replace work not conforming to requirements of Contract Documents.

5. Provide penetrations of non-structural surfaces for installation of piping. The determination of what is a nonstructural surface or material shall be made by the Engineer.

6. Remove, install, or relocate materials.

1.2 RELATED WORK

A. Summary of Work is included in Section 01010.

B. Site work is included in Division 02.

C. Concrete is included in Division 03.

PART 2 PRODUCTS

2.1 MATERIALS

A. Comply with specifications and standards for each specific product involved. Where there is no equivalent specification, notify the Engineer who will provide a specification for the materials to be used.

B. Materials for finish patching shall be equal to those of adjacent construction. Where existing materials are no longer available, use materials with equivalent properties and that will provide the same appearance. The materials are to be approved by the Engineer prior to their use.

PART 3 EXECUTION

3.1 INSPECTION

A. Inspect existing conditions, including elements subject to damage or movement during cutting and patching.

B. After uncovering work, inspect conditions affecting installation of products, or performance of work.

C. Report unsatisfactory or questionable conditions to the Engineer; do not proceed with work until the Engineer has provided further instructions.

3.2 PREPARATION

A. Provide adequate temporary support as necessary to assure structural value or integrity of the affected portion of work.

B. Protect surrounding materials and equipment prior to starting work.

C. Contain and control cooling liquids and slurry produced by the cutting and coring operations.

D. When the cutting or coring results in the structure or equipment being exposed to the environment, the Contractor shall provide adequate weather protection.

E. Provide dewatering for excavation work in accordance with Section 02140.

3.3 PERFORMANCE

A. Execute cutting and demolition by methods which will prevent damage to other work and will provide proper surfaces to receive installation.

B. Execute excavating and backfilling by methods which will prevent settlement or damage to other work. When excavating in close proximity to piping or other items subject to damage, use hand excavation.

C. All equipment and workplace safety shall conform to OSHA standards and specifications pertaining to plugs, noise and fume pollution, wiring and maintenance.

D. Execute fitting and adjustment of products to provide a finished installation to comply with specified products, functions, tolerances and finishes.

E. Restore work which has been cut or removed; install new products to provide completed work in accordance with the requirements of Contract Documents.

F. Refinish entire surfaces as necessary to provide an even finish to match adjacent finishes:

G. Remove rubble and excess patching materials from the premises.

3.4 CUTTING

A. All cutting shall be performed in such a manner as to limit the extent of patching.

B. Cutting shall be performed with a concrete saw, and diamond saw blades of the proper size.

C. Provide for control of slurry generated by sawing operation on both sides of the wall and from below if cutting a floor.

D. When cutting a reinforced concrete wall or floor, the cutting shall be done so as not to damage the bond between the concrete and reinforcing steel left in structure. Cut shall be made so that steel neither protrudes nor is recessed from the face of the cut.

E. Adequate bracing of the area to be cut shall be installed prior to the start of cutting. Check area during sawing operations for partial cracking and provide additional bracing as required to prevent a partial release of the cut area during sawing operations.

F. Provide equipment of adequate size to remove cut panel.

G. Saw cut concrete and masonry prior to breaking out sections.

H. Install work at such time as to require the minimum amount of cutting and patching.

3.5 PROTECTION

A. Provide devices and methods to protect other portions of the project from damage.

B. Provide protection from elements for that portion of the project which may be exposed by cutting and patching work.

C. Maintain excavations free from water.

3.6 PATCHING

A. Rough patching shall be such as to bring the cut or cored area flush with existing construction unless otherwise shown.

B. Finish patching shall match existing surfaces as approved.

C. Patching shall be of the same kind and quality of material as was removed.

D. The completed patching work shall restore the surface to its original appearance or better.

E. Patching of waterproofed surfaces shall render the area of the patching completely waterproofed to include the joint between the existing material and the patch.

F. Slurry or tailings resulting from coring or cutting operations shall be contained and vacuumed or otherwise removed from the area following drilling or cut.

G. Equipment shall be protected against mechanical and water damage during cutting and patching. Provide protective covers or use other means to protect equipment that is at risk of damage from the cutting and patching

H. Provide protection for existing equipment, utilities and critical areas against water or other damage caused by drilling operation.

END OF SECTION

SECTION 01046

CONTROL OF WORK

PART 1 GENERAL

1.1 CONSTRUCTION EQUIPMENT

A. Furnish equipment which will be efficient, appropriate and large enough to secure a satisfactory quality of work and a rate of progress which will ensure the completion of the work in a timely manner. If at any time such plan appears to the Engineer to be inefficient, inappropriate or insufficient for securing the quality of work required or for producing the rate of progress aforesaid, he/she may order the Contractor to increase the efficiency, change the character or increase the equipment and the Contractor shall conform to such order. Failure of the Engineer to give such order shall in no way relieve the Contractor of his/her obligations to secure the quality of the work and rate of progress required.

1.2 PRIVATE LAND

A. The Contractor shall not enter or occupy private land outside of easements, except by written permission of the property owner in question.

1.3 EXISTING WATER DISTRIBUTION SYSTEM

A. The Contractor shall interrupt water services and disrupt the normal functioning of the distribution system as little as possible. All work to repair service lines shall be done with water mains live and in service. If special circumstances require that any water mains need to be isolated or shut down to facilitate work, Engineer shall review and approve. If approved by Engineer, Contractor shall notify Engineer and fire department 72 hours in advance of any requirement for isolating a section of water mains, so that water customers may be notified, and the necessary arrangements may be made, which may include a fire watch by the fire department.

B. If water or fire services for a single Customer or several customers are to be interrupted for an extended period (i.e., longer than 8 hours), the Contractor shall provide temporary water service to all water users as required through new temporary hoses. Temporary hoses shall meet NSF 61 standards for potable water; hoses shall be connected to the water meter at every impacted location, providing potable water. The inconvenience to water users shall be kept at a minimum.

C. The Engineer reserve the right to review and approve the Contractor's proposed use of any temporary hose. The safety and integrity of the water system are of prime importance. All work shall be completed with all water mains live and in service unless necessitated by special circumstances that are reviewed and approved by the Engineer.

D. If temporary hoses are needed and only if approved by the Engineer, the Contractor is required to submit a daily log of all addresses where temporary services have been installed or removed. All temporary hoses shall be 1-inch minimum diameter and shall be capable of withstanding at least 1.5 times the normal working pressure. All hoses that are to supply potable water to buildings are to be NSF 61 and/or FDA approved for contact with drinking water.

E. Construction Sequence and Special Work Requirements are as specified in Section 01014.

1.4 WATER SERVICE LINE LOCATIONS

A. The Contractor shall bear full responsibility for obtaining all locations of underground structures and utilities (including existing water services, drain lines, and sewers.

B. Service lines replacement pipe shall be located substantially close to existing lead service lines; however, the Engineer reserves the right to make such modifications in locations as may be found desirable to avoid interference with existing structures or for other reasons. Where fittings or connections are noted in details, such notation is for the Contractor's convenience and does not relieve him/her from laying and jointing different or additional items where required.

1.5 TRENCHING – TRENCHLESS AND OPEN EXCAVATION

A. All new water service lines are to be constructed via trenchless methods to minimize private property restoration unless otherwise approved by the Engineer for specific properties.

B. Trenchless installation shall include but not limited to Utility Impact Moling, Pipe Bursting, Pipe Pulling or Thrust Boring.

1. All trenchless work shall be done at a minimum of 4- feet below surface unless the existing water service line is shallower.

2. Contractor shall make every effort to minimize impact to existing underground utilities and shall report any utilities struck or damaged to Owner and Engineer.

3. Launch pits shall be large enough to accommodate the operator and tools for alignment. All excavation specifications shall be followed in the construction of the launch and recovery pits.

4. If a “tool” is lost, it shall be recovered as soon as possible at the Contractor’s expense.

C. Contractor shall obtain approval from the Engineer to install the entire new service line, or portions of the new line, utilizing a method other than a trenchless method. If a service line or portion of the new service line, is installed via open-cut trench due to site conditions, failure of trenchless methods or other approved reasons, payment shall be under lump sum Bid Item 1 the same as if the service line was installed via trenchless methods including all restoration requirements as specified.

D. If open excavations are used, adequate safeguarding shall include but not limited to temporary barricades, caution signs, lights and other means to prevent accidents to persons and damage to property. The Contractor shall, at his/her own expense, provide suitable and safe bridges and other crossings for accommodating travel by pedestrians and workers. Bridges provided for access during construction shall be removed when no longer required. The length or size of excavation will be controlled by the particular surrounding conditions but shall always be confined to the limits prescribed by the Engineer. If the excavation becomes a hazard, or if it excessively restricts traffic at any point, the Engineer may require special construction procedures such as limiting the length of the open trench, prohibiting stacking excavated material in the street and requiring that the trench shall not remain open overnight.

E. Contractor shall take precautions to prevent injury to the public due to open trenches. All trenches, excavated material, equipment, or other obstacles which could be dangerous to the public shall be well lighted at night. Accordingly, unattended trenches must be covered, barricaded or backfilled

F. Where the use of road plates is approved for temporarily securing open excavations in roads, plates shall be spiked and recessed to be flush with the surrounding pavement.

1.6 MAINTENANCE OF TRAFFIC

A. Traffic on the affected roads and streets shall be maintained at all times. Maintenance of traffic provisions shall be approved in writing by the Engineer, Owner, and the jurisdiction Police Department. Work on County and State roads also shall be approved in writing by the Mercer County and the New Jersey Department of Transportation, respectively. All traffic control devices shall be in accordance with the Manual on Uniform Traffic Control Devices, latest issue.

B. Unless permission to close a street is received in writing from the Police Department, Engineer and Owner, all construction equipment and excavated material shall be placed so that vehicular and pedestrian traffic may be maintained at all times. If the Contractor's operations cause traffic hazards, he/she shall repair the road surface, provide temporary ways, erect wheel guards or fences, or take other measures for safety satisfactory to the Engineer.

C. Detours around construction will be subject to permit approval, and approval of the Engineer and Owner. Where detours are permitted, the Contractor shall provide all necessary barricades and signs as required to divert the flow of traffic. The Contractor shall provide expedited construction when traffic is detoured.

D. The Contractor shall take precautions to prevent injury to the public due to open trenches. Night guards may be required where special hazards exist, or traffic control officers provided for traffic while work is in progress. The Contractor shall be fully responsible for damage or injuries whether or not traffic control officers have been provided.

E. See Section 01576 for additional requirements for traffic control.

1.7 CARE AND PROTECTION OF PROPERTY

A. 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 restored by the Contractor, at his/her expense, to a condition similar or equal to that existing before the damage was done, or he/she shall make good the damage in another manner acceptable to the Engineer.

1.8 PROTECTION AND RELOCATION OF EXISTING STRUCTURES AND UTILITIES

A. The Contractor shall assume full responsibility for the protection of all buildings, structures, and utilities, public or private, including poles, signs, services to buildings, utilities in the street, gas pipes, water pipes, hydrants, sewers, drains, and electric and telephone cables. The Contractor shall carefully support and protect all such structures and utilities from injury of any kind. Any damage resulting from the Contractor's operations shall be repaired at the Contractor's expense. The Contractor shall call the New Jersey One Call (Excavation Hotline), telephone 811 or 1-800-272-1000 to alert the Excavation Hotline of the emergency repair. Only Trenton Water Works personnel may operate Trenton Water Works' valves.

B. Services to buildings shall be maintained, and all costs or charges resulting from damage thereto shall be paid by the Contractor at no additional cost to the Owner.

C. Protection and temporary removal and replacement of existing utilities and structures as described in

this Section shall be a part of the work under the Contract at no additional cost to Trenton Water Works. The Contractor shall coordinate the removal and replacement of traffic loops and signals, as required for the performance of the work, at no additional cost to the Owner.

D. The Contractor shall bear full responsibility, for obtaining all locations of underground structures and utilities (including existing water services, drain lines, gas, electric, telecommunication, and sewers) as needed. All utilities are considered unknown and shall not be considered as differing site conditions.

1.9 WATER FOR CONSTRUCTION PURPOSES

A. In locations where public water is available, the Contractor may be allowed to use water for construction purposes without charge. The Contractor shall meter water use, or estimate water use, and include it in reports to the Engineer.

B. of water shall be sufficient cause for withdrawing the privilege of unrestricted use. Hydrants or valves shall only be operated under the supervision of the Trenton Water Work's personnel.

C. If water restrictions are in force, the Contractor shall supply his/her own source of water which shall be acceptable to the Engineer.

D. When drawing water for construction purposes, the Contractor shall use caution at all times to prevent potential contamination of the Owner's water distribution system. Hydrant connections will require a backflow preventer and meter suitably installed to the satisfaction of the Engineer.

E. The Contractor shall coordinate with the Owner for the opening and closing of hydrants. Hydrants shall be operated under the supervision of the Owner. All hydrants must be opened and closed SLOWLY to prevent damage.

F. The Contractor shall supply a working reduced pressure backflow preventer and flow meter on each hydrant utilized during construction. The Contractor shall be responsible for providing all hoses and special fittings needed for utilizing the Owner's water supply. During the shop drawing process, the Contractor shall submit information on the hydrant meters and backflow preventer intended for use for construction purposes.

G. At the end of construction, the Contractor shall furnish a tabulation of the total gallons of water utilized during the course of the contract.

H. The Contractor will be responsible for any damage caused by water which passes through the hydrant meter, whether it is used or wasted. If damage does occur, Contractor shall incur all responsibility and costs for repair of any damage and returning the site to its original condition.

1.10 MAINTENANCE OF FLOW

A. The Contractor shall at his/her own cost, provide for the flow of drains and watercourses interrupted during the progress of the work, and shall immediately cart away and remove all offensive matter.

1.11 COOPERATION WITHIN THIS CONTRACT

A. All firms or persons authorized to perform any work under this Contract shall cooperate with the Contractor and his/her Subcontractors or trades and shall assist in incorporating the work of other trades where necessary or required.

1.12 CLEANUP AND DISPOSAL OF EXCESS MATERIAL

A. During the course of the work, the Contractor shall keep the site of his/her operations in as clean and neat a condition as is possible. The Contractor shall dispose of all residue resulting from the construction work and, at the conclusion of the work, he/she shall remove and haul away any surplus excavation, broken pavement, lumber, equipment, temporary structures and any other refuse remaining from the construction operations and shall leave the entire site of the work in a neat and orderly condition.

B. The Contractor shall immediately remove from the site and legally dispose of all materials and appurtenances replaced under this Contract. At no time shall these materials be stacked along the trench.

C. In order to prevent environmental pollution arising from the construction activities related to the performance of this Contract, the Contractor and his/her subcontractors shall comply with all applicable Federal, State and local laws and regulations concerning waste material disposal, as well as the specific requirements stated in this Section and elsewhere in the Specifications.

D. The Contractor is advised that the disposal of excess excavated material in wetlands, stream corridors, and floodplains is strictly prohibited even if the permission of the Owner is obtained. Any violation of this restriction by the Contractor or any person employed by him/her will be brought to the immediate attention of the responsible regulatory agencies,with a request that appropriate action is taken against the offending parties. Therefore, the Contractor will be required to remove the fill at his/her own expense and restore the area impacted.

E. The Contractor shall dispose of all surplus excavated soil material, including construction debris, boulders, broken pavement, demolished pipe, and other non-soil material.

1.13 RESTORATION

A. Restore all areas to conditions that existed prior to construction. Restoration outside of the pipe trench limits required as a result of the construction activities shall be at the Contractor's own expense. Restoration within the pipe trench limits shall be included in the appropriate bid items as required in Section 01025. Restoration, including restoration on private property, as specified in Sections 01025 Measurement and Payment, 02576 Pavement Repair and Resurfacing.

B. Existing public and private driveways and sidewalks disturbed by the construction shall be replaced to the limits and thicknesses existing prior to construction and as specified in Section 02576 Pavement Repair and Resurfacing.

C. Existing signs, lampposts and mailboxes which are damaged by the Contractor or removed by the Contractor during the course of the work shall be reinstalled in a vertical position at the same location from which they were removed. Damaged items shall be replaced with an item equal to or better than the damaged items. A concrete anchor shall be provided as necessary, at no additional cost, to ensure a rigid alignment. Care shall be exercised in the reinstallation of all items to prevent damage to the newly installed pipelines.

D. Existing concrete, bituminous, timber or granite curbing shall be protected. If necessary, curbing shall be removed and replaced after backfilling. Curbing which is damaged during construction shall be replaced with curbing of equal quality and dimension. Granite curbing removed and reset shall conform to the Owner’s Standards. Joints between sections shall be expansion type as required. Bituminous berms shall conform to the Owner’s Standards.

E. Restoration of any areas on private property disturbed by construction is as specified in Sections 02576 Pavement Repair and Resurfacing.

1.14 PIPE TRENCH WIDTHS

A. Pipe trench widths referred to herein are the distances separating the vertical planes between which the pipe is to be laid. Maximum trench payment widths for open cut installations are provided on the Details included in Appendix A. In computing the amount of excavation below 11-feet for payment under the respective items on the Bid Form; trench width shall be as specified for the maximum trench widths.

B. Where trenchless installation methods are used, the excavation area shall be only what is needed for workers and equipment to perform the installation. Maximum access pit payment sizes for trenchless installations are provided on the Details included in Appendix A.

1.15 PIPE TRENCH DEPTHS

A. The top of the trench shall be the ground elevation. The bottom of the trench shall be the invert elevation of the pipe and 6-inches of well-graded sand material for pipe bedding.

END OF SECTION

SECTION 01110

ENVIRONMENTAL PROTECTION PROCEDURES

PART 1 GENERAL

1.1 SCOPE OF WORK

A. Furnish all labor, materials, and equipment and perform all work required for the prevention of environmental pollution in conformance with applicable laws and regulations, during and as the result of construction operations under this Contract. For the purpose of this Specification, environmental pollution is defined as the presence of chemical, physical, or biological elements or agents which adversely affect human health or welfare; unfavorably alter ecological balances of importance to human life; affect other species of importance to man; or degrade the utility of the environment for aesthetic and/or recreational purposes.

B. The control of environmental pollution requires consideration of air, water, and land, and involves management of noise and solid waste, as well as other pollutants.

C. Schedule and conduct all work in a manner that will minimize the erosion of soils in the area of the work. Provide erosion control measures such as diversion channels, sedimentation or filtration systems, berms, staked hay bales, seeding, mulching or other special surface treatments as are required to prevent silting and muddying of streams, rivers, impoundments, lakes, etc. All erosion control measures shall be in place in an area prior to any construction activity. Specific requirements for erosion and sedimentation controls are specified in Section 02270.

D. This Specification is intended to ensure that construction is achieved with a minimum of disturbance to the existing ecological balance between a water resource and its surroundings. These are general guidelines. It is the Contractor's responsibility to determine the specific construction techniques to meet these guidelines.

E. All phases of sedimentation and erosion control shall conform to the requirements outlined in the Standards for Soil Erosion and Sediment Control in New Jersey, latest edition including Addenda.

F. The project excavation areas are located within the public right of way and private property. All excess soils for disposal are assumed to be non-hazardous contaminated soil exceeding NJDEP Restricted Residential Soil Remediation Standards (NJAC 7:26D Table 1A Residential Direct Contact Soil Remediation Standard). If grossly contaminated material, visible as free product, soil staining, oil sheen or noxious vapors, are encountered during excavation work performed under this Contract, the Contractor shall notify the Owner and Engineer, and the New Jersey Department of Environmental Protection (NJDEP) by contacting the main reporting line at 1-877-927-6337, where and as required by applicable laws and regulations. The Contractor shall be responsible for sampling and analysis, handling, temporary storage, removal, tracking, and disposal of contaminated and hazardous fluids and solids encountered in accordance with the Contract Specifications. All work shall be performed in accordance with all applicable Federal, State, and local regulations, laws, codes, and ordinances governing the handling, transportation, and disposal of contaminated materials.

1.2 APPLICABLE REGULATIONS

A. Comply with all applicable Federal, State and local laws and regulations concerning environmental pollution control and abatement.

B. All phases of sedimentation and erosion control shall comply with the New Jersey Department of Agriculture, Standards for Soil Erosion and Sediment Control in New Jersey, the latest revision, and the Mercer Soil Conservation District.

1.3 NOTIFICATIONS

A. The Engineer will notify the Contractor in writing of any non-compliance with the foregoing provisions or of any environmentally objectionable acts and corrective action to be taken. State or local agencies responsible for verification of certain aspects of the environmental protection requirements shall notify the Contractor in writing, through the Engineer, of any noncompliance with State or local requirements. The Contractor shall, after receipt of such notice from the Engineer or the regulatory agency through the Engineer, immediately take corrective action. Such notice, when delivered to the Contractor or his authorized representative at the site of the work, shall be deemed sufficient for the purpose.

B. If the Contractor fails or refuses to comply promptly, the Owner may issue an order stopping all or part of the work until satisfactory corrective action has been taken. No part of the time lost due to any such stop orders shall be made the subject of a claim for extension of time or excess costs or damages by the Contractor unless it is later determined that the Contractor was in compliance.

1.4 IMPLEMENTATION

A. Prior to commencement of the work, meet with the Engineer to develop mutual understandings relative to compliance with this provision and administration of the environmental pollution control program.

B. Remove temporary environmental control features, when approved by the Engineer, and incorporate permanent control features into the project at the earliest practicable time.

PART 2 PRODUCTS - (NOT USED)

PART 3 EXECUTION

3.1 ENVIRONMENTAL AND CULTURAL RESOURCE PROTECTION/RESTORATION

A. These specifications which spell out the environmental and cultural resource protection/restoration shall have precedence over other potentially contradictory language contained elsewhere in the Contract Documents. In instances where the provisions of a New Jersey Department of Environmental Protection-issued permit contradict a provision of the specifications (including those identified in Environmental Assessment Requirements for State Assisted Environmental Infrastructure Facilities, N.J.A.C. 7:22-10), the environmental resources protection and/or restoration and cultural resource mitigation measures identified in the Department-issued permit shall govern.

B. All activities which are part of the comprehensive environmental infrastructure project(s) for the planning area must conform to the requirements of this section regardless of the eligibility of individual components of the project.

3.2 EROSION AND SEDIMENT CONTROL

A. Pursuant to NJAC 7:22-10.11(c), every effort shall be made to prevent and correct problems associated with erosion and sedimentation which could occur during and after project construction. At a minimum, the following erosion and sedimentation control measures shall be followed:

1. All erosion and sedimentation control measures shall be in place prior to any grading operations or construction of proposed facilities and shall be maintained until construction is complete and the construction area is stabilized. After restoration is complete, temporary control measures shall be removed and disposed of properly.

2. All erosion and sedimentation control measures shall be constructed and maintained in accordance with the "Standards for Soil Erosion and Sediment Control in New Jersey," prepared by the New Jersey State Soil Conservation Committee, latest revision, incorporated herein by reference, as amended and supplemented. Copies of the "Standards for Soil Erosion and Sedimentation Control in New Jersey" are available for a fee from the New Jersey Department of Agriculture, Soil Conservation Committee, or from the office of any of the 16 local conservation districts.

3. Disturbed areas that will be exposed in excess of 14 days shall be temporarily seeded and/or mulched until proper weather conditions exist for the establishment of a permanent vegetative cover.

B. Provide positive means of erosion control such as shallow ditches around construction to carry off surface water. Erosion control measures, such as siltation basins, hay check dams, mulching, jute netting, and other equivalent techniques, shall be used as appropriate. The flow of surface water into excavated areas shall be prevented. Ditches around construction areas shall also be used to carry away water resulting from dewatering of excavated areas. At the completion of the work, ditches shall be backfilled and the ground surface restored to its original condition.

C. Soil erosion and sediment control measures shall be provided and as shown in the Details and Section 02270.

3.3 SITE AND ACCESS CLEARING

A. Site and access clearing must be confined to approved construction areas. Protection of existing vegetation must be practiced wherever possible. At a minimum, site access and clearing measures shall conform to the following:

1. Temporary and permanent easements widths must be reduced to the minimum feasible for the proposed construction. Unless specifically approved by the Owner and the New Jersey Department of Environmental Protection, permanent access roads must not be more than eight feet wide, and there shall be no permanent access roads in environmentally critical areas. Access roads may be paved only where absolutely necessary, as determined by the Owner and the New Jersey Department of Environmental Protection.

2. Only those portions of the site which are absolutely necessary and essential for construction shall be cleared. Whenever possible, excavation shall include the removal and storage of topsoil from the site for future use. The length of time of ground disturbance shall be reduced to the minimum practicable, especially in environmentally critical areas. Ground disturbance shall be avoided until immediately preceding construction to minimize exposure of soils.

3. Trees and shrubs within construction easements, which are not required to be removed to permit construction, shall be protected to the drip line with appropriate protection measures such as snow fencing or batter boards. Trees and shrubs whose removal is necessary to facilitate construction shall either be replanted at the same location or replaced with nursery stock of the same kind. Trees of greater than 12 inches in diameter should be preserved whenever possible by implementing slight shifts in alignment or tunneling under tree roots. Specimen trees, as identified in "New Jersey's Big Trees" (1998) published by the Department's Division of Parks and Forestry listing specimen trees in the State, shall be preserved.

4. In heavily wooded areas, every effort shall be made to avoid the destruction of common native trees and shrubs so as not to unduly disturb the ecological balance or environmental quality of the area. Trees of 12-inch diameter or greater should be preserved whenever possible and protected to the drip line. Where practical, common native trees and shrubs, of one through three-inch caliper, which must be cleared from the construction area, shall be stockpiled for use in restoration. Straggling roots shall be pruned. Trees which must be pruned to facilitate construction shall be cut cleanly and painted with tree paint. If a tree not intended to be removed is damaged, the wood shall be repaired according to common nursery practice and painted with tree paint.

B. Only those portions of the site which are absolutely necessary and essential for construction shall be cleared. Whenever possible, excavation shall include the removal and storage of topsoil from the site for future use. The length of time of ground disturbance shall be reduced to the minimum practicable, especially in environmentally critical areas. Ground disturbance shall be avoided until immediately preceding construction to minimize exposure of soils.

3.4 RESTORATION MEASURES

A. Restoration aims to restore the disturbed area to a condition as nearly equal to the pre- disturbance condition as possible. At a minimum, restoration measures shall conform to the following:

1. Final restoration shall be undertaken as soon as an area is no longer needed for

construction, stockpiling or access. Excavated material unsuitable for backfill as set forth at N.J.A.C. 7:14-2.13 and considered to be solid waste pursuant to N.J.A.C. 7:26-

1.6 shall be removed from the construction site and disposed of at a sanitary landfill approved and licensed by the New Jersey Department of Environmental Protection. Excess excavated material which is not considered to be solid waste pursuant to

N.J.A.C. 7:26-1.6 shall be graded or removed in accordance with N.J.A.C. 7:22-10.11(l)3. When access roads are no longer needed, road fill shall be removed, and the access area shall be restored to pre- disturbance conditions. Care should be taken to avoid damage to adjacent vegetation and to prevent the formation of depressions that would serve as mosquito pools.

2. Topsoil shall be replaced with a minimum of 6 inches of topsoil material to restore the disturbed area to its original, pre-disturbance grade.

3. Rates and types of fertilization, liming, and seeding shall be as recommended by the local Soil Conservation District based on soil tests and local conditions. Seed mixtures shall be selected that are best suited for the particular site conditions. Seed selection shall provide for a quickly germinating initial growth, to prevent erosion, and for a secondary growth that will survive without continuing maintenance. Mulching shall occur immediately after seeding and in no case shall more than five days elapse between seeding and mulching.

4. In landscaped areas, environmental features shall be replaced or restored to pre- disturbance condition or better. This includes sodding, replacement of trees and shrubs, fences, drives, and other landscape features in kind.

3.5 PROHIBITED CONSTRUCTION PROCEDURES

A. Prohibited construction procedures include, but are not limited to, the following:

1. Dumping of spoil material into any stream corridor, any wetlands, any vernal habitats, any surface waters, any sites listed or eligible for listing on the New Jersey or National Registers of Historic Places, or at unspecified locations;

2. Indiscriminate, arbitrary or capricious operation of equipment in any stream corridors, wetlands, or surface waters;

3. Pumping of silt-laden water from trenches or other excavations into any surface waters, stream corridors, wetlands, or vernal habitats;

4. Damaging vegetation adjacent to or outside of the access road or the right-of-way;

5. Disposal of trees, brush, and other debris in any stream corridors, wetlands, vernal habitats, surface waters, or at unspecified locations;

6. Permanent or unspecified alteration of the flow line of any stream.

7. Open burning of project debris.

8. Use of calcium chloride, petroleum products or other chemicals for dust control; and

9. Use of asphaltic mulch binders; and

10. Any unpermitted discharge of sewage.

3.6 WETLANDS

A. Construction in wetlands shall conform to requirements of the New Jersey Freshwater Wetlands Protection Act, N.J.S.A. 13:9B-1 et. seq., and N.J.A.C.7:7A.

3.7 STREAM CROSSINGS

A. Stream crossings shall conform to the requirements of the Flood Hazard Area Control Act, N.J.S.A. 58:16A-50 et. seq., and N.J.A.C. 7:13.

3.8 STEEP SLOPES

1. Slopes exceeding 15 percent require "special" measures. Measures such as water diversion berms, sodding, or the use of jute or excelsior blankets should be used as appropriate. Hay bales shall be placed at the base of the slope prior to ground disturbance. Steep slopes that have been disturbed, if not sodded, shall be seeded and mulched immediately after construction is complete. Slope boards or other measures necessary to prevent slumping of the disturbed slope shall be incorporated, where appropriate.

3.9 DEWATERING

A. When dewatering will occur, and a dewatering permit is not required, the Contractor shall monitor for adverse effects to structures or wells due to dewatering and shall be responsible for remedying same to the satisfaction of the Owner and the New Jersey Department of Environmental Protection. Discharges from dewatering activities which contain silt are subject to the following controls:

1. All discharges from dewatering activities to surface waters, wetlands, vernal habitats, or storm sewers shall be free of sediment. Care shall be taken not to damage or kill vegetation by excessive watering or by damaging silt accumulation in the discharge area. If discharges are sediment-laden, techniques shall be employed to remove sediment prior to discharge. A sedimentation basin shall be constructed and used as specified, where necessary, to protect vegetation and to achieve environmental objectives.

2. All sewer and storm inlets within construction areas shall be provided with perimeter hay bales or other appropriate siltation control measures.

3.10 STOCKPILING, STORAGE, AND DISPOSAL

A. Requirements with regard to the location and control of stockpile, storage and disposal areas, whether provided by the Owner or the Contractor, must conform to the following:

1. Only environmentally suitable stockpile sites may be used for the purposes of staging or storing materials, equipment and suitable trench backfill material. Environmentally suitable sites must be level, and devoid of mature stands of natural vegetation. Drainage facilities and features, wetlands, vernal habitats, and stream corridors are not environmentally suitable sites.

2. The boundary of all stockpile areas shall be clearly marked by hay bales, silt fencing or another appropriate method. Where fill is to be stored in excess of 10 days, a suitable means of protecting the excavated material from wind and water erosion shall be employed. Erosion control methods may include one or more of the following: mulching, sprinkling, silt fencing, hay baling and stone covering.

3. Excess excavated material which is not considered to be solid waste pursuant to N.J.A.C. 7:26-1.6 shall be graded on-site only to the extent needed to achieve pre-construction grade, unless otherwise specifically approved by the Owner and the New Jersey Department of Environmental Protection. The Contractor shall remove the remainder from the site and disposes of it at a site approved by the Owner in accordance with the following:

   a. Disposal sites selected by the Contractor shall be evaluated and approved by the Owner prior to their use. Disposal sites may also be selected by the Owner. The Owner may conduct periodic inspection of disposal sites to ensure compliance with the requirement of this subsection during the off-site disposal operation.
   b. The disposal of excess excavated material in wetlands, vernal habitats, stream corridors, and floodplains is strictly prohibited, even if the permission of the customer is obtained. The Contractor shall be responsible for removing any fill improperly placed by the Contractor at the Contractor's expense and restore the area impacted.
   c. If the excess excavated material is placed on private property, a hold harmless release in favor of the Owner and New Jersey Department of Environmental Protection shall be obtained from the customer.
   d. Prior to approval of a site for excess excavated material disposal, where the site exceeds 5,000 square feet, the Contractor shall obtain the appropriate certification of the soil erosion and sediment control plan in accordance with the State's standards for soil conservation (N.J.S.A. 4:24-1 et. seq. also referred to as Chapter 251) and submit same to Owner. Where the site is less than 5,000 square feet, the Contractor shall on behalf of and with a copy to Owner advise the customer of the need for erosion and sediment control and obtain a statement that the customer accepts complete responsibility for implementation of appropriate methods to prevent erosion and sedimentation.

3.11 DUST

A. In order to control dust, as often as required during each working day, and particularly prior to the conclusion of each working day, areas under immediate construction (including access roads and other areas affected thereby) shall be swept and wet down with water sufficiently to lay the dust. In addition, these areas shall be wet down during non-working hours (including weekends) as often as required to keep the dust under control. The use of calcium chloride or petroleum products or other chemicals for dust control is prohibited.

B. Maintain dust control throughout the entire construction period including non-working hours (including weekends) by use of water sprinklers as approved by Engineer. Coatings on structures located on private property, resulting from failure to control dust, will be removed promptly at no additional expense.

C. The Contractor will be required to maintain all excavations, embankment, stockpiles, access roads, plant sites, waste areas, borrow areas, and all other work areas within or without the project boundaries free from dust which could cause the standards for air pollution to be exceeded, and which would cause a hazard or nuisance to others.

D. Sprinkling must be repeated at such intervals as to keep all parts of the disturbed area at least damp at all times, and the Contractor must have sufficient competent equipment on the job to accomplish this if sprinkling is used. Dust control shall be performed as the work proceeds and whenever a dust nuisance or hazard occurs, as determined by the Engineer.

3.12 NOISE

A. In order to limit noise impacts in the vicinity of sensitive receptors, construction operations and activities shall be limited as follows: Monday through Friday between the hours of 7:00 A.M. and 6:00 P.M. unless variances to these times are granted in times of emergency. No driving, pulling, or other operations entailing the use of vibratory hammers or compactors shall be permitted, other than between the hours of 8:00 A.M. and 5:00 P.M. The number of machines in operation at a given time shall be limited to the minimum practicable. All engine generators or pumps must have mufflers and be enclosed within a temporary structure.

B. The Contractor shall make every effort to minimize the noises caused by his operations. Equipment shall be equipped with silencers or mufflers designed to operate with the least possible noise in compliance with NJAC State and Federal regulations. Boilers shall be equipped with insulated enclosures for noise reduction.

C. Work outside of normal hours may be done upon “Customers” request. Contractor shall notify the Owner of such work and Contractor shall make all accommodations to meet such “Customer” requests.

3.13 CULTURAL RESOURCES

A. If a cultural resource is encountered during the course of construction, the Contractor is directed to halt all construction activities in that area. The Contractor shall immediately contact the Engineer and the Engineer who shall contact the New Jersey Department of Environmental Protection. The Department will determine and require initiation of the appropriate actions in conformance with N.J.A.C. 7:22-10.8.

B. The Contractor shall not dispose of excess excavated material at, stockpile construction materials at, or obtain borrow material from, properties which are listed or eligible for listing on the New Jersey or National Registers of Historic Places.

C. When the Owner is contacted by the Contractor in accordance with the above provisions, the Owner must immediately contact NJDEP, Municipal Finance, and Construction Element, Bureau of Environmental and Engineering Reviews (BEER) at (609) 633-1170. BEER will determine the appropriate actions, in accordance with N.J.A.C. 7:22-10 and the federal Advisory Council on Historic Preservation procedures.

3.14 PHOTOGRAPHS

A. The Contractor shall obtain and submit to the Engineer/Owner photographs of existing conditions prior to the start of site and access clearing and construction. At a minimum, one photograph shall be

obtained for every flusher assembly location. Special attention shall be given to environmentally critical areas and areas outside of the public right-of-way. Photographs shall be labeled by street address so that upon completion of the construction, or during construction, if necessary, subsequent photographs can be taken from the same control points. As a supplement to the required photographs, video documentation may be submitted by the Contractor to the Engineer, as is encouraged as a way of documenting site conditions.

3.15 PROTECTION OF STREAMS

A. Care shall be taken to prevent, or reduce to a minimum, any damage to any stream from pollution by debris, sediment or other material, or from the manipulation of equipment and/or materials in or near such streams. Water that has been used for washing or processing or that contains oils or sediments that will reduce the quality of the water in the stream shall not be directly returned to the stream. Such waters will be diverted through a settling basin or filter before being directed into the streams.

B. The Contractor shall not discharge water from dewatering operations directly into any live or intermittent stream, channel, wetlands, surface water or any storm sewer. Water from dewatering operations shall be treated by filtration, settling basins, or other approved method to reduce the amount of sediment contained in the water to allowable levels.

C. All preventative measures shall be taken to avoid spillage of petroleum products and other pollutants. In the event of any spillage, prompt remedial action shall be taken.

3.16 PROTECTION OF LAND RESOURCES

A. Land resources within the project boundaries and outside the limits of permanent work shall be restored to a condition, after completion of construction, which will appear to be natural and not detract from the appearance of the project. Confine all construction activities smallest possible footprint per address.

B. Outside of areas requiring earthwork for the construction of the new facilities, the Contractor shall not deface, injure, or destroy trees or shrubs, nor remove or cut them without prior approval. No ropes, cables, or guys shall be fastened to or attached to any existing nearby trees for anchorage unless specifically authorized by the Engineer. Where such anchorage is permitted, first wrap the trunk with a sufficient thickness of burlap or rags over which softwood cleats shall be tied before any rope, cable, or wire is placed. The Contractor shall, in any event, be responsible for any damage resulting from such use.

C. Where trees may possibly be defaced, bruised, injured, or otherwise damaged by the Contractor's equipment, dumping or other operations, protect such trees by placing boards, planks, or poles around them. Monuments and markers shall be protected similarly before beginning operations near them.

D. Any trees or other landscape feature scarred or damaged by the Contractor's equipment or operations shall be restored as nearly as possible to its original condition. The Engineer will decide what method of restoration shall be used and whether damaged trees shall be treated and healed or removed and disposed.

1. All scars made on trees by equipment, construction operations, or by the removal of limbs larger than 1-inch in diameter shall be coated as soon as possible with an approved tree wound dressing. All trimming or pruning shall be performed in an approved manner by experienced workmen with saws or pruning shears. Tree trimming with axes will not be permitted.

2. Climbing ropes shall be used where necessary for safety. Trees that are to remain, either within or outside established clearing limits that are subsequently damaged by the Contractor and are beyond saving in the opinion of the Engineer shall be immediately removed and replaced.

E. The locations of the Contractor's storage, and other construction buildings, required temporarily in the performance of the work, shall be cleared portions of the job site or areas to be cleared and shall require written approval of the Engineer and shall not be within wetlands or floodplains. The preservation of the landscape shall be an imperative consideration in the selection of all sites. Drawings showing storage facilities shall be submitted for approval of the Engineer.

F. If the Contractor proposes to construct temporary roads or embankments and excavations for plant and/or work areas, he shall submit the following for approval at least ten days prior to scheduled start of such temporary work.

1. A layout of all temporary roads, excavations, and embankments to be constructed within the work area.

2. Details of temporary road construction.

3. Drawings and cross sections of proposed embankments and their foundations, including a description of proposed materials.

4. A landscaping drawing showing the proposed restoration of the area. Removal of any trees and shrubs outside the limits of existing clearing area shall be indicated. The drawing shall also indicate the location of required guard posts or barriers required to control vehicular traffic passing close to trees and shrubs to be maintained undamaged. The drawing shall provide for the obliteration of construction scars as such and shall provide for a natural appearing final condition of the area. Modification of the Contractor's approved drawings shall be made only with the written approval of the Engineer. No unauthorized road construction, excavation or embankment construction including disposal areas will be permitted.

G. Remove all signs of temporary construction facilities such as haul roads, work areas, structures, foundations of temporary structures, stockpiles of excess of waste materials, or any other vestiges of construction as directed by the Engineer. Restore disturbed areas as specified.

H. All debris and excess material will be disposed of outside wetland or floodplain areas in an environmentally sound manner.

3.17 PROTECTION OF AIR QUALITY

A. Burning. The use of burning at the project site for the disposal of refuse and debris will not be permitted.

B. Dust Control. Refer to Paragraph 3.11 of this Section.

3.18 MAINTENANCE OF POLLUTION CONTROL FACILITIES DURING CONSTRUCTION

A. During the life of this Contract, maintain all facilities constructed for pollution control as long as the operations creating the particular pollutant are being carried out or until the material concerned has become stabilized to the extent that pollution is no longer being created.

END OF SECTION

SECTION 01170

SPECIAL PROVISIONS

PART 1 GENERAL

1.1 GENERAL OBLIGATIONS OF THE CONTRACTOR

A. General obligations of the Contractor shall be as set forth in the Contract Documents. Unless special payment is specifically provided in the payment paragraphs of the specifications, all incidental work and expense in connection with the completion of work under the Contract will be considered a subsidiary obligation of the Contractor, and all such costs shall be included in the appropriate items in the Bid Form in connection with which the costs are incurred.

B. Contractor shall obtain and maintain all licenses required to complete the work.

1.2 SITE INVESTIGATION

A. The Contractor shall satisfy himself/herself as to the conditions existing within the project area, the type of equipment required to perform the work, the character, quality and quantity of the subsurface materials to be encountered insofar as this information is reasonably ascertainable from an inspection of the site, as well as from information presented by Contract Maps, Details and Specifications. Any failure of the Contractor to acquaint himself/herself with the available information will not relieve him/her from the responsibility for estimating properly the difficulty or cost of successfully performing the work. The Owner assumes no responsibility for any conclusions or interpretation made by the Contractor on the basis of the information made available by the Owner.

1.3 PROJECT SCHEDULE

The Contractor shall complete certain minimum amounts of work under this Contract by specified times as shown in the following Schedule of Intermediate Completion Times.

Intermediate Completion Date	**Work to Be Completed**
180 calendar days from NTP	Full completion of 100 priority flusher assemblies (communicated by Owner within 7 days from NTP)
300 calendar days from NTP	Full completion of Remaining non-priority flusher assemblies (communicated by Owner within 180 days from NTP)

Note. Failure by the Contractor to meet these intermediate dates will result in liquidated damages being charged until that specific work is completed.

1.4 COORDINATION WITH LOCAL AGENCIES

A. The Contractor shall notify the local Police Department, public and private schools, Fire Department, Department of Engineering Division of Traffic and Signals, Trenton Water Works, and any other City and local agencies as required, and supply the following information.

1. Areas and dates where approved detours will be in effect.

2. Immediate notification of any water main breaks.

B. The Contractor shall advise local agencies of changes in the work schedule and locations immediately and provide construction progress updates as needed

C. Maintain pavement as specified in Section 02576 and provide Trenton Water Works Engineer with a telephone number where the Contractor may be reached at any time of day or night. Upon notification by the Owner or the Engineer, promptly make such repairs as necessary to paved surfaces.

1.5 PROVISIONS FOR CONTROL OF EROSION

A. The Contractor shall take sufficient precautions during construction to minimize the runoff of polluting substances such as silt, clay, fuels, oils, bitumen, and calcium chloride into the supplies and surface waters of the State. Special precautions shall be taken in the use of construction equipment to prevent operations that promote erosion.

B. The Contractor shall prevent the flow or seepage of drainage back into the drainage area. Drainage shall not be disposed of until silt and other sedimentary materials have been removed. Care shall be taken to prevent the discharge of unsuitable drainage to a water supply or surface water body.

C. As a minimum, the following shall apply:

1. Staked bales of hay shall be provided at points where drainage from the work site leaves the site, to reduce the sediment content of the water. Sufficient bales of hay shall be provided such that all flow will filter through the hay. Other methods that reduce the sediment content to an equal or greater degree may be used as approved by the Engineer.

2. Drainage leaving the site shall flow to watercourses in such a manner to prevent erosion.

3. Loaming and seeding or mulching of cross-country areas shall take place as soon after laying of the pipeline as practicable. This shall be considered part of the pipeline work, and full payment for the pipeline work need not be made until it has been completed.

D. Measures for control of erosion must be adequate to assure that turbidity in the receiving water will not be increased more than 10 standard turbidity units (s.t.u.), or as otherwise required by the State or other controlling body, in waters used for public water supply or fish unless limits have been established for the particular water. In surface water used for other purposes, the turbidity must not exceed 25 s.t.u. unless otherwise permitted.

1.6 PERMITS

A. The Contractor shall be required to obtain all necessary permits for proper execution of certain phases of the project that were not obtained by the Owner. The Contractor shall fill out all forms and furnish all drawings required to obtain the permits. A copy of the approved permit shall be submitted to the Engineer. All fees associated with these permits shall be paid by the Contractor under the appropriate bid allowance as part of the project. Work shall not commence on any phase of the work requiring a permit until the permit is obtained.

B. The Contractor shall obtain required street and sidewalk opening permits for excavations within streets or sidewalk areas.

1.7 TOOLS

A. Any special tools unique to a special piece of equipment or appurtenances (including grease guns or other lubricating devices) which may be necessary for the adjustment, operation, and maintenance of any equipment or appurtenances shall be furnished with the respective equipment.

1.8 PARTS

A. Parts for certain appurtenances have been specified in the pertinent Sections of the Specifications. The Contractor shall deliver to the Owner all required parts.

B. Parts shall be packed in original cartons, properly labeled with indelible markings with complete descriptive information including manufacturer, part number, part name.

1.9 PROTECTION AND REPLACEMENT OF TREES

A. The Contractor shall exercise sufficient measures during construction to protect all existing trees from damage caused by construction activities. Whenever a tree impairs the Contractor's ability to complete the work, the Contractor shall dig out and properly dispose of the tree and replace it with one similar to that removed, and as approved by the Engineer.

B. Existing trees shall be adequately protected with burlap to prevent any damage to the trunk and any branches from breaking. The Contractor shall be responsible for replacing any damaged trees. New trees shall be sound, healthy, and vigorous, well-branched, and densely foliated when in leaf; shall be free of disease, insect pests, eggs or larvae; and shall have healthy, well- developed root systems. They shall be accompanied by State Nursery inspection certificates and shall be subject to the Engineer's provisional inspection and approval upon delivery.

C. All new trees shall be maintained and guaranteed by the Contractor for not less than one full year from the time of provisional acceptance.

D. At the end of this period, any tree that is missing, dead, not true to name or size as specified, or not in satisfactory growth, as determined by the Engineer, shall be replaced at no cost to the Owner. In case of any question regarding the condition and satisfactory establishment of a rejected plant, the Engineer may allow such a plant to remain through another complete planting season at which time the rejected tree, if found to be dead, in an unhealthy, or badly impaired condition, shall be replaced at once at no cost to the Owner.

E. All replacements shall be trees of the same kind and size, and the cost shall be borne by the Contractor except where it can be definitely shown that loss resulted from vandalism or the Owner's failure to maintain planting as instructed.

F. At the end of the maintenance and guarantee period, and after all necessary corrective work has been completed, an inspection will be made by the Engineer who will certify in writing the final acceptance of the trees.

1.10 SEQUENCE OF CONSTRUCTION

A. All initial pavement over trenches and excavations shall be completed within 24-hours of backfilling or by the end of the workday on the Friday of the same week that the trench or area was excavated. No trench or excavated area shall be left past the end of the week without initial pavement placed and installed.

B. Final pavement may not be undertaken until the initial trench pavement, or full-width binder course has been in place as specified in Section 02576.

C. Once the Contractor begins to install pipe, fittings, valves, and appurtenances, the Contractor shall complete the installation. Work including paving can be performed on other streets if separate crews are provided and approved by the Engineer.

1.11 UTILITY CROSSINGS

A. It is intended that wherever existing utilities such as water, sewer, electrical or other service lines must be crossed, deflection of the pipe within recommended limits and cover shall be used to clear the obstruction satisfactorily. However, when in the opinion of the Owner or Engineer this procedure is not feasible the Engineer may direct the use of fittings for a utility crossing.

1.12 DAMAGE ON ACCOUNT OF HIGH WATER

A. The Contractor will hold themselves responsible for all damage done to his/her work by heavy rains or floods, and he/she shall take all reasonable precautions to provide against damages by building such temporary dikes, channels, or shoring to carry off stormwater as the nature of the work may require.

1.13 RELOCATIONS

A. Be responsible for the relocation of above-ground structures, including but not limited to light poles, signs, sign poles, fences, piping, laterals and French drains that interfere with the positioning of the work. The cost of all such relocations shall be included in the bid for the project and shall not result in any additional cost to the Owner.

1.14 OBSTRUCTIONS

A. The attention of the Contractor is drawn to the fact that during excavation at the Project site, the possibility exists of the Contractor encountering various water, sewer, electrical, or other lines unknown to Engineer. Exercise extreme care before and during excavation to locate and flag these lines to avoid damage to the existing lines. Should damage occur to an existing line, repair the line at no cost to the Owner.

B. It is the responsibility of the Contractor to ensure that all utility or other poles, the stability of which may be endangered by the close proximity of excavation, are temporarily stayed in position while work proceeds in the vicinity of the pole and that the utility or other companies concerned be given reasonable advanced notice of any such excavation by the Contractor.

1.15 EXCAVATED SOIL

A. The project excavation areas are located within the public right of way and private property. All excess soils for disposal are assumed to be non-hazardous contaminated soil and shall be excavated, stockpiled, hauled and disposed of in accordance with all local, state and federal regulations at no additional cost to the Owner.

B. Native soil may be reused on the property it was excavated from if it meets the requirements for Common Fill in accordance with Section 02230.

END OF SECTION

SECTION 01576

TRAFFIC CONTROL

PART 1 GENERAL

1.1 SCOPE OF WORK

A. Public safety and convenience require the Contractor to provide trained traffic control personnel to direct and control traffic within the location of work under this Contract. Uniform Police officers shall only be used when required by the road opening permit or as required by the agencies have jurisdiction over the road.

B. The Contractor must arrange with the Police Department for traffic direction services whenever work is conducted within a roadway or whenever traffic flow is restricted as a result of work performed under this Contract. The Contractor shall also be responsible for coordinating and scheduling with the Police Department whenever work is to be conducted within a roadway or whenever traffic flow is restricted as a result of work performed under this Contract.

C. The traffic control services required herein are intended to ensure public safety by the direction and control of traffic. Traffic control personnel are not intended to serve as watchmen or security to protect the Contractor's equipment and material or to warn pedestrians of such hazards as open trenches or manholes. It is solely the Contractor's responsibility to guard open excavations by erecting suitable barriers by day and lights by night.

D. Nothing contained herein shall be construed as relieving the Contractor of any of his/her responsibilities for the protection of persons and property under the terms of the Contract.

E. All payments to the Uniformed Traffic Officers under this Contract shall be in accordance with the General Laws of the State of New Jersey and any amendments thereto. On a site by site basis, as repairs arise, the Contractor shall submit to the Engineer a summary of the hours each officer provided traffic control services. TWW shall be responsible for paying the cost for police officers charged by the jurisdiction. The Contractor will be responsible for paying the police cost, and the police cost from the City or Township shall be included in the Contractor's voucher for payment without overhead or profit.

F. Prior to submitting their bid on the project, the Contractor shall contact all agencies that have jurisdiction within the Trenton Water Works Distribution System including, but not limited to the Townships of Hopewell, Ewing, Hamilton, Lawrence, the City of Trenton, Mercer County, and NJDOT in order to determine the traffic control requirements and costs of same. The cost of traffic control is included in each unit price bid item.

G. For planned work, Contractor shall provide the Police Departments with construction schedules on a timely basis showing work that requires traffic control. In the event the construction schedule is revised after submittal to the Police Department, the Contractor shall provide at least 24 hours' notice before commencing the unscheduled work. In the event of emergency main and hydrant repairs and replacements, the Contractor shall notify the relevant Police Department as soon as possible.

1.2 REQUIREMENTS

A. All traffic control work performed by the Contractor shall be in accordance with the Manual on Uniform Traffic Control Devices (latest edition, the latest edition of the New Jersey Department of

Transportation Standard Specifications for Highways and Bridges, the Details and these Specifications. Where reference is made to one of the aforementioned publications, the revision in effect at the time of bid opening shall apply.

B. The Contractor shall protect the traveling public and personal by adhering to the requirements of Title 39, The Motor Vehicle Code of the State of New Jersey. The Contractor shall be liable for any neglect to safeguard the traveling public.

C. The Contractor shall furnish, install, transport operate, maintain equipment, repair and replace; services, and personnel, with traffic control and protective devices, as required to expedite vehicular traffic flow during construction.

D. The Contractor shall follow the traffic control requirements shown in the Contract Documents detailing all temporary changes in traffic control equipment, street or road closures, detours, etc. The Contractor shall make every effort to adhere to these requirements. The Owner and Engineer reserve the right to modify traffic control requirements through the course of the Contract.

E. The Contractor shall remove temporary equipment and facilities when no longer required and restore grounds to original or to specified conditions.

F. When required, the Contractor shall notify the appropriate jurisdiction's Street and Sidewalk Inspectors Office at:

Jurisdiction	Representative	Phone No.
State of New Jersey	Richard Crum	732-308-4111
Mercer County	Mike Piazza	609-989-6605
Ewing Township	Angelo Capuano	609-882-3382
Hamilton Township	Samantha Brown	609-890-3636
Hopewell Township	Mark Kataiyniak	609-737-0799
Lawrence Township	Jim Parvesse	609-844-7087
City of Trenton	Hogarth Stephen	609-989-3015

G. Traffic control, including but not restricted to signing and devices, shall be provided for all openings in roads by the Contractor in accordance with Owner and State standards.

H. Special work hour limitations are discussed in Section 01170.

1.3 MINIMUMREQUIREMENTS FOR TRAFFIC CONTROL

A. Whenever possible, the Contractor shall provide for access to all buildings including business and parking areas. This shall include but is not limited to schools, churches, hospitals, urgent care centers, polling stations, and grocery stores. The Contractor will allow for the maintenance of a minimum of one – 11-foot lane of traffic, in one direction, at all times.

B. Traffic control and road closings in Townships of Hopewell, Ewing, Hamilton, Lawrence and the City of Trenton are under the direct control of the respective Police Departments.

C. Normal drainage shall be maintained. The pavement shall be maintained in broom-swept clean condition, and all work shall be cleaned up at the close of operations each day.

D. During non-working hours, all excavations shall be either back-filled or steel-plated, and all roadways

shall be kept completely clear of any obstructions to traffic. No barricades shall be left within the roadway at night when work is not in progress.

E. If the Contractor is notified of hazardous construction practice, violation of a regulation or motor vehicle code or if traffic volumes become excessive, all operations shall be summarily discontinued and immediate corrective action shall be taken to the satisfaction of regulator before work can resume.

F. In the event an obstruction blocks pedestrian traffic, the Contractor shall provide a safe passage area for pedestrians.

G. When the Contractor will be performing an operation which requires the closing of a lane of traffic, even for brief periods of time, the Contractor shall close the lane and so mark it with the necessary Protections. Flagmen shall be placed in advance of all lane closures. Additional flagmen shall be placed wherever, in the work area trucks or other vehicle enter or leave the traffic stream. The cost of flagmen shall be included in unit price. The local police departments shall determine the number of flagmen which may be required by the Contractor.

1.4 TRAFFIC CONTROL

A. All traffic control shall be performed in accordance with all Federal, State, and local laws, codes, rules and regulations.

B. All individuals performing traffic control shall be properly equipped and trained. Where required by the road opening permit or as required by the agencies have jurisdiction over the road a Uniformed Police officer for Traffic Control l shall be paid for under the Traffic Control Allowance on the Bid Form in accordance with N.J.S.A. 40A:11.23.1c.

C. A minimum of one trained traffic control person shall be present during all work in public streets. If the setup is such that more than one trained traffic control person is needed to control traffic at any one location the Contractor shall provide the additional personal at no additional cost to the Owner.

D. Contractor shall be aware of certain festivals and activities that occur in the City and Townships. These activities may cause changes in traffic patterns and road closures. Contractor-and is responsible for being aware of the dates, times and locations of all festivals and activities that may be located in work areas and require adjustments to traffic control and construction schedule. Contractor shall coordinate all work with Owner and Engineer.

E. Personal vehicles shall not be permitted to park in the work area or immediately adjacent thereto.

1.5 TRAFFIC CONTROL SUBMITTALS

A. The Contractor shall maintain traffic on affected roads and streets at all times as specified and required for permit approvals.

B. For planned water main extension work, the Contractor may be required at the request of the Engineer to prepare and submit traffic control plans for each roadway to be impacted by the Contractor's activities. Work shall not commence until approval has been obtained from the Police Department, the Engineer, the City and/or Townships' Public Works Departments, Division of Traffic and Signals and the Mercer County Department of Public Works (for County roadways Approval by the Engineer shall be required before the Contractor applies for street occupancy and street opening permits with the Department of Engineering). The traffic control plans submitted to and approved by the Engineer shall be the basis of the plans

submitted with the permit applications to the Department of Engineering. The Contractor shall revise and resubmit the traffic control plans based on the Department of Engineering comments as required to receive approval for street occupancy and street opening permits. Approval by the Engineer does not assure approval without revision by the Department of Engineering or the Mercer County Department of Public Works. In the event of emergency main and hydrant repair, the Contractor will notify the abovementioned entities as soon as possible.

C. Prior to submitting the traffic control plans to the Engineer, the Contractor shall review his/her proposed traffic control set-up for each work site and work activity with representatives of the Police Department. The Contractor shall obtain input from the Police Department regarding the level of police presence and any work hour restrictions on construction activities at the sites.

D. The traffic control plans shall indicate:

1. Street right-of-way, traffic flow directions, manholes locations, driveway locations, and other site features.

2. The location and arrangement of all traffic control devices, signs, equipment, and personals.

3. Location where temporary no parking signs will be posted.

4. Legend and description of symbols used.

5. Arrangement and dimensions of work zones, buffer areas, transition zones, and traffic lanes.

6. Location of bypass pumps, hose, and water hose routes and required hose ramps.

7. Anticipated work schedule, including work hours (start and ending times), dates, and duration.

E. Modifications to approved traffic control plans shall be submitted for approval before being implemented in the field.

F. See Section 01010 and Section 01046 for related work. Work on County roads shall follow the requirements of the Mercer County Department of Public Works, per Section 01010.

G. The Contractor shall provide to the Owner/Engineer complete copies of approved street permits for each site per Section 01170 prior to commencing work at each site.

H. The Contractor shall provide to the Engineer written approval from the Police Department and the Public Works Departments prior to commencing work at each site.

I. The Engineer shall be copied on all correspondence to and from the Police Department and Public Works Departments concerning obtaining approval of the traffic control plans.

END OF SECTION

SECTION 01601

CONTROL OF MATERIALS

PART 1 GENERAL

1.1 APPROVAL OF MATERIALS

A. Unless otherwise specified, only new materials and equipment shall be incorporated in the work. All materials and equipment furnished by the Contractor shall be subject to the inspection and approval of the Engineer. No material shall be delivered to the work without prior approval of the Engineer.

B. As specified in Section 01300, the Contractor shall submit to the Engineer, data relating to materials and equipment he/she proposes to furnish for the work. Such data shall be in sufficient detail to enable the Engineer to identify the particular product and to form an opinion as to its conformity to the specifications.

C. The Contractor shall furnish facilities and labor for handling and inspection of all materials and equipment. If the Engineer requires, either prior to beginning or during the progress of the Work, the Contractor shall submit additional samples or materials for such special tests as may be necessary to demonstrate that they conform to the specifications. Such samples shall be furnished, stored, packed and shipped as directed at the Contractor's expense.

D. Any delay of approval resulting from the Contractor's failure to submit samples or data promptly shall not be used as a basis of a claim against the Owner or the Engineer.

E. In order to demonstrate the proficiency of workmen or to facilitate the choice among several textures, types, finishes, and surfaces, the Contractor shall provide such samples of workmanship or finish as may be required.

F. The materials and equipment used on the work shall correspond to the approved samples or other data.

G. In accordance with the “Buy American” provision in Public Law 95-217 (Section 215 of the Public Law 91-500 as amended) and implementing EPA regulations and guidelines, N.J. Public Contracts Law 40A:11-18, and the Contractor, subcontractor, material suppliers, and equipment suppliers shall purchase American made products in the performance of this contract.

H. The Contractor is to certify that the purchased products and materials are in accordance with the above referenced “Buy American” clause and, in addition, is to provide all information required to justify the use of any foreign made product.

1.2 HANDLING AND STORAGE OF MATERIALS

A. All materials and equipment to be incorporated in the work shall be handled and stored by the manufacturer, fabricator, supplier, and Contractor before, during and after shipment in a manner to prevent warping, twisting, bending, breaking, chipping, rusting and any injury, theft or damage of any kind whatsoever to the material or equipment.Cement and lime shall be stored under a roof and off the ground and shall be kept completely dry at all times. All structural, miscellaneous, reinforcing steel shall be stored off the ground or otherwise to prevent accumulations of dirt or grease and in a position to prevent accumulations of standing water and to minimize rusting. Flat metal shall be

stored vertically. Precast concrete shall be handled and stored in a manner to prevent accumulations of dirt, standing water, staining, chipping or cracking. Brick, block and similar masonry products shall be handled and stored in a manner to reduce breakage, chipping, cracking and spalling to a minimum.

B. All mechanical equipment subject to corrosive damage by the atmosphere if stored outdoors (even though covered by canvas) shall be stored in a building to prevent injury. The building may be a temporary structure on the site or elsewhere, but it must be satisfactory to the Engineer.

C. All materials which, in the opinion of the Engineer, have become so damaged as to be unfit for the use intended or specified shall be promptly removed from the site of the work, and the Contractor shall receive no compensation for the damaged material or its removal.

D. All pipe and other materials delivered to the job shall be unloaded and placed in a manner that will not hamper the normal operation of the existing plant or interfere with the flow of necessary traffic.

END OF SECTION

SECTION – 01700

CONTRACT CLOSEOUT

PART 1 GENERAL

1.1 SCOPE OF WORK

A. This Section specifies administrative and procedural requirements for project closeout, including but not limited to:

1. Special provisions are included in Section 01170.

2. Project Record Documents are included in Section 01720.

1.2 RELATED WORK

A. Project deliverables are described in Division 2, 3 and 15.

1.3 PROJECT RECORDS

A. Maintain in Contractor's office, one set of the following information; actual revisions to work shall be recorded in these documents:

1. Specifications.

2. Addenda.

3. Change Orders and other Modifications to the Contract.

4. Reviewed submittals.

5. Contract Maps

6. Details

B. Record information concurrent with the progress of the Work.

C. Specifications:

1. Changes made by Addenda and Modifications.

D. Submit record information and complete service line log documents to Engineer prior to Application for Final Payment.

1. Record information shall be submitted in accordance with as specified in Section 01720.The Owner/Engineer will not provide additional sets of Contract maps, details or specifications for use as record information free of charge, but the Contractor may request an additional set from the Engineer, and one will be provided if the Contractor agrees to pay the cost of reproduction.

1.4 CLOSEOUT PROCEDURES

A. Submit written certification that Contract Documents have been reviewed, work has been inspected, and that work is complete in accordance with Contract Documents and ready for Engineer's inspection.

B. Provide all deliverables as specified, prior to submitting the final payment application.

C. Provide submittals to Engineer that are required by governing or other authorities having applicable jurisdiction including but not limited to permit close out information, etc.

D. Submit Application for Final Payment identifying total adjusted Contract Sum, previous payments and sum remaining due. The adjusted Contract Sum shall reflect the actual installed unit quantities as well as other possible adjustments for change orders, liquidated damages, and recovery of engineering fees.

E. Submit fully executed Contractor’s Certificate, Final Release and Release of Liens with a final payment application.

F. Submit the information required by Article 32 of Section 00100, including tabulations and an accurate list and the proof of business registration of each subcontractor or supplier used in the fulfillment of the Contract, or attest that no subcontractor was used.

1.5 FINAL CLEANING

A. Before requesting the inspection for certification of substantial completion, the Contractor shall complete the following to the extent that the inspection operations left the work area in an unacceptable condition.

1. Clean the project area of rubbish, litter, and other foreign substances. Sweep paved areas broom clean; remove stains, spills and other foreign deposits. Rake grounds that are neither paved nor planted, to a smooth even-textured surface, as necessary.

END OF SECTION

SECTION 01720

PROJECT RECORD DOCUMENTS

PART 1 GENERAL

1.1 SCOPE

A. The Contractor shall keep and maintain a copy of contract documents, Contract maps, details, and sketches to indicate all changes made during the course of a project, as specified herein.

1.2 RELATED REQUIREMENTS

A. Contract Closeout is included in Section 01700.

1.3 REQUIREMENTS INCLUDED

A. Contractor shall maintain a record copy of the following documents, marked up to indicate all changes made during the course of a project:

1. Contract maps (included in appendices of the Specifications).
2. Specifications
3. Service cards with sketches and information for every water service line replaced as specified herein.

B. Contractor shall assemble copies of the following documents for turnover to the Engineer at the end of the project, as specified and as applicable.

1. Field Orders, Change Orders, Design Modifications, and RFIs
2. Field Test records
3. Permits and permit close-outs (final approvals)
4. Certificate of Completion, as applicable
5. Certificates of Compliance for materials and equipment
6. Record Shop Drawings
7. Samples

C. RECORD DRAWINGS

1. The Contractor shall provide an as-built sketch for every flusher assembly installed. Record sketches shall be provided in legible hard copies cards and scanned PDF format.
   a. Sketch shall indicate:
      1) Property address.
      2) Method of installation.
      3) Make, model, material and size of saddle, curb stop, ball valve, and piping.
      4) Length of depth of piping

2. These annotated sketches constitute the Contractor's Record documents and shall be actual representations of as-built conditions, including all revisions made necessary by change orders, design modifications, requests for information and field orders.

3. Record drawings shall be accessible to the Owner and Engineer at all times during the construction period.

4. Record documents, details. Contractor shall ascertain as-built record information specific to the work, including surveying and/or taking GPS points to indicate the location, alignment, and elevations of all features.

    a. Label each document “PROJECT RECORD” in neat large printed letters. Contract maps and sketches shall also include all deviations or changes from the design maps, including but not limited to changes in materials, distances, lengths, locations, elevations, slopes, etc. All deviations from the design plans shall be clearly shown, labeled, and accurately located on record sketches and shall be drawn to scale.

    b. Compile record information contemporaneously with construction progress for review and approval on a monthly basis along with pay application. If Engineer determines that the record information provided by the Contractor be inaccurate, incomplete or does not meet the requirements of these Specifications, Engineer will return the information to the Contractor for correction. Contractor shall correct the record information at no additional cost to the Owner and shall resubmit to the Engineer for review and approval. Requirements for as-built record documents and information for the work include:

        1) Laboratory test reports (e.g., bacteriological and primary & secondary water quality, soil and concrete test).
        2) Legibly mark the Specifications to record the manufacturer, trade name, catalog number, and supplier of each product and item of equipment or material actually installed, as well as any changes made by Field Order, Change Order, RFI, and approved shop drawing.
        3) Record documents, details.
        4) As-built sketches

5. Record documents shall not be used for construction purposes. The information submitted by the Contractor in the Record Documents will be assumed to be correct, and the Contractor shall be responsible for the accuracy of such information and shall bear the costs resulting from the correction of incorrect data.

PART 2 – PRODUCTS (NOT USED) PART 3 – EXECUTION

3.1 MAINTENANCE OF RECORD DOCUMENTS AND SAMPLES

A. Store documents and records digitally in Contractor’s office for 10 years. Share all digitally stored records with TWW.

B. File documents and samples in accordance with the Construction Specifications Institute (CSI) format.

C. Maintain documents in a clean, dry, legible, condition and good order. Do not use record documents for construction purposes.

D. Make documents and sample available for inspection by the Engineer or Owner at all times.

E. Up-to-date Record documents may be a pre-requisite of processing periodic monthly pay applications if so specified under the section for progress payments.

3.2 RECORD INFORMATION COMPILATION

A. Do not conceal any work until the required information is acquired.

B. Items to be recorded include but are not limited to the location of internal utilities and appurtenances concealed in the construction –referenced to visible and accessible features.

C. Details not indicated on the original Details.

D. Service Line Sketches and GPS locations.

E. Specifications - legibly mark each Section to record:

1. Manufacturer, trade name, catalog number, and Supplier of each product and item of equipment actually installed.

2. Changes made by Field Order, Change Order, RFI, and approved shop drawing.

3.3 SUBMITTAL

A. If specified under the section for progress payments, monthly applications for payment will be contingent upon up-to-date Record documents. If requested by the Engineer or Owner, Contractor shall provide a copy of the Record documents, or present them for review prior to processing monthly applications for payment.

B. Upon substantial completion of the work and prior to final acceptance, the Contractor shall finalize and deliver a complete set of Project Record Documents to the ENGINEER conforming to the construction records of the Contractor. The Project Record Documents shall consist of service line sketches, all sketches of all water mains, and hydrants repaired and/or replaced or extended, corrected and annotated Contract maps and GPS point data showing the recorded location(s) of the work. Unless specified otherwise elsewhere, Record documents and sketches shall be in the form of a hard copy carefully and neatly drawn with a with annotations in red ink or pencil.

C. The information submitted by the Contractor into the Project Record documents will be assumed to be correct, and the Contractor shall be responsible for the accuracy of such information and shall bear the costs resulting from the correction of incorrect data.

D. Delivery of Project Record documents to the Engineer will be a prerequisite to Final payment.

E. The Contractor shall maintain a copy of all books, records, and documents pertinent to the performance under this Agreement for a period of five years following completion of the contract.

END OF SECTION

SECTION 02113

CONTAMINATED SOIL EXCAVATION

PART 1 GENERAL

1.1 SCOPE OF WORK

A. Furnish all labor, materials, tools and equipment necessary for field screening, excavation, removal, tracking, handling, stockpiling, sampling and analysis, and temporary storage of potentially contaminated soil, transport and disposal of fluids and solids generated during decontamination of vehicles and personnel, and dewatering discharge disposal as part of this Work.

1.2 RELATED WORK

A. Environmental Protection Procedures are included in Section 01110.

B. Transportation and Disposal of Contaminated Material are included in Section 02120.

C. Dewatering and Drainage are included in Section 02140.

D. Trenching, Backfilling, and Compaction are included in Section 02221.

E. Sedimentation and Erosion Control is included in Section 02270.

1.3 SUBMITTALS

A. Submit, in accordance with Section 01300, test results for all analytical samples, including all Chain-of-Custody forms and all documentation provided by the laboratory.

B. Submit, in accordance with Section 01300, all pertinent information relating to the disposal site or recycling facility. The facility information shall include the following:

1. General Information
   a. Facility name
   b. Facility address
   c. Name and title of contact person
   d. Telephone number and email of a contact person
   e. Permit number

2. The facility shall provide a listing of current and valid permits, licenses, letters of approval and other authorizations to operate pertaining to the receipt and management of the soils removed from the project site.

3. A detailed Contamination Removal Plan of the proposed work procedures to be used in the controlled removal and demolition of materials. Such plan shall include the location of contaminated areas, decontamination areas, disposal plan, monitoring program, and a detailed description of the method(s) to be employed in order to control pollution. The plan shall indicate anticipated starting and completion dates for each activity and each work area and shall allow adequate time for clean-up, inspection and monitoring activities. This plan must be approved prior to the commencement of any contamination removal work.

4. Certifications signed by each employee working on-site as specified herein. Such certifications

shall indicate that employees scheduled to perform the contaminated soil removal work have had the training and instructions on the hazards of contamination exposure, respirator selection, and its use, decontamination protocols and the OSHA regulations pertinent to contaminated soil removal work.

5. Proof that copies of applicable regulations specified herein and this Section are available on-site for review by Contractor and/or Owner and Engineers' personnel upon demand. Any equipment used by the Contractor shall have an operations manual and technical bulletin of said equipment on-site at all times. Any chemical product brought on-site by Contractor shall have an accompanying safety data sheet (SDS) as per the Federal Hazard Communication Standard.

1.4 QUALITY ASSURANCE

A. The Owner will be the generator and will sign all manifests and bills of lading. Except for materials required to be transported under manifest, all contaminated soil material shall be transported under bills of lading approved by the New Jersey Department of Environmental Protection (NJDEP) regardless of the chemical quality of the soils.

B. The Engineer's duties do not include supervision or direction of the actual work by the Contractor, his employees or agents. Neither the presence of the Engineer nor any observation and testing by the Engineer shall excuse the Contractor from defects discovered in his Work.

1.5 REGULATORY REQUIREMENTS

A. The project area is located within the public right of way and private property which have been assumed to be non-hazardous contaminated exceeding NJAC 7:26D Table 1A Residential Direct Contact Soil Remediation Standard. The Contractor shall comply with the NJDEP Site Remediation Program Linear Construction Technical Guidance, January 2012. Under the technical guidance, the person conducting the linear construction is not required to delineate or remediate contamination outside the limit of the exaction areas within the linear construction corridor. Notification of the existing contamination to the NJDEP is not required. If grossly contaminated material, visible as a free product, soil staining, oil sheen or noxious vapors, are encountered during excavation work performed under this Contract, the Contractor shall notify the Owner and Engineer, and NJDEP by contacting the main reporting line at 1-877-927-6337, where and as required by applicable laws and regulations. Work of this Section shall be performed in accordance with all applicable Federal, State, and local regulations, laws, codes, and ordinances governing the handling, transportation, and disposal of contaminated materials.

B. The Contractor shall follow environmental regulations and guidance, as applicable, included but not limited to New Jersey Technical Requirements for Site Remediation (NJAC 7:26E), Administrative Requirements for the Remediation of Contaminated Sites (NJAC 7:26C), Site Remediation Program Linear Construction Guidance, and other NJDEP technical guidance.

PART 2 PRODUCTS

2.1 GENERAL

A. The Contractor shall provide all employees, including Subcontractor's employees, with personal protective equipment and protective clothing consistent with the levels of protection for this Work as indicated in the Contractor's Site Health and Safety Plan.

PART 3 EXECUTION

3.1 GENERAL

A. The Contractor shall prepare a Site Health and Safety Plan for excavation work in the project area. All soil excavation work shall be in accordance with this Site Health and Safety Plan. Contaminated soil excavation work shall consist of but is not limited to test pits, utility trenches, removal of obstructions, trench support systems, pre-trenching, mass excavations, and any incidental soil work.

B. Excavate soil only to the limits necessary to install or repair the proposed main, hydrant, or service line and appurtenances.

C. Provide all layout field data, including ties, to the Engineer. Maintain all required field controls throughout the performance of the Work.

D. All site health and safety controls shall be fully established and in operation prior to beginning any soil excavation. Site controls shall include but not be limited to work zones properly barricaded, decontamination facilities, and all support equipment and supplies including personal protective equipment.

3.2 FIELD SCREENING

A. Upon the discovery of any visibly impacted material identified as stained soils, product, sheen or noxious vapors the Contractor shall:

1. Notify the Engineer.

2. Take the necessary steps to provide the appropriate personal protective equipment to workers.

3. Take necessary Health, Safety and Monitoring Precautions including soil screening with a Photoionization Detector.

4. Segregate suspected potentially hazardous-contaminated material from the non- hazardous contaminated material for soil characterization including hazardous waste characterization.

3.3 EXCAVATION OF CONTAMINATED MATERIAL

A. Work and decontamination procedures in areas containing contaminated material shall be performed in accordance with standard engineering practices and approved Contamination Removal Plan.

B. Employ methods necessary to isolate contaminated soils from non-contaminated soils, including benching.

C. Separate excavated contaminated soil based on the determination that the contaminated soil could be from more than one source and by degrees of contamination (i.e., visually contaminated) or as directed by the Engineer.

3.4 STORAGE OF CONTAMINATED EXCAVATED MATERIAL

A. Excavated non-hazardous contaminated soils shall be direct loaded into dump trucks for disposal at an appropriate facility or shall be temporarily staged within a paved lot located along the construction corridor or near if additional soil characterization is required.

B. Neither the Owner nor the Engineer shall have any responsibility for obtaining or maintaining stockpile locations. All excavated contaminated soil shall be temporarily stockpiled at locations provided by Contractor in stockpiles not exceeding a volume of 100 cubic yards pending soil characterization and analytical results. Soil shall be stockpiled in accordance with this Section. Blending of soil to attain composition thresholds by dilution is not allowed. No additional payment will be made for multiple handling of soil.

C. All material entering or leaving the staging area will be under the direct supervision of the Contractor's inspector. Stockpiles shall be inspected by the Contractor's Field Operations Manager or representative a minimum of one time per week, after all storm events and prior to any Contractor extended leaves to ensure the stockpile area is adequately maintained to limit negative impacts to the surrounding public. Inspection results will be recorded in the Daily Log and maintained on site and available for inspection by the Owner or their representative. A copy of the log will be provided to the Owner and Engineer.

D. Excavated contaminated materials shall be stockpiled in accordance with the most recent version of NJDEP guidance policies while samples are analyzed for chemical constituents. Excavated materials shall be placed on a base, lined with 20 mil (or higher gauge) polyethylene and be completely and securely covered with 6 mil (or higher gauge) polyethylene.

1. The stockpiles shall be tracked to provide complete data necessary to locate any stockpile within the site. All Work necessary to coordinate stockpiling from placement to disposal shall be included. Provide Engineer with duplicate copies of all documentation at the time of stockpiling.

2. The Contractor shall handle all soil in accordance with applicable regulations at all times. No soil shall be left at the stockpiling facility after the completion date of this contract.

3. The polyethylene shall be bermed around the edges to prevent any infiltration of stormwater or exfiltration of leachate. The berm height shall be a minimum of 12- in.

4. The polyethylene shall be adequately secured to prevent damage or loss by wind or other weather elements.

E. Stockpiles shall be securely barricaded and clearly labeled.

F. Soils shall be suitably dewatered prior to their leaving the site, to prevent free water from developing during transport to the disposal facility.

G. Hay bales meeting the standards in Section 02270, shall be placed around the stockpiles in accordance with best practices.

H. Stockpiles will be graded such that stormwater runoff is diverted from stockpiled materials and hay bales berms/ silt fencing and other control measures acceptable to the Owner will be placed around the perimeter of the area. Hay bales shall be used as needed near catch basins, surface waters, and other discharge points. Soil erosion and sediment control measures shall be inspected and maintained for the duration of the project. Stockpile slopes shall be no steeper than 1 horizontal to 1 vertical (1:1).

I. Soil movement on site will be recorded on daily soil/sediment tracking log to log to record all material entering or leaving for the duration of disposal activities. The log must be maintained daily and include up-to-date records that identify; the origin of each waste stream in the staging area, the date the materials were received, identify the specific storage location, type, quantity, and characteristics of all materials excavation, indicate the date the materials were transported from the storage area to the final destination, document the waste transporter, and the location of the final disposal destination.

3.5 SOIL TRACKING, STOCKPILE SAMPLING, AND ANALYSIS

A. Track all contaminated soils from excavation to final disposition.

B. Take samples of stockpiled material as necessary and as required by the disposal facility, in such a manner as not to cause any cross-contamination. All sampling equipment shall be decontaminated between collection of samples from each stockpile.

C. Samples shall be analyzed at the frequency and for the constituents required by the disposal facility. These analyses shall be performed by a laboratory certified for such analyses by the State of New Jersey.

D. Submit a copy of all analyses to the Engineer within two days of receipt of the laboratory report. A review period of one week should be anticipated for Engineer's review of analytical data.

3.6 DEWATERING

A. Dewatering within the contaminated soil area shall be conducted in accordance with Section 02140.

END OF SECTION

SECTION 02120

TRANSPORTATION AND DISPOSAL OF CONTAMINATED MATERIAL

PART 1 GENERAL

1.1 SCOPE OF WORK

A. The Contractor shall furnish all labor, materials, equipment, and incidentals necessary for transportation and offsite disposal of contaminated waste materials. Contaminated waste materials refer to any and all materials including, but not limited to: soil encountered during excavation, lead pipe, debris encountered from clearing and grubbing operations, excess/waste site preparation material unsuitable for disposal and water from the Contractor's staging/dewatering areas (if not treated and disposed of onsite, as discussed in Section 02140). The Contractor's plans, which will be based on the requirements of this Section, shall provide the detailed methods for performing the work.

B. The Contractor shall characterize all contaminated waste materials in accordance with the sample requirements and methodology included in the Contractor's approved Sampling and Analysis Plan and as required by the offsite disposal facilities.

C. The Contractor shall ensure that all operations for loading and hauling of contaminated waste materials are in compliance with Federal and New Jersey Department of Transportation (NJDOT) regulations, and all other applicable Federal, State, and local requirements.

D. Recycle/reuse contaminated soil at a non-hazardous waste landfill or recycling facility.

1.2 RELATED WORK

A. Submittals shall be handled on an as needed basis.

1.3 SUBMITTALS

A. If necessary, submit, in accordance with Section 01300 of the EJCDC standard contract documents, as a single submittal, all pertinent information relating to the transport and disposal of materials specified herein. The information submitted shall include, as a minimum:

1. Name and address of all contaminated material transporters to be used to complete the project.
2. NJDOT Transporter Identification Number and expiration date.
3. Proof of permit, license, or authorization to transport contaminated material in all affected states.
4. Waste characterization sampling forms, sampling logs, sample location maps, and laboratory analysis reports.
5. Documentation of the disposal facility's commitment to accept the volume of waste material and statement that it will be open for business during the Contract duration to accept the volume of regulated waste material prior to transporting any material off- site.
6. Transportation manifests/ bill of lading.
7. Waste disposal/recycling documentation (e.g., weight tickets) in hard copy and electronic (spreadsheet) formats from the receiving facility.

8. Copies of each manifest shall be submitted to the OWNER and OWNER's Representative) within seven (7) business days following shipment from the site after delivery to the disposal facility.

1.4 REGULATORY REQUIREMENTS

A. The Work of this Section shall be performed in accordance with all applicable Federal, State, and local regulations, laws, codes, and ordinances governing the handling, transportation, and disposal of contaminated waste materials.

B. Obtain all Federal, State and local permits required for the transport and disposal of contaminated waste materials. The Contractor shall adhere to all permit requirements.

C. Document that the disposal facilities proposed have all certifications and permits as required by Federal, State, and local regulatory agencies to receive and dispose of the contaminated waste materials.

D. Excess non-hazardous contaminated waste materials not designated for reuse as backfill material will be disposed offsite within 180 days of excavation. A non-hazardous bill of lading will be used to document the transportation and final disposition of contaminated waste materials during construction. The Owner will be identified as the generator associated with the Bill of lading, and the Owner or Owner Representative will sign each Bill of lading unless agreed otherwise. The contaminated waste materials designated for off-site disposal will be trucked off-site to the selected licensed TSD facility

E. Any contaminated waste materials classified as hazardous waste will be removed within 90 days of excavation. If the regulated material is determined to be hazardous waste in accordance with applicable federal, state and local requirements, hazardous waste manifests must be generated and complete with the Code of Federal Regulations Title 40 Subpart B Parts 262.20 to 262.23 and N.J.A.C. 7:26G. Owner will be identified as the associated generator and will sign each hazardous waste manifest.

F. Hazardous materials containers will be labeled when first placed in service, and each container will remain closed except when compatible waste types are added. When moved within the site, each container will remain within the geographic boundaries of the site. Containers of waste will be immediately sealed as each container is filled. The Contractor shall continuously maintain custody of all non-hazardous and hazardous material generated at the work site including security, short-term storage, transportation, and disposition until custody is transferred to the off-site TSD facility.

PART 2 PRODUCTS

2.1 GENERAL

A. All Contractor personnel shall wear personal protective equipment and protective clothing consistent with the levels of protection for this Work.

PART 3 EXECUTION

3.1 CONTAMINATED WASTE MATERIALS CHARACTERIZATION

A. The Contractor shall be responsible for characterizing the contaminated waste materials for the purpose of obtaining approvals for final disposal of contaminated waste material. Collect samples to perform the testing required by the disposal facility.

1. Submit a copy of all analytical results to the Engineer within two days of receipt of the laboratory report.

B. Sampling of contaminated waste materials shall be done at sufficient and adequately distributed locations so that the concentrations of the chemical constituents attributable to the contaminants of concern which may be present are adequately characterized.

C. Coordinate schedule so that Engineer may observe sample collection.

D. The Contractor is responsible for any additional contaminated waste materials characterization required to meet disposal facility requirements.

3.2 TRANSPORT OF CONTAMINATED WASTE MATERIAL

A. The Contractor shall not be permitted to transport contaminated waste materials from the stockpile to the disposal or recycling facility until all disposal or recycling facility documentation has been received, reviewed, and accepted by Owner and the Engineer.

B. Transport contaminated waste materials from the stockpile site to the disposal or recycling facility in accordance with all United States Department of Transportation (DOT), United States Environmental Protection Agency (USEPA), New Jersey Department of Environmental Protection (NJDEP) regulations and other regulations of all affected states.

C. The hauler(s) shall be licensed in all states affected by transport.

D. Provide to the Engineer copies of all weight slips, both tare and gross, for every load weighed and disposed of at the accepted disposal facility. The slips shall be tracked by the original manifest document number that was assigned by the Engineer at the site.

E. The Contractor shall be responsible for ensuring that free-liquid does not develop during transport. “Wet contaminated waste materials” shall not be loaded for transport. The Contractor shall be responsible to properly dispose of any free liquids that may result during transportation.

F. The temporary stockpiled contaminated waste materials must be removed from the stockpile to the disposal or recycling facility in accordance with applicable regulatory deadlines however no later than the completion date of this contract as may be extended.

END OF SECTION

SECTION 02140
DEWATERING AND DRAINAGE

PART 1 GENERAL

1.1 SCOPE OF WORK

A. Design, furnish, install, operate, monitor, maintain and remove a temporary dewatering system as required to lower and control water levels at least 2-ft below subgrades of excavations and to permit construction to proceed in-the-dry.

B. Furnish, maintain and remove temporary surface water control measures adequate to drain and remove surface water entering excavations.

C. Retain the services of a professional engineer registered in the State of New Jersey to prepare dewatering and drainage system designs and submittals described herein.

D. Work shall include the design, equipment, materials, installation, protection, and monitoring of geotechnical instrumentation required to monitor the performance of the dewatering and drainage system as required herein.

E. Collect and properly dispose of all discharge water from the dewatering and drainage systems. Under no circumstances shall water from dewatering systems be discharged into the existing sewer system without prior approval from the Owner which may include fees and applications.

F. All discharges from dewatering activities to surface waters, wetlands, vernal habitats, or storm sewers shall be free of sediment. Care shall be taken not to damage or kill vegetation by excessive watering or by damaging silt accumulation in the discharge area. If discharges are sediment-laden, techniques shall be employed to remove sediment prior to discharge. A sedimentation basin shall be constructed and used as specified, where necessary, to protect vegetation and to achieve environmental objectives.

G. Obtain and pay for all permits required for dewatering and drainage systems. Dewatering permit fees will be paid under Permit Allowance.

H. Repair damage caused by dewatering and drainage system operations.

1.2 RELATED WORK

A. Submittals are included in Section 01300.

B. Trenching, Backfilling and Compaction is included in Section 02221.

C. Granular Fill Material is included in Section 02230.

D. Sedimentation and Erosion Control are included in Section 02270.

E. Pavement Repair and Resurfacing is included in Section 02576.

1.3 SUBMITTALS

A. Dewatering and drainage system designs shall be prepared by a licensed professional engineer retained by the Contractor. The Contractor shall submit an original and three copies of the licensed professional engineer's certification on the PE form specified in Section 01300. The Contractor shall also submit qualifications as required herein.

B. The Contractor shall submit a dewatering and drainage system design plan.

1. The plan shall include a description of the proposed dewatering system(s) and include the proposed installation methods to be used for dewatering and drainage system(s) elements. The plan shall include equipment, and dewatering system design calculations in the plan.

C. The plan shall identify the anticipated area influenced by the dewatering system(s) and address impacts to adjacent existing and proposed structures.

D. Coordinate dewatering and drainage submittals with the excavation and support of excavation submittals. The submittal shall show the areas and depths of excavation to be dewatered.

E. Do not proceed with any excavation or dewatering activities until the dewatering submittals have been reviewed by the Engineer.

1.4 QUALITY ASSURANCE

A. Perform all work in accordance with current applicable regulations and codes of all Federal, State and local agencies.

B. The Contractor shall have at least 5 years of experience with work compatible to the Work specified, employing labor and supervisory personnel who are similarly experienced in this type of Work.

C. The Contractor's design engineer shall be registered in the State of New Jersey and have a minimum of 5 years of professional experience in the design and construction of dewatering and drainage systems and shall have completed not less than 5 successful dewatering and drainage projects.

1.5 DESIGN REQUIREMENTS

A. The Contractor is responsible for the proper design and implementation of methods for controlling surface water and groundwater.

B. The primary purpose of the groundwater control system(s) is to perform all pipe laying "in- the- dry" and on undisturbed subgrade soils in the areas of the proposed excavations. The Contractor is responsible for lowering the groundwater as necessary to complete construction in accordance with the details and specifications at no additional cost to the Owner.

C. Design all groundwater control system components to prevent loss of fines from surrounding soils.

D. The Contractor shall be responsible for damage to properties, buildings or structures, sewers and other utility installations, pavements and work that may result from dewatering or surface water control operations.

E. Design review and field monitoring activities by the Owner or by the Engineer shall not relieve the Contractor of his/her responsibilities for the work.

1.6 DEFINITIONS

A. Where the phrase "in-the-dry" is used in this Section, it shall be defined as an excavation subgrade where the groundwater level has been lowered to at least 2-ft below the lowest level of the excavation, is stable with no ponded water, mud, or muck, is able to support construction equipment without rutting or disturbance and is suitable for the placement and compaction of fill material, pipe or concrete foundations.

PART 2 PRODUCTS

2.1 MATERIALS

A. Piping, pumping equipment and all other materials required to control of surface water and groundwater in excavations shall be suitable for the intended purpose.

B. Standby pumping systems and a source of standby power shall be maintained at all sites.

PART 3 EXECUTION

3.1 GENERAL

A. Control surface water and groundwater such that excavation to final grade is made in-the- dry, the natural undisturbed condition of the subgrade soils is maintained and softening and/or instability or disturbance due to the presence or seepage of water does not occur. All construction and backfilling shall proceed in-the-dry and flotation of completed portions of work shall be prohibited.

B. Methods of groundwater control may include but are not limited to perimeter trenches and sump pumping, perimeter groundwater cutoff, ejectors and combinations thereof.

C. It is expected that the type of system, and details of the work will have to be varied depending on soil/water conditions at a particular location.

D. All work included in this Section shall be done in a manner which will protect adjacent structures and utilities and shall not cause loss of ground or disturbance to the pipe bearing soils or to soils which support overlying or adjacent structures.

E. Locate groundwater control system components where they will not interfere with construction activities adjacent to the work area Excavations for sumps or drainage ditches shall not be made within or below 1H:1V slopes extending downward and out from the edges of existing or proposed foundation elements or from the downward vertical footprint of the pipe.

3.2 SURFACE WATER CONTROL

A. Construct surface water control measures, including dikes, ditches, sumps and other methods to prevent, as necessary, flow of surface water into excavations and to allow construction to proceed without delay.

B. All sewer and storm inlets within construction areas shall be provided with perimeter hay bales or other appropriate siltation control measures.

3.3 EXCAVATION DEWATERING

A. At all times during construction, provide and maintain proper equipment and facilities to promptly remove and properly dispose of all water entering excavations. Excavations shall be maintained in-the-dry. Groundwater levels shall be kept at least 2-ft below the lowest excavation level.

B. Excavation dewatering shall maintain the subgrade in a natural undisturbed condition and until the fill, structure or pipes to be built thereon have been completed to such extent that they will not be floated or otherwise damaged by allowing water levels to return to natural elevations.

C. Pipe, masonry, and concrete shall not be placed in water or be submerged within 24 hours after being installed. Water shall not flow over new masonry or concrete within four days after placement.

D. In no event shall water rise to cause unbalanced pressure on structures until the concrete or mortar has set at least 24 hours. Prevent flotation of the pipe by promptly placing backfill.

E. Dewatering shall at all times be conducted in such a manner as to preserve the natural undisturbed condition of the subgrade soils at the proposed bottom of excavation.

F. If the subgrade of the trench or excavation bottom becomes disturbed due to inadequate dewatering or drainage, excavate below normal grade as directed by the Engineer and refill with structural fill, screened gravel or other material as approved by the Engineer at the Contractor's expense.

G. It is expected that the initial dewatering plan may have to be modified to suit the variable soil/water conditions to be encountered during construction. Dewater and excavate, at all times, in a manner which does not cause loss of ground or disturbance to the pipe bearing soil or soil which supports overlying or adjacent structures.

H. Pumping from the dewatering system shall be continuous until pipe or structure is adequately backfilled. Stand-by pumps shall be provided.

I. Water entering the excavation from precipitation or surface runoff shall be collected in shallow ditches around the perimeter of the excavation, drained to a sump and pumped from the excavation to maintain a bottom free from standing water.

J. Drainage shall be disposed of in an approved area as specified in Section 01110. Existing or new sanitary sewers shall not be used to dispose of drainage without first obtaining written permission from the Owner.

3.4 REMOVAL OF SYSTEMS

A. At the completion of the excavation and backfilling work, and when approved by the Engineer, all pipe, pumps, generators, other equipment and accessories used for the groundwater and surface water control systems shall be removed from the site. All materials and equipment shall become the property of the Contractor. All areas disturbed by the installation and removal of groundwater control systems shall be restored to their original condition.

END OF SECTION

SECTION 02221

TRENCHING, BACKFILLING AND COMPACTION

PART 1 GENERAL

1.1 SCOPE OF WORK

A. Furnish all labor, materials, equipment, and incidentals required and perform all trenching for pipelines and appurtenances, including drainage, filling, backfilling, disposal of surplus material and restoration of trench surfaces and rights-of-way.

B. Furnish and place all sheeting, bracing and supports and remove from the excavation all materials which the Engineer may deem unsuitable for backfilling. The bottom of the excavation shall be firm, dry and in all respects, acceptable.

C. All excavation, trenching and related sheeting, bracing, etc., shall comply with the requirements of OSHA excavation safety standards (29 CFR Part 1926.650 Subpart P) and State requirements. Where a conflict between OSHA and State regulations exists, the more stringent requirements shall apply.

D. Wherever the requirement for 95 percent compaction is referred to herein, it shall mean "at least 95 percent of maximum density as determined by ASTM D1557".

1.2 RELATED WORK

A. Dewatering and Drainage are included in Section 02140.

B. Excavation Support and Protection is included in Section 02311.

C. Granular Fill Materials are included in Section 02230.

D. Pavement Repair and Resurfacing is included in Section 02576.

1.3 REFERENCE STANDARDS

A. American Society for Testing and Materials (ASTM)

1. D698 - Standard Test Methods for Laboratory Compaction Characteristics of Soil Using the Standard Effort (12,400 ft-lbf/ ft3 (600 kN-m/m3))

2. D1557 - Standard Test Methods for Laboratory Compaction Characteristics of Soil Using the Modified Effort (56,000 ft-lbf/ ft3 (2,700 kN-m/m3))

B. Occupational Safety and Health Administration (OSHA)

1. 29 CFR Part 1926.650 Subpart P – Excavation Safety Standards.

2. 29 CFR Part 1926- Construction Industry Standards.

3. 29 CFR 1910.120 Hazardous Waste Operations and Emergency Response, and the corresponding construction standard 29CFR 1926.62.

C. Where reference is made to one of the above standards, the revision in effect at the time of bid opening shall apply.

1.4 SUBMITTALS

A. Submit to the Engineer the sheeting and bracing design as required prior to excavation.

B. Submit to the Engineer the proposed method of backfilling and compaction prior to excavation.

PART 2 PRODUCTS

2.1 GENERAL

A. Soils and materials designated for use in this Section are specified in Section 02230.

PART 3 EXECUTION

3.1 TRENCH EXCAVATION

A. All trench excavations shall comply with OSHA Standards.

B. Trench excavation shall include material of every description and of whatever substance encountered, including brick pavement, rock, and boulders. Where encountered in the trench, rock shall be excavated to a depth of half of the pipe diameter below the pipe, but in no case less than 6-inches below the bottom of the pipe.

C. Pavement shall be cut with a saw, wheel or pneumatic chisel along straight lines before excavating.

D. Strip and stockpile topsoil from grassed areas crossed by trenches. At the Contractor's option, topsoil may be otherwise disposed of and replaced, when required, with approved topsoil of equal quality.

E. Ensure that trenching does not interfere with normal 45 degrees bearing splay of any building foundation.

F. While excavating and backfilling is in progress, traffic shall be maintained, and all utilities and other property protected as provided in the General Conditions and other Specification Sections.

G. Do not disturb soil within the branch spread of existing trees or shrubs that are to remain. If necessary to excavate through roots, perform work by hand and cut roots with a sharp axe.

H. Except where trees are indicated to be removed, trees shall be protected from injury during construction operations. No tree roots over 2 inches in diameter shall be cut without express permission of the Engineer. Trees shall be supported during excavation by any means previously reviewed by the Engineer.

I. Correct unauthorized excavations as directed at no cost to the Owner.

J. Trenches shall be excavated to the depth and in widths sufficient for proper installation of the service line and to allow thorough inspection, bracing and for pumping and drainage equipment. The bottom of the excavations shall be firm, dry and free of irregularities lumps, projections and in all respects acceptable to the Engineer. Trench width shall be a practical minimum.

K. Excavation and dewatering shall be accomplished by methods which preserve the undisturbed state of

subgrade soils. The trench may be excavated by machinery to or just below the designated subgrade, provided that material remaining in the bottom of the trench is no more than slightly disturbed. Subgrade soils which become soft, loose,"quick," or otherwise unsatisfactory as a result of inadequate excavation, dewatering or other construction methods shall be removed and replaced by No. 57 stone as required by the Engineer at the Contractor's expense.

L. Clay and organic silt soils are particularly susceptible to disturbance due to construction operations. When excavation is to end in such soils, use a smooth-edge bucket to excavate the last 1-ft of depth.

M. Service lines in open cut areas are to be laid on well-graded sand bedding; the trench may be excavated by machinery to the normal depth of the pipe provided that the material remaining in the bottom of the trench is no more than slightly disturbed and does not becomesoftened.

N. The maximum amount of open trench permitted in any one location shall be 500 feet, or the length necessary to accommodate the amount of pipe installed in a single day, whichever is greater. All trenches shall be fully backfilled at the end of each day or, in lieu thereof, shall be covered by recessed heavy steel plates adequately braced pinned and capable of supporting vehicular traffic in those locations where it is impractical to backfill at the end of each day. The above requirements for backfilling or use of steel plate will be waived in cases where the trench is located further than 100 feet from any traveled roadway or occupied structure. In such cases, however, barricades and warning lights meeting safety requirements shall be provided and maintained.

3.2 DISPOSAL OF MATERIALS

A. Excavated material shall be stacked without excessive surcharge on the trench bank or obstructing free access to hydrants and water valves. Inconvenience to traffic and abutters shall be avoided as much as possible. Excavated material shall be segregated for use in backfilling as specified below.

B. It is expressly understood that all surplus material shall be removed from the site of the work and properly disposed of. It shall be assumed that surplus material is contaminated non- hazardous and shall be transported, stockpiled and disposed of in accordance to Section 02120.

C. Should conditions make it impracticable or unsafe to stack material adjacent to the trench, the material shall be hauled and stored at a location provided. When required, it shall be rehandled and used in backfilling the trench, see paragraph 3.06.

3.3 TEST PITS

A. Water service must be turned off before any excavation near the lead service line, including test pits.

B. Contractor shall use service line material verification test pits to verify service line material at the curb stop. Test hole shall be of sufficient dimensions and depths to definitely determine existing pipe materials and other information on the existing subsurface conditions that may be needed for Contractor’s planning. If service material is lead, test hole may be expanded to accommodate selected replacement technique; provided Contractor has all materials on-hand to complete suchinstallation.

C. Engineer or Owner may request test pits for locating underground utilities or structures as an aid in establishing the precise location of new work. Engineer test pits shall be made vacuum excavation approximately 8-inches in diameter to minimize disturbance to lead service lines.

D. Engineer test pits shall be backfilled as soon as the desired information has been obtained. In roadway, flowable fill shall be used to ensure required compaction and strength are achieved. The backfilled surface shall be maintained in a satisfactory condition for travel until resurfaced as specified.

E. Contractor shall provide Customer with a flier on flushing instructions after any test pit or excavation is conducted within 5-feet of a lead service line. The flier will be provided by the Owner or Engineer for distribution by the Contractor.

3.4 EXCAVATION BELOW GRADE AND REFILL

A. Whatever the nature of unstable material encountered or the groundwater conditions, trench drainage shall be complete and effective.

B. If the Contractor excavates below grade through error or for the Contractor's own convenience, or through failure to properly dewater the trench, or disturbs the subgrade before dewatering is sufficiently complete, he may be directed by the Engineer to excavate below grade as set forth in the following paragraph, in which case the work of excavating below grade and furnishing and placing the refill shall be performed at his own expense.

C. A 6-inch thick layer of crushed stone shall be placed below the pipe. Crushed stone shall then be placed in 6-in layer thoroughly compacted up to the normal grade of the pipe. If directed by the Engineer, No. 57 stone shall be used for refill of excavation below grade.

3.5 BACKFILLING

A. As soon as practicable after the pipe has been laid and jointed, backfilling shall begin and thereafter be prosecuted expeditiously. Backfilling shall be in compliance with NJ DOT Table 203.03.02-1. Density measurements shall be taken for every 0.5 CY of backfill placed or as directed by the Engineer.

B. Where the pipes are laid in streets, the remainder of the trench up to the bottom of bituminous stabilized base course shall be backfilled with compacted backfill referenced in Appendix A, Detail No. 4 and as specified in Section 02230. At no time shall backfill layers exceed 1-ft.

C. Water Service Connections in the open cut areas shall be installed on a minimum of a 6-inch bed of well-graded sand and shall be covered with a minimum of 6-inches of well-graded sand.

D. To prevent movement of the all pipes, dumping backfill material into the trench and then spreading will not be permitted until material has been placed and compacted to a level 1-ft over the pipe.

E. Backfill shall be brought up evenly on all sides. Each layer of backfill material shall be thoroughly compacted by rolling, tamping, or vibrating with mechanical compacting equipment or hand tamping, to tamping to 95 percent compaction according to ASTM D 1557 or 98 percent according to ASTM D 698. If rolling is employed, it shall be by use of a suitable roller or tractor, being careful to compact the fill throughout the full width of the trench.

F. Where other methods are not practicable, compaction shall be by use of hand or pneumatic ramming with tools weighing at least 20 lbs. The material being spread and compacted in layers not over 6-in thick. If necessary, sprinkling shall be employed in conjunction with rolling or ramming.

G. Subject to approval by the Engineer, fragments of ledge and boulders smaller than 6-in may be used in trench backfill provided that the quantity, in the opinion of the Engineer, is not excessive. Rock fragments shall not be placed until the pipe has at least 2-ft of earth cover Small stones and rocks shall be placed in thin layers alternating with earth to ensure that all voids are completely filled. Fill shall not be dropped into the trench in a manner to endanger the pipe. All other rock, ledge, boulders, and other material unsuitable for backfilling shall be removed from the site and disposed of by the Contractor.

H. Bituminous paving shall not be placed in backfilling. The frozen material shall not be used under any circumstances.

I. Do not compact by puddling or water jetting.

J. Broom and hose-clean road surfaces immediately after backfilling. Employ dust control measures throughout the construction period.

3.6 RESTORING TRENCH SURFACE

A. Where the trench occurs adjacent to paved streets, in shoulders or sidewalks, thoroughly consolidate the backfill and maintain the surface as the work progresses. If settlement takes place, immediately deposit additional fill to restore the level of the ground.

B. The surface of any driveway or any other area which is disturbed by the trench excavation and which is not a part of the paved road shall be restored to a condition at least equal to that existing before work began.

C. In sections where the pipeline passes through grassed areas, and at the Contractor's own expense, remove and replace the sod, or loam and seed the surface asper Section 02930 and to the satisfaction of the Engineer.

D. Where the trench occurs in paved area, the pavement shall be restored to maintain smooth even grade that matches the adjacent pavement and preconstruction conditions as detailed in Section 02576.

END OF SECTION

SECTION 02230

GRANULAR FILL MATERIALS

PART 1 GENERAL

1.1 DESCRIPTION

A. Granular fill materials are specified in this Section, but their use for bedding pipe, pavement base, and similar uses are specified in detail elsewhere. The Engineer may order the use of fill materials for purposes other than those specified in other Sections if, in his/her opinion, such use is advisable.

B. Granular fill materials shall be natural or processed mineral soils, graded crushed stone or gravel obtained from off-site sources. Granular fill materials shall be free of all organic material, trash, snow, ice, frozen soil, or other objectionable materials which may be compressible or which cannot be properly compacted. Soft, wet, plastic soils which may be expansive, clay soils having a natural, in-place water content in excess of 30 percent, soils containing more than 5 percent (by weight) fibrous organic materials, and soils having a plasticity index greater than 30 shall be considered unsuitable for use as granular fill materials. Granular fill materials shall have a maximum of 1 percent expansion when testing is performed on a sample remolded to 95 percent of maximum dry density (per ASTM D1557) at 2 percent below optimum moisture content under a 100 lbs/sq ft surcharge.

1.2 RELATED WORK

A. Trenching, Backfilling, and Compaction are included in Section 02221.

B. Sedimentation and Erosion Control is included in Section 02270.

C. Pavement Repair and Resurfacing is included in Section 02576.

1.3 REFERENCE STANDARDS

A. American Society for Testing and Materials (ASTM)

1. ASTM C33 – Standard Specification for Concrete Aggregates.
2. ASTM D1557 – Test Method for Laboratory Compaction Characteristics of Soil.

B. NJDOT Standard Specifications for Road and Bridge Construction

C. Where reference is made to one of the above standards, the revision in effect at the time of bid opening shall apply.

1.4 QUALITY ASSURANCE

A. Laboratory Testing

1. At least 7 days prior to the placement of any backfill or fill materials, deliver a representative sample of the proposed materials weighing at least 50 lbs to the soils testing laboratory in accordance with Section 01410.

2. Engage the soils testing laboratory to perform:
   a. Grain size analyses of the samples to determine their suitability for use as backfill or fill material in conformance to the materials requirements specified herein.
   b. The appropriate Proctor analyses to determine the maximum dry densities required for compaction testing as specified elsewhere in the Contract Documents.
   c. Test results and determinations of suitability shall be delivered to the resident project representative no later than 3 days prior to the placement of backfill or fill materials.

1.5 SUBMITTALS (AS NEEDED)

A. Submit to the Engineer all laboratory testing and certification prior to any work.

PART 2 PRODUCTS

2.1 MATERIALS

A. Backfill and Fill materials shall be suitable excavated materials, natural or processed mineral soils obtained from off-site sources, or graded crushed stone or gravel. Backfill and Fill materials shall be free of all organic material, trash, snow, ice, frozen soil or other objectionable materials which may be compressible, or which cannot be properly compacted. Soft, wet, plastic soils which may be expansive, clay soils having a natural, in-place water content in excess of 30 percent, soils containing more than 5 percent (by weight) fibrous organic materials, and soils having a plasticity index greater than 30 shall be considered unsuitable for use as backfill and fill. Backfill and fill materials shall have a maximum of 1 percent expansion when testing is performed on a sample remolded to 95 percent of maximum dry density (per ASTM D698) at 2 percent below optimum moisture content under a 100 lbs/sq. ft. surcharge.

B. Projects in the NJDEP's formal linear construction program require that imported backfill material complies with the NJDEP's April 2015 Fill Material Guidance for SRP Sites. Certified clean fill is required for trench backfilling. The Contractor shall provide Engineer with the source of clean fill used for trench backfilling. The Contractor shall provide Engineer with a copy of the clean fill certification prior to the material being brought to the site

C. Contractor shall refer to Appendix A Detail No. 4 for required backfill materials and lift heights for all Municipalities, County and NJDOT Roads.

D. Common fill shall consist of mineral soil, substantially free of clay, organic material, loam, wood, trash, snow, ice, frozen soil and other objectionable material which may be compressible, or which cannot be compacted properly. Common Fill shall not contain granite blocks, broken concrete, masonry rubble, asphalt pavement, or any material larger than 6-in in any dimension. It shall have physical properties, as approved by the Engineer, such that it can be readily spread and compacted. Common Fill shall have a plasticity index of less than 15 and shall conform to the following gradation limits: material larger than 1/2 –inch in its largest dimension.

Sieve Size	Percent Passing
No. 40	*75*
No. 200	*30*

E. Native fill shall be as classified a common fill if it meets the specifications above for common fill.

F. Select Fill shall be as specified above for common fill except that the material shall contain no stones larger than 2-inches in its largest dimension. Well-Graded Sand shall contain less than 15% fines (Silt and Clay). Sand shall be in particle size gradation within the following limits (ASTM D422) and have a Unified Soil Classification of SW per ASTM D2487. The material shall contain no stones, shell fragments or deleterious material larger than 1/2 –inch in its largest dimension.

Sieve Size	Percent Passing
No. 4	*100*
No. 200	*5 maximum*

A. Bank Run Sand and Gravel (I-5) shall as specified in Section 901.11 of the NJDOT Standard Specifications. Bank Run Sand and Gravel (I-5) shall be capable of being compacted to 95% relative compaction by the compaction method used. Bank Run Sand and Gravel (I-5) shall not contain granite blocks, broken concrete, masonry rubble or other similar materials. Bank Run Sand and Gravel (I-5) shall be graded within the following limits:

Sieve Size	Percent Passing
2"	*100*
3/4"	*70 - 100*
No. 4	*30-80*
No. 50	*10-35*
No. 200	*5-12*

B. Crushed stone shall be washed coarse aggregate of size No. 57 as specified in Section 901.03 of the NJDOT Standard Specifications. Crushed Stone shall be capable of being compacted to 95% relative compaction by the compaction method used. Crushed Stone shall not contain granite blocks, broken concrete, masonry rubble or other similar materials. Crushed Stone shall be graded within the following limits:

Sieve Size 1	Percent Passing
1/2"	*100*
1"	*95 - 100*
2"	*25 - 60*
No. 4	*0 - 10*
No. 8	*0 – 5*

C. 3/4” Stone shall be washed coarse aggregate as specified in Section 901.03 of the NJDOT Standard Specifications. 3/4” Stone shall be capable of being compacted to 95% relative compaction by the compaction method used. 3/4” Stone shall not contain granite blocks, broken concrete, masonry rubble or other similar materials. 3/4” Stone shall be graded within the following limits:

Sieve Size	Percent Passing
1"	*100*
3/4”	*90-100*
3/8"	*20 - 55*
No. 4	*0 - 10*
No. 8	*0 – 5*

D. 1-1/2” Stone shall be washed coarse aggregate as specified in Section 901.03 of the NJDOT Standard Specifications. 1-1/2” Stone shall be capable of being compacted to 95% relative compaction by the compaction method used. 1-1/2” Stone shall not contain granite blocks, broken concrete, masonry

rubble or other similar materials. 1-1/2" Stone shall be graded within the following limits:

Sieve Size	Percent Passing
2"	*100*
1-1/2"	*90-100*
1"	*20 - 55*
3/4"	*0 - 15*
3/8"	*0 - 5*

E. Dense-Graded Aggregate (DGA) (formerly Quarry Process Stone) for backfill material shall be in accordance with Specification Subsection 901.10 of the NJDOT Standard Specifications. DGA shall be used to backfill all excavation within the roadway. Recycled concrete will not be acceptable in lieu of DGA. DGA shall conform to the following limits:

Sieve Size	Percent Passing
1-1/2"	*100*
3/4"	*55 - 90*
No. 4	*25 - 50*
No. 50	*5 - 20*
No. 200	*3 - 10*

F. Flowable Fill used as void fill shall be comprised of a mixture of Portland cement, coarse aggregate, fine aggregate, and water. Materials, methods of preparation, and placement techniques shall comply with the requirements of Section 03301 as for concrete. Design mix shall result in a flowable material with a 28-day compressive strength of approximately 75 to 125 psi and shall require no subsequent vibration or tamping to achieve consolidation. Recommended mix shall be as follows:

Portland Cement	50 lbs/cu yd
Coarse Aggregate	1700 lbs/cu yd
Fine Aggregate	1900 lbs/cu yd
Water	300 lbs/cu yd, or as needed

Flowable Fill shall not contain any materials or products that will corrode the pipe.

PART 3 EXECUTION (NOT USED)

END OF SECTION

SECTION 02270
SEDIMENTATION AND EROSION CONTROL

PART 1 GENERAL

1.1 SCOPE OF WORK

A. Furnish all labor, materials, equipment and incidentals required and perform all installation, maintenance, removal and area cleanup related to sedimentation control work as shown on the Details and as specified herein.

1.2 RELATED WORK

A. Environmental Protection Procedures are included in Section 01110.

B. Trenching, Backfilling and Compaction specifications are included in Section 02221.

C. Granular Fill Materials are included in Section 02230.

1.3 SUBMITTALS (AS NEEDED)

A. Submit to the Engineer, in accordance with Section 01300 (Appendix D) and within 10 days after award of Contract, technical product literature for all commercial products to be used for sedimentation and erosion control.

1.4 QUALITY ASSURANCE

A. Be responsible for the timely installation and maintenance of all sedimentation control devices necessary to prevent the movement of sediment from the construction site, staging or laydown areas to off-site areas or into the combined sewer system. Measures in addition to those shown in the details necessary to prevent the movement of sediment off site shall be installed, maintained, removed, and cleaned up at the expense of the Contractor. No additional charges to the Owner will be considered.

B. Sedimentation and erosion control measures shall conform to the requirements outlined in the Standards for Soil Erosion and Sediment Control in New Jersey, most recent edition.

PART 2 PRODUCTS

2.1 MATERIALS

A. Silt Fence

1. Hardwood posts shall be a minimum of 4-ft in length, 1-1/4-in by 1-1/4-in post spaced

   8.3 ft on center.

2. Silt fence filter fabric shall be a woven, polypropylene, ultraviolet resistant material such as Mirafi 100X by Mirafi Inc., Charlotte, NC or equal.

B. Crushed stone shall be as specified in Section 02230 Granular Fill Materials.

C. Hay/straw bales shall be placed around catch basins that discharge into wetlands, water supply or surface water bodies. Hay/straw bales shall be utilized, along with other sediment filtration devices, in wetland buffer zones, if designated on the Details. Hay/Straw Bales shall meet the following requirements:

1. Wire bound or string tied.
2. Securely anchored by at least 2 stakes driven through the bale into the ground or other methods approved by the Engineer.
3. Chinked (filled by wedging) with hay to prevent water from escaping between bales.

PART 3 EXECUTION

3.1 INSTALLATION

A. Silt Fence Installation

1. Silt fence shall be positioned as necessary to prevent off site movement of sediment produced by construction activities as directed by the Engineer.
2. Dig trench approximately 6-in wide and 6-in deep along proposed fence lines.
3. Drive metal stakes, 8-ft on center (maximum) at back edge of trenches. Stakes shall be driven 2-ft (minimum) into ground.
4. Hang filter fabric on wire carrying to bottom of trench with about 6-in of fabric laid across bottom of trench for the entire length of the fence as no gaps between the bottom of the fabric and the ground surface will be permitted. Secure fabric to posts with self- fastening tabs.
5. Backfill trench with excavated material and tamp.
6. Install prefabricated silt fence according to manufacturer's instructions.

B. Construct inlet filters using filter fabric as specified in this Section and as shown in the details. Filter fabric shall be secured to inlet frame with bricks and in a fashion as to minimize impedance on traffic flow.

C. Construct sediment traps using hay bales and filter fabric as shown in the details. Filter fabric shall be as specified in this Section. Crushed stone may be used in place of hay bales.

D. Staging areas, access ways, and construction entrance shall be surfaced with a minimum depth of 12-in of crushed stone. If the egress is to a County road, then a 20 ft. long paved transition shall be provided between the edge of pavement and the stone access pad

3.2 MAINTENANCE AND INSPECTIONS

A. Inspections

1. Make a visual inspection of all sedimentation control devices once per week and promptly after every rainstorm.

2. If such inspection reveals that additional measures are needed to prevent movement of sediment to offsite areas or into the vent trench, promptly install additional devices as needed. Sediment controls in need of maintenance shall be repaired promptly.

B. Device Maintenance

1. Silt Fences
   a. Remove accumulated sediment once it builds up to 1/2 of the height of the fabric.
   b. Replace damaged fabric, or patch with a 2-ft minimum overlap.
   c. Make other repairs as necessary to ensure that the fence is filtering all runoff directed to the fence.

2. Filter Boxes
   a. Replace crushed stone when it becomes saturated with silt.

3. Add crushed stone to access ways and staging area and laydown yard as necessary to maintain a firm surface free of ruts and mudholes.

3.3 REMOVAL AND FINAL CLEANUP

A. Once the site has been fully stabilized against erosion, remove sediment control devices and all accumulated silt. Dispose of silt and waste materials in proper manner. Regrade all areas disturbed during this process and stabilize against erosion with surfacing materials.

END OF SECTION

SECTION 02311

EXCAVATION SUPPORT AND PROTECTION

PART 1 GENERAL

1.1 SCOPE OF WORK

A. The work specified in this Section includes requirements for excavation and support of temporary excavations, and trenches. The Contractor shall design, furnish, install, and maintain a system of supports, including all bracing and associated items, to retain excavations in a safe manner and to control ground movements. Upon completion of the required construction, the system of supports shall be completely removed and the excavation and staging area sites restored as discussed herein.

B. The work shall include site grading; fencing, barricades and signing; construction staging areas; design and construction of excavation support systems; disposal of excavated material, surface water, and groundwater; backfilling; and site restoration. Work shall include all labor, materials, and equipment required to complete excavation support.

C. Retain the services of a professional engineer registered in the State in which the work will occur to prepare excavation support and protection system designs and submittals described herein. Work shall include the design, equipment, materials, installation, protection, and monitoring of geotechnical instrumentation required to monitor the performance of the excavation support system as required herein.

D. All excavations and support systems shall conform to applicable OSHA excavation, trenching, and shoring standards which are contained in the U.S. Code of Federal Regulations 29 (C.F.R.) 1926.650-1926.653, other federal, state or local requirements. In the event of a conflict, comply with the more restrictive applicable requirements.

1.2 RELATED WORK

A. Dewatering and Drainage are included in Section 02140.

B. Rock and Boulder Excavation are included in Section 02213.

C. Trenching, Backfilling, and Compaction are included in Section 02221.

D. Granular Fill Materials are included in Section 02230.

1.3 SUBMITTALS (AS NEEDED)

A. If necessary, submit to the Engineer Shop Drawings and design calculations for the Contractor-designed excavation support system stamped by a Professional Engineer in the State of New Jersey. Submittals shall indicate the following, as a minimum:

B. Shop Drawings shall include:

1. Provide overall plan layout of the system, indicating clearances, dimensions, material properties, member sizes, locations, spacing and penetrations depth of all members, locations of various types of lateral supports. Indicate existing and proposed utilities, structures or other obstruction, location and type of instrumentation and monitoring points within the area of influence of the excavation.

2. Provide wall elevations and locations of all bracing.

3. Show the overall sequence of installation and removal of bracing, indicating levels to which the work will be carried out before bracing is installed or removed.

4. Method of preloading bracing (if required) and the preload for each member, and the method of locking-off the preload. Include detailed drawings of the connections, jacking supports and method of shimming.

5. Details, layout, arrangement, equipment requirements, and method of construction of the proposed excavation support system.

6. Procedures for resolving difficulties arising from misalignment of members exposed during excavation, and criteria for implementing those procedures.

C. Design calculations shall include:

1. Loads on the excavation support system for all stages of excavation, bracing removal, and concrete placement, including material and equipment loads on the adjacent ground during construction.

2. Design of wall and all bracing members including all details for all stages of construction.

3. Theoretical deflections of excavation support system and deformation of structures, pipelines, and other improvements located within the area of influence of the excavation.

4. Submit to the Engineer for review and acceptance, a plan of action to be implemented in the event any threshold value for deformation is reached. The plan of actions shall be positive measures by the Contractor to limit further movement of the wall including but not limited to trenching for struts and wales, placement of granular earth berms against the wall, installation of additional struts, or combinations thereof. The details of the mitigating measures shall include a schedule of implementation, location and/or availability of materials, structural details for all connections to the wall and support elements, and a detailed description of the method of implementation. The Contractor shall be prepared to work 24 hours per day to implement such measures. The remedial work/mitigating measures shall be at no additional cost to the Owner.

D. Submit quality control measures as required to ensure that the performance of the excavation support system is consistent with the approved shop drawings and the requirements herein.

E. Submit welder qualifications and weld procedures in accordance with AWS D1.1.

F. Submit Contractor's and Design Engineer's qualifications as described in herein.

G. At least one copy of the design shall be maintained at the job site during excavation that includes a plan indicating the sizes, types, and configurations of the materials to be used in the protective system, and the identity of the registered engineer who approved the design.

H. Do not proceed with any support of excavation or protection activities until the submittal has been approved by the Engineer.

I. Design Engineer's documentation shall include:

1. On-site inspections of the excavation support system as the systems are constructed.

2. Review of quality control measures and performance data.

3. Certification that the excavation support system is constructed per the applicable design following completion of each support system and following any modifications by Contractor during construction.

1.4 QUALITY ASSURANCE

A. Regulations: Perform all work in accordance with current applicable regulations and codes of all Federal, State and local agencies.

B. The Contractor shall have at least 5 years of experience with work compatible with the Work shown and specified, employing labor and supervisory personnel who are similarly experienced in this type of Work.

C. The Contractor's Design Engineer shall be a Registered Professional Engineer in the State in which the work is located with at least 5 years professional experience in the design and construction of support of excavation systems and shall have completed not less than 5 successful excavation support projects of equal type, size, and complexity to that required for the work.

1.5 DESIGN REQUIREMENTS

A. The design of temporary excavation support systems is the responsibility of the Contractor. The design calculations and drawings shall be prepared, stamped and signed by a Professional Engineer registered in the State of New Jersey, who is experienced in designing similar excavation support systems.

B. Design temporary excavation support systems in accordance with the requirements of this Section. These criteria are the minimum acceptable standards.

C. All underground utility lines shall be identified, located, and protected from damage or displacement. Utility companies and other responsible authorities shall be contacted to locate and mark the locations and, if they so desire, direct or assist with protecting the underground installation. When required, the Contractor shall obtain an excavation permit from the local authority having jurisdiction prior to the initiation of any excavation work.

D. Design excavation support systems in accordance with all OSHA requirements and other local and agency requirements.

E. Design the support system to minimize horizontal and vertical movements and to protect adjacent structures and utilities from damage.

F. Excavations below the level of the base of any adjacent foundation or retaining wall shall not be permitted unless the design of the excavation and bracing includes an analysis of the stability of the structure supported by the foundation and as necessary, incorporates required bracing/underpinning of the foundation.

G. For support systems in which bracing is installed between opposite sides of the excavation, design the excavation support of both sides to be nearly the same as feasible.

H. Where necessary to resist point loads, pipe piles used as soldier piles shall be filled with concrete with a compressive strength not less than 3,000 psi. The strength of the concrete shall not be considered in the design of the pipe pile for bending stress.

I. Design, install, operate, and maintain groundwater control system to control groundwater inflows, prevent piping or loss of ground, and maintain the stability of the excavation. Refer to the requirements of Section 02140.

J. Design review and field monitoring activities by the Owner or by the Engineer shall not relieve the Contractor of his/her responsibilities for the work.

PART 2 PRODUCTS

2.1 MATERIALS

A. Soldier piles and structural steel members shall conform to ASTM A572 or ASTM A242 unless approved otherwise. No members with permanent deformations are to be provided. Members shall not be spliced unless approved by the Engineer.

B. Pipe piles used as soldier piles shall conform to ASTM A252.

C. Steel sheet piling shall conform to ASTM A328 or ASTM A572 or ASTM A690 unless approved otherwise.

D. Liner plates shall be fabricated from structural quality hot-rolled carbon steel sheets or plates conforming to ASTM A1101 with the following minimum properties before cold forming:

E. Plates shall be of either the two- or four-flange type, punched for bolting on all sides. Bolt spacing shall be in accordance with the manufacturer's standard spacing and shall be multiples of the plate length so that the plates having the same curvature shall be interchangeable. Bolt numbers and pattern shall be determined by the liner supplier.

F. Tensile Strength: 42,000 psi

1. Yield strength: 28,000 psi

G. Concrete shall conform to Section 03301 or ASTM C33 and ASTM C150 unless otherwise approved.

H. All timber shall be structural grade with a minimum allowable flexural strength of 1100 psi. Timber lagging shall be at least 3 inches thick and free of large or loose knots.

PART 3 EXECUTION

3.1 GENERAL

A. Commence installation of support system and excavations only after shop drawings have been reviewed and accepted by the Engineer.

B. All required instrumentation shall be installed and initialized prior to the start of work.

C. Methods of construction for excavations shall be such as to ensure the safety of the Work, Contractor's employees, Engineer, and Owner's employees and inspectors, the public and adjacent property and improvements, whether public or private.

D. Before beginning construction at any location of this project, adequately protect existing structures,

utilities, trees, shrubs, and other existing facilities. The repair of or compensation for damage to existing facilities shall be at no additional cost to the Owner.

E. As a minimum, place fencing or suitable barricades, gates, lights, and signs as necessary around the excavations and staging areas to provide for public safety. Contractor shall provide personnel to serve as flagmen and watchmen.

F. Install excavation support systems in accordance with the approved shop drawings and applicable permits.

G. All voids between the excavation support system and earth shall be filled with materials acceptable to the Engineer.

H. If unstable material is encountered during excavation, all necessary measures shall be taken immediately to contain it in place and prevent ground displacement.

I. If settlement or deflections of supports indicate that support system requires modification to prevent excessive movements, redesign and resubmit revised shop drawings and calculations to the Engineer at no additional cost to the Owner.

J. Sufficient quantity of material shall be maintained on site for the protection of work and use in case of accident or emergency.

K. All welding shall conform to the applicable provisions of ANSI/AWS D1.1.

3.2 PORTABLE TRENCH BOXES

A. Portable trench boxes or sliding trench shields may be used for the protection of workers only.

B. Additional excavation, backfilling, and surface restoration required as the result of trench box use shall be at no additional cost to the Owner.

C. Trench boxes or shields shall be designed, constructed, and maintained to meet acceptable engineering and industry standards.

D. Shields shall be installed in a manner to restrict lateral or other hazardous movement of the shield in the event of the application of sudden lateral loads.

E. A copy of the trench box manufacturer's specifications, recommendations, and limitations shall be in written form and maintained at the job site during all excavation work.

3.3 SOLDIER PILES

A. Install soldier piles with the minimum embedment depths as shown on approved shop drawings.

B. Driven piles shall be installed with driving shoes where hard driving is anticipated.

C. For soldier piles installed in predrilled holes, provide a casing or other methods of support as necessary to prevent caving of holes and loss of ground.

D. Predrilled holes for soldier piles shall be backfilled with concrete from the pile tip elevation to the elevation of the bottom of the excavation. The remainder of the predrilled hole shall be backfilled with lean concrete or sand. Concrete strength shall be in accordance with the approved shop drawings.

E. The predrilled hole diameter shall be sufficient to allow for proper alignment and concrete backfilling of the pile.

F. Driven soldier piles shall be advanced without the aid of a waterjet.

G. Provide timber lagging of sufficient thickness to withstand earth pressures and in accordance with the approved shop drawings.

H. Install lagging such that ground loss does not occur between adjacent or below the lowest board. As excavation proceeds, the maximum height of unlagged face of excavation shall not exceed 4 feet. The unlagged face shall not exceed 2-ft if water seeps or flows from the face of the excavation or if the face of the excavation becomes unstable.

I. As installation progresses, backfill the voids between the excavation face and the lagging. Pack with materials such as hay, burlap, or geotextile filter fabric where necessary to allow drainage of groundwater without loss of ground.

3.4 STEEL SHEET PILING

A. Install steel sheet piling with the minimum embedment depths as shown on the approved shop drawings.

B. Drive sheeting in plumb position with each sheet pile interlocked with adjoining piles for its entire length to form a continuous diaphragm throughout the length of each run of the wall, bearing tightly against the original ground. Exercise care in driving so that interlocking members can be extracted without damaging adjacent structures or utilities. The methods of driving, cutting, and splicing shall conform to the approved shop drawings.

C. Use templates or other temporary alignment facilities to maintain piling line.

D. Prior to installation, the sheet piles shall be thoroughly cleaned and inspected for defects and proper interlock dimensions. The Contractor shall provide a tool for checking the interlock dimensions.

E. Each sheet pile shall have sufficient clearance in the interlocks to slide, under its own weight, into the interlock of the sheet pile previously placed.

F. Excavation shall not be carried in advance of steel sheet piling installation.

G. Where obstructions are anticipated, pre-excavation or pre-drilling along the sheet pile wall alignment shall be conducted at no additional cost to the Owner. Pre-excavation and pre-drilling shall not extend below the lowest excavation level or into bearing soils for existing or future structures.

H. Obstructions encountered before the specified embedment for piles shall be removed. Where obstructions cannot be removed, the sheet pile system shall be re-evaluated by the Contractor's Design Engineer for the resulted reduced embedment and additional toe stability measure implemented, as required or for realignment of the sheet pile wall. Submittal of the proposed measures shall be provided.

I. Damaged piling or piling with faulty alignment shall be withdrawn and new piling driven properly in its place. The cost of such additional work shall be considered as part of the pile driving and shall be borne by the Contractor.

3.5 LINER PLATES

A. Liner plates shall be installed as soon as excavation has progressed sufficiently for the next ring of plates to be installed. A complete circumferential ring of liner plates shall be installed prior to continuing the excavation. Installing more than one incomplete ring of liner plates at any time is not acceptable. Plates shall be staggered in the vertical direction to facilitate shaft strength and leakage resistance.

B. Liner plates shall be grouted in accordance with the approved shop drawings.

3.6 INTERNAL BRACING

A. Provide internal bracing to carry maximum design load without distortion or buckling.

B. Include web stiffeners, plates, or angles as needed to prevent rotation, crippling, or buckling of connections and points of bearing between structural steel members. Allow for eccentricities caused by field fabrication and assembly.

C. Install and maintain all bracing support members in tight contact with each other and with the surface being supported.

D. Coordinate excavation work with the installation of bracing. Excavation shall extend no more than 2 feet below any brace level prior to installation of the bracing.

E. Use procedures that produce uniform loading of a bracing member without eccentricities or overstressing and distortion of members of the system.

3.7 REMOVAL OF EXCAVATION SUPPORT

A. Do not remove internal bracing and transfer loads to the permanent structure without prior acceptance of the Engineer.

B. Removal shall begin at and progress from the bottom of the excavation. Members shall be released slowly as to note any indication of the possible failure of the remaining members or possible cave-in of the sides of the excavation.

C. Backfilling shall progress together with the removal of support systems from excavations.

D. Unless otherwise indicated, remove all portions of excavation support.

E. Do not remove vertical support members that were installed within the zone of influence of new or existing structures. The zone of influence is defined as a zone extending down and away from the outer edge of the structure at 1 horizontal to 1 vertical. Support members installed within this zone shall be cut off at 5 ft below finished grade and abandoned in place.

F. No untreated wood shall remain as part of the abandoned portion of the work.

G. When removing the excavation support system, do not disturb or damage adjacent buildings, structures, waterproofing material, or utilities. Fill voids immediately with lean concrete or well-graded cohesionless sand, as indicated or as directed by the Engineer.

H. Remove material of the excavation support system from the site immediately.

END OF SECTION

SECTION 02576
PAVEMENT REPAIR AND RESURFACING

PART 1 GENERAL

1.1 SCOPE OF WORK

A. Furnish all labor, material, equipment, and incidentals required and replace all pavement removed over trenches or excavations or otherwise disturbed by the Contractor's operations.

B. New pavement in streets shall consist of initial pavement over trenches, and final bituminous concrete pavement placed over trenches and excavations or as otherwise indicated.

C. Final pavement on streets under moratoriums shall be infra-red paving as described in Section 02577.

D. Streets, driveways, parking areas or sidewalk pavements damaged or disturbed by the Contractor's operations shall be repaired, replaced or restored in accordance with the requirements specified herein and as directed for the respective type of pavement replacement and in a manner satisfactory to the Owner, City, Townships and County.

E. The Contractor shall obtain all necessary City, Township and County permits for road opening and comply with all rules and regulations governing road opening permits.

F. Any damage to the pavement outside of the limits of work which, in the opinion of the Engineer, is not necessary to complete the Work and is a result of activities by the Contractor, his laborers, agents or subcontractors shall be repaired in a manner satisfactory to the Engineer, City, Townships and County at the expense of the Contractor.

G. Limits of pavement are shown on the details in Appendix B.

1.2 RELATED WORK

A. Trenching, Backfilling, and Compaction are included in Section 02221.

B. Granular Fill Materials are included in Section 02230.

C. Infra-red Pavement Repair and Patching are included in Section 02577.

1.3 REFERENCE STANDARDS

A. Except as otherwise specified herein, the current Standard Specifications for Highways and Bridges, including all addenda, issued by the State of New Jersey, Department of Transportation (NJDOT), shall apply to materials and workmanship required for the work of this Section.

B. American Association of State Highways and Transportation Officials (AASHTO)

1. AASHTO M144 - Standard Specification for Calcium Chloride.

D. Where reference is made to one of the above standards, the revision in effect at the timeof bid opening shall apply.

1.4 MAINTENANCE

A. All pavement placed shall be maintained for a period of 2-year. During this period, all areas which have settled or are unsatisfactory for traffic shall be refilled and replaced within 10 days of notification by the Owner and at no additional cost to the Owner.

1.5 SUBMITTALS

A. Submit to the Engineer, in accordance with Section 01300, design mix for each bituminous material.

B. Product Data: Submit data on material and equipment to be used in concrete pavement including:

1. Sources of aggregate, manufacturer data sheets for cement and concrete admixtures used in the concrete mix design.

2. Dowels and dowel bar assemblies.

3. Reinforcement or welded wire mesh.

4. Proposed Techniques: submit proposed techniques for placement, consolidation, finishing texturing and curing of concrete.

5. Concrete Mix Design Data:
   a. Submit concrete mix design for each concrete strength.
   b. Identify mix ingredients and proportions, including admixtures.

PART 2 PRODUCTS

2.1 MATERIALS

A. Asphalt Paving

1. Calcium chloride shall conform to AASHTO M144, Type I or Type II.

2. Bituminous concrete pavement and bituminous materials shall conform to Section 902 of the NJDOTSS.

3. Asphalt-Tack coat shall consist of either emulsified asphalt, type RS, conforming to Subsection 902.01.03, or cutback asphalt conforming to Subsection 902.01.02 of the NJDOTSS.

4. Subgrade material shall be density graded aggregate, compacted to 95 percent modified proctor, as specified in Section 02230.

5. Initial pavement shall be stabilized base course shall be Hot Mix Asphalt HMA12.5/64, in accordance with the NJDOTSS.

6. Temporary pavement marking paint shall be epoxy and thermoplastic markings conforming to Subsection 610.03.01 and 610.03.02 of the NJDOTSS. Paint shall be white or yellow to match existing conditions or as directed by the Engineer.

7. Final pavement shall be bituminous concrete surface course shall be Hot Mix Asphalt HMA 9.5M634 in accordance with the NJDOTSS.

B. Concrete Paving

1. Concrete pavement shall be repair with a minimum of 4,000 psi concrete, in accordance with NJDOTSS Table 903.03.06-1.

C. Permanent pavement marking paint shall be epoxy resin reflectorized traffic paint conforming to Subsection 912.03.01 of the NJDOTSS. Paint shall be white or yellow to match existing conditions or as directed by the Engineer.

PART 3 EXECUTION

3.1 GENERAL

A. Materials for pavement shall be mixed, delivered, placed and compacted in accordance with the NJDOT standards and as specified herein.

B. Whenever the subbase becomes dry enough to cause dust problems, spread calcium chloride uniformly over the gravel surface in sufficient quantity to eliminate the dust.

C. When the air temperature falls below 50 degrees F, extra precautions shall be taken in drying the aggregates, controlling the temperatures of the materials and placing and compacting the mixtures.

D. No mixtures shall be placed when the air temperature is below 40 degrees F, nor when the material on which the mixtures are to be placed contains frost or has a surface temperature not suitable to the Engineer.

E. No vehicular traffic or loads shall be permitted on the newly completed pavement until adequate stability has been attained and the material has cooled sufficiently to prevent distortion or loss of fines. If the climatic or other conditions warrant it, the period of time before opening to traffic may be extended at the discretion of the Engineer.

F. All agencies must be notified in the event of a detour or road closure, these include but are not limited to Police, Fire, and other emergency departments.

G. The Contractor shall notify residents and business 48-hours prior to beginning roadwork.

H. All openings shall be properly guarded, day and night, with approved signs, barricades, lights, etc., Flagmen shall be provided in the amount as directed by the involved jurisdiction's Police Department. If necessary, a uniformed police officer for traffic control will be determined by the involved jurisdiction's Police Department. Transverse openings shall be restricted so that not more than one half of a traveled way will be obstructed at any time, one line in each direction must be maintained at all times. Recessed and pinned steel plates are to be used as protection on openings maintained overnight in the traveled ways.

I. All road openings shall be saw cut prior to any excavation.

3.2 MUNICIPALITIES GENERAL REQUIREMENTS

A. On streets owned by Hopewell Township, Ewing Township, Hamilton Township, Lawrence Township, City of Trenton, the Contractor shall perform the following:

1. The Contractor shall solely be responsible for obtaining and maintaining road opening permit with the Municipalities as needed. Notify police jurisdiction of work.

2. After an opening is made, the work shall be continuous, and restoration of disturbed surfaces shall be completed as soon as conditions permit.

3. Work shall be conducted to eliminate interference with subsurface utilities and their appurtenances unless permission for interference has been obtained from the proper authorities.

4. All excavations shall be completely backfilled. Trenches may not be flushed or puddled except by specific permission of the Municipality.

3.3 MERCER COUNTY GENERAL REQUIREMENTS

A. On Mercer County-owned streets, the Contractor shall perform the following:

1. It shall be unlawful for any person or persons, firm, corporation, or municipality to make any excavation in or to open or damage the surface of any road or street under the jurisdiction of the County of Mercer without written approval from, the County Engineer.

2. Contractor shall apply for a road opening permit with Mercer County and receive approve from County a minimum of 2-weeks prior to the start of work: Road Supervisor of Mercer County Highway Division (609-530-7510).

3. Contractor shall be responsible for taking out and maintain the minimum required Insurances, Bonds, statements and all other items as required by the County.

4. Contractor shall schedule for all inspection 72-hour prior to the commencement of work. If the anticipated date and duration of work change the Contractor shall notify the Mercer County Highway Division the prior business day. Road Supervisor of Mercer County Highway Division (609-530-7510). Failure to notify County may result in the nullification of the permit.

5. Contractor shall telephone Mercer County Highway Division at least 2-hours in advance of any backfill. All backfill of trench work or excavated areas within County Road Right of Way shall be done in the presence of the assigned Mercer County Inspector. If County inspector is not present and the excavated area has been backfilled, the Contractor shall re- excavate the opening and backfill with the County Inspector present at Contractor's sole expense.

6. Road opening permits are valid for 15-days from the date of issuance.

7. All pavement replacement, curbing, and sidewalk replacement shall be performed in strict accordance with the requirements of the Mercer County.

8. Contractor shall backfill the excavated area and complete temporary pavement the same day trench is made. Open trenches shall not be permitted overnight.

9. Special attention shall be given for the protection of pedestrians, particularly school children and motorists.

10. Ingress and egress shall be maintained to the abutting properties at all times.

11. All roadways shall be cleanly saw cut before excavation is made.

12. The Contractor shall be aware that working hours are restricted on County roads. Road openings allowed between the hours of 9 AM. and 3 PM. unless otherwise approved by County Engineer or County Road Supervisor.

13. Provisions shall be made to protect all existing underground utilities during construction.

14. Daily notification of the area of operations shall be made to the Engineer, Police, Fire Department, County Engineer or County Road Supervisor.

15. The Contractor shall employ Police Officers as required by the Mercer County Highway Division Permit to maintain and control the flow of traffic and for the protection of motorists and pedestrians. The Contractor shall place and maintain such barricades, detour signs, flashing lights, etc. as are deemed necessary by the by the involved jurisdiction's Police Department. Traffic control shall be coordinated with Police and County.

16. Before the Contractor leaves each site, all areas shall be restored to original conditions. If the existing traffic lines are removed or damaged during the day's construction, the Contractor is to restripe these lines as necessary and return them to their original condition. Following final completion, the Contractor shall restore all traffic lines with long life epoxy resin.

17. Steel plates are to be used over excavations to permit full traffic flow during non- working hours. No barricades, equipment, materials or other obstructions to traffic shall be left in the roadway when work is not actually in progress.

18. No Mercer County controlled roads can be open after November 15th or before April 1st. Road plates may not be left in place after November 15th. The only exceptions shall be for emergencies declared by the County Engineer.

19. If the edge of any excavation ends with two (2) feet or less to the curb or edge of the pavement, the Contractor shall remove and replace all pavement between the edge of the trench and curb or edge of pavement at no additional cost other than at the unit price bid for pavement replacement.

3.4 TEMPORARY PAVEMENT

A. In Municipalities listed in Appendix B – Details.:

1. If during the winter months, the bituminous stabilized base is not available, the Contractor may substitute Type "A" cold patch material. Cold patches shall be a minimum of 2" compacted, underlaid by the appropriate Base Course or Compacted backfill as applicable to the work area.

2. However, as soon as Stabilized Base Course (Initial Pavement) is available and able to be laid, the Contractor shall excavate the cold patch and base material to its full depth or a depth of 10-inches, whichever is greater, and replace it with stabilized base compacted as shown in Appendix A - Details. Installation and removal of temporary cold patch material and replacement with the specified

stabilized base material shall be at no additional cost to the Initial Paving unit price bid.

B. Initial Pavement shall be placed wherever existing pavement has been removed or disturbed as soon as practical, but in no case, more than 24 hours after backfilling is completed. Exceptions are noted elsewhere in the Specification.

C. During the interval between the completion of backfill and the time of placement of initial paving, all areas shall be maintained in a safe and satisfactory condition to allow for normal traffic use.

D. The stabilized base course (Initial Pavement) shall be placed in two equal layers. Tack coat shall be applied between all layers and along the edges of the existing pavement. Prior to placing any initial, temporary pavement, the Contractor shall ensure the edges of the cut pavement are vertical and square. The Engineer will inspect the conditions prior to pavement placement, and the Contractor will correct any deficiencies prior to paving operations. This initial pavement shall be maintained in a safe and usable condition by placement of additional stabilized base course material and brought to pre-construction grade at no additional cost until top mix pavement is placed.

E. The base pavement shall be placed and compacted by rubber-wheeled rollers or other compaction equipment of sufficient weight to thoroughly compact the bituminous concrete without damaging the existing pavement. The new pavement shall be rolled smooth and flush with the existing pavement.

F. Hose clean all road surfaces adjacent to the trench area to be paved. No paving is to be placed until subsurface is dry.

G. Initial pavement shall be maintained in a condition suitable for traffic until replaced or overlaid by top mix. Defects shall be repaired within 3 days of notification of such defects.

H. If the Contractor fails to maintain his trench and pavements in a safe and satisfactory condition and fails to remedy these conditions, the Owner may repair these areas at his own expenses with the cost of such repairs being deducted from payments due to the Contractor.

3.5 FINAL PAVEMENT – MUNICIPALITIES

A. Final pavement shall not be placed over trenches in less than 90 days after completion of the backfilling unless otherwise directed in writing by the Engineer.

B. Prior to placing the final surface course pavement, the Contractor shall mill the trench and existing pavement to a depth of two inches. Milling shall extend a minimum of six inches beyond the limits of the excavation when curb to curb pavement is not required.

C. Following milling operations, the road shall be broom swept. The area to be paved and edges of existing pavement shall be tack coated at a rate of 0.1 gallons per square yard.

D. Following the tack coating operation, a two-inch thick compacted layer of top mix pavement shall be placed flush with the existing pavement.

E. All manhole/catch basin covers, grates, valve covers, and other items at the roadway surfaces shall be appropriately raised or lowered to bring them flush with the new pavement.

F. Rubber-tired equipment shall be employed, and extreme care shall be taken to prevent damage to or marking up the existing pavement. If the existing pavement is disturbed, the Contractor shall repair and seal cost any damaged sections without additional payment. Pavements disturbed by the construction, but not in

the excavation area, shall be replaced or repaired at the Contractor's expense.

G. Asphalt pavement shall be placed with a tack coat of RC-70 or RC-T between and along edges of the trench and at valve boxes.

H. Repair any defects in curbing caused by the Contractor's operations.

3.6 INITIAL PAVEMENT – MERCER COUNTY

A. All road openings shall be saw cut prior to any excavation.

B. Initial Pavement shall be placed immediately after trenches have been backfilled and compacted unless otherwise approved by the County.

C. During the interval between the completion of backfill and the time of placement of initial paving, all areas shall be maintained in a safe and satisfactory condition to allow for normal traffic use.

D. The stabilized base course shall be placed in two equal layers. Tack coat shall be applied between all layers and along the edges of the existing pavement. Prior to placing any initial, temporary pavement, the Contractor shall ensure the edges of the cut pavement are vertical and square. The Engineer will inspect the conditions prior to pavement placement, and the Contractor will correct any deficiencies prior to paving operations. This initial pavement shall be maintained in a safe and usable condition by placement of additional stabilized base course material and brought to pre-construction grade at no additional cost until top mix pavement is placed.

E. The base pavement shall be placed and compacted by rubber-wheeled rollers or other compaction equipment of sufficient weight to thoroughly compact the bituminous concrete without damaging the existing pavement. The width of the roller must be less than the width of the trench. The new pavement shall be rolled smooth and flush with the existing pavement.

F. Hose clean all road surfaces adjacent to the trench area to be paved. No paving is to be placed until subsurface is dry.

G. Initial pavement shall be maintained in a condition suitable for traffic until replaced or overlaid by top mix pavement. Defects shall be repaired within 3 days of notification of such defects.

H. If the Contractor fails to maintain his trench and pavements in a safe and satisfactory condition and fails to remedy these conditions, the Owner or the County Highway Department may repair these areas at his own expenses with the cost of such repairs being deducted from payments due to the Contractor.

3.7 FINAL PAVEMENT – MERCER COUNTY

A. Top mix pavement shall occur within four months after completion of the backfilling and approval of by County Engineer or County Road Supervisor. Once approved, the Contractor shall place the permanent pavement as soon as possible.

B. Prior to placing the top mix pavement, the Contractor shall mill the trench and existing pavement to a depth of two inches. Milling shall extend a minimum of twelve inches beyond the limits of the excavation when curb to curb pavement is not required.

C. Following milling operations, the road shall be broom swept. The area to be paved and edges of existing

pavement shall be tack coated at a rate of 0.1 gallons per square yard.

D. Following the tack coating operation, a two-inch thick compacted layer of surface course pavement shall be placed flush with the existing pavement.

E. All manhole/catch basin covers, grates, valve covers, and other items at the roadway surfaces shall be appropriately raised or lowered to bring them flush with the new pavement.

F. Rubber-tired equipment shall be employed, and extreme care shall be taken to prevent damage to or marking up the existing pavement. If the existing pavement is disturbed, the Contractor shall repair and seal cost any damaged sections without additional payment. Pavements disturbed by the construction, but not in the excavation area, shall be replaced or repaired at the Contractor's expense.

G. The Contractor shall employ a vibratory roller with a suitable width for all compaction purposes within the County right-of-way. No roller with a width greater than the narrowest trench width will be permitted for use.

H. Asphalt pavement shall be placed with a tack coat of RC-70 or RC-T between and along edges of the trench and at valve boxes.

I. Repair any defects in curbing caused by the Contractor's operations.

3.8 CONCRETE ROADS

A. Where concrete road repair is required, concrete shall be placed to match existing concrete thickness. Steel plates shall be used to protect the concrete during curing time.

B. Prior to placing concrete, the Contractor shall cut back the existing concrete for a minimum of twelve inches beyond the limits of the pipe trench. Existing concrete shall be of suitable quality to abut repair.

C. Drill holes into the face of the existing concrete pavement not more than 1/4 inch in diameter greater than the dowels. Maintain vertical and horizontal alignment during drilling and do not damage existing concrete surrounding the hole. Before installing dowels and joint ties, clean the holes of cement dust, standing water, and materials that interfere with the proper bonding of the epoxy grout.

D. Place concrete in 2 layers with the first layer placed to such a depth that the surface of the layer is at the proper elevation to receive the reinforcement steel. Place the reinforcement steel followed by the next layer of concrete. Remove and replace the lower layer concrete if it has

developed initial set or has been in place more than 30 minutes before being covered with the next layer. Texture the surface using a stiff broom.

E. Steel plates shall be set flush with surrounding pavement and pinned with a minimum of one spike at each corner of the individual steel plate.

F. All manhole/catch basin covers, grates, valve covers, and other items at the roadway surfaces shall be appropriately raised or lowered to bring them flush with the new pavement.

G. Repair any defects in curbing caused by the Contractor's operations.

3.3 PAVEMENT MARKINGS

A. Reline all streets with pavement markings equal in type and location where existing prior to paving. Pavement markings shall be replaced after the placement of the initial pavement and again after the placement of the final pavement.

3.4 STAMPED ASPHALT

A. Repair stamped asphalt to match the pattern, color and texture of the surrounding stamped asphalt during the placement of the final surface course.

END OF SECTION

SECTION 02616
DUCTILE IRON PIPE AND FITTINGS

PART 1 GENERAL

1.1 SCOPE OF WORK

A. Furnish all labor, materials, equipment, and incidentals required, install, disinfect, test and repair ductile iron pipe and fittings as may be directed by the Engineer.

B. Where the word "pipe" is used it shall refer to pipe, fittings, or appurtenances unless otherwise noted.

C. Existing asbestos water main shall be removed and replaced with a ductile iron pipe of equal size. This work shall be paid for under the allowance, at the direction of the Owner.

D. All water main work shall be in accordance with this Section regardless of whether it is work requested by the Owner and paid for under the allowance or results from the Contractor's activities where no additional compensation will be provided by the Owner.

1.2 RELATED WORK

A. Trenching, Backfilling, and Compaction are included in Section 02221.

B. Granular Fill Materials are included in Section 02230.

C. Water Service Connections are included in Section 02663.

1.3 SUBMITTALS

A. If necessary, submit to the Engineer in accordance with Section 01300 (Appendix D) shop drawings and product data for review.

B. Submit a certified affidavit of compliance from the manufacturer stating that the pipe, fittings, gaskets, linings, and exterior coatings for this project have been manufactured and tested in accordance the ASTM and AWWA standards and requirements specified herein.

1.4 REFERENCE STANDARDS

A. American Society for Testing and Materials (ASTM)

1. ASTM A 193- Standard Specification for Alloy-Steel and Stainless-Steel Bolting Materials for High-Temperature Service.

2. ASTM A 194- Standard Specification for Carbon and Alloy Steel Nuts for Bolts for High-Pressure and High-Temperature Service.

3. ASTM C 150- Standard Specification for Portland Cement.

B. American Water Works Association (AWWA)

1. AWWA C104- Cement-Mortar Lining for Ductile-Iron Pipe and Fittings for Water.

2. AWWA C110- Ductile-Iron and Gray-Iron Fittings, 3-in Through 48-in (75mm Through 1200mm), for Water and Other Liquids.

3. AWWA C111- Rubber-Gasket Joints for Ductile-Iron Pressure Pipe and Fittings.

4. AWWA C150- Thickness Design of Ductile-Iron Pipe.

5. AWWA C151- Ductile-Iron Pipe, Centrifugally Cast, for Water or Other Liquids.

6. AWWA C153 - Ductile-Iron Compact Fittings, 3 in. (76 mm) Through 64-in (1,600 mm), for Water and Other Liquids.

7. AWWA C600 - Installation of Ductile-Iron Water Mains and Their Appurtenances.

8. AWWA C651 - Disinfecting Water Mains

C. Where reference is made to one of the above standards, the revision in effect at the time of bid opening shall apply.

1.5 QUALITY ASSURANCE

A. All ductile-iron pipe and fittings shall be from a single manufacturer. Each length of ductile- iron pipe supplied for the project shall be hydrostatically tested at the point of manufacture to 500 psi for a duration of 10 seconds per AWWA C151. Testing may be performed prior to machining bell and spigot. Failure of ductile-iron pipe shall be defined as any rupture of the pipe wall.

B. All ductile-iron pipe and fittings to be installed under this project shall be inspected and tested at the foundry as required by the standard specifications to which the material is manufactured.

C. Inspection of the pipe and fittings will be made by the Engineer or representative of the Owner after delivery. The pipe shall be subject to rejection at any time on account of failure to meet any of the requirements specified herein, even though pipes may have been accepted as satisfactory at the place of manufacture. Pipe rejected after delivery shall be marked for identification and immediately removed from the job site.

D. All pipe and fittings shall be permanently marked with the following information:

1. Manufacturer, date.
2. Size, type, class, or wall thickness.
3. Standard produced to (ASTM, AWWA, etc.).
4. Interior coating type.

1.6 DELIVERY, STORAGE, AND HANDLING

A. Care shall be taken in loading, transporting, and unloading to prevent injury to the pipe. Under no circumstances shall the pipe be dropped or skidded against each other. Slings, hooks, or pipe tongs shall be used in pipe handling.

B. Materials, as stored, shall be kept safe from damage. The interior of all pipe, fittings, and other appurtenances shall be kept free from dirt or foreign matter at all times.

C. Pipe shall not be stacked higher than the limits recommended by its manufacturer. The bottom tier shall be kept off the ground on timbers, rails, or concrete. Stacking shall conform to the manufacturer's recommendations.

D. Gaskets for mechanical and push-on joints to be stored shall be placed in a cool location out of direct sunlight. Gaskets shall not come in contact with petroleum products. Gaskets shall be used on a first-in, first-out basis.

PART 2 PRODUCTS

2.1 PIPING

A. Ductile iron pipe shall conform to AWWA C151. Pipe shall be supplied in standard lengths as much as possible.

B. Thickness design shall be per AWWA C150, except provide minimum Class 350 for piping 24 in and smaller, and provide minimum Class 250 for piping larger than 24 in.

C. Pipe thickness classes for sixteen inch (16 ") diameter and smaller pipe shall be Class 52.

D. Ductile iron pipe shall be by U.S. Pipe and Foundry Company, Inc.; American Cast Iron Pipe Company; all pipe divisions of McWane, Inc.; or equal.

2.2 JOINTS

A. Mechanical Joints with Retainer glands shall be used as Ductile Iron Fittings underground.

B. Joints shall be mechanical restraining type. Joints shall be Megalug retaining glands, as manufactured by EBAA Iron, Texas; or equal.

C. Sleeve type couplings shall be as specified in Section 02640.

2.3 FITTINGS

A. Pipe fittings shall be ductile iron with a pressure rating of 350 psi for 24-in and smaller piping and 250 psi for 24-in and larger piping. Fittings shall meet the requirements of AWWA C110 or AWWA C153 as applicable. Fittings shall have the same pressure rating, as a minimum, of the connecting pipe.

2.4 INTERIOR LINING

A. Ductile iron pipe and fittings shall have a double thickness cement mortar lining in accordance with AWWA C104 and liner shall be SNF/ANSI 61 certified.

2.5 EXTERIOR COATING

A. Buried pipe and fittings shall be provided with a double-thickness bituminous coating in accordance with AWWA C151 and C110 respectively.

2.6 REPAIR SLEEVES

A. Repair sleeves for repairing potable water mains shall be Smith-Blair Style 261 for water mains up to and including 10 inches in diameter, Smith-Blair Style 263 for water mains greater than 10 inches in diameter, or equal. Clamps for water mains up to and including 10- inches in diameter shall be single band and clamps for water mains greater than 10 inches in diameter shall be multi-band. All clamps shall be type 304 stainless steel, with type 304 stainless steel bolts and nuts. Clamp width shall be as required to properly and fully seal the leak area.

B. Mechanical Joint solid sleeves shall be as manufactured by U.S. Pipe, Clow, or equal. Solid sleeves shall be installed with ductile iron retainer glands and shall be installed in accordance with manufacturers recommendations. Solid sleeves shall be installed where shown on the drawings and where necessary to prevent movement of cut out lengthen that are to be rejoined.

C. Flexible couplings shall be Hymax Couplings as manufactured by Krausz, or equal. Couplings shall be used only where existing pipe diameters make the use of mechanical joint solid sleeves inappropriate. Couplings shall be installed in accordance with the recommendations of the manufacturer. All flexible couplings are to be adequately harnessed to withstand the test pressures in the lines unless other means are provided to take the thrust. Where new ductile iron mains are to be joined to existing pit cast pipe, transitional couplings suitable for the actual field-measured pipe diameters shall be provided.

D. Coupling devices for connecting existing water mains to new mains shall be Smith-Blair Style 411 or style 413 should a transition coupling be required. All couplings shall be furnished with a fusion bonded epoxy coating meeting the requirements of AWWA C213 and AWWA C550.

PART 3 EXECUTION

3.1 GENERAL

A. Care shall be taken in loading, transporting and unloading to prevent injury to the pipe, lining or coatings. Pipe or fittings shall not be dropped. All pipe or fittings shall be examined before laying, and no piece shall be installed which is found to be defective. Damage to the pipe linings or coatings shall be repaired per manufacturer’s recommendations. Handling and laying of pipe and fittings shall be in accordance with the manufacturer's instruction and as specified herein.

B. If any defective pipe is discovered after it has been laid, it shall be removed and replaced with a sound pipe in a satisfactory manner. All pipe and fittings shall be thoroughly cleaned before laying, shall be kept clean until they are used in the work, and when installed or laid, shall conform to the lines

and grades required.

3.2 INSTALLING DUCTILE IRON PIPE ANDFITTINGS

A. Ductile iron pipe and fittings shall be installed in accordance with requirements of AWWA C600, except as otherwise specified herein. A firm, even bearing throughout the length of the pipe shall be provided by digging bell holes at each joint and by tamping backfill materials at the side of the pipe to the springline. Blocking will not be permitted.

B. All pipe and fittings shall be sound and clean before laying. When laying is not in progress, including lunchtime, the open ends of the pipe shall be closed by watertight plugs or other approved means. Sufficient backfill shall be placed to prevent flotation. Good alignment shall be preserved in laying. The deflection at joints shall not exceed 75 percent of allowable deflection recommended by the manufacturer. If any defective pipe or fitting is discovered after it has been laid, it shall be removed and replaced with a sound pipe in a satisfactory manner at the Contractor's own expense.

C. All ductile iron pipe laid underground shall have a minimum of 4-ft of cover.

D. Fittings, in addition to those shown on the Drawings, shall be provided, where required, in crossing utilities that may be encountered upon opening the trench. Solid sleeve closures shall be installed at locations approved by the Engineer.

E. The pipe interior shall be maintained dry and brush clean throughout the construction period.

F. When cutting pipe is required, the cutting shall be done by machine, leaving a smooth cut at right angles to the axis of the pipe. Cut ends of pipe to be joined with a bell shall be beveled to conform to the manufactured spigot end. Cement lining shall be undamaged. Field cut ends shall be sealed with approved epoxy in accordance with manufacturer's instructions. Cutting of restrained joint pipe will not be allowed, unless approved at specific joints in conjunction with the use of mechanical joint retaining brands or field adaptable restrained joints.

G. Concrete thrust blocks shall be installed at all fittings and other locations as directed by the Engineer. The minimum bearing area shall be as shown on the Drawings. Joints shall be protected by felt roofing paper prior to placing concrete. Concrete shall be placed against the undisturbed material, and shall not cover joints, bolts or nuts, or interfere with the removal of any joint. Wooden side forms or sandbags shall be provided for thrust blocks.

H. Jointing Ductile-Iron Pipe

1. Mechanical joints shall be assembled in strict accordance with the manufacturer's instructions and AWWA C600. Pipe shall be laid with bell ends looking ahead. To assemble the joints in the field, thoroughly clean and lubricate the joint surfaces and rubber gasket. Bolts shall be tightened to the specified torque. Under no condition shall extension wrenches or pipe over the handle of ordinary ratchet wrench be used to secure greater leverage.
2. Bolts in mechanical or restrained joints shall be tightened alternately and evenly.
3. Restrained joints shall be installed according to the pipe manufacturer's instructions.
4. Transition couplings shall be used where new ductile iron mains are to be joined to existing pit cast pipe and be Hymax Coupling, as manufactured by Krausz, or equal. Couplings shall be installed in

accordance with the recommendation of the manufacturer. All transition couplings are to be adequately harnessed to withstand the test pressures in the lines unless other means are provided to take the thrust.

3.3 TESTING

A. After installation, the pipe shall be tested for compliance as specified herein. Furnish all necessary equipment and labor for the pressure tests and leakage tests on the pipelines. The Engineer shall approve the procedures and method for carrying out the pressure and leakage tests.

B. Submit detailed test procedures and method for Engineer's review. In general, testing shall be conducted in accordance with Section 4 of AWWA C600.

C. Pressure pipelines shall be subjected to a hydrostatic pressure 50 percent above the normal operating pressure for the line being tested. This test pressure shall be maintained for a minimum of 2 hours. The leakage rate shall not exceed those indicated in AWWA C600. Provide suitably restrained bulkheads as required to complete the hydrostatic testing specified.

D. All valves and valve boxes shall be properly located, installed, and operable prior to testing. Bulkheads shall be provided with a sufficient number of outlets for filling and draining the line and for venting air.

E. Duration of pressure test shall not be less than 2 hours. The leakage test shall be a separate test following the pressure test and shall not be less than 2 hours in duration. All leaks evident at the surface shall be repaired, and leakage eliminated regardless of the total leakage as shown by the test. Lines that fail to meet test criteria shall be repaired and retested as necessary until test requirements are met. Defective materials, pipes, valves, and accessories shall be removed and replaced.

3.4 CLEANING

A. At the conclusion of the work, thoroughly clean the entire pipe by flushing with water or other means to remove all dirt, stones, pieces of wood, or other material that may have entered during the construction period. All debris shall be removed from the pipeline. The lowest segment outlet shall be flushed last to assure debris removal.

3.5 DISINFECTION

A. Ductile iron pipe used for potable water service shall be disinfected after cleaning. Provide all necessary equipment and labor for the disinfection.

B. Disinfection shall be in accordance with AWWA C651 standard.

C. Discharge of chlorinated water shall comply with all Federal, State, and local standards. Provide sodium bisulfite for dechlorination prior to discharge. Under no circumstances shall chlorinated water be discharged to the combined sewer system without dechlorinating to a maximum 1-mg/l of residual chlorine and the express permission of the Engineer.

D. Heavily chlorinated water must be disposed of in a manner that conforms to all local, State and Federal regulations. Disposal may be to the sanitary sewer system or storm sewer system. The proposed disposal site shall be approved by the Engineer.

1. If the Contractor elects to direct the heavily chlorinated water to the sanitary sewer system, the Contractor shall contact the local sewer department to ascertain any requirements for discharge. Any fees associated with the discharge to the sanitary sewer system shall be included in the unit price.

2. If the Contractor elects to direct the heavily chlorinated water to a storm sewer system, the chlorine residual of water being disposed of shall be neutralized by treating with one of the reducing agents listed in Table 1. The amount of reducing agent applied shall be sufficient to the lower chlorine residual of the water disposed to 0.0 mg/l. If the Contractor elects to utilize a chemical for dechlorination, the water shall be aerated prior to discharge to the storm sewer system.

Table 1. Pounds of Chemical Required to Neutralize Various Residual Chlorine Concentrations in 100,000 Gallons of Water

Residual Chlorine Concentration (mg/l)	Sulfur Dioxide (SO_2)	Sodium Bisulfite ($NaHSO_3$)	Sodium Sulfite (Na_2SO_3)	Sodium Thiosulfate ($Na_2S_2O_3.5H_20$)
1	0.8	1.2	1.4	1.2
2	1.7	2.5	2.9	2.4
10	8.3	12.5	14.6	12.0
50	41.7	62.6	73.0	60.0

3. The Contractor shall engage a State Certified potable water testing lab to perform all bacteriological testing; and shall pay all costs of the testing. The laboratory must be acceptable to the Owner.

END OF SECTION

SECTION 02640
VALVES AND APPURTENCANCES

PART 1 GENERAL

1.1 SCOPE OF WORK

A. The Contractor shall furnish all labor, materials, equipment and incidentals required to connect new replacement gate valve to new main/lateral pipe, including all required fittings, complete as shown on the Drawings and as specified herein.

1.2 RELATED WORK

A. Trenching, Backfilling and Compaction is included in Section 02221.

B. Ductile Iron Pipe and Fittings are included in Section 02616.

1.3 SUBMITTALS

A. Submit to the Engineer, in accordance with Section 01300, the name of the manufacturers and model number of all materials to be furnished.

PART 2 PRODUCTS

2.1 GENERAL

A. All buried valves shall open right - clockwise.

B. The use of a manufacturer's name and/or model or catalog number is for the purpose of establishing the standard of quality and general configuration desired.

C. Valves of the same type shall be identical and from one manufacturer. Size of Valves will be verified by Contractor.

D. Valves shall have the name of the maker, nominal size, flow directional arrows, working pressure for which they are designed and standard to which they are manufactured cast in raised letters on some appropriate part of the body.

E. Unless otherwise noted, valves shall have a minimum working pressure of 250 psi or be of the same working pressure as the pipe they connect to, whichever is higher, and suitable for the pressures noted where they are installed.

F. Valves shall be of the same nominal diameter as the pipe or fittings they are connected to. Except as otherwise noted, joints shall be mechanical joints, with Megalux retaining glands or equal.

G. Valves shall be especially constructed for buried service.

2.2 GATE VALVES

A. For new construction, all valves shall be U.S. Pipe Resilient Wedge Gate Valve for Water Systems; 250 psi Operating Pressure; 500 psi Test Pressure; 2-inch square operating nut, mechanical joint ends non-rising stem and shall open right (clockwise). Valves shall conform to or exceed the requirements of AWWA C500 and C509. The size range is 3 inches – 12 inches inclusive.

B. Valves 16-inch and larger shall be U.S. Pipe Resilient Wedg3e Pattern, side wedge type, have a 2-inch square operating nut, O-ring seals, mechanical joint ends, a non-rising stem, and shall open- right (clockwise). The working pressure shall be 150 psi with a hydrostatically tested pressure of 300 psi. (ANSI/AWWA C515).

2.3 REPAIR CLAMPS AND COUPLINGS

A. Repair Clamp Couplings shall be Smith-Blair Style 226 or Dresser Style 360 or equal

1. Band: Stainless Steel.
2. Lugs: High Strength Ductile Iron ASTM A536.
3. Gasket: Grade 30 specially compounded rubber of all new materials with ingredients to produce superior storage characteristics, performance and resistance to set after installation. Temperature range -40^{o} F to +150^{o} F.

2.4 VALVE BOXES

A. Top sections shall be Bingham & Taylor catalog Short Top Section # 55-S, 16 inches long double flanged. or catalog Long Top Section # 56-S, 26 inches long double flanged, and shall have the standard Trenton Water Works additional support flanges 6 inches from the top of the top section and shall have lids marked with "TWW WATER". Shaft diameter shall be 5- 1/4".

B. Bottom sections shall be (Bingham & Taylor) catalog # 64 slid bottom or equal and shall be 36 inches long.

C. Steel Coupling Devices shall be Smith-Blair style 441 or Dresser Style 38 or Powerseal style 3501 or equal.

1. Sleeve: Ductile iron ASTM A-536. Ends shall have smooth inside taper for uniform gasket seating.

2. Gaskets: Grade 30-standard-specially compounded rubber with ingredients to produce superior storage characteristics, performance and resistance to set after installation. Temperature range -40^{o} F to +150^{o} F.

3. Follower Flanges: Ductile Iron ASTM A-536. Designed for high strength/weight ratio. Thickness determined by coupling size.

4. Bolts and Nuts: High strength low alloy steel with heavy, semi-finished hexagon nuts to AWWA C111(ANSI-A21.11) standards.

5. Finish: Blue shop coat enamel.

D. Operating nut shall be 2-in square.

E. The upper section of each box shall have a top flange of enough bearing area to prevent settling. The bottom of the lower section shall enclose the stuffing box and operating nut of the valve and shall be oval.

F. An approved operating key or wrench shall be furnished. Where possible, all valves shall be able to be opened by the same key or wrench.

G. All fasteners shall be stainless steel.

2.5 LINE STOPS

A. Line Stop equipment shall be folding valve type as manufactured by TDW Services, Inc. or equal.

B. Line stop fittings shall be manufactured in two sections. The bottom and top sections shall be of the full encirclement type and conform to the measured pipe outside diameter of the water main to be stopped. Body run sections (top and bottom) shall be as a minimum, ASTM A-283 steel.

C. Bolts and nuts shall be ¾. -inch Type 304 stainless steel per AWWA C111.

D. Flanges used for line plugging shall be ASTM A-105 and shall comply with ASME B.16.5.

E. Completion plugs shall be rated for 150 psi.

F. Blind Flanges shall be ASTM- A-181 or ASTM A-I 05 grade steel.

PART 3 EXECUTION

3.1 INSPECTION AND PREPARATION

A. During installation of all valves and appurtenances, verify that all items are clean, free of defects in material and workmanship and function properly.

B. All valves shall be closed and kept closed until otherwise directed by the Engineer.

3.2 INSTALLATION OF BURIED VALVES AND VALVE BOXES

A. Buried valves shall be cleaned and manually operated before installation. Buried valves and valve boxes shall be set with the stem vertically aligned in the center of the valve box. Valves shall be set on a firm foundation and supported by tamping pipe bedding material under the sides of the valve. The valve box shall be supported during backfilling and maintained in vertical alignment with the top flush with finish grade. The valve box shall be set so as not to transmit traffic loads to the valve.

B. Before backfilling, all exposed portion of any bolts shall be coated with two coats of bituminous paint.

3.3 INSTALLATION OF LINE STOPS

A. Line stops shall be installed by individuals with ISO-9002 certification and no less than 5 years' experience supplying line stop plugging services. Contractor shall verify pipe outside diameter prior to ordering fittings, as necessary. Mechanical bolt-on fittings shall be encased in concrete to provide support for the weight of the line stop plugging equipment and to act as a thrust block. Contractor shall pressure test line stop fittings prior to concrete encasement and hot tapping to verify the quality of the gasket seal.

3.4 FIELDTESTS AND ADJUSTMENTS

A. Conduct a functional field test of each valve, including actuators and valve control equipment, in presence of Engineer to demonstrate that each part and all components together function correctly. All testing equipment required shall be furnished by the Contractor.

END OF SECTION

SECTION 02663
WATER SERVICES AND FLUSHER ASSEMBLIES

PART 1 GENERAL

1.1 SCOPE OF WORK

A. Typical Water Service Connection and Flusher Assembly Details are included in Appendix A of these Specifications.

B. Furnish all labor, materials, equipment, tools, and incidentals required to install water service connections and flusher assemblies as directed by the Engineer. Furnish all necessary labor and equipment to install new rolled copper tubing, saddles on water mains as required, corporation stops, curb stops, meter pits as required, adapters and fittings of the necessary size required, and restore the street, sidewalk, landscaped areas and any other areas disturbed by construction to their original condition.

C. Contractor shall establish the location and extent of all existing utilities before the commencement of excavation by calling 811 Dig Safe NJ and obtaining a dig ticket.

D. Trenton Water Works' distribution system have typical normal operating pressures ranging from 35 psi to 120 psi. The Contractor is responsible for verifying operating pressure at all locations prior to performing any work. Unless otherwise approved or directed by the Engineer, all work shall be performed with water mains live and in service. Water mains shall not be shut down to facilitate service line or flusher assembly installation unless otherwise approved by the Engineer.

E. New corporation stops shall be installed if the existing corporation stop is 5/8" diameter or less, brass tapering ferrule or as directed by the Engineer. The Contractor shall extract and remove existing corporation stops and install the new corporation stop matching diameter of new service, in the same penetration unless otherwise approved or directed by the Engineer. If existing corporation stop location cannot be reused, Contractor shall notify the Engineer and install a new tap a minimum of 1 ft from the existing tap and 18 inches away from a water main joint. The existing corporation shall shutoff, capped/plugged or destructed in other approved manner and abandoned. Relocation, capping/destructing, and abandonment shall be at no additional cost to the Owner. Contractor shall keep a record of the locations of all corporation stops installed. A copy of this record shall be given to the Engineer at the completion of the work. Rolled copper tubing, curb stops, and necessary adapters and fittings shall be used to make connections between new corporation stops and new and existing service piping.

F. Unless otherwise directed, the new curb stops shall be located 1.5-feet back of the curb line. Contractor shall be responsible for the removal of existing curb stops and/or installation of curb stops in the locations directed by the Engineer.

G. Contractor shall maintain a supply of anticipated specialty fittings, including but not limited to tapping saddles, repair clamps, repair sleeves corporation stops, curb stops, curb boxes, etc., such that the work proceeds without impacting the execution of the work and causing a delay in connecting the service.

1.2 RELATED WORK

A. Special Provisions are included in Section 01170.

B. Project Record Documents are included in Section 01720.

C. Trenching, Backfilling, and Compaction are included in Section 02221.

D. Granular Fill Material is included in Section 02230.

E. Piping - General Requirements is included in Section 15050.

1.3 SUBMITTALS

A. If necessary, submit in accordance with Section 01300 in Appendix D.

1.4 REFERENCE STANDARDS

A. ASTM International

1. ASTM B88 - Standard Specification for Seamless Copper Water Tube.

B. American Water Works Association (AWWA)

1. AWWA C800 - Underground Service Line Valves and Fittings.

2. AWWA C810 - Replacement and Flushing of Lead Service Lines

C. National Sanitation Foundation (NSF)

1. NSF 61 - Drinking Water System Components Health Effects.

D. National Standard Plumbing Code

E. New Jersey Plumbing Subcode (NJAC 5:23-3.16),

F. Where reference is made to one of the above standards, the revision in effect at the time of bid opening shall apply.

1.5 DELIVERY, STORAGE AND HANDLING

A. All materials shall be inspected for size, quality, and quantity against approved shop drawings upon delivery.

B. All equipment shipped that is exposed, such as on a flatbed truck, shall be protected during transit. The equipment shall be protected from moisture, road salt, dirt, stones or other materials thrown up from other vehicles. Electrical components shall be protected as above, but with special attention to moisture. The method of shipment protection shall be defined in the submittals.

C. All materials shall be stored in a covered dry location off the ground. When required to protect the materials they shall be stored in a temperature-controlled location.

1.6 QUALITY ASSURANCE

A. All products and materials provided for potable water service application shall be certified “lead-free,”

by an ANSI certified, third-party independent organization. The term “lead- free” shall refer to the wetted surface of the pipe, fittings, and fixtures in potable water systems that have a weighted average lead content less than or equal to 0.25 percent per the Safe Drinking Water Act (Sec. 1417) amended 1-4-2011 and other equivalent state regulations.

B. Inspection by the Engineer's representative or failure to inspect shall not relieve the Contractor of responsibility to provide materials and perform the work in accordance with the documents.

C. The piping manufacturer shall furnish an affidavit of compliance certifying that all materials used and work performed complies with the specified requirements. Provide copies of the mill test confirming the type of material used in the various components.

D. All the types of valves and appurtenances shall be the product of well-established firms who are fully experienced, reputable and qualified in the manufacture of the equipment to be furnished. The equipment shall be designed, constructed and installed in accordance with the best practices and methods and shall comply with this Section as applicable.

E. The Owner and Engineer reserve the right to sample and test any materials after delivery and to reject all components represented by a sample that fails to comply with the specified requirements.

1.7 WARRANTY:

A. The Contractor shall warranty the WORK against defects for two (2) years from the date of Substantial Completion.

PART 2 PRODUCTS

2.1 COPPER SERVICE PIPE

A. Service pipe shall be soft, annealed seamless rolled copper tubing conforming to ASTM B88, Type K with a maximum working pressure of 200 psi. The name and trademark of the manufacturer shall be stamped along the pipe. Copper tubing shall be a minimum of 3/4-inch or shall match the existing service connection size if larger than ¾-inch.

2.2 FITTINGS

A. Line fittings, as required on the new service line and if approved by Engineer, shall be standard three-part unions conforming to AWWA C800. For full-service line replacements from the water main into the building basement, fittings shall be used only at the corporation and curb stop.

B. Type CF-1, cast bronze, threaded adaptors, 150 lbs., screwed, ASTM B62, ANSI/ASME B16.15.

C. Type CF-6, 125 lbs., flared or compression type copper unions, ASME B16.26.

2.3 JOINING OF PIPE

A. Pipe shall only be joined if approved by the Engineer.

B. Compression

1. Rolled copper tubing shall be joined by bronze bodied compression fittings with a synthetic rubber

gasket that holds stainless steel gripper band, such as Mueller 110 Compression Connections; or equal.

2.4 VALVES AND APPURTENANCES

A. Valves and appurtenances shall meet current Trenton Water Works standards.

B. All valves for service lines shall open left – counterclockwise. Valves of the same type shall be identical and from one manufacturer.

C. Valves shall have the name of the maker, nominal size, flow directional arrows, working pressure for which they are designed and standard to which they are manufactured cast in raised letters on some appropriate part of the body.

D. Unless otherwise noted, valves shall have a minimum working pressure of 175 psi and suitable for the pressures noted where they are installed.

E. Valves shall be of the same nominal diameter as the pipe or fittings they are connected to. Except as otherwise noted, joints shall be compression joints for copper tubing.

F. Valves shall be specially constructed for buried service.

2.5 CORPORATION STOP ASSEMBLIES

A. Corporation stops shall be lead-free meeting all NSF lead-free requirements, shall be compliant with ASTM B62 and AWWA C800. Corporation stops for service connections shall not be less than 3/4-inch in diameter. Corporation stops shall be the same size as the service unless otherwise directed by the Engineer. Corporation stops of the required size shall be installed where shown in the appendices, specified or required. Corporation stops shall be rated at 100 psi working pressure.

1. Corporation Stops for ¾ or 1-inch services shall be Mueller Catalog #H15008, shall have an inlet with Mueller CC threads and outlet with a Conductive Compression Connection for CTS O.D. tubing or equals.

2. Corporation Stops for 1-1/2-inch and 2-inch services shall be Mueller Catalog #H15013, shall have an inlet with Mueller CC threads and outlet with a compression connection for CTS OD tubing connection suitable for a “K” copper service tubing, or equals.

2.6 CURB STOP ASSEMBLIES

A. Curb stops shall be lead-free meeting all NSF lead-free requirements, shall be compliant with AWWA C800 and ASTM B62 and designed for a hydrostatic test pressure not less than 175 psi.

1. Curb stops for 3/4-inch services shall be Mueller Mark II Oriseal Compression Connection Catalog #H15172 or equal, 3/4-inch size and shall have an inlet with Mueller compression for CTS O.D CC tubing and outlet with Female Iron Pipe (F.I.P.) thread or Mueller Mark II Oriseal Catalog # H10283 (or equal) with inlet/outlet with Female Iron Pipe (F.I.P.). Curb stops shall have a quarter turn check to stop the valve from turning 360 degrees and shall not have a drain.

2. Curb stops for 1-1/2-inch or 2-inch services shall be Mueller Mark II Oriseal Compression Connection Catalog #H15172 or equal , 1-1/2-inch or 2-inch sizes and shall have an inlet with Mueller compression for CTS O.D CC tubing and outlet with Female Iron Pipe (F.I.P.) thread or Mueller Mark II Oriseal Catalog # H10283 or equal with inlet/outlet with Female Iron Pipe (F.I.P.)

thread. Curb stops shall have a quarter turn check to stop the valve from turning 360 degrees and shall not have a drain.

2.7 CURB BOXES

A. Curb boxes shall be installed for all new curb stops. Curb boxes shall be compatible with approved curb stop.

B. Curb boxes for ¾ or 1-inch services shall be Mueller Cast Iron Improved Extension Type- Arch Pattern Catalog #H10385 or equal, with pentagonal plug, lid shall be inscribed with "WATER." Box extension shall be 50.5-inches to 60-inches fully extended or shall be sized to fit actual service depth. Foot pieces for curb boxes shall be Mueller Catalog # H10396 or #H10397 or equals.

1. Curb stop stationary rod for # H10385 curb boxes shall be Mueller 39" Catalog #84247 or equal.

C. Curb boxes for 1-1/2-inch or 2-inch services shall be Mueller Cast Iron Improved Extension Type- Arch Pattern Catalog #H10336 or equal, with pentagonal plug, lid shall be inscribed with "WATER." Box extension shall be 50.5-inches to 60-inches fully extended or shall be sized to fit actual service depth. Foot pieces for curb boxes shall be Mueller Catalog # H10400 or equal.

1. One Curb box key of appropriate size shall be provided for every 100 1-1/2-inch or 2- inch services installed.

2.8 METER BALL VALVE

A. Ball valves of the necessary size required shall be furnished and installed by Contractor within building interior upstream of the meter. All valves and appurtenances shall have the name of the maker, flow directional arrows and the working pressure for which they are designed cast in raised letters upon some appropriate part of the body.

B. Adapter couplings for connecting new copper tubing shall be standard straight coupling fittings conforming to AWWA C800. When connecting new water service to existing water service, the Contractor may encounter different pipe materials such as steel, brass, etc. Couplings used to connect new to existing services shall electrically isolate the two materials and be comprised of corrosion resistant material. Contractor shall use caution to ensure that the electric ground of existing buildings is not disrupted or altered.

2.9 TAPPING SADDLES

A. Service saddles shall be provided for all new 1-1/2-inch and 2-inch services.

1. Shall be compatible with approved corporation stops.

2. Service saddles shall be Smith-Blair double strap iron saddle, Model 313 or equal.

B. Tapping Saddles for 1-inch services shall only be used if approved or directed by the Engineer. Shall be compatible with approved corporation stops.

1. Bodies: See table below.

2. Straps: See table below.

3. Studs: Type 304 – 5/8 inch stainless steel.

4. Nuts: Cold formed semi-finished heavy hex steel A563 electro-galvanized with di- chromate seal ASTM-B633 or Type 304 stainless steel Teflon coated for stainless steel.

5. Washers: Carbon steel ASTM-A108 electro-galvanized with di-chromate seal ASTM- B633 or Type 304 stainless steel for stainless steel.

6. Gaskets: Grade 60 compounded to resist oil, natural gas, acids, alkalis, hydrocarbon fluids, water, and other chemicals.

7. Finish: Fusion bonded nylon to a minimum thickness of 12 mils or optional topcoat enamel.

Water Main Material	**Tapping Method**	**Requirements**
Ductile Iron or Cast Iron	Direct Tap	To be used where pipe wall thickness provides a minimum of four full threads of engagement with the corporation stop inlet threads to the pipe wall. For suspected or confirmed thin wall metallic pipe, utilize a Smith-Blair model 313.
PCCP	Tapping Saddle	To be used at all PCCP locations. Contractor to use ductile iron bodied tapping saddle with steel per ASTM A-36 or Stainless Steel 18-8 Type 304 straps with a Buna-N compounded gasket. The entire saddle, including straps, shall be encased in Portland cement mortar or concrete to provide at least 1" thickness over external steel surfaces. When encountered with Embedded Cylinder Pipe, gland inserts will be fabricated steel instead of castings.
PVC	Tapping Saddle	To be used at all PVC locations. Contractor shall only use outer diameter controlled heavy bronze body saddles. They shall have AWWA taper threads (CC) in ¾" through 2" tapping with a maximum working pressure of 200psi.
Steel	Tapping Saddle	To be used where pipe wall thickness provides a minimum of four full threads of engagement with the corporation stop inlet threads to the pipe wall. For suspected or confirmed thin wall metallic pipe, utilize a Smith-Blair model 313.

PART 3 EXECUTION

3.1 INSTALLATION

A. Lead service line replacement, testing, and flushing shall be in strict accordance with AWWA 810. Water service to the interior plumbing of the building must be shut off before any excavation, or test pits are commenced.

B. Unless otherwise approved or directed by the Engineer, all work shall be performed with water mains live

and in service. Water mains shall not be shut down to facilitate service line replacements unless otherwise approved or directed by the Engineer.

C. All service connections shall be installed as shown in Details in Appendix B, and shall have a minimum of 4 feet of cover unless approved by the Engineer or TWW. Any new service connection that is not installed in the same location as the existing service and is installed in a new location must not be laid in the same trench as other utilities (i.e., gas, electric, sewer).

D. Care shall be exercised when either pulling or placing and laying copper tubing to be sure that the pipe does not have kinks or sharp bends and to assure against it being in contact with sharp stones or ledge which would cause damage to the pipe. At least 6-inches of sand shall be placed adjacent to and above the service line in open cut location.

E. All valves shall be closed and kept closed until otherwise directed by the Engineer.

F. During installation of all valves and appurtenances, verify that all items are clean, free of defects in material and workmanship and function properly.

G. Buried valves shall be cleaned and manually operated to verify that all items are clean, free of defects in material and workmanship and function properly before installation. Buried valves and valve boxes shall be set with the stem vertically aligned in the center of the valve box. Valves shall be set on a firm foundation and supported by tamping pipe bedding material under the sides of the valve. The valve box shall be supported during backfilling and maintained in vertical alignment with the top flush with finish grade.

H. The drilling and tapping machine shall be rigidly fastened to the pipe. The length of travel of the tap should be so established that when the stop is inserted and tightened per manufacturer recommendations so that no more than one to three threads will be exposed on the outside. When a wet tapping machine is used, the corporation stops shall be inserted with the machine while it is still in place. Stops shall be tightened only sufficiently to give water tightness, and care must be constantly exercised not to overtighten them.

I. Water service lines shall be installed with a minimum vertical separation distance of 12 inches at all sewer and stormwater utility crossings. Where possible, water service lines shall be installed above sewer utilities in accordance with the applicable State Plumbing Code.

J. Curb stops will, in most cases, be installed 1.5-feet from the curb line or pavement limit. Install the curb stops and boxes in a workmanlike manner as described herein and as directed by the Engineer and place compacted pea gravel around and below the stop to permit ready draining of the pipe through the waste opening.

1. Curb Boxes shall be set center and plum over curb stops.

2. Set curb box flush with finished grade, except when located in the roadway. If curb box is within a roadway the box shall be set ½-inch below finished grade.

K. Coring, cutting or drilling of the building must be done in accordance with Section 01045 and submittals of this section.

L. When no ball valve is present upstream of meter or when current upstream valve is not functional, Contractor shall install a new ball valve. Valves shall be supported per manufacture recommendation and National Standard Plumbing Code.

3.2 LEAK TESTING AND FLUSHING

A. Test all pipelines for water tightness as specified herein at system pressure. Furnish all labor, testing plugs or caps, pipe connections, gauges and all other equipment required.

B. Testing shall be performed after the line has been constructed in the presence of the Engineer or the Owner's representative, and no backfilling of the access pits or trenches will be permitted until the leakage testing is satisfactorily completed.

C. Water Services: When the service line has been installed prior to backfilling of the access pits or trenches and connecting the Property Owner/Resident service, the ball valve shall be closed, and the corporation and curb stop opened. After all, air is expelled, a visual leakage test will be conducted on all exposed unions and connections. The Property Owner/Resident service shall remain disconnected, and a 10-minute full velocity flush performed or in accordance with the latest recommendation in AWWA C810, with Contractor disposing of all flush water to the sanitary sewer. When the flush is complete, the final connection shall be made to the water meter and final visual leakage test under "system pressure" will commence for 10 minutes and be observed by Engineer. Repair faulty joints or remove defective pipe and fittings and replace as approved by the Engineer. Retest until water service line passes.

D. Flusher Assemblies: When the flusher assembly has been installed prior to backfilling of the access pits or trenches, the ball valve shall be opened to expel all air and a visual leakage test will be conducted on all exposed piping, fittings, etc. A 10-minute full velocity flush performed. When the flush is complete, a final visual leakage test under "system pressure" will commence for 10 minutes and be observed by Engineer. Repair faulty joints or remove defective pipe and fittings and replace as approved by the Engineer. Retest until water service line passes.

E. Test Reports

1. Two copies of all field test reports, signed and dated by Contractor and Engineer

F. Property Owner/Resident flushing instruction shall be left with Property Owner/Resident

END OF SECTION

SECTION 03301
CONCRETE AND REINFORCING STEEL

PART 1 GENERAL

1.01 SCOPE OF WORK

A. Furnish all labor, materials, equipment, and incidentals required and install all concrete work complete as shown on the Drawings and as specified herein.

1.02 SUBMITTALS

A. Submit to the Engineer, in accordance with Section 01300, shop drawings and product data. Submittals shall include at least the following:

1. Concrete mix for each formulation of concrete proposed for use including constituent quantities per cubic yard, water-cementitious ratio, type and manufacturer of cement.

2. Bar schedules and bar bending details in conformity with the recommendations of ACI 315.

3. Technical data on all materials and components.

4. Material Safety Data Sheets (MSDS) for all concrete admixtures and curing agents.

B. Certifications

1. Certify concrete proposed will have a minimum 28-day compressive strength of 3,700 psi.

1.03 REFERENCE STANDARDS

A. American Society for Testing and Materials (ASTM)

1. ASTM A82 - Standard Specification for Steel Wire, Plain, for Concrete Reinforcement.

2. ASTM A185 - Standard Specification for Steel Welded Wire Fabric, Plain for Concrete Reinforcement.

3. ASTM A615 - Standard Specification for Deformed and Plain Billet-Steel Bars for Concrete Reinforcement.

4. ASTM C31 - Standard Practice for Making and Curing Concrete Test Specimens in the Field.

5. ASTM C33 - Standard Specification for Concrete Aggregates.

6. ASTM C94 - Standard Specification for Ready-Mixed Concrete.

7. ASTM C143 - Standard Test Method for Slump of Hydraulic Cement Concrete

8. ASTM C150 - Standard Specification for Portland Cement

9. 9ASTM C173 - Standard Test Method for Air Content of Freshly Mixed Concrete by the Volumetric Method.

10. ASTM C231 - Standard Test Method for Air Content of Freshly Mixed Concrete by the Pressure Method.

11. ASTM C260 - Standard Specification for Air-Entraining Admixtures for Concrete.

12. ASTM C494 - Standard Specification for Chemical Admixtures for Concrete.

B. American Concrete Institute (ACI).

1. ACI 211.1 - Standard Practice for Selecting Proportions for Normal, Heavyweight and Mass Concrete.

2. ACI 301 - Standard Specification for Structural Concrete.

3. ACI 305R - Hot Weather Concreting.

4. ACI 306R - Cold Weather Concreting.

5. ACI 315 - Details and Detailing of Concrete Reinforcement.

6. ACI 318 - Building Code Requirements for Structural Concrete.

C. Concrete Reinforcing Steel Institute (CRSI)

1. MSP - Manual of Standard Practice

D. New Jersey Department of Transportation

1. Standard Specifications for Road and Bridge Construction

E. American Association of State Highway and Transportation Officials (AASHTO)

1. AASHTO M213 - Standard Specification for Preformed Expansion Joint Fillers for Concrete Paving and Structural Construction (Non-extruding and Resilient Bituminous Types)

F. Where reference is made to one of the above standards, the revision in effect at the time of bid opening shall apply.

1.04 QUALITY ASSURANCE

A. If during the progress of the work, it is impossible to secure concrete of the required workability and strength with the materials being furnished, the Engineer may order such changes in proportions or materials, or both, as may be necessary to secure the desired properties. All changes so ordered shall be made at the Contractor's expense.

B. Reinforced concrete shall comply with ACI 318.

C. Ready-Mix-Concrete Manufacturer Qualifications: A firm experienced in manufacturing ready- mixed concrete products, and that complies with ASTM C 94/C 94M requirements for production facilities and equipment.

D. All testing and inspection services required, unless otherwise specified, shall be provided and paid for by the Owner. Testing necessary to establish the concrete mixes shall be performed by and at the expense of the Contractor. Methods of testing shall comply with the latest applicable ASTM standards.

1.05 DELIVERY, STORAGE AND HANDLING

A. Reinforcing steel shall be shipped and stored with bars of the same size and shape fastened bundles with durable tags, marked in a legible manner with waterproof markings showing the same designations as shown on the submitted bar schedules and shop drawings.

B. Reinforcing steel and Welded Steel Wire Fabric shall be free from mill scale, loose rust, dirt, grease, or other foreign matter. Store off the ground and protect from moisture, dirt, oil, or other injurious contaminants.

C. Products shall be stored in conformity with the manufacturer's recommendations.

D. Sand, aggregates, and cement shall be stored or stockpiled in conformity with the recommendations of ACI 301.

1.06 FIELD CONDITIONS

A. Cold-Weather Concrete Placement: Protect concrete work from physical damage or reduced strength that could be caused by frost, freezing, or low temperatures. Comply with ACI 306.1 and the following:

1. When air temperature has fallen to or is expected to fall below 40 deg F (4.4 deg C), uniformly heat water and aggregates before mixing to obtain a concrete mixture temperature of not less than 50 deg F (10 deg C) and not more than 80 deg F (27 deg C) at point of placement.

2. Do not use frozen materials or materials containing ice or snow.

3. Do not use calcium chloride, salt, or other materials containing antifreeze agents or chemical accelerators unless otherwise specified and approved in design mixtures.

B. Hot-Weather Concrete Placement: Comply with ACI 301 (ACI 301M) and as follows when hot- weather conditions exist:

1. Cool ingredients before mixing to maintain concrete temperature below 90 deg F (32 deg C) at time of placement. Chilled mixing water or chopped ice may be used to control temperature, provided water equivalent of ice is calculated in total amount of mixing water. Using liquid nitrogen to cool concrete is Contractor's option.

PART 2 PRODUCTS

2.01 MATERIALS

A. Cement shall be domestic Portland cement conforming to ASTM C150, Type II.

B. Fine aggregate shall be washed inert natural sand conforming to the requirements of ASTM C33.

C. Coarse aggregate shall be well-graded crushed stone or washed gravel conforming to the requirements of ASTM C33, size 57 unless otherwise directed.

D. Water shall be potable, clean, and free from injurious amounts of oils, acids, alkalis, organic matter, or other deleterious substances.

E. Concrete admixtures shall be free of chlorides and alkalis (except for those attributable to water). When it is required to use more than one admixture in a concrete mix, the admixtures shall be from the same

manufacturer. Admixtures shall be compatible with the concrete mix including other admixtures and shall be suitable for use in contact with potable water after 30 days of concrete curing. No admixtures shall be used unless approved by the Engineer in writing.

1. Air-entraining admixture shall comply with ASTM C260. Proportioning and mixing shall be in accordance with manufacturer's recommendations.

2. Water reducing admixture shall comply with ASTM C494, Type A. Proportioning and mixing shall be in accordance with manufacturer's recommendations.

3. Admixtures causing retarded or accelerated setting of concrete shall not be used without written approval from the Engineer. When allowed, the admixtures shall be retarding or accelerating water-reducing admixtures.

F. Reinforcing steel bars shall be deformed, intermediate grade, steel bars conforming to ASTM A615 Grade 40. Rail-steel bars will not be permitted in the work.

G. Welded Steel Wire Fabric: Conforming to ASTM A1064.

H. Tie wires for reinforcing steel shall be 16 gauge or heavier, black annealed wire.

I. Precast concrete block bar supports shall conform to CRSI – Manual of Standard Practice (MSP) for Precast Concrete Bar Supports.

2.02 CONCRETE QUALITY

A. Class B concrete shall be Type II and designed in accordance with the New Jersey Department of Transportation Standard Specifications Table 903.03.06-3 for a minimum allowable compressive strength of 3,700 psi at 28 days, with a minimum cement content of 564 lbs/cy and maximum water to cement ratio of 0.488 (by weight). Slump and air entrainment shall be in accordance with Table 903.03.06-2 per application.

B. Class A concrete shall be Type II and designed for a minimum allowable compressive strength of 4,600 psi at 28 days. Cement content shall be 611 lbs/cy minimum, and maximum water to cement ratio shall be 0.443 (by weight). Slump and air entrainment shall be in accordance with Table 903.03.06-2 per application.

2.03 MIXING CONCRETE

A. Ready-mix concrete shall conform to ASTM C94 and the requirements herein, or as otherwise approved by the Engineer. If ready-mix concrete is to be used, the manufacturer shall furnish a statement to the Engineer for his approval giving the dry portions to be used, with evidence that these will produce concrete of the quality specified.

B. Select proportions of ingredients to meet the design strength and materials limits specified and to produce concrete having proper placability, durability, strength, appearance, and other required properties. Proportion ingredients to produce a homogenous mixture which will readily work into corners and angles of forms and around reinforcement without permitting materials to segregate or allowing excessive free water to collect on the surface.

2.04 MEASURING, BATCHING, MIXING AND TRANSPORTING CONCRETE

A. Measuring, batching, mixing and transporting concrete shall conform to ASTM C94 and the requirements herein, or as otherwise approved in writing by the Engineer.

B. Ready-mixed concrete, whether produced by a concrete supplier or the Contractor shall conform to the requirements above. No hand mixing will be permitted.

C. Admixtures shall be dispensed into the batch in conformity with the recommendations of the manufacturer of the admixtures.

D. Concrete shall be mixed until there is uniform distribution of the materials and shall be discharged completely before the mixer is recharged. The mixer shall be rotated at a speed recommended by the mixer manufacturer and mixing shall be continued for at least 1-1/2 minutes after all the materials are in the mixer. Concrete shall be placed within 1-1/2 hours of the time at which water was first added, otherwise it shall be rejected. Concrete which has been remixed or retempered, or to which an excess amount of water has been added, shall also be rejected.

2.05 FORMS

A. Forms shall be free from roughness and imperfections, substantially watertight and adequately braced and tied to prevent motion when concrete is placed. No wooden spreaders will be allowed in the concrete.

B. Wire ties will not be allowed. Metal ties or anchorages which are necessary within the forms shall be so constructed that the metal work can be removed for a depth of at least 1-in from the surface of the concrete without injury to such surface by spalling or otherwise. Forms shall be thoroughly cleaned before using and shall be treated with oil, or other approved material.

PART 3 EXECUTION

3.01 REINFORCING STEEL

A. Fabricate reinforcing steel accurately to the dimensions shown. Bend bars around a revolving collar having a diameter of not less than that recommended in ACI 318. All bars shall be bent cold.

B. Provide tension lap splices in compliance with ACI 318. Stagger splices in adjacent bars where possible. Provide Class B tension lap splices at all locations unless otherwise indicated.

C. Lap splices in welded wire fabric in accordance with the requirements of ACI 318 but not less than 12-in. Tie the spliced fabrics together with wire ties spaced not more than 24-in on center and lace with wire of the same diameter as the welded wire fabric. Offset splices in adjacent widths to prevent continuous splices.

D. Before being placed in position, reinforcement shall be thoroughly cleaned of loose mill and rust scale, dirt and other coatings, including ice, that reduce or destroy bond. Where there is a delay in depositing concrete after the reinforcement is in place bars shall be reinspected and cleaned when necessary.

E. Reinforcement which is to be exposed for a considerable length of time after being placed shall be given a heavy coat of cement grout.

F. In no case shall any reinforcing steel be covered with concrete until the amount and position of the reinforcements have been checked and permission given to proceed by the Engineer.

3.02 INSPECTION AND COORDINATION

A. The batching, mixing, transporting, placing and curing of concrete shall be subject to the inspection of the Engineer at all times. The Contractor shall advise the Engineer of his/her readiness to proceed at least 24 hours prior to each concrete placement. The Engineer will inspect the preparations for concreting including the preparation of previously placed concrete, the reinforcing steel, and the alignment, cleanliness and tightness of formwork. No placement shall be made without the inspection and acceptance of the Engineer.

3.03 CONCRETE APPEARANCE

A. Concrete mix showing either poor cohesion or poor coating of the coarse aggregate with paste shall be remixed. If this does not correct the condition, the concrete shall be rejected.

B. Concrete for the work shall provide a homogeneous structure which, when hardened, will have the required strength, durability and appearance. Mixtures and workmanship shall be such that concrete surfaces, when exposed, will require no finishing. When concrete surfaces are stripped, the concrete when viewed in good lighting from 10-ft away shall be pleasing in appearance and at 20-ft shall show no visible defects.

3.04 PLACING AND COMPACTING

A. Reinforcement, where required, shall be accurately placed in exact positions shown, shall be secured against displacement with annealed iron wire ties or suitable clips at intersections and shall have a clear space of 2-in between the steel and face of forms unless otherwise indicated. Wire ties passing through the forms for the purpose of holding the steel in proper position will not be allowed. Concrete blocks with wire ties cast therein may be used where approved by the Engineer for the purpose of maintaining the clearance between reinforcement and forms. Reinforcing bars shall be free from rust, scale, dirt, grease, and injurious contaminants.

B. No concrete shall be placed until forms, the condition of subgrade and method of placement have been approved by the Engineer. Before depositing concrete, all debris, foreign matter, dirt, and water shall be removed from the forms. The contact surface between concrete previously placed and new concrete shall be cleaned and brushed with cement paste.

C. Concrete shall not be placed in water or submerged within 24 hours after placing, nor shall running water be permitted to flow over the surface of fresh concrete within 4 days after its placing.

D. Deposit concrete as near its final position as possible to avoid segregation due to rehandling or flowing. Pumping of concrete will be permitted when an approved design mix and aggregate sizes, suitable for pumping, are used. Do not deposit concrete which has partially hardened or has been contaminated by foreign materials. If the section cannot be placed continuously, place construction joints as specified or as approved. Do not drop concrete more than 4-ft.

E. High-frequency mechanical vibrators shall be used to the extent necessary to obtain proper consolidation of the concrete, but not to move or transport concrete in the forms. Care shall be taken to avoid segregation of aggregates by excess vibration. Vibration shall continue until the frequency returns to normal, trapped air ceases to rise and the surface appears liquefied, flattened and glistening. Concrete adjacent to forms and around pipe stubs shall be carefully spaded or rodded.

F. No concrete shall be mixed or placed during freezing weather without explicit permission. When placing concrete when the air temperature is below 40 degrees F, the water, sand, and gravel shall be heated so that the temperature of the concrete will be at least 50 degrees F. This temperature shall be maintained for 72 hours after placing. No concrete shall be placed on the frozen ground.

G. Preformed expansion joint filler shall be placed adjacent to structures as directed.

H. Concrete walkways shall be placed in such quantity that, after being thoroughly consolidated in place, it shall be 5-in in depth. Finishing operations shall be delayed until all bled water and water sheen has left the surface and concrete has started to stiffen. After water sheen has disappeared, edging operations shall be completed. After edging and jointing operations, the surface shall be floated with an aluminum or magnesium float. Immediately following floating, the surface shall be steel troweled. If necessary, tooled joints and edges shall be rerun before and after troweling to maintain uniformity. Finish shall match as near as possible the original finish.

I. The curb face shall be equal to the face of the adjacent undisturbed curb, and the type (i.e., stand up curb or gutter curb) shall be replaced in kind to a condition equal to or better than that which existed previously. Curb that is broken or cracked during construction operations shall be removed and disposed and replaced of by the Contractor at his own expense.

3.05 CURING AND PROTECTION

A. Protect all concrete work against injury from the elements and defacements of any nature during construction operations.

B. All concrete shall be cured in conformity with ACI 301. Concrete that is to be used for the containment of water shall be water cured. Water curing shall be by ponding, by continuous sprinkling or by covering with continuously saturated burlap.

C. Other concrete shall be cured by either water curing, sheet material curing or liquid membrane curing compound except that liquid membrane curing compound shall not be used on any concrete surface where additional concrete is to be placed or where the concrete surface is to be coated or painted.

D. Finished surfaces and slabs shall be protected from the direct rays of the sun to prevent checking and crazing.

E. Concrete placed during cold weather shall be batched, delivered, placed, cured and protected in compliance with the recommendations of ACI 306R. Salt, manure or other chemicals shall not be used for cold weather protection.

F. Concrete placed during hot weather shall be batched, delivered, placed, cured and protected in compliance with the recommendations of ACI 305R. The temperature of the concrete shall be such that it will cause no difficulties from loss of slump, flash set or cold joints. Immediately cover the plastic concrete with sheet material during hot weather.

3.06 CONCRETE ENCASEMENTS AND THRUST BLOCKS

A. Concrete encasements shall be placed as directed by the Engineer. Backfill shall not be placed on the concrete until permitted by the Engineer.

B. The backs of thrust block anchors shall be placed against undisturbed earth. The sides of thrust blocks shall be formed. Minimum bearing area shall be as designated by the Engineer. Felt roofing paper shall be placed to protect pipe joints. Concrete shall not be placed over bolts or nuts, or to prevent the removal of joints.

3.07 FIELD TESTS

A. Sets of three field control cylinder specimens will be taken by the Contractor during the progress of the work as directed by Engineer, in compliance with ASTM C31. The number of sets of concrete test cylinders taken of each class of concrete shall be determined by the Engineer. One cylinder shall be broken

at 7 days and two cylinders shall be broken and their strengths averaged at 28 days. When the average 28 day compressive strength of the cylinders in any set falls below the specified compressive strength or below proportional minimum 7 day strengths (where proper relation between 7 and 28 day strengths have been established by tests); the Engineer may reject the concrete represented by the set of cylinders, may require modification of the concrete and/or require modification of the proportions, water content, or temperature conditions of the design mix to achieve the required strengths.

B. Cooperate in the making of tests by allowing free access to the work for the selection of samples, providing an insulated closed curing box for specimens, affording protection to the specimens against injury or loss through his/her operations and furnishing material and labor required for the purpose of taking concrete cylinder samples. All shipping of specimens will be paid for by the Contractor.

C. Slump tests will be made in the field by the Contractor in conformity with ASTM C143.

D. Tests for air content shall be made in compliance with either the pressure method complying with ASTM C231 or by the volumetric method complying with ASTM C173.

3.08 STRIPPING AND FINISHING CONCRETE

A. Forms shall not be stripped before the concrete has attained a strength of at least 30 percent of the specified design strength unless otherwise approved by the Engineer. This is equivalent to approximately "100 day-degrees" of moist curing.

B. Care shall be exercised to prevent damaging edges or to obliterate the lines of chamfers, rustications or corners when removing the forms or doing any other work adjacent thereto.

C. Clean all exposed concrete surfaces and adjoining work stained by leakage of concrete, to the satisfaction of the Engineer.

D. As soon as forms have been stripped, form ties, if employed, shall be removed, and the recess filled to ensure complete water tightness. Any defects in the surface of the walls shall be chipped out and repaired in a workmanlike manner. Defective concrete where it occurs shall be cut to a minimum depth of 1-in, thoroughly roughened and neat cement brushed in. The hole shall then be filled with mortar in the proportion of 1 part cement and 2-1/2 parts sand with a minimum of water. Mortar for filling form tie recesses shall be mixed to a slightly damp consistency (just short of "balling"), pressed into the recess until dense, and troweled smooth. Mortar in larger patches shall be applied and allowed to assume a partial set following which it shall be struck off flush with the adjoining surface.

E. Patches shall be kept moist for several days to assure proper curing.

F. Concrete to receive damp proofing and concrete not exposed in the finished work shall have off-form finish with fins, and other projections removed and tie cones and defects filled as specified.

G. Sidewalks broken or cracked as a result of the construction operations shall be removed and disposed of by the contractor and replaced at his own cost.

END OF SECTION

SECTION 15050

PIPING - GENERAL REQUIREMENTS

PART 1 GENERAL

1.01 SCOPE OF WORK

A. The existing plumbing systems, including piping and equipment, shall remain in operation until the new water service line is in service. All systems shall be maintained without interruption. The demolition and removal work shall be coordinated with the Owner, Customer and construction schedule for the new water service line.

B. The temporary shutdown of the individual water system for service transfer shall be limited to 8-hours.

1.02 RELATED WORK

A. Water Service Connections are included in Section 02663.

1.03 REFERENCE STANDARDS

A. ASTM International

1. ASTM A307 - Standard Specification for Carbon Steel Bolts and Studs, 60,000 psi Tensile Strength
2. ASTM B42- Seamless Copper Pipe
3. ASTM B88- Seamless Copper Pipe
4. ASTM B32- Solder Metals
5. ASTM B813 – Liquid and Paste Fluxes for Soldering Applications of Copper and Copper Alloy Tube and Fittings

B. American National Standards Institute (ANSI)

1. ANSI A5.8 Specification for Filler Metals for Brazing.
2. ANSI A5.31 Specification for Fluxes for Brazing and Braze Welding.
3. ANSI B2.2 Standard for Brazing Procedure and Performance Qualification.
4. ANSI C3.4 Specification for Torch Brazing.

C. American Welding Society (AWS)

1. AWS B2.1 - Specification for Welding Procedure and Performance Qualifications

D. American Water Works Association (AWWA)

1. AWWA Manual M11 - Steel Pipe - A Guide for Design and Installation

2. AWWA C800 - Underground Service Line Valves and Fittings.

3. AWWA C810 Replacement and Flushing of Lead Service Lines

4. AWWA C901 Polyethylene (PE) Pressure Pipe and Tubing, ¾ in. Through 3 in. for Water Service.

E. American Society of Mechanical Engineers (ASME)

F. Underwriters Laboratories (UL)

G. Factory Mutual (FM)

H. Where reference is made to one of the above standards, the revision in effect at the time of bid opening shall apply.

1.04 QUALITY ASSURANCE

A. All materials shall be new and unused.

B. Install piping to meet the requirements of local codes.

C. Provide manufacturer's certification that materials meet or exceed minimum requirements as specified. Reference to standards such as ASTM and ANSI shall apply to those versions in effect at the time of bid opening.

D. Unless otherwise specified, pressures referred to in all Piping Sections are expressed in pounds per square in gauge above atmospheric pressure, psig and all temperatures are expressed in degrees Fahrenheit (F).

1.05 DELIVERY, STORAGE AND HANDLING

A. During loading, transportation and unloading take care to prevent damage to pipes and coating. Carefully load and unload each pipe under control at all times. Place skids or blocks under each pipe in the shop and securely wedge pipe during transportation to ensure no injury to pipe and lining.

PART 2 PRODUCTS

2.01 MATERIALS

A. Specific piping materials and appurtenances are specified in the respective Piping or System Sections.

B. General installation materials shall be as specified below.

1. Unions shall be brass or bronze unions for joining nonferrous pipe.

PART 3 EXECUTION

3.01 GENERAL

A. All dirt, scale, weld splatter, water, and other foreign matter shall be removed from the inside and outside of all pipe and sub-assemblies prior to installing.

B. All pipe joints and connections to equipment shall be made in such a manner as to produce a minimum of strain at the joint.

C. Install piping in a neat manner with lines straight and parallel or at right angles to walls or column lines and with risers plumb. Run piping to avoid passing through ductwork or directly under electric light outlets and/or interference with other lines. All work shall be accomplished using recognized methods and procedures of pipe fabrication and in accordance with the latest revision of applicable ANSI Standards, ASME Codes and Pipe Fabrication Institute Standards.

1. Use the full length of pipe except where cut lengths are necessary. Do not spring or deform piping to make up joints.

2. Pipe shall be cut square, not upset, undersized or out of round. Ends shall be carefully reamed and cleaned before being installed.

a. Pipe bending shall only be done with mechanical bending equipment only. The minimum radius of a bend for 1-inch copper type K tubing is 4-inches, minimum radius of a bend for 1¼ -inch copper type K tubing is 9-inches. Pipe of different materials or sizes shall follow trade/authoritative reference for all bends.

3. Do not use bushings except where specifically approved by the Engineer. Reducers shall be eccentric to provide for drainage from all liquid-bearing lines and facilitate air removal from water lines.

4. Verify the locations and elevations of any existing piping and manholes before proceeding with work on any system. No claim for extra payment will be considered if the above provision has not been complied with.

5. Where lines of lower service rating tie into services or equipment of higher service rating the isolation valve between the two shall conform to the higher rating.

6. Mitering of pipe to form elbow is not permitted.

7. All piping interiors shall be thoroughly cleaned after installation and kept clean by approved temporary closures on all openings until the system is put in service. Closures should be suitable to withstand the hydrostatic test.

8. End caps on pre-cleaned pipe shall not be removed until immediately before assembly. All open ends shall be capped immediately after completion of installation.

3.02 UNIONS

A. Use unions to allow the dismantling of pipes, valves, and equipment.

1. Unions shall be provided where indicated and in the following locations even if not indicated.
   a. In long runs of piping to permit convenient disassembly for alterations or repairs.

END OF SECTION