

SECTION 02625**GRAVITY SEWER AND DRAIN PIPE****PART 1 GENERAL****1.01 SUMMARY**

- A. This section covers furnish and install polyvinyl chloride (PVC) pipe as specified for Town of Needham sewer and drain pipes. PVC pipe shall not be used for the proposed 36-inch MWRA dewatering drain line.
- B. Furnish and install transition couplings for connections to existing sewer and drain pipe. Also refer to the Town of Needham Reference Specifications included in Appendix I for work related to the Town of Needham sewer or drain utilities.
- C. Furnish and replace all sewer lines crossing the 36-inch drain line or as indicated on the Contract Drawings. Furnish and replace all sewer service lines connecting to a replaced sewer main or as indicated on the Contract Drawings.
 - 1. Replace sewer lines and sewer service lines to extend to the nearest joint, but in no case less than five (5) feet from the centerline of the 36-inch drain line on each side of the crossing, or less than five (5) feet from the wye or tee connection to the sewer main, as applicable.
- D. Furnish and replace existing sewer service lines exposed during open-cut excavations that were not marked or indicated, with PVC pipe. Replace the sewer service line no less than five (5) feet from the wye or tee connection to the sewer main, as applicable.

1.02 RELATED SECTIONS

- A. Section 01300 – Submittals
- B. Section 02200 - Earthwork
- C. Section 02240 – Construction Dewatering and Groundwater Control
- D. Section 02513 – Cleaning and Television Inspection
- E. Section 02612 – Reinforced Concrete Pipe
- A. Section 03302 – Miscellaneous Cast-In-Place Concrete
- F. Section 03450 – Precast Structures

1.03 CODES AND STANDARDS

- A. American Society for Testing and Materials International (ASTM)
 - 1. ASTM D1784 - Standard Classification System and Basis for Specification for Rigid Poly (Vinyl Chloride) (PVC) Compounds and Chlorinated Poly (Vinyl Chloride) (CPVC) Compounds
 - 2. ASTM D3034 - Standard Specification for Type PSM Poly (Vinyl Chloride) (PVC) Sewer Pipe and Fittings
 - 3. ASTM F679 - Standard Specification for Poly (Vinyl Chloride) (PVC) Large-Diameter Plastic Gravity Sewer Pipe and Fittings

1.04 SUBMITALS

- A. Submit the following in accordance with Section 01300:
 - 1. Product Data
 - a. Manufacturer's literature.
 - 2. Shop Drawings
 - a. Complete layout drawings and details for polyvinyl chloride gravity pipe installation.
 - 3. Sewer bypass piping and pumping plan.

1.05 QUALITY ASSURANCE (NOT USED)

1.06 QUALIFICATIONS (NOT USED)

1.07 DELIVERY, STORAGE, AND HANDLING (NOT USED)

1.08 PROJECT/SITE CONDITIONS (NOT USED)

1.09 DEFINITIONS (NOT USED)

1.10 TOLERANCE (NOT USED)

PART 2 PRODUCTS

2.01 MANUFACTURERS

- A. SDR 35 PVC Pipe
 - 1. IPEX, Inc. Pineville, NC;

2. North American Pipe Corporation, Houston, TX;
3. Diamond Plastics Corporation, Grand Island, NE;
4. or equal

2.02 MATERIALS

A. Polyvinyl Chloride Pipe and Fittings

1. PVC gravity sewer, storm drain pipe and pipe for drain and sanitary service connections shall be solid wall and conform to ASTM Standard D1784 and ASTM D3034 or ASTM F679.
2. The pipe and fittings shall be homogeneous throughout and free from visible cracks, holes, foreign inclusion or other injurious defects. The pipe shall be as uniform as commercially practical in color, opacity, density and other physical properties.
3. All pipe and fittings shall be clearly marked on the outside indication name, manufacturer, nominal diameter, ASTM, schedule, and/or pipe or pressure class designation.
4. The normal length of PVC pipe shall be 20-feet and shall be green in color or as approved by the Authority. Straight pipe shall be furnished in lengths according to ASTM D3034.
5. PVC pipe provided for depths between 4-feet and 15-feet shall have an SDR of 35 and a pipe stiffness of 46 psi. Pipe provided for depth over 15 feet shall be ductile iron.
6. PVC pipe shall have bell and spigot push-on joints. The bell shall consist of an integral wall section with a solid cross section elastomeric gasket factory-assembled, securely locked in place to prevent displacement during assembly. Installation of elastomeric gasketed joints and performance of the joint shall conform to ASTM F477, ASTM D3139 or ASTM D3212.
7. All fittings and accessories shall have dimensions as recommended by the manufacturer and have bell and/or spigot configurations compatible with that of the pipe. Fittings shall comply with ASTM D3034 or ASTM F679.
8. PVC wyes shall be furnished in lengths of not more than 3-ft. Saddle wyes are not allowed.
9. Pipe shall pass Impact Resistance Test (210 ft-lbs) in accordance with ASTM D2444. Minimum Pipe Stiffness at 5% deflection shall be not less than 46 psi

(SDR 35) or 115 psi (SDR 26) when tested in accordance with ASTM D2412.

B. Transition Couplings

1. Transition couplings for joining existing concrete, reinforced concrete, vitrified clay or asbestos cement pipe to new PVC pipe shall be made of chemical resistant elastomeric plastic with corrosion resistant stainless steel clamp bands and shall be sized to fit the outside diameters of the pipes being joined.
2. Couplings shall conform to ASTM C425 and shall be as manufactured by Fernco, Mission, Indiana Seal or equal.

PART 3 EXECUTION

3.01 INSTALLATION

A. General

1. Utility locations are approximate and need to be verified in the field by the Contractor. Maintaining utilities in service during excavation and backfill is required at all times. Some utilities may not be shown on the Contract Drawings. Notify all utilities prior to performing any excavation work. The DIG SAFE telephone number is 811.
2. Determine the location or absence of all underground utilities and plan and conduct the work operations to ensure that those utilities will not be damaged.
 1. Assume full responsibility for the protection of all buildings, structures, public and private utilities, services to buildings, utility poles, signs, mail boxes, and all other surface furniture whether on private or public property. Also assume full responsibility for the protection of public and private trees, bushes and other landscaping features.
 2. Any damage resulting from the Contractor's operations shall be repaired at the Contractor's expense.

B. Delivery, Storage, and Handling

1. New pipe, fittings, and other appurtenances shall be delivered to the construction site as close in time to installation as possible.
2. All pipes shall be shipped with lifts separated by work separators such that pipe to pipe contact is prevented during transit and/or storage.
3. Care shall be taken during the loading, trucking, unloading and handling of all pipe, fittings, and other appurtenances so as not to damage the materials or surrounding

area. Pipe, fittings, and other appurtenances shall not be dropped directly from the truck to the ground. The Contractor is responsible for any pipe, fittings, and other appurtenances damaged during delivery, handling or storage. All damaged materials shall be removed from the site immediately.

3. Pipe sections shall not be stored on areas over newly laid pipe or other existing pipelines which might be damaged by the superimposed load. Storage of sections shall be restricted to approved areas.
 4. All pipe, fittings, and other appurtenances shall be stored in a manner that prevents water on the ground and /or animals from entering the material and prevent damage to the material and /or others' property.
 5. All pipe and fittings shall be carefully lowered into the trench piece by piece by means of a boom, straps, chains, or other suitable tools or equipment, and in such a manner as to prevent damage to materials and protective coatings or linings. Under no circumstances shall material be dropped or dumped into trench.
 6. Pipe may not be strung along the line of work unless approved by the Authority. Materials must be stored in a manner such that they do not obstruct driveways, sidewalks, or restrict vehicular and pedestrian traffic circulation.
 7. PVC Pipe is not intended to be continuously stored in direct sunlight. The Contractor shall be responsible for protecting PVC Pipe from damage due to direct sunlight exposure.
4. On request, provide an affidavit from the manufacturer and/or vendor for each and every delivery of an order, stating that the above items and all materials in its construction exactly conform to the Contract Documents and include the applicable ASTM standards.
 5. References: On request, provide references from the manufacturer and/or vendor, which shall list a minimum of three (3) Municipalities/Utilities that were, supplied this product, in the last two (2) years. The listing is to include:
 - a. Name of Municipality/Utility.
 - b. Total amount of product bid on and amount delivered.
 - c. Date the bid was accepted and date the product was delivered.
 - d. Reference person with address and desk top phone number whom the Authority has authorization to contact regarding the product.

C. Removal and Replacement

1. Removing Existing Pipes. Existing pipes shall be removed in accordance with these Specifications.
 - a. Where sewer replacement occurs, service shall be maintained continuously by either bypass pumping or temporary plugging of flow for the duration of construction. Prevent flooding of adjacent, upstream, or downstream buildings or property, or discharge to the ground or watercourses. Assume that flow through existing pipe to be replaced shall be full flow as per open channel flow calculations. A fully operational backup pump and power source must be available at all times during bypass pumping operations. Continuous 24-hour monitoring of bypass pumping operations must be provided, including procedures for immediate response in the event of equipment malfunction or failure.
 - b. Service connections affected by any sewer rehabilitation shall be maintained in service unless specifically exempted by the Authority. Before any service connection is removed from service, the homeowner or user shall be notified at least 48 hours in advance. Service connections shall not be out of service longer than four (4) hours.
 - a. For all pipes, including services, the limits of the trench shall be sawcut or milled full depth through all existing pavements prior to any excavation for pipe placement.

D. PVC Pipe

1. Except as modified herein, installation of the PVC pipe shall be in accordance with ASTM D2321.
2. Each pipe length shall be inspected before being laid to verify that it is not cracked. Pipe shall be laid to conform to the lines and grades required. Each pipe shall be laid to form a joint with the next adjoining pipe and bring the inverts continuously to the indicated grade.
3. Pipe shall be supported by $\frac{3}{4}$ inch crushed stone as specified in Section 02200 – Earthwork.
4. Pipe shall not be driven down to grade. When each pipe has been bedded, backfill material shall be placed and compacted between the pipe and the side of the trench to hold the pipe in indicated alignment.
5. Before a joint is made, pipe shall be checked to assure that the joint with the next adjoining pipe has been maintained and that inverts are matched

and conform to the indicated line and grade.

6. Immediately after the joint is made the jointing area shall be filled with materials placed and compacted so that neither pipe will settle under backfill load.
7. No pipe or fitting shall be permanently supported on saddles, blocking or stones.
8. Branches and fittings shall be laid as required. Open ends of pipe and branches shall be closed with PVC caps secured in place with pre-molded gasket joints.
9. Cuts ends shall be beveled when recommended by the pipe manufacturer.
10. All pipe joints shall be made watertight. There shall be no visible leakage at the joints and there shall be no sand, silt, clay, or soil of any description entering the pipeline at the joints. Where there is evidence of water or soil entering the pipeline repair joints at no additional cost to the Authority.
11. When pipe laying operations are suspended, place a stopper in the open end of the pipe.

E. Pipe Joints

1. Pipe joints shall be made for the different kinds of pipe and types of joint in accordance with the following requirements:
 - a. Compression gasket joints in PVC services shall be installed in accordance with instructions furnished by the manufacturer.
 - b. Flexible couplings, transition couplings, repair couplings, and/or adapters shall be installed as shown and as recommended by the manufacturer. They should also be installed where existing pipe is to be connected to new structures. The new adjoining pipe shall be of a similar outer diameter.

F. Connection of New Pipe to Existing Pipe or Manholes

6. Connection of new sewers and services to existing sewers or manholes shall be made as specified on the Contract Drawings. All connections shall be watertight in accordance with the testing requirements of this Section of the Specifications. Re-build sewer inverts as required to maintain smooth flow and match elevations.

G. Transition Couplings:

1. Couplings which are factory manufactured shall be installed at all connections from existing pipe to proposed pipe unless the existing pipe is the same material as the proposed pipe and the bell and spigot end of the pipes to be connected are compatible and free from defects. All couplings shall be installed in accordance with the manufacturer's recommendations for the types of pipe to be connected.

H. Cleaning Lines

1. Upon completion, all dirt and foreign material shall be removed from pipelines, service connections and appurtenant construction. No excess material shall be left at joints to impede normal flow. Legal disposal of cleaning debris shall be the responsibility of the Contractor.

3.02 TESTING

- A. Television inspection shall be required by the Contractor. Television Inspection followed by a mandrel test as described herein. A NASSCO-certified inspection report shall be submitted to the Authority. Any defects identified by the inspection shall be repaired/remedied by the Contractor at no additional cost to the Authority.
- B. The Contractor shall make all necessary arrangements for securing the water and/or air for test purposes and shall stand the expense of these arrangements and of the water required for leakage tests.
- C. Pipelines shall be tested for deflection by mandrel test after final trench compaction has taken place but not sooner than 30 days after installation as described below:
 1. A 5% maximum deflection test is required for PVC pipeline.
1. The mandrel shall be a rigid device, with odd numbered-legs (9 legs minimum) having an effective length not less than its nominal diameter. The mandrel shall be fabricated of steel with pulling rings at each end. It shall be stamped or engraved on some segment other than a runner indicating the pipe material specification, nominal size, and mandrel outer diameter.

2. The minimum diameters, based on approximately 95% of base inside diameter at any point along the full length, are as follows:

Nominal Size	Minimum Mandrel Diameter
6"	5.61"
8"	7.49"
10"	9.35"
12"	11.23"
15"	14.04"
18"	16.84"
24"	22.46"
30"	28.07"
36"	33.72"

3. A mandrel shall be pulled through the pipe by hand to ensure that maximum allowable deflections have not been exceeded. The mandrel diameter shall be verified and approved by the Authority prior to use. Use of an unapproved mandrel will invalidate the test. If the mandrel fails to pass through the pipe, the pipe will be deemed to be over deflected. Any over deflected pipe shall be uncovered and if not damaged, as determined by the Authority, shall be allowed for reinstallation. Damaged pipe shall not be reinstalled and shall be removed from the work site. Any method or process other than removal to reduce or correct pipe over deflection will not be acceptable.
- D. To the extent possible, all work that can be visually inspected shall be so inspected after the work is completed.

3.03 CCTV INSPECTION

- a. Once the proposed pipeline has been installed and backfilled, the Contractor shall be required to inspect the infrastructure per NASSCO Requirements. Any defects found shall be corrected by the Contractor at its expense. Inspection results and data shall be made available to the Authority in accordance with Section 02513 – Cleaning and Television Inspection within 14 days of inspection.

3.04 RECORD PLAN INFORMATION

- a. Furnish assistance to the Authority in securing ties, depths, distances and/or other reference dimensions for all pipelines, manholes, wye branches, service connections and markers to facilitate the Authority's development of

RECORD PLAN DATA. Any pipeline or appurtenance that is backfilled prior to obtaining the aforementioned information shall be uncovered by the Contractor at its expense.

3.05 FIELD QUALITY CONTROL

A. Tie Cards

1. Complete a tie-card for each sewer service lateral.
2. Tie cards shall show sewer main (size, material, configuration), and service line, along with building/structure frontage.
3. Tie cards shall be typed or neatly printed in block lettering.
4. Tie cards shall indicate date of installation, size and material of service, average depth of service, configuration, size and type of main (in street), and address of service.
5. Tie cards shall note any significant facility/structure within 100 feet of the service lateral (wetland, railroad track, bridge, fence, porch, etc.)
6. Tie cards shall include three (3) swing-ties in foot-inch format and measured to the nearest inch for location. Swing ties shall be to items that are easily visible and above ground. These items shall be labeled as appropriate (i.e. – utility poles shall have utility pole numbers, manhole shall indicate type, ties to porch corners shall be labeled as such). In no case shall swing ties be taken to mailboxes, trees, shrubs, curbs.
7. Tie cards shall be completed on cards provided by the Town of Needham.

**** END OF SECTION ****