SECTION 33 1300

STORMWATER MANAGEMENT

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Furnish and install retaining wall drainage piping, fittings, and accessories.

1.02 REFERENCES

A. AASHTO M294 – Specification for Corrugated Polyethylene Drainage Tubing, 12” Through 48” Diameters.

B. ASTM A48 - Cast iron frames and grates.

C. ASTM A615 - Steel bar reinforcement for pre-cast concrete catch basins.

D. ASTM D1056 – Specification for Flexible Cellular Materials – Sponge or Expanded Rubber.

E. ASTM D3350 - Standard Specifications for polyethylene plastic pipe and fittings.

F. ASTM D2321 - Recommended Practice for Underground Installation of Flexible Thermoplastic Sewer Pipe.

G. ASTM C150 - G-mat specification for pre-cast concrete catch basins and manholes.

H. NYSDOT Standard Specifications (latest edition), Section 706-13 – Perforated Corrugated Polyethylene Underdrain Tubing.

I. NYSDOT Standard Specifications (latest edition), Section 706-14 – Corrugated Polyethylene Storm Drain Pipe.

1.03 SUBMITTALS FOR REVIEW

A. Product Data: Submit manufacturer’s technical product data for all storm sewer pipe materials and fittings.

B. Shop Drawings: Submit shop drawings for all area drains, underground stormwater cistern and dry well, showing all materials, structure sizes, pipe sizes, all rim and invert elevations, and any other pertinent information.

C. Record Drawings: At project closeout, submit as-built drawings of installed storm sewer system.

1.04 REGULATORY REQUIREMENTS

A. Plumbing Code Compliance: Conform to applicable portions of the National Standard Plumbing Code pertaining to selection and installation of storm sewer system's materials and products.

B. The Contractor and all subcontractors must comply with the terms of the SWPPP.

1.05 COORDINATION

A. Coordinate work of this section with any and all other underground utility work.

1.06 QUALITY ASSURANCE

A. Manufacturer’s Qualifications: Firms regularly engaged in manufacture of storm sewer system's products of types, materials and sizes required, whose products have been in satisfactory use in similar service for not less than five years.

B. Installer’s Qualifications: Firm with at least three years of successful installation experience on projects with storm sewer work similar to that required for project.

PART 2 PRODUCTS

2.01 PIPING AND ACCESSORIES

A. The prescribed sizes of pipe are nominal inside diameters. Pipes shall be of the size and lengths indicated on the plans.

B. Underdrain Pipe (4” perforated wall): Double wall, smooth interior, corrugated exterior, High Density Polyethylene Pipe and fittings (HDPE): Shall be high density, corrugated exterior, smooth interior polyethylene pipe in accordance with AASHTO M294 and section 706-14 of the NYSDOT Standard Specifications. Coupling bends shall cover at least one full corrugation on each section of pipe. Where watertight fittings are required, use pipes with molded couplings and “O” ring gaskets.

2.02 GRATES & END CAPS

A. Of the same material and size of the pipe. Drainage outlet shall have a grate to mitigate any unwanted blockage of drain piping. Opposite end of outlet shall have a solid cap to enclose perforated drainpipe.

PART 3 EXECUTION

3.01 EXAMINATION

A. Verify that substrate is ready to receive work and that the excavations, dimensions, and elevations are as indicated on the drawings.

3.02 PREPARATION

A. Hand trim excavations to required elevations. Correct over excavation with fine aggregate.

B. Remove large stones or other hard matter that could damage piping or impede consistent backfilling or compaction.

3.03 INSTALLATION OF PIPE AND PIPE FITTINGS

A. Install pipe, fittings, and accessories in accordance with governing authorities having jurisdiction, and manufacturer's instructions. Seal joints silt tight.

B. Inspect piping before installation to detect apparent defects. Extreme care shall be taken in the handling of pipe and appurtenances. Under no circumstances shall such material be dropped, rolled or skidded against another pipe. All slings, hooks, and pipe tongs shall be padded and used in such a manner to prevent damage to the pipe. Handling pipe from the interior pipe wall is prohibited. Mark defective materials with white paint and promptly remove from site.

C. All pipe bedding, haunching and initial backfill materials shall have optimum moisture content suitable for proper compaction. Pipe haunch material shall be manually compacted and the initial backfill shall be mechanically compacted.

D. Lay pipe beginning at low point of system, true to grades and alignment indicated, with unbroken continuity of invert. Contractor shall use a low intensity mobile laser for pipe alignment and grade. The laser must be set up to emit a beam of light through the pipe being installed. The use of a mechanical blower (designed for pipe lines) is required on all runs over 100' long. Using a level to check the elevation of the pipe at various locations is highly recommended. Maximum variation from true slope of 1/8 inch in 10 feet.

E. Place bell ends or groove ends of piping facing upstream.

F. Install initial backfill at sides and over top of pipe and compact. Provide final backfill in 6” lifts compacted to 95 percent maximum density.

G. When required, install gaskets in accordance with manufacturer's recommendations including the use of lubricants, cements and other special installation requirements.

H. Cleaning Pipe: Clear interior of piping of dirt and other superfluous material as work progresses. Maintain swab or drag line and pull past each joint as it is completed. In large, accessible piping, brushes and brooms may be used for cleaning.

I. Place plugs in ends of uncompleted conduit at end of day or whenever work stops.

J. Flush lines between drainage structures, if required, to remove collected debris.

K. Interior Inspection: Inspect piping to determine whether line displacement or other damage has occurred.

1. Make inspections after lines between drainage structures have been installed and approximately 2' of backfill is in place, and again at completion of project.

2. If inspection indicates poor alignment, debris, displaced pipe, infiltration or other defects, correct such defects, and re-inspect.

3.07 TOLERANCES

A. Lay pipe to alignment and slope gradients noted on drawings; with maximum variation from true slope of 1/8 inch in 10 feet.

3.08 BACKFILLING

A. Conduct backfill operations of open-cut trenches closely following laying, jointing and bedding of pipe, and after initial inspection and testing are completed.

B. All piping and drainage structures shall be backfilled as per Section 31 2200.

3.09 FIELD QUALITY CONTROL

A. Notify the Owner's Representative 48 hours in advance of testing procedures. Provide all necessary testing apparatus. Prevent separation and displacement of piping during testing operation and take necessary safety precautions.

B. Conduct all tests in the presence of the Director's Representative or the authority/agency having jurisdiction, as may be required. All sections of piping that fail to pass the specified tests shall have the defects located and repaired or replaced and re-tested until passable, at the contractor's expense.

C. Thoroughly clean and flush all sewers prior to testing. The following visual test is to be performed prior to final Acceptance: When shining a light at one end of a length of pipe, the full diameter must be visible from the other end, with no intermediate obstructions.

D. The tests shall be performed prior to placement of pavement or other construction, which may, in the opinion of the Owner's Representative, be detrimentally affected by excavation required for repairs.

E. The tests shall be performed only after the backfill has been in place and compacted to its full depth. Prior to testing, the contractor shall submit details of his testing procedures with a description of methods and equipment he proposes to use to the Owner's Representative for approval.

F. If tests indicate Work does not meet specified requirements, remove Work, replace and re-test.

3.10 PROTECTION

A. Protect pipe and aggregate cover from damage or displacement until backfilling operation is in progress.

3.11 CLEAN-UP

A. Remove all excess materials and debris from work of this section.

END OF SECTION

SECTION 333104

PLASTIC DRAINAGE PIPE (SANITARY)

PART 1 GENERAL

1.01 RELATED WORK SPECIFIED ELSEWHERE

A. Earthwork: Section 310000.

B. Manholes: Section 333913.

1.02 SUBMITTALS

A. Product Data: Manufacturer's specifications with all pertinent information regarding dimensions, fittings and installation instructions.

PART 2 PRODUCTS

2.01 GENERAL

A. Each length of pipe and each fitting shall be marked in accordance with the applicable ASTM Designation.

2.02 DRAINAGE PIPE AND FITTINGS

A. PVC Sewer Pipe, service lateral, cleanouts and Fittings: SDR 35 and ASTM D 3034 with push-on joints/gasketed pipe.

B. Forcemain: SDR-21 PVC pressure main, push-on joint type. PVC compounds used in the extrusion of this pipe meet or exceed the requirements of ASTM D1784 cell class 12454. Gaskets conform to ASTM F477. Joint design is tested to the requirements of ASTM D3139.

2.03 SOLVENT CEMENTS

A. Solvent cement used for joining plastic pipe and fittings shall meet the following designations for the various types of plastic pipe listed.
   1. PVC: ASTM D 2564.

PART 3 EXECUTION

3.01 INSPECTION

A. Inspect all pipe and fittings before installation. Remove defective pipe and fittings from the site.

B. Do not backfill before installation is inspected by the Director's Representative.

3.02 GENERAL

A. Install pipe in accordance with the manufacturer's recommendations and as specified in ASTM D 2321.

B. Join PVC pipe with solvent cemented joints as recommended by ASTM D 2855.

C. Refer to drawings for bedding and backfill material.

3.03 INSTALLATION

A. Laying Pipe: Lay pipe to indicated line and grade with a firm uniform bearing for the entire length of the pipe. Excavate sufficient clearance at each bell or coupling to allow uniform bearing along the pipe barrel. Fill excess excavation with suitable material and tamp.

B. Joints:
   1. Wipe inside of sockets and outside of pipe to be jointed, clean and dry.
   2. Install rubber gaskets in accordance with the manufacturer's specifications.

C. Connections:
   1. Make connections to existing manholes by cutting into the floor or bench of the manhole and forming a new channel, or as otherwise directed on drawings.
   2. If the pipe, manholes or other structures with which connection is to be made has not yet been installed, install the pipe to a point directed by the Director's Representative and plug or cap the end in a satisfactory manner.

D. Lay perforated pipe on a tamped bed of underdrain filter material.

E. Temporary Conductor Outlets: If required, remove existing temporary conductor outlets and deliver them to the Facility Authorities as directed.

F. Cleanouts:
   1. Construct cleanouts at the locations shown and as detailed on the drawings.
   2. Use PVC wyes, bends and pipe as indicated.

3.04 LEAKAGE TESTS

A. See drawings for forcemain and gravity sewer testing requirements.

END OF SECTION

SECTION 333913

MANHOLES AND DRAINAGE STRUCTURES WITH FRAMES AND COVERS

PART 1 GENERAL

1.01 RELATED WORK SPECIFIED ELSEWHERE

A. Earthwork: Section 310000.

B. Plastic Drainage Pipe: Section 333104.

1.02 REQUIREMENTS OF REGULATORY AGENCIES

A. Obtain necessary permits from local Authorities. Ascertain and comply with local requirements for materials, construction and restoration of pavement.

1.03 SUBMITTALS

A. Shop Drawings: Show fabrication details and connections to adjacent Work.

B. Product Data: Manufacturer's catalog cuts, specifications, and installation instructions.

PART 2 PRODUCTS

2.01 MATERIALS

A. Precast Reinforced Concrete Manholes:
   1. Riser Sections: ASTM C 478.
   2. Joints Between Riser Sections-One of the following:
      a. Rubber Gaskets: ASTM C 443.
      b. Butyl Joint Sealant: ConSeal CS-202 by Concrete Sealants, Inc., 8917 S. Palmer Rd., P. O. Box 176, New Carlisle, OH 45344, (513) 845-8776.
   3. Concrete for Precast Units: Air content 6 percent by volume with an allowable tolerance of plus or minus 1.5 percent. Minimum compressive strength of 4,000 psi after 28 days.
   4. Load Rating: AASHTO HS-20 with 30% impact and 130 lb/cf equivalent soil pressure.

B. Precast Reinforced Square and Rectangular Concrete Structures:
   1. Riser Sections: ASTM C890.
   2. Keyed Joints:
      a. Joint Sealant - Select One:
         1) Mortar
         2) Rubber Gasket
         3) Butyl Joint Sealant
   3. Load Rating: AASHTO HS-20 with 30% impact and 130 lb/cf equivalent soil pressure.

4. Concrete for Precast Units: Air content 6 percent by volume with an allowable tolerance of plus or minus 1.5 percent. Minimum compressive strength of 4,000 psi after 28 days.

C. Cast-in-Place Concrete for Manhole Invert Channels: Normal weight, air entrained concrete with a minimum compressive strength of 4,000 psi after 28 days.
1. Design Air Content: 6 percent by volume plus or minus 1.5 percent.
2. Cement: Minimum 610 pounds per cubic yard.
3. Slump: Between 2 and 3 inches.

D. Frames, Covers and Grates for Manholes and Catch Basins:
1. Design of each shall be the same throughout the project unless otherwise specified or indicated on the drawings.
2. Units shall meet AASHTO H20 wheel loading requirements. Manufacture, workmanship and certified proof-load tests shall conform to AASHTO M306-89-Standard Specification for Drainage Structure Castings.
3. Material:
   a. Cast iron: ASTM A48, Class 30B or 35B.
   b. Delivered to Site free of any coatings, unless otherwise specified.
4. Frames:
   a. Round with a 24-inch clear opening.
5. Covers:
   a. Round.
   b. Solid lid, lockable and water tight.
6. Acceptable Manhole Frames and Covers: See drawings.

E. Pipe-to-Manhole/Drainage Structure Connections-One of the following:
1. A-Lok Flexible Connector by A-Lok Products, Inc., 697 Main St., Tullytown, PA 19007, (215) 547-3366.
2. Lockjoint Flexible Connector by Chardon Rubber Company, 373 Washington St., Chardon, OH 44024, (216) 285-2161.
3. Kor-N-Seal Flexible Connector by NPC, Inc., 250 Elm St., Milford, NH 03055, (601) 673-8680.
4. Link-Seal Flexible Connector by Thunderline Link-Seal, Inc., 6525 Goforth St., Houston, TX 77021, (713) 747-8819.

F. Mortar: ASTM C 270, Type M.

PART 3 EXECUTION

3.01 PREPARATION

A. Sewer Lateral Openings in Precast and Cast-in-Place Concrete Risers: Provide openings and install pipe connectors in strict accordance with the recommendation of the connector manufacturer.

3.02 INSTALLATION

A. Construct concrete structures with precast reinforced riser sections to the dimensions shown. Seal joints between precast riser sections with material specified.

1. Wall thickness for circular structures 12 feet deep or less: 5 inches.
2. Wall thickness for circular structures greater than 12 feet deep: 6 inches.

B. Position tops of structures flush with finished grade.

C. Form inverts in manholes on straight runs by the use of channel pipe. Form inverts in manholes at changes in direction or grade by making curved channels of concrete. Channels shall have a smooth surface free from irregularities.

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END OF SECTION