SECTION 334000 – STORM DRAINAGE UTILITIES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. The Contractor, Subcontractors, and/or suppliers providing goods or services referenced in or related to this Section shall also be bound by the Documents identified in Division 01.

1.2 DESCRIPTION

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

B. Wherever reference is made to the DOT Specifications, it shall mean the Connecticut Department of Transportation Standard Specifications for Roads, Bridges, Facilities and Incidental Construction Form 819 as modified by Supplemental Specifications issued by the Connecticut Department of Transportation.

1.3 SUMMARY

A. Section Includes:
   1. Pipe and fittings.
   2. Nonpressure transition couplings.
   3. Cleanouts.
   4. Drains.
   5. Manholes.
   6. Catch basins.
   7. Yard drains.
   8. Area drains.
   9. Dry wells.
   10. Water Quality units
   11. Warning tape.
   12. Underground Detention System (Shop Drawings & Spec)

1.4 DEFINITIONS

A. ABS: Acrylonitrile butadiene styrene.

B. DI: Ductile-iron.

C. FRP: Fiberglass-reinforced plastic.

D. HDPE: High density polyethylene.

E. PVC: Polyvinyl chloride plastic.

F. RCP: Reinforced concrete piping.

1.5 COORDINATION

A. Coordinate Work of this Section with termination of storm sewer connection outside building, trenching, connection to, and roof drainage system.

1.6 PREINSTALLATION MEETINGS

A. Preinstallation Conference: Conduct conference at Project Site.

1.7 PERFORMANCE REQUIREMENTS

A. Gravity-Flow, Nonpressure Drainage-Piping Pressure Rating: At least equal to test pressure. Pipe joints shall be at least silt tight, unless otherwise indicated.

B. Precast concrete structures shall comply with ASTM C 890 Standard Practice for Minimum Structural Design Loading for Monolithic or Sectional Precast Concrete Water and Wastewater Structures.

1.8 ACTION SUBMITTALS

A. Product Data:

1. Pipe and fittings.
2. Nonpressure transition couplings.
3. Cleanouts.
4. Drains.
5. Manholes.
6. Catch basins.
7. Yard drains.
8. Area drains.
9. Dry wells.
10. Water Quality units
11. Warning tape.
12. Underground Detention System

B. Shop Drawings:

1. Catch Basins and Manholes: Include plans, elevations, sections, details, frames, and covers. Include design calculations and concrete design-mix report.

1.9 INFORMATIONAL SUBMITTALS

A. Coordination Drawings: Show pipe sizes, locations, and elevations. Show other piping in same trench and clearances from storm drainage system piping. Indicate interface and spatial relationship between manholes, piping, and proximate structures.

B. Field Quality-Control Reports: For storm drainage piping, manholes, catch basins, cleanouts, pile support systems, and concrete encasement and cradles.

C. Qualifications Statement: For manufacturer.

1.10 QUALITY ASSURANCE

A. Manufacturer Qualifications: Company specializing in manufacturing products specified in this Section.

1.11 DELIVERY, STORAGE, AND HANDLING

A. Inspection: Accept materials on Site in manufacturer's original packaging and inspect for damage.

B. Store materials according to manufacturer instructions.

C. Protection:

1. Protect materials from moisture and dust by storing in clean, dry location remote from construction operations areas.
2. Provide additional protection according to manufacturer instructions.
3. In the event of damage, immediately make all repairs and replacements necessary to the acceptance of the Architect/Engineer and at no additional cost to the Owner.

1.12 PROJECT CONDITIONS

A. Interruption of Existing Storm Drainage Service: Do not interrupt service to facilities occupied by Owner or others unless permitted under the following conditions and then only after arranging to provide temporary service according to requirements indicated:

1. Do not proceed with interruption of service without Engineer's and Owner's written permission.

PART 2 - PRODUCTS

2.1 STORM DRAINAGE PIPING

A. Reinforced Concrete Piping:

1. Pipe:

a. Comply with ASTM C76 (C76M), Class IV, with Wall Type B
b. Comply with ASTM C76 (C76M), Class V, with Wall Type B
c. End Connections: Bell and spigot

2. Fittings: Reinforced concrete.

3. Joints:

   a. Comply with ASTM C443 (C443M).
   b. Gaskets: Rubber, compression.

B. PVC Piping:

1. Pipe:

   a. Comply with ASTM D3034; SDR 35
   b. Style: Bell and spigot with rubber-ring sealed gasket joint.

2. Fittings: PVC.
3. Joints:

   a. Comply with ASTM F477.
   b. Gaskets: Elastomeric.

C. Corrugated HDPE Piping for 8- to 24-Inch (200- to 600-mm) or 12- to 60-Inch (300- to 1 500-mm) Diameters:

1. Pipe:

   a. Comply with ASTM F667/F667M& AASHTO M294.
   b. Type: S
   c. With smooth waterway for coupling joints

2. Fittings: HDPE.
3. Joints: Comply with ASTM F667/F667M.
4. Silt tight couplings: HDPE sleeve with ASTM D1056, Type 2, Class A, Grade 2 gasket material that mates with tubes and fittings

D. HDPE Perforated Pipe

1. Pipe

   a. Comply with ASTM D3350
   b. Type: ADS Smoothwall
   c. The perforations shall be 3/8″ diameter on 5″ centers, 120 degrees apart

2.2 NONPRESSURE TRANSITION COUPLINGS

A. Comply with ASTM C 1173, elastomeric, sleeve-type, reducing or transition coupling, for joining underground nonpressure piping. Include ends of same sizes as piping to be joined, and corrosion-resistant-metal tension band and tightening mechanism on each end.

B. Sleeve Materials:

1. For Concrete Pipes: ASTM C 443, rubber.
2. For Plastic Pipes: ASTM F 477, elastomeric seal or ASTM D 5926, PVC.
3. For Dissimilar Pipes: ASTM D 5926, PVC or other material compatible with pipe materials being joined.

2.3 MANHOLES

A. Standard Precast Concrete Manholes:

1. Description: ASTM C 478, precast, reinforced concrete, of depth indicated, with provision for sealant joints.
2. Diameter: 48 inches minimum unless otherwise indicated, or deeper than 10-feet.
3. Ballast: Increase thickness of precast concrete sections or add concrete to base section as required to prevent flotation.
4. Base Section: 6-inch minimum thickness for floor slab and 5-inch minimum thickness for walls and base riser section, and separate base slab or base section with integral floor.
5. Riser Sections: 5-inch minimum thickness and lengths to provide depth indicated.
6. Top Section: Eccentric-cone type unless concentric-cone or flat-slab-top type is indicated, and top of cone of size that matches grade rings.
7. Joint Sealant: Butyl rubber, mastic type seal that conforms to latest AASHTO specification M-198, and meets federal specification SS-S-0021(210-A).
8. Resilient Pipe Connectors: ASTM C923, cast or fitted into manhole walls, for each pipe connection.
9. Steps: Individual Copolymer Polypropylene Plastic steps, wide enough to allow worker to place both feet on one step and designed to prevent lateral slippage off step. Cast or anchor steps into sidewalls at 12- to 16-inch intervals. Omit steps if total depth from floor of manhole to finished grade is less than 36 inches.
10. Install frame over a minimum of three layers (8 inches) of concrete brick, continuous around frame, to allow vertical adjustment.
11. Mortar for Chimney, Frame and Cover Joints: Comply with ASTM C 270, Type M, except for quantities less than 2.3 cu. ft. where packaged mix complying with ASTM C387, Type M, may be used.

B. Manhole Frames and Covers:

1. Description: Size as indicated on drawings. Include indented top design with lettering cast into cover, using wording equivalent to "STORM SEWER" as required by the Town of East Hartford.
2. Material: ASTM A 48, Class 35 gray, designed for H20 structural loading.

2.4 CATCH BASINS, YARD DRAINS, AND AREA DRAINS

A. Standard Precast Concrete Drainage Structures:

1. Description: ASTM C 478, precast, reinforced concrete, of depth indicated, with provision for sealant joints. To be used for dry wells, catch basins and yard drains.
2. Base Section: 6-inch minimum thickness for floor slab and 3-inch minimum thickness for walls and base riser section, and separate base slab or base section with integral floor.
3. Riser Sections: 3-inch minimum thickness and lengths to provide depth indicated.
4. Joint Sealant: ASTM C 990, bitumen or butyl rubber.
5. Drainage Hood with Backing Plate: Provide on outlet pipe of drainage structure, where indicated. Provide aluminum or cast-iron trap with stainless steel fasteners. Size hood to accommodate pipe taking into account the pipe orientation. Should

field conditions preclude use of standard trap, Contractor to provide alternate solution for review and approval by Engineer.

B. Area Drains:

1. Description: ASTM A 536, ductile iron, painted black, with water tight PVC adapters. To be used for area drains.
2. Base Section: prefabricated by manufacturer and made of PVC.
3. Riser Sections: Nyoplast® or approved equal. Shall be field installed using the guidelines outlined in ASTM D 2855
4. Joint Sealant: ASTM D 2564, PVC cement
5. Water Tight Adapter: Provide an outlet pipe of drainage structure, where indicated. The outlet pipe shall be corrugated HDPE pipe, to be fit into the water tight joint. Drainage connection stub joint tightness shall conform to ASTM D 3212

2.5 CLEANOUTS

A. Cast-Iron Cleanouts:

1. Description: ASME A112.36.2M, round, gray-iron housing with clamping device and round, secured, scoriated, gray-iron cover. Include gray-iron ferrule with inside calk or spigot connection and countersunk, tapered-thread, brass closure plug.
2. Top-Loading Classification(s): Heavy Duty.
3. Sewer Pipe Fitting and Riser to Cleanout: ASTM A74, Service class, cast-iron soil pipe and fittings.

2.6 BEDDING, BASE, COVER, AND BACKFILL MATERIALS

A. Crushed stone for bedding shall be sound, tough and durable; it shall be free from soft, thin elongated, or laminated pieces and vegetable or other deleterious substances. Grading Article M.01.01, DOT Specifications. Size: As indicated on the Drawings for the various storm pipes.

B. Suitable Backfill Material: Section 312333 – Trenching and Backfilling.

2.7 UNDERGROUND DETENTION SYSTEMS

1. Pipe System (N12 60" diameter pipe by ADS or Engineer approved equal).

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine substrates, areas, and conditions, with Installer present, for compliance with requirements for installation tolerances and other conditions affecting performance of the Work.

B. Verify that excavations, dimensions, and elevations are as indicated on drawings.

C. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 PREPARATION

A. Identify and describe unexpected variations to subsoil conditions or discovery of uncharted utilities.

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

3.3 INSTALLATION OF STORM DRAINAGE PIPING

A. General Locations and Arrangements: Drawing plans and details indicate general location and arrangement of underground storm drainage piping. Location and arrangement of piping layout take into account design considerations. Install piping as indicated, to extent practical. Where specific installation is not indicated, follow piping manufacturer's written instructions.

B. Install piping beginning at low point, true to grades and alignment indicated with unbroken continuity of invert. Place bell ends of piping facing upstream. Install gaskets, seals, sleeves, and couplings according to manufacturer's written instructions for use of lubricants, cements, and other installation requirements.

C. Install manholes for changes in direction unless fittings are indicated. Use fittings for branch connections unless direct tap into existing sewer is indicated.

D. Install proper size increasers, reducers, and couplings where different sizes or materials of pipes and fittings are connected. Reducing size of piping in direction of flow is prohibited.

E. When installing pipe under streets or other obstructions that cannot be disturbed, use pipe- jacking process of microtunneling.

F. Install gravity-flow, nonpressure drainage piping according to the following:

1. Install piping pitched down in direction of flow at a minimum slope of 0.5 percent, unless otherwise indicated.
2. Install piping with cover as indicated on Drawings.
3. Install HDPE corrugated sewer piping according to CPPA’s "Recommended Installation
4. Practices for Corrugated Polyethylene Pipe and Fittings."
5. Install PVC sewer piping according to ASTM D 2321 and ASTM F 1668.
6. Install reinforced-concrete sewer piping according to ASTM C1479 and ACPA's
7. "Concrete Pipe Installation Manual."

3.4 PIPE JOINT CONSTRUCTION

A. Join gravity-flow, nonpressure drainage piping according to the following:

1. Join corrugated HDPE piping according to CPPA 100 and the following:
   a. Use silt tight couplings for Type 1, silt tight joints.
2. Join PVC sewer piping according to ASTM D 2321 and ASTM D 3034 for elastomeric-seal joints or ASTM D 3034 for elastomeric-gasketed joints.
3. Join reinforced-concrete sewer piping according to ACPA's "Concrete Pipe Installation Manual" for rubber-gasketed joints.
4. Join dissimilar pipe materials with nonpressure-type flexible couplings.

3.5 MANHOLE INSTALLATION

A. General: Install manholes, complete with appurtenances and accessories indicated.

B. Install precast concrete manhole sections with sealants according to ASTM C 891.

C. Where specific manhole construction is not indicated, follow manhole manufacturer's written instructions.

D. Set covers flush with finished surface for manholes that occur in pavements. Set covers flush with topsoil and provide a graded transition away from covers to surrounding grade.

3.6 YARD DRAIN INSTALLATION

A. Construct yard drains sizes and installation details as indicated.

B. Set top of frames and grates flush with surrounding surface to allow for stormwater interception.

3.7 CATCH BASIN INSTALLATION

A. Construct catch basins to sizes and shapes indicated.

B. Set frames and grates flush with surrounding surface to allow for stormwater interception.

3.8 CONCRETE PLACEMENT

A. Place cast-in-place concrete according to ACI 318.

3.9 CONNECTIONS

A. Connect nonpressure, gravity-flow drainage piping in building's storm building drains specified in Section 22 14 13 "Facility Storm Drainage Piping."

B. Pipe couplings, expansion joints, and deflection fittings with pressure ratings at least equal to piping rating may be used in applications below unless otherwise indicated.

1. Use nonpressure-type flexible couplings where required to join gravity-flow, nonpressure sewer piping unless otherwise indicated.

   a. Unshielded flexible couplings for same or minor difference OD pipes.
   b. Unshielded, increaser/reducer-pattern, flexible couplings for pipes with different OD.
   c. Ring-type flexible couplings for piping of different sizes where annular space between smaller piping's OD and larger piping's ID permits installation.

3.10 IDENTIFICATION

A. Materials and their installation are specified in Section 312300 "Earthwork." Arrange for installation of detectable warning tape 18 to 24 inches directly over piping and at outside edge of underground structures.

3.11 FIELD QUALITY CONTROL

A. Inspect interior of piping to determine whether line displacement or other damage has occurred. Inspect after approximately 24 inches of backfill is in place, and again at completion of Project.

1. Submit separate reports for each system inspection.
2. Defects requiring correction include the following:
   a. Alignment: Less than full diameter of inside of pipe is visible between structures.
   b. Deflection: Flexible piping with deflection that prevents passage of ball or cylinder of size not less than 92.5 percent of piping diameter.
   c. Damage: Crushed, broken, cracked, or otherwise damaged piping.
   d. Infiltration: Water leakage into piping.
   e. Exfiltration: Water leakage from or around piping.
3. Replace defective piping using new materials, and repeat inspections until defects are within allowances specified.
4. Re-inspect and repeat procedure until results are satisfactory.

B. Test new piping systems, and parts of existing systems that have been altered, extended, or repaired, for leaks and defects.

1. Do not enclose, cover, or put into service before inspection and approval.
2. Test completed piping systems according to requirements of authorities having jurisdiction.
3. Schedule tests and inspections by authorities having jurisdiction with at least 24 hours' advance notice.
4. Submit separate report for each test.
5. Manhole Test: Visually inspect for damage.

C. Damage, leaks and loss in test pressure below limits stated above, constitute defects that must be repaired.

D. Replace leaking piping using new materials, and repeat testing until leakage is within allowances specified.

3.12 CLEANING

A. Clean interior of piping of dirt and superfluous materials. Flush with potable water.

END OF SECTION 334000