

SECTION 33 41 00 – STORM UTILITY DRAINAGE PIPING**PART 1 GENERAL**

1.01 SUMMARY

- A. Section Includes:
 - 1. Stormwater Pipe and fittings.
- B. Related Requirements:
 - 1. Section 31 23 33 – Trenching and Backfilling
 - 2. Section 33 49 00 – Storm Drainage Structures

1.02 REFERENCES

- A. Pennsylvania Department of Transportation (PENNDOT):
 - 1. Publication 408 – Standard Specifications, Section 601

1.03 SUBMITTALS

- A. Submit under provisions of Section 01 33 00 – Submittal Procedures.
- B. Product Data: Drainage piping and piping specialties.
- C. Coordination Drawings and Test Pit Data: Provide drawings indicating relationships of utilities discovered including top and bottom elevations, horizontal locations of pipes, conduits, etc., and elevations / locations of all adjacent utility lines within area specified to be located or confirmed by a test pit.
- D. Record drawings at project closeout of installed storm sewer system piping and products according to contract requirements. Provide all information required by municipality or authority in jurisdiction. Information to include (but is not limited to) the following:
 - 1. Plans indicating all final locations of storm sewer lines, structures, inverts, sizes, length and slopes of all pipes, etc.
 - 2. Provide dimensions from faces of curb, buildings and other adjacent utilities.
 - 3. Provide depths of lines and indicate at a maximum 50-foot interval.
 - 4. Provide signature and seal of registered surveyor responsible for the record drawings. Provide benchmark and datum consistent with project documents.

1.04 QUALITY ASSURANCE

- A. Environmental Compliance: Comply with applicable portions of federal, state and local environmental agency regulations pertaining to storm drainage systems.
- B. Municipal Compliance: Comply with local municipal and county regulations and standards pertaining to storm drainage systems in accordance with approved plan.

- C. Structural Design Loading: Unless otherwise noted, underground conveyance systems shall be constructed to withstand traffic loading designation A-16 (HS-20) per ASTM C 890-91.
- D. Product Substitutions: Storm sewer systems specialties and accessories are based on specific types, manufacturers, and models indicated. Components by other manufacturers but having equal performance characteristics will be considered, provided deviations in dimensions, operation, and other characteristics do not change design concept or intended performance as judged by Engineer.

1.05 DELIVERY, STORAGE AND HANDLING

- A. Do not store plastic manholes, pipe, and fittings in direct sunlight.
- B. Protect pipe, pipe fittings, and seals from dirt and damage.

1.06 PROJECT CONDITIONS

- A. Prior to beginning the installation of the storm drainage system, the Contractor shall investigate existing underground utility locations, research site utility records, and dig test pits to verify existing utility depths and locations and to verify that storm drainage system piping may be installed in compliance with original design and referenced standards. If the Contractor determines that the original design is in conflict with the existing utilities, he shall immediately notify the Engineer of such conflict.
 - 1. Locate existing storm drainage system piping and structures that are to be removed, abandoned and/or closed.
- B. Existing Utilities: Do not interrupt utilities serving facilities occupied by Owner or others unless permitted under the following conditions and then only after arranging to provide temporary utility services according to requirements indicated. Follow the requirements of the governing authority where applicable.
 - 1. Notify Owner and Design Professional not less than two days in advance of proposed utility interruptions.
 - 2. Do not proceed with interruption of service without Owner's written permission.

PART 2 PRODUCTS

2.01 GENERAL

- A. All materials, unless specified otherwise, shall be supplied by producers listed in PENNDOT Bulletin 15, Approved Construction Materials.
- B. Provide pipe and pipe fitting materials compatible with each other and of the type of pipe and size specifically indicated on the drawings. Pipe and joint materials for the type of pipe indicated on the drawings shall, unless otherwise indicated, conform to the material requirements herein specified.

2.02 PVC PIPE

- A. PVC (Polyvinyl Chloride) Gravity Flow Pipe and Fittings, Type PSM SDR-35
1. References
 - a. ASTM D 3034 – 4” through 15” diameter
 - b. ASTM F 679 – 18” to 27” diameter
 2. Materials
 - a. Stiffness: 50 psi minimum when measured at 5 percent deflection, ASTM D 2412.
 - b. Additives and Fillers: Not to exceed 10 parts by weight; 100 parts of resin in the compound.
 3. Joints and Fittings
 - a. Solvent Cement: Solvent cement per ASTM D 2564.
 - b. Elastomeric gasket joints ASTM D 3212: Gaskets per ASTM F 477.
 - c. Fittings - ASTM D 1784

2.03 PE PIPE

- A. Smooth-Lined Corrugated High Density Polyethylene (HDPE-SB) Solid or Perforated Pipe and Fittings, Gravity Flow Storm Drainage Application 8” diameter and larger:
1. References:
 - a. AASHTO M 294-94: Standard Specification for Corrugated Polyethylene Pipe, 12” to 36” Diameter.
 - b. AASHTO MP6-95: Standard Specification for Corrugated Polyethylene Pipe, 42” and 48” Diameter.
 - c. ASTM D2321-89: Standard Practice for Underground Installation of Thermoplastic Pipe for Sewers and Other Gravity-Flow Applications.
 - d. ASTM D3350: Standard Specification for Polyethylene Plastic Pipe and Fittings Materials.
 - e. ASTM F477-93: Specifications for Elastomeric Seals (Gaskets) for Joining Plastic Pipe.
 2. Material Properties:
 - a. Pipe and fitting materials shall be made from virgin high-density polyethylene compounds which conform to the requirements of ASTM D3350 resin cell classification 335420C or ASTM 01248 Type III, Class C, Category 4, Grade P33.
 3. Joints and Fittings:
 - a. Joint Requirements: Joints shall consist of a bell and spigot type joint with an o-ring rubber gasket meeting ASTM F477 placed on the spigot end. The bell end shall engage a minimum of two (2) corrugations to provide sufficient longitudinal strength, preserve pipe alignment, and prevent separation at the joints.
 - b. Fittings Requirements: Pipe fittings shall be manufactured to conform to AASHTO M294. They shall not reduce or impair the overall integrity of function of the pipe line. Only fittings supplied or recommended by the pipe manufacturer shall be used.

2.04 CONCRETE PIPE AND FITTINGS

- A. Reinforced-Concrete Sewer Pipe and Fittings: Comply with ASTM C 76-94, Class III, Wall B, and AASHTO M-170, for gasket joints.
 - 1. Gaskets: ASTM C 443

2.05 CORRUGATED METAL PIPE

- A. Corrugated-Aluminum Pipe: ASTM B 745/B 745M, Type I, made from ASTM B 744/B 744M, aluminum-alloy sheet for banded joints.
 - 1. Fittings: Fabricated to types indicated and according to same standards as pipe.
 - 2. Connecting Bands: Standard couplings made for corrugated-aluminum pipe to form soiltight joints.

2.06 SPECIAL PIPE COUPLINGS AND FITTINGS

- A. Sleeve-Type Pipe Couplings: ASTM C 1173, rubber or elastomeric sleeve and band assembly fabricated to mate with OD of pipes to be joined, for nonpressure joints.
 - 1. Sleeve Material for Concrete Pipe: ASTM C 443, rubber.
 - 2. Sleeve Material for Cast-Iron Soil Pipe: ASTM C 564, rubber.
 - 3. Sleeve Material for Plastic Pipe: ASTM F 477, elastomeric seal.
 - 4. Sleeve Material for Dissimilar Pipe: Compatible with pipe materials being joined.
 - 5. Bands: Stainless steel, at least one at each pipe insert.
- B. Bushing-Type Pipe Couplings: ASTM C 1173, rubber or elastomeric bushing fabricated to mate with OD of smaller pipe and ID of adjoining larger pipe, for nonpressure joints.
 - 1. Material for Concrete Pipe: ASTM C 443, rubber.
 - 2. Material for Cast-Iron Soil Pipe: ASTM C 564, rubber.
 - 3. Material for Plastic Pipe: ASTM F 477, elastomeric seal.
 - 4. Material for Dissimilar Pipe: Compatible with pipe materials being joined.

PART 3 EXECUTION

3.01 EARTHWORK

- A. Excavation, trenching, and backfilling shall be as specified in Section 31 23 33.

3.02 INSTALLATION, GENERAL

- A. General Locations and Arrangements: Drawings (plans and details) indicate the drainage location and arrangement of the underground storm drainage system piping. Location and arrangement of piping layout take into account many design considerations. Install the piping as indicated, to the extent practical. Any proposed variation of locations, invert or pipe slope requires prior approval of the Design Professional.
- B. Install piping beginning at low point of systems, true to grades and alignment indicated with unbroken continuity of invert. Place bell ends of piping facing upstream. Install

gaskets, seals, sleeves, and couplings in accordance with manufacturer's recommendations for use of lubricants, cements, and other installation requirements. Maintain swab or drag in line and pull past each joint as it is completed.

- C. Use manholes or inlets for changes in direction, except where a fitting is specifically indicated. Use fittings for branch connections, except where direct tap into existing pipe is specifically indicated.
- D. Use proper size increasers, reducers, and couplings, where different size or material of pipes and fittings are to be connected. Reduction of the size of piping in the direction of flow is prohibited.
- E. Install piping pitched down in direction of flow, at minimum slope of 2 percent, except where indicated otherwise on the drawings.
- F. Extend storm drainage system piping to connect to building storm drains, of sizes and in locations indicated.

3.03 FIELD QUALITY CONTROL

- A. Clear interior of piping and structures of dirt and superfluous material as work progresses. Maintain swab or drag in piping, and pull past each joint as it is completed.
 - 1. In large, accessible piping, brushes and brooms may be used for cleaning.
 - 2. Place plug in end of incomplete piping at end of day and when work stops.
 - 3. Flush piping between manholes and other structures to remove collected debris, if required by authorities having jurisdiction.
- B. Inspect interior of piping to determine whether line displacement or other damage has occurred. Inspect after approximately 24" 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% of piping diameter.
 - c. 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. Reinspect and repeat procedure until results are satisfactory.
- C. Test new piping systems, and parts of existing systems that have been altered, extended, or repaired, for leaks and defects. Perform hydraulic and other testing of completed piping system in accordance with municipality or agency having jurisdiction.
 - 1. Do not enclose, cover, or put into service before inspection and approval.
 - 2. Test completed piping systems according to authorities having jurisdiction.

3. Schedule tests and inspections by authorities having jurisdiction with at least 24 hours' advance notice.
4. Submit separate reports for each test.
5. Leaks and loss in test pressure constitute defects that must be repaired.
6. Replace leaking piping using new materials, and repeat testing until leakage is within allowances specified.

END OF SECTION