

SECTION 14
POST-CONSTRUCTION STORMWATER MANAGEMENT FACILITIES

A. GENERAL

1. Scope of Work

The work covered under this section consists of the Contractor furnishing all labor, materials, and equipment necessary to prepare site, grade, construct and install new storm sewers and new stormwater detention bed. This work shall also include the proper implementation of the erosion and sedimentation control plan under the approved NPDES permit for earth disturbance activities for this project.

All work performed and materials used will be in strict compliance with the relevant portions of the Standard and Detailed Specifications, and contractual matters will conform to the Standard contract Provisions of these Specifications.

The Contractor must be thoroughly experienced in this type of work, must be reputable and must recognize the fact that this project will require utmost care in the execution of the work.

All work shall conform, during its progress or on its completion, truly to the lines, levels and grades, and shall be built in a thoroughly substantial and workmanlike manner, in accordance with the plans and directions given from time to time by the Engineer, subject to such modifications and additions as shall be deemed necessary by the Engineer during its execution. In no case shall any work in excess of the plan requirements and Specifications be paid for unless ordered in writing by the Owner or the Engineer.

All references to ASTM and AASHTO specifications apply to the most recent version.

2. Stake-Out

All lines and grades shall conform to the Contract Drawings. Gibson-Thomas Engineering will provide benchmarks and base line layout.

3. Installation

The installation shall be in accordance with good construction practice and the appropriate sections of the Contract Drawings, and specifications.

B. DETENTION POND SITE PREPARATION

1. The area to be occupied by the stormwater detention bed will be cleared of all trees, brush, logs, fences, rubbish and other objectionable material unless otherwise designated on the plans.
2. Rubbish and all cleared and grubbed material shall be disposed of in accordance with these specifications.

C. STRUCTURE BACKFILL

1. Backfill adjacent to pipes or structures shall be of the type and quality conforming to that specified for the adjoining fill material. The fill shall be placed in horizontal layers not to exceed four inches in thickness and compacted by hand tampers or other manually directed compaction equipment. The material needs to fill completely all spaces under and adjacent to the pipe. At no time during the backfilling operation shall driven equipment be allowed to operate closer than four feet, measured horizontally, to any part of a structure. Under no circumstances shall equipment be driven over any part of a concrete structure or pipe, unless there is a compacted fill of 24" or greater over the structure or pipe.
2. Unless specified otherwise on the contract drawings, all stone shall be PennDOT Type #2A. Any street crossings and ditch openings in streets and driveways shall have 100% stone backfill. All piping outside of streets shall be backfilled with acceptable material as defined in the Standard Specifications, after proper stone bedding is installed.
3. Structure backfill may be flowable fill meeting the requirements of Pennsylvania Department of Transportation Form 408, latest revision. The mixture shall have a 100-200 psi; 28 day unconfined compressive strength. The flowable fill shall have a minimum pH of 4.0 and a minimum resistivity of 2,000 ohm-cm. Material shall be placed such that a minimum of 6" (measured perpendicular to the outside of the pipe) of flowable fill shall be under (bedding), over and, on the sides of the pipe. It only needs to extend up to the spring line for rigid conduits. Average slump of the fill shall be 7" to assure flowability of the material. Adequate measures shall be taken (sand bags, etc.) to prevent floating the pipe. When using flowable fill, all metal pipe shall be bituminous coated. Any adjoining soil fill shall be placed in horizontal layers not to exceed four inches in thickness and compacted by hand tampers or other manually directed compaction equipment. The material shall completely fill all voids adjacent to the flowable fill zone.
4. At no time during the backfilling operation shall driven equipment be allowed to operate closer than four feet, measured horizontally, to any part of a structure. Under no circumstances shall equipment be driven over any part of a structure or pipe unless there is a compacted fill of 24" or greater over the structure or pipe. Backfill material outside the structural backfill (flowable fill) zone shall be of the type and quality conforming to that specified for the core of the embankment or other embankment materials.

D. MATERIALS

1. Earthfill Material
 - a. All on-site earthfill material shall be taken from on-site cut areas wherever the cut material is suitable as fill material. It shall be free of roots, stumps, wood, rubbish, stones greater than six inches, frozen or other objectionable materials.
 - a. Any coal encountered during on-site excavation shall be hauled off-site to a coal receiving facility as part of this work and shall not be used as on-site fill material.

3. Sheeting, Bracing and Shoring

All sheeting, bracing and shoring shall be performed according to requirements of the State Department of Labor and Industry, and as may be hereinafter set forth.

4. Non-Shrink Grout

Where "non-shrink" grout is called for by the Drawings, or specified herein, it shall be "Embeco Pre-Mixed Grout" as manufactured by the Master Builders Company, "Vibro-Foil Ready-Mixed Grout" as manufactured by Grace Construction Materials, or "Ferrolith G Redi-Mixed Grout" as manufactured by Sonneborn Building Products, Inc., and shall be used in strict conformance with the manufacturer's directions.

5. Storm Catch Basins

Storm catch basins shall be standard PennDOT reinforced concrete inlet boxes with Type 'M' structural steel frame and structural steel bicycle-safe grate rated for H-25 traffic loads. Catch basins greater than 4 feet in depth will require steps spaced at 12" on center vertically. Unless specified otherwise, catch basins shall NOT have knock-out walls, but shall have all openings for pipes precast at the appropriate sizes and depths as per the contract drawings.

All pipes entering structures shall be cut flush with the inside face of the structure, unless otherwise specified by the Engineer. The cut ends of the pipe and the surface of the structure shall be properly rounded and finished so that there will be no protrusion, ragged edges or imperfections that will impede the flow of water or affect the hydraulic characteristics of the installation.

Coring into existing inlets, as well as installing additional pipe to facilitate the installation of new inlets shall be incidental to the Contract.

All pipe connections must be grouted at their entry into the respective structure. Only full sections of pipe shall be used where entering a structure which will be exposed to view, such as endwalls, headwalls, end sections, etc.

6. Pipe Conduit

- a. All pipes shall be circular in cross section.
- b. Coupling bands, anti-seep collars, end sections, etc., must be composed of the same material and coatings as the pipe. Metals must be insulated from dissimilar materials with use of rubber or plastic insulating materials at least 24 mils in thickness.
- c. Connections

All connections with pipes must be completely watertight. The drain pipe or barrel connection to the riser shall be welded all around when the pipe and riser are metal. Anti-seep collars shall be connected to the pipe in such a manner as to be completely watertight. Dimple bands are not considered to be watertight.

All connections shall use a rubber or neoprene gasket when joining pipe sections. The end of each pipe shall be re-rolled an adequate number of corrugations to accommodate the bandwidth. The following type connections are acceptable for pipes less than 24 inches in diameter: flanges on both ends of the pipe with a circular 3/8 inch closed cell neoprene gasket, pre-punched to the flange bolt circle, sandwiched between adjacent flanges; a 12-inch wide standard lap type band with 12-inch wide by 3/8-inch thick closed cell circular neoprene gasket; and a 12-inch wide hugger type band with o-ring gaskets having a minimum diameter of 1/2 inch greater than the corrugation depth. Pipes 24 inches in diameter and larger shall be connected by a 24 inch long annular corrugated band using a minimum of 4 (four) rods and lugs, 2 on each connecting pipe end. A 24-inch wide by 3/8-inch thick closed cell circular neoprene gasket will be installed with 12 inches on the end of each pipe. Flanged joints with 3/8 inch closed cell gaskets the full width of the flange is also acceptable.

Helically corrugated pipe shall have either continuously welded seams or have lock seams with internal caulking or a neoprene bead.

All pipe connections into storm catch basins, manholes, endwall or other concrete structures shall have poured concrete collars around the exterior interfaces between the pipe and the structure. The concrete collar shall be 12 inches thick and project a minimum of 12 inches from all sides of the pipe.

d. Bedding

The pipe shall be firmly and uniformly bedded throughout its entire length. Where rock or soft, spongy or other unstable soil is encountered, all such material shall be removed and replaced with suitable earth compacted to provide adequate support.

e. Backfilling shall conform to specified "Structure Backfill" requirements.

f. Other details (anti-seep collars, valves, etc.) shall be as shown on the drawings.

g. Reinforced Concrete Pipe

All of the following criteria shall apply for reinforced concrete pipe:

- 1) Materials - Reinforced concrete pipe shall have bell and spigot joints with rubber gaskets and shall equal or exceed ASTM C-361.
- 2) Bedding - Reinforced concrete pipe conduits shall be laid in a concrete bedding / cradle for their entire length. This bedding / cradle shall consist of high slump concrete placed under the pipe and up the sides of the pipe at least 50% of its outside diameter with a minimum thickness of 6 inches. Where a concrete cradle is not needed for structural reasons, flowable fill may be used as described in the "Structure Backfill" section of this standard. Gravel bedding is not permitted.

E. CARE OF WATER DURING CONSTRUCTION

All work on permanent structures shall be carried out in areas free from water. The Contractor shall construct and maintain all temporary dikes, levees, cofferdams, drainage channels, and stream diversions necessary to protect the areas to be occupied by the permanent works. The contractor shall also furnish, install, operate, and maintain all necessary pumping and other equipment required for removal of water from various parts of the work and for maintaining the excavations, foundation, and other parts of the work free from water as required or directed by the engineer for constructing each part of the work.

After having served their purpose, all temporary protective works shall be removed or leveled and graded to the extent required to prevent obstruction in any degree whatsoever of the flow of water to the spillway or outlet works and so as not to interfere in any way with the operation or maintenance of the structure. Stream diversions shall be maintained until the full flow can be passed through the permanent works.

The removal of water from the required excavation and the foundation shall be accomplished in a manner and to the extent that will maintain stability of the excavated slopes and bottom required excavations and will allow satisfactory performance of all construction operations. During the placing and compacting of material in required excavations, the water level at the locations being refilled shall be maintained below the bottom of the excavation at such locations which may require draining the water sumps from which the water shall be pumped.

F. STABILIZATION

All borrow areas shall be graded to provide proper drainage and left in a slightly condition. All exposed surfaces of the embankment, spillway, spoil and borrow areas, and berms shall be stabilized by seeding, liming, fertilizing and mulching in accordance with PA DEP Standards and Specifications for erosion and sedimentation control.

END OF SECTION