

SECTION 02700

SEWERAGE AND STORM DRAINAGE

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Provide labor and materials to complete the sanitary and storm drainage as shown on the Drawings and/or herein specified.
 - 1. Sewer lines.
 - 2. Storm drain lines.
 - 3. Underdrains, including foundation drains inside and outside building.
 - 4. Soil gas vent piping under building.
 - 5. Manholes
 - 6. Catchbasins and drain inlets.
 - 7. Trench insulation.
 - 8. Geotextile filter fabric.
 - 9. Repair of existing utilities damaged by the work.
 - 10. Grease trap tank.
 - 11. Cast-in-place concrete encasement for utility lines and pipes.
- B. Terminate site utility pipes and conduits at the building foundation wall for connection to building utilities.

1.02 RELATED SECTIONS IN OTHER DIVISIONS

- A. Section 03300: Cast-In-Place Concrete.

1.03 SUBMITTALS

- A. Submit manufacturer's product literature and Shop Drawings for approval on materials in accordance with Division 1 Submittals section.
- B. Certified copies of test results.
- C. As-built records of pipe location, depth, services, and repairs.

PART 2 PRODUCTS

2.01 SEWER PIPE

- A. Polyvinylchloride (PVC), conforming to ASTM D3034, maximum ratio of outside diameter to wall thickness of 35 (SDR-35). Watertight push-on couplings with flexible O-ring gasket, conforming to ASTM D3212.

2.02 STORM DRAINS

- A. Unless Otherwise Noted Use Any of the Following Pipe Materials:
 - 1. Polyvinylchloride (PVC), conforming to ASTM D3034, maximum ratio of outside diameter to wall thickness of 35 (SDR-35). Watertight push-on couplings with flexible O-ring gasket, conforming to ASTM D3212.

2. High density polyethylene pipe (HDPE), conforming to ASTM D3350 and AASHTO M294 with corrugated exterior and smooth interior. Couplings and fittings of same material conform to AASHTO M294.

2.03 UNDERDRAINS

- A. Use One of the Following for Underdrains:
 1. Polyvinylchloride (PVC), Type PS-46 conforming to ASTM F-789 or PSM (SDR 35) conforming to ASTM D-3034 perforated with two rows of 1/2-inch diameter holes. Gasketed push-on joints.
 2. Corrugated polyethylene drainage pipe, heavy-duty grade, perforated, conforming to AASHTO M252 and ASTM F 405. Pipe must be marked as "Heavy-Duty" conforming to ASTM F405, or pipe stiffness of 30 psi at 5% deflection, maximum of 5% elongation.
- B. Provide cleanout risers to finish grade outside the building with threaded covers. Grease threads on cover. Provide cleanout plug inside a cast iron or aluminum handhole and cover, set flush to walkway or drive pavement, where cleanout is in a hard surface area.

- C. Inside the building, provide cleanouts as specified in Section 15410, Plumbing - General Purpose.

2.04 SOIL GAS VENTS

- A. Provide soil gas vent piping beneath the building floor slabs, as shown on the Plumbing drawings and Site drawings, and terminating with capped riser stubs above the floor.
- B. Schedule 40 polyvinyl chloride (PVC) with solvent cement joints. Horizontal pipe below slab shall be perforated with two rows of 1/2-inch diameter holes; vertical risers shall be solid wall pipe.

2.05 MANHOLES

- A. Precast reinforced 4000 psi concrete base and barrel sections of dimensions shown on the Drawings, eccentric cone section, conforming to ASTM C478, constructed to support HS-20 wheel loading. Polypropylene coated steel steps of 14" width at 12" spacing cast into manhole wall. Exterior of all components to be asphalt coated.
- B. Seal joints watertight with two flexible strips of butyl rubber joint sealant. Pipe openings precast into units, using EPDM flexible sleeves meeting ASTM C-923 with stainless steel coupling bands, or watertight sleeve designed to function without coupling band.
- C. Construct brick and mortar inverts to conform to the sizes of flow-through sewers, or use precast concrete inverts. At changes in directions, lay out in curves of the longest possible radii tangent to the sewer pipe center-lines. Construct shelves to the elevation of the highest pipe crown and sloped upward to the wall of the manhole, at 1/4" per foot, to drain toward the channel.

2.06 CATCHBASINS

- A. Precast reinforced concrete 4000 psi base and barrel sections of dimensions shown on the Drawings, haunched concentric cone sections conforming to ASTM C478, constructed to support HS-20 wheel loading.
- B. Where required by shallow installations or directed by the Architect, provide a flat slab top constructed to support HS-20 wheel loading.
- C. Joints sealed watertight with flexible strips of butyl rubber joint sealant. Pipe openings precast into units, using cast-in EPDM flexible sleeves meeting ASTM C-923 with stainless steel coupling bands.

- D. Provide a 24-inch deep sump in catchbasins, unless otherwise noted.

2.07 DRAIN INLETS

- A. Use One of the Following:
 1. Pre-manufactured 18" diameter drainage basin of PVC. Nyloplast manufactured by Advanced Drainage Systems, Inc. Provide round cast iron bicycle-proof grate designed to fit PVC basin.
 2. Reinforced concrete pipe, Class 3 or higher, cut to length and bedded vertically in a cast-in-place concrete base pad with bell end at ground surface of dimensions shown on Drawings.

2.08 MANHOLE FRAMES AND COVERS

- A. Cast iron conforming to ASTM A48, heavy-duty of 300 pounds minimum weight to support H-20 wheel loading, with machined bearing surfaces.
- B. Frames shall have a minimum clear opening of 22-1/2" diameter. Covers lettered for proper service such as "SEWER," "STORM," "TELEPHONE" AND "ELECTRIC."

2.09 CATCHBASIN FRAMES AND GRATES

- A. Cast iron conforming to ASTM A48, heavy-duty of 450 pounds minimum weight to support H-20 wheel loading, with machined bearing surfaces. Square frame and grate of 24-inch dimensions with bicycle-safe grate grid of 225 square inch minimum flow area.
- B. Drain inlet cast-iron bicycle-safe grate, manufactured to set into bell end of concrete pipe, such as Neenah R-4030 or Etheridge "Vermont Culvert Grate."

2.10 GEOTEXTILE DRAINAGE FABRIC

- A. Polypropylene or Polyester Non-woven, Needle-punched Drainage Fabric with the Following Minimum Properties:

Weight	4.5 oz/sy	Water Flow Rate	280 gpm/sf
Thickness	60 mils	Coef of Permeability	0.2 cm/sec
Tear Strength	50 lbs	Equiv. Opening Size	70-100 sieve

- B. Mirafi 140N, Terra Tex - SD, Trevira 1115, AEF 480, or approved equal.

2.11 TRENCH INSULATION

- A. Extruded polystyrene with a "K" factor of 0.18, with 2.2 lb./cu. ft. density, and 30 psi compressive strength, manufactured by Dow Chemical, or approved equal.

2.12 PRECAST REINFORCED CONCRETE GREASE TRAP

- A. Constructed of 4000 psi concrete, designed to support an H-20 wheel loading. The 1000-gallon capacity tank shall be of approximate dimensions of 8'-0" long, 5'-1" wide, and 5'-4" high. The tank shall have 24" diameter cleanout covers with precast concrete riser rings or manhole sections raised to finish grade at each end.

2.13 MECHANICAL WATERSTOP TRENCH DAM-(Anti-seep Collar)

- A. Polyethylene membrane square waterstop with sleeve. Ripley's Dam manufactured by Mcrip Inc., Durham, NH, or approved equal.

PART 3 EXECUTION

3.01 EXCAVATION AND BACKFILL

- A. Conforming to the appropriate portions of Section 02200, Earthwork.

3.02 SEWER AND STORM PIPING

- A. Lay pipe on stable bedding beginning at the downstream end and proceeding upstream with the bell end of the pipe upstream. Provide adequate trench drainage to prevent pipe floatation and insure proper bedding compaction.
- B. Where continuous bedding material is used and pipe slope exceeds 3%, construct trench dams along the trench to hinder the flow of ground water through the bedding material. Construct trench dams of relatively impervious clayey or silty material excavated from the trench, extending 1 foot above the pipe embedment zone, and spaced within 25 feet upstream of each manhole, and whenever the trench grade rises 10 feet. Optional: Provide mechanical waterstop trench dams extending 6" beyond the pipe embedment zone.

3.03 UNDERDRAINS AND SOIL GAS VENTS

- A. Set pipe in crushed stone bedding surrounding pipe, with perforations on the bottom half of the pipe. Slope pipe uniformly to drain. Fully wrap stone bedding with Geotextile fabric. Compact to 95% maximum density around pipe.

3.04 MANHOLES, CATCHBASINS AND DRAIN INLETS

- A. Place precast base section level on 8-inch layer of compacted granular bedding material to proper invert elevation. Construct precast sections plumb and with watertight joints and pipe connections. Manhole steps must be in vertical alignment.
- B. Fill lifting holes and voids with cement mortar.
- C. Adjust manhole frames to proper grade by use of precast concrete riser rings or brick and mortar. Use a minimum of 4" of risers and a maximum of 12". Encase frame in full bed of cement mortar.
- D. Adjust catchbasin frame to proper grade to receive drainage by use of brick masonry. Use a minimum of 4" of risers and a maximum of 12". Encase frame in full bed of cement mortar.

3.05 SANITARY MANHOLE LEAKAGE TEST

- A. General: Tests must be observed and certified by the Architect or Municipal Engineer. Structures must be complete including backfill for final test acceptance except for shelf and invert brickwork. Plug all pipes and other openings in the structure walls prior to test.
- B. Infiltration Test: For structures with groundwater table above highest joint. Manhole passes infiltration test if there is no visible leakage into structure.
- C. Manhole Vacuum Test: Acceptable as a final test. The manhole being tested must not be backfilled. The test is passing if the manhole holds 10 inches of mercury vacuum for 5 minutes, with 1 inch of mercury loss allowable.

END OF SECTION

