

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 Section “Summary”, Paragraph 1.1A, entitled “Related Documents.”
- B. The following are minimum requirements and shall govern, except that all Federal, Local, and/or Commonwealth Codes and Ordinances shall govern when their requirements are in excess hereof.

1.2 SUMMARY

- A. Section includes the following:
  - 1. Furnishing all labor, materials, and equipment to install the new site drainage required for this project. The pipe and related items shall be installed by the Contractor as indicated on the plans and as further specified herein. For the roof drainage system, the Contractor’s limit of work shall start at a point ten (10) feet outside of the building.
- B. Related Sections:
  - 1. Division 22 Section “Plumbing”.
  - 2. Division 31 Section “Trenching & Backfilling”.
  - 3. Division 31 Section “Site Clearing and Preparation”.
  - 4. Division 31 Section “Erosion Control”.

PART 2 - PRODUCTS

2.1 HIGH DENSITY POLYTETHYLENE (HDPE) PIPE AND FITTINGS

- A. The HDPE drain pipe shall be AASHTO Type “S” (N-12) and shall have a full circular cross-section, with an outer corrugated pipe wall and essentially smooth inner wall. Corrugations shall be annular. Examples are N-12 ProLink Ultra Pipe from Advanced Drainage Systems (ADS), N-12 HP by Hancor, or approved equal.
- B. Pipe Manufactured for this specification shall comply with the requirements for test methods, dimensions, and markings found in AASHTO Designation M252, M294, and MP7-97. Pipe and fittings shall be made from virgin PE components which conform with applicable current edition of the AASHTO Material Specifications for cell classification as defined and described in ASTM D3350.
- C. The HDPE pipe must incorporate a flush gasketed bell-and-spigot joint into each section of N-12 pipe. The pipe must be of the design that eliminates the need for separate couplings.

- D. All HDPE fittings shall not reduce or impair the overall integrity or function of the pipeline. Fittings may be either molded or fabricated. Common corrugated fittings include in-line joint fittings, such as couplers and reducers, and branch or complimentary assembly fittings such as tees, wyes, and end caps. These fittings may be installed by various methods such as snap-on, bell and spigot, and bell-bell and wrap around couplers. Couplers shall provide sufficient longitudinal strength to preserve pipe alignment and prevent separation at the joints. Only fittings supplied or recommended by the manufacturer shall be used.
- E. Methods of shipping and storage on-site shall be such as to avoid injury to the pipe. Damaged pipe shall be rejected and removed from the job site.

## 2.2 CONCRETE CATCH BASIN AND MANHOLES

- A. Drain manholes shall be precast concrete, and have the inside dimensions specified on the Contract Drawings. Standard catch basins shall be 4' inside diameter precast concrete, double catch basins shall be 5' inside diameter precast concrete.
- B. Bases, risers, and flat tops shall be precast concrete suitable of withstanding H-20 live load plus soil loads and conform to ASTM C478.
- C. Horizontal joints shall be preformed tight fitting and be watertight.
- D. Pipe openings shall be preformed and 2" larger than outside pipe diameter.
- E. All connecting lines in manholes shall have poured 3000 psi concrete inverts rounded in the direction of flow. The inverts shall be arched to one-half (1/2) the pipe diameter and sloped upward to the sides of the manhole.
- F. Pipe-to-structure joints shall be sealed with red sewer brick and mortar.
- G. All catch basins shall have a 4' sump as measured from the bottom of the structure to the outlet invert.
- H. All catch basins shall be equipped with an oil/debris trap such as "Snout" by LeBaron Foundry, Inc. or approved equal. The trap shall be fixed on the inside of the structure and over the outlet pipe.

## 2.3 GRATES, FRAMES, AND COVERS

- A. Drain manhole frames and covers shall be LeBaron LK110A, or equal, with the word "DRAIN" cast in the center of the cover at least three (3) inches in height.
- B. Catch basin frames and grates shall be LeBaron LF248-2, four flange model, or equal.
- C. The castings shall be of good quality, strong, tough, even-grained cast iron, smooth, free from scale, lumps, blisters, sandholes, and defects of every nature which would render them unfit for the service for which they are intended. Contact surfaces of covers and frame seats shall be

machined at the foundry, before shipment, to prevent rocking of covers in any orientation.

- D. All castings shall be thoroughly cleaned and subject to a careful hammer inspection. Castings shall be at least Class 30 conforming to the ASTM Standard Specification for Gray Iron Castings, Designation A48.
- E. Before being shipped from the foundry, castings shall be sandblasted and given two coats of coal-tar pitch varnish, applied in a satisfactory manner so as to make a smooth coating, tough, tenacious, and not brittle or with tendency to scale off.
- F. The Contractor shall repair coatings damaged in transit, to the satisfaction of the Engineer.

#### 2.4 PVC DRAIN PIPE AND FITTINGS

- A. PVC drain and fittings shall conform to ASTM D-3034 or ASTM F679 (SDR 35 Minimum) unless otherwise noted. Polymer compounding and classification shall be in accordance with ASTM D-1784, (Class 12454-B). Methods of shipping and storage on site shall such as to avoid injury to the pipe. Damaged pipe shall be rejected and removed from the job site.
- B. All fittings shall in injection molded. Fabricated fittings are not allowed except as permitted by the Engineer.
- C. Joints for PVC pipe shall be oil resistant compression rings of elastomeric material conforming to ASTM D-3212, push-on bell and spigot pressure type joints.

#### 2.5 TRANSITION COUPLINGS

- A. Where cast iron drains from building connect to site drains, use Fernco Transition Couplings or approved equal neoprene couplings with stainless steel bands.

#### 2.6 TRENCH BACKFILL MATERIALS

- A. Refer to Section 31 23 33 – TRENCHING AND BACKFILLING

### PART 3 - EXECUTION

#### 3.1 PIPE HANDLING

- A. The Contractor shall arrange for the delivery of the pipe sections at approved locations in the vicinity of the portion of the drain lines in which the pipe sections are to be laid. To this end, he shall do such work as is necessary for access and for delivery of the pipe. Pipes shall be stored in an approved, orderly manner so that there will be a minimum of re-handling from the storage area to the final position in the trench and so that there is a minimum of obstruction and inconvenience to any kind of traffic. Deliveries shall be scheduled so that the progress of the work is at no time delayed and also so that quantities of pipe shall not be stored for excessive lengths of time in crowded locations, or in locations where large storage areas might be considered objectionable. Storage of pipe will be restricted to approved or permitted areas.

- B. The Contractor will be required to furnish slings, straps, and/or approved devices to provide satisfactory support of the pipes when it is lifted. Transportation from delivery areas to the trench shall be restricted to operations which can cause no injury to the pipe units. The pipe shall not be dropped from trucks or into the trench.
- C. The Contractor shall have on the job site with each pipe laying crew all the proper tools to handle and cut the pipe. The use of hammer and chisel, or any other method that results in rough edges, chips and damaged pipe, shall be prohibited.

### 3.2 PIPE INSTALLATION

- A. Control of Alignment and Grade: The Contractor shall establish the location of the pipe, manholes and other appurtenances. The Engineer has established benchmarks on the site. The Contractor shall provide additional benchmarks as required for his own reference in checking the pipe and manhole inverts and other elevations throughout the project. The Contractor shall use an in-pipe laser alignment instrument with a ventilation blower to assist in setting the pipe. The use of string levels, hand levels, carpenters levels, and other relatively crude devices for transferring grade or setting pipe will not be permitted. The Contractor shall coordinate work with the individuals responsible for the interior work to assure that uniform alignment and grade is maintained for the piping system. The work shall be done in strict conformance with controls and instructions. The Contractor shall maintain all vertical and horizontal survey control stakes.
- B. Preparation of Bed: As soon as excavation has been completed to proper depth, as shown on the drawings, the filter fabric shall be installed as shown on the drawings, a layer of bedding material (3/4" crushed stone) shall be placed to the elevation necessary to bring the pipe to grade and compacted. It shall be the Contractor's responsibility to control any water in the trench below the pipe invert and he shall place concrete, clay, or other impermeable material in the bedding at intervals to prevent horizontal movement of the bed, or make it difficult to handle water in the trench. If in the opinion of the Engineer, the material of the bottom of the bedding (6" below grade of pipe bottom) is unsuitable for foundation, it shall be removed and replaced with 3/4" crushed stone.
- C. Laying Pipe: Each pipe length shall be inspected for defects or other evidence of unsuitability. Pipe shall then be laid on the trench bedding as shown on the drawings, and the spigot pushed home. Jointing shall be in accordance with the manufacturer's instructions and the appropriate ASTM Standards, and the Contractor shall have on hand for each pipe-laying crew, the necessary tools, gauges, pipe cutters, etc. necessary to install the pipe in a workmanlike manner. Pipe laying shall proceed upgrade with spigot ends pointing in the direction of the flow. If trench boxes are use, they shall not be permitted to extend below mid diameter of the pipe. After the pipe has been set to grade additional bedding material (3/4" crushed stone) shall be placed in 6" layers up to the spring line of the pipe. Tamping bars shall be carefully employed to assure compaction of the bedding under the lower quadrants of the pipe. At this point, the pipe shall be checked for line and grade and any debris, tools, etc., shall be removed. The remainder of the trench shall be backfilled in accordance with the drawings and specifications. Backfill shall be mechanically compacted in lifts to provide the required density. At any time that work is not in progress, the end of the pipe shall be suitably closed to prevent the entry of animals, earth, etc. Unsatisfactory work shall be dug up and reinstalled to

the satisfaction of the Engineer at the Contractor's expense.

### 3.3 DRAIN MANHOLE AND CATCH BASIN INSTALLATION

- A. Precast sections shall be installed in accordance with the approved recommendations of the manufacturer. A 6-inch minimum  $\frac{3}{4}$ " crushed stone bedding shall be provided for all bases.
- B. Structure base/sump shall be set level. Prior to backfilling, the structure shall be checked with a level to assure a plumb installation.
- C. The joints between precast sections shall be mortared or sealed per the typical details.
- D. Pipe to structure joints shall be fully mortared. Bricks shall be incorporated into the mortar work if space allows.
- E. Structures shall be adjusted to grade with courses of brick, as shown on the plans. Frames shall be set on a full bed of mortar, true to grade and concentric with the masonry. All voids between the bottom flange shall be completely filled to make watertight fit. A ring of mortar, at least one-inch thick and pitched to shed water away from the frame, shall be placed over and around the outside of the bottom flange. The mortar shall extend to the outer edge of the masonry all around its circumference and shall be finished smooth. No visible leakage will be permitted.
- F. Structures within the limits of bituminous concrete pavement shall be temporarily set at the elevation of the bottom of the binder course or as ordered. After the binder course has been completed, these structures shall be set at their final grade.
- G. Catch basin frames shall be set to provide positive drainage.
- H. Drain manhole inverts shall be constructed or poured 3000 psi concrete to provide an uninterrupted flow channel. The invert shall be poured to drain dry (i.e. no standing water) and shall be arched to correspond in shape to the lower half of the pipe, and extend up the full height of the pipe.

### 3.4 CLEANING AND ADJUSTING

- A. All catch basin, manholes, and piping shall be cleaned of sediment, debris, material, etc. and flushed with clean water before final inspection.
- B. Seat all manhole covers and catch basin grates, replace any cracked covers.
- C. Any manhole or structure not set to finish grade shall be removed and reset to line and grade at the Contractor's expense.

END OF SECTION 334000