

# 02735 WASTE WATER DRAINAGE SYSTEM

\*\*\*\*\*

*SPECIFIER:*

*CSI MasterFormat 2004 number 22 14 00*

\*\*\*\*\*

## PART 1 GENERAL

### 1.1 SUMMARY

#### A. Related Sections:

1. 02221 - Excavating, Backfilling, and Compaction for Utilities.
2. 03300 - Cast-in-Place Concrete.
3. 15175 - Tanks

### 1.2 REFERENCES

#### A. American Society for Testing and Materials (ASTM), latest edition:

1. C131 Test Method for Resistance to Degradation of Small-Size Coarse Aggregate by Abrasion and Impact in the Los Angeles Machine.
2. D1557 Test Method for Laboratory Compaction Characteristics of Soil Using Modified Effort.
3. D2321 Practice for Underground Installation of Thermoplastic Pipe for Sewers and Other Gravity-Flow Applications.
4. D2855 Practice for Making Solvent-Cemented Joints with Poly (Vinyl Chloride) (PVC) Pipe and Fittings.
5. D3034 Specification for Type PSM Poly (Vinyl Chloride) (PVC) Sewer Pipe and Fittings.
6. D3212 Specification for Joints for Drain and Sewer Plastic Pipes Using Flexible Elastomeric Seals.

#### B. American Association of State Highway and Transportation Officials (AASHTO) Publications, latest edition:

1. M-196 Corrugated Aluminum Alloy Culverts and Under Drains.
2. M-190 Bituminous Coated Corrugated Metal Culvert Pipe and Pipe Arches.

#### C. Miami-Dade County Public Works Manual (M-DCPW), latest Edition.

#### D. Florida Department of Transportation (FDOT) Specification, latest Edition.

### 1.3 SUBMITTALS

#### A. Submit properly identified shop drawings and manufacturer's catalog cuts, technical data, and certificates on the following before starting work:

1. Precast concrete structures or fiberglass or plastic structures.
2. Frames and covers.
3. Pipe.

4. Floor drains (vandal proof).
5. Plastic filter fabric.
6. Test reports.

B. Include manufacturer's certificates of compliance or certified analysis according to applicable standards with each shipment of material.

#### 1.4 PRODUCT STORAGE

A. Keep materials, structures, equipment, and appurtenances stored on the site clean and free of foreign materials.

1. Replace damaged items at no cost to the Board.

### PART 2 PRODUCTS

#### 2.1 MATERIALS AND EQUIPMENT

A. Pipe: Helical Corrugated Aluminum Alloy Pipe:

1. Non-Perforated: Comply with AASHTO M-196.
2. Perforated:
  - a. Comply with AASHTO M-196.
  - b. Perforations: 1/4" to 3/8" diameter holes at  $\pm$  2-3/4" o.c. with a minimum of 114 holes per linear foot.

3. Polyvinylchloride (PVC) Drainage Pipe and Fittings:

- a. Comply with ASTM D3034 for SDR35 except where indicated. Use bell and spigot type pipe.
- b. Pipe Identification: Pipe shall be a different color from water pressure pipe and force main for in-ground identification as sewer pipe.

B. Joints:

1. For Corrugated Pipe: Band couplers as indicated.
2. For PVC Drainage Pipe and Fittings: Elastomeric gasket joints complying with the requirements of ASTM D3212 providing a watertight seal or solvent-cemented joints complying with ASTM D2855 providing a watertight seal.

C. Manhole: 24 inch diameter, helical corrugated aluminum alloy pipe or precast concrete with cast iron frame and hinged cover as indicated.

D. Concrete Slab: Provide as indicated, using 3000 psi concrete.

E. French Drain Trench:

1. Ballast Rock:
  - a. Obtain from local fresh water sources.
  - b. When subjected to ASTM C131 tests, loss shall not exceed 40 percent.

c. Ballast rock designated as 2 inches shall fall within the 3/4" to 2-1/2" range.

2. Plastic Filter Fabric:

- a. Poly Filter "X" by Carthage Mills.
- b. Mirafi 140N by TenCate Geosynthetics Americas .
- c. Typar Style 3401 by Dupont.
- d. Propex 4545 by Amoco.

F. Floor Drain: Josam or Zurn as indicated. Floor drain shall be vandalproof.

G. Grease Interceptor Tanks: Shall comply with Master Specifications section 15175 - Tanks

## PART 3 EXECUTION

### 3.1 INSPECTION

A. Do not proceed with the work of this section until conditions detrimental to the proper and timely completion of the work have been corrected in an acceptable manner.

### 3.2 INSTALLATION

A. Trenches:

1. Excavation and backfilling for trenches, manholes, and grease trap shall be as specified in Section 02221-Excavation, Backfilling, and Compaction for Utilities.

B. Grease Trap: Install as indicated and according to manufacturer's recommendations.

C. Placing Pipe:

1. Carefully examine each pipe before laying; do not use defective or damaged pipe.

- a. Lay pipelines to grades and alignment indicated.
- b. Provide proper facilities for lowering sections of pipe into trenches.
- c. Inspect pipe in place before backfilling and remove and replace those damaged during placement at no cost to the Board.

2. Corrugated Pipe: Laying shall proceed with separate sections joined firmly together, with outside lap of circumferential joints pointing upstream and with longitudinal laps on sides.

3. Waste Water Drainage Pipe:

- a. Shape bottom of trench by hand to give substantially uniform circumferential support to lower 1/4 of each pipe.
- b. Where applicable, pipe laying shall proceed upgrade with tongue or spigot ends pointing in direction of flow.
- c. Lay each pipe true to line and grade indicated on drawings and in such a manner to form a close concentric joint with adjoining pipe and to prevent sudden offsets of flow line.

- d. As work progresses, clean interior of storm sewer of dirt and superfluous materials.
  - 1) Where cleaning after laying is difficult because of small pipe size, a suitable swab or drag shall be kept in the pipe and pulled forward past each joint immediately after joint has been completed.
  - 2) If maximum width of trench at top of pipe as specified is exceeded, install either concrete cradling, pipe encasement or other bedding as may be required to support added load of backfill.
- e. Keep trenches for sections of sewer free from water until pipe-jointing material has set and trench backfilled.
  - 1) Do not lay pipe when condition of trench or weather is unsuitable for such work.
- f. Keep open end of pipes and fittings securely closed at times when work is not in progress.
  - 1) When other conditions are such that pipe cannot be adequately supported on undisturbed earth or tamped backfill, encase pipe in concrete or support it on a concrete cradle.
  - 2) Pipe and fittings shall be installed according to ASTM D2321.

#### 4. Pipe Joints:

- a. Polyvinylchloride (PVC) Pipe: Install joints according to ASTM D3212 and manufacturer's installation recommendations.
- b. Helical Corrugated Aluminum Pipe: Install band couplers according to manufacturer's recommendations.

#### D. Manhole:

- 1. Construction: As indicated on the drawings.
- 2. Frames and Covers: Set the cast iron frames and covers in a bed of mortar and carefully adjust to elevations indicated.

#### E. French Drain Trench:

- 1. Excavate trench to depth indicated.
- 2. Place filter fabric and ballast rock to the level of the proposed perforated aluminum pipe.
- 3. After pipe has been laid and accepted, continue placing ballast rock carefully to avoid displacement of pipe, and tamp carefully.
- 4. Continue installation of filter fabric as indicated.
- 5. Fill trench to level indicated with ballast rock of size or sizes indicated.
- 6. Backfill and compact according to requirements of Section 02221 - Trenching, Backfilling, and Compaction for Utilities.
- 7. Finish construction of trench as indicated.

- F. Grease Interceptor Tanks: Install in accordance with Plans and manufacturer's recommendations, whichever is most stringent. Excavate hole for grease interceptor tanks

according to Section 02221 - Trenching, Backfilling, and Compaction for Utilities, except as noted in the following.

1. Perform excavating of every description and of whatever satisfactory or unsatisfactory material encountered to accommodate grease interceptor tanks at depths indicated on plans.
  2. Pile materials suitable for backfilling a sufficient distance from banks of excavation to prevent slides or cave-ins.
  3. Keep surface drainage of adjoining areas unobstructed.
  4. Remove excavated materials not required nor suitable for backfill from site.
  5. Remove water by pumping or other acceptable method and discharge at a safe distance from excavation.
  6. Make hole of necessary width and depth for proper laying of grease interceptor tanks, with bank nearly vertical as practical.
  7. Grade bottom of excavation accurately to provide uniform bearing and support for each section of grease trap according to plans and manufacturer's recommendations.
  8. When unsatisfactory soil, incapable of properly supporting the grease trap, is encountered at the bottom of the excavation, remove such soil to a minimum depth of 12 inches and substitute this unsuitable material by a minimum of 12 inches of compacted ballast rock at no cost to the Board.
  9. Over-depths in unstable soil excavation and unauthorized over-depths shall be at the expense of the Contractor.
- G. Excavation of Unclassified Material: Materials encountered during the excavating to the depth and extent specified and indicated on drawings may include rock, concrete, masonry, debris, garbage, silt, rubble, or other materials.
1. No adjustment will be made in the Contract Price because of the presence (or absence) of these or other materials.
- H. Protection or Removal of Utility Lines:
1. Protect existing utility lines indicated on drawings (or the locations of which are made known to Contractor before excavating and trenching) specified to remain, including utility lines constructed during excavation operations, from damage during excavation, backfilling, and compacting operations.
    - a. If such new or existing utility lines are damaged during excavation, backfilling, and compacting operations, repair or replace at no cost to the Board.
  2. When utility lines specified to be removed or replaced are encountered within the area of operations, issue notices in ample time for measures to be taken to coordinate necessary interruption of services.
  3. Location of existing underground utilities shown are approximate. Excavations shall be done using extreme care to avoid damage to any existing underground utilities. Any damage occurring shall be repaired immediately at the Contractor's expense to the complete satisfaction of the A/E.
  4. Repair of Damage to Unknown Existing Utility Lines: Existing utility lines not shown on drawings and are damaged during excavation operations shall be repaired by Contractor and an adjustment to the Contract Price will be made according to Instructions to Bidders and General Conditions.
- I. Backfilling:

1. General:

- a. Coordinate backfilling with testing of utilities.
- b. Leave sheeting in place where damage is likely to result from withdrawal.
- c. Carefully backfill excavation with satisfactory materials specified.
- d. Bring backfill up evenly in all sides in 9 inch maximum layers, loose depth, and thoroughly and carefully compact with mechanical or hand tampers.
- e. Take care not to damage the grease trap or manhole by excessive tamping.
- f. Excavation pits improperly backfilled or where settlement occurs shall be reopened to the depth required for proper compaction, refilled and compacted, with the surface restored to the specified grade and compaction at the Contractor's expense.
- g. Materials and density shall be as previously specified for trenches depending upon location of the structure.

2. Compaction:

- a. Material may be compacted by a hand tamper, a powered hand tamper, or mechanized power tamper provided such compaction meets the required density as specified.
- b. Backfilling and compacting by means of hydraulic methods will not be allowed except as accepted by A/E.
  - 1) Compact each layer to not less than the percentage of maximum density specified below, determined according to ASTM D1557, Method D:

<u>Fill and Backfill</u>	<u>Cohesionless Soil</u>
Under grass areas	85%
Under pavements	95%

3.3 TESTING

- A. See Section 02221, paragraph related to Testing, two tests minimum at location chosen by A/E.
- B. Abrasion tests for each size and type of ballast rock. Material will be rejected if not in compliance with requirements.

END OF SECTION