

# Special Specification 7236

## Stormwater Treatment System



### 1. DESCRIPTION

Furnish and install pre-engineered stormwater treatment system, complete in place. Work must include all design work, signed and sealed by a Licensed Professional Engineer in the State of Texas, labor, materials, equipment and incidentals required to install stormwater treatment system, pipe connections and appurtenances in accordance with the Drawings and Specifications.

### 2. MATERIALS

Provide new materials that comply with the details shown on the plans and in accordance with the following:

- Item 400, "Excavation and Backfill for Structures"
- Item 420, "Concrete Substructures"
- Item 421, "Hydraulic Cement Concrete"
- Item 429, "Concrete Structure Repair"
- Item 440, "Reinforcement for Concrete"
- Item 471, "Frames, Grates, Rings, and Covers"
- Item 481, "PVC Pipe for Drains"

#### 2.1 **General Design.** Provide stormwater treatment system, pipe connections and appurtenances in accordance with the Drawings and these Specifications.

Alternate designs must be acceptable to the Engineer and not deviate from the functional requirements provided in this specification. Alternate designs, including any structural re-design requirements, are to be designed and sealed by a licensed professional engineer registered in the State of Texas. All stormwater treatment units must be provided by the same manufacturer.

The device must be cylindrical or rectangular and constructed from precast concrete riser and slab components or monolithic precast structures, installed to conform to ASTM C 891 and to any required state highway, municipal or local specifications.

#### 2.2 **Materials.** Materials used for stormwater treatment units and appurtenances must be capable of withstanding aggressive biological, chemical and loading environments, typical of the geographic area in which the units are being installed, including freeze-thaw weather cycles, earth and buoyant pressures, and hydrostatic pressures. Concrete must achieve a minimum 28-day compressive strength of 4,000 psi.

**Concrete Box/Cylinder.** Furnish Class C (HPC) concrete for stormwater treatment box/cylinder and riser unless otherwise shown on the plans. Construct precast stormwater treatment box/cylinder in accordance with Item 420, "Concrete Substructures" or ASTM C 478. Air entrained concrete will not be required in precast concrete members. Use Type II Portland cement conforming to ASTM C 150.

**Mortar.** Furnish mortar composed of one part hydraulic cement and two parts clean sand; hydrated lime, or lime putty, may be added to the mix to a maximum of 10% by weight of the total dry mix.

**Traffic load.** Provide concrete box/cylinder and riser that meet HL93 AASHTO LRFD live loading requirements.

**Buoyant load.** Stormwater treatment units shall be designed and provided by the manufacturer to resist buoyant pressures imposed on the units so they do not become displaced during the 100-year storm event as per the water surface elevations shown on the plans.

**Sealing.** Apply sealant as shown on the plans or as recommended by the manufacturer. Sealant materials must be approved by the Engineer before installation of the stormwater treatment units.

**Frames, Grates, Rings, and Covers.** Furnish materials as shown on the plans and in accordance with Item 471, "Frames, Grates, Rings, and Covers."

2.3 **Maintenance Access to Captured Pollutants.** The stormwater treatment unit must be designed to provide maintenance access for removal of accumulated floatable pollutants and sediment and must be located in an area that maintenance vehicles and personnel can easily access.

2.4 **Performance.** For the 10-year design storm event, the stormwater treatment unit (SWTU) must be capable of treating the design discharge stated on the plans. A stormwater bypass unit may be used for the remaining flow beyond the stated design discharge.

Stormwater treatment system must be capable of removing at least 80% of the long term influent Total Suspended Solids (TSS) load as demonstrated in laboratory testing following the multi-state endorsed Technology Acceptance and Reciprocity Partnership (TARP) Tier II Protocol. To gain approval as a stormwater treatment system, independent proof of 80% TSS removal performance must be submitted in the form of a verification letter from a TARP participating state.

The SWTU must, as a minimum:

Not allow surcharge of the upstream piping network during dry weather conditions.

Provide a means of preventing the introduction of trapped oil and floatable contaminants to the downstream piping during routine maintenance; a means to ensure that no oil escapes the system during the ensuing rain event.

Provide direct access to the sediment and floatable contaminant storage chambers to facilitate maintenance. There must be no internal components that obstruct maintenance access to the contaminant storage chambers.

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### 3 CONSTRUCTION

3.1 **Submittals.** The manufacturer must submit shop drawings for stormwater treatment system with precast concrete box/riser and accessory equipment along with proof of TARP verification. Drawings must include principal dimensions, annotations indicating all materials to be used, and all applicable standards for materials, required tests for materials, and design assumptions for structural analysis. Manufacturer must provide documentation proving that the recommended system was used in the State of Texas and has at least 5 yr. of satisfactory experience from the owners. In addition to drawings, the manufacturer must submit an Operation and Maintenance Manual.

Submit shop drawings showing details for construction, including structural details, in accordance with the requirements of Section 2 for review and approval. Show annotations on the shop drawings to indicate all principal dimensions, materials to be used and all applicable standards for materials, required tests of materials, and design assumptions for structural analysis.

Shop drawings will be signed and sealed by a licensed Professional Engineer in Texas.

Manufacturer must provide documentation demonstrating that the manufacturer has at least 5 yr. of satisfactory experience and has the capability to perform the work.

Submit three full sets of manufacturer's literature and Operation and Maintenance Manual for the proposed stormwater treatment system for review and approval. Literature must include documentation as to the expected design life for stormwater treatment unit and any warranties. The design life of the stormwater treatment unit should be what would be expected from a standard concrete stormwater structure.

- 3.2 **Construction.** Before installation, all precast stormwater treatment units will be inspected for general appearance, dimensions, soundness, etc. The concrete surface must be dense, close textured, and free of blisters, cracks, roughness, and exposure of reinforcement. Repair any damaged concrete boxes/cylinders in accordance with Item 429, "Concrete Structure Repair." Remove and replace any damaged stormwater treatment unit beyond repair, as directed, at no extra cost.

Complete stormwater treatment system installation in accordance with the plans. Place the stormwater treatment box/cylinder on crushed rock base material with minimum thickness of 6 inches after compaction. Compact base material to at least 95% of the maximum dry density as determined by the standard Proctor compaction test, ASTM D698, at moisture content of +/-2% of optimum water content. The base material must be checked for level before setting and the box/cylinder must be checked for level at all four corners after it is set. If the slope from any corner to any other corner exceeds 0.5%, the box/cylinder must be removed and rock base material must be re-leveled.

Place backfill material to ground elevation as shown on the plans and in accordance with Item 400, "Excavation and Backfill for Structures."

Maintain the stormwater treatment system until the project is accepted by providing monthly routine inspection and scheduled cleaning in accordance with the manufacturer's recommendations. Clean and remove accumulated sediment and debris using a vacuum truck or pump when the deposited sediment and debris has accumulated to 12 in. in depth, when a known hazardous spill has occurred, or as directed. Cleaning and sediment and debris removal must be performed by a waste management company licensed in Texas to perform solid waste disposal.

- 3.3 **Clean Up.** Remove all excess materials, rocks, roots, or foreign material, leaving the site in a clean, complete condition approved by the Engineer. All internal components of the stormwater treatment unit must be free of any foreign materials including concrete and excess sealant.

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## 4 MEASUREMENT

Stormwater treatment unit, satisfactorily completed in accordance with the plans and this specification, will be measured by each, of the size (design discharge treatment capacity) specified, complete in place.

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## 5 PAYMENT

The work performed and materials furnished in accordance with this Item and measured as provided under "Measurement" will be paid for as follows:

Payment for complete stormwater treatment unit will be made at the unit price bid for "Stormwater Treatment Unit" of the size (design discharge treatment capacity) specified. The size of the stormwater treatment unit will be the 10-year design storm discharge to be treated shown on the plans rounded up to the next 5-CFS increment. The price is full compensation for furnishing concrete, reinforcing steel, grout, aluminum and castings, frames, grates, rings and covers, treatment units, internal components, connection pipes, excavation, crushed rock base, backfill, cleaning, maintaining the system, and for all other materials, tools, equipment, labor, incidentals, cleaning, and maintenance as necessary to install stormwater treatment units, complete in place, and in accordance with the plans and this specification.