

Subsection 5.03
Headwalls, Wingwalls and
Safety End Treatments

I. Scope: Furnish, construct and install, concrete headwalls, wingwalls, and safety end treatments for drainage structures.

II. Material

A. Furnishing materials in accordance with:

1. Subsection 4.07, "Concrete;"
2. Subsection 4.12, "Reinforcing Steel;"
3. Subsection 4.20, Metal Beam Guard fence."
4. Subsection 5.01, Storm Sewer Pipe," and
5. Supply cast in place or pre-cast units as shown in the plans.

Provide galvanized steel for prefabricated metal end sections that meet the requirements of galvanized pipe detailed in Subsection 5.01, "Storm Sewer Pipe."

B. When required furnish pipe runners for safety end treatments in accordance with the following:

1. ASTM A 1085;
2. ASTM A 53, Type E or S, Grade B;
3. ASTM A500, Grade B; or
4. API 5L, Grade X42.

Furnish plates and angles in accordance with ASTM A36. Furnish nuts and bolts in accordance with ASTM A307. Galvanize pipes, plates, angles, nuts, and bolts in accordance with Subsection 4.20, Metal Beam Guard Fence."

C. Fabrication

1. Headwalls and Wingwalls

a) General: Fabricate cast in place concrete in accordance with Subsection 4.07, "Concrete;" Use the following definitions for headwalls and wingwalls:

(1) "Headwalls" refers to all walls, including wings, at the ends of single-barrel and multi-barrel pipe culvert structures.

(2) "Wingwalls" refers to all walls at the ends of single-barrel or multi-barrel box culvert structures.

b) Marking: Clearly mark each precast unit before shipment from the casting yard with the following:

(1) Date of manufacture

(2) Name or Trademark of manufacturer

(3) Type and size of unit

c) Causes for Rejection: Precast units may be rejected for fractures or cracks passing through the wall. Surface defects of honeycombed or open areas. Remove and replace rejected units. Imperfections may be repaired if approved by the ODR or the Engineer.

2. Safety End Treatments: Fabricate cast in place concrete units in accordance with Subsection 4.07, "Concrete."

For reinforced concrete pipe provide either mitered ends or precast safety end treatments (SET).

a) SET Types

(1) **Type I.** SET consisting of concrete headwalls or wingwalls and pipe runners in accordance with the plans.

(2) **Type II.** SET consisting of mitered ends for pipes in the proper slope shown in the plans and pipe runners when required.

b) Causes for rejection: Precast units may be rejected for fractures or cracks passing through the wall. Surface defects of honeycombed or open areas. Remove and replace rejected units. Imperfections may be repaired if approved by the ODR or the Engineer.

III. Construction: The Contractor shall design, produce, transport, and place the class of

concrete in accordance with requirements of this Subsection. The Contractor will perform quality assurance (QA) testing at the scope and frequency outlined in Table 1. QA testing conducted by the Contractor will be submitted to the ODR for review to determine payment and make acceptance decisions. The Contractor may perform quality control (Q/C) testing. The Contractor is allowed to submit Q/C testing to the ODR. The ODR reserves the right to take additional Q/A tests.

**Table 1
Concrete Testing Frequency**

Test For	Test Number	Sampling Location	Frequency of Testing	Remarks
Compressive Strength	Tex-418-A	At point of placement	4 cylinders for each 100 CY or fraction thereof for 3000 psi concrete.	Sampling shall be in accordance with Tex-407-A. 2 cylinders shall be tested at 7 days and if the average is below the design strength as defined in Table 1 of Subsection 4.07 "Concrete", the remaining 2 cylinders shall be tested at 28 days. If the average value of the 2 cylinders broken at 7 days the 2 remaining cylinders are not required to be tested.
Slump	Tex-415-A	At point of placement	When cylinders are taken.	Slump shall not exceed 4 inches
Entrained Air	Tex-416-A or Tex-414-A	At point of placement	When cylinders are taken.	A minimum of 3% and a maximum of 7% entrained air is required
Temperature	Tex-422-A	At point of placement	When cylinders are taken.	A maximum of 90°F is allowed at placement.

- A. General:** Remove portions of existing culvert or pipes if necessary for application of SET.
- B. Excavation, Shaping, Bedding, and Backfill:** Excavate, shape, bed and backfill in accordance with Subsection 5.06," Structural Excavation and Backfill." SET must be placed on a firm foundation. Take precautions to keep from disturbing the SET while backfilling.
- C. Connections:** Make connections to new or existing structures using joint material shown in Subsection 5.01, "Storm Sewer Pipe."
- D. Pipe Runners:** Install pipe runners as shown on the plans.

IV. Measurement

- A.** Headwalls will be measured by each end of structure
 - B.** Wingwalls will be measured by each end of structure.
 - C.** Safety End Treatments will be measured by each end of structure.
- V. Payment:** The work performed and materials furnished as prescribed by this item and measured as provided under "Measurement" shall be paid for at the unit price bid for " Headwalls, Wingwalls, and Safety End Treatments", which price shall be full compensation for supplying, hauling, testing, installing of end treatments; excavating, and backfilling, and all incidentals necessary to complete the work. Riprap aprons around precast SET's are subsidiary to the end treatment.

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