

## SECTION 504 CULVERTS, RETAINING WALLS AND ENDWALLS

### 504.1 Description

- (1) This section describes constructing culverts, retaining walls, and endwalls.
- (2) This section applies to all culverts, whether the department classifies them as culverts, or bridges as defined in section 101.
- (3) This work does not include furnishing or installing pipe culverts.

### 504.2 Materials

- (1) Furnish materials conforming to the following:

|                          |             |
|--------------------------|-------------|
| Concrete .....           | section 501 |
| Steel reinforcement..... | section 505 |

### 504.3 Construction

#### 504.3.1 Concrete Composition

- (1) Unless specified otherwise, conform to the requirements for grade A, A-FA, A-S, A-T, A-IS, or A-IP concrete as specified in section 501. Where the contract specifies or the engineer allows, the contractor may use high early strength concrete.
- (2) Conform to coarse aggregate sizes specified in 501.2.5.4.4 and 501.3.2.2.

#### 504.3.2 Placing Concrete

- (1) Before placing concrete give the engineer sufficient notice to allow inspection of the forms, reinforcement, and casting preparations.
- (2) For constructing concrete box culverts, unless specified otherwise, place the curtain walls, base slab, and the barrel sidewalls as a single unit to an approximate height of 6 inches (150 mm) and allow to set before constructing the remaining culvert. Construct the sidewalls and top slab of box culverts as a monolith, unless specified otherwise. Allow not less than one hour or more than 3 hours to elapse between placing the concrete in the sidewalls and that in the top slab.

#### 504.3.3 Removing Falsework and Applying Load

- (1) Do not remove culvert falsework with a span of 4 feet (1.2 m) or less until 5 days after pouring, exclusive of days subject to temperatures below 40 F (4 C), except if using concrete grades A-FA, A-S, A-T, A-IS, or A-IP, and did not control field operations by cylinder tests, then increase the time to 12 days. If controlling field operations by cylinder tests, the engineer may approve falsework removal, if cylinder tests show a compressive strength not less than 2000 pounds per square inch (13 800 kPa). Determine cylinder strengths as specified under falsework in 502.3.4.2. If using high early strength concrete, the engineer may reduce the above 5-day period to 3 days.
- (2) Remove culvert falsework with a span of more than 4 feet (1.2 m) according to 502.3.4.2 for removing falsework for concrete bridges.
- (3) The Contractor may backfill culverts, retaining walls, and end walls that have attained the specified compressive strength or upon expiration of the minimum times as specified in 206.3.13. Do not apply additional loads on culverts until attaining a compressive strength of 3500 psi (20.7 MPa) or, absent compressive strength information, for at least 21 days.

#### 504.3.4 Name Plates

- (1) Install on each culvert and retaining wall, a nameplate conforming to 506.2.4 at the location the plans show or as the engineer directs. Attach the nameplate as specified in 502.3.11. Furnishing and placing the nameplate is incidental to the work.

#### 504.3.5 Curing

- (1) Cure concrete in culverts, retaining walls, and end walls by any of the methods specified for curing substructure units in 502.3.8.

### 504.4 Measurement

- (1) The department will measure the several bid items that constitute the completed and accepted structure according to the provisions of the contract for those bid items and in the units the contract specifies. All

work included within the scope of this contract but not listed as bid items in the proposal is incidental to the work.

- (2) The department will measure the Concrete Masonry Culverts bid items by the cubic yard acceptably completed. The department will not measure work or material for forms, falsework, cofferdams, unless specified otherwise. The department will not measure pumping, bracing, or other incidentals necessary to complete the work.
- (3) The department will measure the Concrete Masonry Retaining Walls bid items by the cubic yard acceptably completed. The department will not measure work or material for forms, falsework, cofferdams, unless specified otherwise. The department will not measure pumping, bracing, or other incidentals necessary to complete the work.
- (4) The department will measure Concrete Masonry Endwalls by the cubic yard acceptably completed. The department will not measure excavation, reinforcement, work or material for forms, pumping, bracing or other incidentals necessary to complete the work.

## **504.5 Payment**

### **504.5.1 General**

- (1) The department will pay for measured quantities at the contract unit price under the following bid items:

| <u>ITEM NUMBER</u> | <u>DESCRIPTION</u>                   | <u>UNIT</u> |
|--------------------|--------------------------------------|-------------|
| 504.0100           | Concrete Masonry Culverts            | CY          |
| 504.0200           | Concrete Masonry Culverts HES        | CY          |
| 504.0500           | Concrete Masonry Retaining Walls     | CY          |
| 504.0600           | Concrete Masonry Retaining Walls HES | CY          |
| 504.0900           | Concrete Masonry Endwalls            | CY          |

- (2) Perform miscellaneous work the plans show, or the contract otherwise specifies but does not list as a bid item, as a part of and included in the contract price for other contract bid items.
- (3) Payment for the Concrete Masonry Culverts bid items is full compensation for all materials, forms, falsework, placing, finishing, curing, protecting, and heating.
- (4) Payment for the Concrete Masonry Retaining Walls bid items is full compensation for all materials, forms, falsework, placing, finishing, curing, protecting, and heating.
- (5) Payment for Concrete Masonry Endwalls is full compensation for all excavating; all materials, including reinforcement; forms; placing, including reinforcement; finishing, curing, protecting and heating.