

## SECTION 504 CULVERTS, RETAINING WALLS, AND ENDWALLS

### 504.1 Description

- (1) This section describes providing culverts whether defined as a culvert or bridge under [101.3](#), retaining walls, and endwalls. This work does not include providing pipe culverts under [section 520](#) through [section 525](#).

### 504.2 Materials

*Revise 504.2 to require QMP testing as class I structure concrete under 715 for culverts and retaining walls and as class III ancillary concrete under 716 for endwalls.*

- (1) Furnish steel reinforcement conforming to [section 505](#).
- (2) Furnish grade A, A-FA, A-S, A-T, A-IS, or A-IP air-entrained concrete conforming to [section 501](#) as modified in [part 7](#). Where the contract specifies or the engineer allows, the contractor may use high early strength concrete.
- (3) Provide QMP for concrete as follows:
  - For culverts and retaining walls as specified in [section 715](#) for class I structure concrete.
  - For endwalls as specified in [section 716](#) for class III ancillary concrete.

### 504.3 Construction

*Revise and retitle 504.3.1 to define general construction requirements for culverts, retaining walls, and endwalls. Parapets placed on retaining walls cannot be slip formed unless explicitly allowed in the special provisions.*

#### 504.3.1 General

- (1) Construct culverts, retaining walls, and endwalls conforming to [502.3](#).

#### 504.3.2 Placing Concrete

- (1) 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 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

*Revise 504.3.3(1) and 504.3.3(2) to simplify the falsework removal requirements for culverts.*

- (1) For culvert spans less than 12 feet, the engineer may allow falsework removal based on one of the following:
  - Absent compressive strength information, the minimum equivalent days specified in [502.3.10.1](#).
  - With compressive strength information, a strength of 2000 psi or greater.
- (2) For culvert spans of 12 feet and greater, the engineer may allow falsework removal after 7 equivalent days as defined in [502.3.10.1](#).
- (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 or, absent compressive strength information, for at least 21 days.

#### 504.3.4 Name Plates

- (1) Install nameplates on culverts and retaining walls conforming to [506.2.4](#) at the locations the plans show. Embed in concrete as specified in [502.3.11](#).

#### 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 and 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.
- (3) 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 r incidental to other contract bid items.
- (3) Payment for the Concrete Masonry Culverts and the Concrete Masonry Retaining Walls bid items is full compensation for all materials, forms, falsework, placing, finishing, curing, protecting, and heating; and for providing nameplates.
- (4) Payment for Concrete Masonry Endwalls is full compensation for all excavating; all materials, including reinforcement; forms; placing, including reinforcement; finishing, curing, protecting and heating.