

Special Specification 4049

Precast C-Span Culverts



1. DESCRIPTION

Design, fabricate, and install a formed, single-span, precast C-span culvert including wingwalls, headwalls, footings and solid bottom with toe walls when required. This item does not govern the design or installation of drilled shafts or piles.

2. MATERIALS

Meet the requirements of Section 462.2.1., "General." Use Class F or Class H concrete, with design strength of 5,000 psi for the precast elements and Class C concrete for the cast-in-place elements.

- 2.1. **Design.** The type and size of structure will be shown on the plans using the following convention: Precast C-Span Culvert (XX ft. span) (XX ft. rise) (XX ft. length). Span is the dimension between the inside face of the walls of the structure. Rise is dimension between the top of footing and the inside face of the top slab. Length is the combined width of the 3-sided culvert sections to provide the clear roadway width.

Submit to the Engineer details and design calculations bearing the seal of a licensed professional engineer for review and approval. Include a complete explanation of design methodology and design computations for arch sections, footings, headwalls and wingwalls. Design the precast C-span culvert sections for earth loading, dead loading, HL-93 live loading, and rail impact loading. Design the rail to headwall and rail to wingwall connections for rail impact loading. Use the allowable bearing pressure and footing elevation shown in the plans for footing design. For C-span culverts with footing thickness less than two ft., or not founded on piles and drilled shafts, provide a four inch thick minimum culvert bottom between footings and a two ft. minimum depth toe wall on the upstream and downstream ends of the culvert.

- 2.2. **Fabrication.** Prepare and submit detailed shop and working drawings for the precast C-span culvert including details for casting, lifting, placing, sealing joints, attachment of headwalls and parapets, and any other detail necessary to cast and place the culvert, headwalls, and wingwalls. Submit the lifting and placing details to the Engineer for review. Submit all others to the Engineer of Record, or a review office as directed by the District for review and approval. Submit all drawings in accordance with the formats stipulated in the Guide to Electronic Shop Drawing Review found at http://ftp.dot.state.tx.us/pub/txdot-info/library/pubs/bus/bridge/e_submit_guide.pdf.

Meet the requirements of Sections 462.2.2., "Fabrication;" 462.2.3., "Testing;" 462.2.6., "Tolerances;" 462.2.7., "Defects and Repair;" and 462.2.8., "Storage and Shipment."

Provide surface finish as indicated under Section 420.4.13., "Ordinary Surface Finish" for exposed exterior surfaces of wing walls and headwalls, unless indicated otherwise on the plans.

Manufacture precast C-span culvert sections with flat butt ends such that when the sections are laid together they will make a continuous line of sections with a smooth interior free of appreciable irregularities.

Mark precast C-span culvert sections with the following:

- Culvert Section Span x Culvert Rise x Height of Fill,
- Date of Manufacture, and
- Name or Trademark of Manufacturer.

Indent markings into the culvert section or paint with waterproof paint. Locate the markings on the inside of the vertical leg of the culvert section.

- 2.3. **Construction.** For excavation, shaping, bedding, backfill, and placement of boxes, meet the requirements of Article 462.3., "Construction."

Provide a smooth-float finish for non-exposed cast-in-place concrete.

Take care during the backfilling operations to keep the joint wrap in its proper location over the joint.

- 2.4. **Measurement.** This Item will be measured by the foot. Measurement will be made between the ends of the culvert along the flow line.

- 2.5. **Payment.** The work performed and materials furnished in accordance with this Item and measured as provided under "Measurement" will be paid for at the unit price bid for "Precast C-Span Culverts" of the size specified. This price is full compensation for constructing, furnishing, and transporting sections; preparation and shaping of the bed; jointing of components; jointing material; reinforced concrete footings, bottom and toe walls; and equipment, labor, tools and incidentals.

Protection methods for excavations greater than 5 ft. deep will be measured and paid for as required under Item 403, "Temporary Special Shoring." Excavation, bedding and backfill will be paid for in accordance with Item 400, "Excavation and Backfill for Structures." Piling and drilled shafts will be paid for under Item 409, "Prestressed Concrete Piling", and 416, "Drilled Shaft Foundations". Abutment caps will be paid for under Item 420, "Concrete Substructures".