

# **vaughn concrete products, inc.**

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## **SAMPLE SPECIFICATION FOR PRECAST CONCRETE U-CULVERT** **(PRECAST UNITS ALSO CALLED 3-SIDED BOX CULVERT)**

Precast Concrete U-Culverts are to be manufactured by a firm, which has a minimum of 10 years successful experience in fabrication of Precast Concrete units such as those required on this project. Precast Concrete U-Culverts to be manufactured by Vaughn Concrete Products, Inc., 1-877-827-8255, or a pre-approved comparable manufacturer. For pre-approval all other manufacturers must present complete shop drawings and submittals for verification of compliance with design criteria along with a list of several completed projects using similar type products. The list of completed projects shall include project name, location, type and size of precast structure provided and a contact name with a phone number of an individual familiar with the project. This must be provided to the design engineer at least 21 days prior to project bid date. A full five days must be given to the design engineer for submittal review. Supplier approval must be obtained 14 days prior to bid opening. No late approvals will be allowed. A plant inspection will (may) also be required for production facility inspection, similar product inspection and to review record keeping for material certification. The submittal information must be supplied in accordance with requirements of the project specifications and must address compliance with the items listed below.

Precast Concrete U-Culverts shall be designed and manufactured in accordance with the requirements of ASTM and AASHTO Standards latest revision as required. The precast manufacturer shall submit shop drawings, structural design calculations performed by a registered engineer and material certifications as follows to verify all products used in manufacturing meet the design requirements:

REINFORCING BARS	ASTM A-615 or A-706
AGGREGATES	ASTM C-33
CEMENT	ASTM C-150
JOINT SEALANT (IF USED)	ASTM C-990

Production of precast units shall not begin until the design engineer and/or purchaser reviews and approves all submittals. Compressive strength test results for the precast units must be supplied prior to their delivery to verify that the strength requirements were met. The compressive strength tests must be done in accordance with ASTM C-39.

Designer is to specify:

Interior Height & Span
Any Special Configurations, Degree of Skew, Piping Sizes and Locations, etc.
Loading Requirements: Light, Medium or Heavy Traffic
Any Other Requirements

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## **PRECAST CONCRETE U-CULVERT** **3-SIDED BOX CULVERT BRIDGE SECTIONS**

### **PART 1: GENERAL**

#### **1-1 DESCRIPTION:**

- A. The work of this section consists of manufacturing and delivering Precast Reinforced Concrete 3-Sided Box Culvert Sections for Drainage Structures of the shape and dimensions called for on the drawings in accordance with these specifications.

#### **1-2 QUALITY ASSURANCE:**

A. Reference Standards

1. American Society for Testing and Materials (ASTM), American National Standards (ANSI), American Association of State Highway and Transportation Officials (AASHTO), AWS D12.1 for Reinforcing Steel, Inserts and Connections and ACI 318 for Reinforced Concrete.

B. Design Criteria

1. Precast Concrete Box Sections shall be designed for Earth Deadload and Interstate Live Load Conditions, as indicated on the drawings (Normally AASHTO HS-20-44 loadings).
2. Precast Footings may be provided. The owner's representative must supply the manufacturer with all soils and other information at least 7 days prior to bid opening.

#### **1-3 SUBMITTALS:**

- A. Submittals with shop drawings from manufacturer, prepared by a registered engineer, showing the Precast Reinforced Precast Concrete 3-Sided Box Culvert Sections meet the requirements for this specification.

Submittals are to include:

REINFORCING BARS	ASTM A-615 or A-706
AGGREGATES	ASTM C-33
CEMENT	ASTM C-150
JOINT SEALANT (if used)	ASTM C-990

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## PART 2: MATERIALS

### 2-1 PRECAST BOX BRIDGE MATERIALS:

- A. Minimum Concrete Compressive Strengths as indicated by concrete compression cylinders shall be 4,500 psi minimum at 28 days unless otherwise indicated on the design. A minimum of four (4) concrete test cylinders shall be taken for each 3-Sided Box Bridge Section manufactured.
- B. Reinforcement shall be by deformed steel reinforcing bars in accordance with ASTM A-615, (latest revision), grade 60 minimum, non-coated.

### 2-2 PRECAST BOX BRIDGE MANUFACTURE:

- A. Cement shall conform to the requirements of ASTM C-150, (latest revision).
- B. The concrete mix shall be as designed by the precast manufacturer and utilize cement, clean aggregates and water. Water reducers or plasticizers may be used at the manufacturers option and with concurrence of the engineer to produce a well-blended concrete mix, which will meet or exceed the design requirement.
- C. Concrete compressive tests shall be performed at day one (1), day seven (7), and day twenty-eight (28) intervals. If a particular section fails to reach the design compressive strength, the engineer may reject it, only if adequate non-destructive testing an/or correlation cannot be provided by the manufacturer to assure its proper 28-day compressive strength.
- D. Forms for the manufacture of 3-Sided Box Bridges shall be a steel construction and designed expressly for the casting of 3-Sided Box Culvert Bridge Sections. Wood or “gang” forms will not be allowed.
- E. Four (4) lifting points are to be provided in the precast unit for handling by the installation contractor. The lifting inserts shall be per the precast manufacturer.
- F. Precast Concrete 3-Sided Box Culvert Bridge Sections shall be manufactured by Vaughn Concrete Products, Inc. (1-877-827-8255) or approved equal. The manufacturer shall deliver the Precast Concrete 3-Sided Box Culvert Bridge Sections to the project site. The manufacturer is to supply all lifting devices for attaching to the precast units. The manufacturer is to have trained personnel on site for a minimum of 4 hours to assist in coordination of installation.

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## PART 3: EXECUTION

### 3-1 INSTALLATION:

- A. Structural excavation and sub-grade preparation shall be completed as required.
- B. Install cast-in-place concrete foundations and floor slab in accordance with the drawings and specifications. Care should be taken in the forming and finishing of the foundation keyways to allow placement of precast sections with the tolerance specified below, or if precast footings are used, the precast footing are to be placed, aligned and welded together as required. Extreme care must be taken to verify the footing keyways are properly located and aligned.
- C. Placement of the Precast Concrete 3-Sided Box Culvert Bridge Sections may not commence until the foundation concrete has developed in-place strength as required. The contractor shall coordinate delivery and placement of precast units at the site. For jobsite unloading, the contractor, only by means of the lifting devices provided by the manufacturer, shall accomplish handling and installation of the 3-Sided Box Culvert Bridge Section. Improper handling or handling by any other means could cause damage to the units. The 3-Sided Box Culvert Bridge Sections shall be placed such that the maximum joint space between adjacent sections is  $\frac{3}{4}$  inch.
- D. The installation contractor shall equip the operations with suitable equipment of a capacity adequate to handle and install the 3-Sided Box Culvert Bridge Sections for this project. All grout keys at the footing, keyways in the leg sections and keyways in the top slab, will be filled with a non-shrink grout. This material shall be prepared on the jobsite in accordance with the manufacturers recommendations and shall be of a suitable consistency to perform as it is intended. A compressible polyethylene backer rod (supplied by the installer) shall be placed along the inside face of the ceiling and wall joints prior to starting the grouting operations.
- E. Backfill around the Footings and the 3-Sided Box Culvert Bridge Sections shall be performed carefully as not to displace the precast units or exceed the design capacity of the precast units.