Precast Box Culvert & Crown-Span
Precast Box Culverts & Crown-Span

Use
Precast box sections are recommended for installations where circular or elliptical concrete pipe cannot provide adequate flow capacity, and as a superior substitute for cast-in-place box culverts, long span metal arches, short bridges, and multi-barrel circular culverts or drains.

Crown-Span 3-Sided bridge units are recommended for installations where precast box sections cannot carry the required flow capacity, uninterrupted opening spans are necessary, natural stream bottoms are desired and installation time is important.

Sizes
Precast box sections are normally available in spans of 4 feet through 12 feet, with a variety of rises. Crown-Span bridge units are normally available in spans of 10 feet through 28 feet, with rises up to 10 feet. Please contact our Sales / Engineering team for additional sizes and options.

Application
Precast box sections and Crown-Span bridge units can be used for the following:
- highway culverts
- railroad culverts
- highway bridges
- short span highway bridges
- storm drains
- livestock, pedestrian or golf cart undercrossings
- utility tunnels
- underground stormwater retention structures
- groundwater recharge systems
- to replace existing open channels or ditches, and enable land to be used productively
- jacked or tunneled installations.

Joints
Precast box sections are produced with tongue and groove joints and a glued on neoprene gasket. Joints may also be packed with mastic joint compound, preformed mastic or butyl gaskets, mortar, or other approved sealant. Crown-Span sections are butted together with a slued on neoprene gasket. They may also be sealed with a mastic compound or joint wrap.

Appurtenances
Precast headwalls and wingwalls are available for most sizes.

Linings / Coatings
A variety of linings and coatings is available where project conditions dictate their use.
Precast Box Culverts & Crown-Span (cont.)

Uses Applicable Specifications

The following specifications apply to precast concrete box sections:

- ASTM C1433 - Precast Reinforced Concrete Monolithic Box Sections for Culverts, Storm Drains, and Sewers
- ASTM C1577 - Precast Reinforced Concrete Monolithic Box Sections for Culverts, Storm Drains, and Sewers according to AASHTO LRFO.
- ASTM C1504 - Precast Reinforced Concrete Three-Sided Structures for Culverts and Storm Drains
- AASHTO M259 & M273 - Precast Reinforced Concrete Box Sections for Culverts Storm Drains, and Sewers.

When specifying precast box sections, the following information is needed:

- Governing design specification (eg. ASTM, AASHTO, AREMA, etc.)
- Design live load (eg. AASHTO HS-20, AREA Cooper E80, etc.)
- Design fill range (eg. 0'-2', 2'-5', 5'-10', etc.).
**Isometric View**

**Elevation View**

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**Notes**
1) These Standard Sizes reflect ASTM C1577 for Precast Concrete Box Culverts.
2) Additional sizes and configurations are available including:
   - Intermediate Sizes
   - Over Sized Boxes
   - Bottomless (3-sided) Culverts
   - Multi-Cell Monolithic Units
   - Removable Top Sections
3) Please contact CP&P for additional options and configurations.
Double Cell Monolithic Box Culvert
Isometric View

Elevation View

Cell Rise

Cell Span

Triple Cell Monolithic Box Culvert

12-14-16
Notes
1) Precast box culvert design conforms to ASTM C1433, ASTM C1577 and AASHTO for Highway Bridges.
2) Typical haunch.
3) Wall, roof and floor dimensions shall be determined by job conditions. Typical configurations as well as steel requirements are detailed in ASTM C1433 and ASTM C1577.
4) Penetrations in roof slab and walls can be provided per job requirements. Additional steel may be required at all penetrations.
5) Weep holes available per job requirements and are typically placed one per culvert section at each exterior wall.
6) Tongue and groove shall be sized in proportion to culvert cross section. Joints shall be sealed by 1" x 1" close cell neoprene sponge gasket material which is factory applied to Bell or Groove end of the culvert section.
7) See Special details for end treatments, curves, and additional options available.
Notes
1) Precast box culvert design conforms to ASTM C1433, ASTM C1577 and AASHTO for Highway Bridges.
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7) See Special details for end treatments, curves, and additional options available.
8) Precast culvert section can be produced monolithically in multi-cell configurations.
Notes
1) Precast box culvert design conforms to ASTM C1433, ASTM C1577 and AASHTO for Highway Bridges.
2) Typical haunch.
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4) Penetrations in roof slab and walls can be provided per job requirements. Additional steel may be required at all penetrations.
5) Weep holes available per job requirements and are typically placed one per culvert section at each exterior wall.
6) Tongue and groove shall be sized in proportion to culvert cross section. Joints shall be sealed by 1" x 1" close cell neoprene sponge gasket material which is factory applied to Bell or Groove end of the culvert section.
7) See Special details for end treatments, curves, and additional options available.
8) Multi-cell configuration may be accomplished by repeated rows of single cell cross sections. This is primarily due to constraints on site due to weight handling limitations.
9) Spacing between rows are to be filled with granular material in order to assume load distribution in walls.
Notes
1) Precast box culvert design conforms to ASTM C1433, ASTM C1577 and AASHTO for Highway Bridges.
2) Typical haunch.
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4) Penetrations in roof slab and walls can be provided per job requirements. Additional steel may be required at all penetrations.
5) Weep holes available per job requirements and are typically placed one per culvert section at each exterior wall.
6) Tongue and groove shall be sized in proportion to culvert cross section. Joints shall be sealed by 1" x 1" close cell neoprene sponge gasket material which is factory applied to Bell or Groove end of the culvert section.
7) See Special details for end treatments, curves, and additional options available.
8) Standard skewed angle may be limited due to section length as related to span of culvert. Special length end section can be produced to increase skewed angle.
9) Special skew configuration can be achieved in single and multiple cell culverts by incorporating a precast headwall into the end design. Call our sales / Engineering Team for additional information.
Notes
1) Precast box culvert design conforms to ASTM C1433, ASTM C1577 and AASHTO for Highway Bridges.
2) Typical haunch.
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7) See Special details for end treatments, curves, and additional options available.
8) Standard skewed angle may be limited due to section length as related to span of culvert. Special length end section can be produced to increase skewed angle.
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Notes
1) Precast box culvert design conforms to ASTM C1433, ASTM C1577 and AASHTO for Highway Bridges.
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4) Penetrations in roof slab and walls can be provided per job requirements. Additional steel may be required at all penetrations.
5) Weep holes available per job requirements and are typically placed one per culvert section at each exterior wall.
6) Tongue and groove shall be sized in proportion to culvert cross section. Joints shall be sealed by 1" x 1" close cell neoprene sponge gasket material which is factory applied to Bell or Groove end of the culvert section.
7) See Special details for end treatments, curves, and additional options available.
8) This section may be used for various applications where it is desirable to gain access to a trench or install piping or utilities before closing top sections.
Notes
1) Precast culvert design conforms to ASTM C1504 and AASHTO for Precast Reinforced Concrete Three-Sided Structures.
2) Typical haunch.
3) Wall and roof dimensions shall be determined by job conditions. Typical configurations as well as steel requirements are detailed in ASTM C1504.
4) Penetrations in roof slab and walls can be provided per job requirements. Additional steel may be required at all penetrations.
5) Weep holes available per job requirements and are typically placed one per culvert section at each exterior wall.
6) Joints shall be sealed by 1" x 1" close cell neoprene sponge gasket material which is factory applied to the Butt end of the culvert section.
7) See Special details for end treatments, curves, and additional options available.
Notes
1) Precast box culvert design conforms to ASTM C1433, ASTM C1577 and AASHTO for Highway Bridges.
2) Typical haunch.
3) Wall, roof and floor dimensions shall be determined by job conditions. Typical configurations as well as steel requirements are detailed in ASTM C1433 and ASTM C1577.
4) Weep holes available per job requirements and are typically placed one per culvert section at each exterior wall.
5) Tongue and groove shall be sized in proportion to culvert cross section. Joints shall be sealed by 1" x 1" close cell neoprene sponge gasket material which is factory applied to Bell or groove end of the culvert section.
6) Special joint section required. Limited by cross section configurations.

Isometric View

Precast Box Culvert
Tight Bend-Special Section
Notes
1) Precast box culvert design conforms to ASTM C1433, ASTM C1577 and AASHTO for Highway Bridges.
2) Typical haunch.
3) Wall, roof and floor dimensions shall be determined by job conditions. Typical configurations as well as steel
   requirements are detailed in ASTM C1433 and ASTM C1577.
4) Weep holes available per job requirements and are typically placed one per culvert section at each exterior wall.
5) Tongue and groove shall be sized in proportion to culvert cross section. Joints shall be sealed by 1" x 1" close cell
   neoprene sponge gasket material which is factory applied to Bell or Groove end of the culvert section.
6) Special joint section required. Limited by cross section configurations.
Isometric View

Notes
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5) Tongue and groove shall be sized in proportion to culvert cross section. Joints shall be sealed by 1" x 1" close cell neoprene sponge gasket material which is factory applied to Bell or Groove end of the culvert section.
6) Special joint section required. Limited by cross section configurations.
**Notes**

1) All joining surfaces to be neatly sealed with state approved sealant.
2) All components designed to be independently stable in overturning, sliding and bearing. Components should not be externally restrained by mechanical connectors. Such connection could lead to stress concentrations from minor settlement or thermal expansion.
3) Wingwalls may be produced in 8' minimum sections as shipping limitations dictate. Weep holes to be adjusted to provide 1' clearance to section joints, if needed.
4) Chamfer ¾ " on all exposed 90° corners.
5) Grade Beam must be installed before box end sections and are required by design to retain fill and pressure below box sections. Minimum grade beam length to be equal to the overall width of finished end sections. Contractor to provide and place #6 bars in preformed openings and grout in the field.

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**Isometric View**

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**TABLE**

| **Precast Box Endwall (ES) and Wingwall (BWW)** |
| **Connection Details** |
| **DATE** | 01-10-17 |
Notes
1) All joining surfaces to be neatly sealed with state approved sealant.
2) All components designed to be independently stable in overturning, sliding and bearing. Components should not be externally restrained by mechanical connectors. Such connection could lead to stress concentrations from minor settlement or thermal expansion.
3) Wingwalls may be produced in 8’ minimum sections as shipping limitations dictate. Weep holes to be adjusted to provide 1’ clearance to section joints, if needed.
4) Chamfer 3/4” on all exposed 90° corners.
5) K: Upper stem height, 12” increments (Typ)
   L: lower stem height
   M: Stem length, 12” increments (Typ)
   Ts: Stem thickness, 8” (Typ)
   Th: Heel thickness, 8” (Typ)
   Ttoe: Toe thickness, 18” (Typ)
   Ln: Heel length, 6” increments (Typ), 12” minimum
   Lt: Toe length, 14” for K less than 10 feet, 28” for K of 10 feet or more.

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## Precast Box Culverts & Crown-Span

### Full Flow Hydraulic Data - Box Culverts

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**Notes:**

For accuracy, equivalent round and equivalent double round are not rounded to standard pipe sizes.

Capacity of culverts may be governed by inlet conditions.

For further information, see APCA concrete pipe design manual.
We are committed to making Concrete Pipe & Precast the preferred supplier for our customers by delivering outstanding value, continuous innovation, and exceptional customer experience by consistently fulfilling our promise:

“Not Just Concrete, Concrete Solutions”