

PRECAST CONCRETE BOX CULVERT

Heavy-Duty Civil Infrastructure Engineering Specification

Document Ref:	TS-PC-BC-2000	Application Class:	Subsurface Drainage & Utility Ducting
Product Model:	PC-BC-2000 (Monolithic Symmetrical Single Cell)	Design Codes:	ASTM C1577 / AASHTO M273 / IS 15916

1. PRODUCT DESCRIPTION & SCOPE

The **PC-BC-2000** is a heavy-duty, monolithic precast concrete single-cell box culvert designed for high-capacity stormwater conveyance, wastewater systems, culverted stream crossings, and underground service utility tunnels. Engineered to withstand substantial dead loads from deep soil cover as well as live vehicle traffic surcharges (such as AASHTO HL-93 or local highway bridge loadings), this monolithic system guarantees rapid structural assembly and strict fluid-tight integrity.

2. GEOMETRICAL & DESIGN PROFILE

As shown in the engineering profile, the culvert is cast as a single rigid frame featuring large internal corner **haunches (fillets)**. These diagonal structural corbels optimize shear capacity and dissipate high bending moments at the wall-to-slab junctions.

- **Weep Holes & Alignment Ports:** Symmetrically positioned side-wall penetration sleeves allow localized hydrostatic pressure relief and external securement point routing.
- **Lifting & Handling Recesses:** Integrated deep round pocket anchors are cast on the outer side faces to facilitate safe balanced rigging and site placement.
- **Joint Interface:** Precision male/female stepped shiplap/tongue-and-groove profile joints engineered for elastomeric rubber gaskets or bitumen sealant ropes to prevent subsoil fluid migration.

3. NOMINAL DIMENSIONAL DATA

DIMENSION PARAMETER	STANDARD NOMINAL VALUE	ENGINEERING TOLERANCE
Internal Clear Span (Width)	2000 mm	± 10 mm
Internal Clear Height	2000 mm	± 10 mm
Wall Slab Thickness (Top / Bottom / Sides)	200 mm	± 5 mm
Corner Haunch (Fillet) Dimensions	200 mm × 200 mm (45°)	± 5 mm
Standard Laying Length per Segment	1500 mm / 2000 mm	± 6 mm
Estimated Unit Mass (per meter length)	Approx. 4.4 Metric Tons	Calculated Nominal

4. MATERIAL SPECIFICATION & STRUCTURAL PERFORMANCE

Concrete Concrete Design: Minimum Characteristic Compressive Strength of 40 MPa (M40 / C40/50) at 28 days. Uses sulfate-resisting cement properties for prolonged subsoil exposure.

- **Reinforcement:** Grade Fe 500D / Fe 550 High-Yield Deformed TMT inner and outer cage mats conforming to rigid structural codes. Minimum structural concrete cover is maintained at 40 mm to resist reinforcement corrosion.
- **Water Absorption:** Restricted to less than 5.0% by mass under ASTM C497 testing guidelines, ensuring high durability against chemical attacks and freeze-thaw degradation.

5. INSTALLATION & BEDDING GUIDELINES

1. **Trench Excavation:** Trench widths must accommodate culvert external footprints plus a minimum working clearance of 300 mm on each side for correct compaction.
2. **Foundation Base Bedding:** Placement over a minimum 150 mm thick compacted granular material bed (crushed rock/gravel stone graded from 5mm to 20mm), leveled to a 98% Proctor standard density.
3. **Jointing Protocol:** Apply continuous preformed flexible butyl rubber joint sealant along the seating shoulder of the joint before homing the segments together using hydraulic pullers.