

REVISED 10-2021: Updated Note 7, 8, and added Note 10.
 REVISED 01-2023: Added note to burr threads of Concrete Box Ties.
 ENGLISHIGNEDPRECASTCULVERTS.DGN - PES 4-20-T1 S2 - THIS SHEET ISSUED 12-2020.

Apron Dimens.	
Box Rise R (FT)	Apron Length L
4	10'-0"
5	13'-0"
6	16'-0"
7	19'-0"
8	22'-0"
9	25'-0"
10	28'-0"
11	31'-0"
12	34'-0"
13	37'-0"
14	40'-0"

Dimens.		Ah & As3 Reinf.	
Span S (FT)	Section Ht. H (FT)	Req'd. Ah (IN ² /FT)	Required As3 (IN ² /FT)
14			
	4	0.24	0.24
	5	0.24	0.24
	6	0.24	0.24
	7	0.24	0.24
	8	0.24	0.28
	9	0.34	0.36
	10	0.49	0.45
	11	0.67	0.55
	12	0.90	0.68
	13	0.98	0.86
	14	1.22	1.03
16			
	4	0.24	0.24
	5	0.24	0.24
	6	0.24	0.24
	7	0.24	0.24
	8	0.24	0.30
	9	0.34	0.38
	10	0.49	0.47
	11	0.67	0.58
	12	0.90	0.71
	13	0.98	0.89
	14	1.22	1.07

Note: "H" is the largest vertical dimension of the section.

At & Ab Reinf.		
Span S (FT)	Req'd. At (IN ² /FT)	Req'd. Ab (IN ² /FT)
14	0.47	0.90
16	0.56	1.08

Parapet Longit. Reinforcing	
Span S (FT)	Required Bar Size
14	#7
16	#8

Construction Notes:

Precast box culvert end sections shall be constructed in accordance with details and notes, as shown below:

Reinforcing for precast end sections & curtain walls shall be welded wire reinforcing (WWR) meeting the requirements of AASHTO LRFD Section 5. The concrete cover over the reinforcing steel shall not be less than 1.5 inches or greater than 2.0 inches.

Refer to sheets PRCB G1-20 & PRCB G2-20 for additional notes & details.

Refer to "Fabric Layer Detail" on sheet PRCB G2-20 for multiple WWR layers.

Burr threads of Concrete Box Ties without damaging galvanizing to prevent nut rotation after tightening is complete.

- ① Use tongue on inlet end section and groove on outlet end section, to match barrel section.
- ② Fill holes with grout. Grout shall consist of 1 part cement and 2 parts sand. Use air entrained portland cement. Grout mix shall have a maximum slump of 4 inches.
- ③ Lap splices shall be Class B and shall be designed according to the AASHTO LRFD Bridge Design Specifications, Section 5.
- ④ Joint "Option A": Provide joint in walls and floor. Terminate joint at haunch. See "Detail A" on Sheet PES 3-20-T1.
- ⑤ Joint "Option B": Provide continuous joint in walls, floor and haunch.
- ⑥ Haunch dimension to match barrel haunch size.
- ⑦ Minimum longitudinal reinforcement shall be 0.06 sq. inches per peripheral foot on all faces of the end section, except in the tongue and groove area.
- ⑧ Wall thickness (Tc) shall be 8 inches when the Section Height (H) is less than or equal to 12 feet. For "H" equal to 13 to 14 feet, wall thickness shall be 9 inches.
- ⑨ Optional eyebolts shall conform to ASTM A307. Eyebolts and nuts shall be galvanized in accordance with ASTM A153. The eye of the eyebolt shall be cast flush with the concrete surface.
- ⑩ Bottom slab thickness may be increased up to 2" max. provided cover is 1½" min. to 2" max.

Dowel Setting Note (Fence Anchor):

The 5fa bars or eyebolt may be set as dowels in drilled holes. Holes shall be drilled to the depth required to achieve bar embedment as shown in the "Side Elevation" or "Detail C". The dowels shall be installed in accordance with the Manufacturer's recommendations. Either of the following systems may be used as a bonding agent:

- A. Polymer grout system shall be in accordance with Article 2301.03, E, of the Standard Specifications.
- B. Hydraulic cement grout systems. Drilled holes are to be 2½ times the dowel diameter and are to be blown clean with compressed air immediately prior to placing grout. The hydraulic cement grout shall be one of those approved in Materials I.M. 491.13.

Note: See sheet PES 3-20-T1 for details used in conjunction with this sheet.

01-2023 LATEST REVISION DATE	 APPROVED BY BRIDGE ENGINEER	 Standard Design Single Precast Reinforced Concrete Box Culverts December, 2020
		Type 1 End Section Details For Skews up to 7.5°; 14' - 16' Spans
		PES 4-20-T1 Sheet 2 of 2