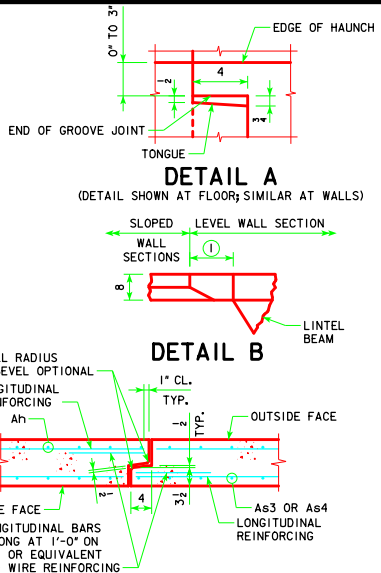
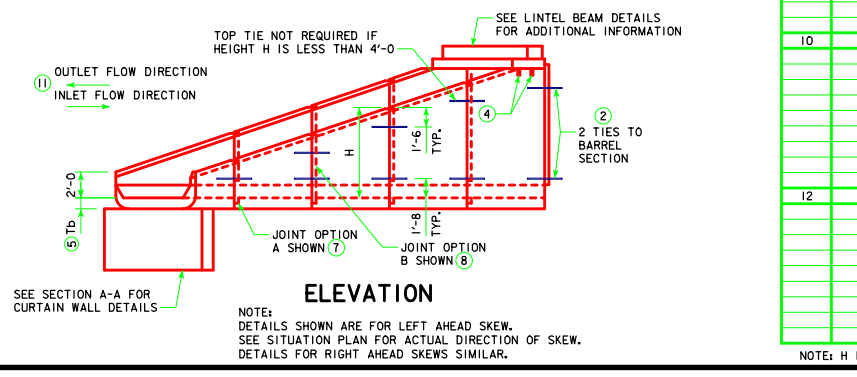
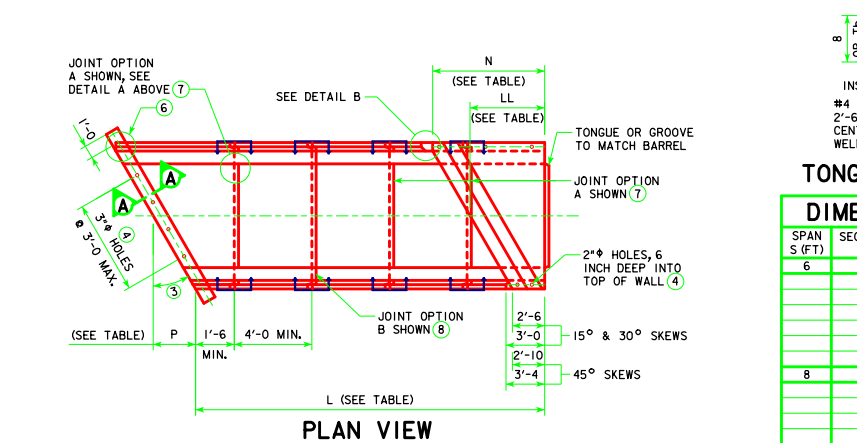
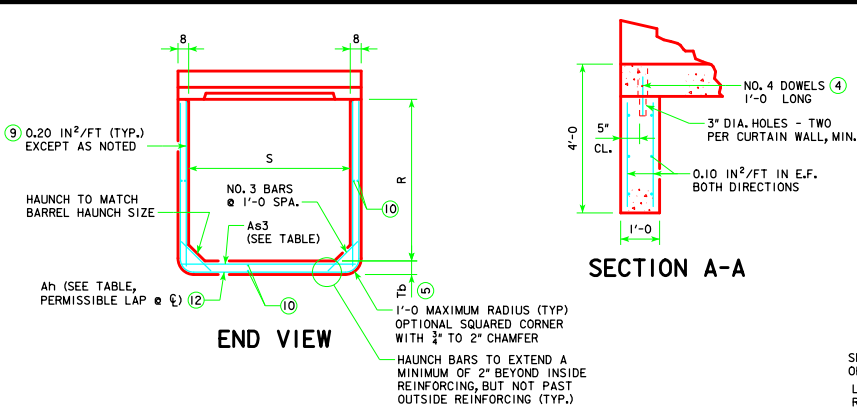


REVISED 05-13 - ADDED THE 3/4 RISE TO THE LENGTH L INFORMATION TABLE. ENGLISH SIGN PRECAST CONCRETE VERTICALLY - PES 2-13-T3 - THIS SHEET ISSUED 01-13.



**TONGUE AND GROOVE JOINT DETAIL**

SPAN S (FT)	SECTION HT. H (FT)	Ah & As3 REINFORCEMENT			BOTTOM SLAB THICK. (IN)	
		Ah (IN²/FT)			REQUIRED As3 (IN²/FT)	
		15° SKEW	30° SKEW	45° SKEW	8	10
6	3	0.20	0.20	0.20	0.20	---
4	0.20	0.20	0.20	0.20	0.20	---
5	0.20	0.20	0.20	0.20	0.20	---
6	0.21	0.22	0.24	0.20	---	---
7	0.33	0.36	0.38	0.23	---	---
8	0.50	0.53	0.56	0.31	---	---
8	4	0.24	0.24	0.24	---	0.24
5	0.24	0.24	0.24	---	---	0.24
6	0.24	0.24	0.24	---	---	0.24
7	0.25	0.27	0.28	---	---	0.24
8	0.37	0.40	0.42	---	---	0.24
9	0.53	0.57	0.60	---	---	0.29
10	0.73	0.78	0.83	---	---	0.37
10	4	0.24	0.24	0.24	---	0.24
5	0.24	0.24	0.24	---	---	0.24
6	0.24	0.24	0.24	---	---	0.24
7	0.24	0.24	0.24	---	---	0.24
8	0.27	0.28	0.30	---	---	0.24
9	0.39	0.42	0.44	---	---	0.31
10	0.56	0.60	0.64	---	---	0.40
11	0.77	0.82	0.87	---	---	0.50
12	1.02	1.09	1.16	---	---	0.62
12	4	0.24	0.24	0.24	---	0.24
5	0.24	0.24	0.24	---	---	0.24
6	0.24	0.24	0.24	---	---	0.24
7	0.24	0.24	0.24	---	---	0.24
8	0.29	0.29	0.29	---	---	0.26
9	0.37	0.40	0.42	---	---	0.34
10	0.53	0.57	0.60	---	---	0.42
11	0.73	0.78	0.83	---	---	0.53
12	0.97	1.05	1.10	---	---	0.65

NOTE: H IS THE LARGEST VERTICAL DIMENSION OF THE SECTION.

**NOTES:**

- PRECAST BOX CULVERT END SECTIONS SHALL BE CONSTRUCTED IN ACCORDANCE WITH DETAILS AND NOTES, AS SHOWN BELOW:
- REINFORCING FOR PRECAST END SECTIONS AND CURTAIN WALLS SHALL BE WELDED WIRE REINFORCING (WWR) MEETING THE REQUIREMENTS OF AASHTO LRFD SECTION 5. THE CONCRETE COVER OVER THE REINFORCING SHALL NOT BE LESS THAN 1.5 INCHES OR GREATER THAN 2.0 INCHES.
- REFER TO SHEET PRCB G1-13 FOR ADDITIONAL NOTES.
- REFER TO FABRIC LAYER DETAIL ON SHEET PRCB G2-13 FOR MULTIPLE WWR LAYERS.
- 1) 8 1/4" @ 15°; 10 3/8" @ 30°; 1'-2" @ 45°
- 2) CULVERT TIES ARE TO BE 1 INCH DIA. RODS.
- 3) FOR SKEW ANGLES OVER 7°30' UP TO 22°30', USE A 15° SKEW END SECTION. FOR SKEW ANGLES OVER 22°30' UP TO 37°30', USE A 30° SKEW END SECTION. FOR SKEW ANGLES OVER 37°30' UP TO 45°, USE A 45° SKEW END SECTION.
- 4) 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.
- 5) THICKNESS OF FLOOR, T<sub>b</sub> = 8 IN. FOR 6' SPAN AND T<sub>b</sub> = 10 IN. FOR ALL OTHER SPANS.
- 6) END OF WALL MAY BE CUT SQUARE AS SHOWN OR FOLLOW THE SKEW.
- 7) JOINT OPTION A: PROVIDE JOINT IN WALLS AND FLOOR. TERMINATE JOINT AT HAUNCH. SEE DETAIL A ON THIS SHEET.
- 8) JOINT OPTION B: PROVIDE JOINT IN WALLS, FLOOR AND HAUNCH.
- 9) FOR THE FIRST SECTION ADJACENT TO THE BARREL, SEE AS4 TABLE
- 10) 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.
- 11) USE TONGUE ON INLET END SECTION AND GROOVE ON OUTLET END SECTION.
- 12) LAP SPLICES SHALL BE CLASS C AND SHALL BE DESIGNED ACCORDING TO THE AASHTO LRFD BRIDGE DESIGN SPECIFICATIONS.

RISE R (FT)	LENGTH L		
	15° SKEW	30° SKEW	45° SKEW
3	6'-1	6'-6	7'-11
4	9'-3	9'-11	12'-2
5	12'-4	13'-5	16'-5
6	15'-5	16'-10	20'-8
7	18'-6	20'-4	24'-11
8	21'-8	23'-9	29'-1
9	24'-9	27'-3	33'-4
10	27'-10	30'-9	37'-7
11	30'-11	34'-2	41'-10
12	34'-1	37'-8	46'-1

SPAN S (FT)	LENGTH LL		
	15° SKEW	30° SKEW	45° SKEW
6	3'-6	4'-7	6'-6
8	3'-9	5'-2	7'-6
10	4'-0	5'-9	8'-6
12	4'-3	6'-4	9'-6

SPAN S (FT)	LENGTH N		
	15° SKEW	30° SKEW	45° SKEW
6	4'-3	6'-4	9'-6
8	4'-10	7'-6	11'-6
10	5'-4	8'-8	13'-6
12	5'-11	9'-10	15'-6

SECTION HT. H (FT)	As4 REINF. (IN²/FT)		
	15° SKEW	30° SKEW	45° SKEW
10 OR LESS	0.20	0.20	0.20
11	0.20	0.21	0.22
12	0.25	0.27	0.29

SPAN S (FT)	LENGTH P		
	15° SKEW	30° SKEW	45° SKEW
6	1'-0	2'-1	3'-8
8	1'-3	2'-8	4'-8
10	1'-6	3'-3	5'-8
12	1'-9	3'-10	6'-8

NOTE: As4 IS INSIDE FACE WALL STEEL FOR THE FIRST SECTION ADJACENT TO THE BARREL ONLY. H IS THE LARGEST VERTICAL DIMENSION OF THE SECTION FOR ALL OTHER SECTIONS, As4 = 0.20 IN²/FT

NOTE: DIMENSIONS SHOWN IN TABLES ARE ROUNDED TO THE NEAREST WHOLE INCH.

05-13  
LATEST REVISION DATE

*Thomas E. Mc Donnell*  
APPROVED BY BRIDGE ENGINEER

**Iowa Department of Transportation**  
Highway Division

STANDARD DESIGN

**SINGLE PRECAST REINFORCED CONCRETE BOX CULVERTS**

JANUARY, 2013

**TYPE 3 END SECTION DETAILS**

FOR SKEWS OF 7.5° TO 45°

**PES 2-13-T3**