

**DOWEL SETTING NOTE :**  
 THE 5fa BARS 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" DETAIL. 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 2 1/2 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.

**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 SHEET PRCB G1-13 FOR ADDITIONAL NOTES.  
 REFER TO FABRIC DETAIL ON SHEET PRCB G2-13 FOR MULTIPLE WWR LAYERS.
- USE TONGUE ON INLET END SECTION AND GROOVE ON OUTLET END SECTION.
  - 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.
  - THICKNESS OF FLOOR, T<sub>b</sub> = 8 IN. FOR 6' SPAN, T<sub>b</sub> = 10 IN. FOR ALL OTHER SPANS.
  - JOINT "OPTION A": PROVIDE JOINT IN WALLS AND FLOOR. TERMINATE JOINT AT HAUNCH. SEE DETAIL "A" ON THIS SHEET.
  - JOINT "OPTION B": PROVIDE JOINT IN WALLS, FLOOR AND HAUNCH.
  - HAUNCH DIMENSION TO MATCH BARREL HAUNCH SIZE.
  - 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.
  - LAP SPLICES SHALL BE CLASS C AND SHALL BE DESIGNED ACCORDING TO THE AASHTO LRFD BRIDGE DESIGN SPECIFICATIONS.

**A+ & Ab REINF.**

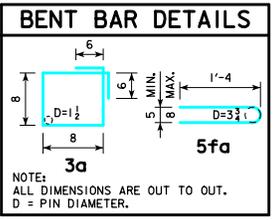
SPAN S (FT)	A+ (IN <sup>2</sup> /FT)	Ab (IN <sup>2</sup> /FT)
6	0.22	0.33
8	0.24	0.46
10	0.31	0.59
12	0.38	0.74

**DIMENS. Ah & As3 REINF.**

SPAN S (FT)	SECTION HT. H (FT)	BOTTOM SLAB THICK. (IN)		
		Ah (IN <sup>2</sup> /FT)	REQUIRED As3 (IN <sup>2</sup> /FT)	
6	3	0.20	0.20	
	4	0.20	0.20	
	5	0.20	0.20	
	6	0.20	0.20	
	7	0.31	0.23	
	8	0.46	0.31	
	8	4	0.24	0.24
		5	0.24	0.24
6		0.24	0.24	
7		0.24	0.24	
8		0.24	0.24	
9		0.34	0.26	
10		0.49	0.34	
11		0.67	0.42	
10	4	0.24	0.24	
	5	0.24	0.24	
	6	0.24	0.24	
	7	0.24	0.24	
	8	0.24	0.24	
	9	0.36	0.31	
	10	0.51	0.40	
	11	0.70	0.50	
12	4	0.24	0.24	
	5	0.24	0.24	
	6	0.24	0.24	
	7	0.24	0.24	
	8	0.24	0.24	
	9	0.34	0.26	
	10	0.49	0.34	
	11	0.67	0.42	
12	4	0.24	0.24	
	5	0.24	0.24	
	6	0.24	0.24	
	7	0.24	0.24	
	8	0.24	0.24	
	9	0.34	0.26	
	10	0.49	0.34	
	11	0.67	0.42	

**PARAPET LONGIT. REINFORCING**

SPAN S (FT)	REQUIRED BAR SIZE
6'	#5
8'	#6
10'	#6
12'	#7



**APRON DIMENS.**

BOX RISE R (FT)	APRON LENGTH L (FT)
3	7'-3"
4	10'-3"
5	13'-3"
6	16'-3"
7	19'-3"
8	22'-3"
9	25'-3"
10	28'-3"
11	31'-3"
12	34'-3"

LATEST REVISION DATE: 07-2016  
 APPROVED BY BRIDGE ENGINEER: *Thomas E. Mc Donnell*

**Iowa Department of Transportation Highway Division**  
 STANDARD DESIGN  
**SINGLE PRECAST REINFORCED CONCRETE BOX CULVERTS**  
 JANUARY, 2013  
**TYPE I END SECTION DETAILS**  
 FOR SKEWS UP TO 7.5°  
**PES 1-13-TI**

REVISED 05-13 - ADDED 3" RISE TO THE APRON DIMENSIONS INFORMATION TABLE.  
 REVISED 01-16 - ADDED 1/2" MIN. COVER TO THE 3" DIA. HOLES IN THE CURB AND SLAB.  
 ENGLISH: IOWA DEPT. OF TRANSPORTATION PRECAST CULVERTS.DGN - PES 1-13-TI - THIS SHEET ISSUED 01-13.