

T (in.), T <sub>s</sub> (in.)	Reinforcing Steel A <sub>slm</sub> (in. <sup>2</sup> /ft.)										
	2	3	4	5	6	7	8	9	10	11	12
4	0.19	0.17									
5	0.26	0.21	0.18								
6		0.26	0.23	0.22							
7		0.33	0.59	0.27	0.28						
8			0.43	0.39	0.36	0.34	0.40				
9				0.43	0.40	0.37	0.36	0.48			
10				0.47	0.44	0.41	0.38	0.42	0.56		
11					0.54	0.46	0.41	0.50	0.65		
12					0.58	0.50	0.45	0.46	0.46	0.75	

(A<sub>slm</sub> reinforcement based upon welded wire fabric conforming to AASHTO M 55 or M 221).

**Notes:**

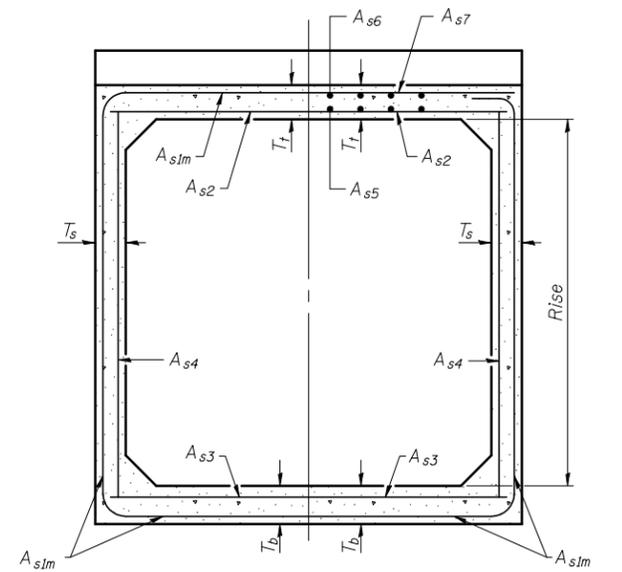
Alternate Section D-D is provided to allow the Contractor the option of casting the bottom slab of the end section first followed by construction of the sidewalls using conventional forming methods. Shop drawings that detail slab thickness and reinforcement layout shall be submitted to the Engineer for review and approval when using Alternate Section D-D.

The size and spacing of the v<sub>2</sub>(E) bars shall provide a minimum reinforcement area along each face of the walls (in.<sup>2</sup>/ft.) equal to 1.10\*(A<sub>slm</sub>). v<sub>2</sub>(E) bars may consist of #3 thru #6 size reinforcement bars and the longitudinal spacing shall not exceed the lesser of the wall thickness or 8 inches.

Bonded construction joints shall be prepared according to Article 503.09 of the Standard Specifications.

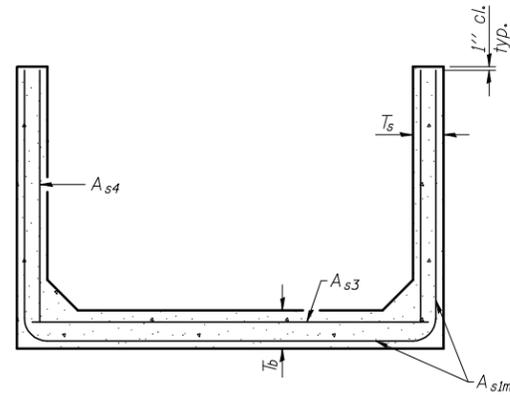
**l<sub>1</sub> DIMENSION**

- #3 bar = 2'-0"
- #4 bar = 2'-8"
- #5 bar = 3'-4"
- #6 bar = 3'-11"

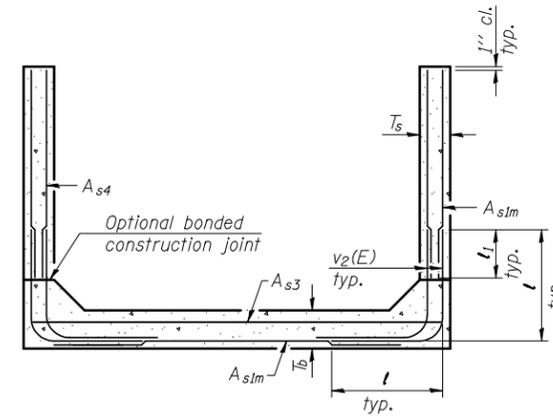


(Design Earth Cover < 2 ft.) (Design Earth Cover ≥ 2 ft.)

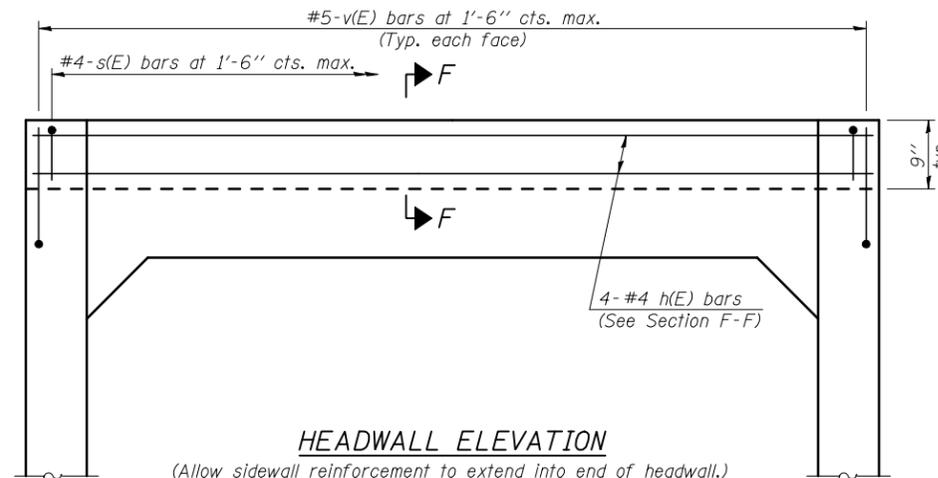
**SECTION C-C**



**SECTION D-D**

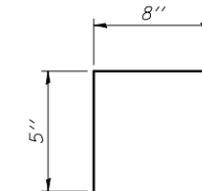


**ALTERNATE SECTION D-D**

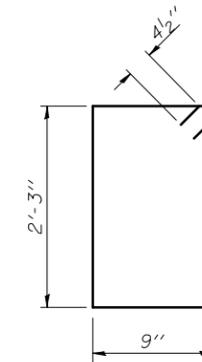


(Allow sidewall reinforcement to extend into end of headwall.)

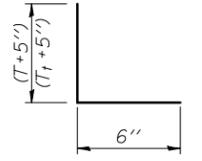
**HEADWALL ELEVATION**



**BAR s(E)**



**BAR s<sub>1</sub>**



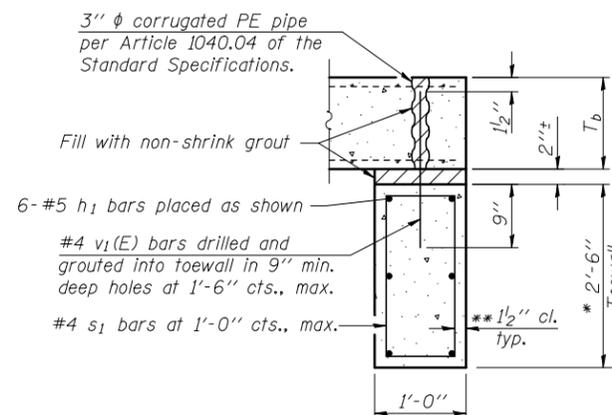
**BAR v(E)**

**TOEWALL CONSTRUCTION SEQUENCE**

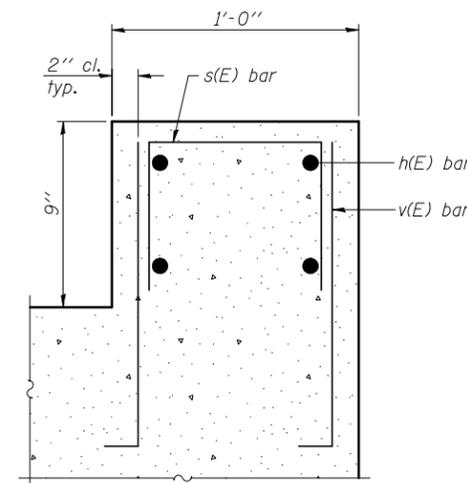
1. Perform excavation and construct toewall.
2. Backfill according to the applicable paragraphs of Article 502.10 of the Standard Specifications and place bedding for precast box culvert end sections.
3. Set precast box culvert end section.
4. Drill and grout reinforcement in toewall using approved chemical adhesive in accordance with Section 1027 of the Standard Specifications.
5. Pressure grout voids using non-shrink grout conforming to Section 1024 of the Standard Specifications.

\* The Contractor may furnish a precast or cast-in-place toewall. The Contractor shall be responsible for the strength and stability of the precast toewall during handling. Additional lifting points may be required depending upon the length of the toewall or the Contractor may need to modify the design of the toewall for the proposed handling the method.

\*\* If soil conditions permit, the sides of the toewall may be poured directly against the soil. The clear cover on the sides of the toewall shall be increased to 3" by increasing the thickness of the toewall.



**SECTION E-E**



**SECTION F-F**

(Sheet 2 of 2)

10-16-12

FILE NAME #FILES*	USER NAME =	DESIGNED -	REVISED -
PLOT DATE 5/7/2013	PLOT SCALE =	CHECKED -	REVISED -
	PLOT DATE =	DRAWN -	REVISED -
		CHECKED -	REVISED -

**STATE OF ILLINOIS  
DEPARTMENT OF TRANSPORTATION**

**MULTIPLE CELL PRECAST BOX CULVERT END SECTIONS**

SHEET NO. 2 OF 2 SHEETS

F.A.P. RTE.	SECTION	COUNTY	TOTAL SHEETS	SHEET NO.
303	129R	WINNEBAGO	968	694
			CONTRACT NO. 64988	

ILLINOIS FED. AID PROJECT