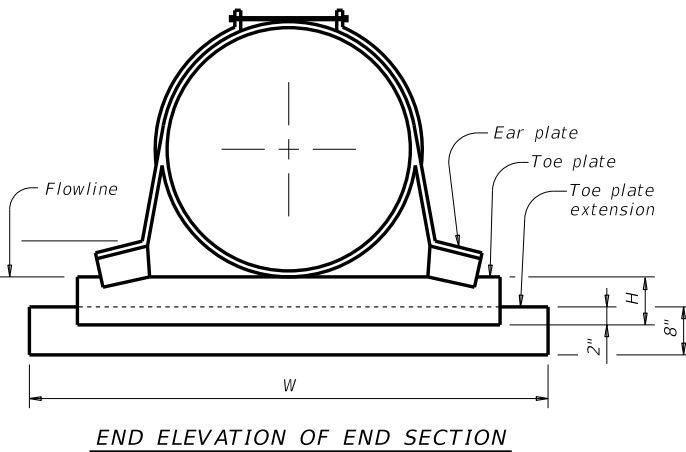
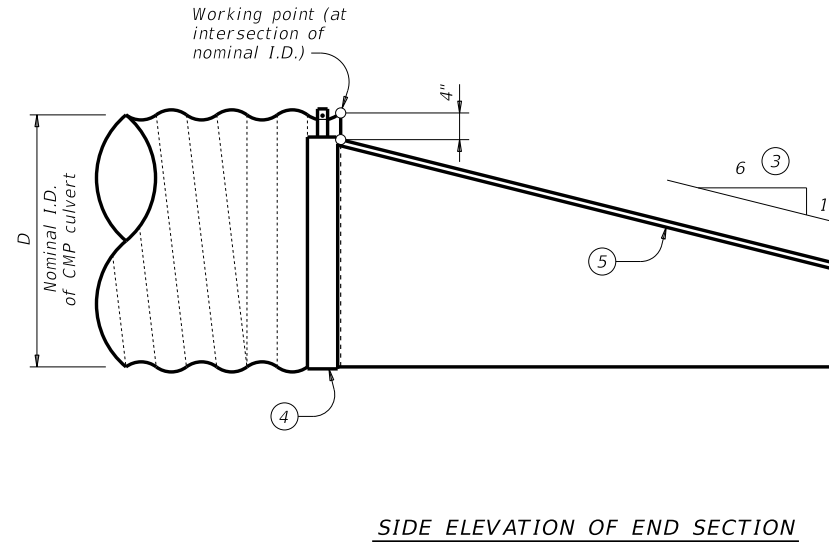
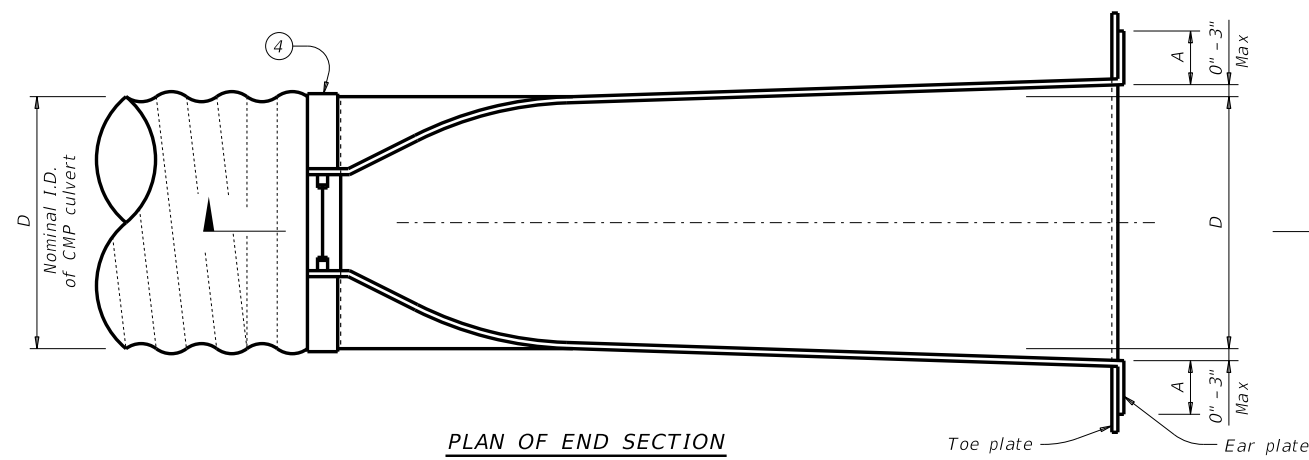
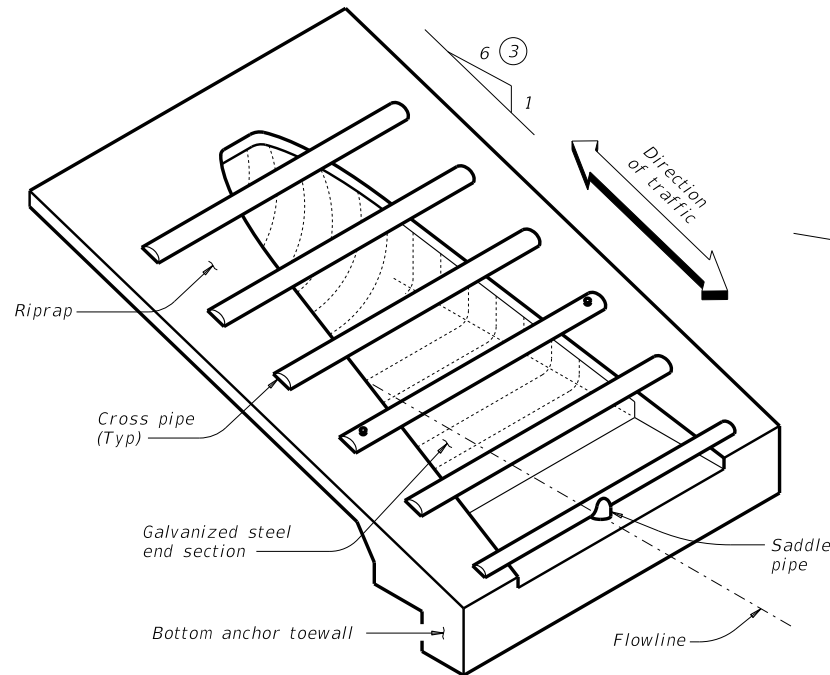


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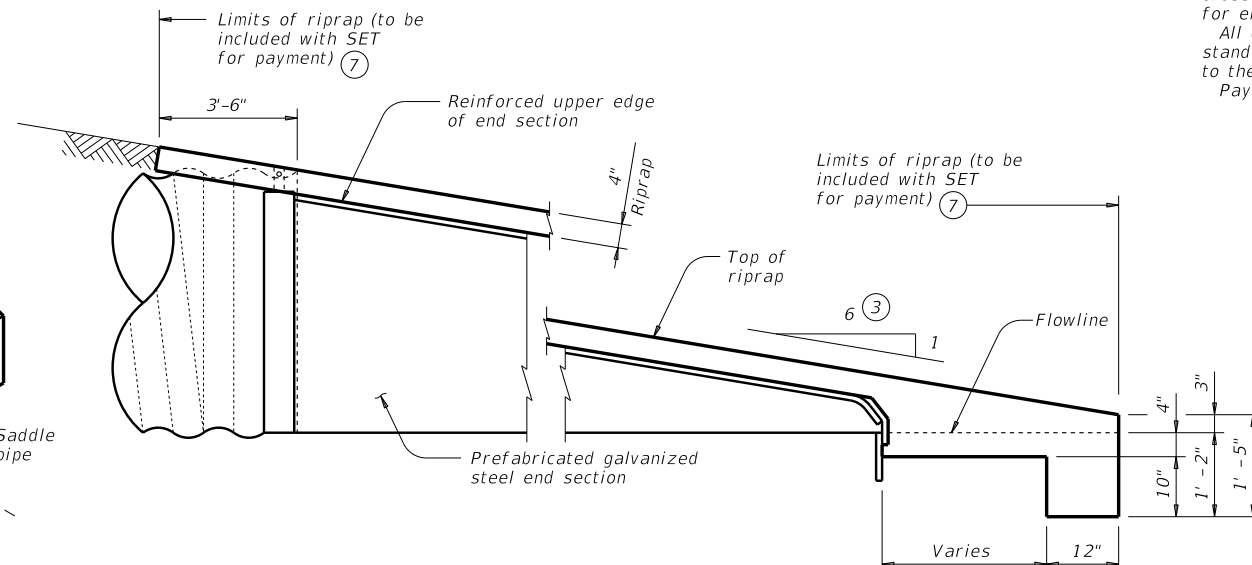


PREFABRICATED GALVANIZED STEEL END SECTION DETAILS

(Safety end treatment and riprap are not shown for clarity.)



ISOMETRIC VIEW OF TYPICAL INSTALLATION



SIDE ELEVATION OF CAST-IN-PLACE CONCRETE

(Cross pipes are not shown for clarity.)

- ① Provide size and lengths of cross pipes as shown in the tables, except the first cross pipe from the bottom and the saddle pipe must be 3 1/2\"/>
- ② Provide all 3-piece apron sections with 12 gage sides and 10 gage center panels.
- ③ Match cross slope as shown elsewhere in the plans. All quantities, calculations, and dimensions shown herein are based on the 6:1 Slope. 6:1 slope or flatter is required for vehicle safety.
- ④ Connection between corrugated metal pipe (CMP) culvert and galvanized prefabricated end section may be with strap and bolt as shown or other combinations of threaded rods and/or coupling bands.
- ⑤ Reinforce upper edge of prefabricated end section with minimum 3/8\"/>
- ⑥ Values shown are minimum requirements.
- ⑦ Riprap placed beyond the limits shown will be paid as concrete riprap in accordance with Item 432, "Riprap."

CROSS PIPE LENGTHS AND REQUIRED PIPE SIZES

D (Nominal Culvert I.D.)	Cross Pipe Length	Cross Pipes Required	Cross Pipe Size
≤ 30"	N/A	No	N/A
36"	4' - 5"	Yes	4.500 x 0.237
42"	4' - 11"		
48"	5' - 5"		
54"	5' - 11"	Yes	5.563 x 0.258
60"	6' - 5"		

PREFABRICATED END SECTION INFORMATION

D (Nominal Culvert I.D.)	H	A	W	Gage	STANDARD PIPE SIZES	
					HSS Size	STD Size
≤ 24"	6"	9"	D + 24"	16	4.000 x 0.154	2"
30"	9"	12"	D + 32"	14	4.500 x 0.216	3"
36"	9"	12"	D + 32"	14	5.563 x 0.237	4"
≥ 42"	12"	16"	D + 40"	12/10		

MATERIAL NOTES:

- Provide cross pipes and saddle pipes conforming to ASTM A1085, A500 Gr B, A53 (Type E or S, Gr B), or API 5LX52.
- Provide ASTM A307 bolts and nuts.
- Galvanize all steel components, except reinforcement, after fabrication. Repair galvanizing damaged during transport or construction in accordance with the specification.
- Toe plate extensions are required only when shown elsewhere in the plans.
- Concrete riprap is required only when cross pipes are required, unless otherwise shown in the plans. Provide concrete riprap in accordance with Item 432, "Riprap." Bolted anchor toewall may be omitted when an alternate end section with pre-attached cross pipes is supplied.
- Synthetic fibers listed on the "Fibers for Concrete" Material Producer List (MPL) may be used in lieu of reinforcing steel in concrete riprap unless noted otherwise.

GENERAL NOTES:

- Safety end treatments (SET) shown herein are intended for use in those installations where out of control vehicles are likely to traverse the openings approximately perpendicular to the cross pipes.
- Cross pipes are designed for a traversing load of 10,000 pounds at yield as recommended by Research Report 280-2F, "Safety Treatment of Roadside Parallel-Drainage Structures", Texas Transportation Institute, March 1981.
- Alternate styles of end sections, including those with pre-attached cross pipes, may be supplied. Alternate styles must meet all of the following: design values shown in tables for cross pipe size; spacing of cross pipes and location of first cross pipe; H, A, W, and gage for end section; and material requirements noted.
- All cross pipes, calculations, and dimensions are based on the end section shown on this standard. Alternate styles of end sections will require that appropriate adjustments be made to the values presented on this standard.
- Payment for riprap and toewall is included in price bid for each safety end treatment.

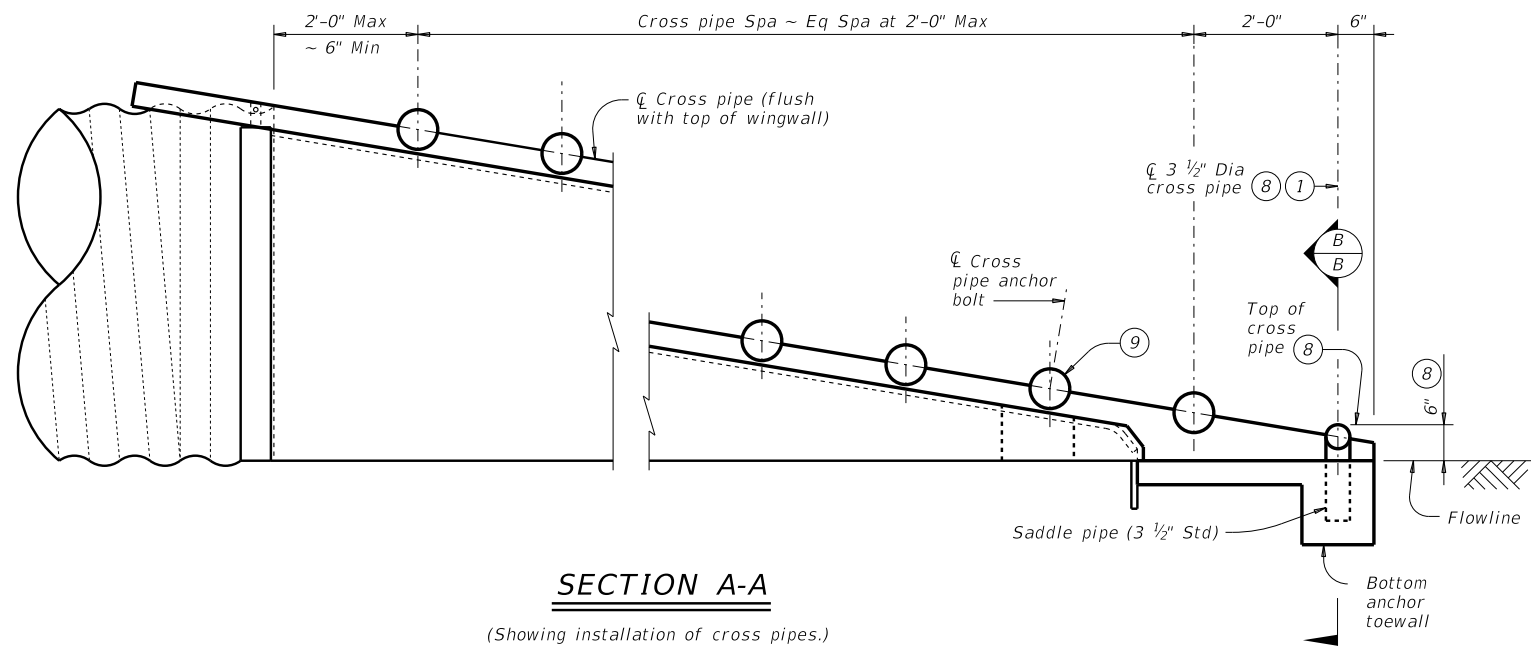
SHEET 1 OF 2

				Bridge Division Standard	
PREFABRICATED GALVANIZED STEEL END SECTION SAFETY END TREATMENT FOR 12" TO 60" DIA CMP CULVERTS TYPE II ~ PARALLEL DRAINAGE GS-ES-PD					
FILE: CD-GSES-PD-20.dgn	DN: TxDOT	CK: TxDOT	DW: JRP	CK: GAF	
©TxDOT February 2020	CONT	SECT	JOB	HIGHWAY	
REVISIONS					
	DIST	COUNTY		SHEET NO.	

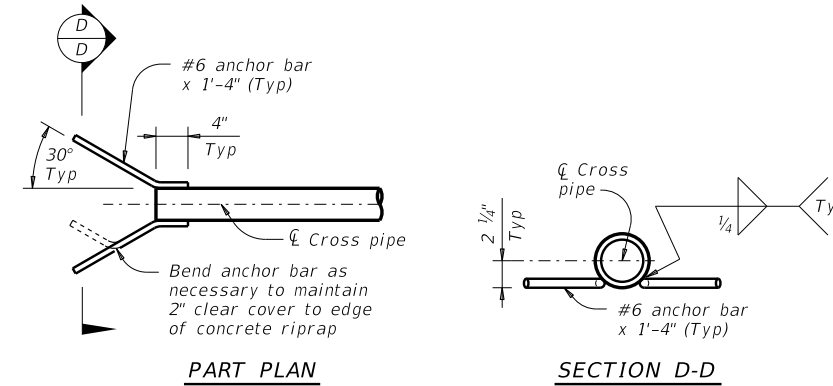
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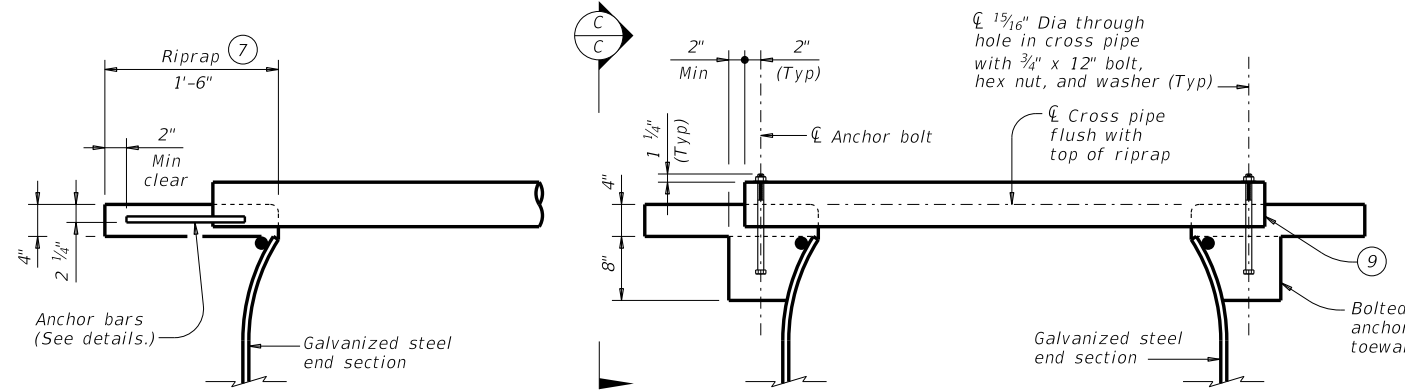


SECTION A-A
(Showing installation of cross pipes.)

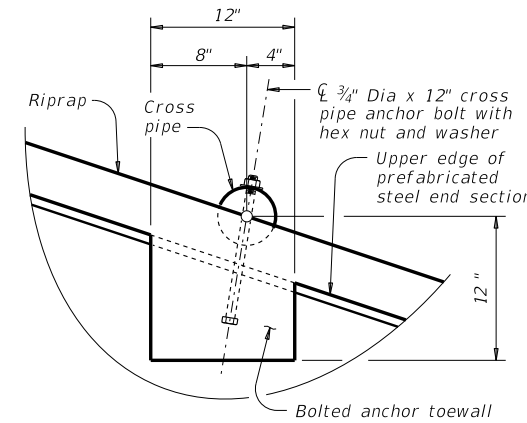


ANCHOR BAR DETAILS

ESTIMATED CONCRETE RIPRAP QUANTITIES	
D (Nominal Culvert I.D.)	Concrete (CY)
12"	0.8
15"	0.9
18"	1.0
21"	1.1
24"	1.2
27"	1.3
30"	1.4
33"	1.5
36"	1.6
42"	1.8
48"	2.0
54"	2.2
60"	2.4

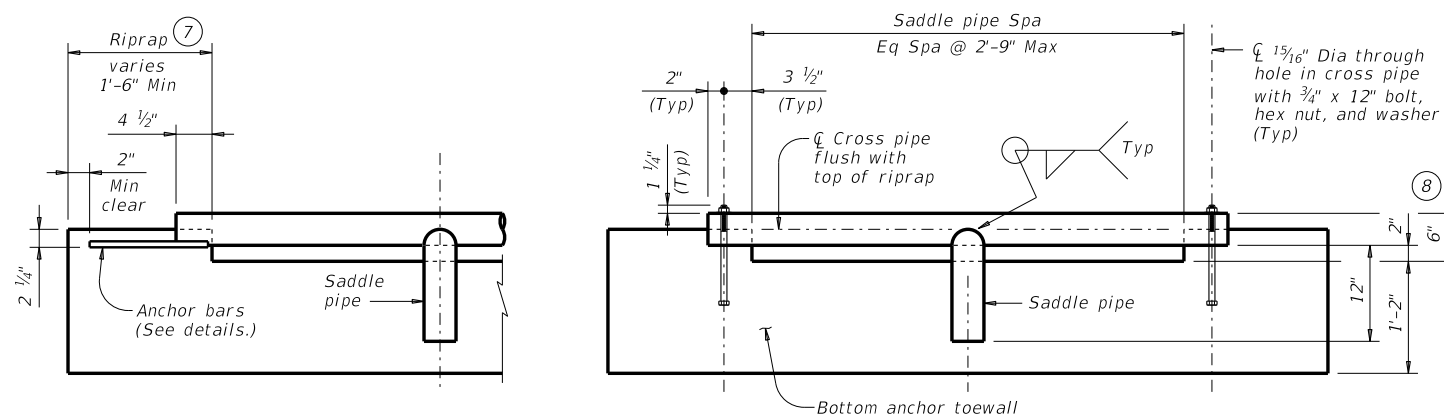


SECTION THROUGH INSTALLATION OF TYPICAL FULL CROSS PIPE



SECTION C-C
(Showing bolted anchor details.)

- ① Provide size and lengths of cross pipes as shown in the tables, except the first cross pipe from the bottom and the saddle pipe must be 3 1/2". All other values shown are minimum requirements.
- ⑤ Reinforce upper edge of prefabricated end section with minimum 3/8" diameter smooth or deformed bar (pre-galvanized).
- ⑦ Riprap placed beyond the limits shown will be paid as concrete riprap in accordance with Item 432, "Riprap."
- ⑧ The proper installation of the first cross pipe is critical for vehicle safety. The top of the first cross pipe must be placed at no more than 6" above the flow line.
- ⑨ The third cross pipe from the bottom of the culvert must always be installed using a bolted connection. Ensure that concrete does not flow into this cross pipe so as to permit disassembly of the bolted connection to allow cleanout access.
- ⑩ Riprap quantities shown are for one end of one culvert only. For multiple culverts, quantities will need to be adjusted. Riprap quantities are for Contractor's information only.

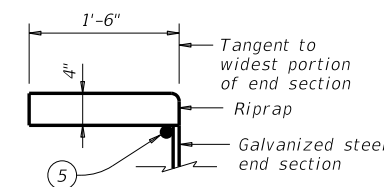


SECTION THROUGH INSTALLATION OF 3 1/2" FIRST CROSS PIPE

WITH ANCHOR BARS & RIPRAP

WITH BOLTED ANCHOR

SECTION B-B
(Showing installation of cross pipes.)



CROSS SECTION OF TYPICAL RIPRAP

SHEET 2 OF 2

		Bridge Division Standard	
PREFABRICATED GALVANIZED STEEL END SECTION SAFETY END TREATMENT FOR 12" TO 60" DIA CMP CULVERTS TYPE II ~ PARALLEL DRAINAGE GS-ES-PD			
FILE: CD-GSES-PD-20.dgn	DN: TxDOT	CK: TxDOT	DW: JRP
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REVISIONS			HIGHWAY
	DIST	COUNTY	SHEET NO.