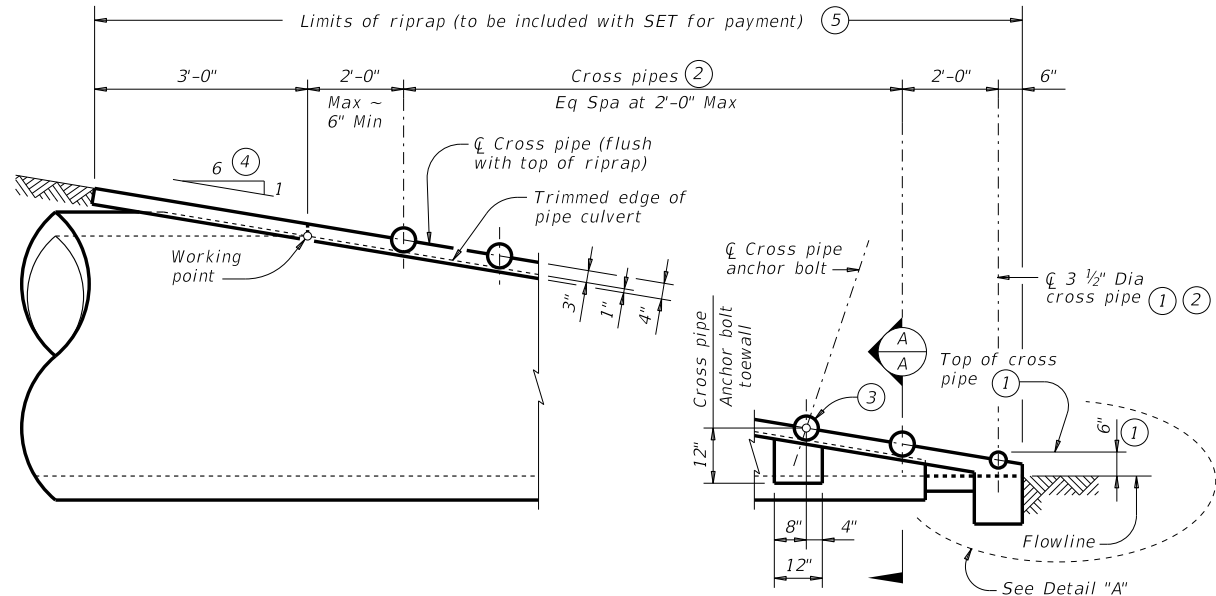


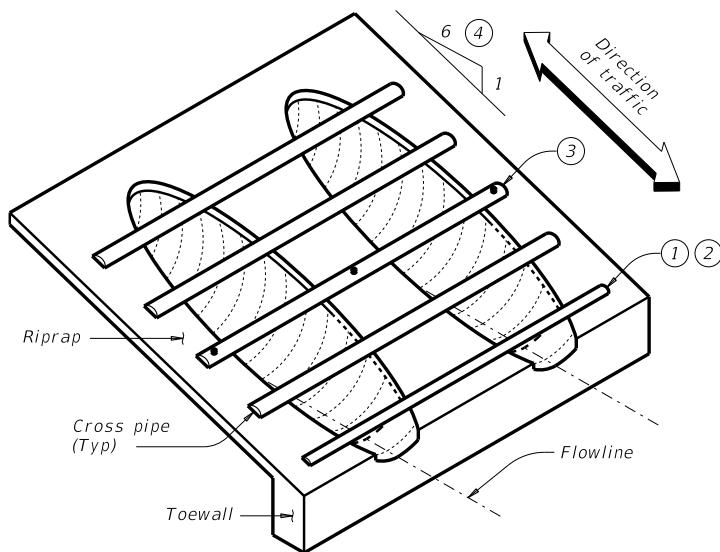
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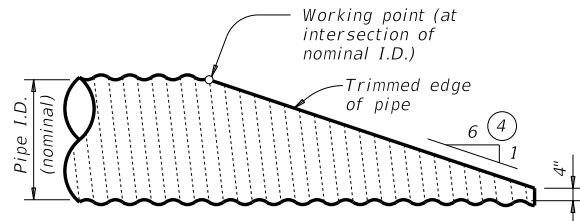


SIDE ELEVATION OF CAST-IN-PLACE CONCRETE

(Showing reinforced concrete pipe (RCP) culvert. Details of corrugated metal pipe (CMP) culvert are similar. pipe runners not shown for clarity.)



ISOMETRIC VIEW OF TYPICAL INSTALLATION



NOTE: All cross pipes, calculations, and dimensions are based on the pipe culverts mitered as shown in this detail. Alternate styles of mitered ends will require that appropriate adjustments be made to the values presented on this standard.

SIDE ELEVATION OF TYPICAL PIPE CULVERT MITER

(Showing corrugated metal pipe (CMP) culvert. Details at reinforced concrete pipe (RCP) culvert are similar.)

CROSS PIPE LENGTHS AND REQUIRED PIPE SIZES ②

Corrugated Metal Pipe (CMP) Culverts

Design	Conc Riprap (CY) (6)	Pipe Culvert Span	Pipe Culvert Rise	Pipe Culvert Spa ~ G	Single Barrel ~ Q1	Multi-Barrel ~ Q1	Q2	Conditions for Use of Cross Pipes	Cross Pipe Sizes
1	0.6	17"	13"	1' - 0"	N/A	2' - 8"	2' - 5"	3 or more pipe culverts	3" Std (3.500" O.D.)
2	0.7	21"	15"	1' - 2"	N/A	3' - 1"	2' - 11"		
3	0.9	28"	20"	1' - 5"	N/A	3' - 9"	3' - 9"		3 1/2" Std (4.000" O.D.)
4	1.0	35"	24"	1' - 8"	4' - 4"	4' - 6"	4' - 7"	All pipe culverts	4" Std (4.500" O.D.)
5	1.2	42"	29"	1' - 11"	4' - 11"	5' - 2"	5' - 5"		
6	1.4	49"	33"	2' - 2"	5' - 6"	5' - 11"	6' - 3"	All pipe culverts	5" Std (5.563" O.D.)
7	1.6	57"	38"	2' - 5"	6' - 2"	6' - 8"	7' - 2"		
8	1.8	64"	43"	2' - 10"	6' - 9"	7' - 6"	8' - 2"		
9	1.9	71"	47"	3' - 2"	7' - 4"	8' - 3"	9' - 1"		

Reinforced Concrete Pipe (RCP) Culverts

Design	Conc Riprap (CY) (6)	Pipe Culvert Span	Pipe Culvert Rise	Pipe Culvert Spa ~ G	Single Barrel ~ Q1	Multi-Barrel ~ Q1	Q2	Conditions for Use of Cross Pipes	Cross Pipe Sizes
1	0.6	22"	13 1/2"	1' - 0"	N/A	3' - 1"	2' - 10"	3 or more pipe culverts	3" Std (3.500" O.D.)
2	0.7	26"	15 1/2"	1' - 2"	N/A	3' - 6"	3' - 4"		
3	0.9	28 1/2"	18"	1' - 5"	N/A	3' - 10"	3' - 9 1/2"	3 or more pipe culverts	3 1/2" Std (4.000" O.D.)
4	1.0	36 1/4"	22 1/2"	1' - 8"	4' - 5"	4' - 7"	4' - 8 1/4"		4" Std (4.500" O.D.)
5	1.2	43 3/4"	26 5/8"	1' - 11"	5' - 1"	5' - 4"	5' - 6 3/4"	All pipe culverts	4" Std (4.500" O.D.)
6	1.4	51 1/8"	31 5/16"	2' - 2"	5' - 8"	6' - 1"	6' - 5 1/4"		
7	1.6	58 1/2"	36"	2' - 5"	6' - 4"	6' - 10"	7' - 3 1/2"	All pipe culverts	5" Std (5.563" O.D.)
8	1.8	65"	40"	2' - 10"	6' - 10"	7' - 7"	8' - 3"		
9	1.9	73"	45"	3' - 2"	7' - 6"	8' - 5"	9' - 3"		

- ① The proper installation of the first cross pipe is critical for vehicle safety. Place the top of the first cross pipe no more than 6" above the flow line.
- ② Provide cross pipes, except the first bottom pipe, of the size shown in the table. Provide a 3 1#2" standard pipe (4" O.D.) for the first bottom pipe.
- ③ Install the third Cross Pipe from the bottom of the culvert using a bolted connection. Ensure that riprap concrete does not flow into the cross pipe so as to permit disassembly of the bolted connection to allow cleanout access. At the Contractor's option, install all other cross pipes using the bolted connection details.
- ④ Match cross slope as shown elsewhere in the plans. Cross slope of 6:1 or flatter is required for vehicle safety.
- ⑤ Riprap placed beyond the limits shown will be paid as concrete riprap in accordance with Item 432, "Riprap."
- ⑥ Quantities shown are for one end of one pipe culvert. For multiple Pipe Culverts, quantities will need to be adjusted. Riprap quantities are for Contractor's information only.

MATERIAL NOTES:

Synthetic fibers listed on the "Fibers for Concrete" Material Producer List (MPL) may be used in lieu of steel reinforcing in riprap concrete unless noted otherwise.

Provide cross pipes that meet the requirements of ASTM A53 (Type E or S, Gr B), ASTM A500 Gr B, or API 5LX52.

Provide ASTM A307 bolts and nuts.

Galvanize all steel components, except concrete reinforcing, after fabrication. Repair galvanizing damaged during transport or construction in accordance with the specifications.

GENERAL NOTES:

Pipe runners 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.

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 Pipe Runners.

Construct concrete riprap and all necessary inverts in accordance with the requirements of Item 432, "Riprap." Payment for riprap and toewall is included in the price bid for each safety end treatment.

SHEET 1 OF 2



Texas Department of Transportation

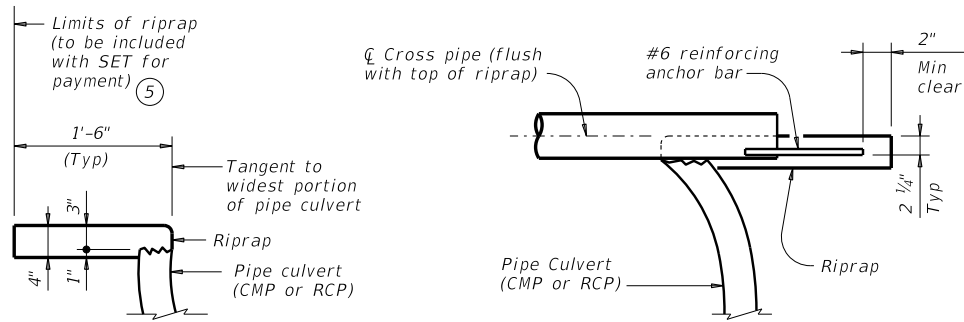
Bridge
Division
Standard

SAFETY END TREATMENT FOR DESIGN 1 TO 9 ARCH PIPE CULVERTS TYPE II ~ PARALLEL DRAINAGE SETP-PD-A

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	DIST	COUNTY		SHEET NO.

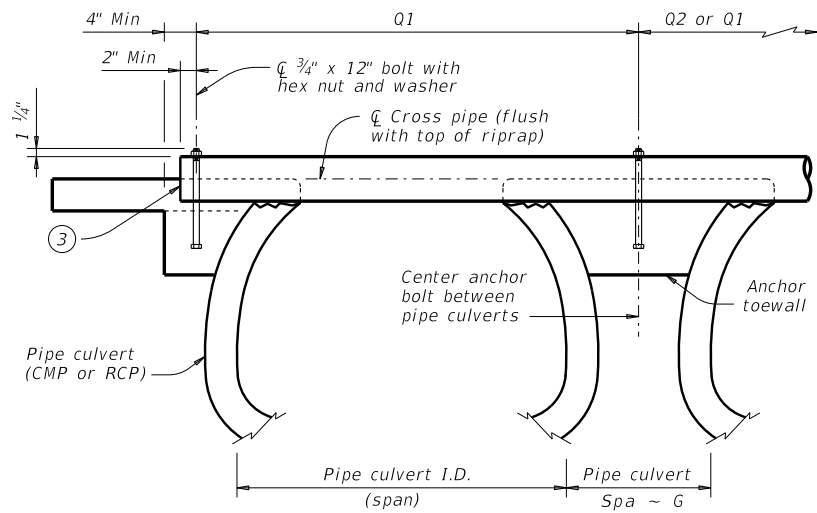
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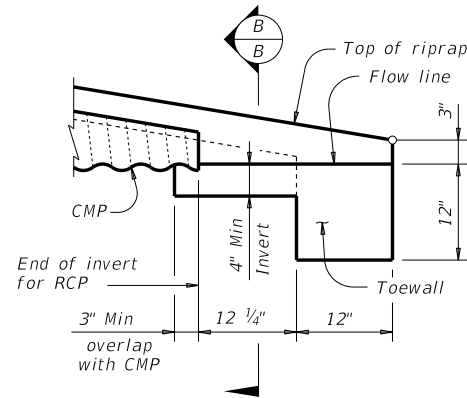
SHOWING TYPICAL PIPE CULVERT AND RIPRAP

SHOWING CROSS PIPE WITH ANCHOR BAR



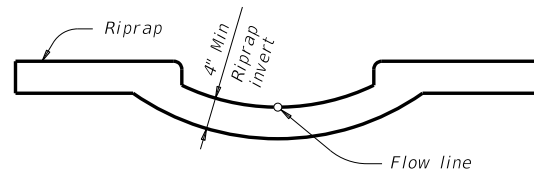
SHOWING CROSS PIPE WITH BOLTED ANCHOR

SECTION A-A



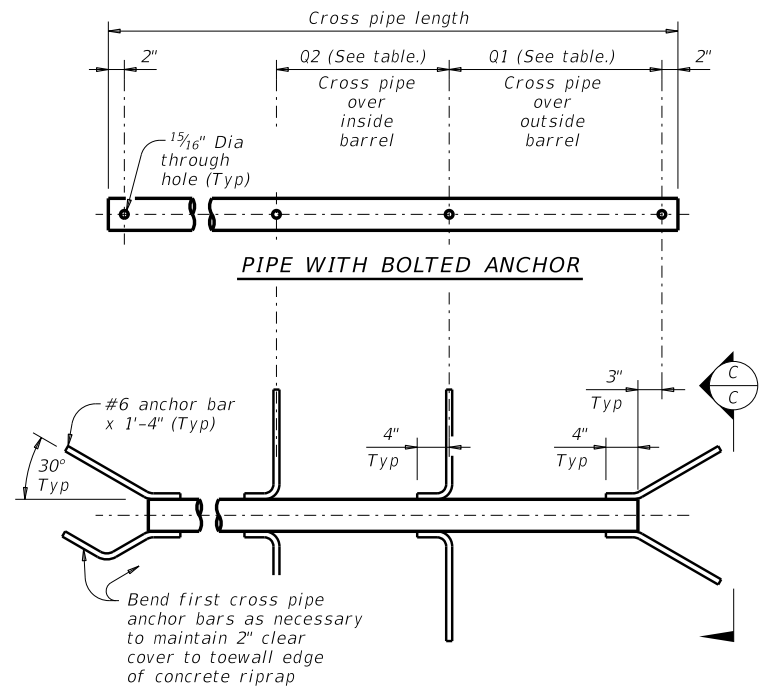
DETAIL "A"

(Showing invert with corrugated metal pipe (CMP) culvert. Reinforced concrete pipe (RCP) culvert details are similar. Cross pipes not shown for clarity.)

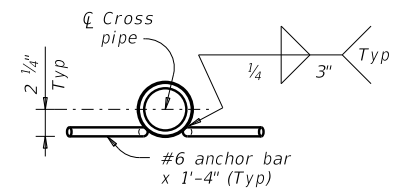


SECTION B-B

(Cross pipes not shown for clarity.)



PIPE WITH ANCHOR BARS



SECTION C-C

CROSS PIPE DETAILS

SHEET 2 OF 2



SAFETY END TREATMENT
FOR DESIGN 1 TO 9
ARCH PIPE CULVERTS
TYPE II ~ PARALLEL DRAINAGE
SETP-PD-A

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