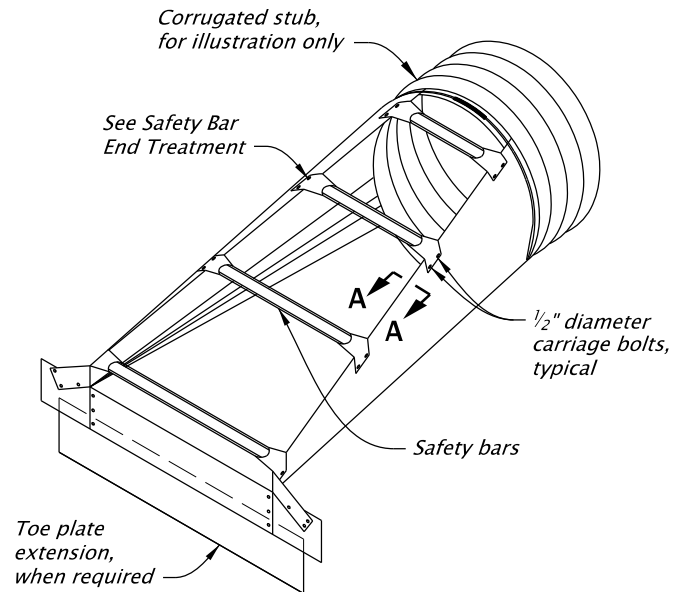
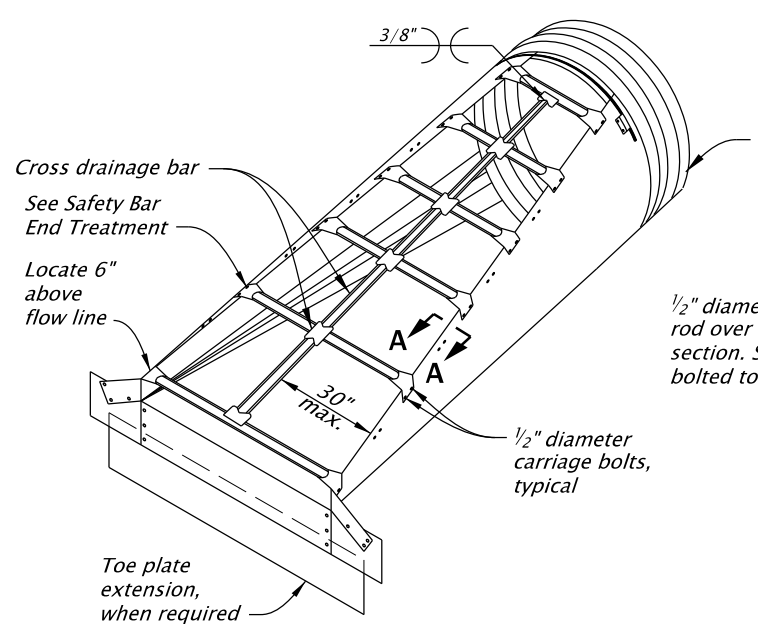




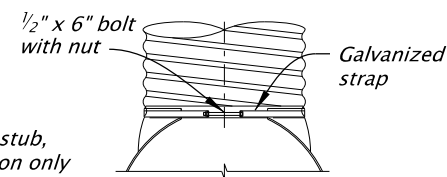
PARALLEL DRAINAGE STRUCTURE

Use with single pipe installations 30" diameter or larger.
Use with multiple pipe installations 15" diameter or larger.



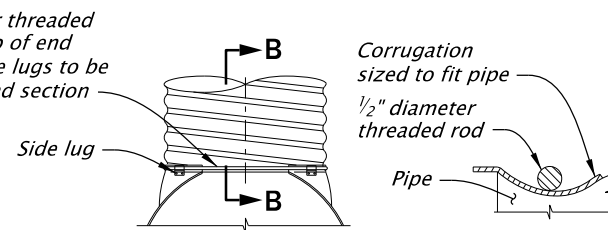
CROSS DRAINAGE STRUCTURE

Use with pipe installations 36" diameter and larger



TYPE 1 CONNECTOR

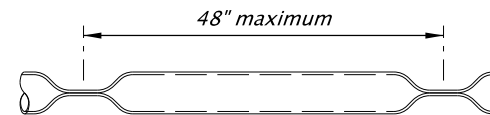
Through 24" diameters



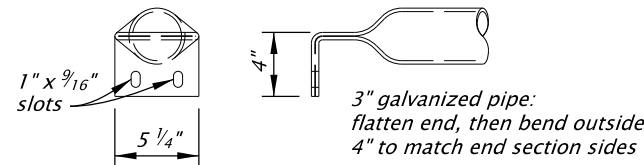
SECTION B-B

TYPE 2 CONNECTOR

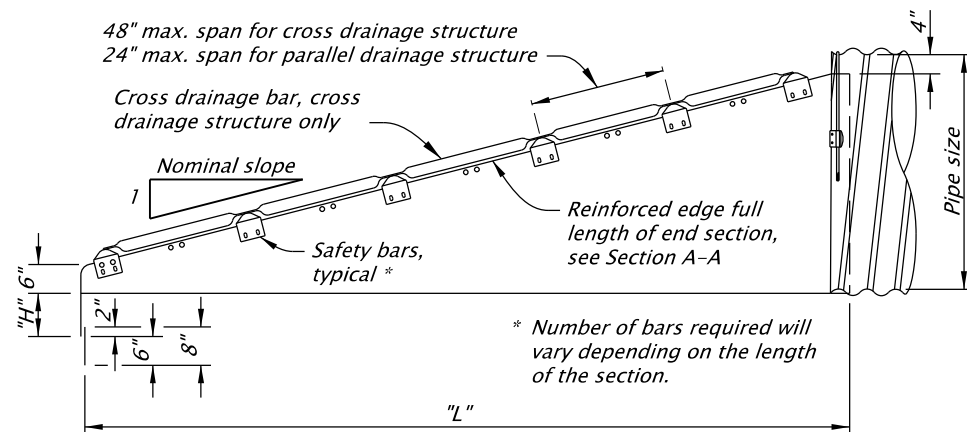
For 30" and larger diameters



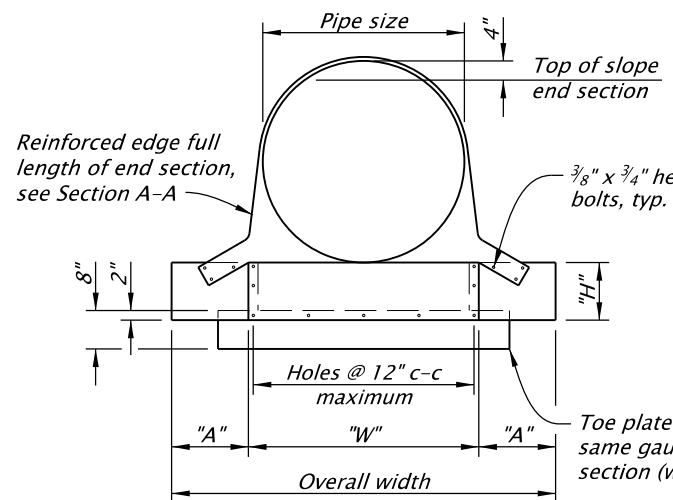
CROSS DRAINAGE BAR



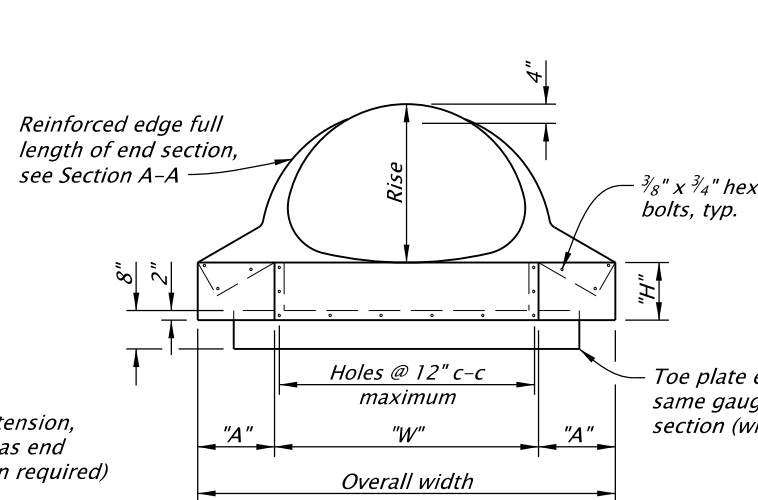
SAFETY BAR END TREATMENT



PARALLEL AND CROSS DRAINAGE SIDE ELEVATION

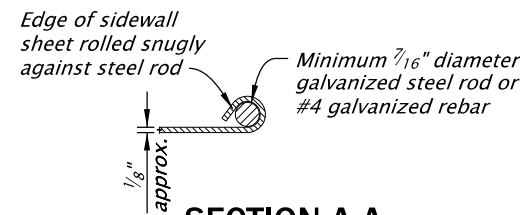


CIRCULAR PIPE

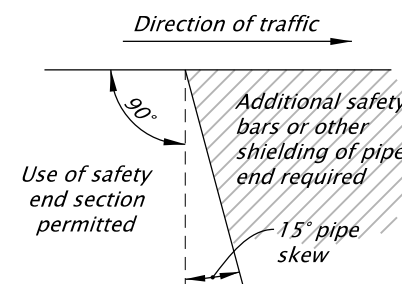


ARCH PIPE

SAFETY END SECTION FRONT VIEWS



SECTION A-A



LOCATION DIAGRAM

GENERAL NOTES FOR ALL DETAILS THIS SHEET:

- For round pipes with diameters 24 inches or less use Type 1 connector. All arch pipes equivalent round diameter, and round pipes over 24 inch diameter use Type 2 connector.
- Toe plate extensions are to be the same minimum thickness as end section. Dimensions shall be overall width less 6 inches by 8 inches high.
- Cross drainage and safety bars shall be 3 inch diameter Schedule 40 galvanized steel pipe.
- Slotted holes for safety bar attachment shall be provided for all end sections.
- Cross-sectional dimensions of attaching pipe may vary with different materials.
- Open ends of pipes normally require a site specific design, and may require special treatment (slope ends, culvert embankment protection, paved end slopes, safety end sections, or other measures). See special details or Standard Drawings as called for on plans.
- See Std. Dwg. RD317 for culvert embankment protection and riprap pads (when required).

STEEL END SECTIONS FOR CIRCULAR PIPES

PIPE DIAMETER (In)	METAL THICK (MIN.) (In/Gage)	DIMENSIONS (Inches)					
		A	H	W	OVERALL WIDTH	L	
						SLOPE 1:4	SLOPE 1:6
15	0.064/16	8	6	21	37	20	30
18	0.064/16	8	6	24	40	32	48
21	0.064/16	8	6	27	43	44	66
24	0.064/16	8	6	30	46	56	84
30	0.109/12	12	9	36	60	80	120
36	0.109/12	12	9	42	66	104	156
42	0.109/12	16	12	48	80	128	192
48	0.109/12	16	12	54	86	152	228
54	0.109/12	16	12	60	92	176	264
60	0.109/12	16	12	66	98	200	300

STEEL END SECTIONS FOR ARCH PIPES

EQUIVALENT ROUND DIAMETER	SPAN ***	RISE ***	METAL THICK (MIN.) (In/Gage)	DIMENSIONS (Inches)					
				A	H	W	OVERALL WIDTH	L	
								SLOPE 1:4	SLOPE 1:6
18	21	15	0.064/16	8	6	27	43	20	30
21	24	18	0.064/16	8	6	30	46	32	48
24	28	20	0.064/16	8	6	34	50	40	60
30	35	24	0.079/14	12	9	41	65	56	84
36	42	29	0.109/12	12	9	48	72	76	114
42	49	33	0.109/12	16	12	55	87	92	138
48	57	38	0.109/12	16	12	63	95	112	168
54**	64	43	0.109/12	16	12	70	102	132	198
60**	71	47	0.109/12	16	12	77	109	148	222
72**	83	57	0.109/12	16	12	89	121	188	282

** Requires two cross drainage bars.

*** See General Note 5.

The selection and use of this Standard Drawing, while designed in accordance with generally accepted engineering principles and practices, is the sole responsibility of the user and should not be used without first consulting a Registered Professional Engineer.

All materials shall be in accordance with the current Oregon Standard Specifications.

OREGON STANDARD DRAWINGS

SAFETY END SECTION FOR METAL PIPE

2024

DATE	REVISION	DESCRIPTION
01-2024	REDRAWN TO CAD STANDARDS, REVISED DETAILS, TABLES AND NOTES	
CALC. BOOK No.	N/A	SDR DATE: 19-JAN-2024

RD322

Effective Date: June 1, 2026 – November 30, 2026