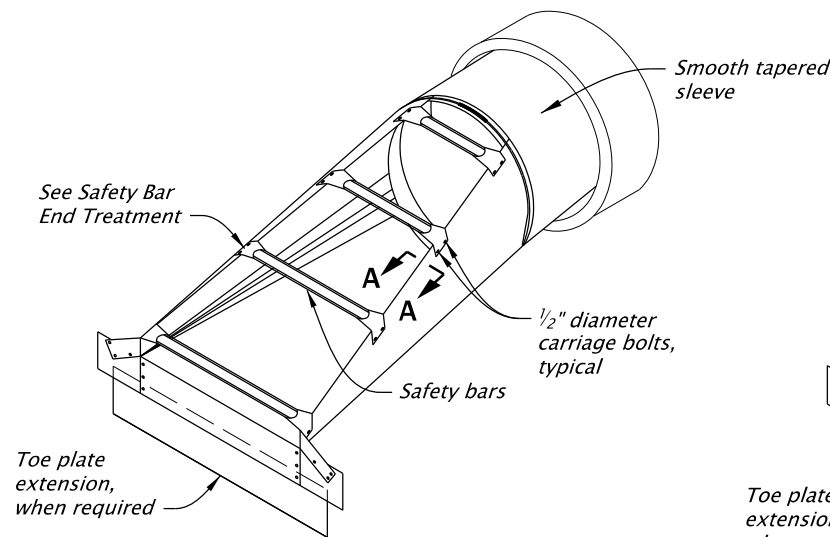
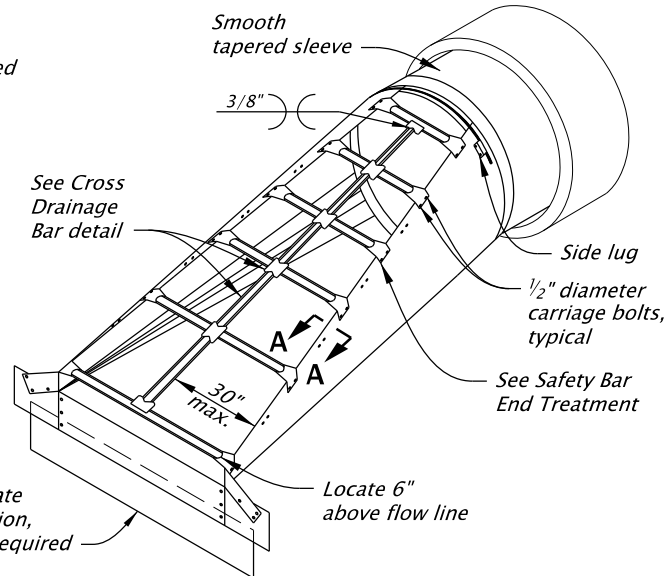




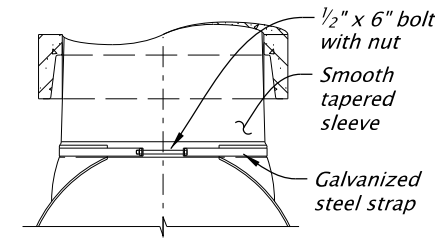
PARALLEL DRAINAGE STRUCTURE

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



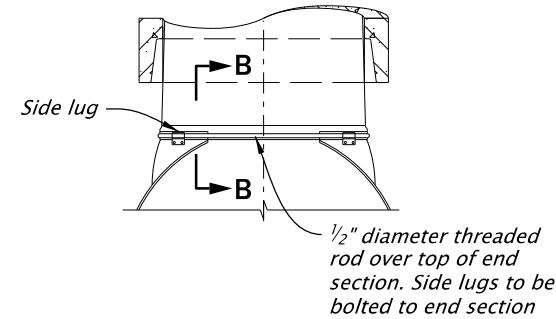
CROSS DRAINAGE STRUCTURE

Use with pipe installations 36" diameter and larger



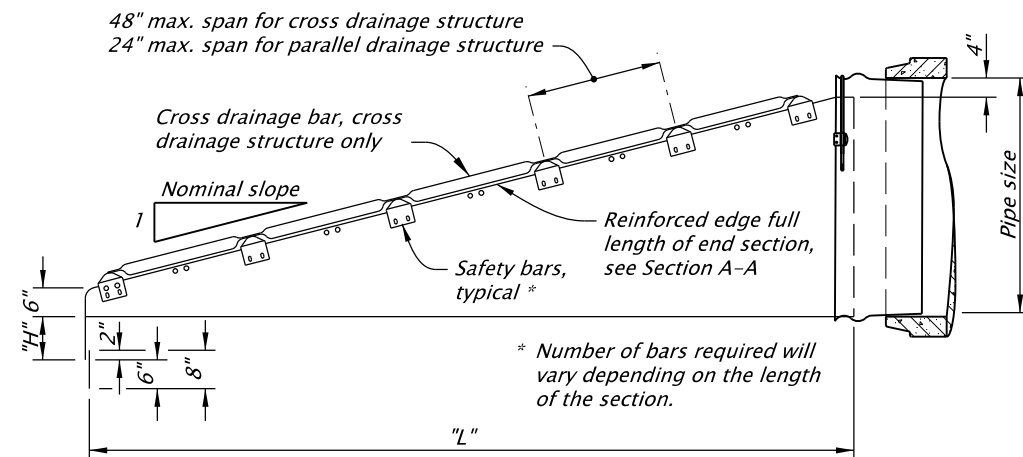
TYPE 1 CONNECTOR

Through 24" diameter

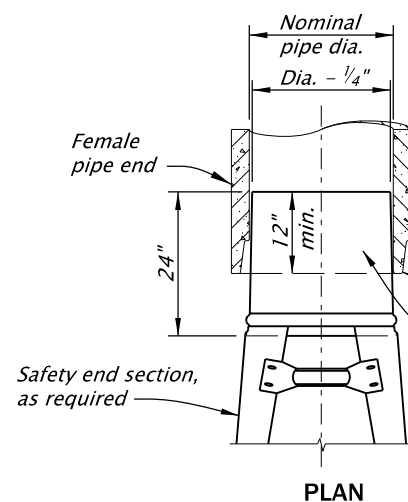


TYPE 2 CONNECTOR

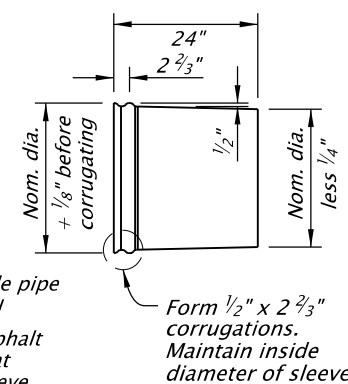
For 30" and larger diameters



PAPRALLEL AND CROSS DRAINAGE SIDE ELEVATION



PLAN

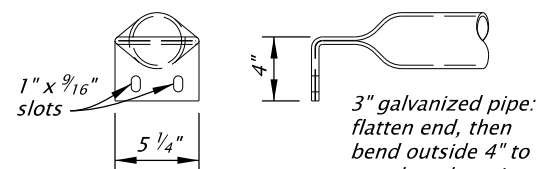


NOTE: Metal to be smooth galvanized steel in accordance with AASHTO M218. 0.079" (14 ga.) minimum thickness up to 18" diameter
0.109" (12 ga.) minimum thickness over 18" diameter

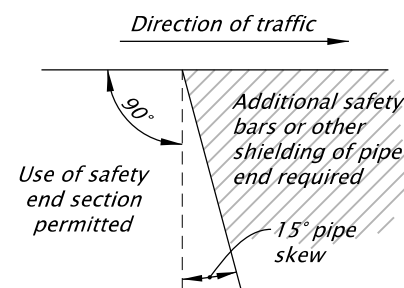
SMOOTH TAPERED SLEEVE

SMOOTH TAPERED SLEEVE DETAIL

For attaching steel safety end sections to concrete pipe



SAFETY BAR END TREATMENT



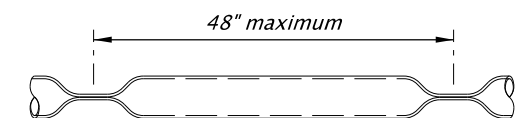
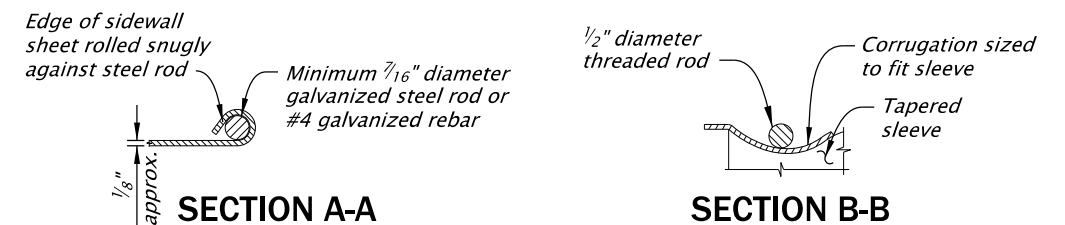
LOCATION DIAGRAM

GENERAL NOTES FOR ALL DETAILS THIS SHEET:

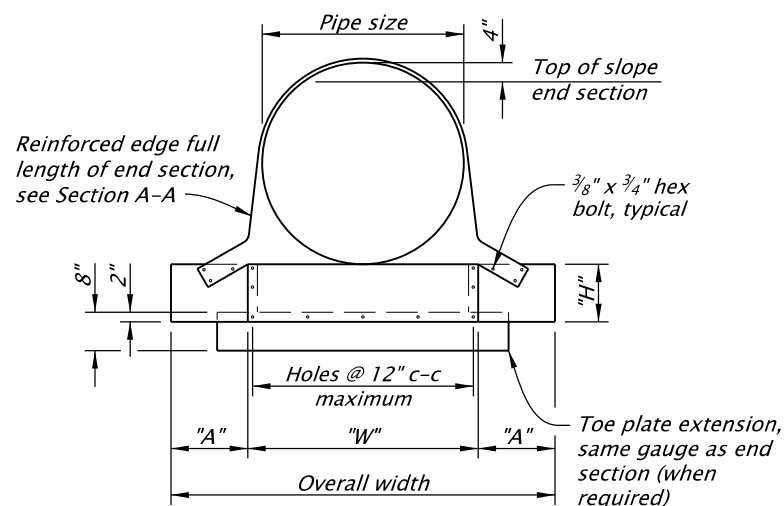
- For round pipes with diameters 24 inches or less use Type 1 connector. All arch pipes equivalent round diameter, and round pipes over 24 inch diameter use Type 2 connector.
- Toe plate extensions are to be the same minimum thickness as end section. Dimensions shall be overall width less 6 inches by 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.
- 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



CROSS DRAINAGE BAR



SAFETY END SECTION FRONT VIEW

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 CONCRETE, PVC, HDPE AND POLYPROPYLENE PIPE

2024

DATE	REVISION	DESCRIPTION
01-2024	REDRAWN TO CAD STANDARDS, REVISED DETAILS AND NOTES	

CALC. BOOK NO.	N/A	SDR DATE	19-JAN-2024	RD324
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Effective Date: June 1, 2026 – November 30, 2026