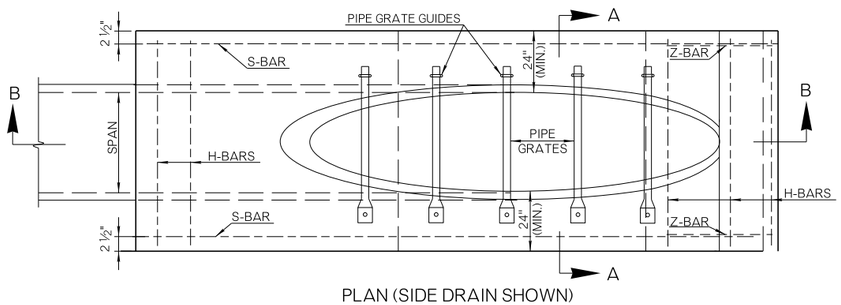
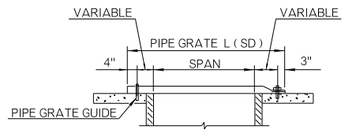
TABLE A - SCHEDULE OF PIPE SAFETY GRATES

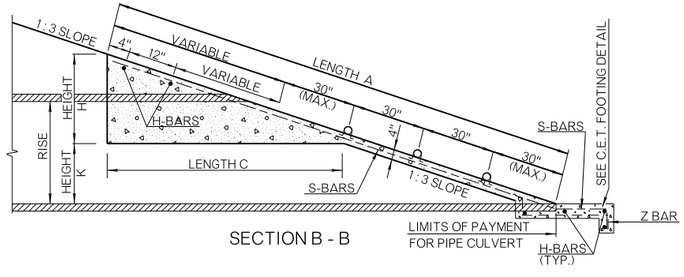
C. E. T. TYPE	CULVERT TYPE: REINF. CONC., STEEL OR ALUMINUM ROUND PIPE	REINF. CONC. ARCH PIPE	REINF. CONC. ELLIPTICAL PIPE (RISE x SPAN)	STEEL OR ALUMINUM ARCH PIPE	SIDE DRAIN: NO. OF GRATES	SIDE DRAIN: GRATE LENGTH L (SD)	CROSS DRAIN: NO. OF GRATES	CROSS DRAIN: GRATE LENGTH L (CD)
A3	18"				2	36"		NONE
		22" x 13"	14" x 23"	21" x 15"	2	42"		NONE
				24" x 18"	2	45"		NONE
B3	24"				2	45"		NONE
		28" x 18"	19" x 30"		2	48"	1	8'-0"
				28" x 20"	2	48"		NONE
		36" x 22"	22" x 34"		3	54"	1	8'-9"
				35" x 24"	3	54"	1	9'-4"
			24" x 38"		3	57"	1	9'-4"
C3	30"				3	50"		NONE
		43" x 26"			3	64"	1	9'-10"
				42" x 29"	3	64"	1	10'-8"
			29" x 45"		3	64"	1	10'-8"
		51" x 31"			4	70"	1	11'-2"
				49" x 33"	4	70"	1	11'-8"
			34" x 53"		4	72"	1	12'-0"
D3	36"				4	54"	1	12'-6"
	42"				4	61"	1	14'-1"
		58" x 36"	38" x 60"	57" x 38"	4	78"	1	13'-0"
		65" x 40"			4	84"	2	13'-6"
				64" x 43"	4	84"	2	14'-4"
E3	48"				5	68"	1	15'-8"
			43" x 68"		4	88"	2	14'-4"
		73" x 45"		71" x 47"	4	92"	2	15'-5"
			48" x 76"		5	99"	2	15'-8"



PLAN (SIDE DRAIN SHOWN)



SECTION A - A

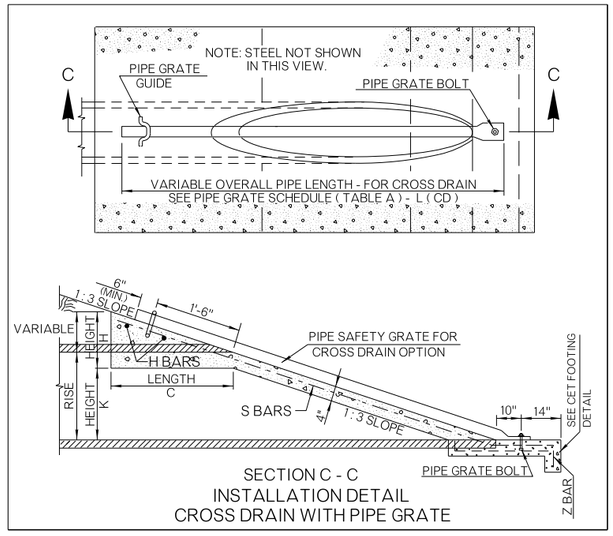


SECTION B - B

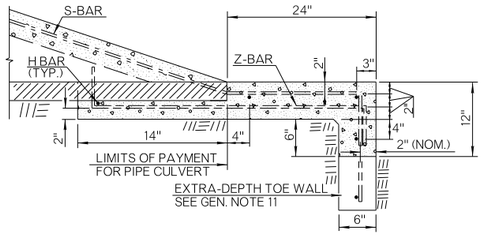
TABLE B - SCHEDULE OF DIMENSIONS

C.E.T. TYPE	LENGTH A	Ⓡ WIDTH B	Ⓐ Ⓔ WIDTH B	LENGTH C	HEIGHT H	HEIGHT K	Ⓡ CONC. CY	Ⓐ Ⓔ CONC. CY	STEEL LENGTH: Ⓡ H-BARS	STEEL LENGTH: Ⓐ Ⓔ H-BARS	STEEL LENGTH: S-BARS	STEEL LENGTH: Z-BARS
A3	7'-11"	5'- 6"	6'- 2"	4'- 3"	21"	9"	1.67	1.82	5'- 2"	5'-8"	10'- 3"	4'- 0"
B3	9'-6"	6'- 0"	7'- 2"	4'- 5"	22"	14"	2.05	2.44	5'- 8"	6'-10"	11'- 10"	4'- 0"
C3	12'-2"	6'- 6"	8'- 5"	5'- 5"	26"	20"	2.96	3.83	6'- 2"	10'- 9"	14'- 5"	4'- 0"
D3	14'-6"	7'- 6"	9'- 5"	6'- 0"	28"	27"	3.99	5.01	7'- 2"	9'- 1"	16'- 10"	4'- 0"
E3	15'-10"	8'- 0"	10'- 4"	6'- 5"	30"	30"	4.79	6.19	7'- 8"	10'- 0"	18'- 2"	4'- 0"

Ⓡ ROUND SHAPE CULVERT OPTIONS
Ⓐ ARCH SHAPE CULVERT OPTIONS
Ⓔ HORIZONTAL ELLIPSE SHAPE CULVERT OPTIONS

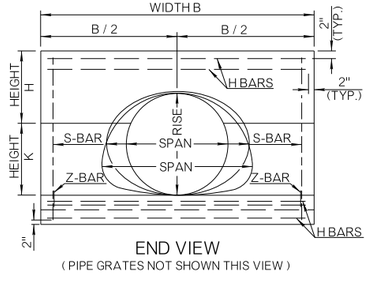


SECTION C - C
INSTALLATION DETAIL
CROSS DRAIN WITH PIPE GRATE

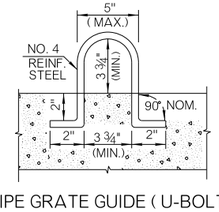


C.E.T. FOOTING DETAIL

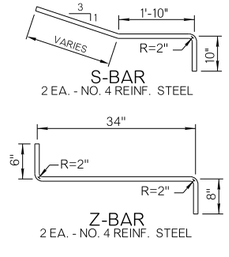
TYPICAL ABBREVIATIONS
RS - ROUND SIDE DRAIN
RC - ROUND CROSS DRAIN
AS - ARCH SIDE DRAIN
AC - ARCH CROSS DRAIN
GR - GRATED
NG - NON-GRATED

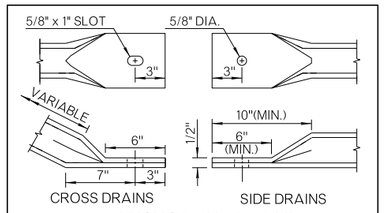


END VIEW
(PIPE GRATES NOT SHOWN THIS VIEW)



PIPE GRATE GUIDE (U-BOLT)





ANCHOR END DETAIL
PIPE GRATE MEMBERS

GENERAL NOTES

1. ALL CONSTRUCTION AND MATERIAL REQUIREMENTS SHALL BE IN ACCORDANCE WITH THE 2019 ODOT STANDARD SPECIFICATIONS.
2. QUANTITIES SHOWN IN TABLE B ARE FOR ONE END ONLY. CLASS "A" CONCRETE SHALL CONFORM TO THE MINIMUM REQUIREMENTS OF SECTION 509 OF THE ODOT SPECIFICATIONS.
3. TYPES A3 THROUGH E3 END TREATMENTS, AS SHOWN IN TABLE B, MAY BE USED WITH ANY AASHTO DESIGNATED METAL, ALUMINUM AND CONCRETE PIPE SIZES, AS SHOWN IN TABLE A. END TREATMENT QUANTITIES ARE BASED ON METAL PIPE DIMENSIONS, NO PIPE WALL THICKNESS AND SMALLEST LISTED CULVERT ROUND OR ARCH WITHIN SAME TYPE.
4. COAT THE FIELD OR SHOP CUT EDGES OF THE METAL PIPE CULVERT WITH TWO COATS OF COLD GALVANIZATION. COAT THE FIELD OR SHOP CUT EDGES OF THE CONCRETE PIPE CULVERT WITH CONCRETE OR AN APPROVED CORROSION INHIBITOR. IF THE PIPE CULVERT IS CUT AFTER THE CONSTRUCTION OF THE CULVERT END TREATMENT, THE CONTRACTOR SHALL ALLOW SUFFICIENT TIME FOR THE PROPER CURING OF THE CONCRETE. INCLUDE THE COST OF CUTTING AND COATING IN THE PRICE BID FOR THE METAL AND/OR CONCRETE PIPE CULVERT.
5. ALL SIZES OF CULVERT PIPE WILL BE CUT ON 1 TO 3 SLOPE.
6. PIPE FOR SAFETY GRATES SHALL BE 3" x 7.58 LBS./FT. STANDARD WEIGHT STEEL PIPE, SCHEDULE 40. IT SHALL BE FURNISHED GALVANIZED, PLAIN END AND SHALL MEET THE MINIMUM REQUIREMENTS OF ASTM A53 (HYDROSTATIC TESTS MAY BE WAIVED) OR ASTM F1083. COST OF GRATES SHALL BE INCLUDED IN THE PRICE BID FOR CULVERT END TREATMENT.
7. ANY GALVANIZED AREA(S) OF METAL PIPE DISTRESSED DURING THE POST FABRICATION AND/OR HANDLING PROCESS SHALL BE COATED WITH AN APPROVED ZINC-RICH PAINT.
8. REINFORCING STEEL AND PIPE GRATE GUIDES SHALL BE NO. 4 DEFORMED BARS. COST OF STEEL SHALL BE INCLUDED IN PRICE BID FOR THE CULVERT END TREATMENT.
9. CRITERIA FOR USE OF PIPE SAFETY GRATE MEMBER:
   (A) ALL SIDE DRAIN AND MULTIPLE PIPE INSTALLATIONS WITHIN THE CLEAR ZONE.
   (B) ALL CROSS DRAIN INSTALLATIONS WITH A CULVERT SPAN OF 30" OR LARGER WITHIN THE CLEAR ZONE.
   (C) ALL INSTALLATIONS OUTSIDE THE CLEAR ZONE WHERE HAZARD POTENTIAL IS HIGH BASED ON TRAFFIC DIRECTION, SPEED, VOLUME, AND SIZE OF CULVERT.
   NOTE: ANALYZE HYDRAULIC PERFORMANCE AT VARYING DEGREES OF CLOGGING AND APPLY RISK ASSESSMENT BEFORE USING GRATES
10. ANCHOR END OF PIPE GRATE MEMBERS SHALL BE HELD IN PLACE WITH A 1/2" x 5 1/2" GALVANIZED BOLT, NUT AND WASHER. THREADS, 1 3/4" (NOM.) SHALL REMAIN EXPOSED FOR INSTALLING GRATE, WASHER AND NUT. ALL BOLTS, NUTS AND WASHERS SHALL CONFORM TO ASTM A307 WITH COST TO BE INCLUDED IN THE PRICE BID FOR THE CULVERT END TREATMENT.
11. FOR TOTAL QUANTITY OF EXTRA DEPTH TOE WALL, MULTIPLY WIDTH B (TABLE B) TIMES 0.0185 FOR EACH FOOT OF DEPTH OF TOE WALL REQUIRED. PAYMENT TO BE INCLUDED IN PRICE BID FOR THE CULVERT END TREATMENT.

PRECAST CULVERT END TREATMENTS OR OTHER ALTERNATIVE DESIGNS MAY BE USED IF APPROPRIATE DRAWINGS ARE SUBMITTED TO AND APPROVED BY THE ENGINEER.

BASIS OF PAYMENT		
ITEM NO.	ITEM	UNIT
613 (M)	◒ CULVERT END TREATMENT	EA

◒ SPECIFY TYPE OF END TREATMENT.
(EXAMPLE: TYPE B3 CULVERT END TREATMENT)

■ CET ORIENTATION AND SAFETY GRATE REQUIREMENTS SHALL BE SPECIFIED ON THE SUMMARY OF DRAINAGE STRUCTURES. (SEE TYPICAL ABBREVIATIONS)

APPROVED BY
ROADWAY ENGINEER: _____ DATE: 4/3/2025

ROADWAY DESIGN DIVISION STANDARD

CULVERT END TREATMENT
SINGLE PIPE INSTALLATION
1 TO 3 SAFETY SLOPE

OKLAHOMA Transportation

2019 SPECIFICATIONS

CET 3S-1	0

R-28