

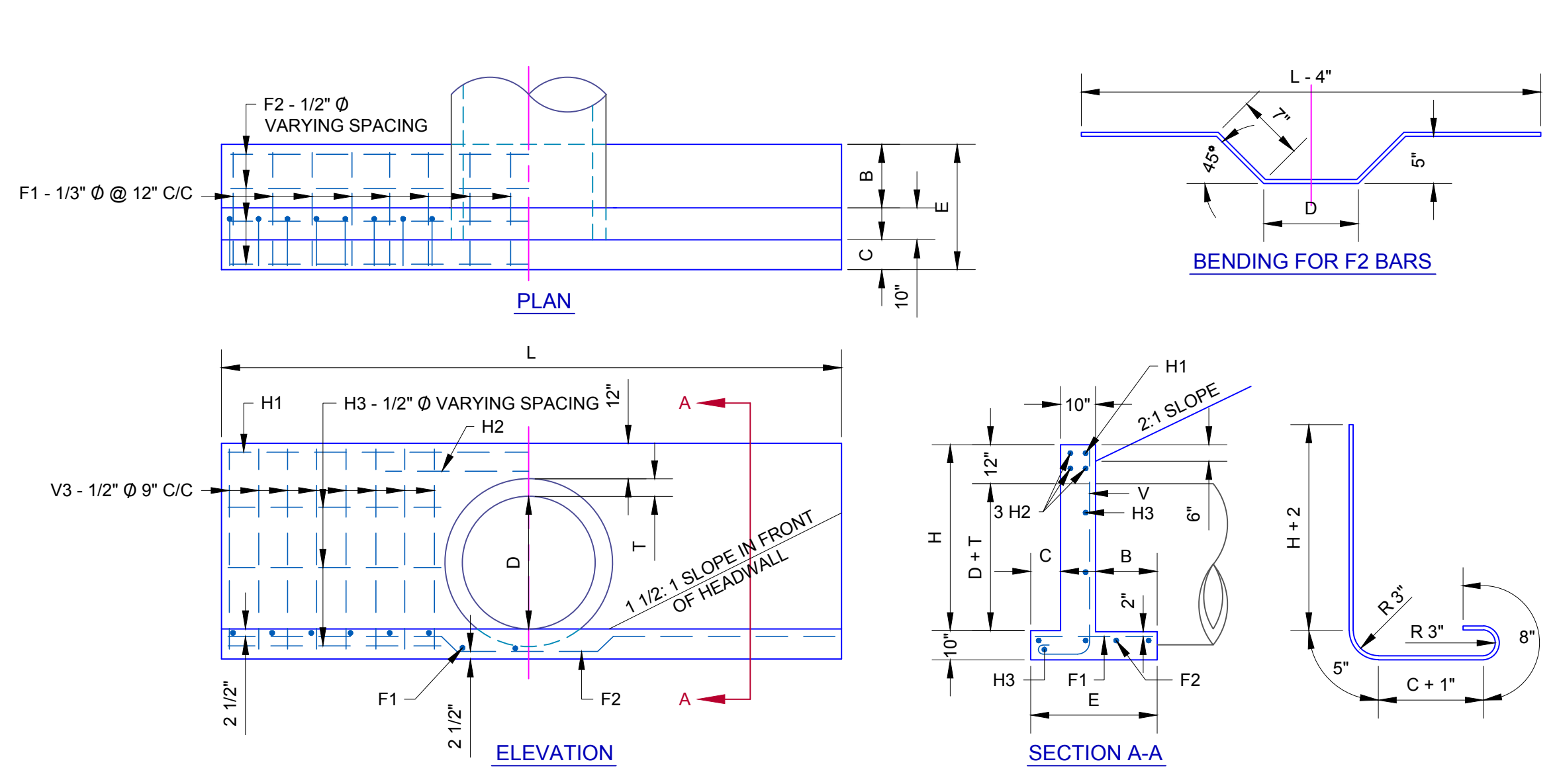
The City of
Oklahoma City
Public Works Department
Engineering Division

APPROVED BY: DATE: 02-06-13
ERIC J. WENGER, P.E.
CITY ENGINEER

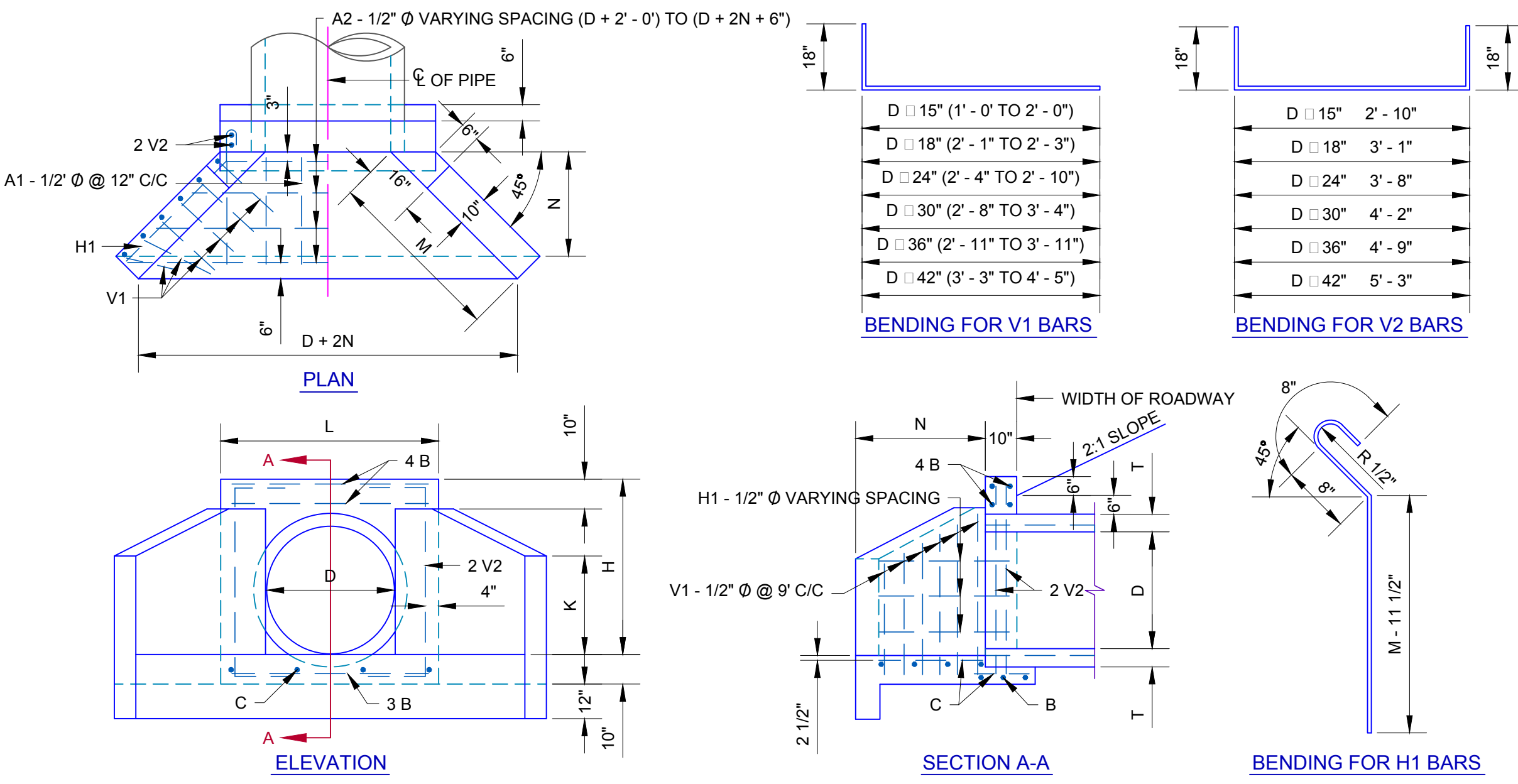
DRAWN: VSC
DATE: 02-06-13

**CAST IN PLACE CONCRETE
HEADWALLS FOR 15" TO 42"
REINFORCED CONCRETE PIPES**

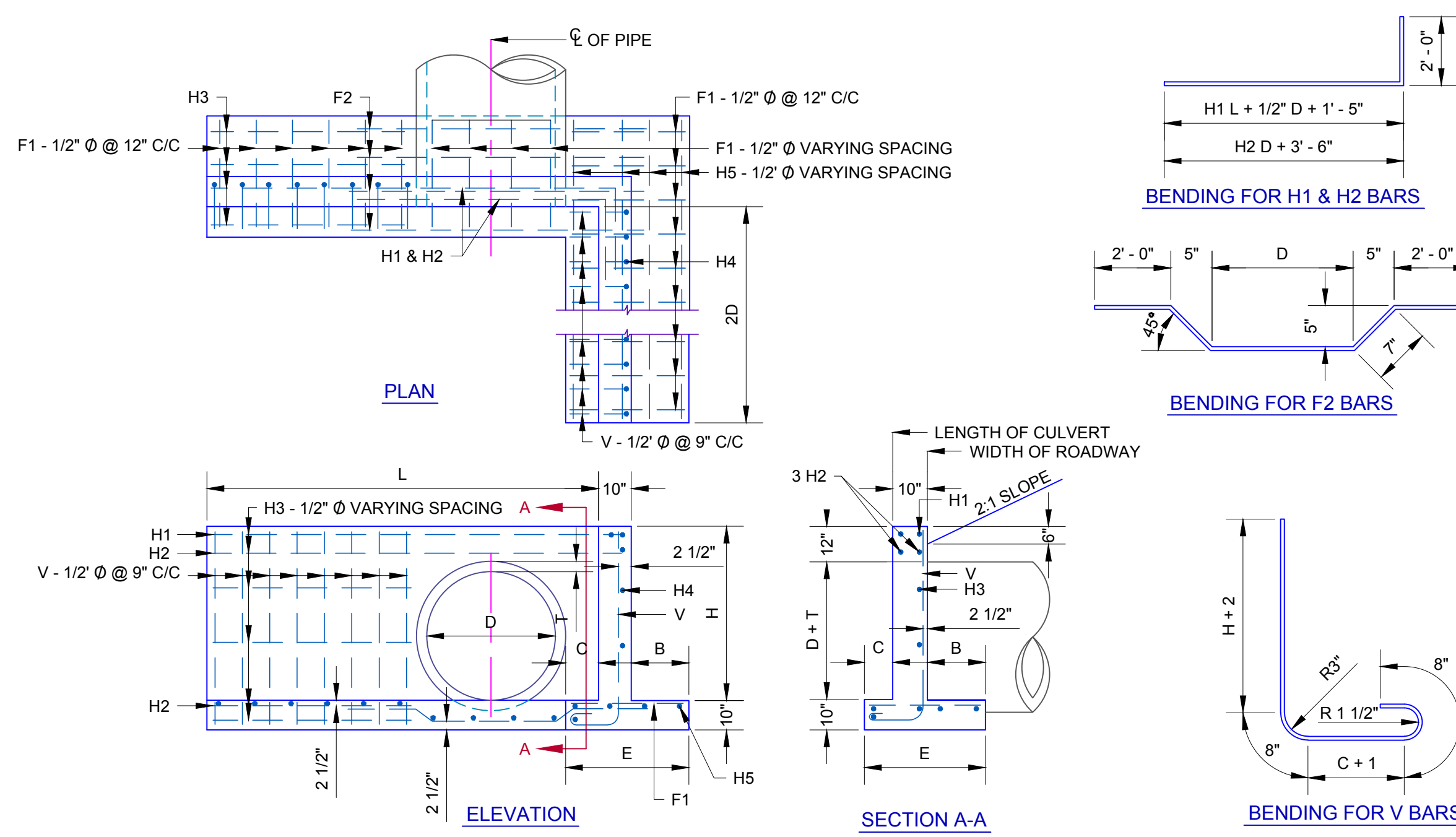
Drawing Number
D-406



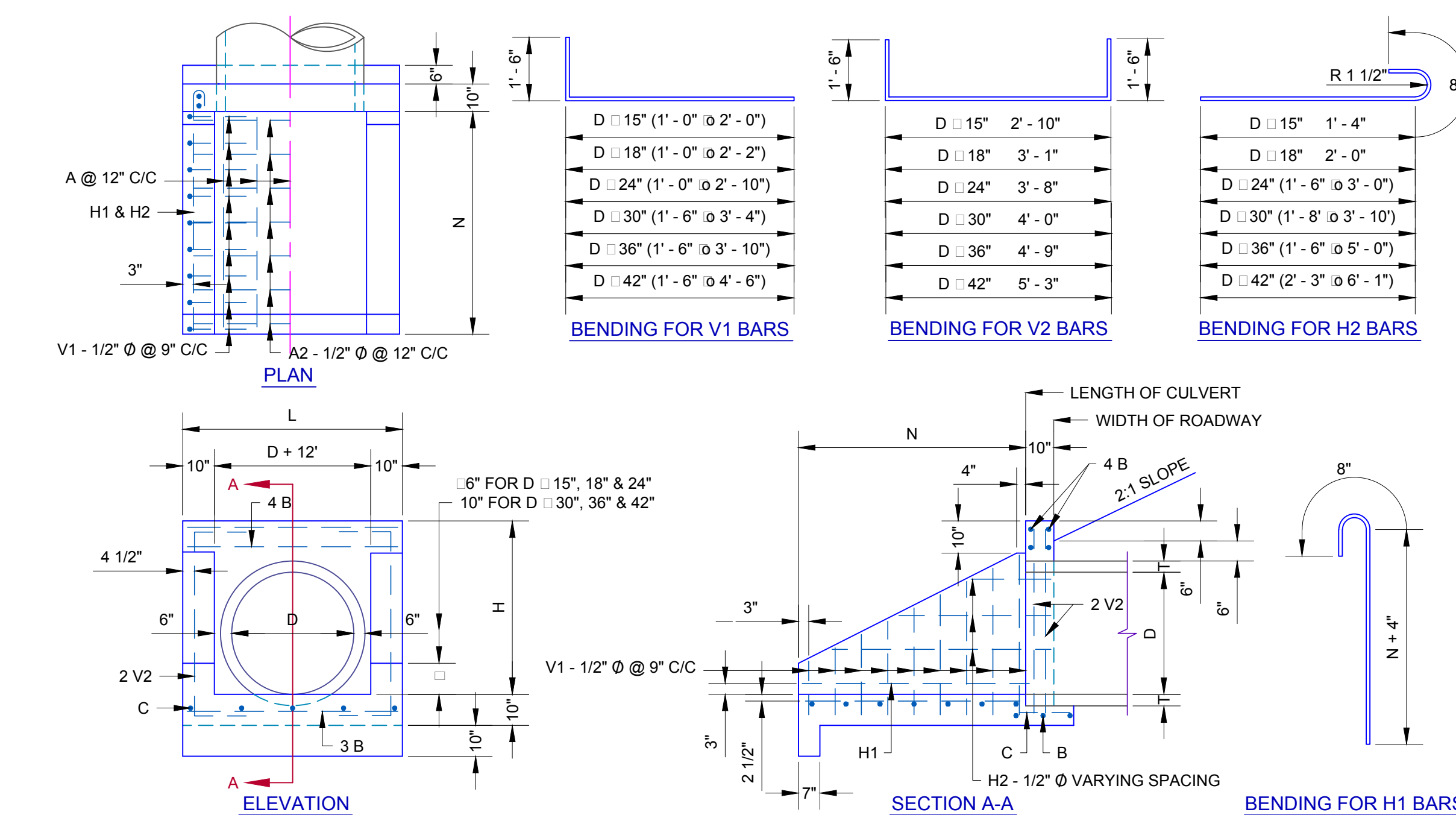
DIMENSIONS & QUANTITIES FOR STRAIGHT HEADWALLS											FOR ONE HEADWALL										
D	AREA SQ FT	DIMENSIONS						REINFORCING STEEL						QUANTITIES							
		T	H	L	E	B	C	F1 - 1/2" Ø	F2 - 1/2" Ø	H1 - 1/2" Ø	H2 - 1/2" Ø	H3 - 1/2" Ø	V - 1/2" Ø	CLASS "A" CONC C.Y.	REINF. STEEL LBS						
15"	1.23	2 1/2"	2'-5 1/2"	6'-0"	2'-2"	10"	6"	6	1'-10"	3	6'-0"	1	5'-8"	3	5'-3"	4	2'-0"	6	4'-3"	.78	56
18"	1.77	2 1/2"	2'-8 1/2"	7'-0"	2'-3"	11"	6"	8	1'-11"	3	7'-0"	1	6'-8"	3	5'-6"	4	2'-4"	8	4'-6"	.98	70
24"	3.14	3"	3'-3"	9'-0"	2'-7"	1'-3"	6"	10	2'-3"	3	9'-0"	1	8'-8"	3	6'-0"	4	3'-1"	10	5'-1"	1.46	95
30"	4.91	3 1/2"	3'-9 1/2"	11'-0"	2'-10"	1'-4"	8"	12	2'-6"	3	11'-0"	1	10'-8"	3	6'-6"	6	3'-9"	12	5'-9"	2.00	122
36"	7.07	4"	4'-4"	14'-0"	3'-1"	1'-7"	8"	14	2'-9"	4	14'-0"	1	13'-8"	3	7'-0"	6	5'-0"	14	6'-4"	2.85	170
42"	9.62	4 1/2"	4'-10 1/2"	16'-0"	3'-4"	1'-8"	10"	16	3'-0"	4	16'-0"	1	15'-8"	3	7'-6"	6	5'-8"	16	7'-0"	3.58	198



DIMENSIONS & QUANTITIES FOR HEADWALLS WITH 45° WINGS														FOR ONE HEADWALL									
D	AREA SQ FT	DIMENSIONS						REINFORCING STEEL						QUANTITIES									
		T	H	L	M	N	A1 - 1/2" Ø	A - 1/2" Ø	B - 1/2" Ø	C - 1/2" Ø	H1 - 1/2" Ø	V1 - 1/2" Ø	V - 1/2" Ø	CLASS "A" CONC C.Y.	REINF. STEEL LBS								
15"	1.23	2 1/4"	2'-5 1/4"	1'-5"	3'-7"	1'-9"	1'-3"	4	1'-0"	2	3'-9" AV.	7	3'-3"	3	1'-6"	4	2'-1"	4	3'-5" AV.	4	5'-10"	.74	57
18"	1.77	2 1/2"	2'-8 1/2"	1'-7"	3'-10"	2'-1 1/2"	1'-6"	4	1'-2"	2	4'-3" AV.	7	3'-6"	3	1'-6"	4	2'-6"	4	3'-8" AV.	4	6'-1"	.91	61
24"	3.14	3"	3'-3"	1'-10 1/2"	4'-4"	2'-10"	2'-0"	5	1'-8"	3	5'-3" AV.	7	4'-0"	3	1'-6"	6	3'-2"	6	4'-1" AV.	4	6'-8"	1.37	85
30"	4.91	3 1/2"	3'-9 1/2"	2'-2"	4'-10"	3'-6 1/2"	2'-6"	5	2'-2"	3	6'-3" AV.	7	4'-6"	4	1'-6"	6	3'-11"	8	4'-6" AV.	4	7'-2"	1.77	104
36"	7.07	4"	4'-4"	2'-5 1/2"	5'-4"	4'-3"	3'-0"	6	2'-8"	4	7'-3" AV.	7	5'-0"	4	1'-6"	6	4'-7"	10	4'-11" AV.	4	7'-9"	2.29	130
42"	9.62	4 1/2"	4'-10 1/2"	2'-9"	5'-10"	4'-1 1/2"	3'-6"	6	3'-2"	4	8'-3" AV.	7	5'-6"	4	1'-6"	6	5'-4"	12	5'-4" AV.	4	8'-3"	2.89	151



DIMENSIONS & QUANTITIES FOR HEADWALLS WITH 90° WINGS														FOR ONE HEADWALL											
D	AREA SQ FT	DIMENSIONS						REINFORCING STEEL						QUANTITIES											
		T	H	L	E	B	C	F1 - 1/2" Ø	F2 - 1/2" Ø	H1 - 1/2" Ø	H2 - 1/2" Ø	H3 - 1/2" Ø	H4 - 1/2" Ø	H5 - 1/2" Ø	V - 1/2" Ø	CLASS "A" CONC C.Y.	REINF. STEEL LBS								
15"	1.23	2 1/4"	2'-5 1/4"	3'-0"	2'-2"	10"	6"	10	1'-10"	3	6'-5"	1	7'-0"	3	6'-9"	5	2'-0"	2	3'-0"	4	3'-10"	7	2'-0"	1.09	84
18"	1.77	2 1/2"	2'-8 1/2"	3'-6"	2'-3"	11"	6"	10	1'-11"	3	6'-8"	1	7'-8"	3	7'-0"	5	2'-4"	2	3'-6"	4	4'-5"	9	2'-4"	1.32	97
24"	3.14	3"	3'-3"	4'-6"	2'-7"	1'-3"	6"	14	2'-3"	3	7'-2"	1	8'-11"	3	7'-6"	6	3'-1"	3	4'-6"	4	5'-9"	11	3'-1"	1.94	131
30"	4.91	3 1/2"	3'-9 1/4"	5'-6"	2'-10"	1'-4"	8"	16	2'-6"	3	7'-8"	1	10'-2"	3	8'-0"	6	3'-9"	3	5'-6"	4	6'-10"	14	3'-9"	2.59	163
36"	7.07	4"	4'-4"	7'-0"	3'-1"	1'-7"	8"	16	2'-9"	4	8'-2"	1	11'-11"	3	8'-6"	7	5'-0"	4	6'-8"	4	8'-1"	17	5'-0"	3.47	216
42"	9.62	4 1/2"	4'-10 1/4"	8'-0"	3'-4"	1'-8"	10"	19	3'-0"	4	8'-8"	1	13'-2"	3	9'-0"	7	5'-8"	4	7'-6"	4	9'-2"	19	5'-8"	4.32	252

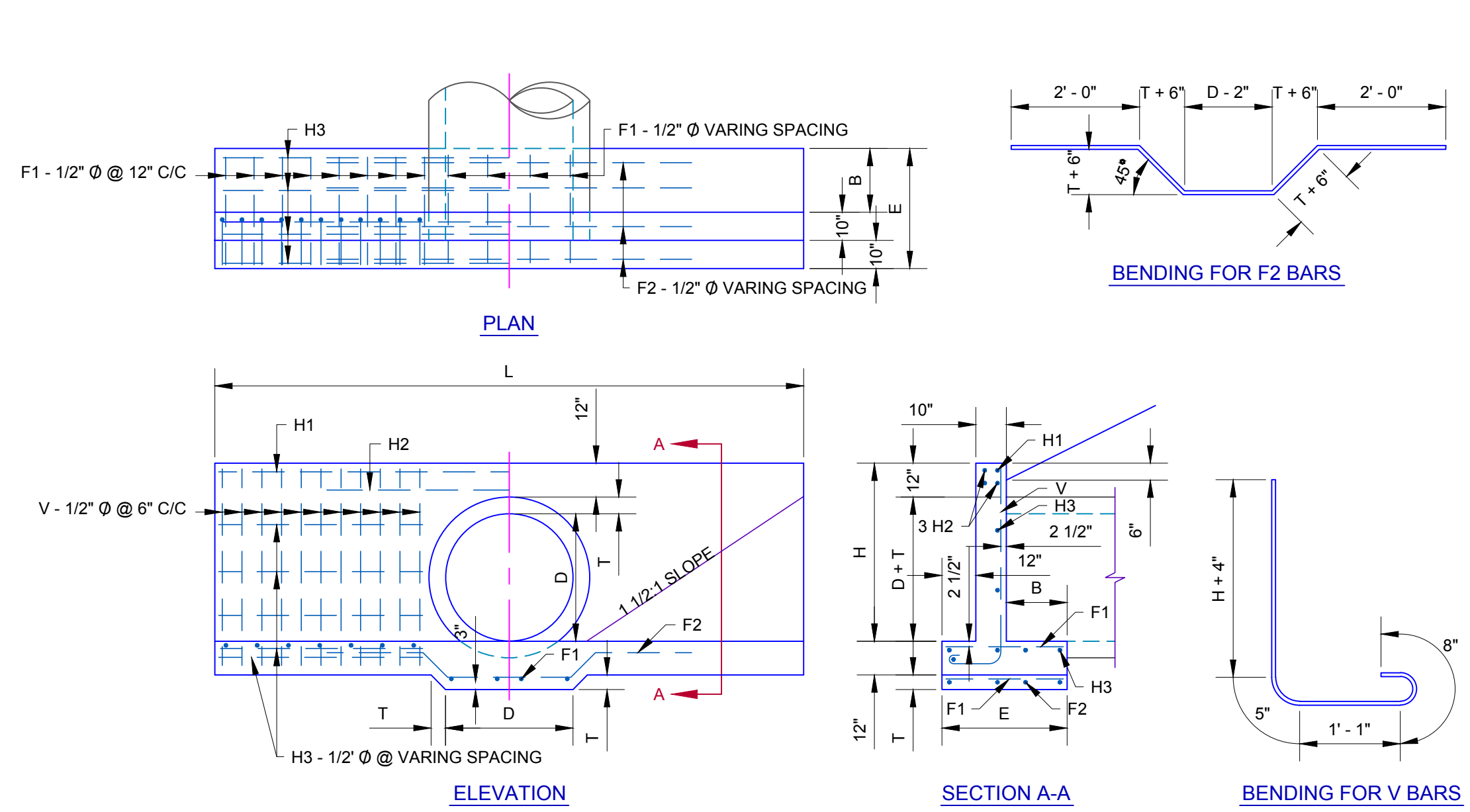


DIMENSIONS & QUANTITIES FOR HEADWALLS WITH U-TYPE WINGS														FOR ONE HEADWALL									
D	AREA SQ FT	DIMENSIONS						REINFORCING STEEL						QUANTITIES									
		T	H	L	N	A1 - 1/2" Ø	A2 - 1/2" Ø	B - 1/2" Ø	C - 1/2" Ø	H1 - 1/2" Ø	H2 - 1/2" Ø	V1 - 1/2" Ø	V2 - 1/2" Ø	CLASS "A" CONC C.Y.	REINF. STEEL LBS								
15"	1.23	2 1/4"	2'-5 1/4"	3'-11"	6'-6"	3	2'-2"	3	3'-7"	7	3'-7"	3	1'-6"	2	3'-6"	2	2'-0"	8	3'-0" AV.	4	5'-10"	.95	71
18"	1.77	2 1/4"	2'-8 1/4"	3'-1"	3'-1"	3	2'-9"	4	3'-10"	7	3'-10"	3	1'-6"	2	4'-1"	2	2'-8"	8	3'-1" AV.	4	6'-1"	1.15	79
24"	3.14	3"	3'-3"	4'-2"	4'-2"	4	3'-10"	5	4'-4"	7	4'-4"	4	1'-6"	2	5'-2"	4	2'-11" AV.	12	3'-5" AV.	4	6'-8"	1.60	109
30"	4.91	3 1/4"	3'-9 1/4"	4'-3"	4'-3"	4	2'-6"	5	4'-10"	7	4'-10"	4	1'-6"	2	5'-3"	4	3'-5" AV.	12	3'-11" AV.	4	7'-2"	1.91	120
36"	7.07	4"	4'-4"	5'-4"	5'-4"	5	2'-9"	6	5'-4"	7	5'-4"	5	1'-6"	2	6'-4"	4	3'-11" AV.	14	4'-2" AV.	4	7'-9"	2.48	152
42"	9.62	4 1/4"	4'-10 1/4"	6'-5"	6'-5"	5	3'-0"	7	5'-10"	7	5'-10"	5	1'-6"	2	7'-5"	6	4'-10" AV.	18	4'-6" AV.	4	8'-3"	3.12	186

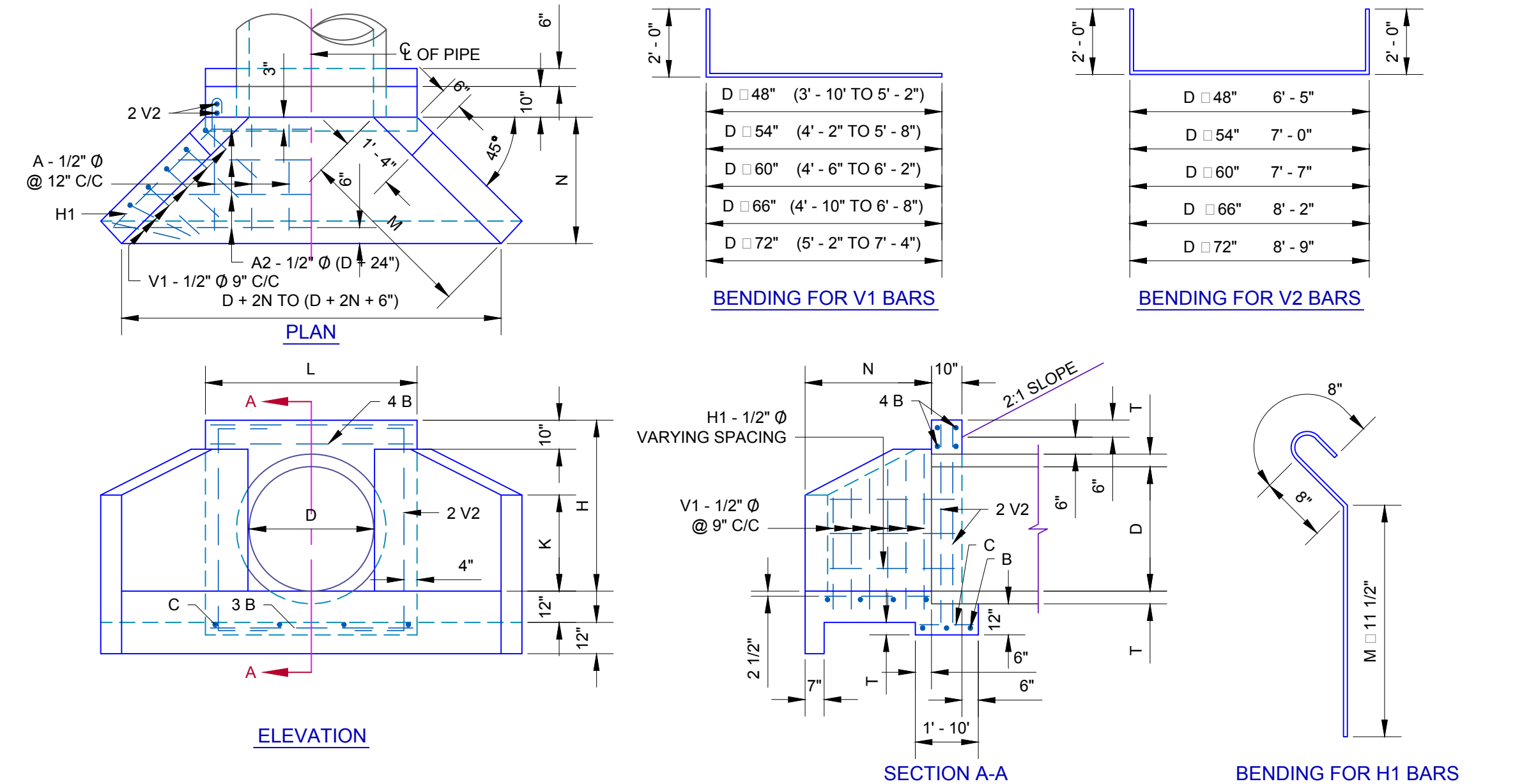
GENERAL NOTES:

- ALL CONSTRUCTION SHALL BE IN ACCORDANCE WITH OKLAHOMA CITY STANDARD SPECIFICATIONS.
- ALL EXPOSED CONCRETE SURFACES SHALL HAVE A CARBORUNDUM FINISH.
- ALL EXPOSED CONCRETE EDGES SHALL HAVE A 3/4" CHAMFER.
- ALL REINFORCED STEEL SHALL CONFORM TO ASTM SPEC. A-305-49.

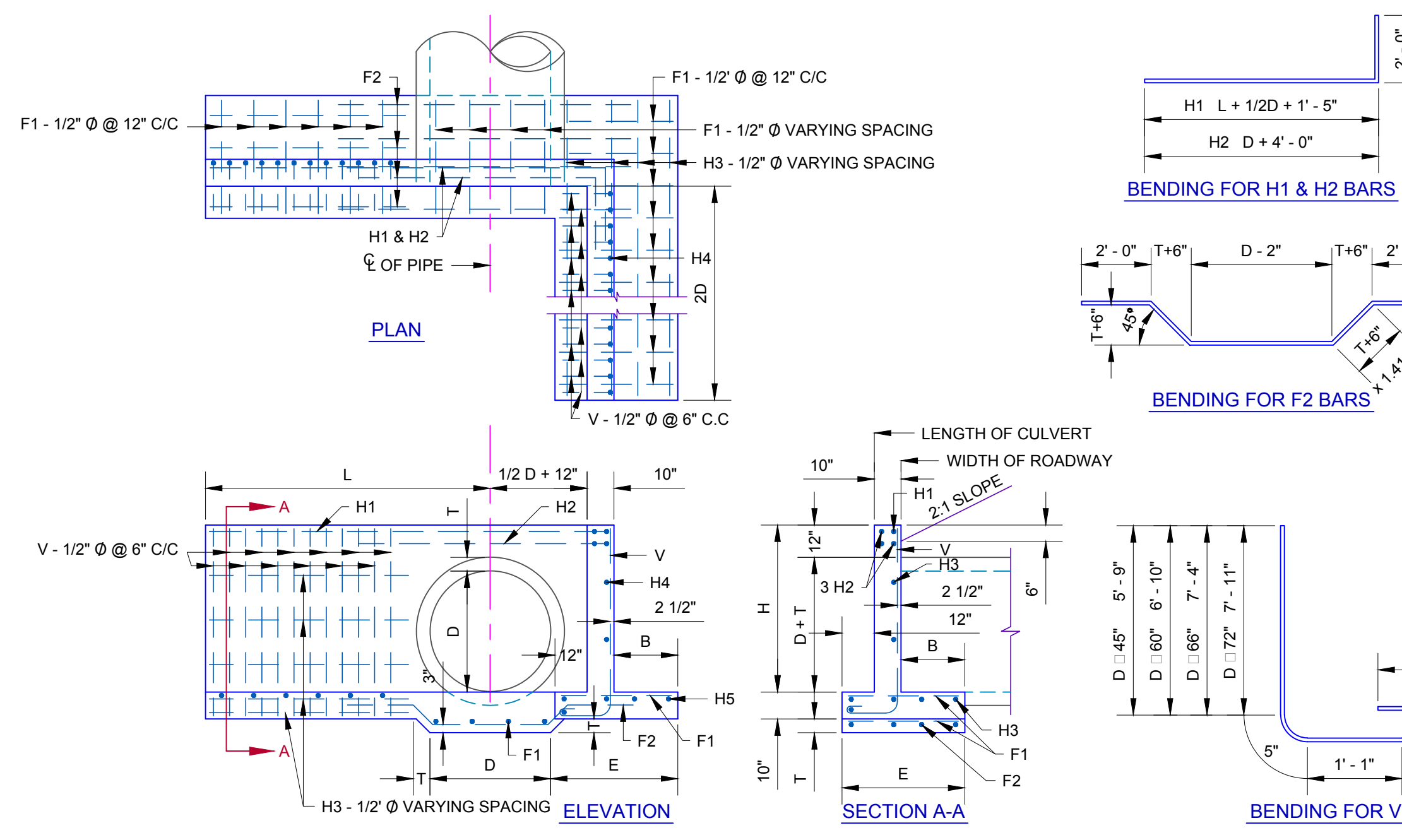
**CAST-IN-PLACE CONCRETE HEADWALLS
FOR 48" TO 72"
REINFORCED CONCRETE PIPE**



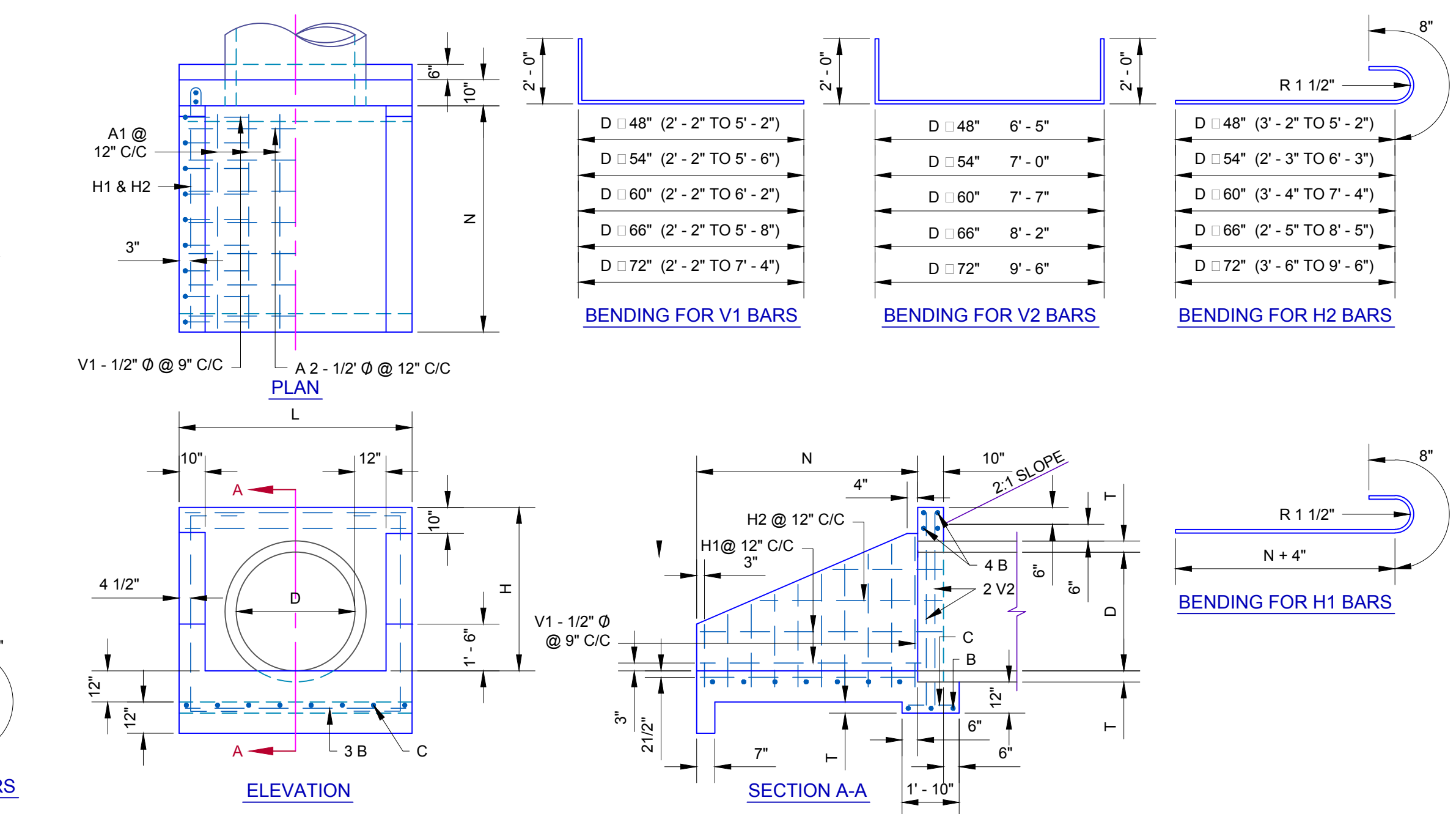
DIMENSIONS & QUANTITIES FOR STRAIGHT HEADWALLS										FOR ONE HEADWALL										
D	AREA SQ. FT.	DIMENSIONS					REINFORCING STEEL					QUANTITIES								
		T	H	L	E	B	F1 - 1/2" Ø #	F2 - 1/2" Ø #	H1 - 1/2" Ø #	H2 - 1/2" Ø #	H3 - 1/2" Ø #	V - 1/2" Ø #	CLASS "A" CONC. C.Y.	REINF. STEEL LBS.						
48"	12.57	5"	5'-5"	18'-0"	3'-9"	1'-11"	18	3'-5"	4	10'-5"	1	17'-8"	3	8'-0"	14	6'-5"	28	7'-11"	5.14	305
54"	15.90	5 1/2"	5'-11 1/2"	20'-0"	4'-0"	2'-2"	20	3'-8"	4	11'-0"	1	19'-8"	3	8'-6"	16	7'-1"	30	8'-6"	6.19	355
60"	19.63	6"	6'-6"	22'-0"	4'-3"	2'-5"	24	3'-11"	5	11'-8"	1	21'-8"	3	9'-0"	18	7'-10"	32	9'-0"	7.34	421
66"	23.76	6 1/2"	7'-0 1/2"	24'-0"	4'-6"	2'-8"	25	4'-2"	5	12'-3"	1	23'-8"	3	9'-6"	18	8'-6"	36	9'-6"	8.58	476
72"	28.27	7"	7'-7"	26'-0"	4'-10"	3'-0"	27	4'-6"	5	12'-10"	1	25'-8"	3	10'-0"	18	9'-3"	38	10'-1"	10.01	529



DIMENSIONS & QUANTITIES FOR HEADWALLS WITH 45° WINGS										FOR ONE HEADWALL													
D	AREA SQ. FT.	DIMENSIONS					REINFORCING STEEL					QUANTITIES											
		T	H	K	L	M	A1 - 1/2" Ø #	A2 - 1/2" Ø #	B - 1/2" Ø #	C - 1/2" Ø #	H1 - 1/2" Ø #	V1 - 1/2" Ø #	V2 - 1/2" Ø #	CLASS "A" CONC. C.Y.	REINF. STEEL LBS.								
48"	12.57	5"	5'-5"	3'-2"	6'-4"	5'-3 1/2"	3'-9"	7	3'-5"	4	9'-0" AV.	7	6'-0"	5	1'-6"	8	5'-8"	12	6'-6" AV.	4	10'-5"	3.81	184
54"	15.90	5 1/2"	5'-11 1/2"	3'-6"	6'-10"	5'-10 1/2"	4'-2"	7	3'-10"	5	9'-11" AV.	7	6'-6"	5	1'-6"	8	6'-3"	14	6'-11" AV.	4	11'-0"	4.54	214
60"	19.63	6"	6'-6"	3'-10"	7'-4"	6'-5 1/2"	4'-7"	8	4'-3"	5	10'-10" AV.	7	7'-0"	6	1'-6"	10	6'-10"	16	7'-4" AV.	4	11'-7"	5.33	253
66"	23.76	6 1/2"	7'-0 1/2"	4'-2"	7'-10"	7'-1"	5'-0"	8	4'-8"	5	11'-9" AV.	7	7'-6"	6	1'-6"	10	7'-5"	18	7'-9" AV.	4	12'-2"	6.20	281
72"	28.27	7"	7'-7"	2'-5 1/2"	8'-4"	7'-9 1/2"	5'-6"	9	5'-2"	6	12'-9" AV.	7	8'-0"	6	1'-6"	10	8'-2"	20	8'-3" AV.	4	12'-9"	7.22	325

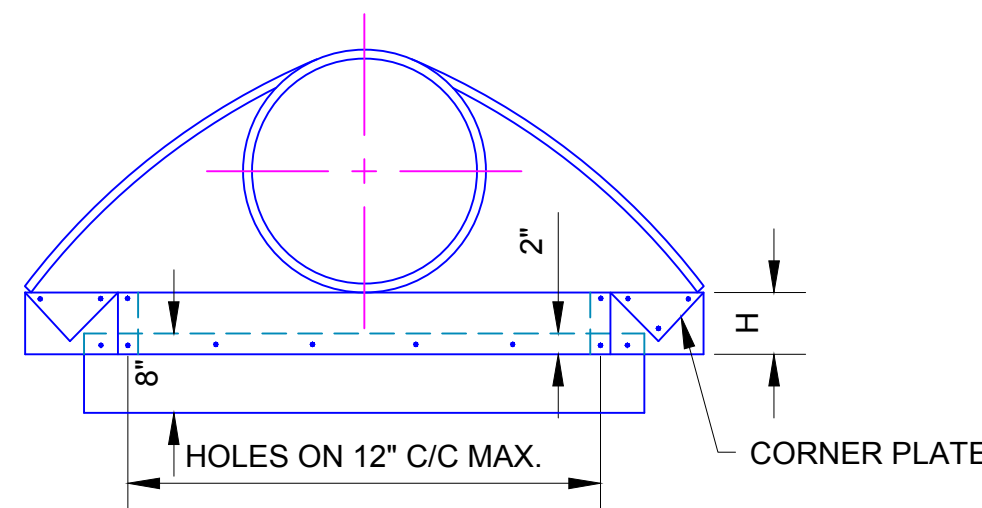
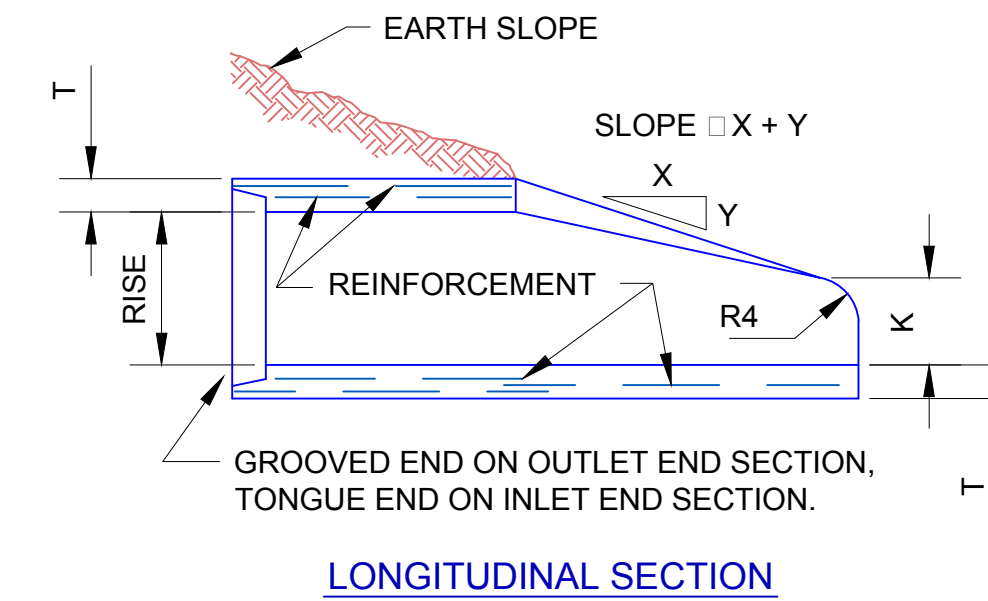
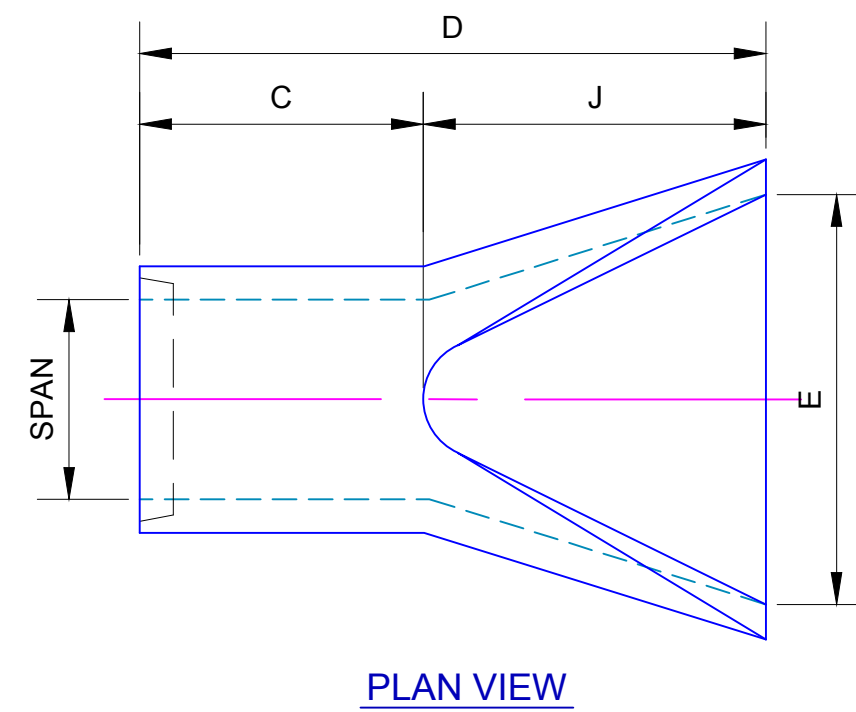
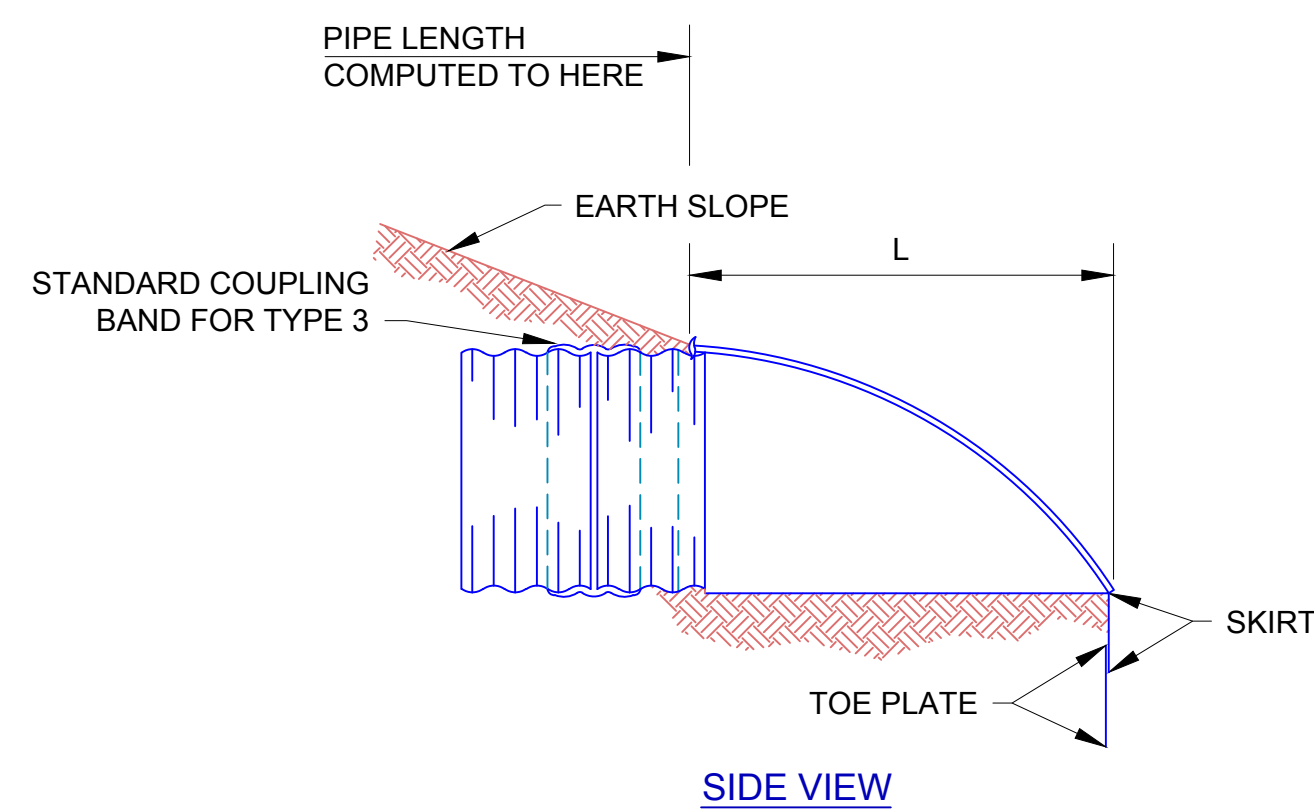
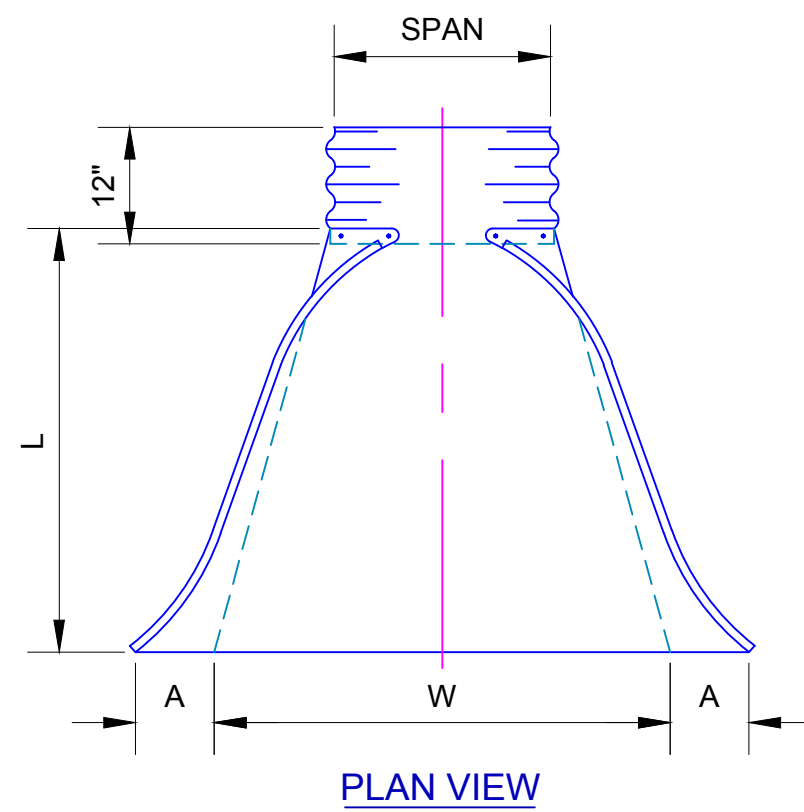


DIMENSIONS & QUANTITIES FOR HEADWALLS WITH 90° WINGS										FOR ONE HEADWALL														
D	AREA SQ. FT.	DIMENSIONS					REINFORCING STEEL					QUANTITIES												
		T	H	L	E	B	F1 - 1/2" Ø #	F2 - 1/2" Ø #	H1 - 1/2" Ø #	H2 - 1/2" Ø #	H3 - 1/2" Ø #	H4 - 1/2" Ø #	H5 - 1/2" Ø #	V - 1/2" Ø #	CLASS "A" CONC. C.Y.	REINF. STEEL LBS.								
48"	12.57	5"	5'-0"	9'-0"	3'-9"	1'-11"	22	3'-5"	4	10'-5"	1	14'-0"	3	10'-0"	7	6'-5"	4	8'-6"	4	10'-5"	30	7'-11"	6.14	347
54"	15.90	5 1/2"	5'-11 1/2"	10'-0"	4'-0"	2'-2"	24	3'-8"	4	11'-0"	1	15'-8"	3	10'-6"	8	7'-1"	4	9'-6"	5	11'-8"	33	8'-6"	7.39	410
60"	19.63	6"	6'-6"	11'-0"	4'-3"	2'-5"	26	3'-11"	5	11'-8"	1	16'-11"	3	11'-0"	9	7'-10"	5	10'-6"	5	12'-11"	36	9'-0"	8.75	482
66"	23.76	6 1/2"	7'-0 1/4"	12'-0"	4'-6"	2'-8"	30	4'-2"	5	12'-3"	1	18'-2"	3	11'-6"	9	8'-6"	5	11'-6"	5	14'-2"	40	9'-6"	10.23	551
72"	28.27	7"	7'-7"	13'-0"	4'-10"	3'-0"	31	4'-6"	5	12'-10"	1	19'-5"	3	12'-0"	9	9'-3"	5	12'-6"	5	15'-6"	43	10'-1"	11.95	612



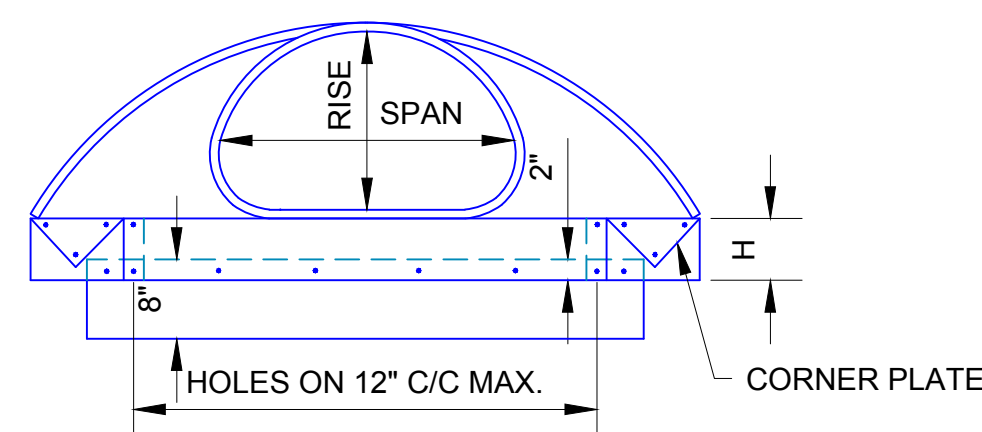
DIMENSIONS & QUANTITIES FOR HEADWALLS WITH U-TYPE WINGS										FOR ONE HEADWALL													
D	AREA SQ. FT.	DIMENSIONS					REINFORCING STEEL					QUANTITIES											
		T	H	L	N	A1 - 1/2" Ø #	A2 - 1/2" Ø #	B - 1/2" Ø #	C - 1/2" Ø #	H1 - 1/2" Ø #	H2 - 1/2" Ø #	V1 - 1/2" Ø #	V2 - 1/2" Ø #	CLASS "A" CONC. C.Y.	REINF. STEEL LBS.								
48"	12.57	5"	5'-5"	7'-8"	6'-6"	7	6'-2"	7	7'-4"	7	7'-4"	7	1'-6"	4	7'-6"	4	4'-10" AV.	18	5'-8" AV.	4	10'-5"	4.56	234
54"	15.90	5 1/2"	5'-11 1/2"	8'-2"	3'-1"	7	7'-3"	8	7'-10"	7	7'-10"	7	1'-6"	4	8'-7"	6	4'-11" AV.	20	5'-10" AV.	4	11'-0"	5.49	270
60"	19.63	6"	6'-6"	8'-8"	4'-2"	8	8'-4"	9	8'-4"	7	8'-4"	7	1'-6"	4	9'-8"	6	6'-0" AV.	24	6'-2" AV.	4	11'-7"	6.50	321
66"	23.76	6 1/2"	7'-0 1/2"	9'-2"	4'-3"	8	9'-5"	10	8'-10"	7	8'-10"	8	1'-6"	4	10'-9"	8	6'-1" AV.	26	6'-5" AV.	4	12'-2"	7.58	364
72"	28.27	7"	7'-7"	5'-4"	9'-8"	9	10'-6"	11	9'-4"	7	9'-4"	8	1'-6"	4	11'-10"	8	7'-2" AV.	30	6'-9" AV.	4	12'-9"	8.75	423

- GENERAL NOTES:
- ALL CONSTRUCTION SHALL BE IN ACCORDANCE WITH OKLAHOMA CITY STANDARD SPECIFICATIONS.
 - ALL EXPOSED CONCRETE SURFACES SHALL HAVE A CARBORUNDUM FINISH.
 - ALL EXPOSED CONCRETE EDGES SHALL HAVE A 3/4" CHAMFER.
 - ALL REINFORCED STEEL SHALL CONFORM TO AASHTO M-179 (ASTM C-76)
 - MINIMUM DEPTH OF FILL OVER CULVERTS SHALL BE 1'-0".
 - WALL THICKNESS (DIMENSION "T" OF PIPES SHOWN, ARE TAKEN FROM "WALL B" COLUMN OF ASTM AND AASHTO TABLES.



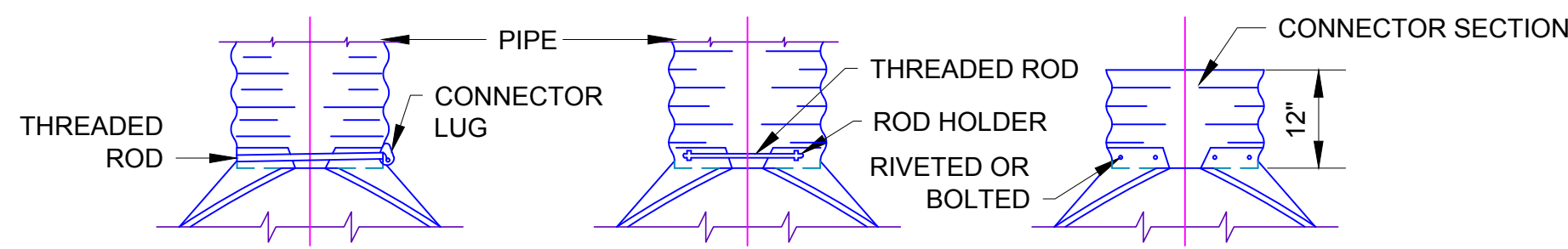
END VIEW
ROUND METAL PIPE END SECTION

DIMENSIONS OF END SECTION FOR ROUND METAL PIPE								
SPAN	GA.	A ± 1	B (MAX.)	H ± 1	L ± 1/2	W ± 2	APPROX. SLOPE	SPAN
IN.		IN.	IN.	IN.	IN.	IN.		IN.
18	16	8	10	6	31	36	2 1/2 : 1	1
24	16	10	13	6	41	48	2 1/2 : 1	1
30	14	12	16	8	51	60	2 1/2 : 1	1
36	14	14	19	9	60	72	2 1/2 : 1	2
42	12	16	22	11	69	84	2 1/2 : 1	2
48	12	18	27	12	78	90	2 1/4 : 1	2



END VIEW
ARCH METAL PIPE END SECTION

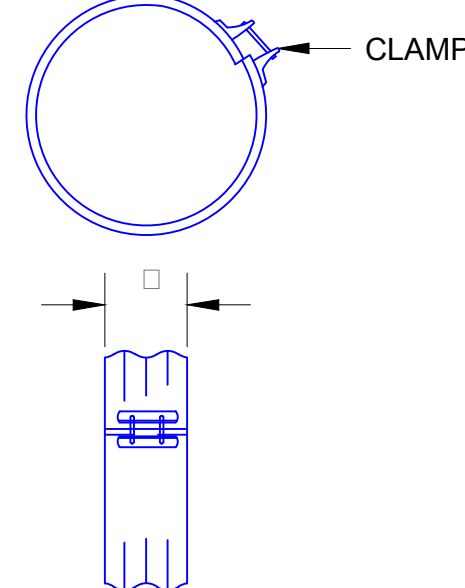
DIMENSIONS OF END SECTION FOR METAL PIPE ARCH									
SPAN	RISE	GA.	A ± 1	B (MAX.)	H ± 1	L ± 1/2	W ± 2	APPROX. SLOPE	SPAN
IN.	IN.		IN.	IN.	IN.	IN.	IN.		IN.
22	13	16	7	10	6	23	36	2 1/2 : 1	1
29	18	16	9	14	6	32	48	2 1/2 : 1	1
43	22	14	10	16	8	39	60	2 1/2 : 1	1
36	27	14	12	18	8	46	75	2 1/2 : 1	1
50	31	12	13	21	9	53	85	2 1/2 : 1	2
58	36	12	18	26	12	63	90	2 1/4 : 1	2
65	40	12	18	30	12	70	102	2 1/2 : 1	2
72	44	12	18	33	12	77	114	2 1/4 : 1	3



TYPE 1 FOR 12" THRU 24" ONLY
TYPE 2 FOR 30" & 36" ROUND PIPE AND 11" X 18" THRU 58" X 36" ARCH PIPE.
TYPE 3 FOR 42" THRU 84" ROUND PIPE AND 65" X 40" THRU 85" X 54" ARCH PIPE.

TYPICAL METAL END SECTION CONNECTIONS

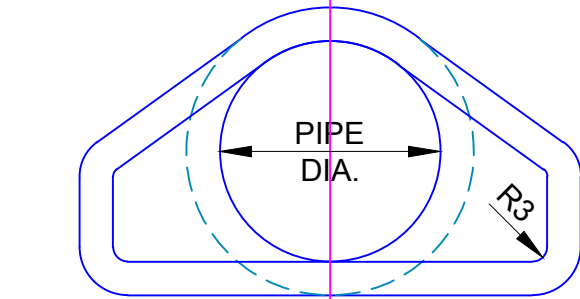
NOTE: COUPLING BAND CLAMP SHALL CLEAR HORIZONTAL LINE



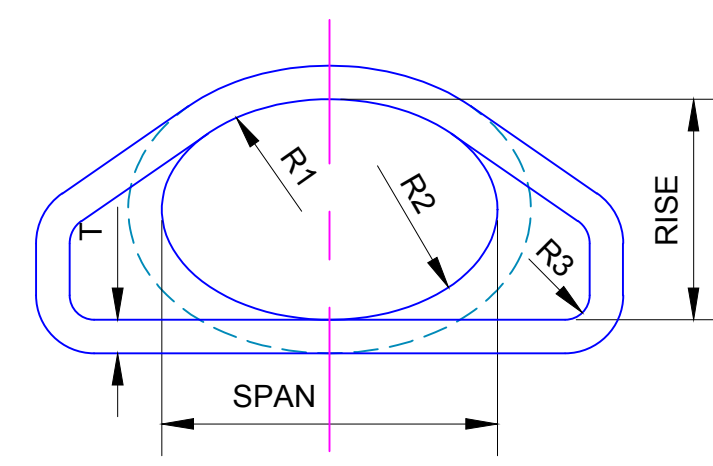
STANDARD COUPLING BAND
7" FOR UP TO 36" DIAMETER, 12" FOR 36" DIAMETER AND UP.

GENERAL NOTES FOR METAL END SECTIONS:

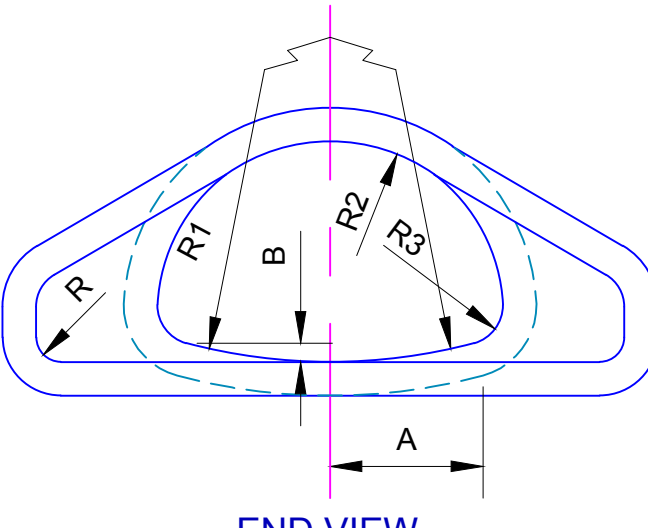
- WHEN PREFABRICATED END SECTIONS ARE OPTIONAL, THEY SHALL BE OF THE SAME MATERIALS AS THAT OF THE PIPE, WHICH THEY ARE INSTALLED.
- FOR MATERIAL OF ALUMINUM ALLOY END SECTION, SEE SUBSECTION 726.65 OF THE CURRENT OKLAHOMA STANDARD SPECIFICATIONS.
- FOR MATERIALS OF GALVANIZED METAL END SECTION, SEE SUBSECTION 726.17 OF THE CURRENT OKLAHOMA STANDARD SPECIFICATIONS.
- CONNECTOR SECTION, CORNER PLATE AND TOE PLATE TO BE OF THE SAME GAGE & MATERIAL AS THE SKIRT AND SHALL BE INCLUDED IN THE BID FOR END SECTION.
- TOE PLATES WILL BE REQUIRED FOR ALL METAL END SECTIONS UNLESS SOLID ROCK IS ENCOUNTERED. HOLES IN TOE PLATE ARE TO BE PUNCHED TO MATCH HOLES IN SKIRT LIP. 3/8" BOLTS TO BE FURNISHED. LENGTH TO TOE PLATES FOR ROUND PIPE SECTION IS W + 10" TO 12" TO 30" DIAMETER PIPE, W + 22" FOR 36" TO 48" DIAMETER PIPE. LENGTH OF TOE PLATES FOR ARCH PIPE END SECTION IS W + 10" FOR A RISE OF 11" TO 27" AND W + 18 FOR A RISE OF 31" TO 44".
- IF TYPE 3 END SECTION IS USED AS OPTIONAL PIPE, THE LENGTH OF PIPE IS TO BE REDUCED BY 12" FOR EACH END SECTION.
- ANY STRUCTURAL EXCAVATION REQUIRED FOR INSTALLATION OF PREFABRICATED END SECTIONS SHALL BE INCLUDED IN THE PRICE BID FOR OTHER ITEMS OF WORK.



END VIEW
ARCH METAL PIPE END SECTION



END VIEW
ELLIPTICAL CONCRETE PIPE END SECTION



END VIEW
ARCH CONCRETE PIPE END SECTION

DIMENSIONS OF PRECAST END SECTION FOR PIPES										
SPAN	K	J	C	D	E	T	R3	R4	R5	SLOPE
IN.	IN.	IN.	IN.	IN.	IN.	IN.	IN.	IN.	IN.	
18	9	27	46	73	36	2 1/2	3	3	6	3 TO 1
24	8 1/2	43 1/2	30	73 1/2	48	3	3	3	7	3 TO 1
30	12	54	19 3/4	73 3/4	60	3 1/2	3	3	8	3 TO 1
36	15	63	34 3/4	73 3/4	72	4	3	3	10 1/2	3 TO 1
42	21	63	35	98	78	4 1/2	3	3	10 1/2	3 TO 1
48	24	72	26	98	84	5	6	6	14	3 TO 1

DIMENSIONS OF PRE-CAST END SECTIONS FOR ELLIPTICAL PIPES													
SPAN	RISE	R1	R2	R3	R4	R5	T	K	J	C	D	E	SLOPE
IN.	IN.	IN.	IN.	IN.	IN.	IN.	IN.	IN.	IN.	IN.	IN.	IN.	
23	14	6	20	3	3		2 3/4	8	27	45	72	36	3 TO 1
30	19	8 1/4	26 1/4	3	3	7	3 1/4	8 1/2	39	33	72	48	3 TO 1
34	22	9 1/4	29 17/32	3	3	8	3 1/2	9	46	26	72	54	3 TO 1
38	24	10 1/4	32 3/4	3	3	9	3 3/4	9 1/2	54	18	72	60	3 TO 1
42	27	11 7/16	36 3/16	3	3	10 1/2	3 3/4	10 3/8	57	15	72	66	3 TO 1
45	29	12 1/4	39 1/4	3	3	12	4 1/2	11 1/4	60	36	96	72	3 TO 1
49	32	13 9/16	42 21/32	3	3	12 1/2	4 3/4	12	60	36	96	75	3 TO 1
53	34	14 3/4	46	6	6	13	5	15 3/4	60	36	96	78	3 TO 1
60	38	16 1/2	51 3/4	6	6	14	5 1/2	21	60	36	96	84	3 TO 1
68	43	18 21/32	58 13/32	6	6	16	6	25 1/2	60	36	96	90	3 TO 1

DIMENSIONS OF PRE-CAST END SECTION FOR ARCH-PIPES																
SPAN	RISE	A	B	R	R1	R2	R3	R4	R5	T	K	J	C	D	E	SLOPE
IN.	IN.	IN.	IN.	IN.	IN.	IN.	IN.	IN.	IN.	IN.	IN.	IN.	IN.	IN.	IN.	
28 1/2	18	10 7/8	3 3/4	3	40 11/16	14 3/4	4 5/8	3	7	3 1/2	8 1/2	39	33	72	48	3 TO 1
36 1/4	22 1/2	13 5/8	3 13/16	3	51	18 3/4	6 1/8	3	8	4	9 1/2	50	46	96	60	3 TO 1
43 3/4	26 5/8	17 1/8	4 1/8	6	62	22 1/2	6 1/2	3	10 1/2	4 1/2	11 1/8	60	36	96	72	3 TO 1
51 1/8	31 1/16	20	5 1/16	6	73	26 1/4	7 3/4	3	12 1/2	4 1/2	15 13/16	60	36	96	78	3 TO 1
58 1/2	36	22 3/4	6	6	84	30	8 7/8	3	14	5	21	60	36	96	84	3 TO 1
65	40	25	6 3/4	6	92 1/2	33 1/2	10	6	16	5 1/2	25 1/2	60	36	96	90	3 TO 1
73	45	28 1/2	7 1/2	6	105	37 1/2	11 1/16	6		6	31	60	36	96	96	3 TO 1

BASIS OF PAYMENT FOR METAL END SECTIONS:

- GALVANIZED METAL END SECTION - ROUND EA.
- GALVANIZED METAL END SECTION - ARCH EA.

WHEN USED AS OPTIONAL END SECTION BETWEEN METAL, ALUMINUM ALLOY & CONCRETE, THE BASIS OF PAYMENT SHALL BE:

- SP. PREFABRICATED CULVERT END SECTION - ROUND EA.
- SP. PREFABRICATED CULVERT END SECTION - ARCH EA.

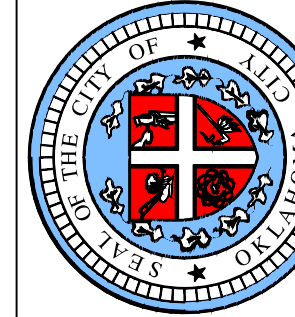
GENERAL NOTES FOR PRECAST END SECTIONS:

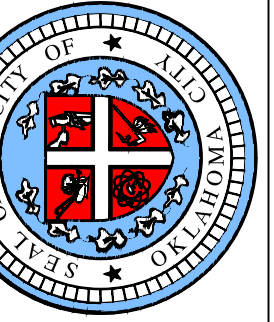
- WHEN PREFABRICATED END SECTIONS ARE OPTIONAL, THEY SHALL BE OF THE SAME MATERIALS AS THAT OF THE PIPE, WHICH THEY ARE INSTALLED.
- DIMENSIONS SHOWN FOR PREFABRICATED END SECTIONS ARE SUBJECT TO MANUFACTURERS TOLERANCES.
- ANY STRUCTURAL EXCAVATION REQUIRED FOR INSTALLATION OF PREFABRICATED END SECTIONS SHALL BE INCLUDED IN THE PRICE BID FOR OTHER ITEMS OF WORK.

BASIS OF PAYMENT FOR PRECAST END SECTIONS:

- PRECAST CONCRETE CULVERT END SECTION - ROUNDED EA.
- PRECAST CONCRETE CULVERT END SECTION - ELLIPTICAL EA.
- PRECAST CONCRETE CULVERT END SECTION - ARCH EA.

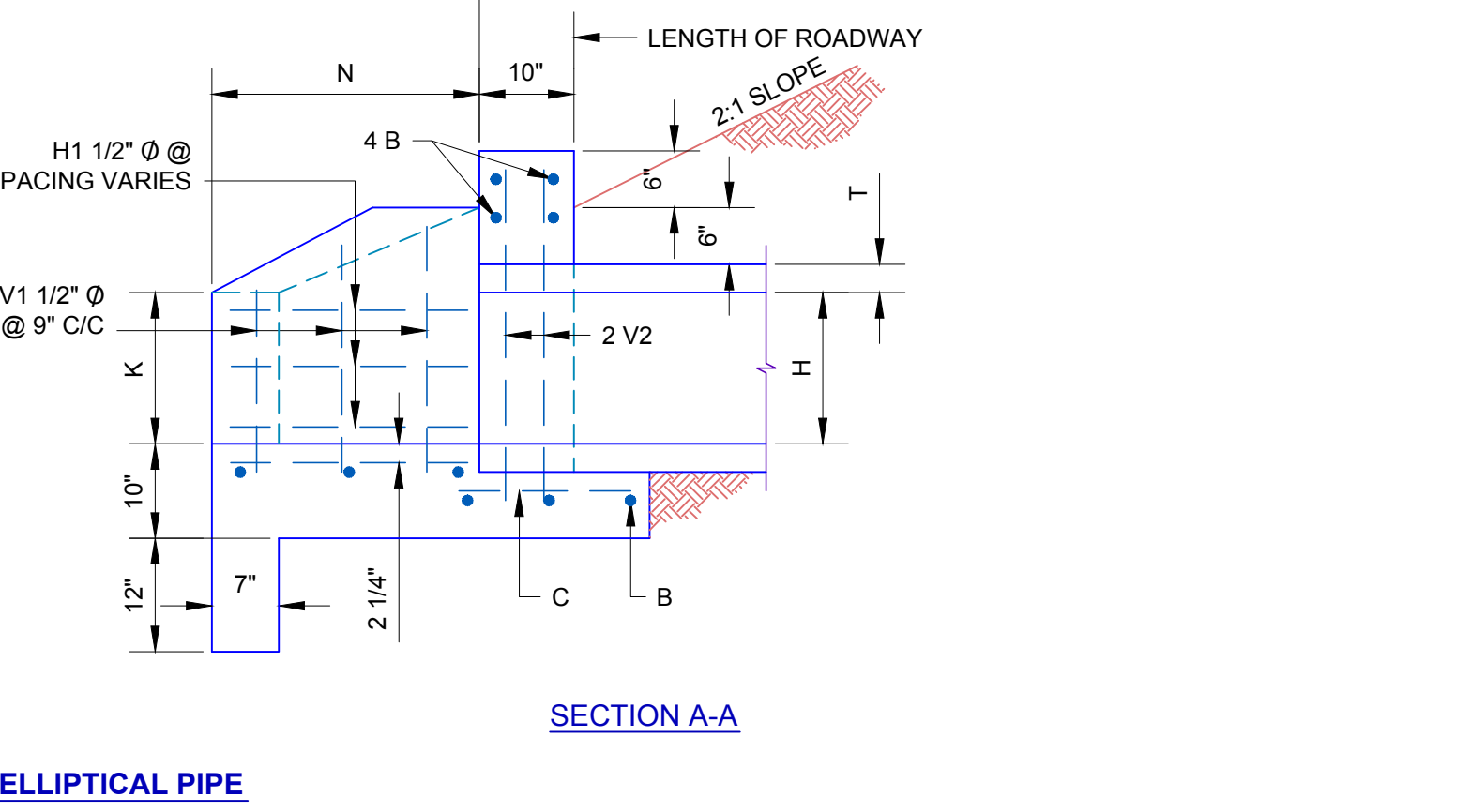
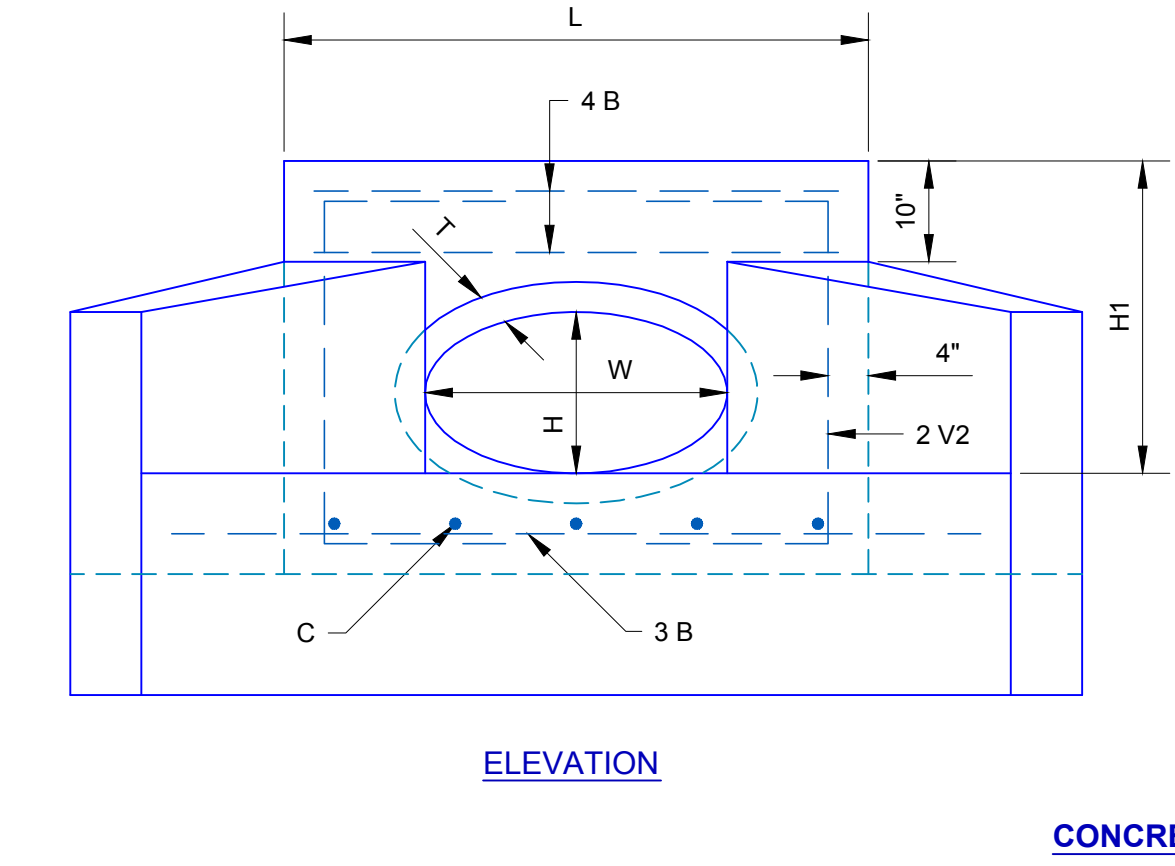
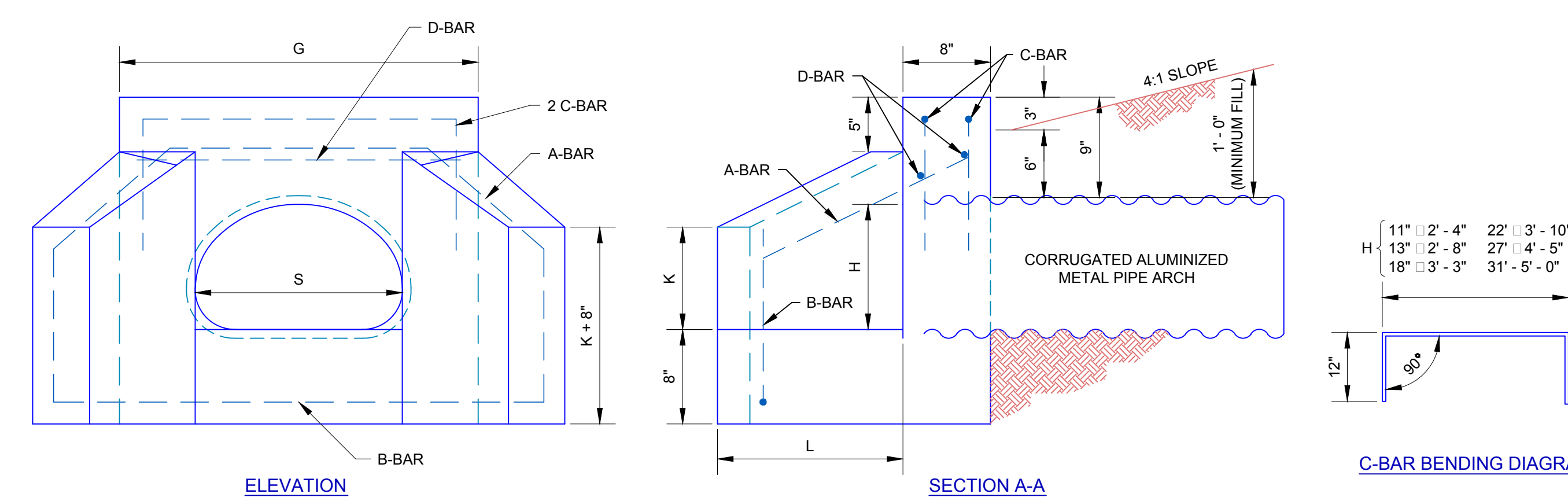
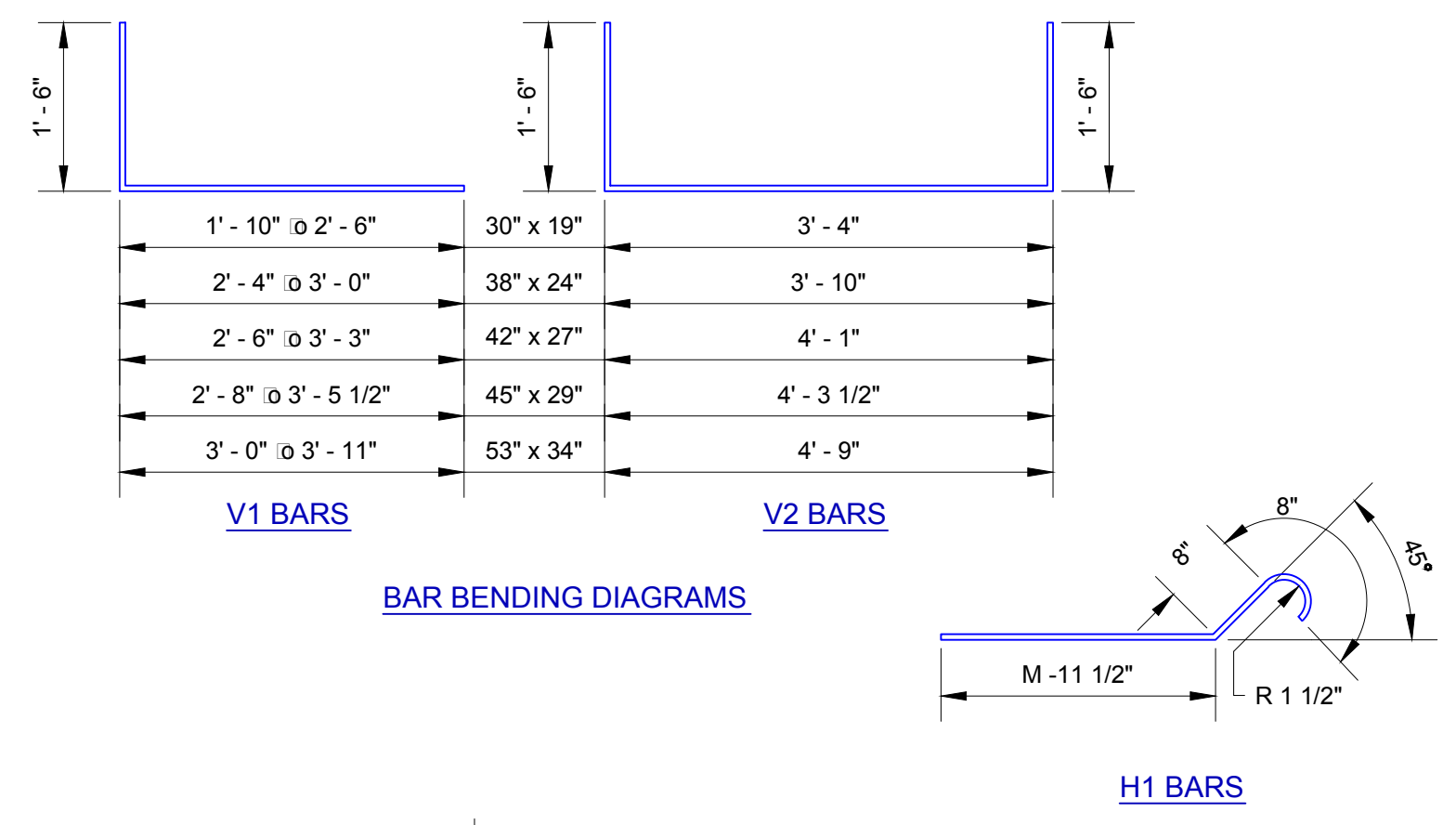
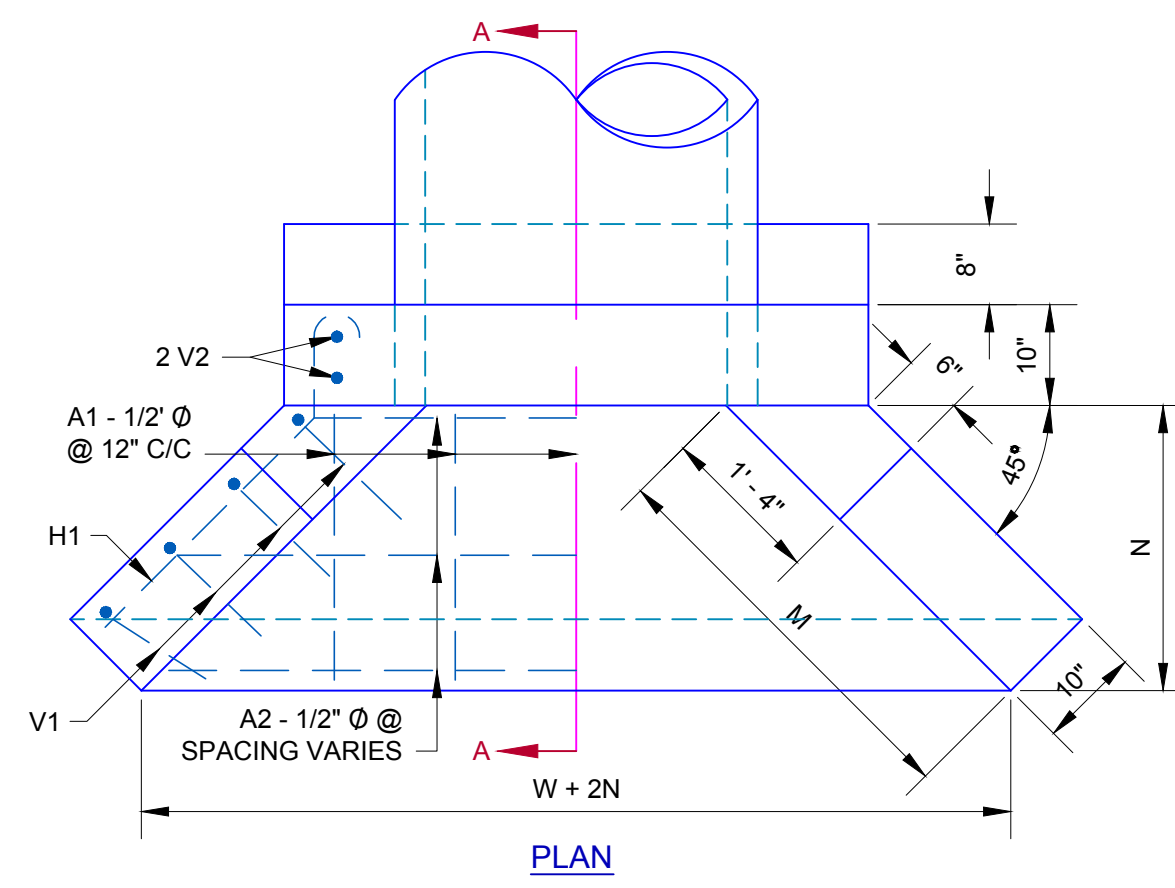
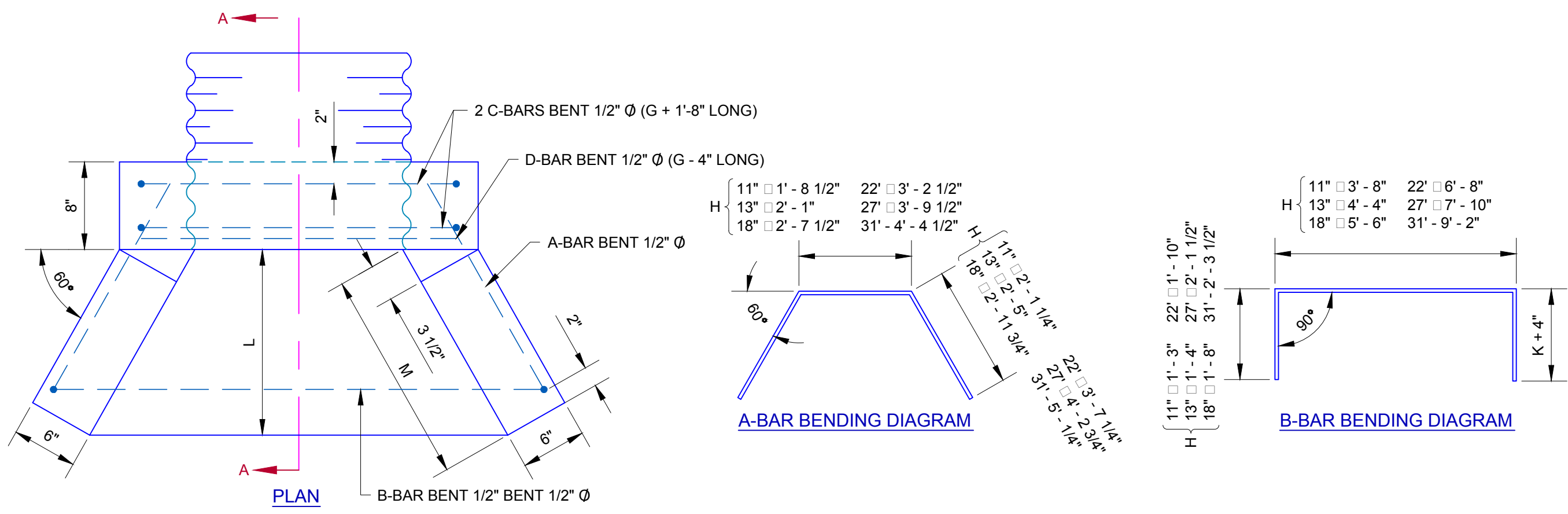
IF ELLIPTICAL CONCRETE IS USED, THE ELLIPTICAL CONCRETE END SECTION SHALL BE USED.





APPROVED BY: DATE: 02-06-13
ERIC J. MENGER, P.E.
CITY ENGINEER
DRAWN: VSC
DATE: 02-06-13

**CAST-IN-PLACE CONCRETE
HEADWALLS FOR ELLIPTICAL
OR ARCH PIPE**



DIMENSIONS AND QUANTITIES FOR STEEL FOR METAL PIPE ARCH

S	H	A-BARS			B-BARS			C-BARS			D-BARS		
		FORM	#	SIZE	FORM	#	SIZE	FORM	#	SIZE	FORM	#	SIZE
18"	11"	BENT	1	1/2" Ø	5'-11"	BENT	1	1/2" Ø	6'-2"	BENT	2	1/2" Ø	4'-4"
22"	13"	BENT	1	1/2" Ø	6'-11"	BENT	1	1/2" Ø	7'-0"	BENT	2	1/2" Ø	4'-8"
29"	18"	BENT	1	1/2" Ø	8'-7"	BENT	1	1/2" Ø	8'-10"	BENT	2	1/2" Ø	5'-3"
36"	22"	BENT	1	1/2" Ø	10'-5"	BENT	1	1/2" Ø	10'-4"	BENT	2	1/2" Ø	5'-10"
43"	27"	BENT	1	1/2" Ø	12'-3"	BENT	1	1/2" Ø	12'-1"	BENT	2	1/2" Ø	6'-5"
50"	31"	BENT	1	1/2" Ø	14'-5"	BENT	1	1/2" Ø	13'-9"	BENT	2	1/2" Ø	7'-0"

DIMENSIONS FOR CONCRETE

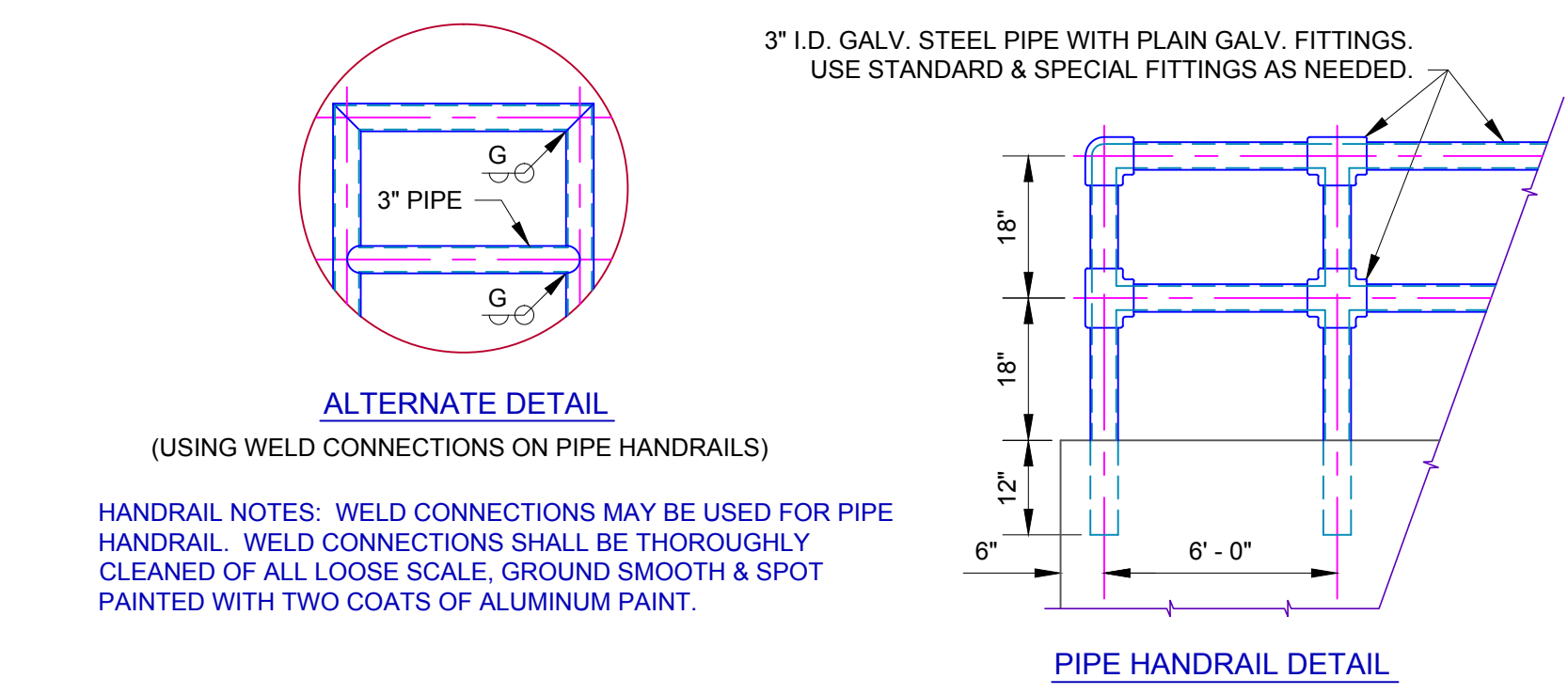
S	H	AREA SQ. FT.	K	G	L	M
18"	11"	1.2	11"	2'-8"	1'-7"	1'-10"
22"	13"	1.8	1'-0"	3'-0"	1'-10"	2'-1 1/2"
29"	18"	3.1	1'-4"	3'-7"	2'-4"	2'-8 1/2"
36"	22"	4.9	1'-6"	4'-2"	2'-10"	3'-3 1/2"
43"	27"	7.1	1'-9 1/2"	4'-9"	3'-4 1/2"	3'-11"
50"	31"	9.6	1'-11 1/2"	5'-4"	4'-12"	4'-8"

QUANTITIES FOR TWO END WALLS

H	CLASS "A" CONC. C.Y.	REINFORCING STEEL LBS.
11"	0.66	31
13"	0.82	35
18"	1.23	42
22"	1.66	49
27"	2.23	56
31"	2.92	63

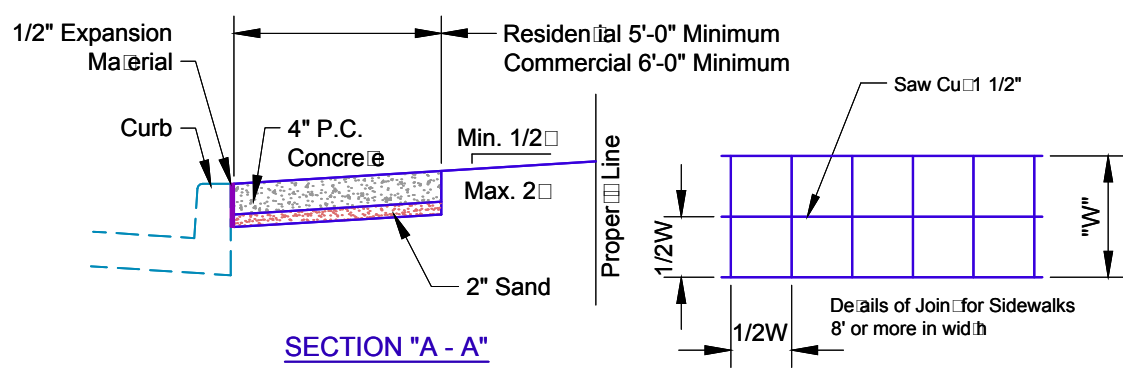
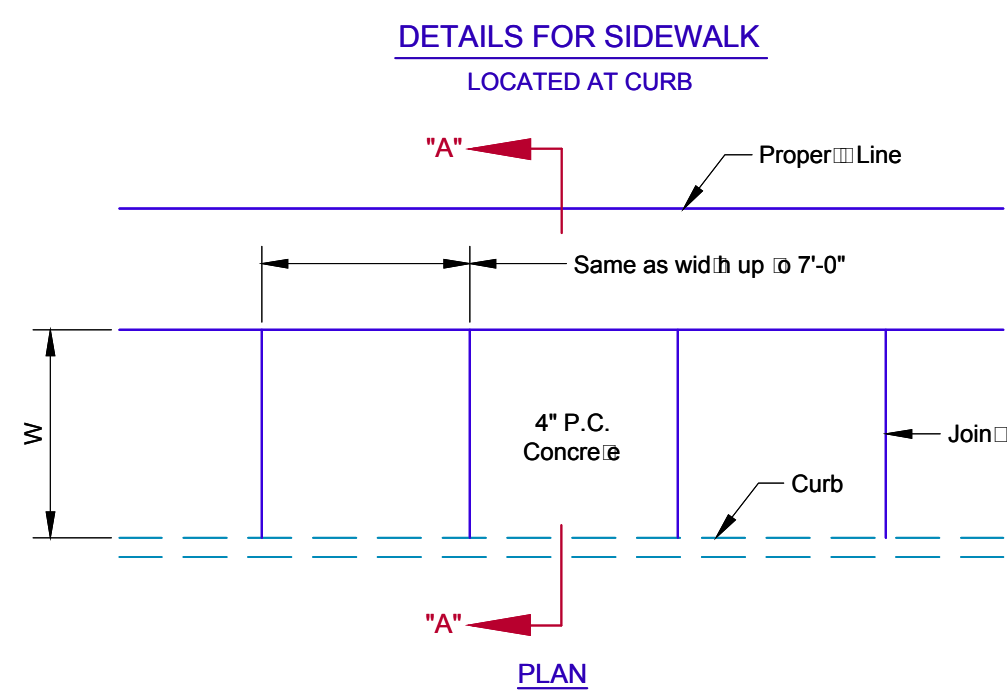
DIMENSIONS & QUANTITIES FOR CAST-IN-PLACE 45° HEADWALLS [FOR ONE HEADWALL]

DIMENSIONS									REINFORCING STEEL						* QUANTITY									
W	H	AREA SQ. FT.	T	H	K	L	M	N	A1 - 1/2" Ø #	A2 - 1/2" Ø #	B - 1/2" Ø #	C - 1/2" Ø #	H1 - 1/2" Ø #	V1 - 1/2" Ø #	V2 - 1/2" Ø #	CLASS "A" CONC. CU. YD.	REINFORCED STEEL LBS.							
30"	19"	3.3	3 1/4"	2'-10 1/4"	1'-4"	4'-10 1/4"	2'-6"	1'-9"	5	1'-5"	3	5'-8" A	7	4'-6 1/2"	4	1'-6"	8	2'-10 1/2"	12	3'-8" A	4	6'-4"	1.27	104
38"	24"	5.1	3 3/4"	3'-3 3/4"	1'-10"	5'-6 1/4"	3'-1"	2'-1 1/2"	6	1'-10"	3	6'-9" A	7	5'-2 1/4"	4	1'-6"	12	3'-5 1/2"	16	4'-2" A	4	6'-10"	1.87	140
42"	27"	6.3	3 3/4"	3'-6 3/4"	2'-0"	5'-10 1/4"	3'-5"	2'-4 1/2"	6	2'-1"	3	7'-1" A	7	5'-6 1/4"	4	1'-6"	12	3'-9 1/2"	16	4'-4 1/2" A	4	7'-1"	2.09	149
45"	29"	7.4	4 1/2"	3'-9 1/2"	2'-2"	6'-1 1/4"	3'-8"	2'-7 1/8"	7	2'-3"	4	7'-9" A	7	5'-9 1/4"	4	1'-6"	12	4'-1/2"	16	4'-6 1/4" A	4	7'-3"	2.38	163
53"	34"	10.2	5"	4'-3"	2'-6"	6'-9 1/4"	4'-3"	3'-0"	7	2'-8"	4	8'-8" A	7	6'-5 1/4"	5	1'-6"	12	4'-7 1/2"	20	4'-11 1/2" A	4	7'-9"	3.01	195

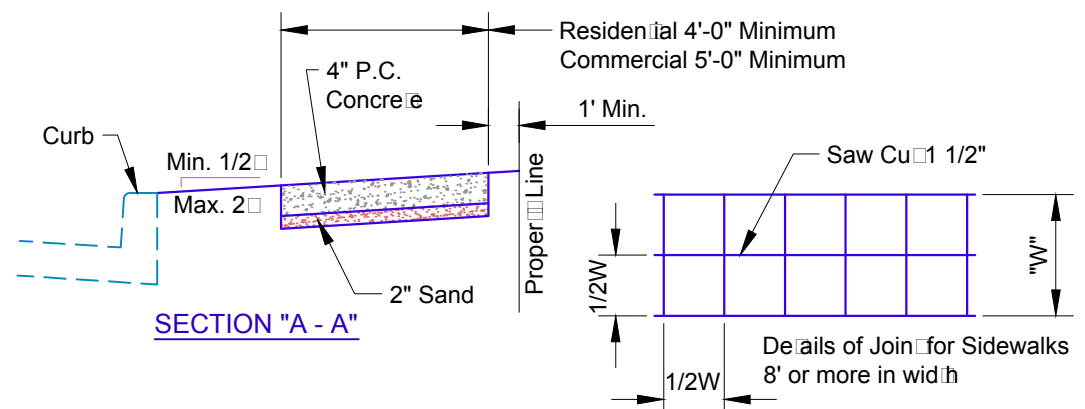
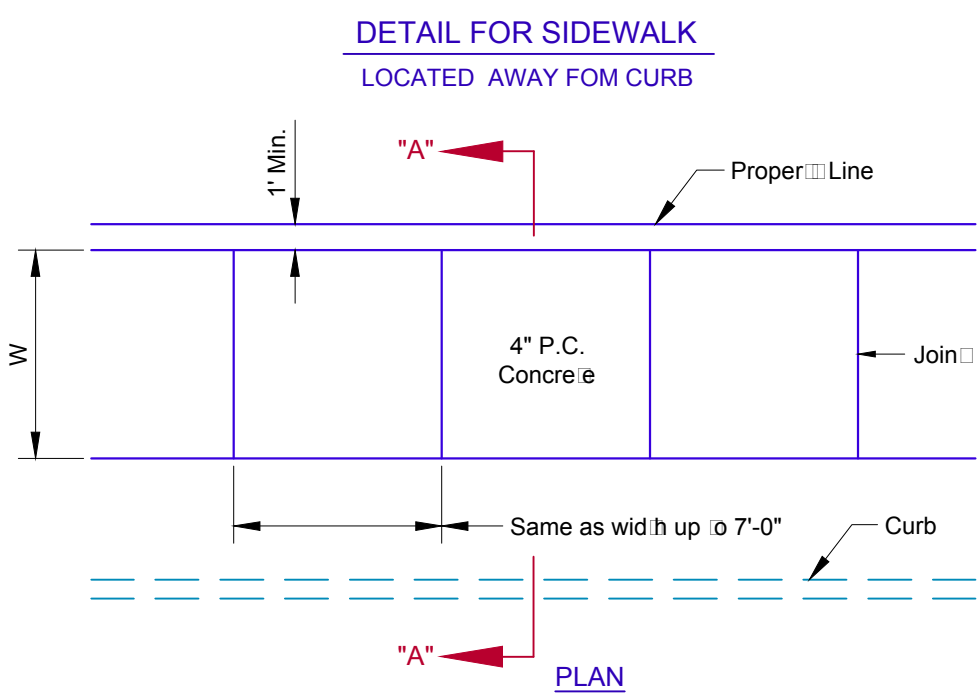


GENERAL NOTES

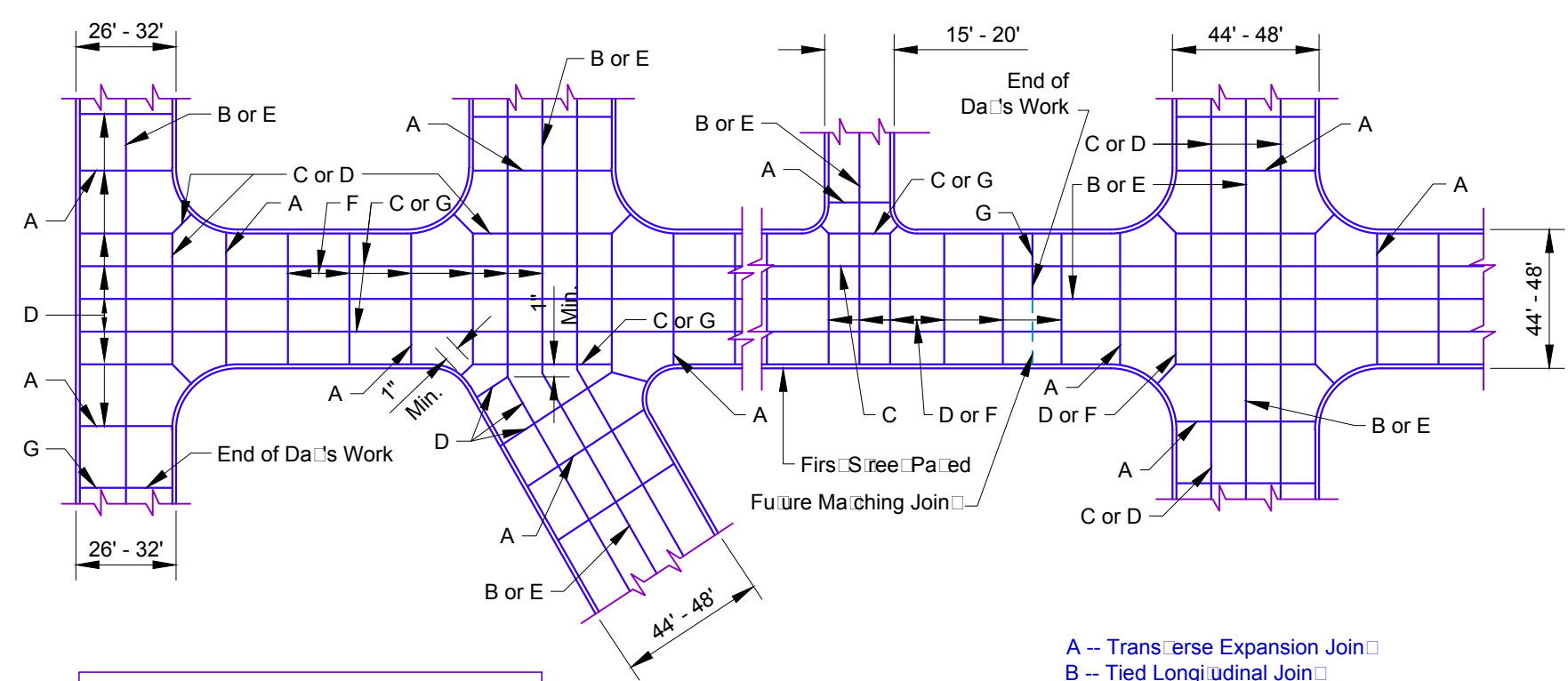
- All construction shall be in accordance with the latest edition of the Oklahoma City Specifications.
- All Exposed Concrete Edges shall have a 3/4" Chamfer.
- All Exposed Concrete Surfaces shall have a Carborundum Finish.
- Minimum depth of fill over Culvert shall be 1'-0".



- NOTES:**
- 1/2" x 4" premolded expansion material around Power Poles or other structures in walk with a least 36" of clear travel space.
 - Expansion Joints maximum distance $\leq 100'$, use 1/2" x 4" premolded expansion material.
 - Contraction Joints maximum distance $\leq 7'$, saw cut 1/2" deep and fill with sealant.
 - Saw cuts within 24 hours.
 - Use 1/2" x 4" premolded expansion joint at curb and adjacent Proper Lines.
 - All joints to be sealed. Premolded expansion material to be removed to a depth of 1/2" prior to applying sealant.



- NOTES:**
- 1/2" x 4" premolded expansion material around Power Poles or other structures in walk with a least 36" of clear travel space.
 - Expansion Joints maximum distance $\leq 100'$, use 1/2" x 4" premolded expansion material.
 - Contraction Joints maximum distance $\leq 7'$, saw cut 1/2" deep and fill with sealant.
 - Saw cuts within 24 hours.
 - All joints to be sealed. Premolded expansion material to be removed to a depth of 1/2" prior to applying sealant.

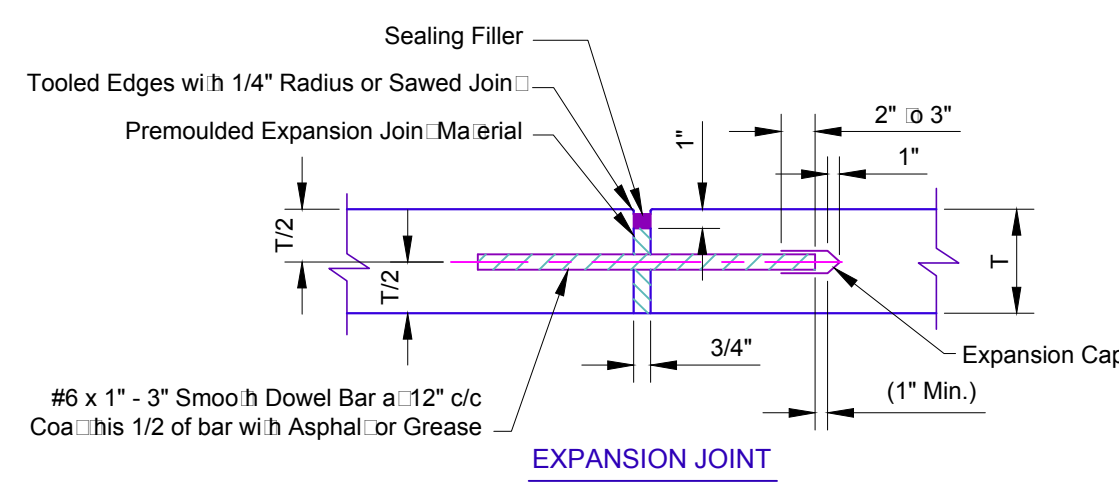


CROWN SCHEDULE

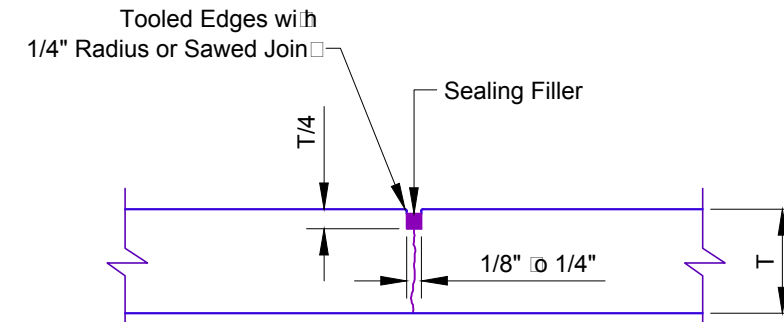
FULL WIDTH	To 33' with 6" Curb	32' and over with 8" Curbs
	2 1/2"	4"

- A -- Transverse Expansion Joint
 B -- Tied Longitudinal Joint
 C -- Tongue & Groove Construction Joint
 D -- Contraction Joint
 E -- Longitudinal Construction Joint
 F -- Doweled Construction Joint
 G -- Doweled Construction Joint

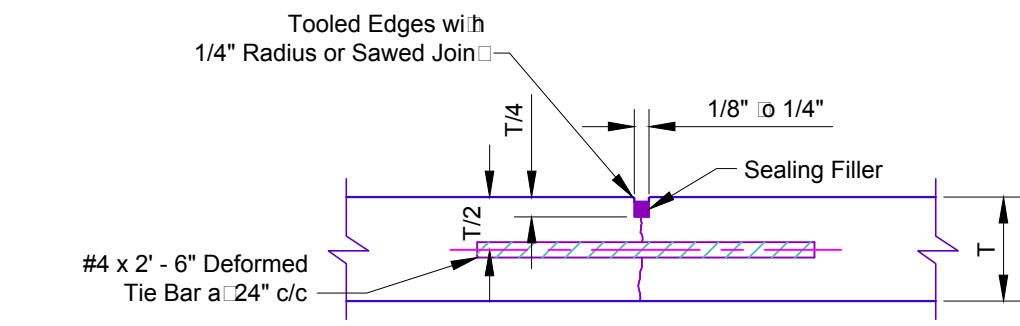
JOINT LAYOUT DETAILS



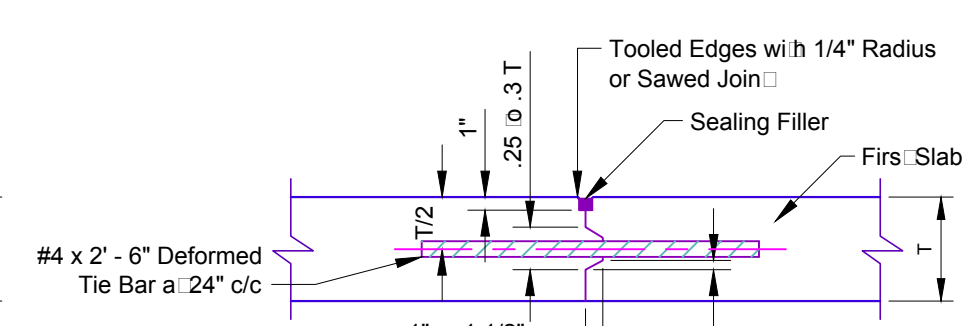
EXPANSION JOINT TYPE "A"



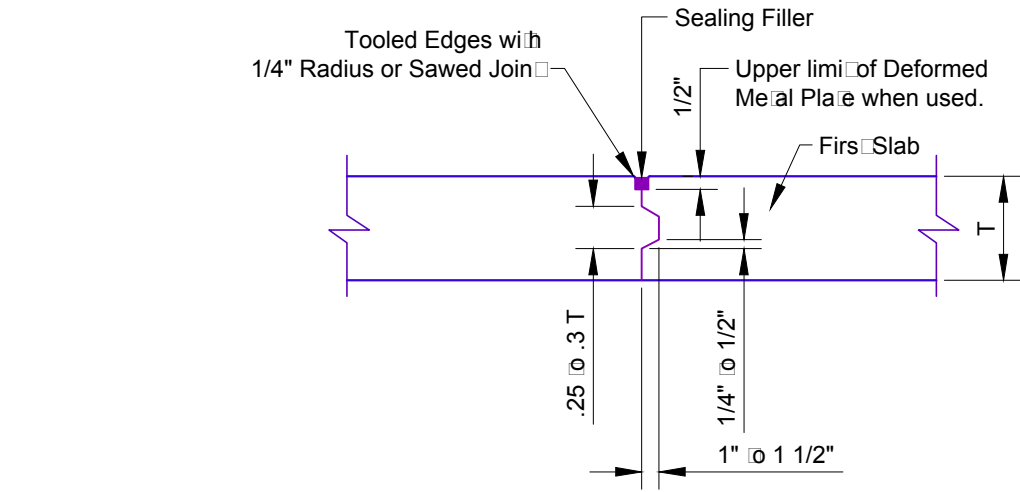
CONTRACTION JOINT TYPE "D" (ALT. TYPE "F")



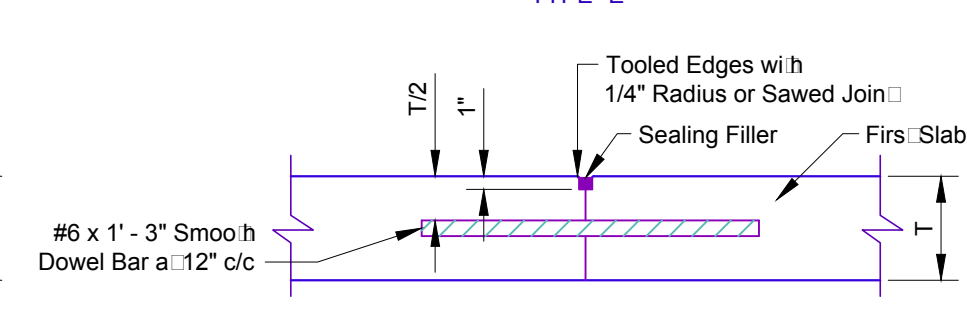
TIED JOINT TYPE "B"



TIED CONSTRUCTION JOINT TYPE "E"

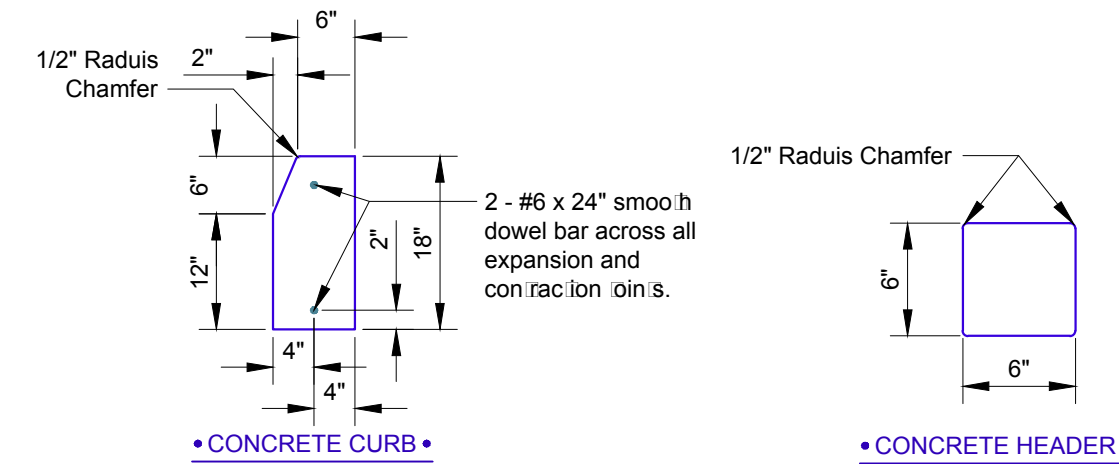


TONGUE & GROOVE CONSTRUCTION TYPE "C"

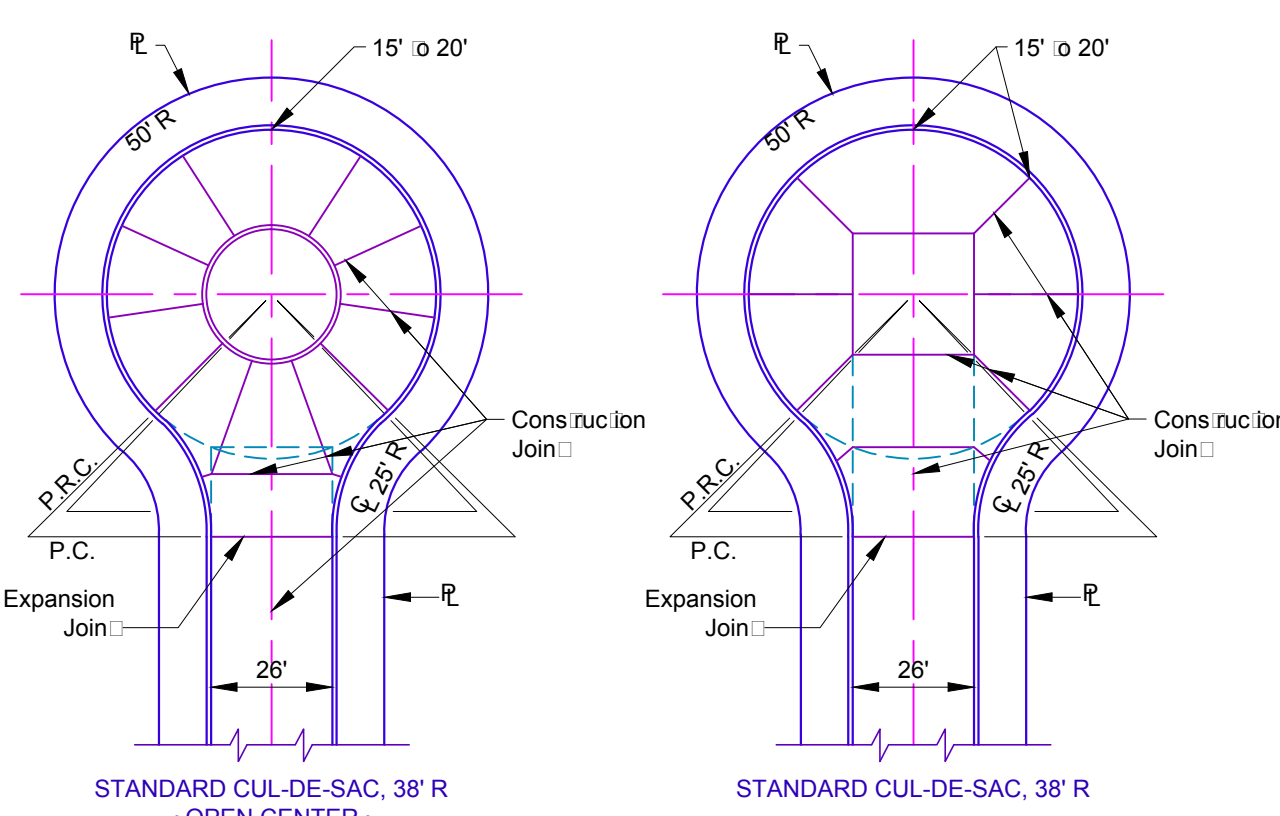


DOWLED CONSTRUCTION JOINT TYPE "G"

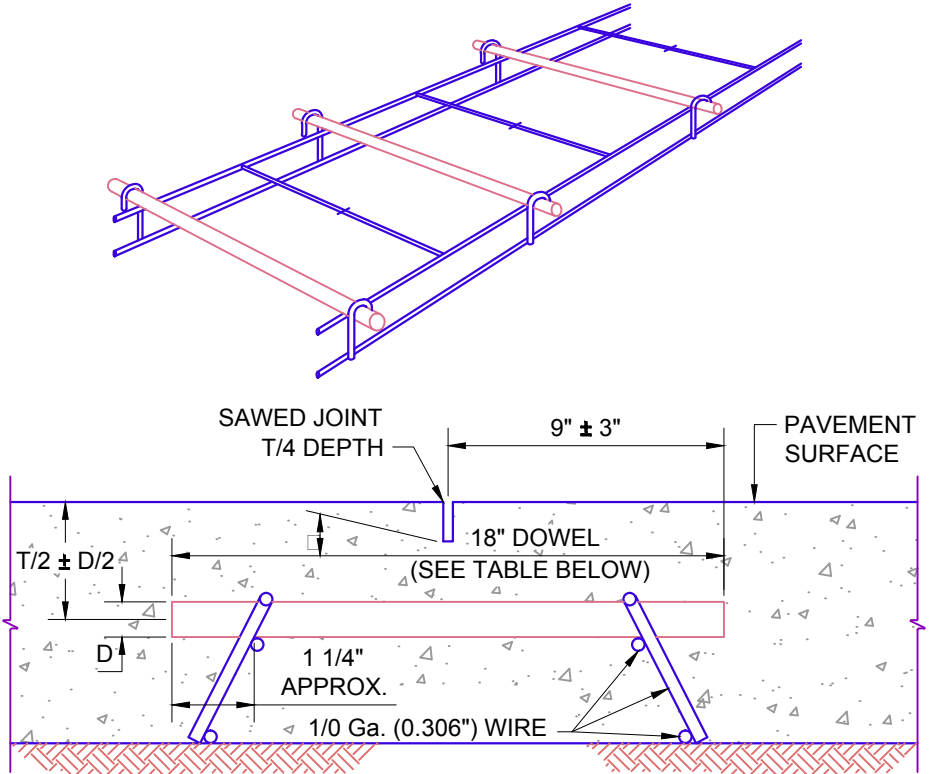
- NOTES:**
- Smooth Dowel Bars across Expansion Joints shall be provided with Expansion Caps, and coated with Asphalt or Grease, (Type A & G).
 - Grooves in Joints shall be formed by: (1) temporary embedment of a suitable Mandrel, (2) installation of a thin strip of premolded Joint Filler Material, (3) sawing the Pavement after the Concrete has hardened.



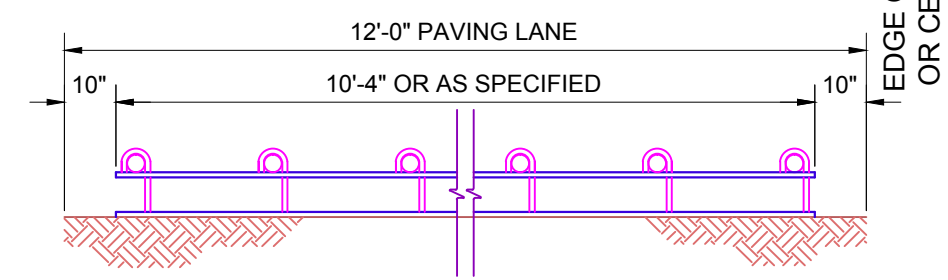
MISCELLANEOUS DETAILS



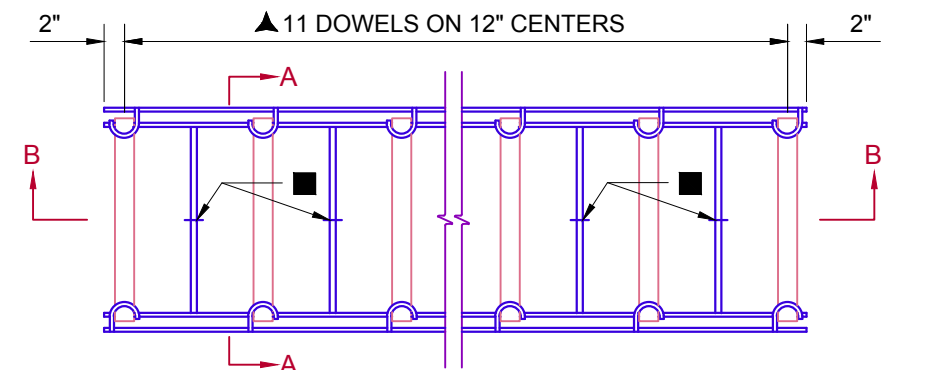
JOINT LAYOUT DETAILS



SECTION A-A



SECTION B-B



PLAN VIEW

DOWEL BARS

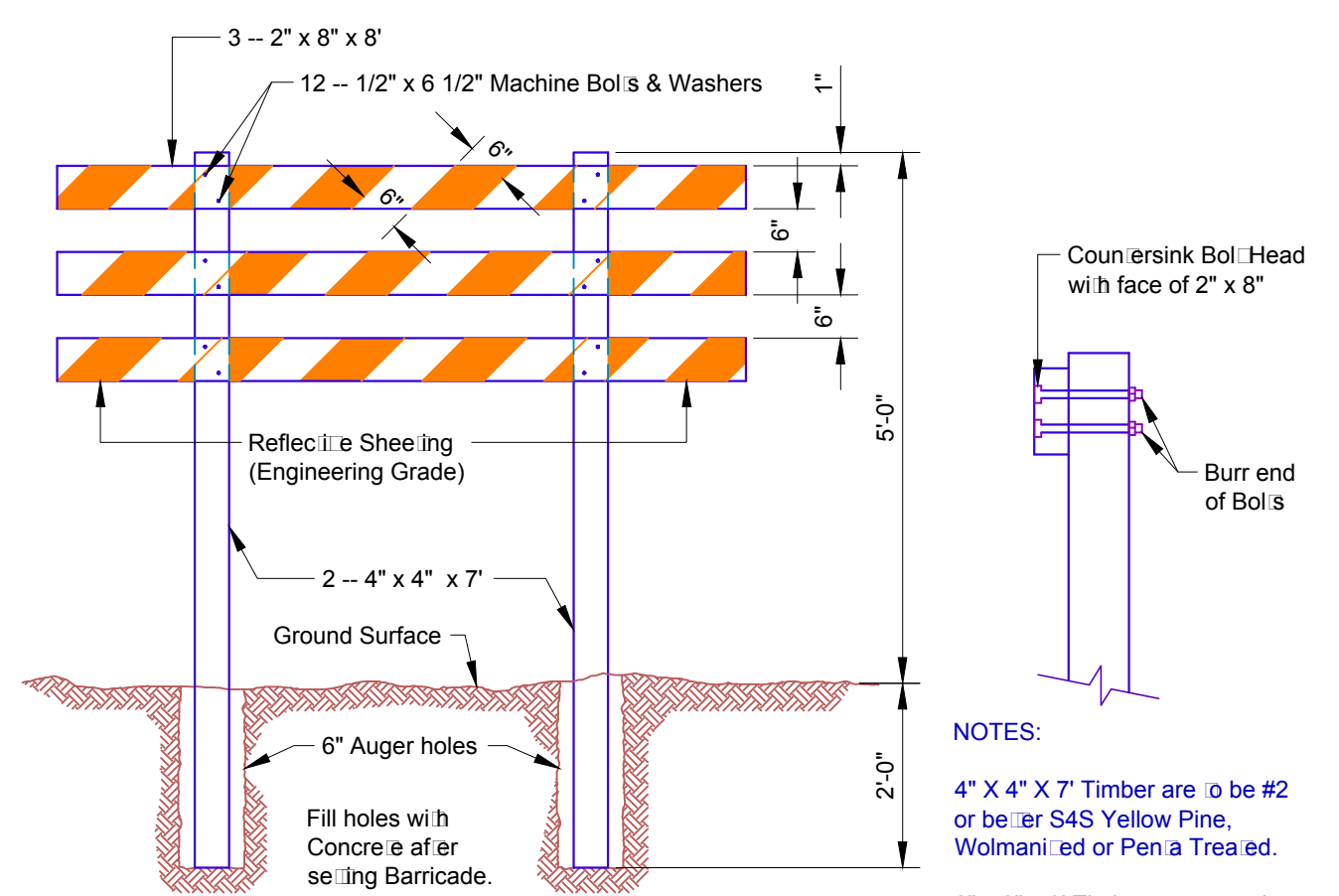
▲ SPACING & SIZE DATA

(T) SLAB DEPTH	DOWEL DIA.	TOTAL DOWEL LENGTH	C/C DOWEL SPACING
6" - 7"	3/4"	15"	12"
8" - 11"	1 1/4"	18"	12"
12" - 16"	1 1/2"	18"	12"

■ SPACER: FOUR EA. 7 GAGE (0.177") WIRES PER UNIT, NOTCHED @ MIDPOINT OF WIRE
 SPACER IN FIELD AFTER PLACEMENT
 REGULAR DOWELS GREASED

DOWELED CONTRACTION JOINT DETAILS TYPE "F" (ALT. TYPE "D")

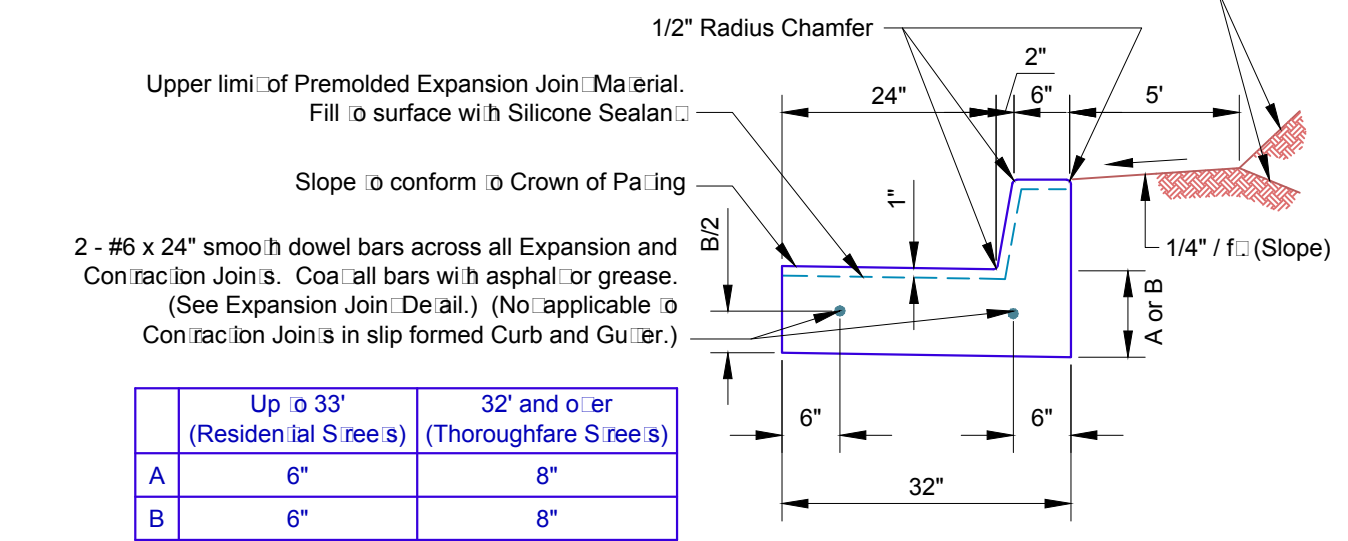
- NOTES:**
- Type "F" to be used for continuous pours only.
 - Do not use for headers at day's end stopping point.



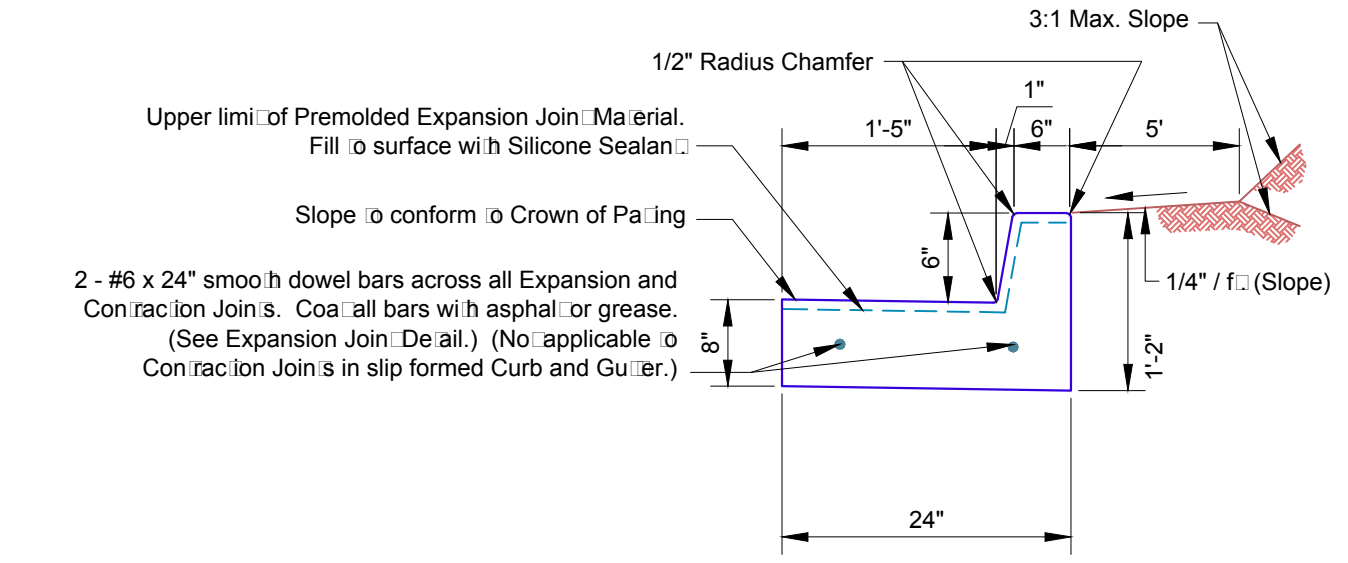
STANDARD REFLECTOR TYPE BARRICADE

- NOTE:** Markings for Barricade Rails are to be Orange and White. Markings are to be 6" wide and attached at 45° angles as set forth in the latest edition of the Uniform Traffic Control Devices Manual.

STANDARD REFLECTOR TYPE BARRICADE

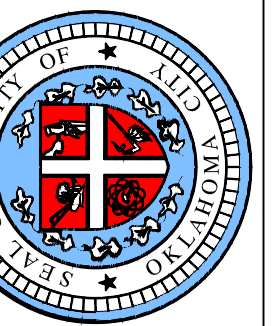


CONCRETE CURB & GUTTER DETAIL



CONCRETE CURB & GUTTER DETAIL FOR DOWNTOWN

- NOTE:** Maximum spacing of 1/2" Expansion Joints to be 100' c/c with Contraction Joints 15' - 20' apart to match Driveway Returns. (Expansion Joint spacing, not applicable to slip formed Curb and Gutter.)

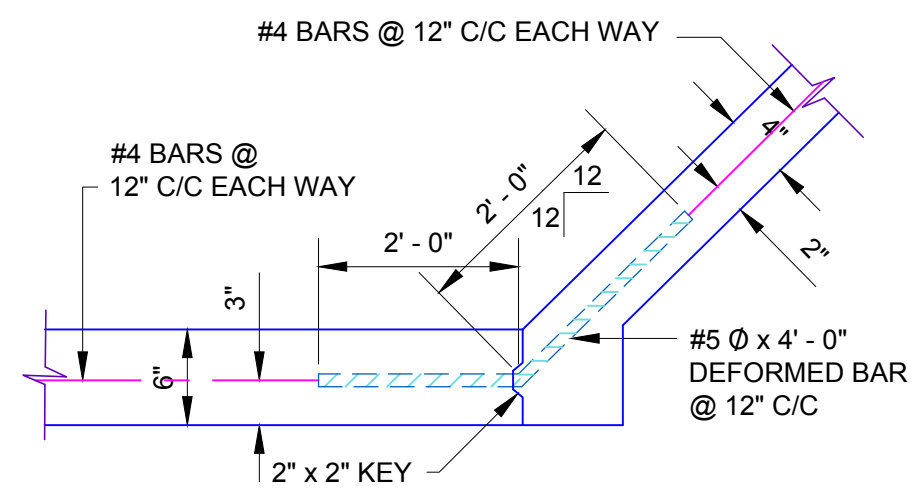


APPROVED BY: DATE: 02-07-13

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 CITY ENGINEER

VSC

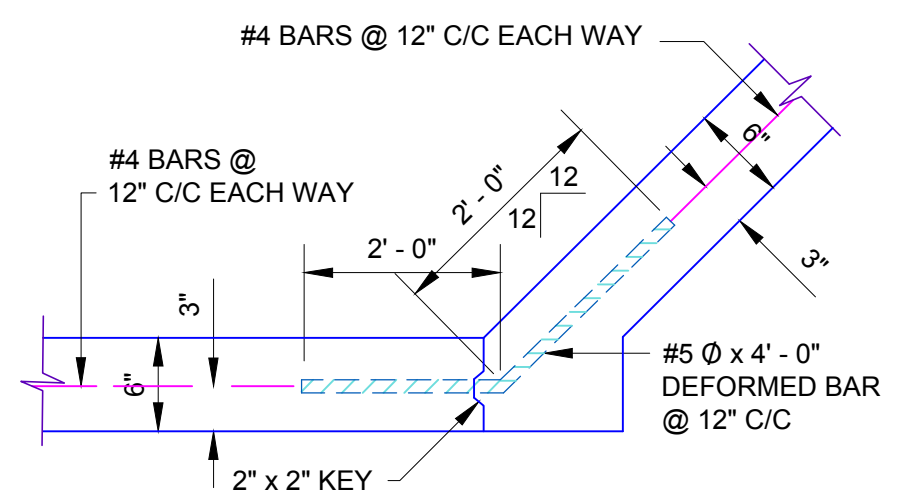
DATE: 02-07-13



LONGITUDINAL CONSTRUCTION JOINT

FOR 6" BOTTOM & 4" SIDE WALLS
4" WALLS FOR DEPTH OF 0' TO 5'
WALL DETAIL "A"

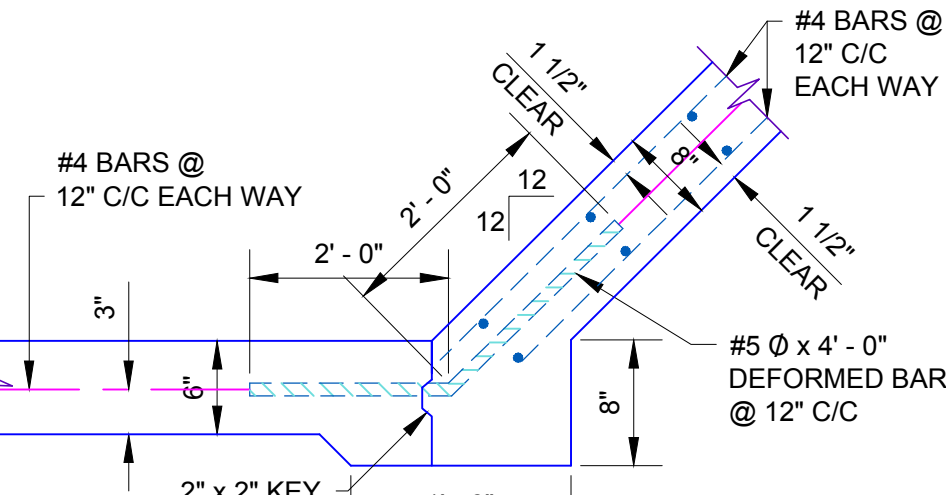
CONCRETE CHANNEL LINER JOINT DETAIL



LONGITUDINAL CONSTRUCTION JOINT

FOR 6" BOTTOM & 4" SIDE WALLS
6" WALLS FOR DEPTH OF 0' TO 5'
WALL DETAIL "B"

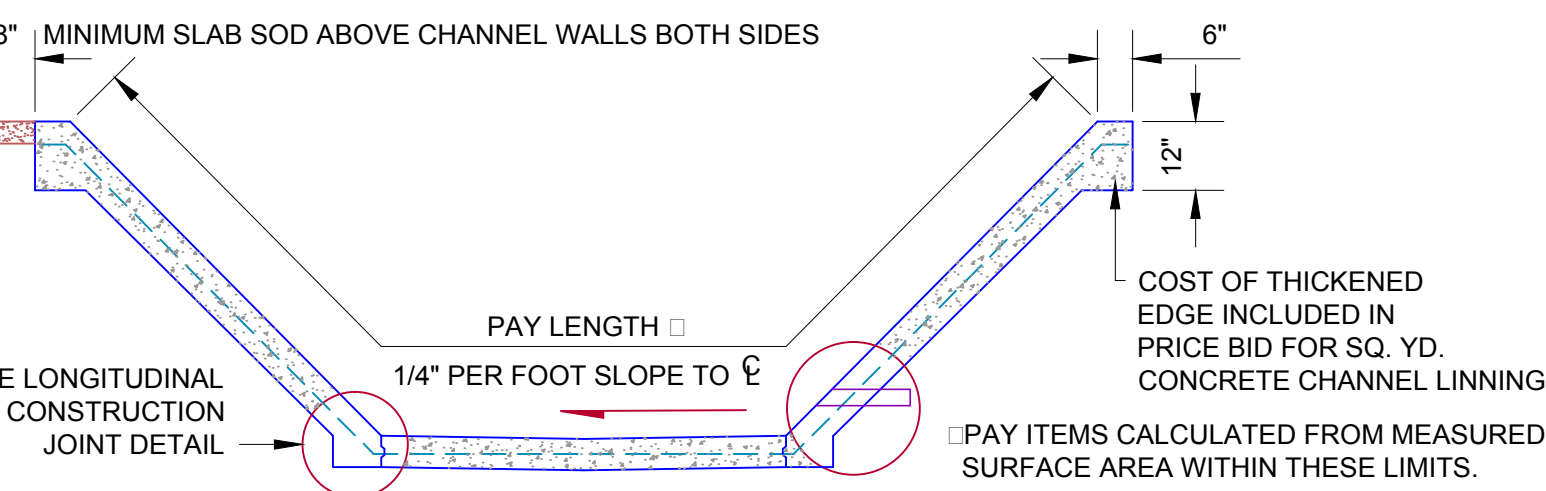
CONCRETE CHANNEL LINER JOINT DETAIL



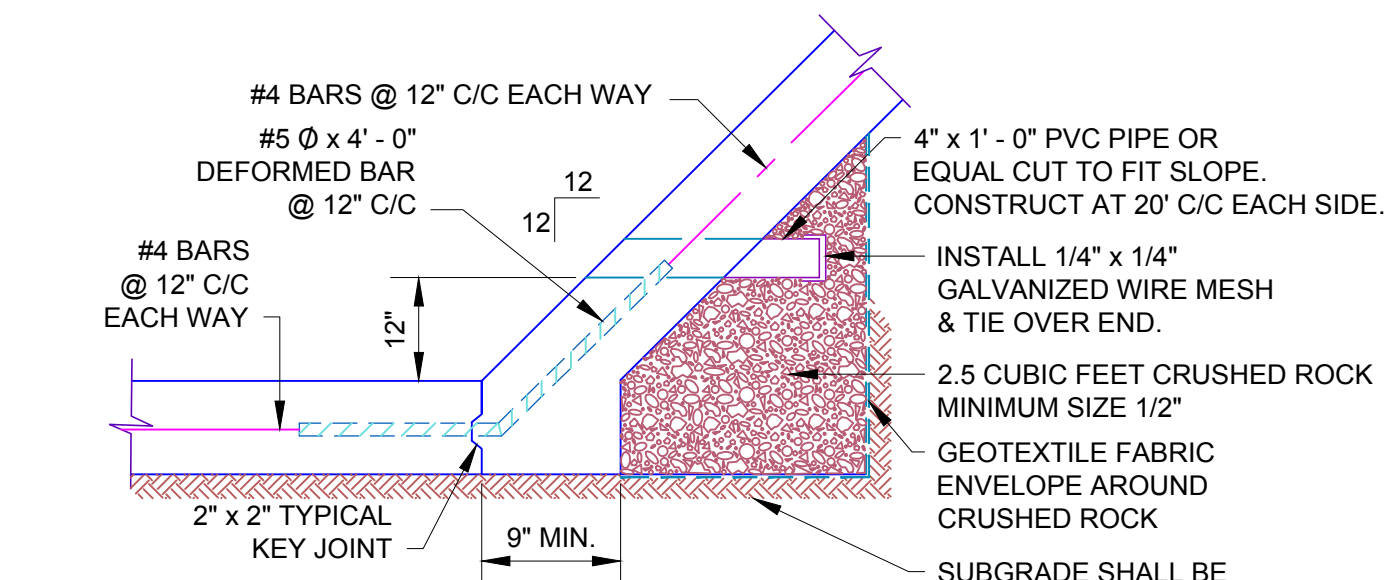
LONGITUDINAL CONSTRUCTION JOINT

FOR 6" BOTTOM & 6" SIDE WALLS
8" WALLS FOR 2/3 THE WALL HEIGHT ABOVE 5'
WALL DETAIL "C"

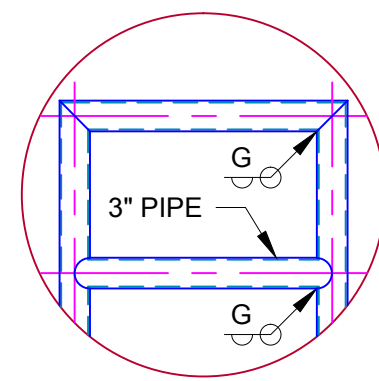
CONCRETE CHANNEL LINER JOINT DETAIL



TYPICAL CONCRETE CHANNEL LINER DETAIL



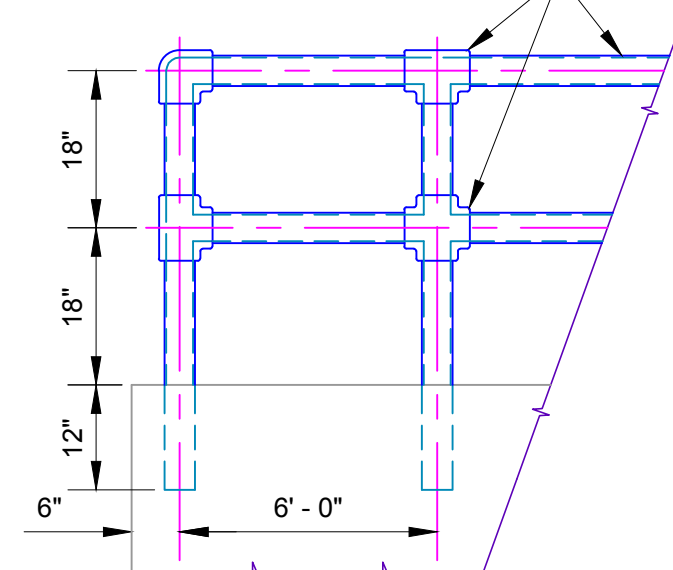
CONCRETE CHANNEL WEEP HOLE DETAIL



ALTERNATE DETAIL

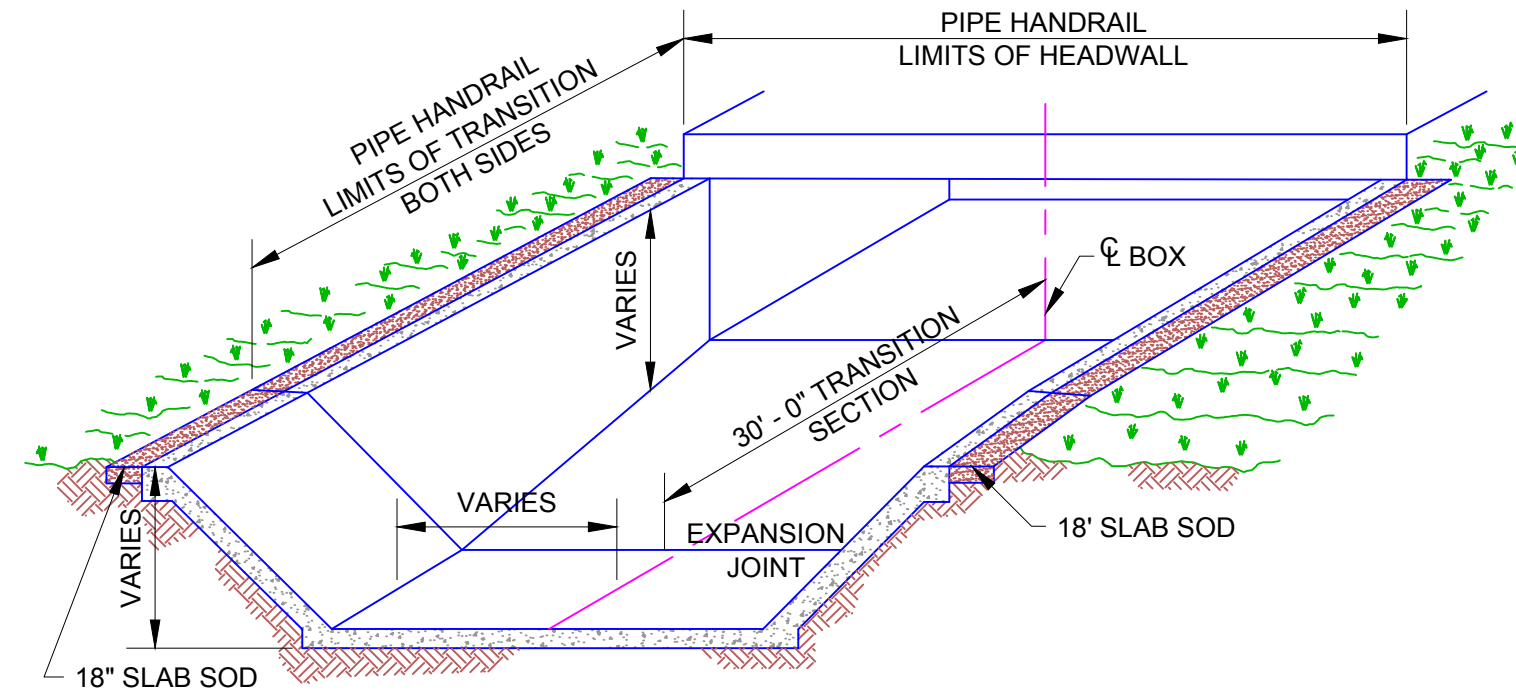
(USING WELD CONNECTIONS ON PIPE HANDRAILS)

3" I.D. GALV. STEEL PIPE WITH PLAIN GALV. FITTINGS.
USE STANDARD & SPECIAL FITTINGS AS NEEDED.

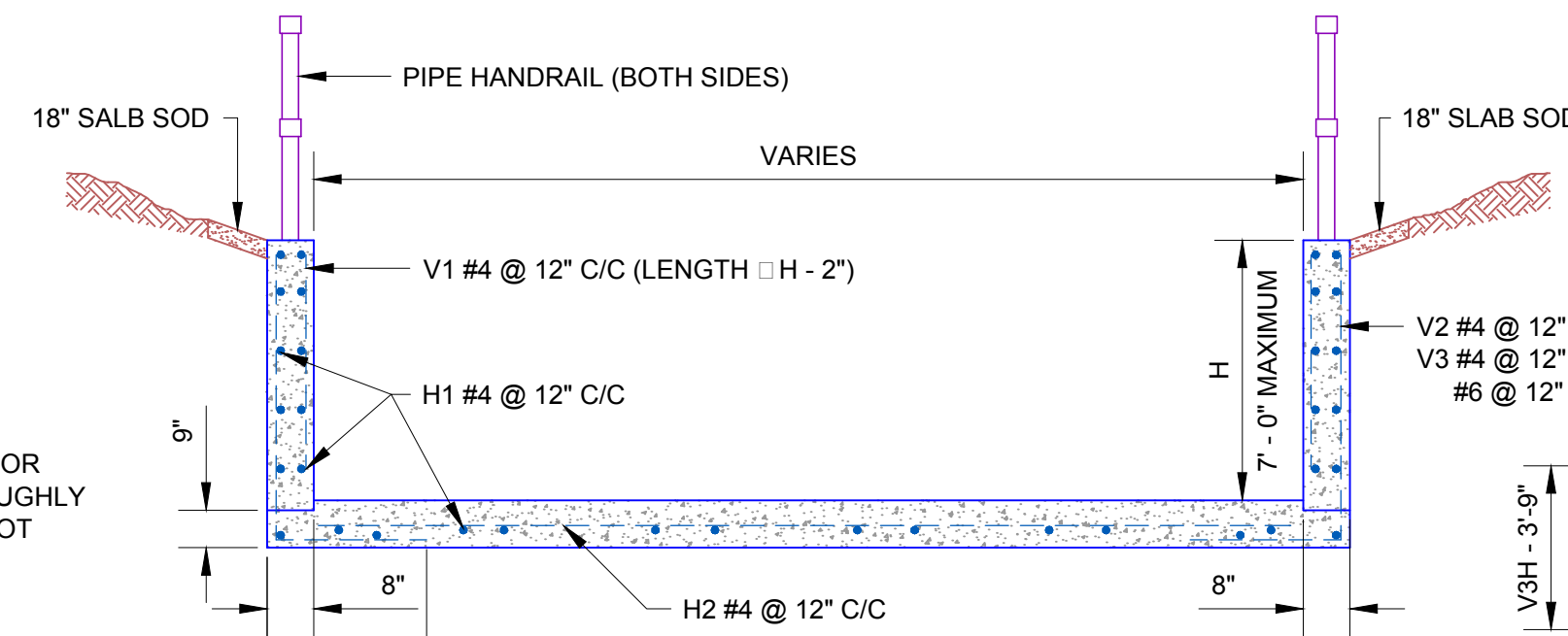


PIPE HANDRAIL DETAIL

HANDRAIL NOTES: WELD CONNECTIONS MAY BE USED FOR
PIPE HANDRAIL. WELD CONNECTIONS SHALL BE THOROUGHLY
CLEANED OF ALL LOOSE SCALE, GROUND SMOOTH & SPOT
POINTED WITH TWO COATS OF ALUMINUM PAINT.

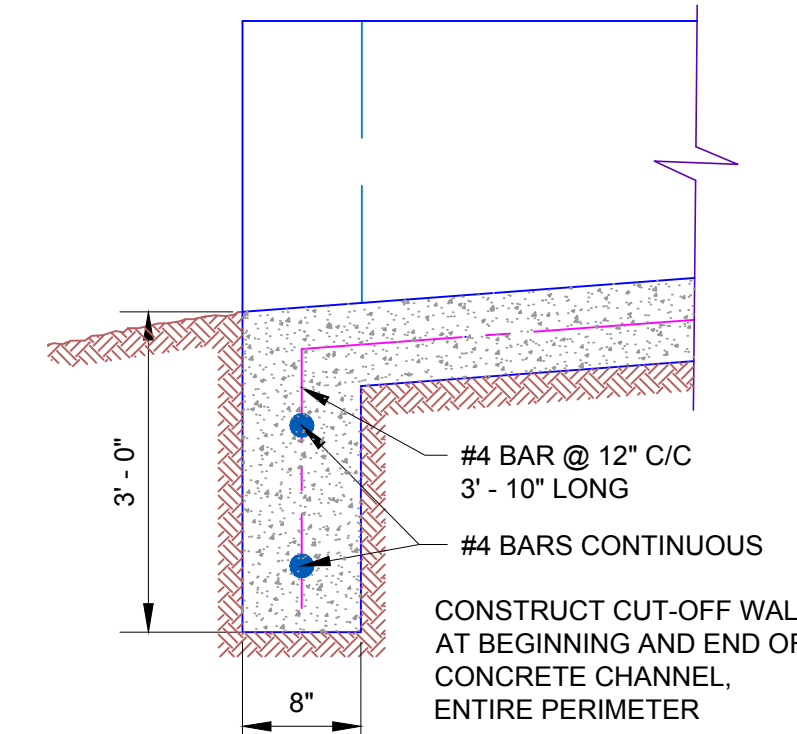


CONCRETE CHANNEL LINER JOINT DETAIL



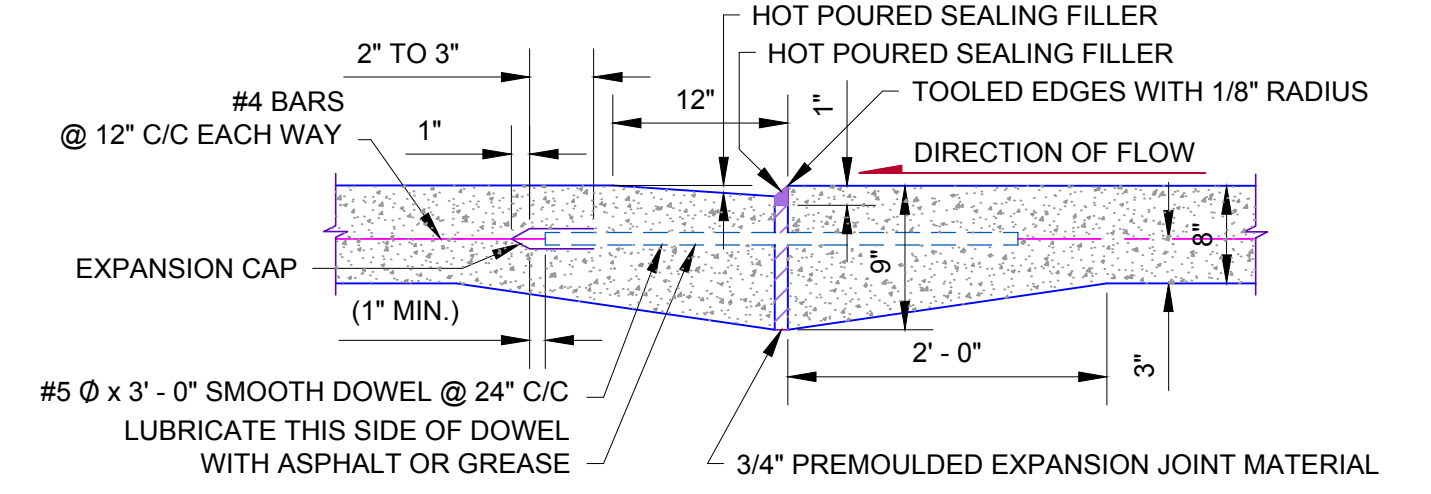
CONCRETE CHANNEL LINER JOINT DETAIL

BAR BENDING DIAGRAM



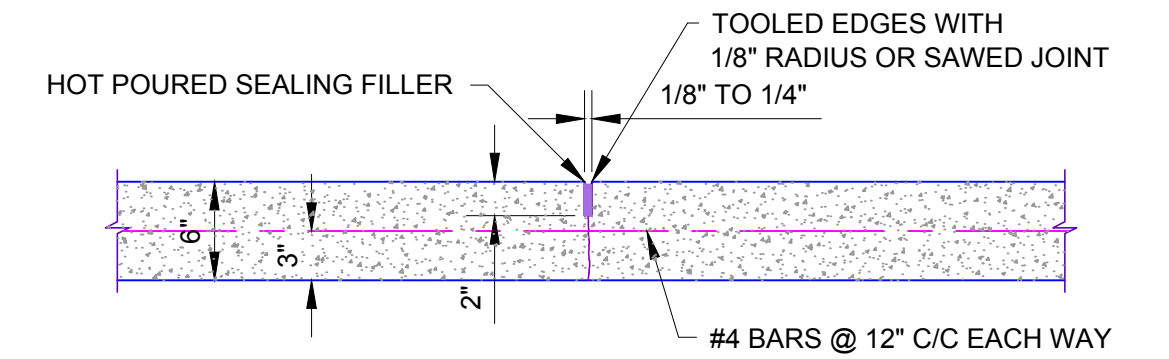
CUT-OFF WALL DETAIL

TYPICAL #4 BAR
(FOR CUT-OFF WALL)



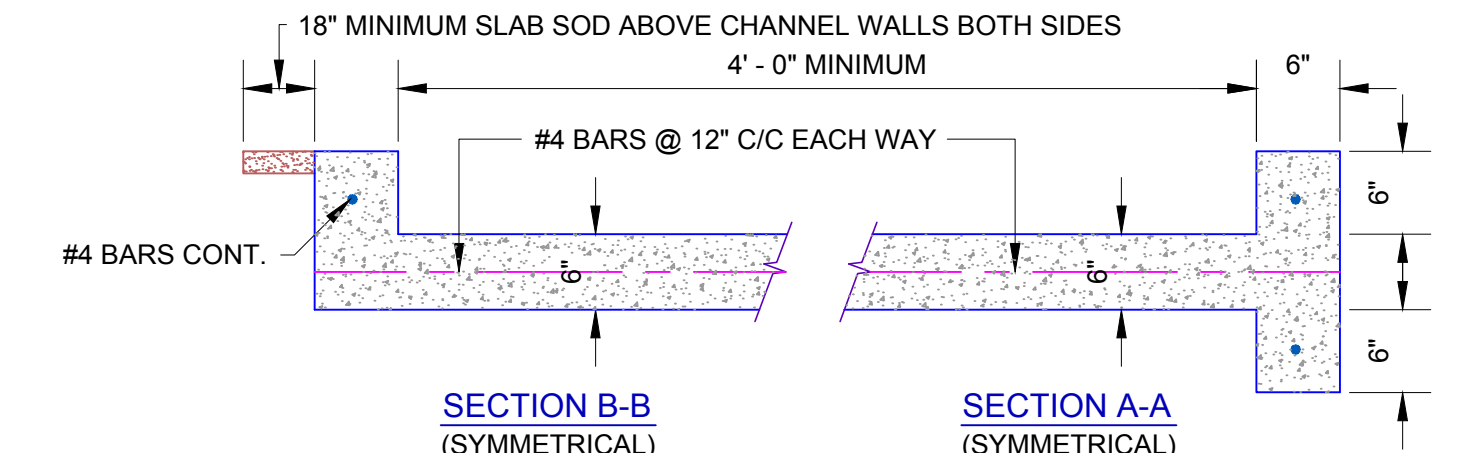
TYPICAL TRANSVERSE EXPANSION JOINT

SPACED AT 100 FOOT C/C MAXIMUM



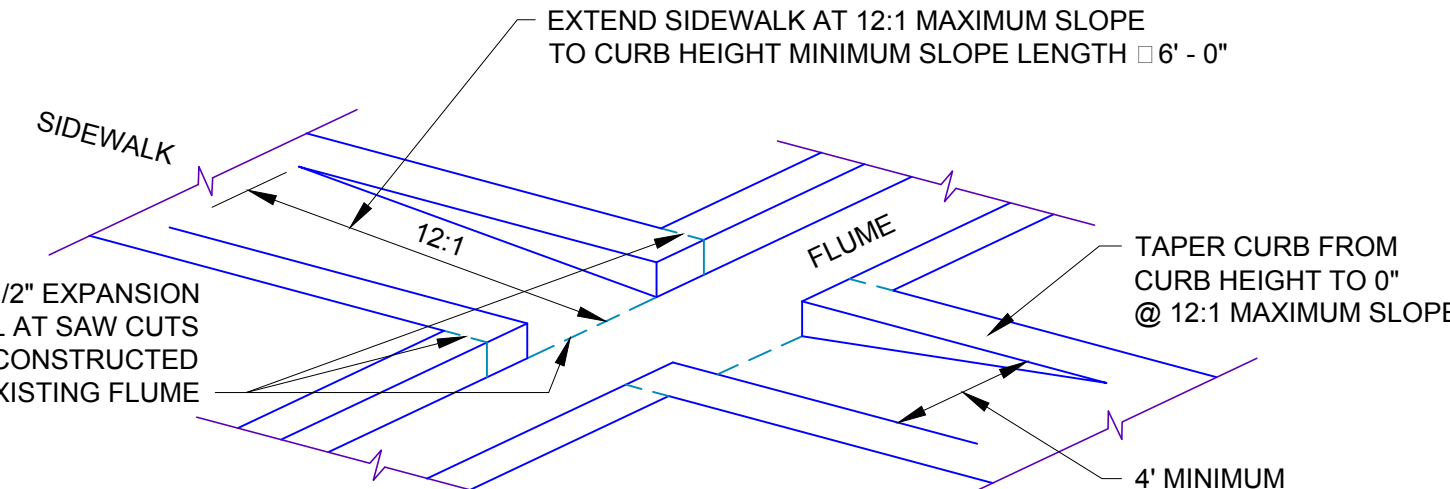
CONTRACTION JOINT

SPACED AT 20 FOOT C/C
(ALSO USE JOINT LONGITUDINALLY AT CENTERLINE OF CHANNEL
FOR BOTTOM WIDTHS OF 12 FOOT AND OVER)

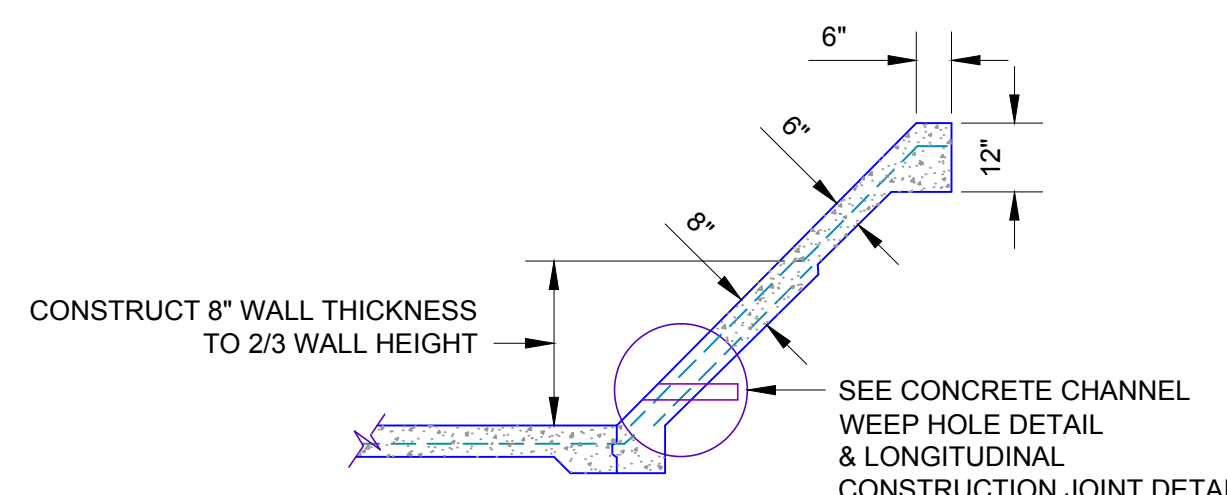


CONSTRUCTION JOINT

SPACED AT 20 FOOT C/C
(ALSO USE JOINT LONGITUDINALLY AT CENTERLINE OF CHANNEL
FOR BOTTOMS OF 12 FOOT AND OVER)

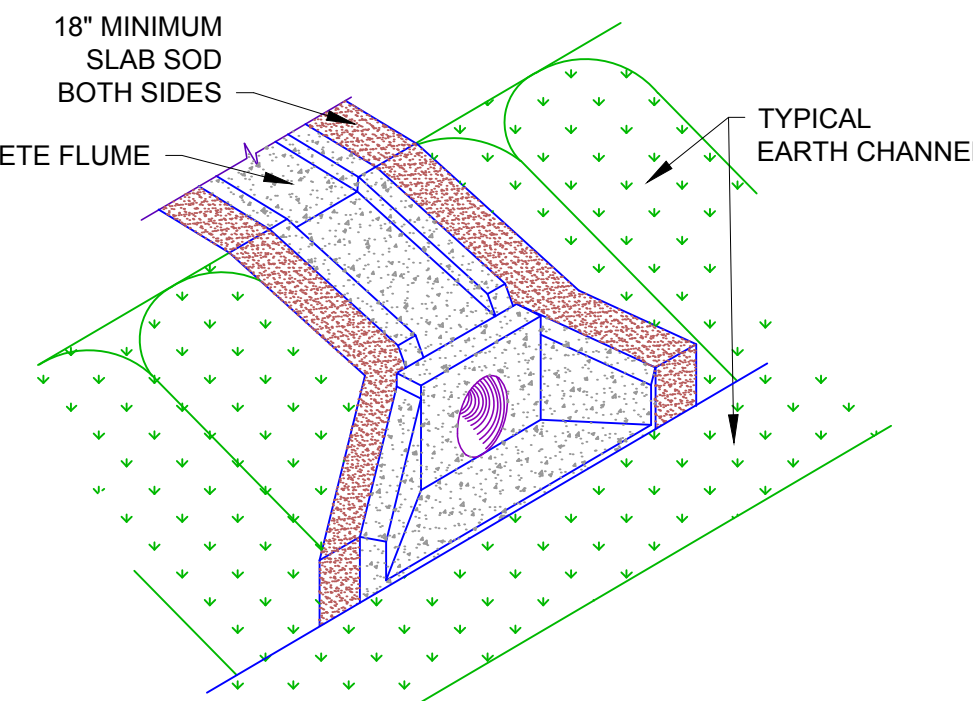


SIDEWALK RAMP AT FLUME CROSSING

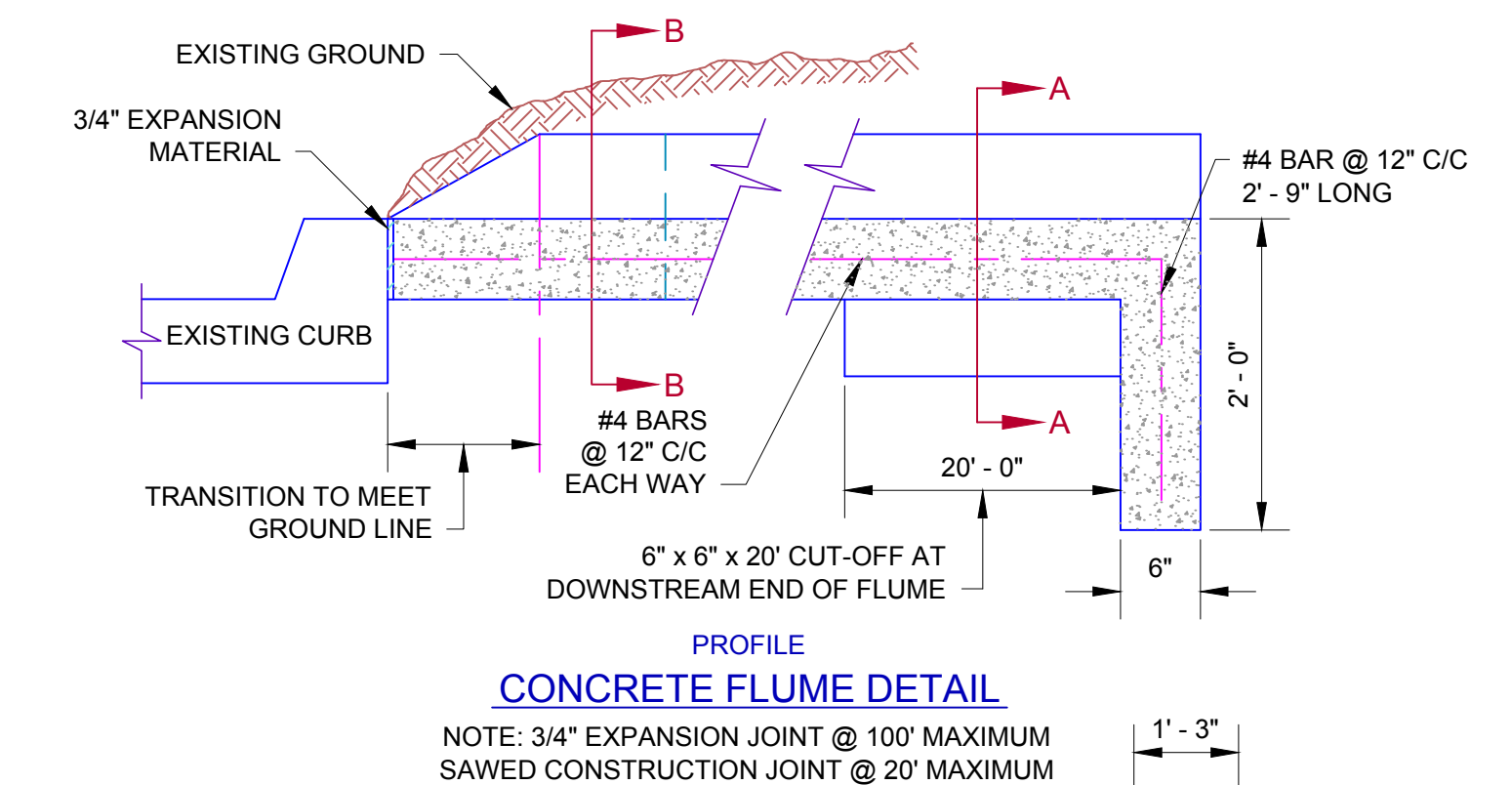


CONCRETE CHANNEL LINER JOINT DETAIL

FOR WALL HEIGHT ABOVE 5'



TYPICAL FLUME DETAIL
EARTH CHANNEL



CONCRETE FLUME DETAIL

NOTE: 3/4" EXPANSION JOINT @ 100' MAXIMUM
SAWED CONSTRUCTION JOINT @ 20' MAXIMUM

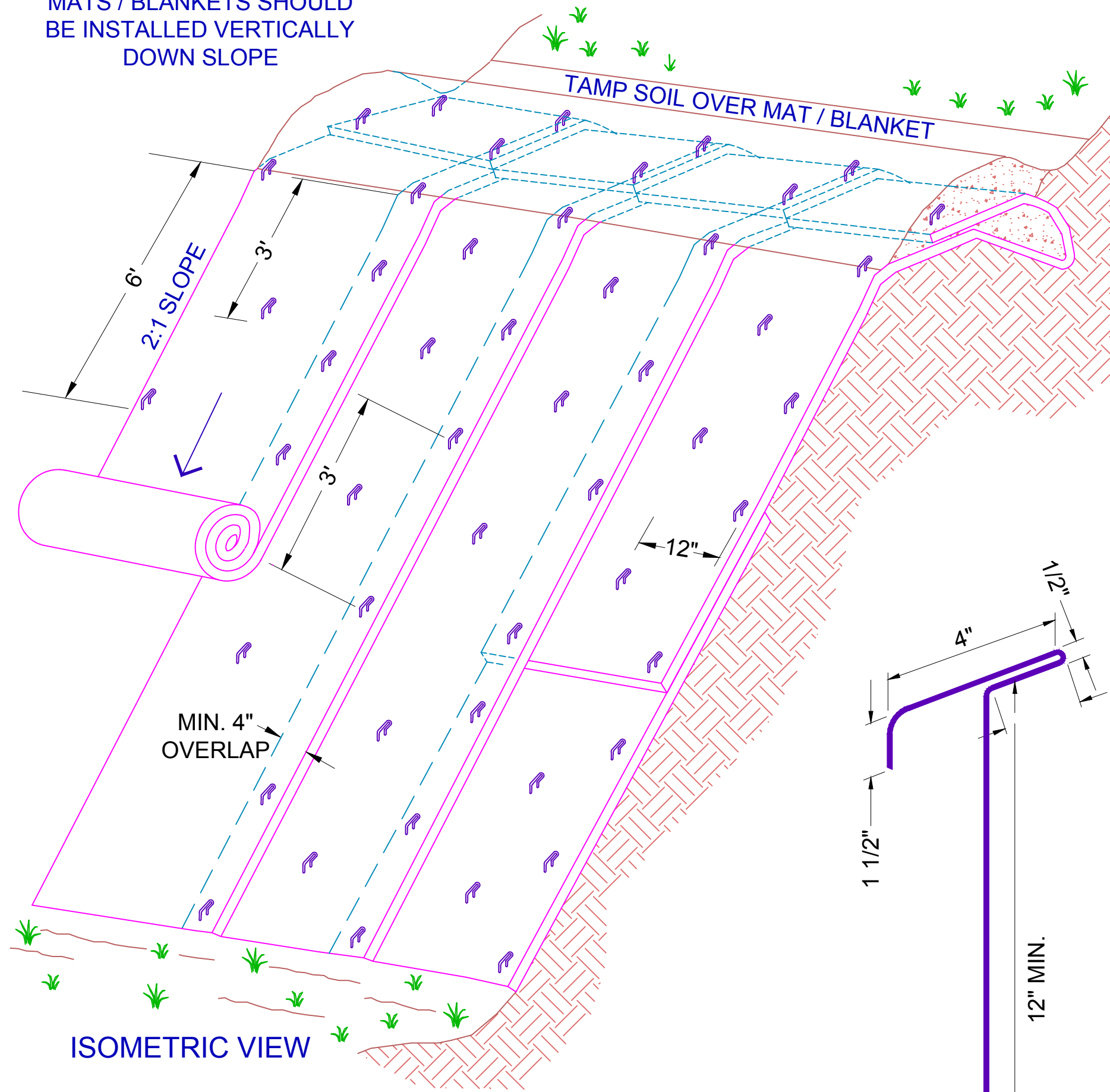
TYPICAL #4 BAR
(FOR CONCRETE FLUME)

OKLAHOMA CITY
PUBLIC WORKS DEPARTMENT
ENGINEERING DIVISION

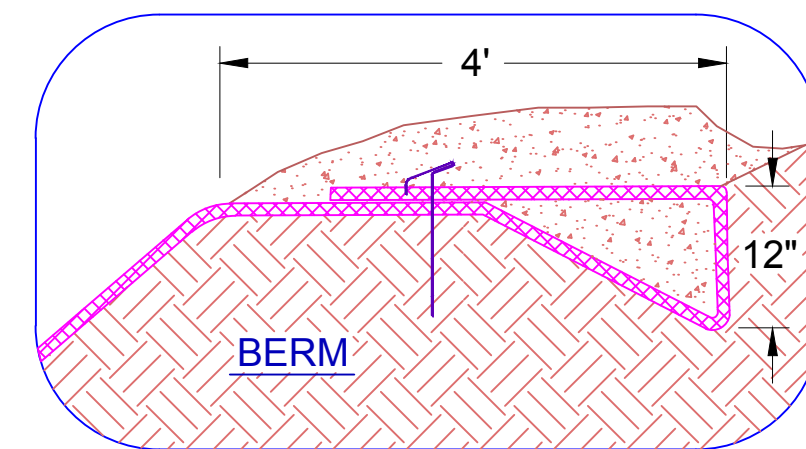
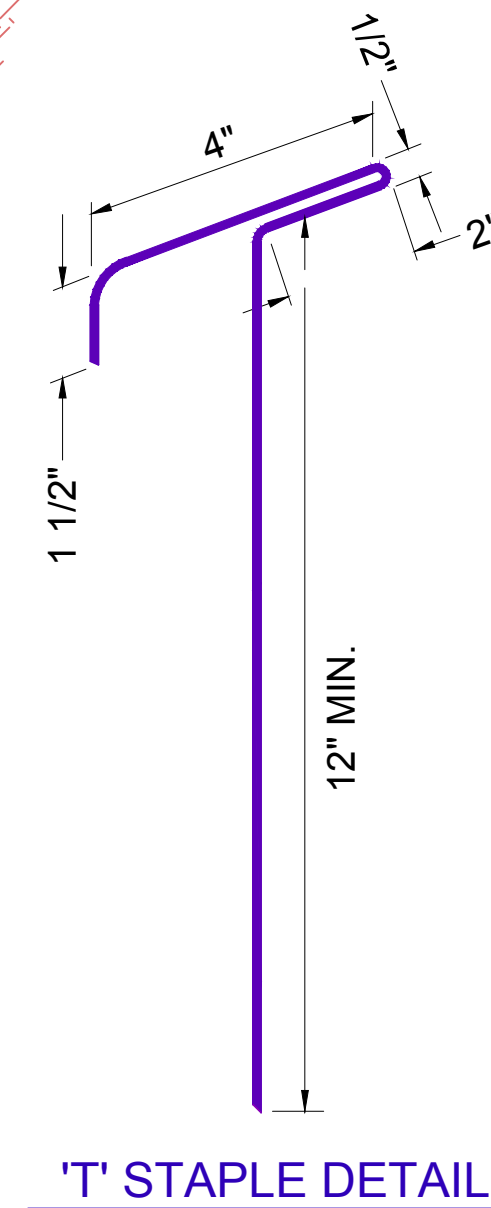
**STANDARD CHANNEL LINER
& FLUME DETAILS**

APPROVED BY: 	DATE: 7-11-01	DRAWN: V.S.C.	DATE: 06/27/01
CITY ENGINEER		DWG. NO. D-501	

MATS / BLANKETS SHOULD BE INSTALLED VERTICALLY DOWN SLOPE



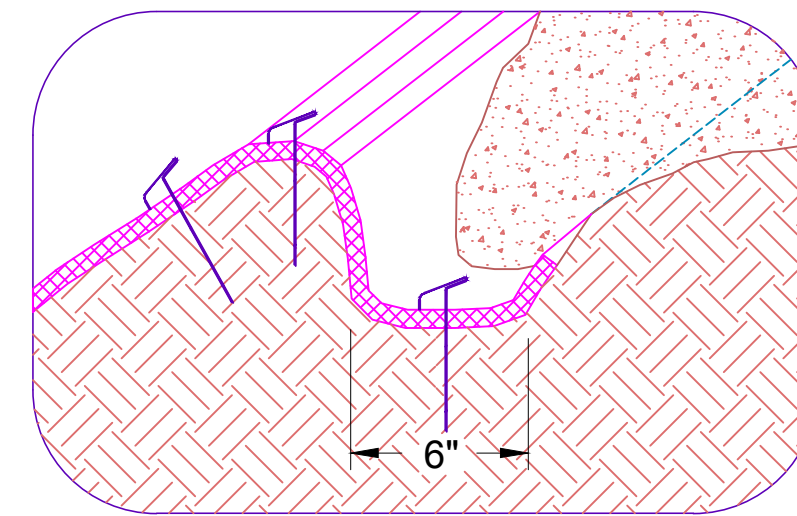
TYPICAL SLOPE SOIL STABILIZATION



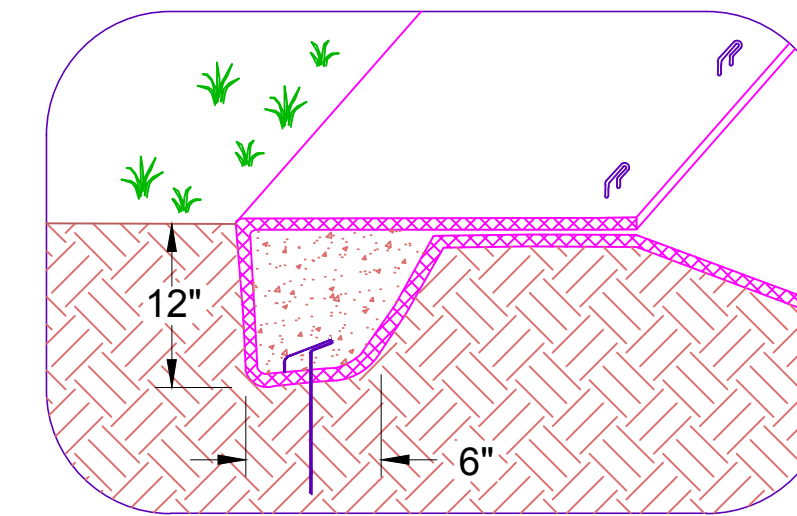
NOTES:

1. SLOPE SURFACE SHALL BE FREE OF ROCKS CLODS, STICKS AND GRASS. MATS / BLANKETS SHALL HAVE GOOD SOIL CONTACT.
2. APPLY PERMANENT SEEDING BEFORE PLACING BLANKETS.
3. LAY BLANKETS LOOSELY AND STAKE OR STAPLE TO MAINTAIN DIRECT CONTACT WITH THE SOIL. DO NOT STRETCH.

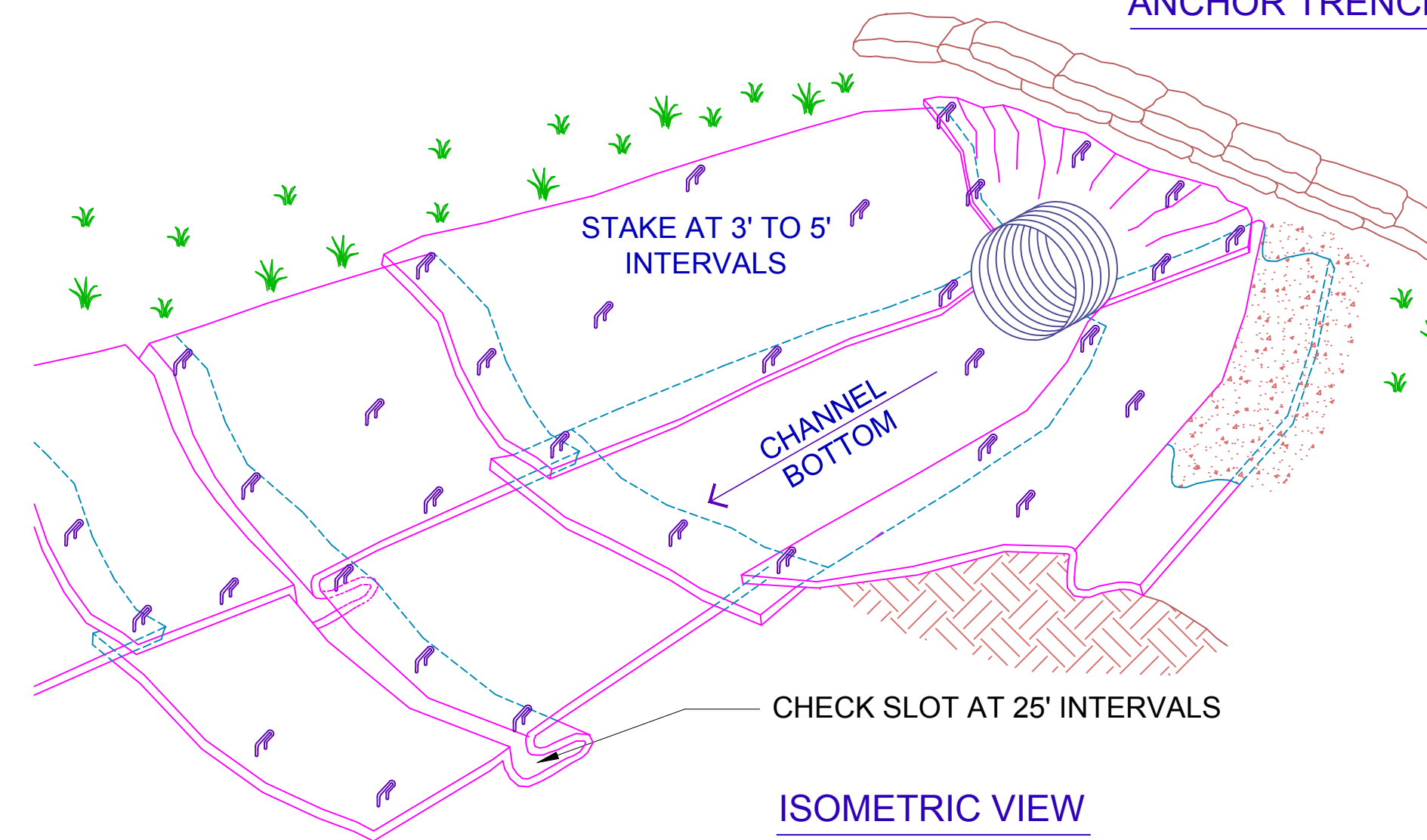
EROSION BLANKET & TURF REINFORCEMENT MATS SLOPE INSTALLATION



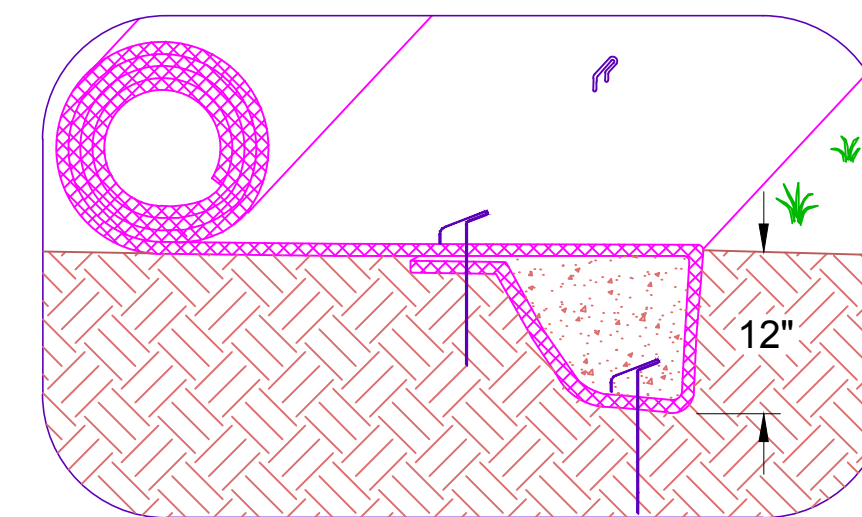
LONGITUDINAL ANCHOR TRENCH



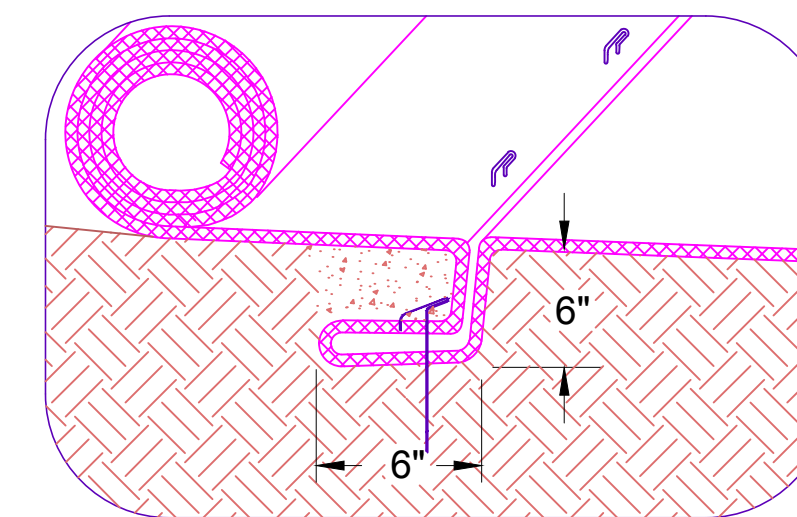
TERMINAL SLOPE AND CHANNEL ANCHOR TRENCH



ISOMETRIC VIEW



INITIAL CHANNEL ANCHOR TRENCH

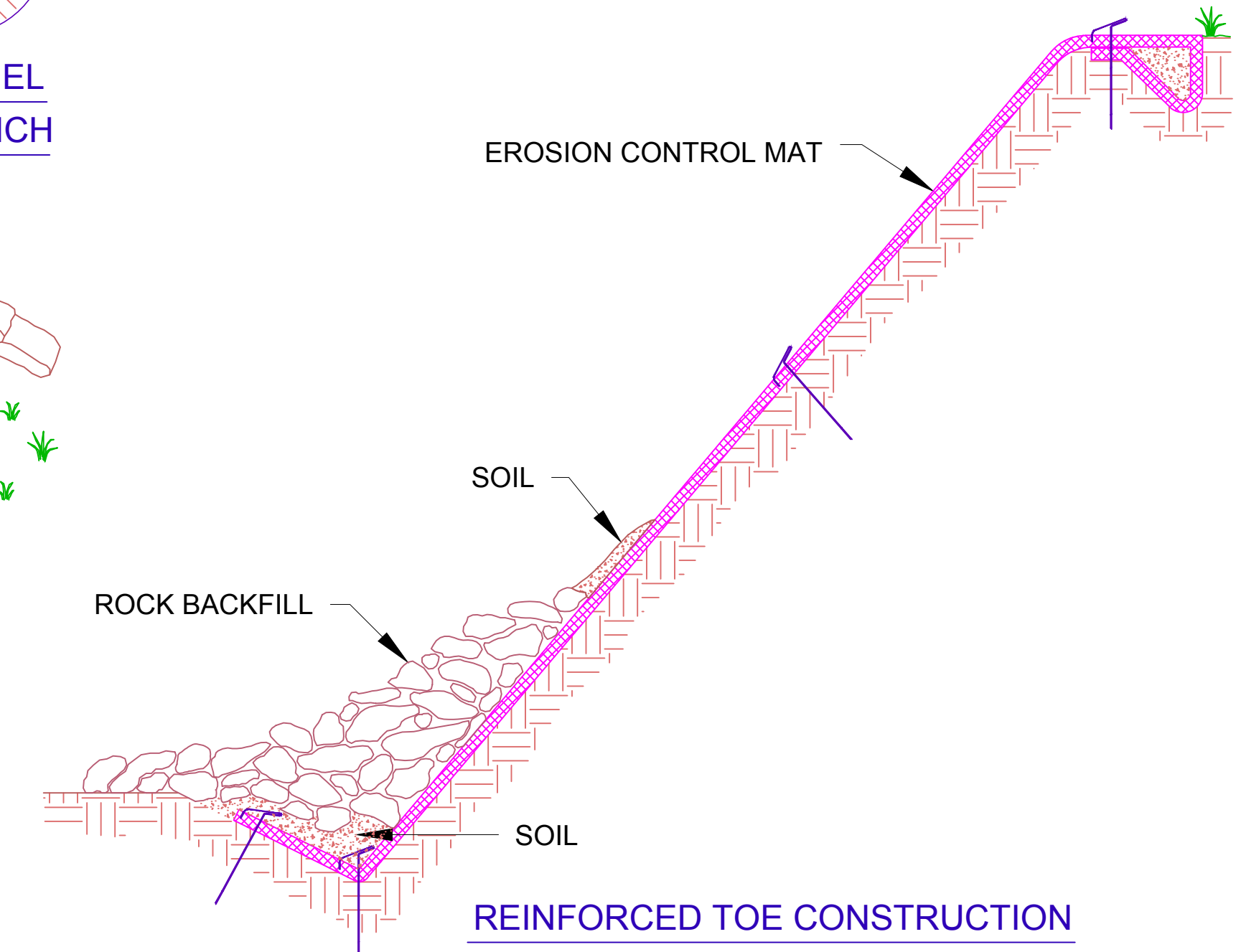


INTERMITTENT CHECK SLOT

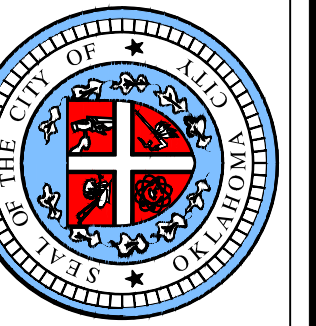
NOTES:

1. CHECK SLOTS TO BE CONSTRUCTED PER MANUFACTURE'S SPECIFICATIONS.
2. STAKING OF STAPLING LAYOUT PER MANUFACTURES SPECIFICATIONS.

EROSION BLANKET & TURF REINFORCEMENT MATS CHANNEL INSTALLATION



REINFORCED TOE CONSTRUCTION (TO BE USED ONLY IF CALLED FOR IN THE PLANS)



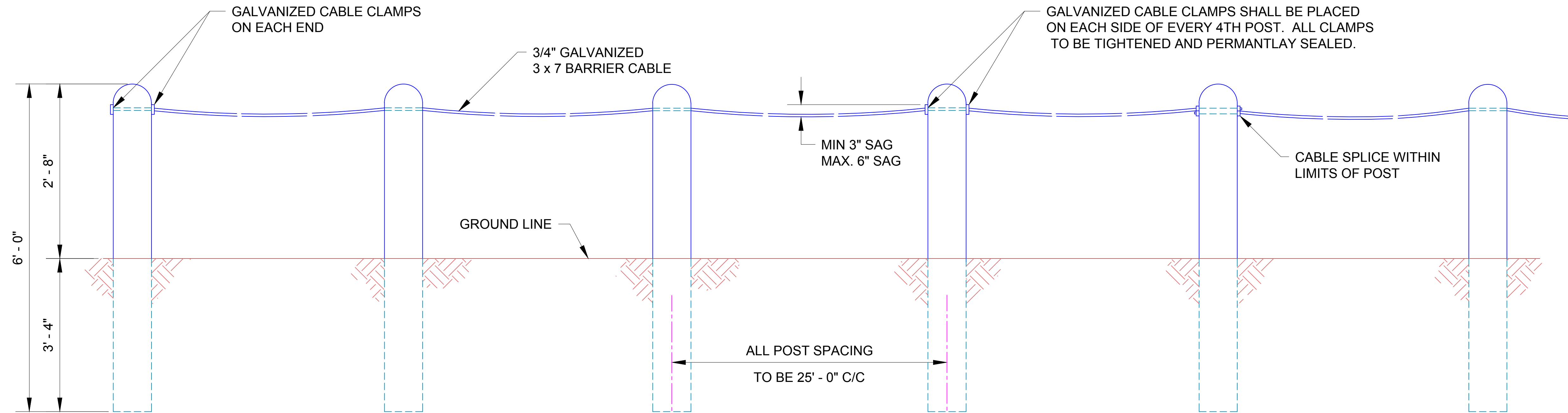
APPROVED BY: DATE: 05-02-13
ERIC J. WENGER, P.E.
CITY ENGINEER

DRAWN: VSC
DATE: 05-02-13

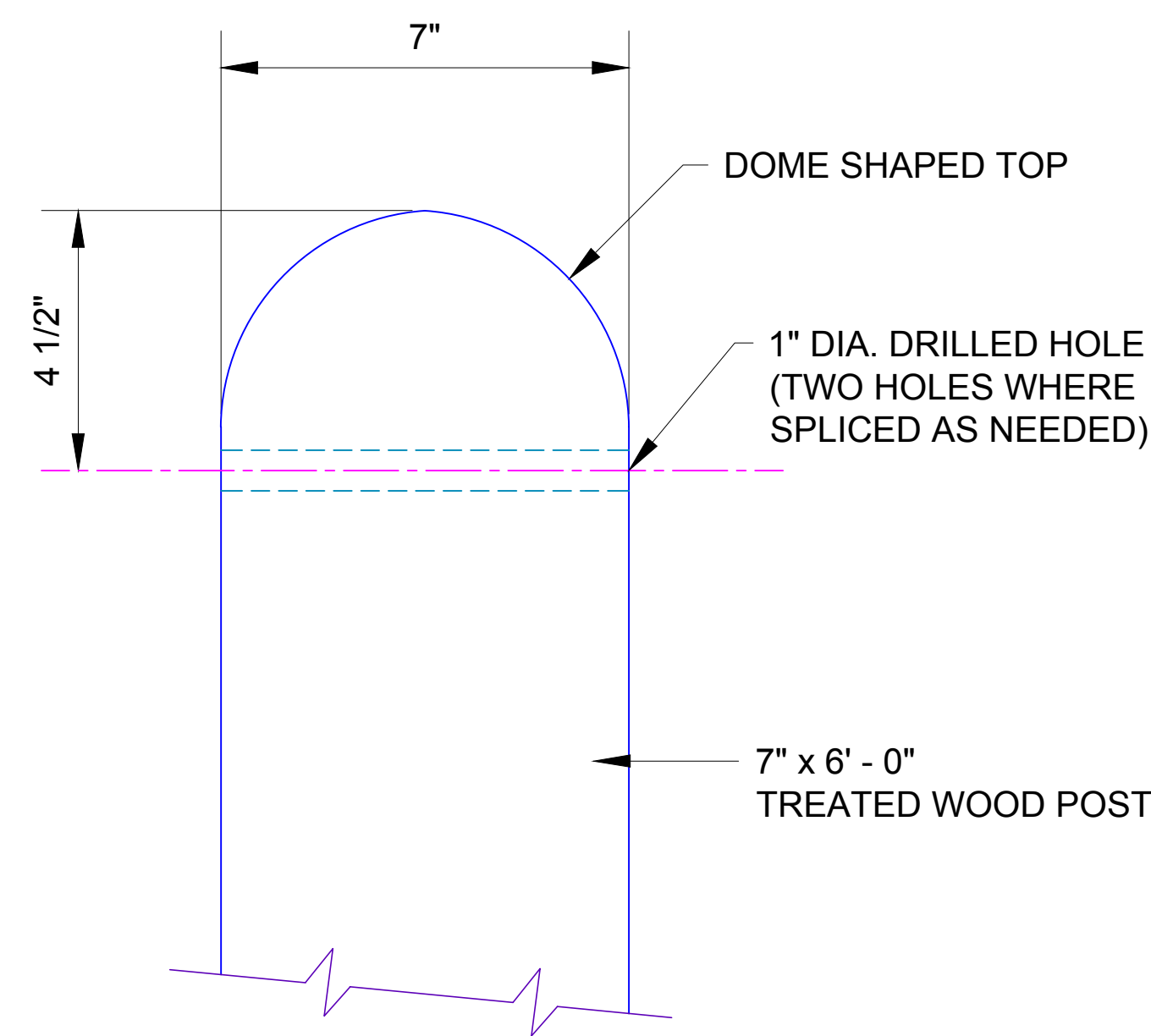
NYLON EROSION CONTROL MAT TYPICAL INSTALLATION DETAILS

Drawing Number

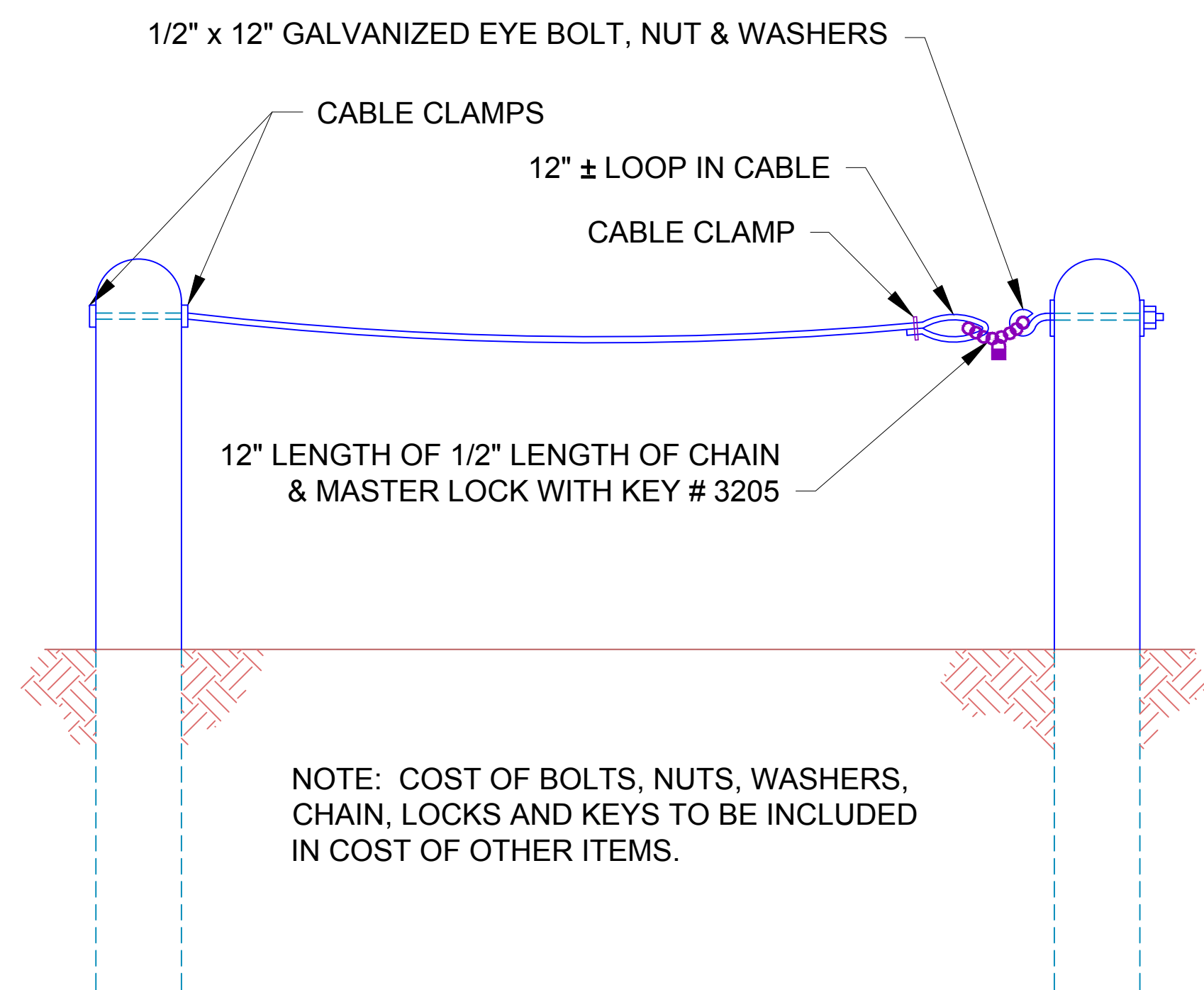
D-502



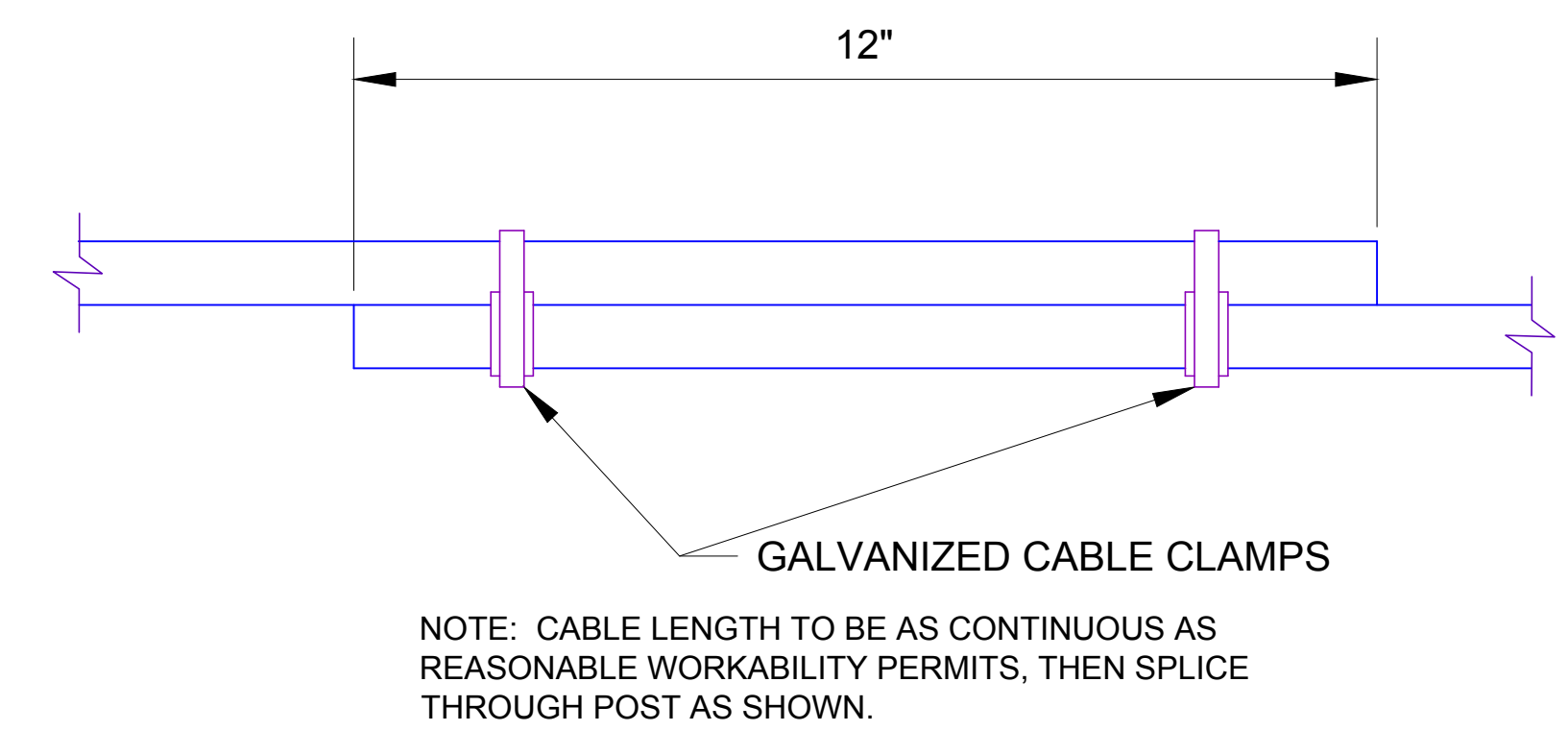
ELEVATION



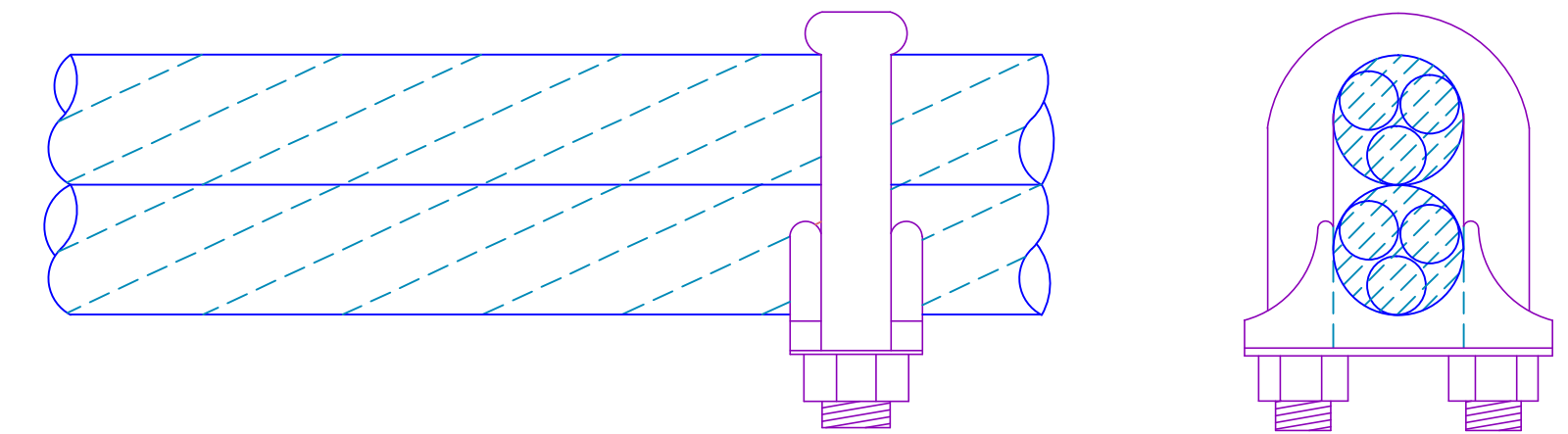
WOOD POST



GATE SECTION DETAIL

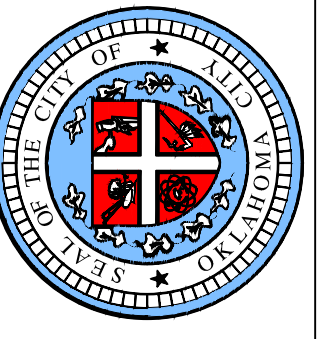


CABLE SPLICE



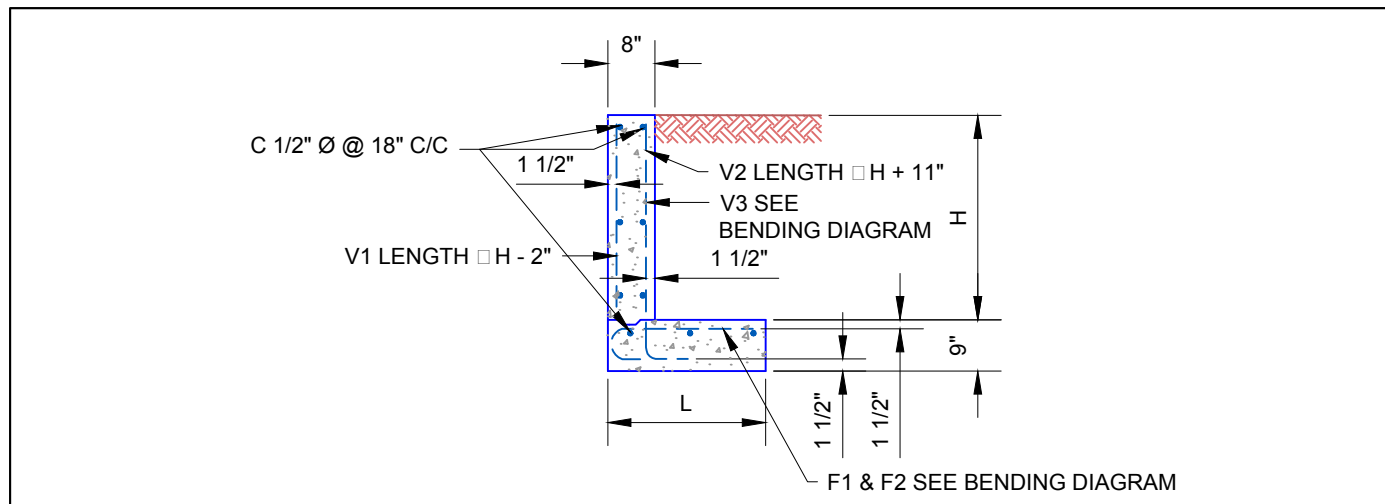
TYPICAL GALVANIZED CABLE CLAMP

NOTE: COST OF BOLTS, NUTS, WASHERS, CHAIN, LOCKS AND KEYS TO BE INCLUDED IN COST OF OTHER ITEMS.

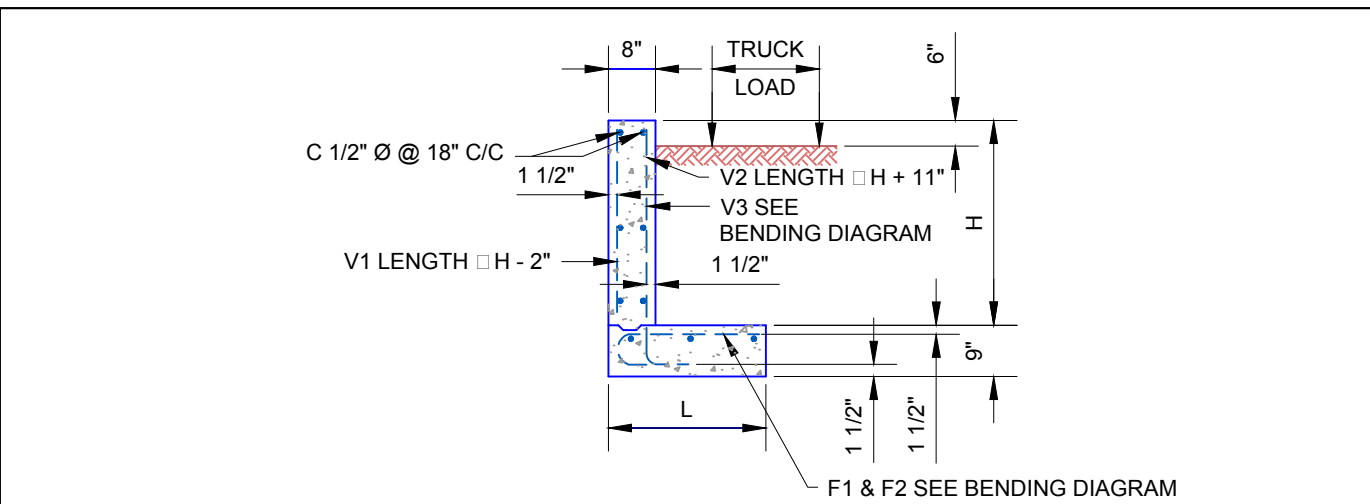


APPROVED BY: ERIC J. WENGER, P.E. CITY ENGINEER	DATE: 05-03-13
DRAWN: VSC	DATE: 05-03-13

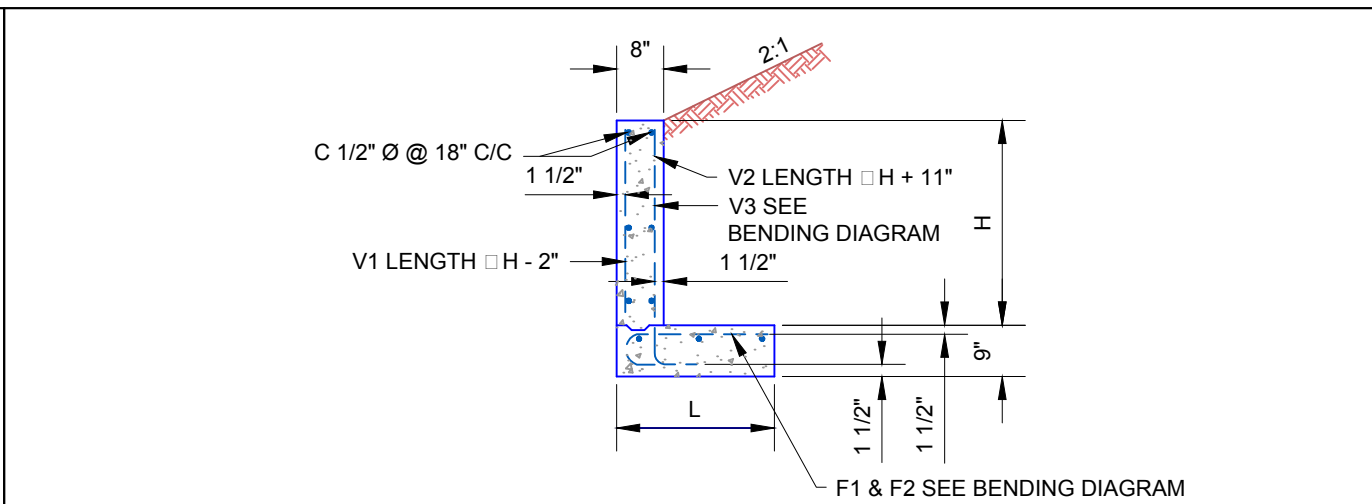
**STANDARD CABLE FENCE
DETAIL**



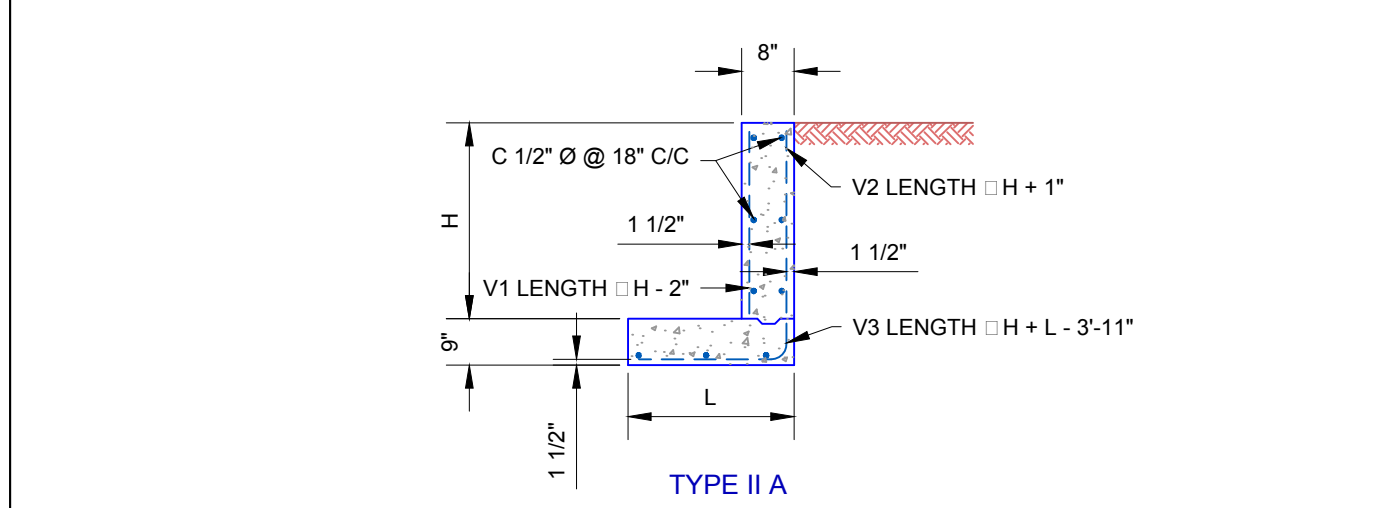
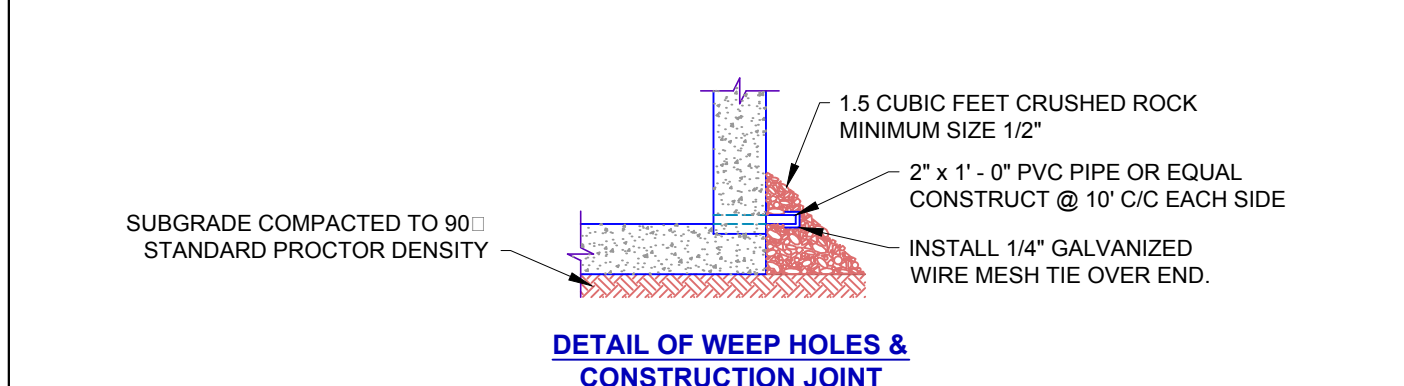
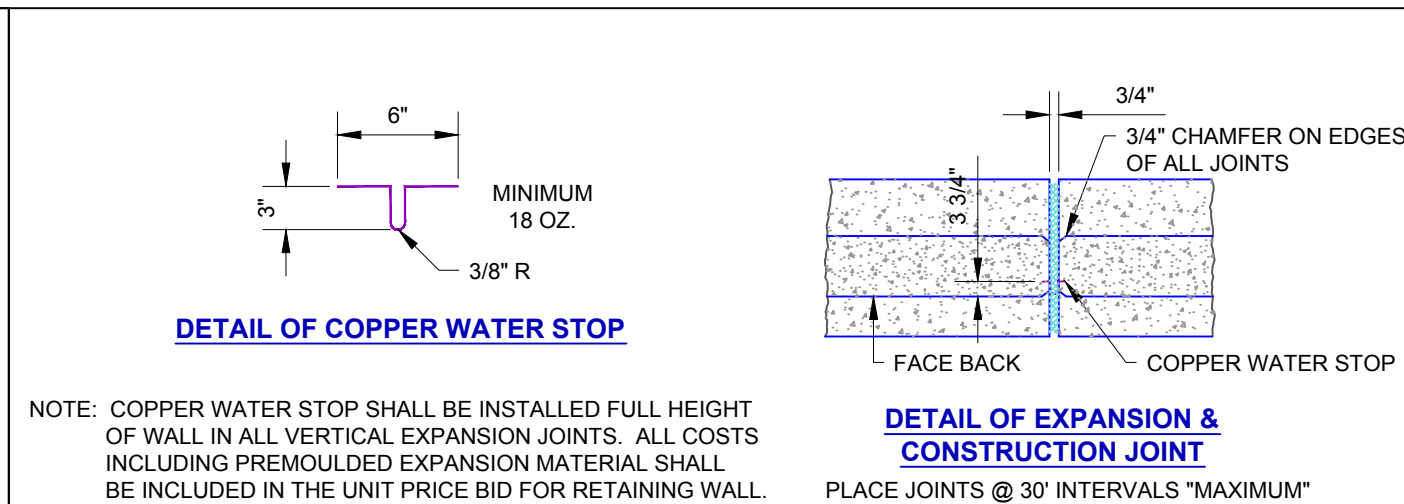
DESIGN NUMBER	H	L	F1 BAR	F2 BAR	C BAR	V1 BAR	V2 BAR	V3 BAR	QUANTITIES	
			SIZE SPC.	SIZE SPC.	# REQ'D	SIZE SPC.	SIZE SPC.	SIZE SPC.	REINF STEEL LBS. PER L.F.	CONC. C.Y. PER L.F.
2	2'-0"	2'-0"	1/2" @ 12"	-----	6	1/2" @ 18"	1/2" @ 12"	-----	8.28	0.105
3	3'-0"	2'-7"	1/2" @ 12"	-----	8	1/2" @ 18"	1/2" @ 12"	-----	11.11	0.146
4	4'-0"	3'-3"	1/2" @ 12"	-----	9	1/2" @ 18"	1/2" @ 12"	-----	13.34	0.189
5	5'-0"	4'-0"	1/2" @ 12"	-----	10	5/8" @ 18"	1/2" @ 12"	-----	16.29	0.235
6	6'-0"	4'-8"	5/8" @ 12"	-----	11	1/2" @ 18"	1/2" @ 12"	-----	22.00	0.278
7	7'-0"	5'-0"	1/2" @ 12"	-----	14	7/8" @ 18"	1/2" @ 12"	1/2" @ 12"	27.76	0.321
8	8'-0"	6'-0"	7/8" @ 12"	-----	17	1/2" @ 18"	1/2" @ 12"	5/8" @ 12"	40.67	0.364
9	9'-0"	6'-8"	1/2" @ 12"	7/8" @ 12"	19	1/2" @ 18"	1/2" @ 12"	7/8" @ 12"	57.51	0.407



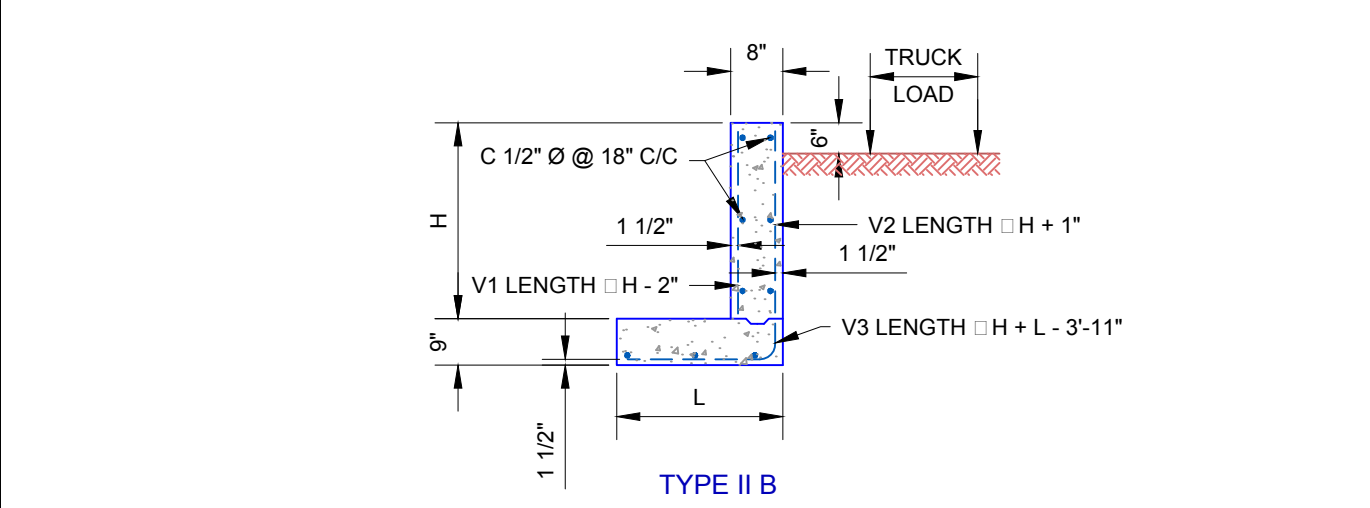
DESIGN NUMBER	H	L	F1 BAR	F2 BAR	C BAR	V1 BAR	V2 BAR	V3 BAR	QUANTITIES	
			SIZE SPC.	SIZE SPC.	# REQ'D	SIZE SPC.	SIZE SPC.	SIZE SPC.	REINF STEEL LBS. PER L.F.	CONC. C.Y. PER L.F.
2	2'-0"	2'-0"	1/2" @ 12"	-----	6	1/2" @ 18"	1/2" @ 12"	-----	8.28	0.105
3	3'-0"	2'-10"	1/2" @ 12"	-----	9	1/2" @ 18"	1/2" @ 12"	-----	11.95	0.164
4	4'-0"	3'-7"	1/2" @ 12"	-----	9	1/2" @ 18"	1/2" @ 12"	-----	13.56	0.198
5	5'-0"	4'-4"	5/8" @ 12"	-----	12	5/8" @ 18"	1/2" @ 12"	-----	19.16	0.244
6	6'-0"	5'-1"	1/2" @ 12"	-----	14	1/2" @ 18"	1/2" @ 12"	1/2" @ 12"	25.64	0.298
7	7'-0"	5'-10"	7/8" @ 12"	-----	15	7/8" @ 18"	1/2" @ 12"	5/8" @ 12"	36.83	0.335
8	8'-0"	6'-7"	1/2" @ 12"	7/8" @ 12"	17	1/2" @ 18"	1/2" @ 12"	7/8" @ 12"	54.97	0.380



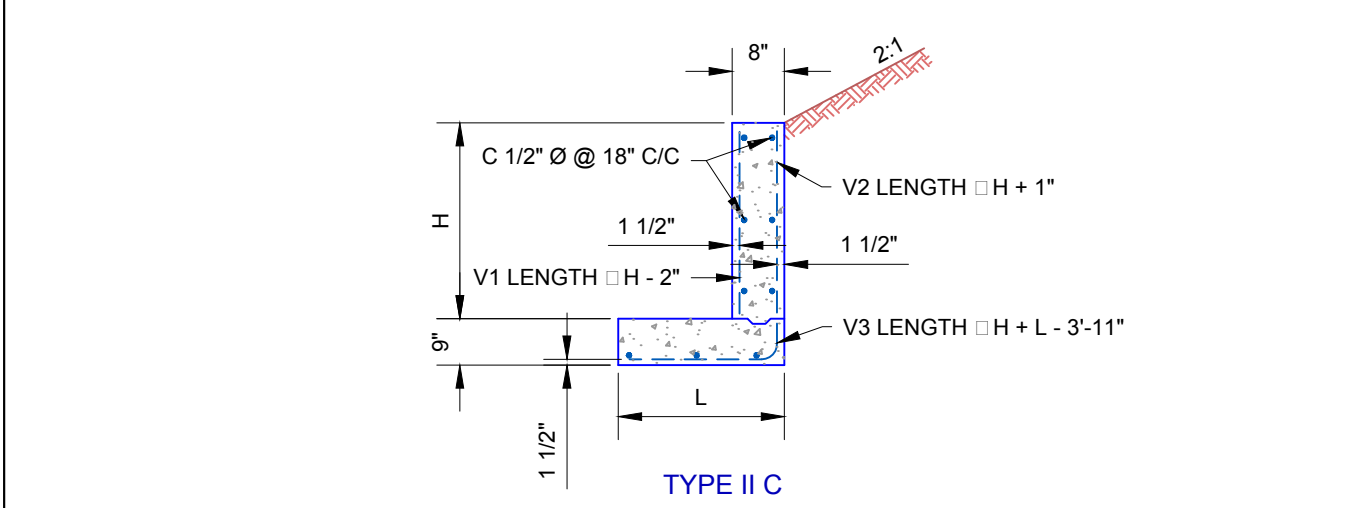
DESIGN NUMBER	H	L	F1 BAR	F2 BAR	C BAR	V1 BAR	V2 BAR	V3 BAR	QUANTITIES	
			SIZE SPC.	SIZE SPC.	# REQ'D	SIZE SPC.	SIZE SPC.	SIZE SPC.	REINF STEEL LBS. PER L.F.	CONC. C.Y. PER L.F.
2	2'-0"	2'-0"	1/2" @ 12"	-----	6	1/2" @ 18"	1/2" @ 12"	-----	8.28	0.105
3	3'-0"	2'-7"	1/2" @ 12"	-----	8	1/2" @ 18"	1/2" @ 12"	-----	11.11	0.146
4	4'-0"	3'-4"	1/2" @ 12"	-----	9	1/2" @ 18"	1/2" @ 12"	-----	13.40	0.191
5	5'-0"	4'-1"	5/8" @ 12"	-----	12	1/2" @ 18"	1/2" @ 12"	-----	18.25	0.237
6	6'-0"	4'-11"	1/2" @ 12"	5/8" @ 12"	14	1/2" @ 18"	1/2" @ 12"	1/2" @ 12"	27.62	0.285
7	7'-0"	5'-8"	1/2" @ 12"	7/8" @ 12"	14	1/2" @ 18"	1/2" @ 12"	5/8" @ 12"	39.78	0.330



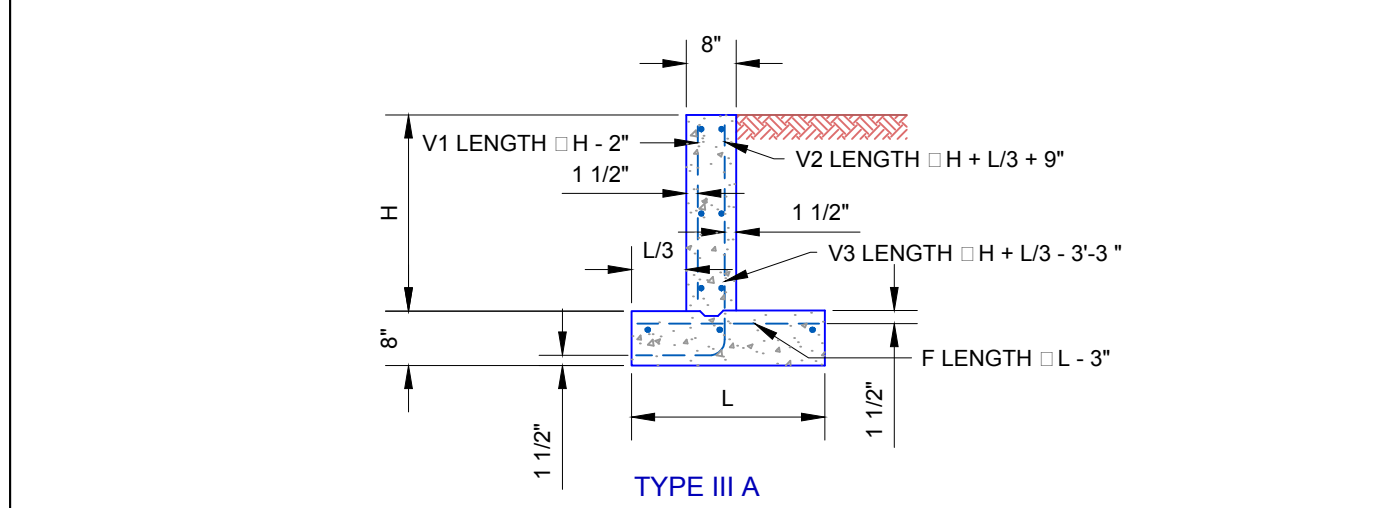
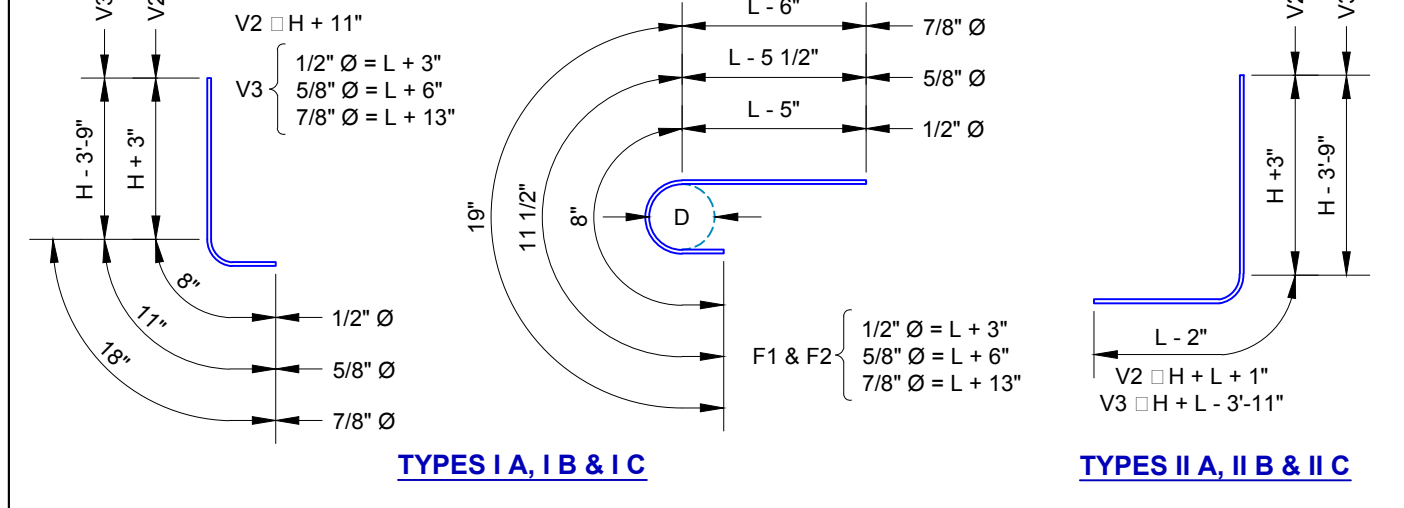
DESIGN NUMBER	H	L	C BAR	V1 BAR	V2 BAR	V3 BAR	QUANTITIES	
			# REQ'D	SIZE SPC.	SIZE SPC.	SIZE SPC.	REINF STEEL LBS. PER L.F.	CONC. C.Y. PER L.F.
2	2'-0"	2'-0"	6	1/2" @ 18"	1/2" @ 12"	-----	7.55	0.105
3	3'-0"	2'-11"	8	1/2" @ 18"	1/2" @ 12"	-----	10.06	0.132
4	4'-0"	2'-11"	9	1/2" @ 18"	1/2" @ 12"	-----	12.40	0.180
5	5'-0"	3'-11"	11	1/2" @ 18"	1/2" @ 12"	-----	15.51	0.232
6	6'-0"	5'-1"	14	1/2" @ 18"	1/2" @ 12"	1/2" @ 12"	24.20	0.289
7	7'-0"	6'-5"	15	1/2" @ 18"	1/2" @ 12"	5/8" @ 12"	31.99	0.351
8	8'-0"	7'-10"	18	1/2" @ 18"	1/2" @ 12"	3/4" @ 12"	44.04	0.415



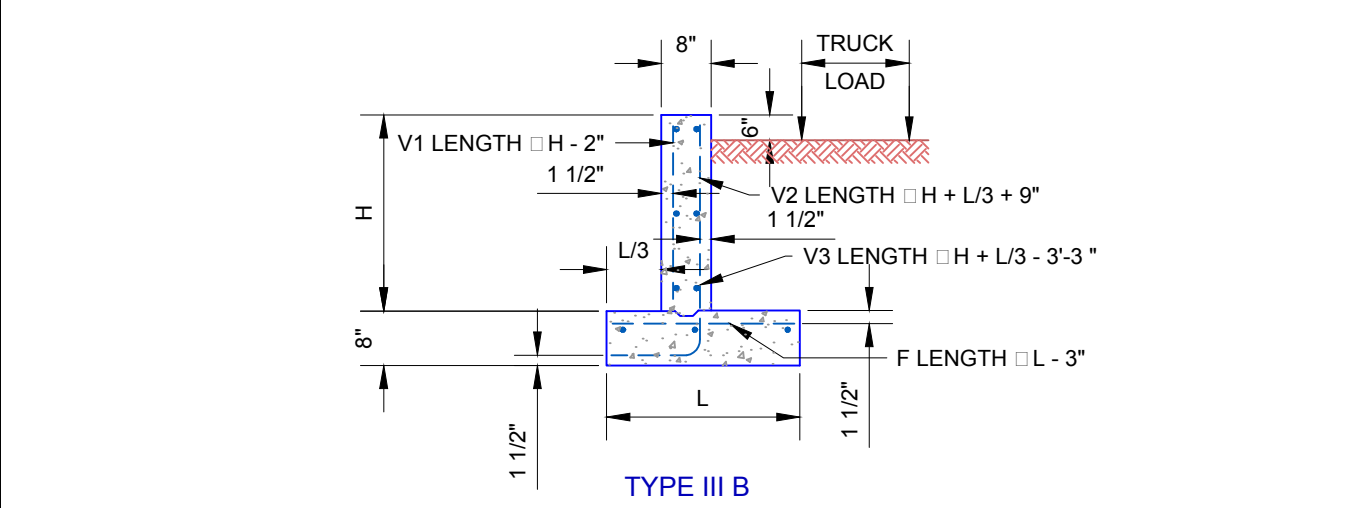
DESIGN NUMBER	H	L	C BAR	V1 BAR	V2 BAR	V3 BAR	QUANTITIES	
			# REQ'D	SIZE SPC.	SIZE SPC.	SIZE SPC.	REINF STEEL LBS. PER L.F.	CONC. C.Y. PER L.F.
2	2'-0"	2'-2"	6	1/2" @ 18"	1/2" @ 12"	-----	7.66	0.110
3	3'-0"	3'-3"	9	1/2" @ 18"	1/2" @ 12"	-----	11.50	0.164
4	4'-0"	4'-5"	10	1/2" @ 18"	1/2" @ 12"	-----	14.07	0.221
5	5'-0"	5'-8"	12	1/2" @ 18"	1/2" @ 12"	1/2" @ 12"	21.86	0.281
6	6'-0"	7'-2"	15	1/2" @ 18"	1/2" @ 12"	5/8" @ 12"	31.12	0.347
7	7'-0"	8'-8"	16	1/2" @ 18"	1/2" @ 12"	7/8" @ 12"	41.90	0.414



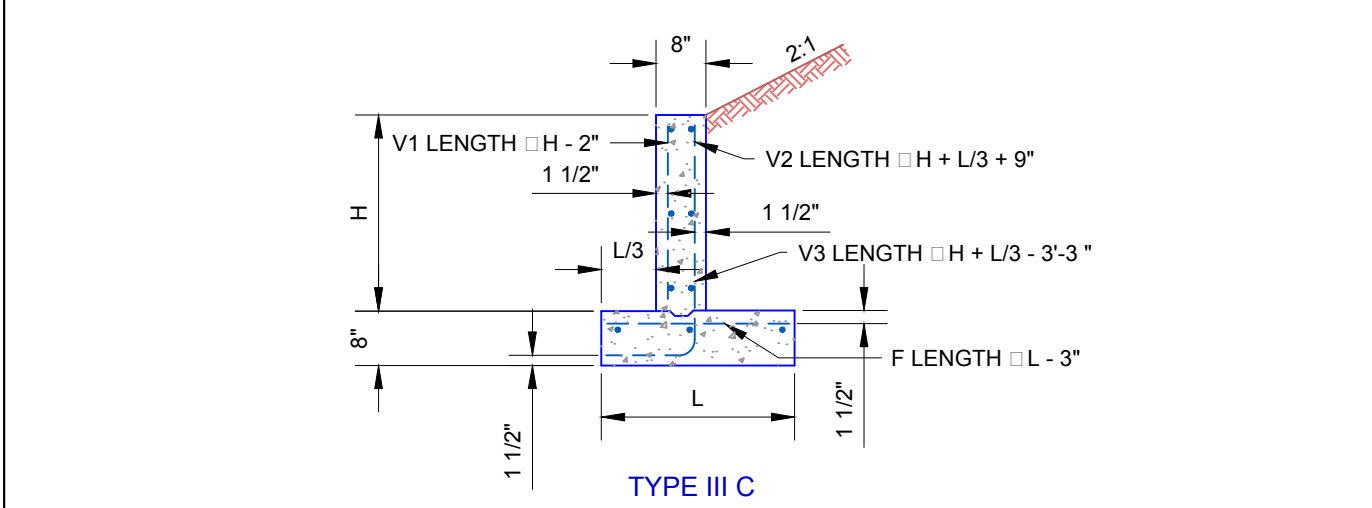
DESIGN NUMBER	H	L	C BAR	V1 BAR	V2 BAR	V3 BAR	QUANTITIES	
			# REQ'D	SIZE SPC.	SIZE SPC.	SIZE SPC.	REINF STEEL LBS. PER L.F.	CONC. C.Y. PER L.F.
2	2'-0"	2'-0"	6	1/2" @ 18"	1/2" @ 12"	-----	7.55	0.105
3	3'-0"	2'-7"	8	1/2" @ 18"	1/2" @ 12"	-----	10.39	0.148
4	4'-0"	3'-8"	9	1/2" @ 18"	1/2" @ 12"	-----	12.90	0.201
5	5'-0"	4'-11"	12	1/2" @ 18"	1/2" @ 12"	1/2" @ 12"	20.86	0.280
6	6'-0"	6'-4"	15	1/2" @ 18"	1/2" @ 12"	1/2" @ 12"	26.53	0.324
7	7'-0"	8'-0"	16	1/2" @ 18"	1/2" @ 12"	3/4" @ 12"	40.45	0.395



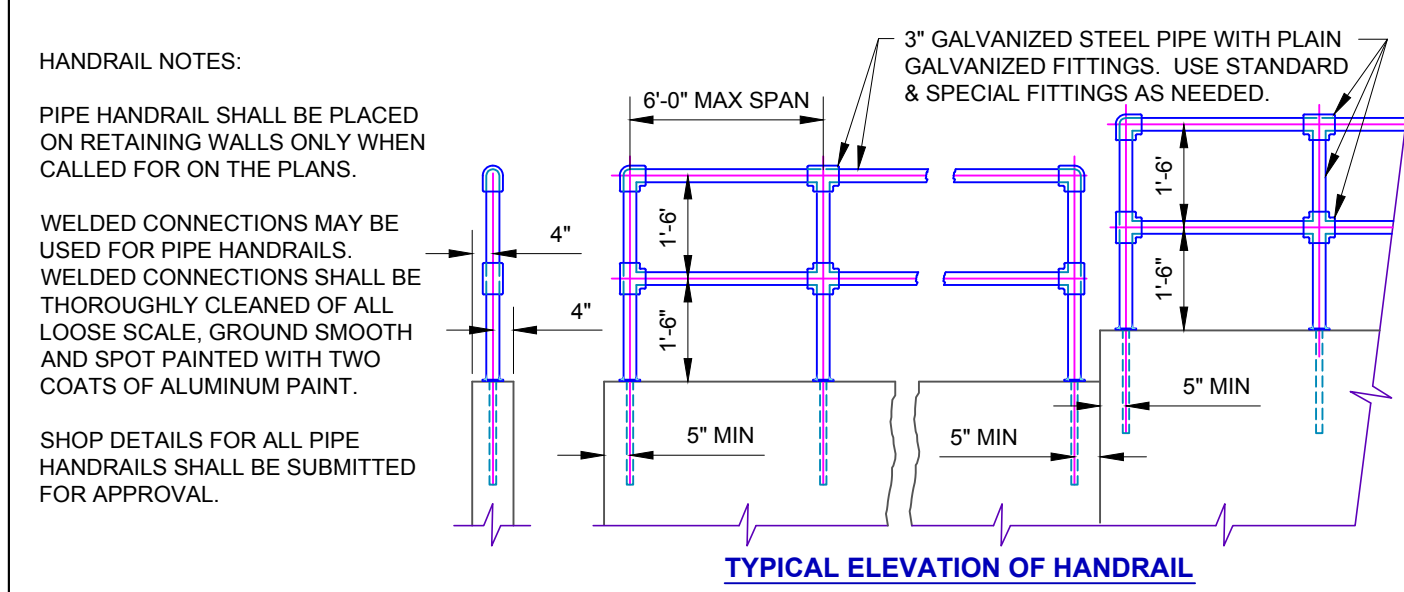
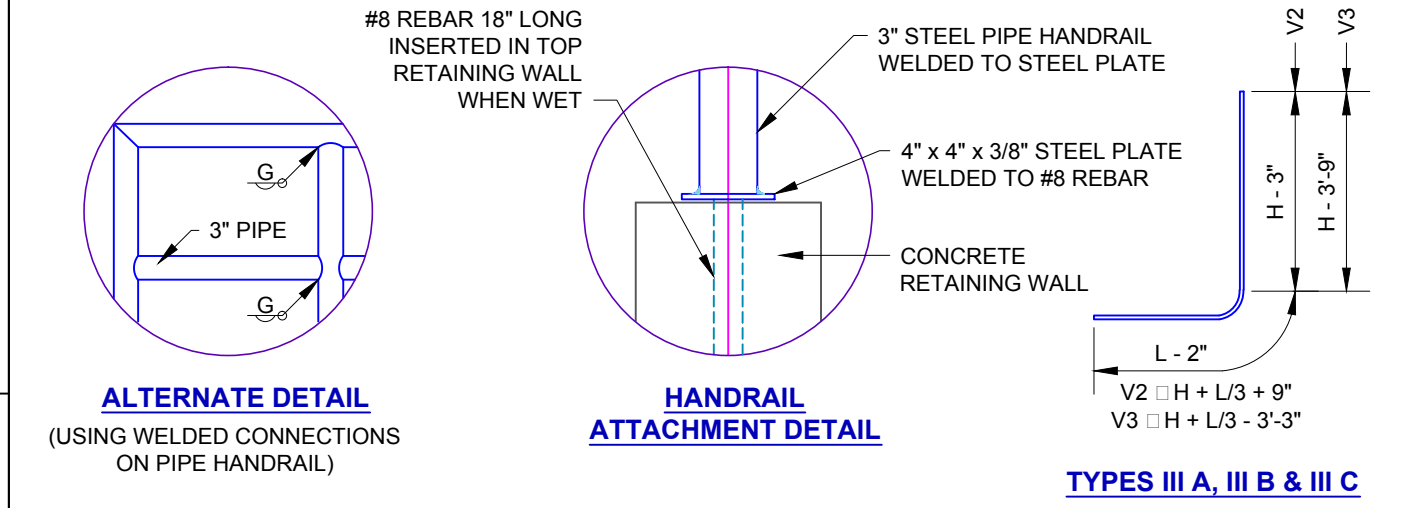
DESIGN NUMBER	H	L	F BAR	C BAR	V1 BAR	V2 BAR	V3 BAR	QUANTITIES		
			SIZE SPC.	# REQ'D	SIZE SPC.	SIZE SPC.	SIZE SPC.	REINF STEEL LBS. PER L.F.	CONC. C.Y. PER L.F.	
2	2'-0"	2'-0"	1/2" @ 12"	-----	6	1/2" @ 18"	1/2" @ 12"	-----	8.28	0.099
3	3'-0"	2'-0"	1/2" @ 12"	-----	8	1/2" @ 18"	1/2" @ 12"	-----	10.72	0.123
4	4'-0"	2'-8"	1/2" @ 12"	-----	9	1/2" @ 18"	1/2" @ 12"	-----	13.10	0.165
5	5'-0"	3'-3"	1/2" @ 12"	-----	11	1/2" @ 18"	1/2" @ 12"	-----	16.07	0.204
6	6'-0"	3'-10"	1/2" @ 12"	-----	13	1/2" @ 18"	1/2" @ 12"	-----	19.04	0.243
7	7'-0"	4'-5"	1/2" @ 12"	-----	14	1/2" @ 18"	1/2" @ 12"	1/2" @ 12"	26.40	0.282
8	8'-0"	5'-0"	1/2" @ 12"	-----	16	1/2" @ 18"	1/2" @ 12"	5/8" @ 12"	34.17	0.321
9	9'-0"	5'-7"	1/2" @ 12"	-----	19	1/2" @ 18"	1/2" @ 12"	7/8" @ 12"	50.84	0.360



DESIGN NUMBER	H	L	F BAR	C BAR	V1 BAR	V2 BAR	V3 BAR	QUANTITIES		
			SIZE SPC.	# REQ'D	SIZE SPC.	SIZE SPC.	SIZE SPC.	REINF STEEL LBS. PER L.F.	CONC. C.Y. PER L.F.	
2	2'-0"	2'-0"	1/2" @ 12"	-----	6	1/2" @ 18"	1/2" @ 12"	-----	8.28	0.099
3	3'-0"	2'-5"	1/2" @ 12"	-----	8	1/2" @ 18"	1/2" @ 12"	-----	11.10	0.134
4	4'-0"	3'-1"	1/2" @ 12"	-----	9	1/2" @ 18"	1/2" @ 12"	-----	13.47	0.175
5	5'-0"	3'-9"	1/2" @ 12"	-----	11	1/2" @ 18"	1/2" @ 12"	-----	16.51	0.216
6	6'-0"	4'-4"	5/8" @ 12"	-----	14	1/2" @ 18"	1/2" @ 12"	1/2" @ 12"	24.48	0.255
7	7'-0"	4'-11"	1/2" @ 12"	-----	14	1/2" @ 18"	1/2" @ 12"	5/8" @ 12"	30.52	0.294
8	8'-0"	5'-7"	7/8" @ 12"	-----	17	1/2" @ 18"	1/2" @ 12"	7/8" @ 12"	46.35	0.335



DESIGN NUMBER	H	L	F BAR	C BAR	V1 BAR	V2 BAR	V3 BAR	QUANTITIES		
			SIZE SPC.	# REQ'D	SIZE SPC.	SIZE SPC.	SIZE SPC.	REINF STEEL LBS. PER L.F.	CONC. C.Y. PER L.F.	
2	2'-0"	2'-0"	1/2" @ 12"	-----	6	1/2" @ 18"	1/2" @ 12"	-----	8.28	0.105
3	3'-0"	2'-0"	1/2" @ 12"	-----	8	1/2" @ 18"	1/2" @ 12"	-----	11.95	0.164
4	4'-0"	2'-7"	1/2" @ 12"	-----	9	1/2" @ 18"	1/2" @ 12"	-----	13.56	0.198
5	5'-0"	3'-2"	1/2" @ 12"	-----	11	1/2" @ 18"	1/2" @ 12"	-----	19.16	0.244
6	6'-0"	3'-9"	5/8" @ 12"	-----	13	1/2" @ 18"	1/2" @ 12"	1/2" @ 12"	25.64	0.298
7	7'-0"	4'-5"	3/4" @ 12"	-----	14	1/2" @ 18"	1/2" @ 12"	5/8" @ 12"	36.83	0.335
8	8'-0"	5'-0"	1" @ 12"	-----	16	1/2" @ 18"	1/2" @ 12"	7/8" @ 12"	54.97	0.380



GENERAL NOTES:
 ALL CONSTRUCTION AND MATERIAL SHALL BE IN ACCORDANCE WITH THE OKLAHOMA CITY STANDARD SPECIFICATIONS
 ALL EXPOSED CONCRETE EDGES SHALL HAVE A 3/4" CHAMFER.
 ALL CONCRETE SHALL BE CLASS "A" CONCRETE 3500 PSI.
 EXPANSION JOINTS SHALL BE AT A MAXIMUM OF 30'-0" INTERVALS.
 ALL REINFORCING STEEL BARS SHALL BE DEFORMED BARS COLD BENT, NO WELDS PERMITTED.
 ALL EXPOSED CONCRETE SURFACES SHALL HAVE A CARBORUNDUM FINISH.
 THIS DETAIL ADAPTED FROM O.D.O.T RETAINING WALL RW-1.

APPROVED BY: DATE: 05-03-13
 CITY ENGINEER
 DRAWN: VSC
 DATE: 05-03-13

RETAINING WALLS
 Drawing Number
 D-504