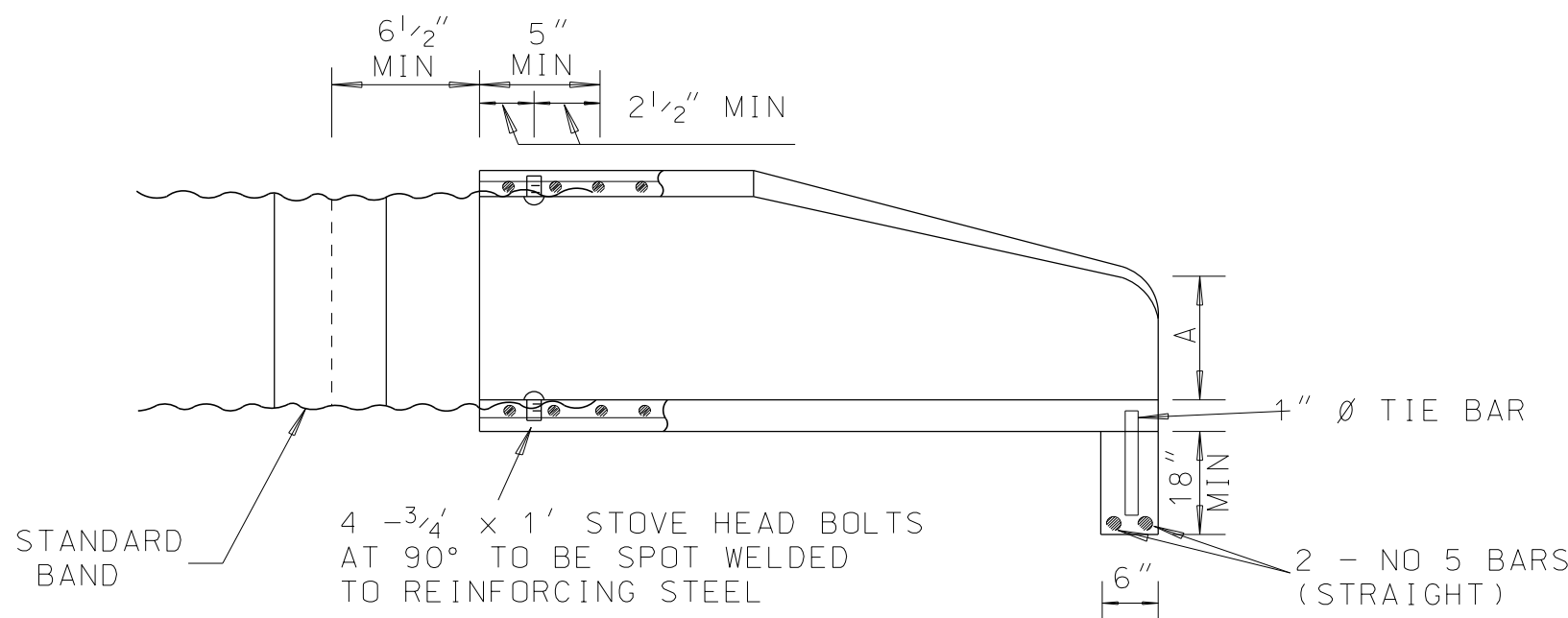
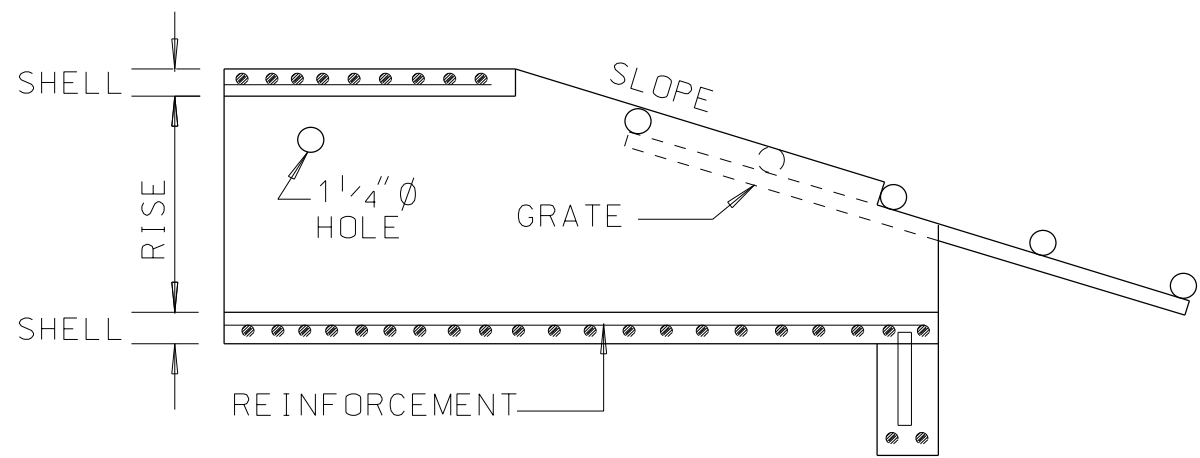


PLAN

(DRAWN FOR DOWNSTREAM SECTION)

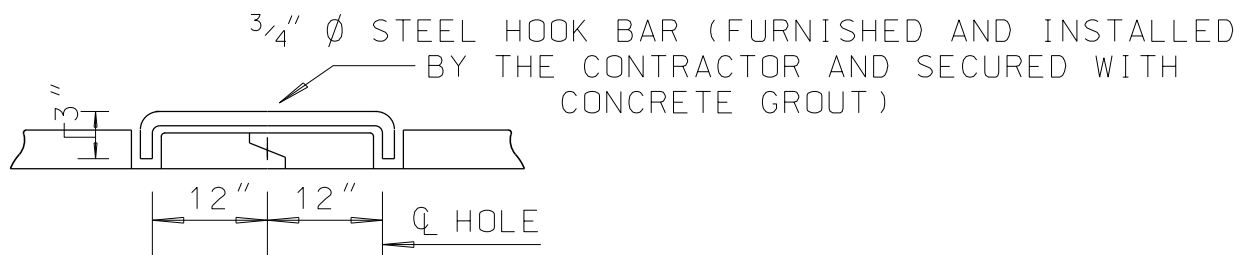


FLARED END W/CM STUB FOR ARCH & ROUND PIPE



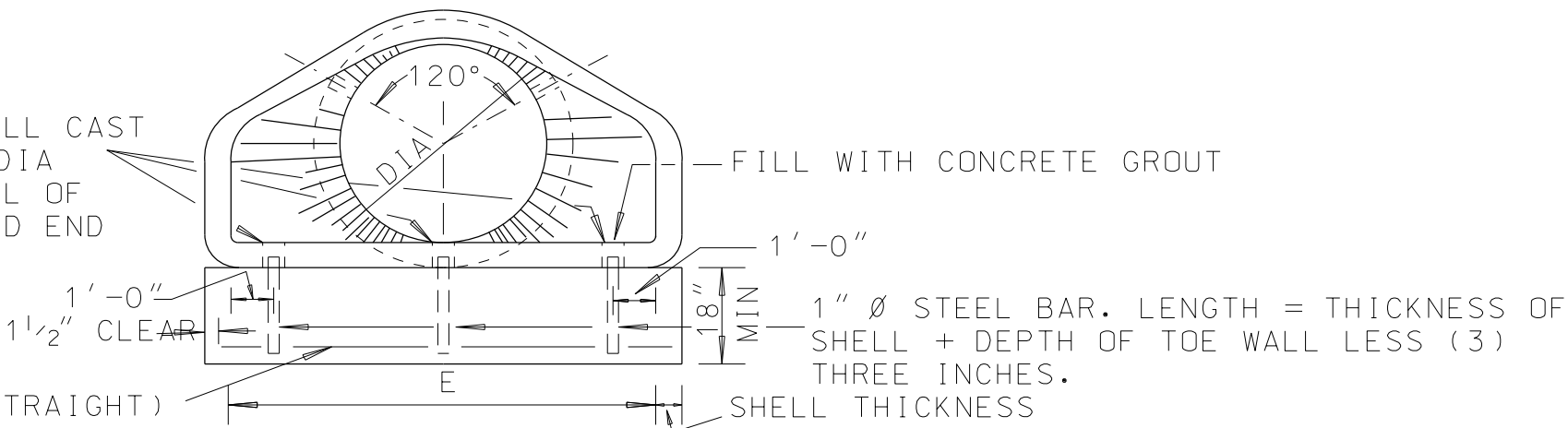
SECTION "XX" SHOWING VIEW OF SAFETY GRATE

(FOR DETAILS OF GRATE SEE SHEET 2 OF 2)



DETAIL OF TIE BOLT

NOTE : THE CONTRACTOR SHALL CAST (3) HOLES 1 1/2" IN DIA THROUGH BOTTOM WALL OF END SECTION. FLARED END FOR PIPES THROUGH 18" Ø REQUIRES TWO (2) HOLES.



FRONT ELEVATION

FLARED END SECTION FOR CONCRETE ROUND PIPE								ROADWAY PIPE GRATE				SIDEDRAIN PIPE GRATE	
DIA	WALL	SLOPE	A	B	C	E	L	"L" PIPE	"T" PIPE	SLOTS & HOLE	X1	"L" PIPE	X2
15"	2 1/4"	3:1	6"	2'-3"	3'-10"	2'-6"	6'-1"	—	—	—	9"	2@18" OC	9"
18"	2 1/2"	3:1	9"	2'-3"	3'-10"	3'-0"	6'-1"	2@12" OC	3	2	1'-7"	2@24" OC	1'-7"
24"	3"	3:1	10"	3'-8"	2'-6"	4'-0"	6'-2"	2@16" OC	3	2	1'-10"	2@36" OC	1'-10"
30"	3 1/2"	3:1	1'-0"	4'-6"	1'-8"	5'-0"	6'-2"	2@20" OC	3	2	2'-4"	2@48" OC	2'-4"
36"	4"	3:1	1'-3"	5'-3"	2'-11"	6'-0"	8'-2"	2@24" OC	3	2	3'-2"	2@60" OC	3'-2"
42"	4 1/2"	3:1	1'-9"	5'-3"	2'-11"	6'-6"	8'-2"	2@26" OC	3	2	4'-9"	2@66" OC	4'-9"
48"	5"	3:1	2'-0"	6'-0"	2'-2"	7'-0"	8'-2"	2@28" OC	3	2	5'-6"	2@72" OC	5'-6"
54"	5 1/2"	3:1	2'-4"	6'-6"	1'-10"	7'-6"	8'-4"	2@30" OC	3	2	6'-7"	2@78" OC	6'-7"
60"	6"	3:1	2'-10"	6'-6"	1'-10"	8'-0"	8'-4"	3@24" OC	3	2	8'-2"	2@84" OC	8'-2"
66"	6 1/2"	3:1	3'-4"	6'-6"	1'-10"	8'-6"	8'-4"	3@25 1/2" OC	3	2	9'-9"	2@90" OC	9'-9"
72"	7"	3:1	3'-10"	6'-6"	1'-10"	9'-0"	8'-4"	3@27" OC	3	2	11'-4"	2@96" OC	11'-4"

FLARED END SECTION FOR CONCRETE ARCH PIPE										ROADWAY PIPE GRATE				SIDEDRAIN PIPE GRATE	
EQUIVALENT SIZE	RISE	SPAN	WALL	SLOPE	A	B	C	E	L	"L" PIPE	"T" PIPE	SLOTS & HOLES	X1	"L" PIPE	X2
15"	11"	18"	2 1/4"	3:1	7"	1'-9"	4'-3"	2'-6"	6'-0"	—	—	—	1'-1"	2@18" OC	1'-1"
18"	13 1/2"	22"	2 1/2"	3:1	7"	2'-3"	3'-9"	3'-0"	6'-0"	2@12" OC	3	2	1'-1"	2@24" OC	1'-1"
24"	18"	28 1/2"	3"	3:1	8"	3'-3"	2'-9"	4'-0"	6'-0"	2@16" OC	3	2	1'-4"	2@36" OC	1'-4"
30"	22 1/2"	36 1/4"	3 1/2"	3:1	10"	4'-0"	2'-0"	5'-0"	6'-0"	2@20" OC	3	2	1'-10"	2@48" OC	1'-10"
36"	26 5/8"	43 3/4"	4"	3:1	10 5/8"	5'-0"	3'-0"	6'-0"	8'-0"	2@24" OC	3	2	2'-1"	2@60" OC	2'-1"
42"	31 5/16"	51 1/8"	4 1/2"	3:1	1'-3 13/16"	5'-0"	3'-0"	6'-6"	8'-0"	2@26" OC	3	2	3'-5"	2@66" OC	3'-5"
48"	36"	58 1/2"	5"	3:1	1'-9"	5'-0"	3'-0"	7'-0"	8'-0"	2@28" OC	3	2	4'-9"	2@72" OC	4'-9"
54"	40"	65"	5 1/2"	3:1	2'-1 1/2"	5'-0"	3'-0"	7'-6"	8'-0"	2@30" OC	3	2	6'-0"	2@78" OC	6'-0"
60"	45"	73"	6"	3:1	2'-2"	6'-3"	1'-9"	8'-0"	8'-0"	3@24" OC	3	2	6'-0"	2@84" OC	6'-0"
72"	54"	88"	7"	3:1	2'-11"	6'-6"	1'-10"	10'-0"	8'-4"	3@30" OC	3	2	8'-5"	2@108" OC	8'-5"

GENERAL NOTES

- RAW METAL EXPOSED BY CUTTING AND DRILLING OF PIPE FOR GRATE ASSEMBLY WILL REQUIRE A GALVANIZING REPAIR PAINT IN ACCORDANCE WITH SECTION 855.31 OF ALABAMA DEPARTMENT OF TRANSPORTATION SPECIFICATIONS.
- COST OF TOE WALL AND DOWELS SHALL BE INCLUDED IN UNIT PRICE BID FOR FLARED CONCRETE END SECTION.
- SAFETY GRATE TO BE USED WHERE ROADWAY EMBANKMENT IS SHALLOW AND OPEN END OF FLARED SECTION IS INSIDE CLEAR ZONE OR WHEN DIRECTED BY THE ENGINEER.
- FLARED END SECTION WITHOUT GRATE SHALL BE CLASS 1, FLARED END SECTION WITH GRATE SHALL BE CLASS 2.
- PIPE FOR GRATES SHALL BE SCHEDULE 40, GALVANIZED (ASTM A120) HARDWARE SHALL BE GALVANIZED ACCORDING TO SPECIFICATIONS.
- IT IS EXPECTED THAT FLARED END UNITS WILL BE PRODUCED TO MEET THE ABOVE REQUIREMENTS. SLIGHT VARIATIONS FROM THE ABOVE DIMENSIONS MAY BE ALLOWED PROVIDED APPROVAL IS OBTAINED FROM THE ENGINEER.
- HOLES & SLOTS TO ATTACH GRATE, IF REQUIRED, SHALL BE CAST ALONG WITH END SECTION.
- CORRUGATED METAL STUB TO BE 14 GA MIN AND MATCH THE PIPE BEING CONNECTED TO IN ALL PROPERTIES ACCORDING TO SPECIFICATIONS. (PAVED INVERT NOT REQUIRED)
- 2 - 1 1/4" Ø HOLES, EACH PLACED AS SHOWN TO ACCOMMODATE 2 - 3/4" Ø TIE BOLTS. USED IN TYING SECTIONS TOGETHER (THE CONTRACTOR SHALL FURNISH AND INSTALL THE 3/4" Ø TIE BOLTS, WHICH SHALL BE INCLUDED IN THE UNIT PRICE BID FOR FLARED CONCRETE END SECTION.)

--SPECIFICATIONS--

CURRENT ALABAMA DEPARTMENT OF TRANSPORTATION

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REVISIONS

- Added to CADD ON 12-01-99 by J.F.T.



ALABAMA DEPARTMENT
OF TRANSPORTATION
1409 COLISEUM BOULEVARD
MONTGOMERY, AL 36130-3050

DESIGN BUREAU SPECIAL DRAWING

DETAILS OF CONCRETE FLARED
END SECTION W/GRATE FOR
CONCRETE AND METAL PIPE

Bureau Std Engr: D.J.W.

DRAWN BY: DATE DRAWN: 01-12-87

SPECIAL DRAWING NO

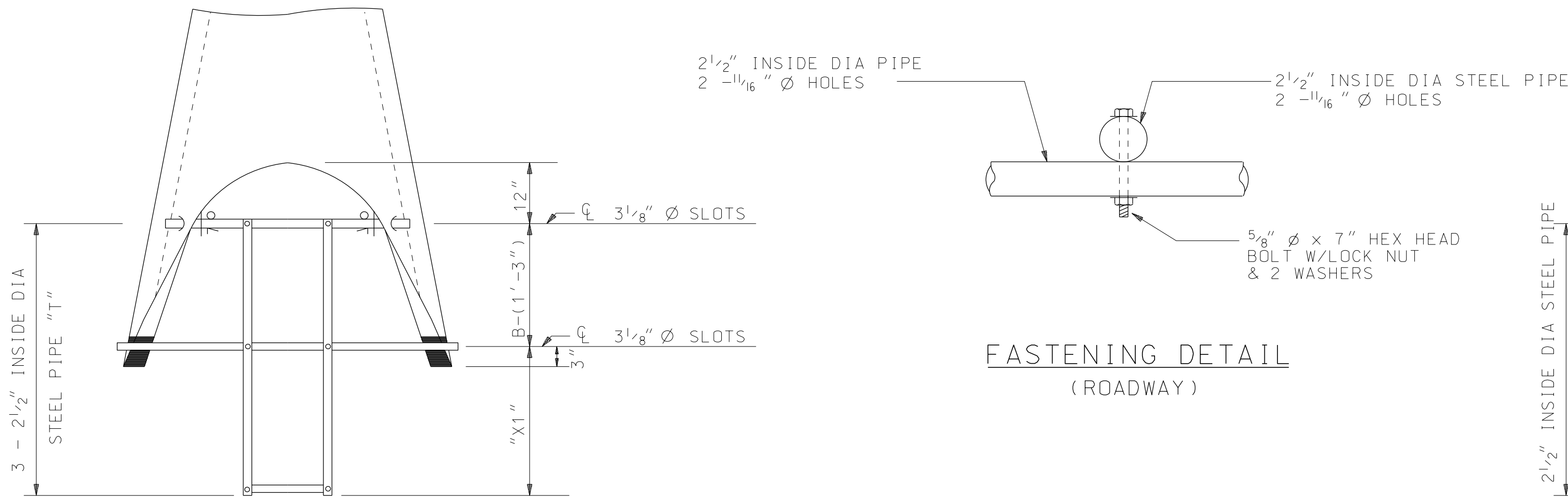
FE-619 (SHEET 1 OF 2)

INDEX NO

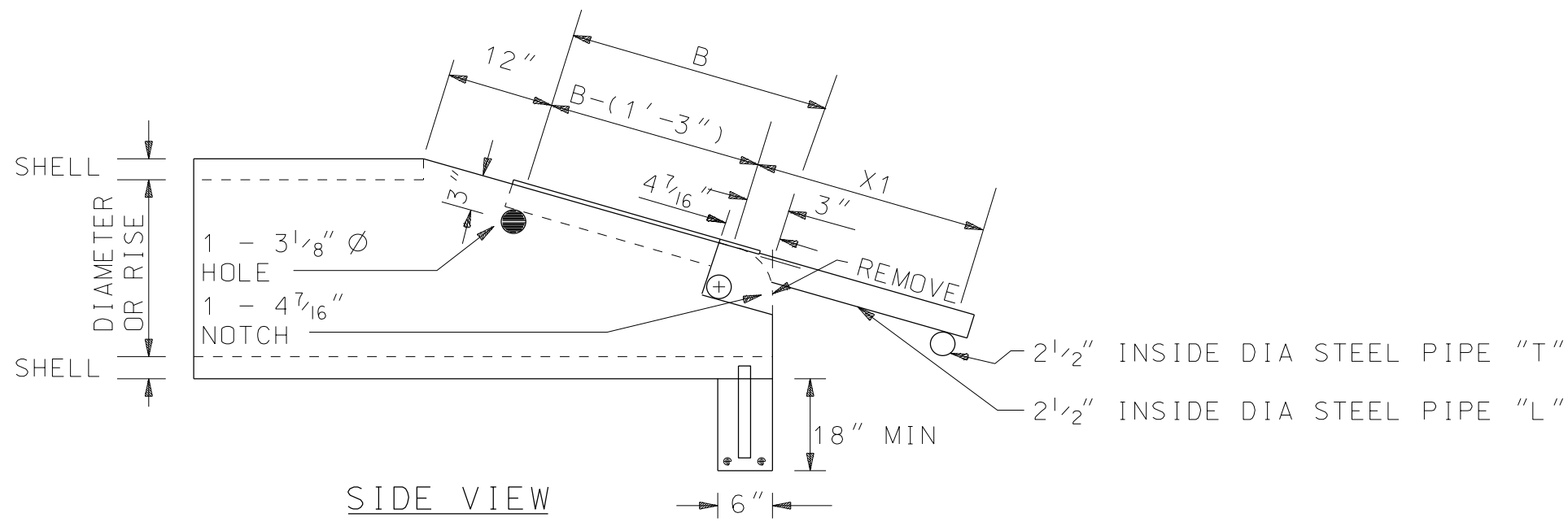
61901

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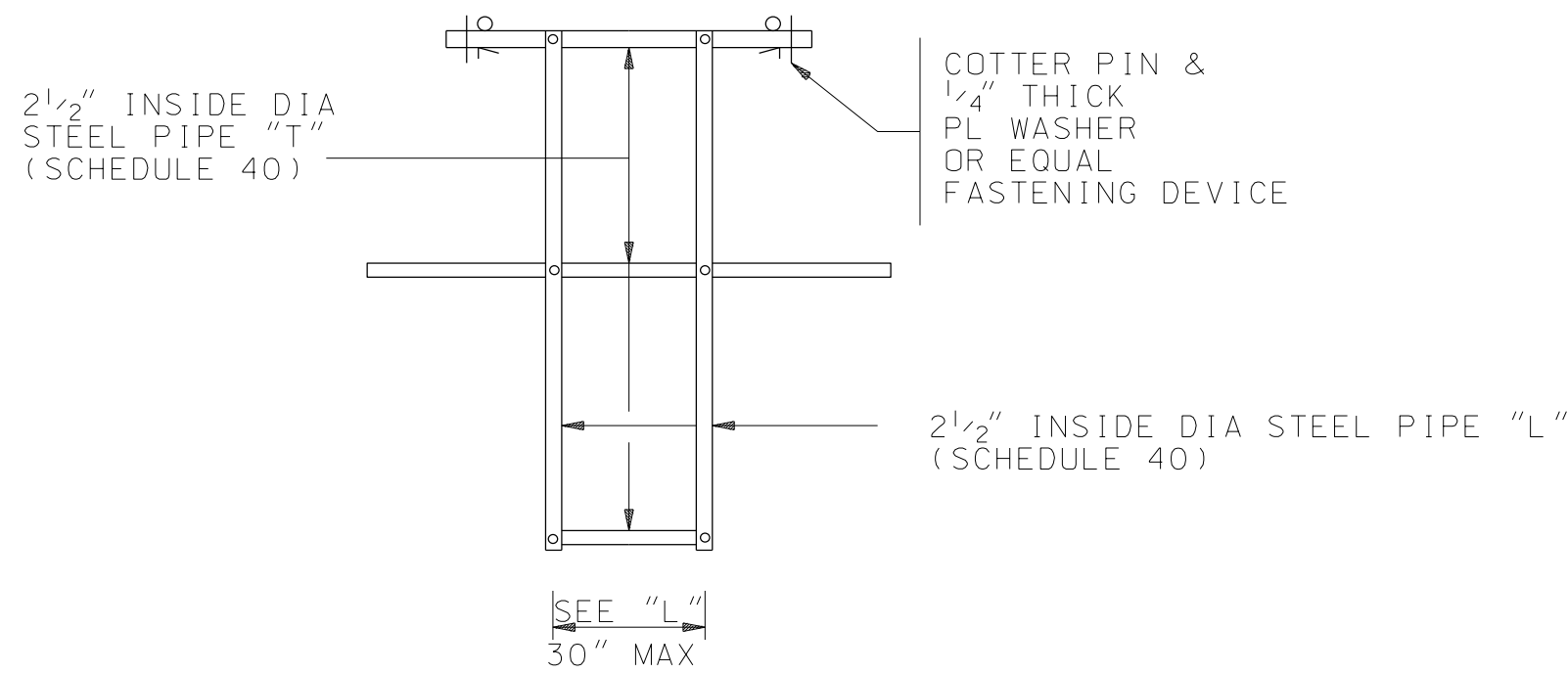
REFERENCE PROJECT NO	FISCAL YEAR	SHEET NO



PLAN

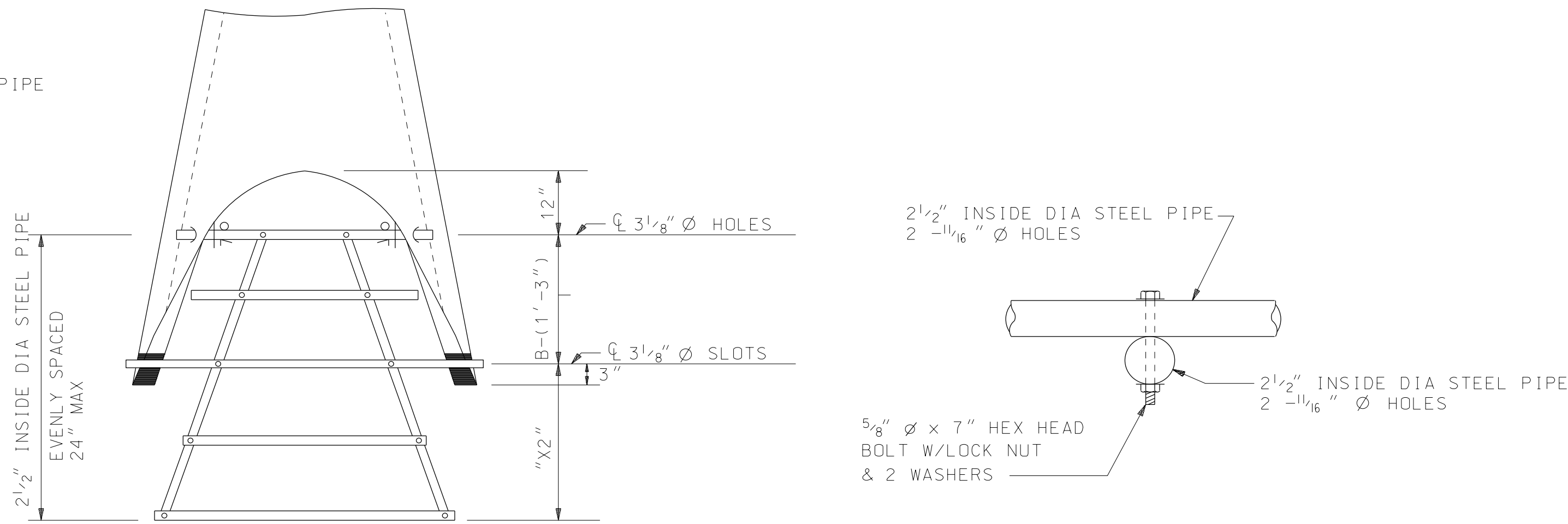


SIDE VIEW

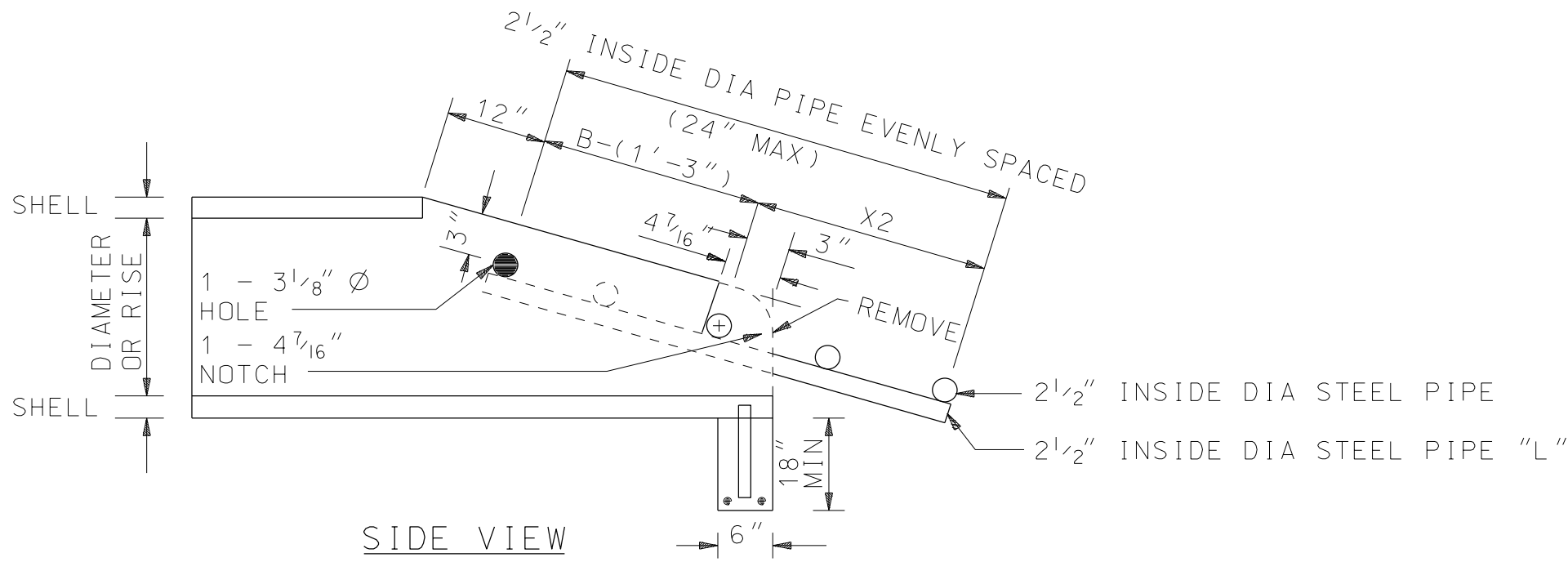


GRATE DETAIL

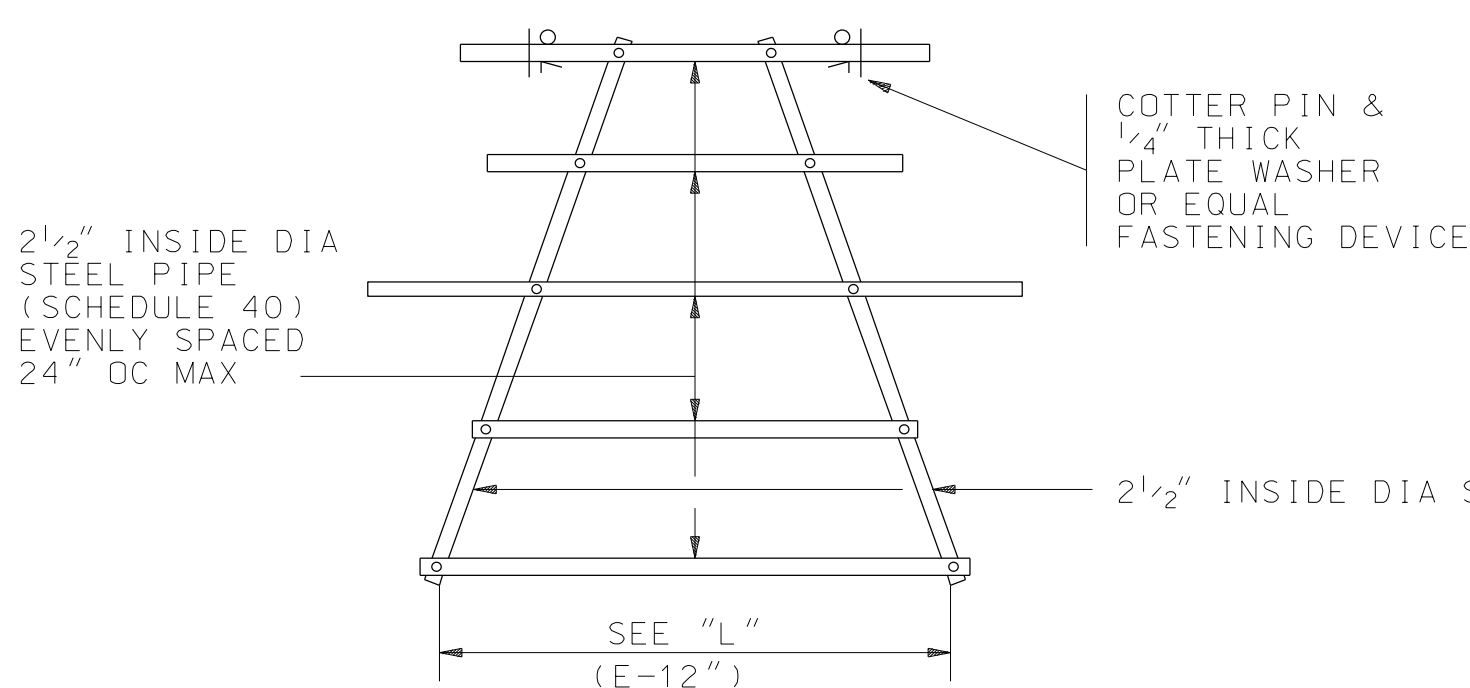
ROADWAY PIPE GRATE DETAILS



PLAN

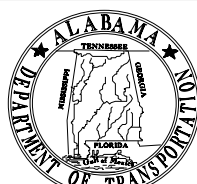


SIDE VIEW

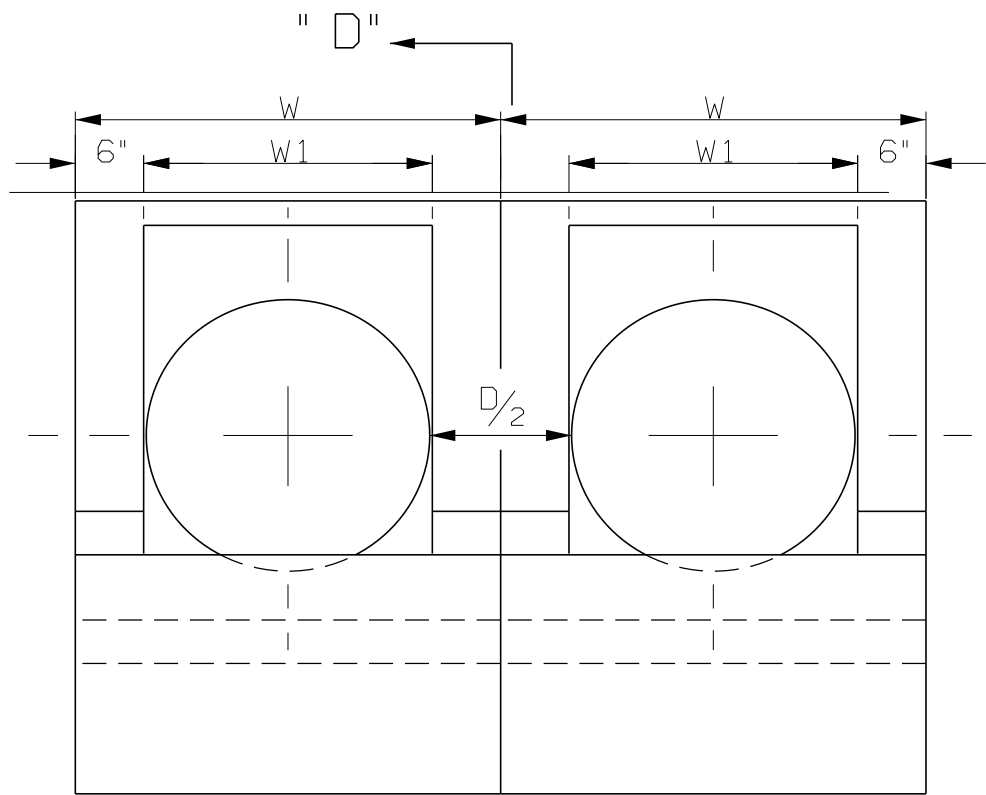


GRATE DETAIL

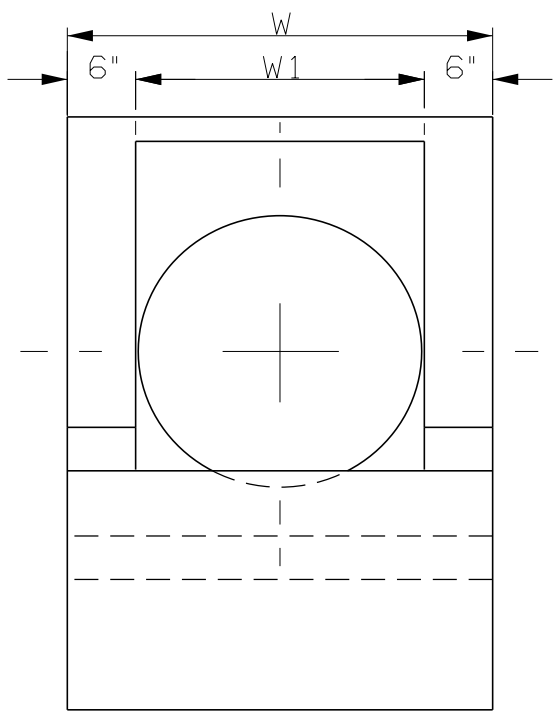
SIDEDRAIN PIPE GRATE DETAIL

--SPECIFICATIONS--		
CURRENT ALABAMA DEPARTMENT OF TRANSPORTATION		
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REVISIONS 1. Added to CAD0 on 12-01-99 by J.F.T.		 <div>ALABAMA DEPARTMENT OF TRANSPORTATION 1409 COLISEUM BOULEVARD MONTGOMERY, AL 36130-3050</div>
DESIGN BUREAU SPECIAL DRAWING		
DETAILS OF CONCRETE FLARED END SECTION W/GRATE FOR CONCRETE AND METAL PIPE		
Bureau Std Engr: <u>D.J.W.</u> DRAWN BY: _____ DATE DRAWN: <u>07-01-86</u>		SPECIAL DRAWING NO FE-619 (SHEET 2 OF 2)
		INDEX NO 61902

NOT TO SCALE

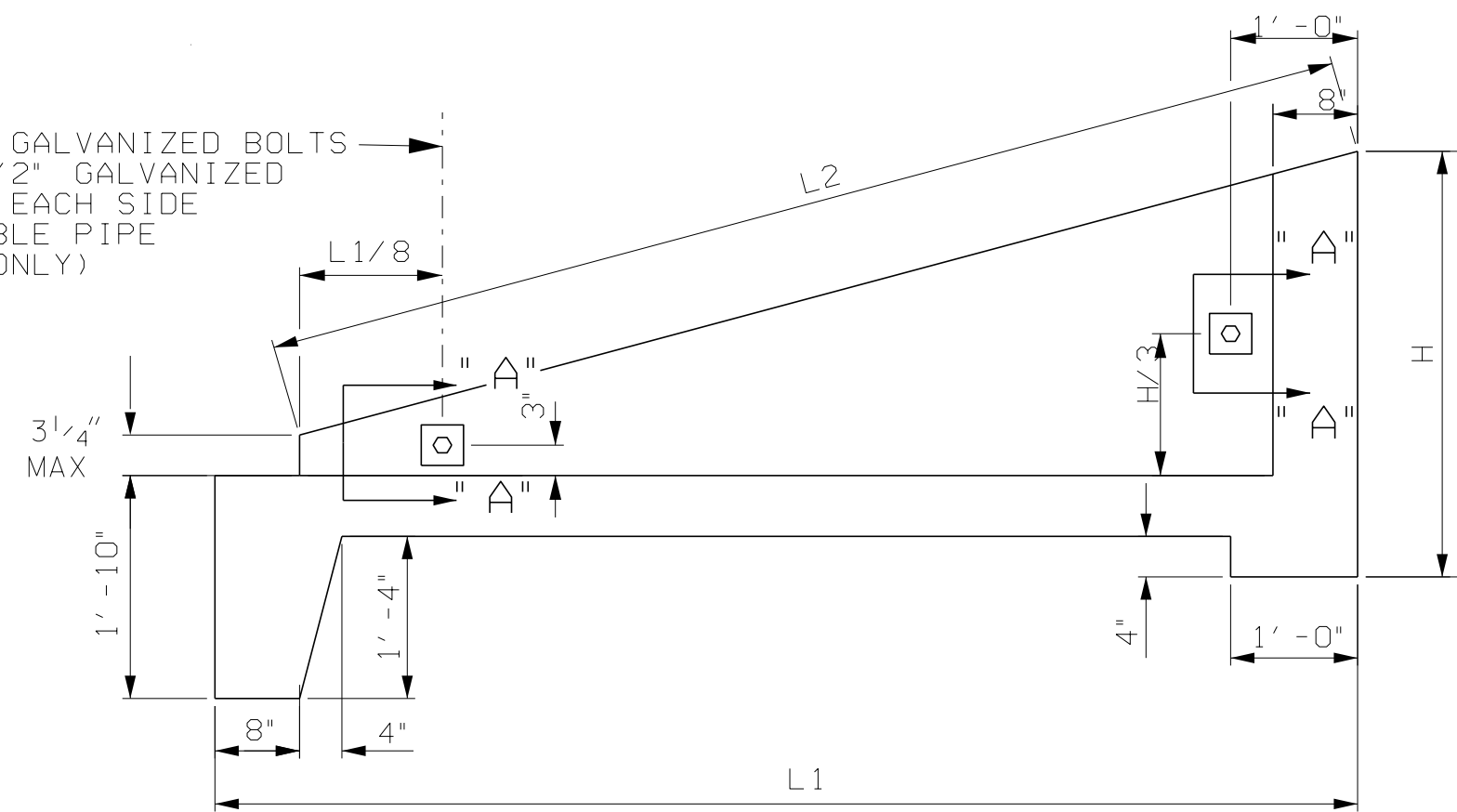


END ELEVATION DOUBLE PIPE INSTALLATION



END ELEVATION SINGLE PIPE INSTALLATION

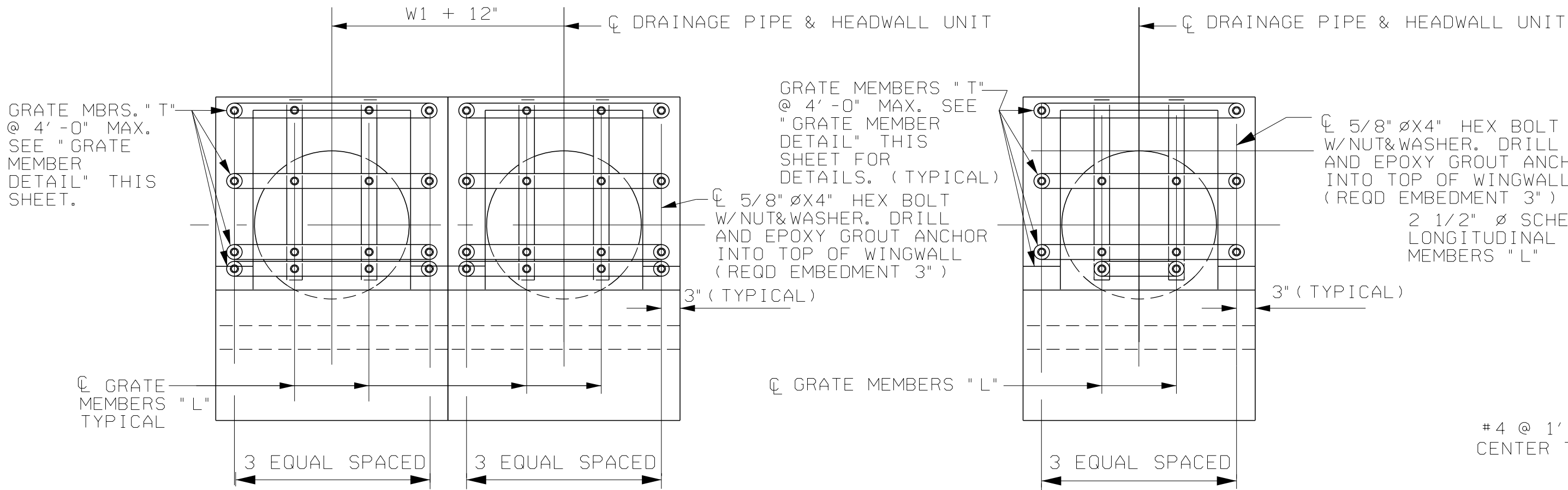
Ø 1" Ø X 1'-3" GALVANIZED BOLTS
W/4" X 4" X 1/2" GALVANIZED
WASHER PLATES EACH SIDE
TYPICAL @ DOUBLE PIPE
INSTALLATION ONLY)



SECTION "D-D"

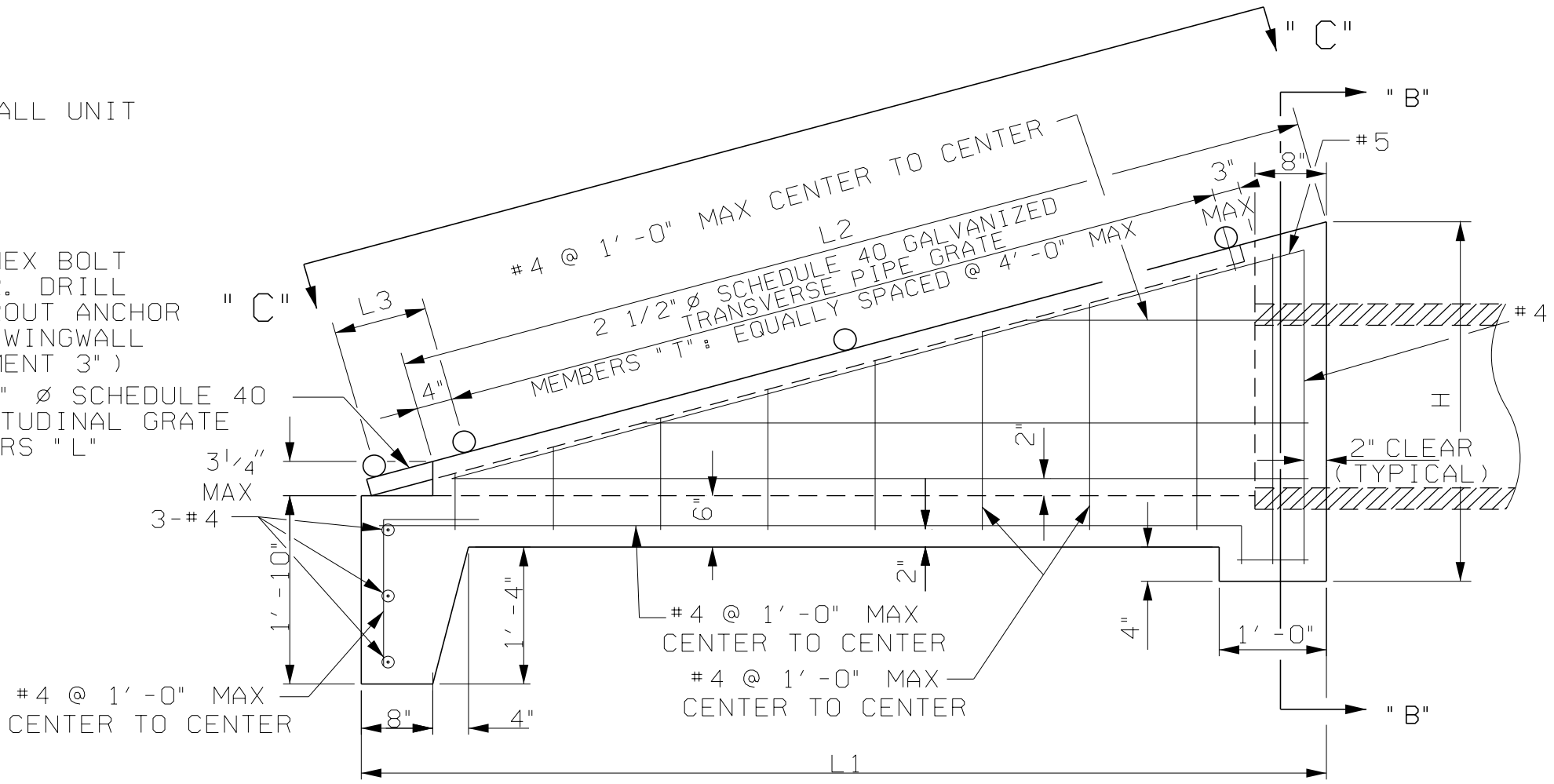
TABLE OF DIMENSIONS AND QUANTITIES

	PIPE DIA	H	L1	L2	L3	W	W1
3: 1SLOPE	18"	3'-2"	6'-8"	6'-4"	1'-0"	2'-11"	1'-11"
	24"	3'-9"	8'-5"	8'-2"	1'-0"	3'-6"	2'-6"
	30"	4'-5"	10'-5"	9'-9"	1'-0"	4'-1"	3'-1"
4: 1SLOPE	18"	3'-2"	8'-8"	8'-3"	1'-0"	2'-11"	1'-11"
	24"	3'-9"	11'-0"	10'-8"	1'-0"	3'-6"	2'-6"
	30"	4'-5"	13'-8"	13'-0"	1'-0"	4'-1"	3'-1"
6: 1SLOPE	18"	3'-2"	12'-8"	12'-1"	1'-0"	2'-11"	1'-11"
	24"	3'-9"	16'-2"	15'-9"	1'-0"	3'-6"	2'-6"



DOUBLE PIPE INSTALLATION

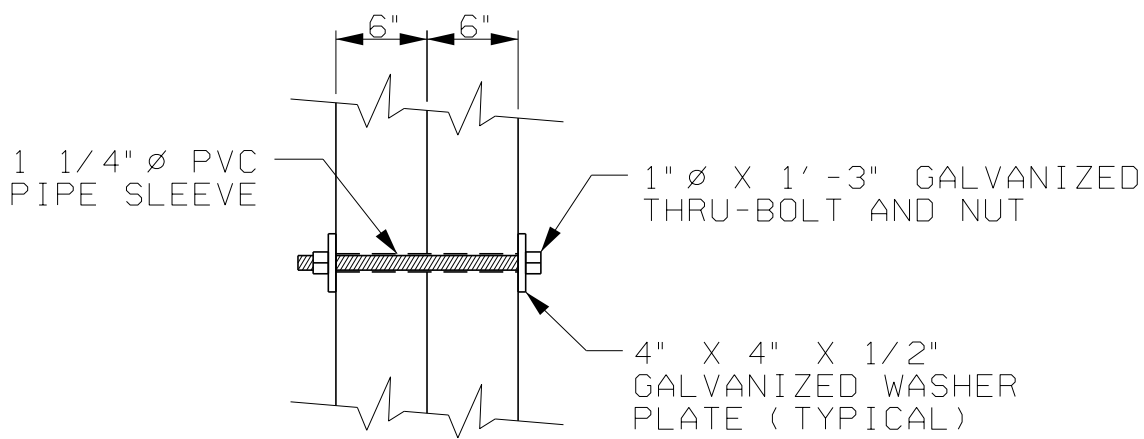
SINGLE PIPE INSTALLATION



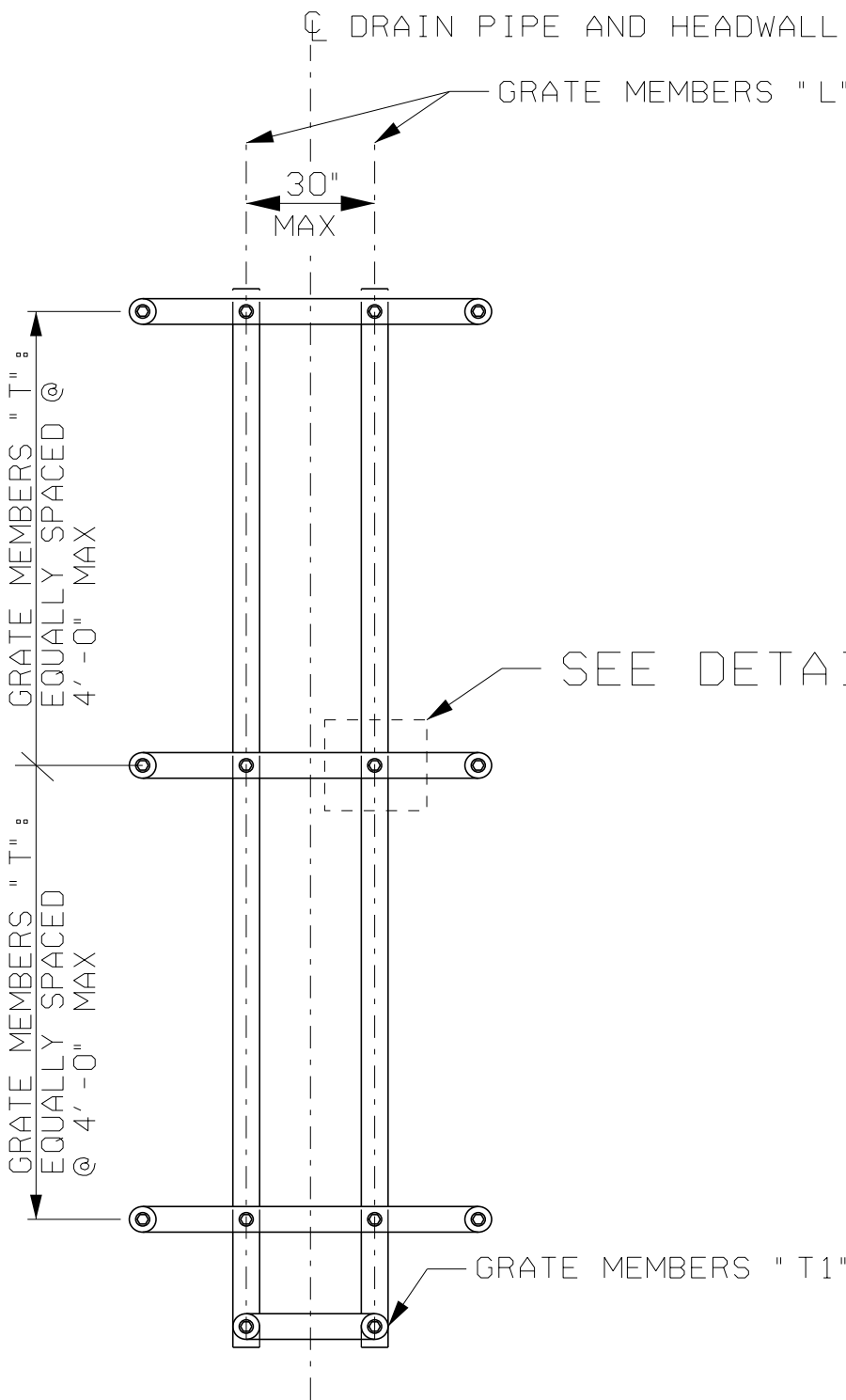
LONGITUDINAL ELEVATION
(SHOWING DIMENSIONS AND REINFORCING STEEL)

GENERAL NOTES

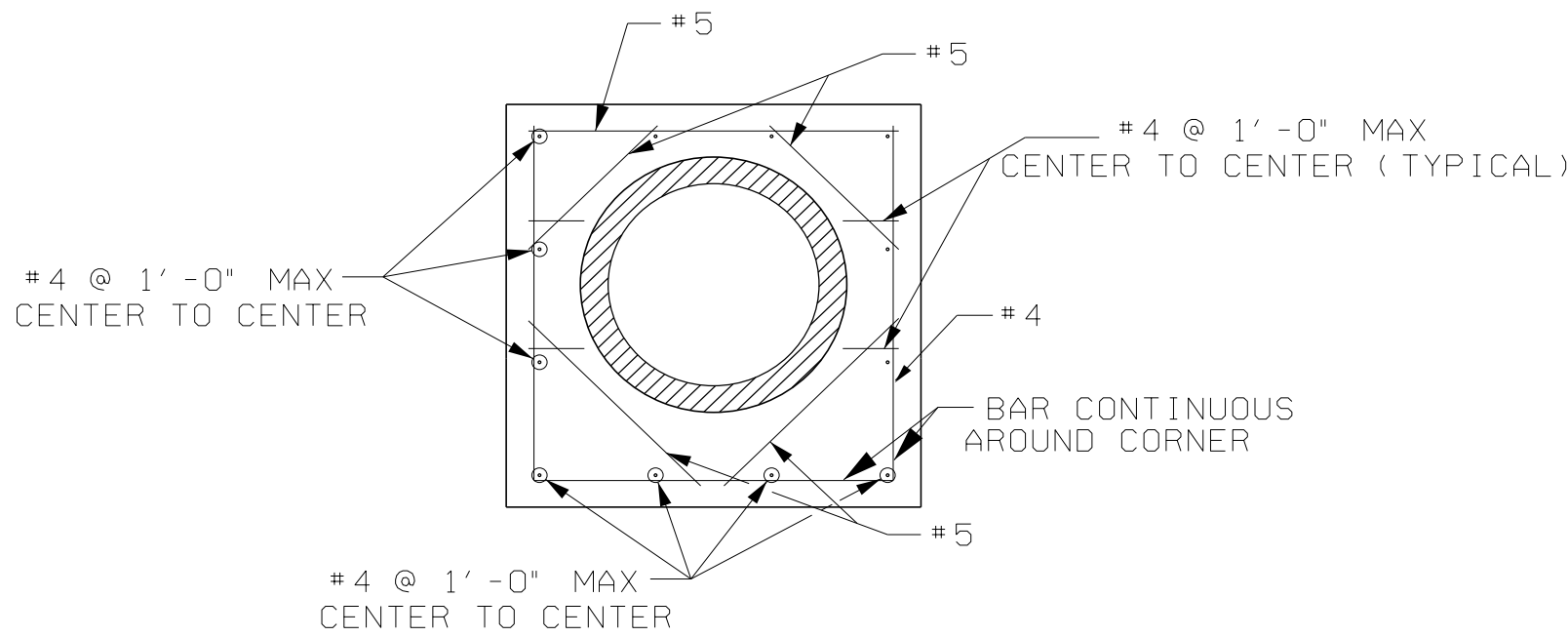
- 28 DAY CONCRETE COMPRESSIVE STRENGTH: TO BE 4000 P.S.I.
- REINFORCING STEEL: TO BE IN ACCORDANCE WITH SPECIFICATIONS. MINIMUM YIELD STRENGTH=60 K.S.I.
- PIPE FOR GRATE TO BE IN ACCORDANCE WITH ASTM A53 GRADE B OR ASTM A501. PIPE SHALL BE HOT-DIPPED GALVANIZED IN ACCORDANCE WITH ASTM A53. THRU-BOLTS, WASHER PLATES, AND NUTS AND EXPANSION BOLTS AND WASHERS SHALL BE GALVANIZED ACCORDING TO SPECIFICATIONS.
- METAL SURFACES EXPOSED BY CUTTING AND DRILLING OF PIPE GRATE ASSEMBLY WILL REQUIRE A GALVANIZING REPAIR PAINT IN ACCORDANCE WITH SECTION 855.15 OF THE SPECIFICATIONS.
- THE PRECAST CONCRETE END SECTIONS ARE LIMITED TO 0° THRU 15° SKEW.
- PRECAST CONCRETE END SECTIONS WITHOUT GRATES SHALL BE CLASS 1. PRECAST CONCRETE END SECTIONS WITH GRATES SHALL BE CLASS 2.
- PIPE LARGER THAN 24" IN DIAMETER SHALL HAVE CLASS 2 CONCRETE END SECTIONS WHEN TERMINATED WITHIN THE CLEAR ZONE.



SECTION "A-A"
WALL CONNECTION DETAIL
(@ DOUBLE PIPE INSTALLATION ONLY)

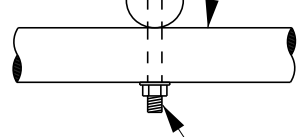


SECTION "C-C" : GRATE ASSEMBLY

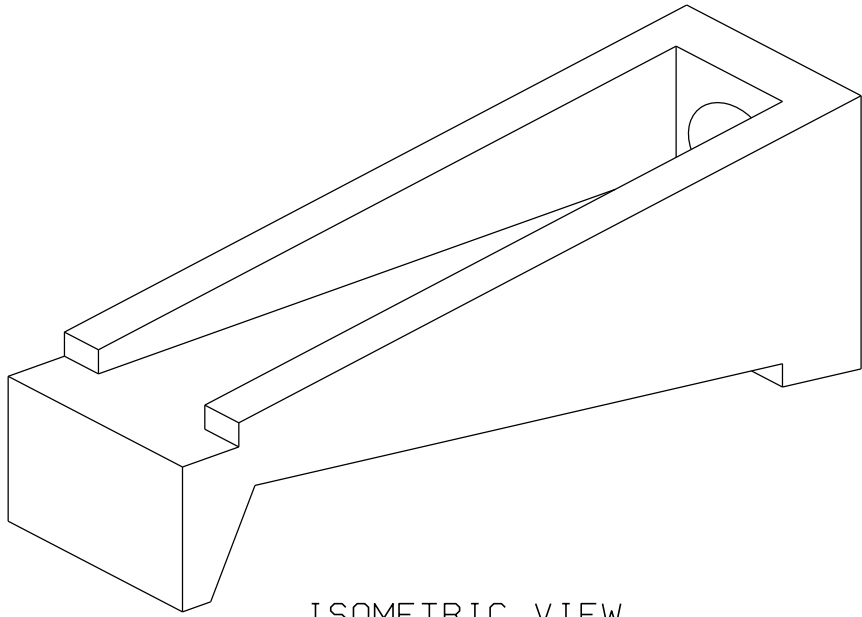


SECTION "B-B"
(SHOWING REINFORCING STEEL)

2 1/2" INSIDE DIAMETER
STEEL PIPE W/2 - 11/16" Ø
HOLES FOR INSTALLATION



DETAIL "A"
(GRATE TO GRATE MEMBER CONNECTION)



ISOMETRIC VIEW

--SPECIFICATIONS--
CURRENT ALABAMA DEPARTMENT OF TRANSPORTATION

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REVISIONS

1. "W" and "W1" dimensions on the 18" and 24" Pipe Dia for 6:1, 4:1 and 3:1 SLOPE on the "TABLE OF DIMENSIONS AND QUANTITIES" were changed and transformed Pipe Insertion into Headwall from 4" to 8" on "LONGITUDINAL SECTION" on 09-09-11 by J.F.T.

ALABAMA DEPARTMENT OF TRANSPORTATION
1409 COLISEUM BOULEVARD
MONTGOMERY, AL 36130-3050

DESIGN BUREAU SPECIAL DRAWING

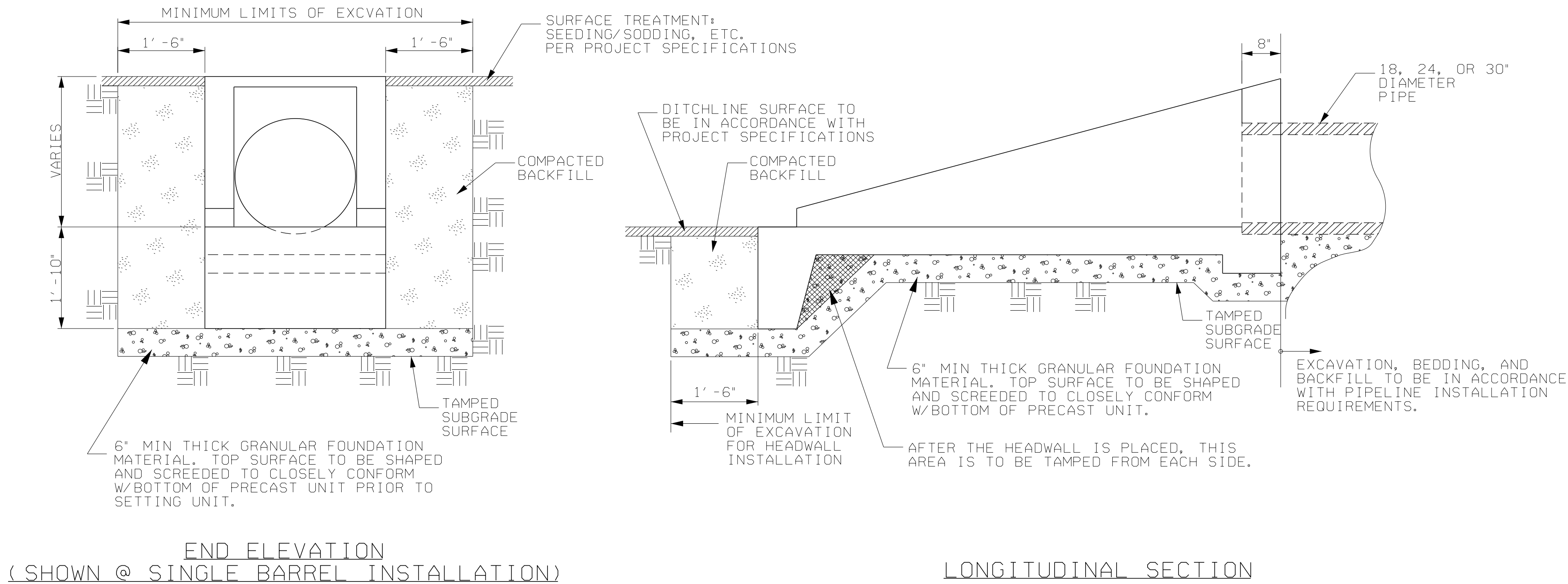
PRECAST SLOPE PAVED HEADWALL
DETAILS FOR RCP AND CMP
ROADWAY PIPE

Bureau Std Engr: D.J.W.
DRAWN BY: J.F.T. DATE DRAWN: JULY, 2008

SPECIAL DRAWING NO
HW-614-B (PC) (SHEET 1 OF 2)

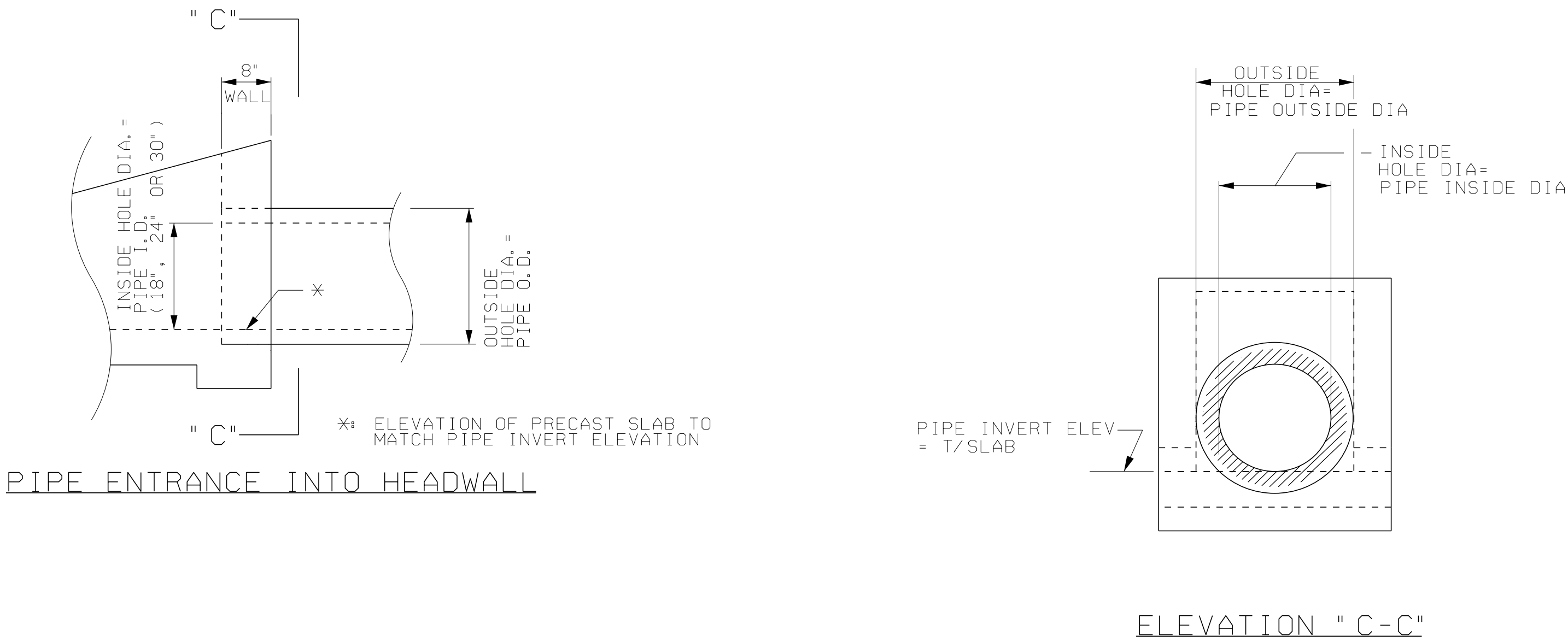
INDEX NO
61905

REFERENCE PROJECT NO	FISCAL YEAR	SHEET NO

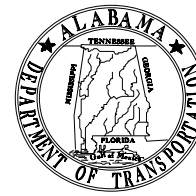


NOTE: FOR SPECIFIC INSTALLATION PROCEDURES, CONTACT THE PRECAST END SECTION VENDOR.

INSTALLATION DETAILS

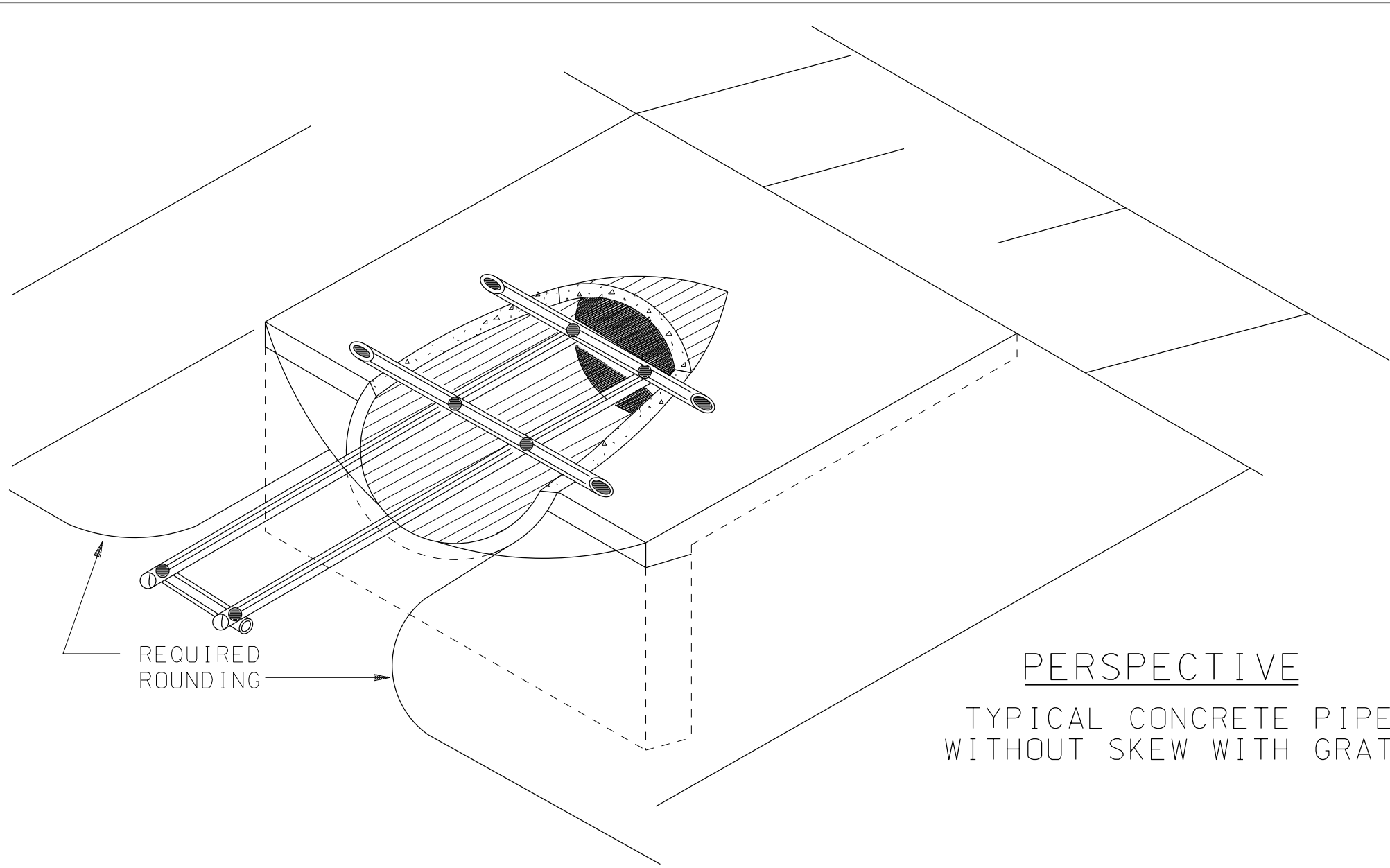


PIPE ENTRANCE DETAILS

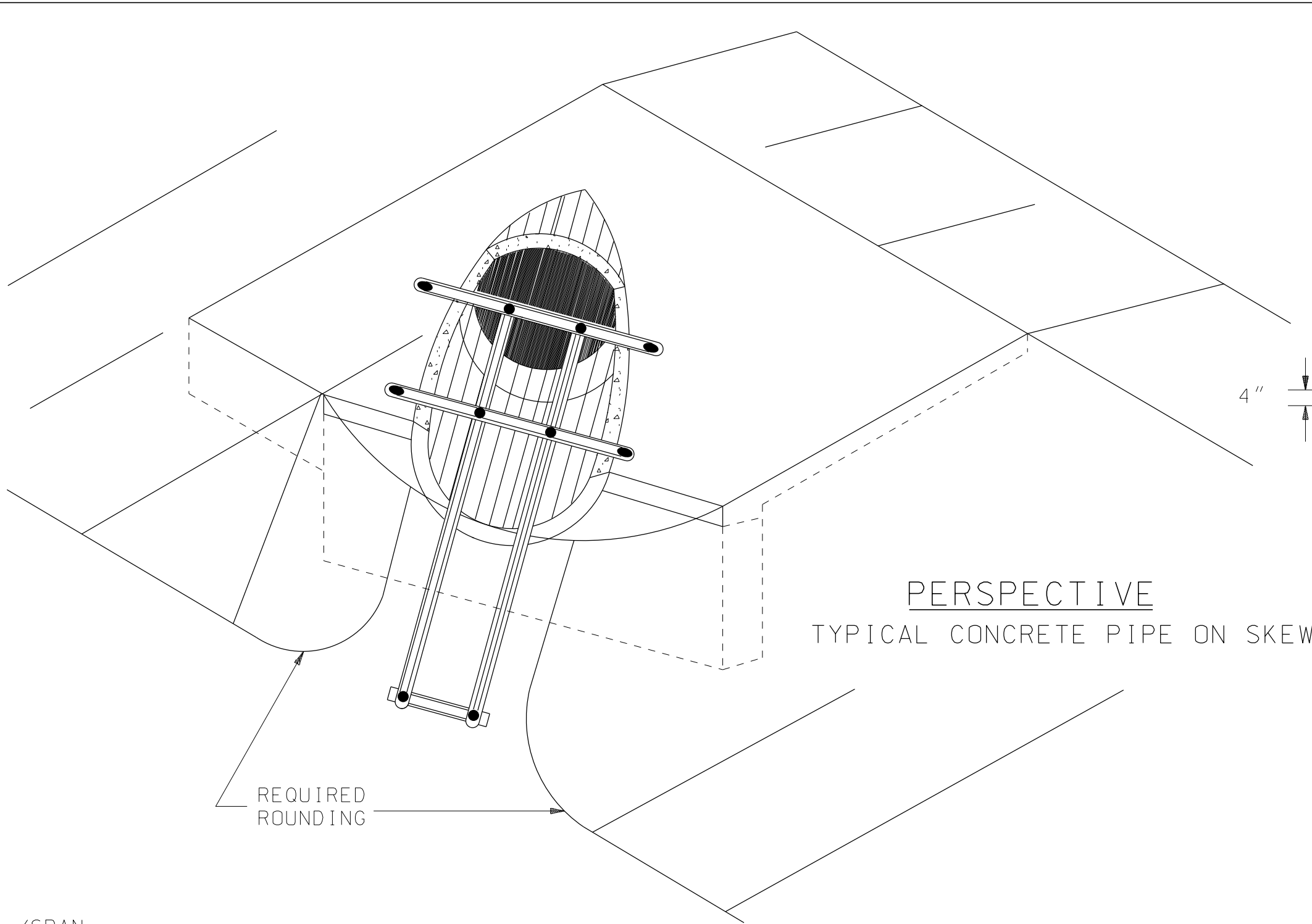
--SPECIFICATIONS-- CURRENT ALABAMA DEPARTMENT OF TRANSPORTATION		
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REVISIONS 1. Removed Grout between Precast Unit and Pipe and related info on the "PIPE ENTRANCE DETAILS" and deleted Drawing Description "GROUT BETWEEN PRECAST UNIT AND PIPE W/ APPROVED NON-SHRINK CEMENTIOUS GROUT" on "PIPE ENTRANCE INTO HEADWALL" and changed Pipe Insertion into Headwall from 4" to 8" on "LONGITUDINAL SECTION" and "PIPE ENTRANCE INTO HEADWALL" on 09-09-11 by J.F.T.	 ALABAMA DEPARTMENT OF TRANSPORTATION 1409 COLISEUM BOULEVARD MONTGOMERY, AL 36130-3050	DESIGN BUREAU SPECIAL DRAWING
		PRECAST SLOPE PAVED HEADWALL DETAILS FOR RCP AND CMP ROADWAY PIPE
Bureau Std Engr: D.J.W. DRAWN BY: J.F.T. DATE DRAWN: July, 2008	SPECIAL DRAWING NO HW-614-B (PC) (SHEET 2 OF 2)	INDEX NO 61906

NOT TO SCALE

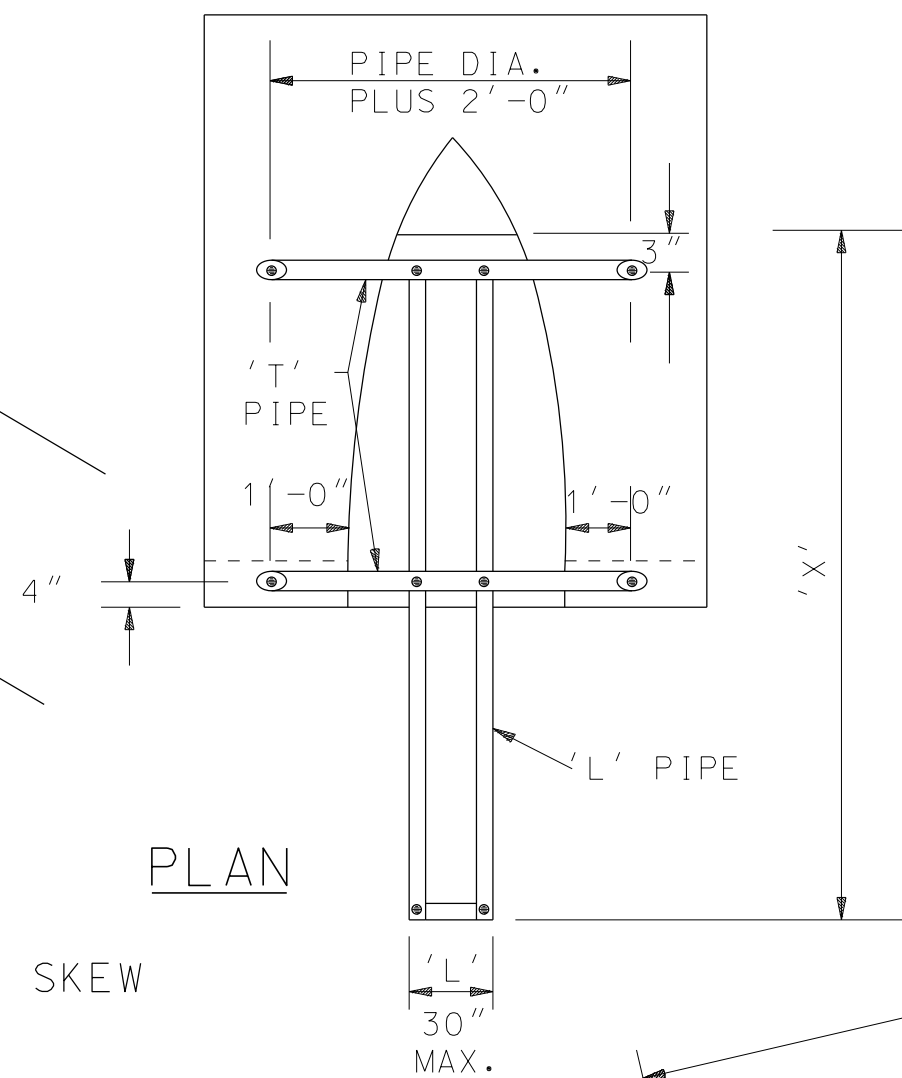
REFERENCE PROJECT NO	FISCAL YEAR	SHEET NO



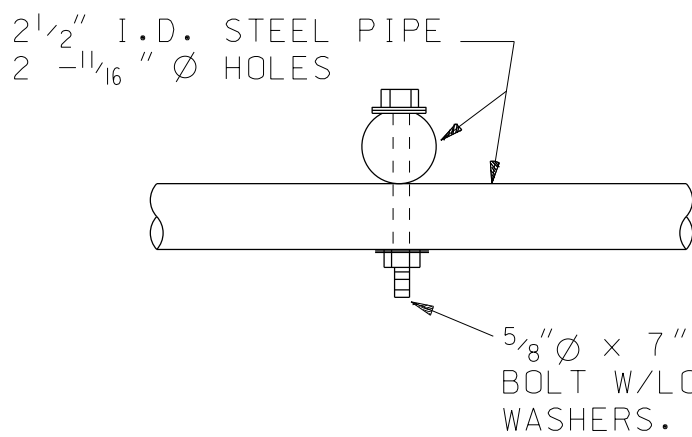
PERSPECTIVE
TYPICAL CONCRETE PIPE
WITHOUT SKEW WITH GRATE



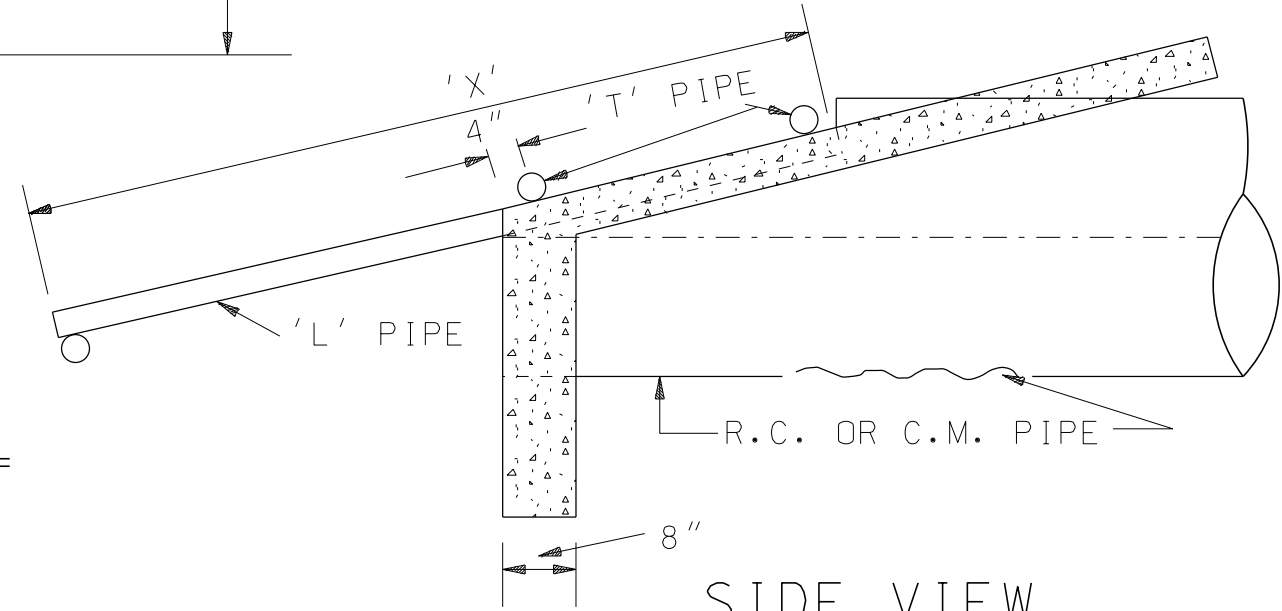
PERSPECTIVE
TYPICAL CONCRETE PIPE ON SKEW



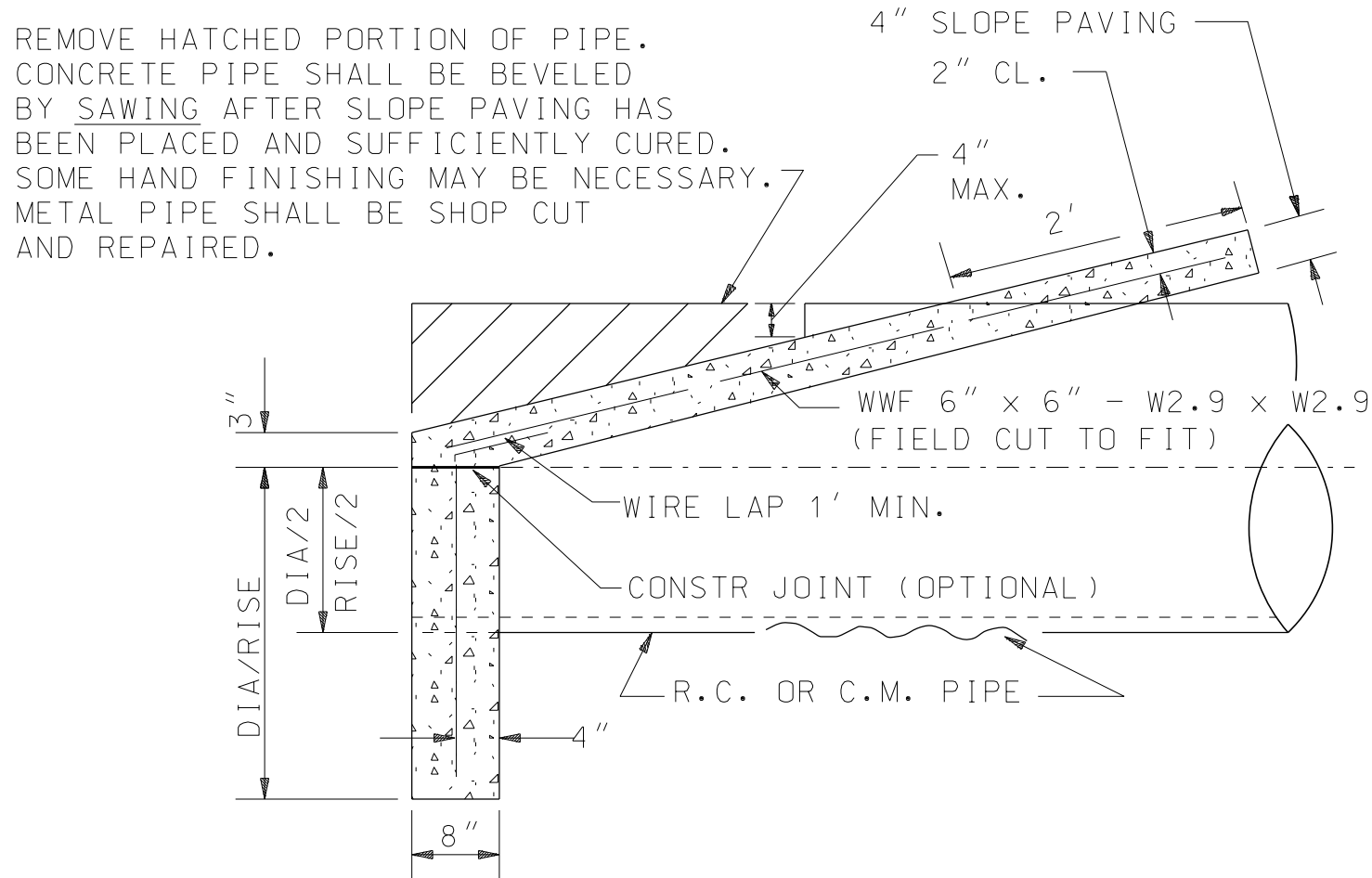
PLAN



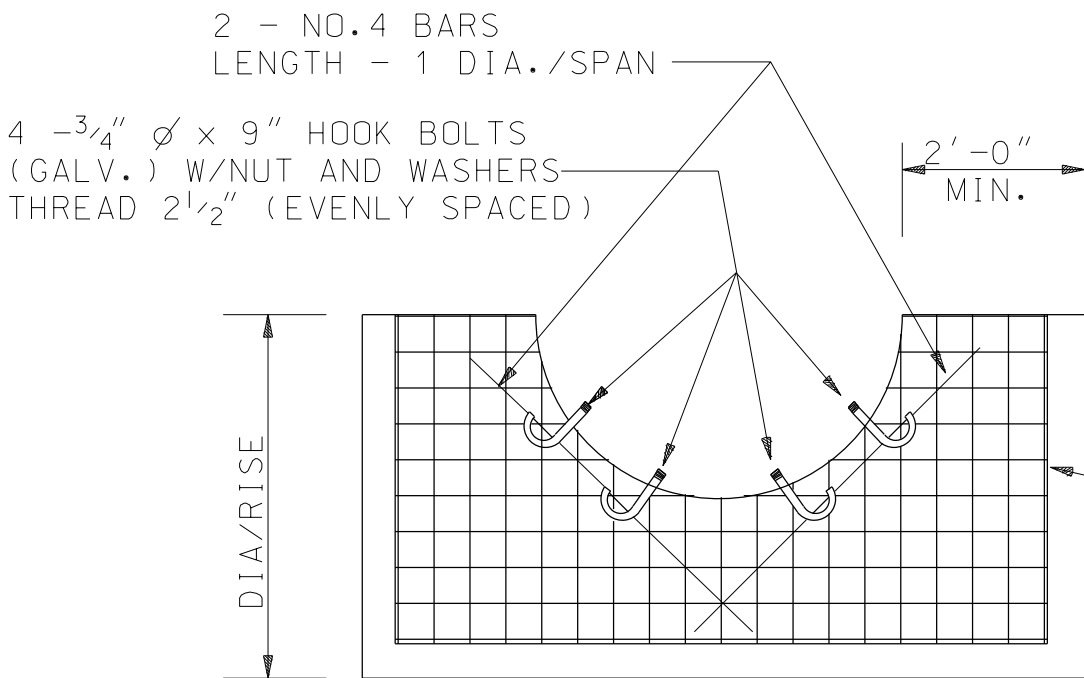
FASTENING DETAIL



SIDE VIEW

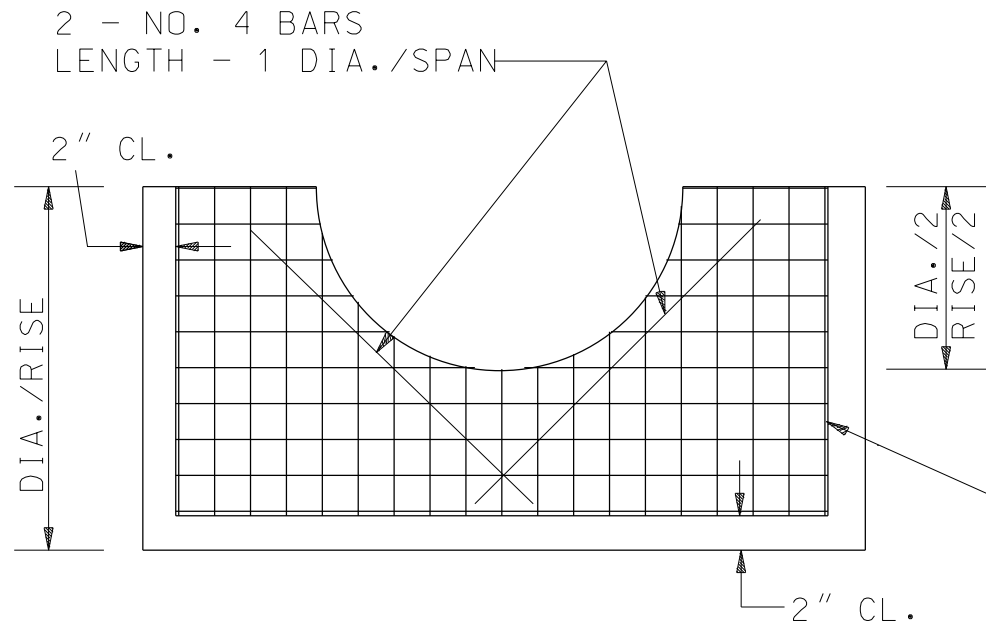


SIDE VIEW



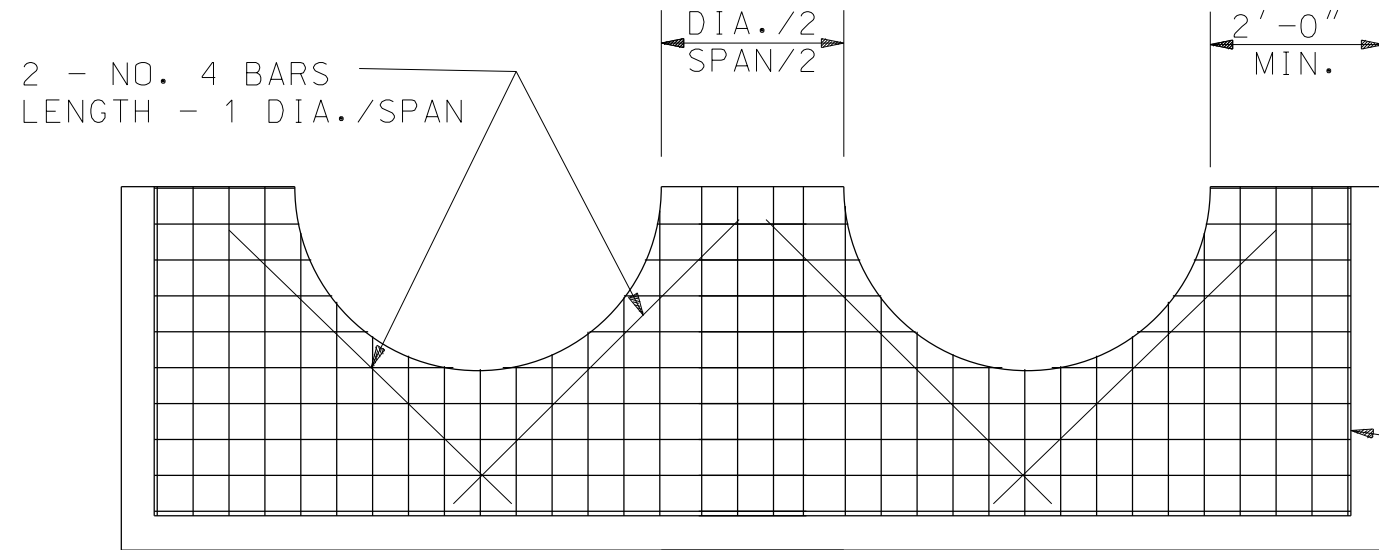
END VIEW-METAL PIPE

WWF 6" x 6"
- W2.9 x W2.9 MIN.
(FIELD CUT)



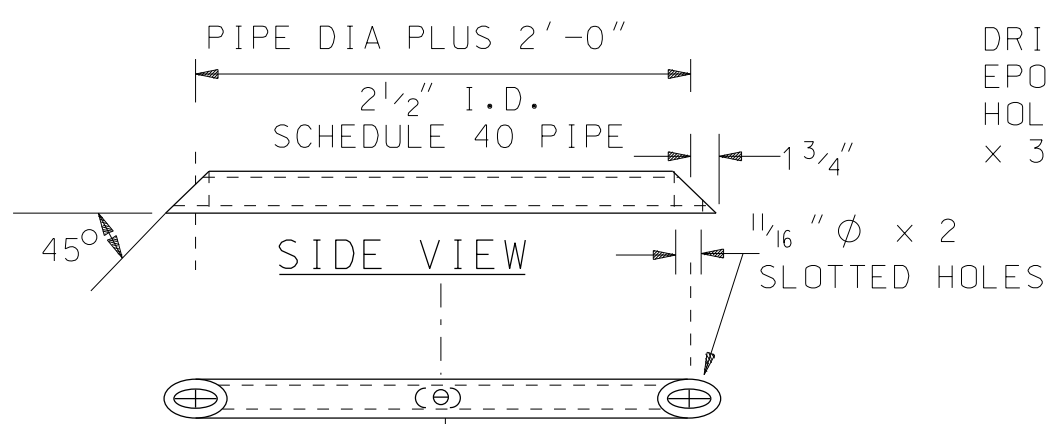
END VIEW-CONCRETE PIPE

WWF 6" x 6"
- W 2.9 x W2.9 MIN.
(FIELD CUT)



END VIEW-DOUBLE CONCRETE PIPE

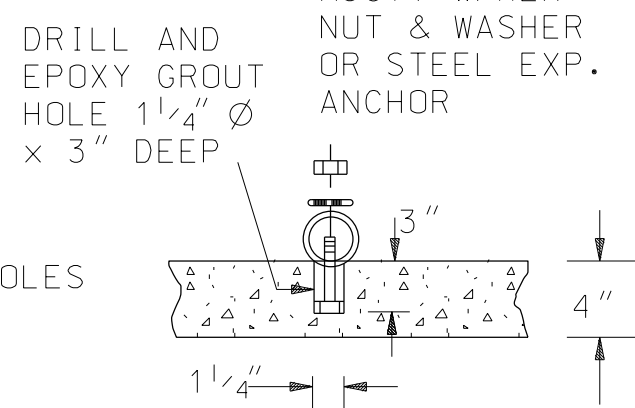
5/8" x 4"
HEX BOLT (ASTM
A307) W/HEX
NUT & WASHER
OR STEEL EXP.
ANCHOR



SIDE VIEW

TOP VIEW

TOP 2" Ø DRILLED
HOLES. BOTTOM
1 1/16" x 2" SLOT
(DOUBLE LINE ONLY)

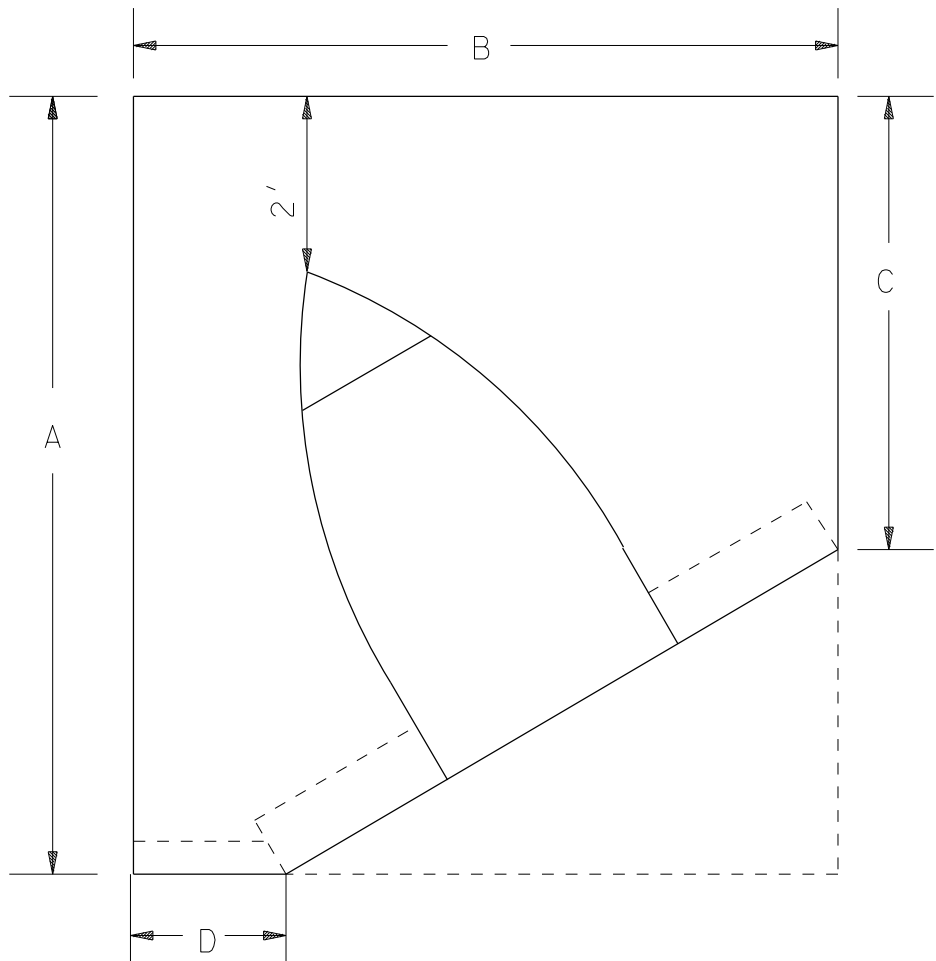


GRATE ATTACHMENT
DETAIL

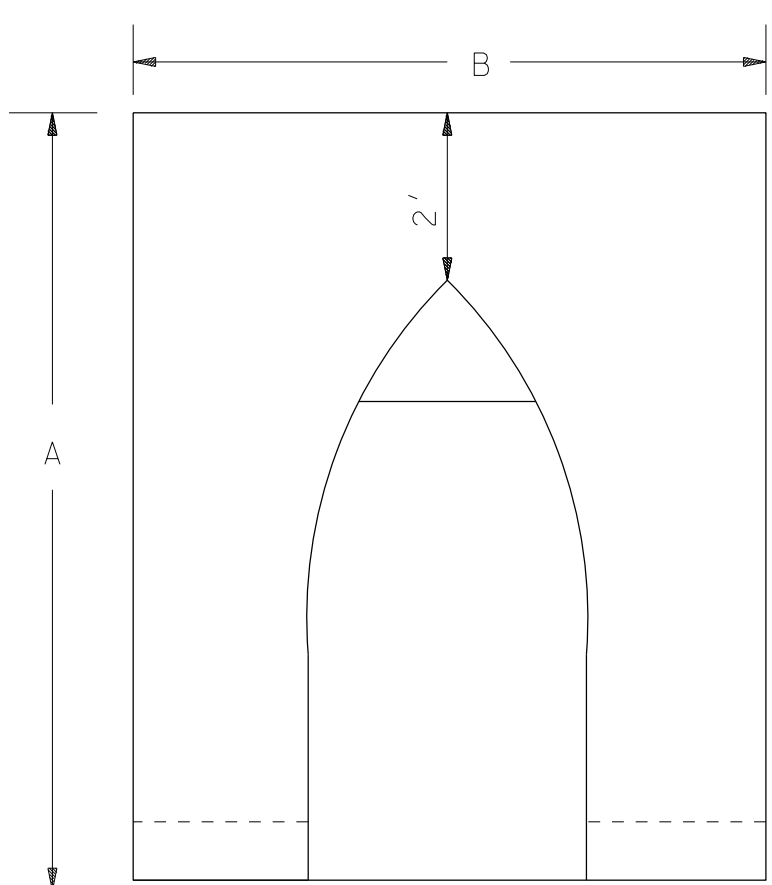
PIPE DETAIL

GENERAL NOTES


- THE FILL SHALL BE PLACED AND FINISHED AND ALL SHORING REMOVED BEFORE ANY CONCRETE SHALL BE PLACED ON SLOPES.
- QUANTITIES SHOWN INCLUDES TWO (2) COMPLETE HEADWALLS.
- WHERE 6:1 FRONT SLOPES ARE REQUIRED, THEY SHALL BE WARPED TO FIT 4:1 INSTALLATION.
- 8" THICK END WALL SHALL BE PERPENDICULAR TO FLOW LINE. WARP AND DRESS ADJACENT FILL TO FIT SKEWED CONDITIONS. EDGES OF PAVING PLACED UPON FRONT SLOPE SHALL BE PARALLEL TO SLOPE LINE.
- DETAIL AND QUANTITIES SHOWN ON THIS DRAWING APPLIES TO REINFORCED CONCRETE AND CORRUGATED METAL PIPES.
- SLOPED PAVED HEADWALL WITHOUT GRATE SHALL BE CLASS 1, HEAD WALL WITH GRATE SHALL BE CLASS 2.
- A 24" PIPE WITH GREATER THAN A 30° SKEW AND 30" OR GREATER IN DIAMETER SHALL HAVE A CLASS 2 END TREATMENT WHEN TERMINATED WITHIN THE CLEAR ZONE.
- ADDITIONAL 4" THICK TOEWALL 12" DEEP WILL BE REQUIRED ON 30° AND 45° SKEW. SEE DIMENSION "D" ON PLAN VIEW.



PLAN
ON SKEW



PLAN
NO SKEW

--SPECIFICATIONS-- CURRENT ALABAMA DEPARTMENT OF TRANSPORTATION		
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<div> <div> REVISIONS 1. Added to CADD on 12-01-99 by J.F.T. 2. Changed Note No. 7 and added a grate to concrete pipe on skew on 12-31-08 by W.W.A. </div> <div>  ALABAMA DEPARTMENT OF TRANSPORTATION 1409 COLISEUM BOULEVARD MONTGOMERY, AL 36130-3050 </div> </div>		
DESIGN BUREAU SPECIAL DRAWING		
SLOPE PAVED HEADWALL DETAILS FOR REINFORCED CONCRETE AND CORRUGATED METAL ROADWAY PIPE		
SPECIAL DRAWING NO		INDEX NO
Bureau Std Engr: D.J.W. DRAWN BY: _____ DATE DRAWN: 06-07-90		HW-614-B (SHEET 1 OF 2) 61909

NOT TO SCALE

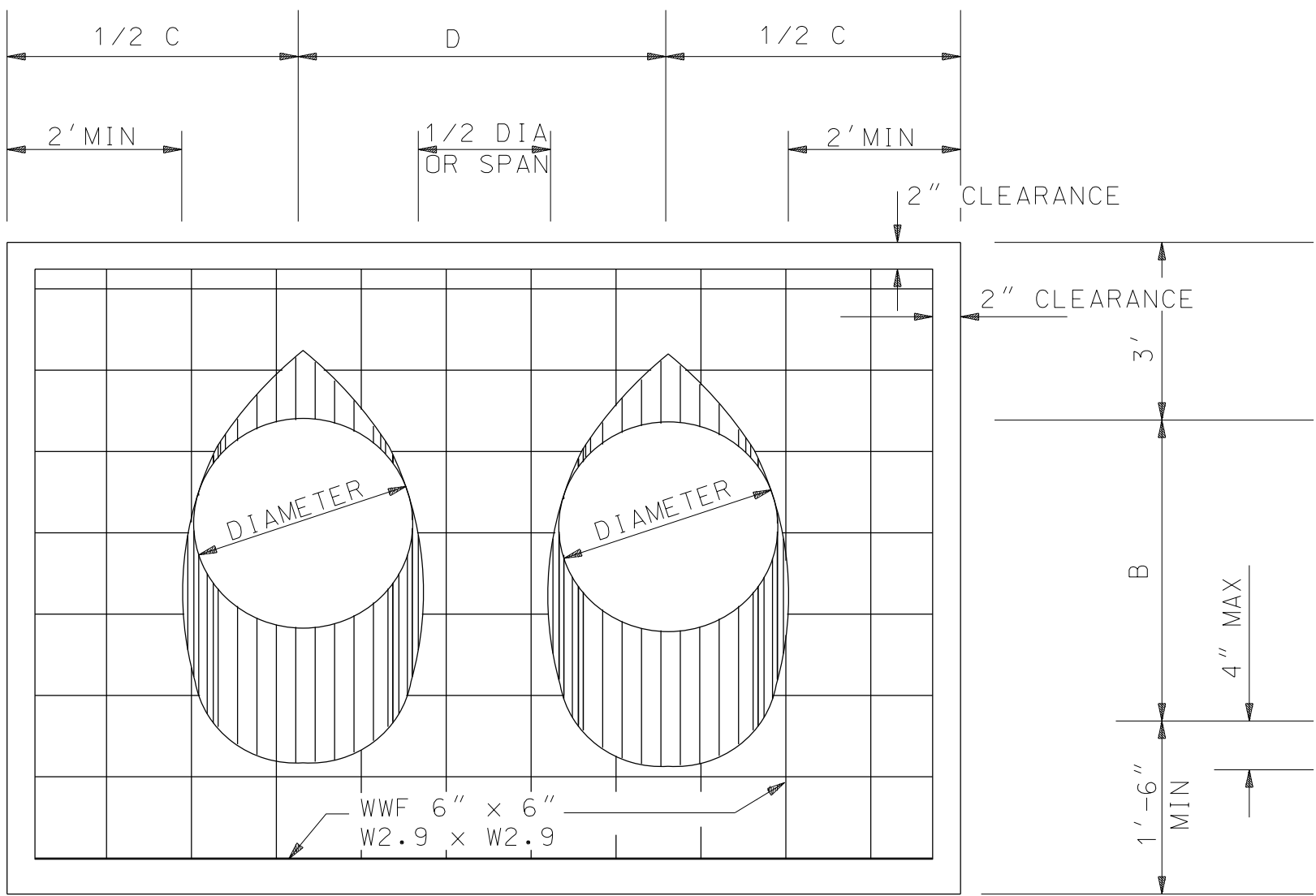
			DIMENSIONS AND QUANTITIES TABLES FOR ROUND PIPE																																																REFERENCE PROJECT NO		FISCAL YEAR		SHEET NO																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																														

GRATE FABRICATION TABLES

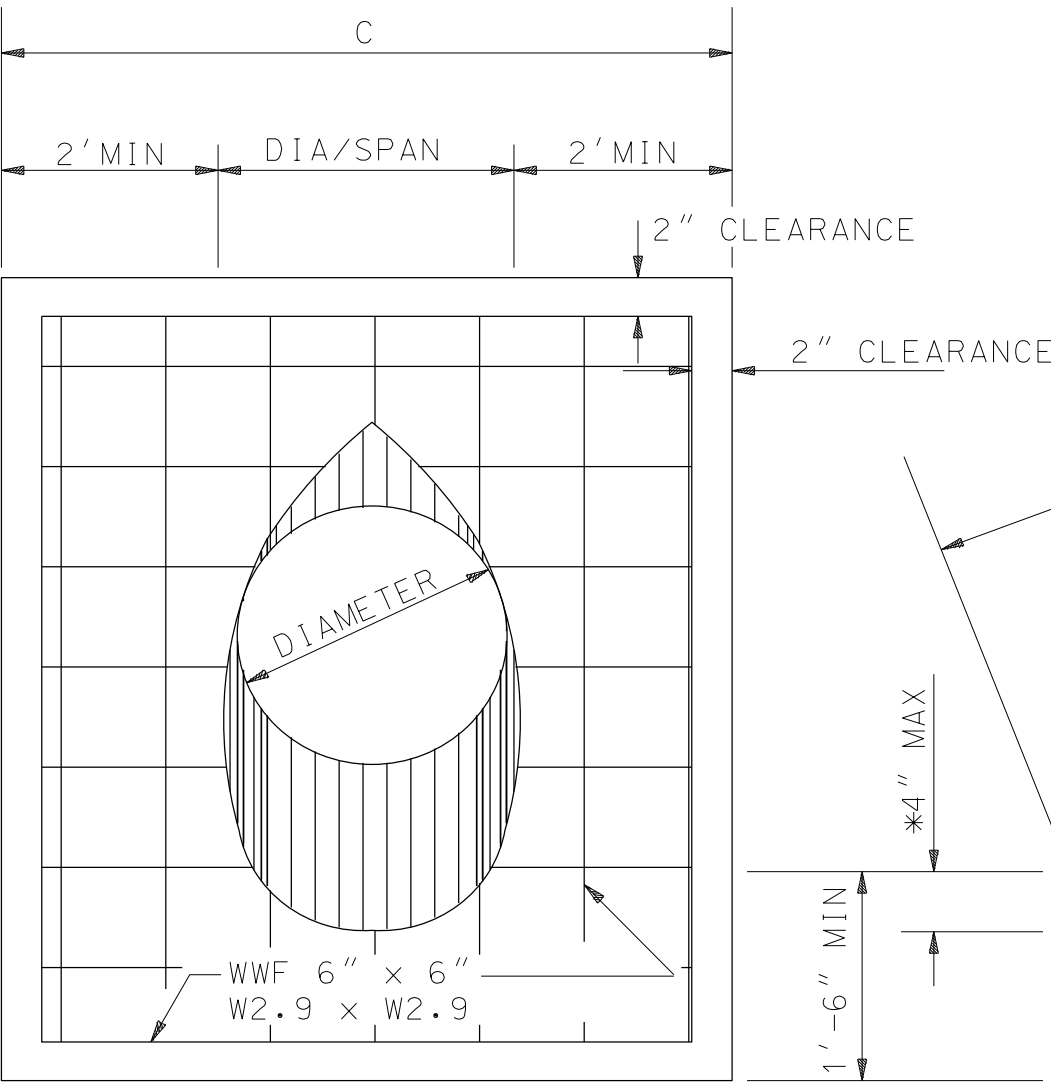
ROUND ROADWAY PIPE				ROADWAY PIPE GRATE		
DIA	SKEW	SLOPE	"X"	"L" PIPE	"T" PIPE	
36"	0°	3:1	8'-6"	2 @ 12" OC	3	
36"	15°	3:1	8'-10"	2 @ 12" OC	3	
36"	30°	3:1	10'-0"	2 @ 12" OC	3	
36"	45°	3:1	12'-4"	2 @ 12" OC	3	
36"	0°	4:1	11'-0"	2 @ 12" OC	3	
36"	15°	4:1	11'-6"	2 @ 12" OC	3	
36"	30°	4:1	13'-0"	2 @ 12" OC	3	
36"	45°	4:1	16'-2"	2 @ 12" OC	3	
42"	0°	3:1	10'-2"	2 @ 14" OC	3	
42"	15°	3:1	10'-6"	2 @ 14" OC	3	
42"	30°	3:1	11'-10"	2 @ 14" OC	3	
42"	45°	3:1	14'-8"	2 @ 14" OC	3	
42"	0°	4:1	13'-2"	2 @ 14" OC	3	
42"	15°	4:1	13'-7"	2 @ 14" OC	3	
42"	30°	4:1	15'-4"	2 @ 14" OC	3	
42"	45°	4:1	19'-0"	2 @ 14" OC	3	
48"	0°	3:1	11'-8"	2 @ 16" OC	3	
48"	15°	3:1	12'-1"	2 @ 16" OC	3	
48"	30°	3:1	13'-8"	2 @ 16" OC	3	
48"	45°	3:1	16'-10"	2 @ 16" OC	3	

DIMENSIONS AND QUANTITIES TABLES FOR ARCH PIPE

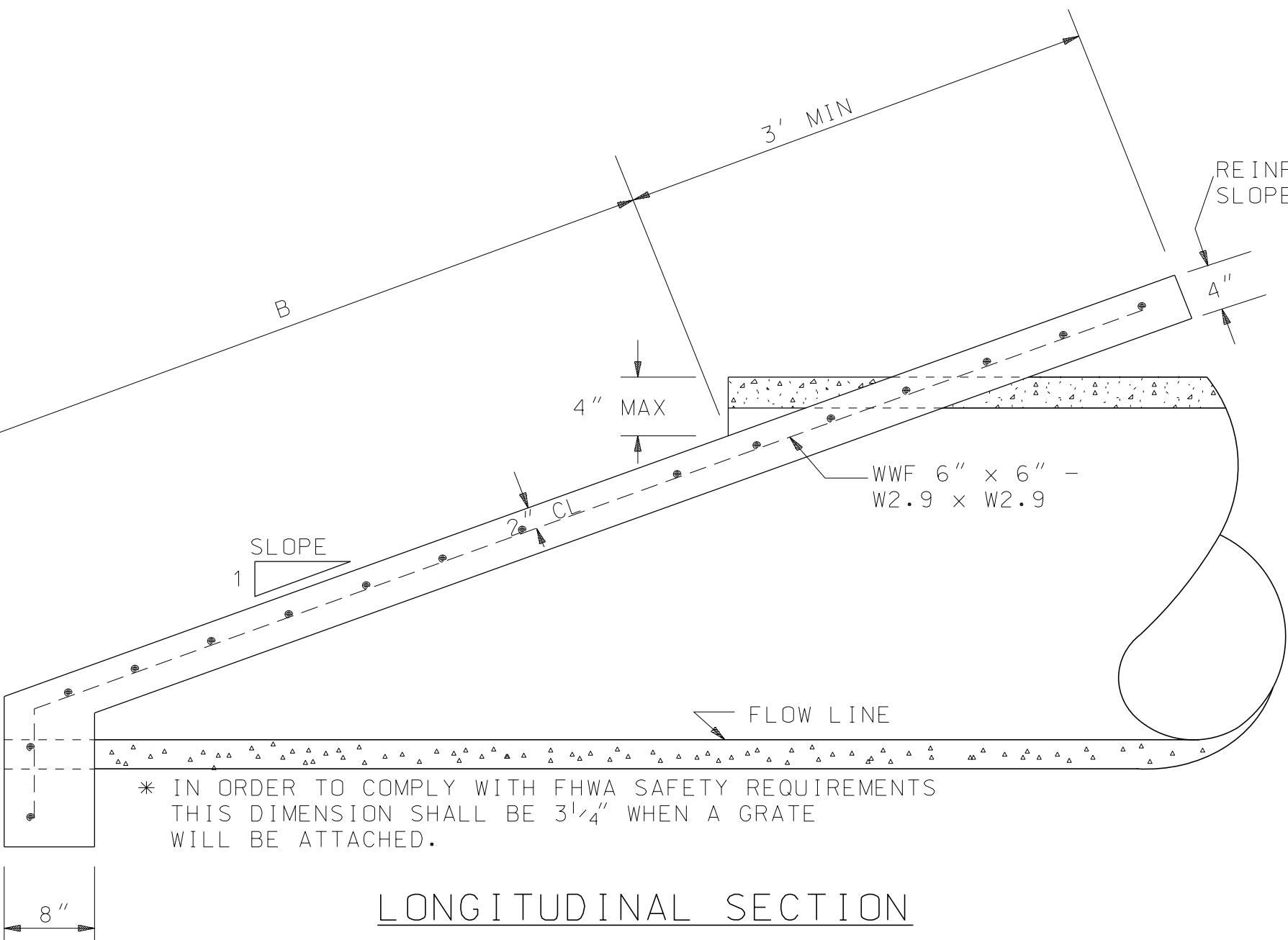
PIPE SIZE	ARCH PIPE	EQUIVALENT ROUND PIPE	0° SKEW			15° SKEW					30° SKEW					45° SKEW				
			4 : 1 SLOPE			4 : 1 SLOPE					4 : 1 SLOPE					4 : 1 SLOPE				
			A	B	CU YD CONC	A	B	C	D	CU YD CONC	A	B	C	D	CU YD CONC	A	B	C	D	CU YD CONC
1'-6" x 11"	SINGLE DOUBLE	15"	6'-1" 6'-1"	5'-6" 7'-9"	.5 .6	6'-9" 7'-4"	6'-5" 8'-7"	5'-4" 5'-4"	1'-1" 1'-1"	.6 .8	7'-5" 8'-7"	7'-1" 9'-0"	4'-8" 4'-8"	2'-4" 2'-4"	.7 .8	8'-0" 9'-7"	7'-11" 9'-7"	4'-1" 4'-1"	4'-1" 4'-1"	.8 .9
1'-10" x 1'-1"	SINGLE DOUBLE	18"	6'-1" 6'-1"	5'-10" 8'-7"	.6 .7	6'-10" 7'-6"	6'-9" 9'-5"	5'-4" 5'-4"	1'-1" 1'-1"	.6 .9	7'-6" 8'-11"	7'-5" 9'-10"	4'-7" 4'-7"	2'-4" 2'-4"	.7 1.0	8'-2" 10'-1"	8'-2" 10'-2"	4'-0" 4'-0"	4'-1" 4'-1"	.8 1.0
2'-5" x 1'-6"	SINGLE DOUBLE	24"	6'-1" 6'-1"	6'-5" 10'-0"	.7 .9	6'-11" 7'-10"	7'-4" 10'-9"	5'-3" 5'-3"	1'-2" 1'-2"	.7 1.2	7'-8" 9'-6"	7'-11" 11'-0"	4'-6" 4'-6"	2'-5" 2'-5"	.8 1.2	8'-4" 10'-11"	8'-8" 11'-2"	3'-10" 3'-10"	4'-1" 4'-1"	.9 1.2
3'-0" x 1'-10"	SINGLE DOUBLE	30"	6'-2" 6'-2"	7'-0" 11'-6"	.8 1.1	7'-1" 8'-3"	7'-11" 12'-3"	5'-3" 5'-3"	1'-2" 1'-2"	.8 1.3	7'-11" 10'-2"	8'-6" 12'-4"	4'-5" 4'-5"	2'-5" 2'-5"	.9 1.4	8'-7" 11'-10"	9'-1" 12'-3"	3'-8" 3'-8"	4'-2" 4'-2"	1.0 1.5
3'-7" x 2'-3"	SINGLE DOUBLE	36"	6'-2" 6'-2"	7'-7" 13'-0"	.9 1.3	7'-2" 8'-7"	8'-6" 13'-8"	5'-2" 5'-2"	1'-2" 1'-2"	0.9 1.6	8'-1" 10'-10"	9'-0" 13'-8"	4'-4" 4'-4"	2'-5" 2'-5"	1.0 1.7	8'-10" 12'-8"	9'-7" 13'-5"	3'-6" 3'-6"	4'-2" 4'-2"	1.1 1.8
4'-2" x 2'-7"	SINGLE DOUBLE	42"	6'-3" 6'-3"	8'-2" 14'-5"	1.0 1.5	7'-4" 8'-11"	9'-0" 15'-1"	5'-2" 5'-2"	1'-2" 1'-2"	1.1 1.8	8'-3" 11'-5"	9'-6" 14'-11"	4'-2" 4'-2"	2'-6" 2'-6"	1.1 2.0	9'-2" 13'-7"	10'-0" 14'-5"	3'-4" 3'-4"	4'-3" 4'-3"	1.2 2.1
4'-10" x 3'-0"	SINGLE DOUBLE	48"	6'-4" 6'-4"	8'-10" 16'-1"	1.1 1.8	7'-5" 9'-4"	9'-9" 16'-9"	5'-2" 5'-2"	1'-2" 1'-2"	1.2 2.2	8'-6" 12'-2"	10'-2" 16'-5"	4'-1" 4'-1"	2'-6" 2'-6"	1.3 2.4	9'-5" 14'-7"	10'-7" 15'-8"	3'-2" 3'-2"	4'-4" 4'-4"	1.3 2.5
5'-5" x 3'-4"	SINGLE DOUBLE	54"	6'-4" 6'-4"	9'-5" 17'-6"	1.3 2.1	7'-7" 9'-8"	10'-3" 18'-1"	5'-2" 5'-2"	1'-2" 1'-2"	1.3 2.5	8'-9" 12'-9"	10'-8" 17'-8"	4'-0" 4'-0"	2'-6" 2'-6"	1.4 2.7	9'-8" 15'-5"	11'-0" 16'-9"	3'-0" 3'-0"	4'-4" 4'-4"	1.5 2.7
6'-0" x 3'-8"	SINGLE DOUBLE	60"	6'-4" 6'-4"	10'-0" 19'-0"	1.4 2.3	7'-9" 10'-1"	10'-10" 19'-0"	5'-2" 5'-2"	1'-2" 1'-2"	1.5 2.8	8'-11" 13'-5"	11'-3" 19'-0"	3'-11" 3'-11"	2'-7" 2'-7"	1.5 3.1	10'-0" 16'-4"	11'-6" 17'-11"	2'-11" 2'-11"	4'-5" 4'-5"	1.6 3.2



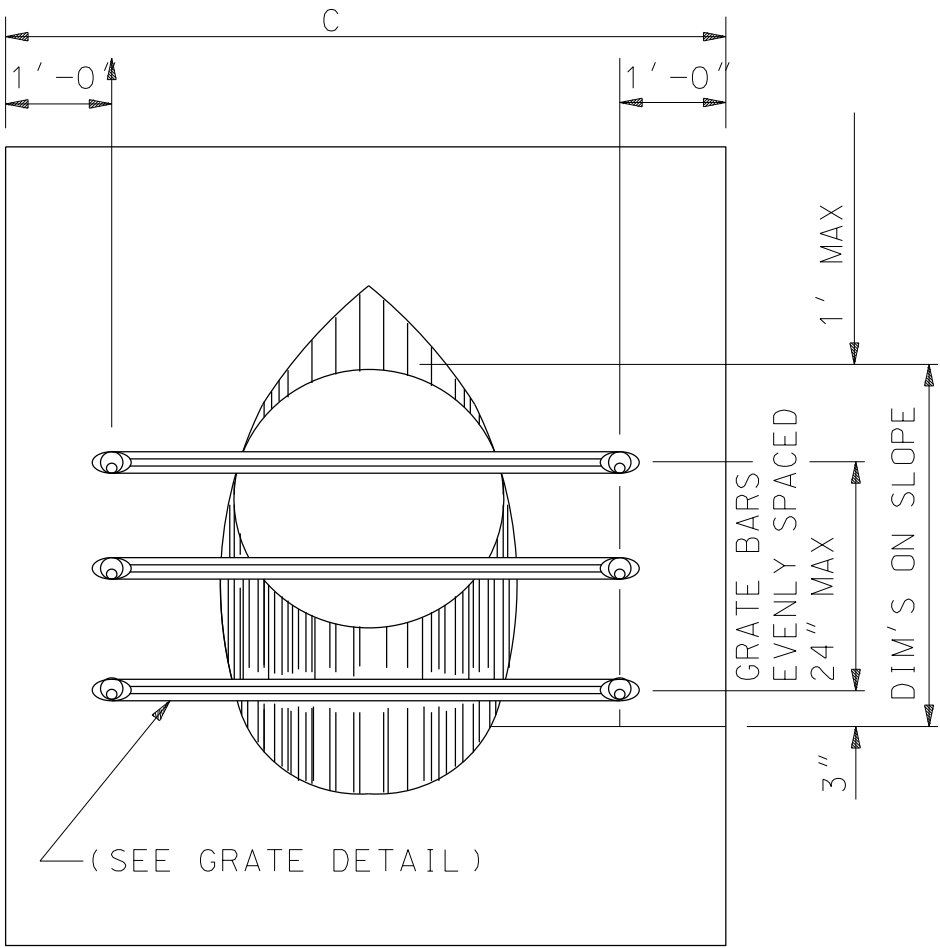
END ELEVATION DOUBLE BARREL



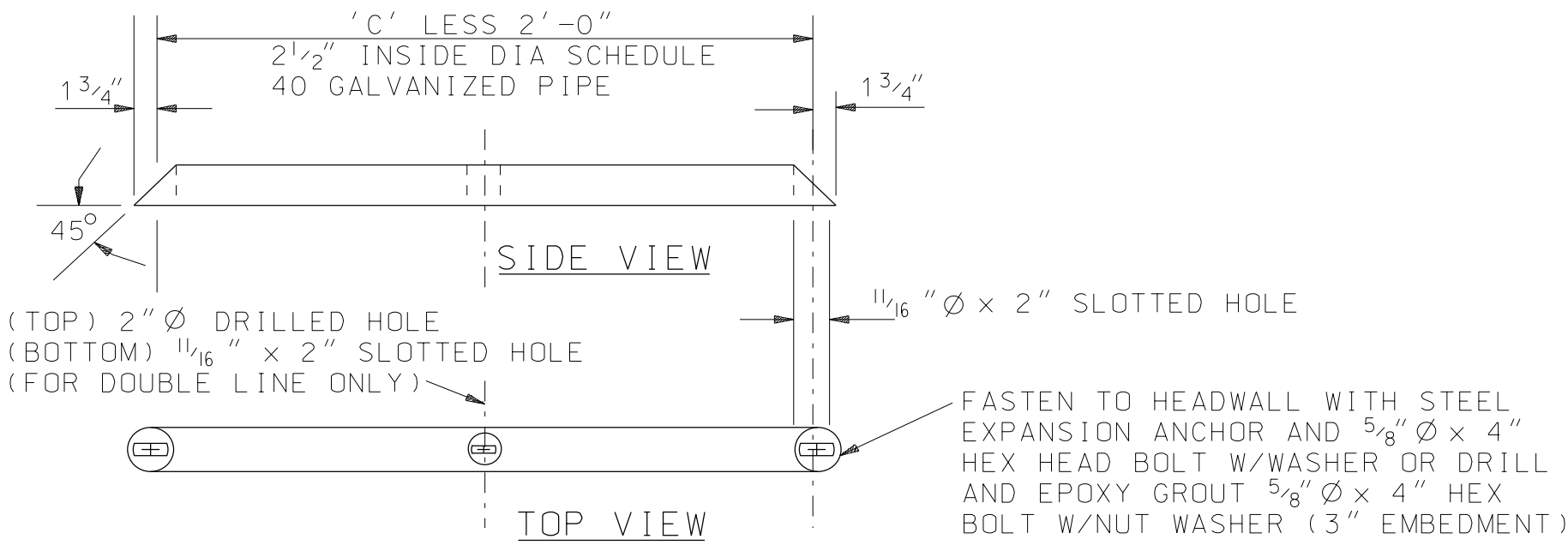
END ELEVATION SINGLE BARREL



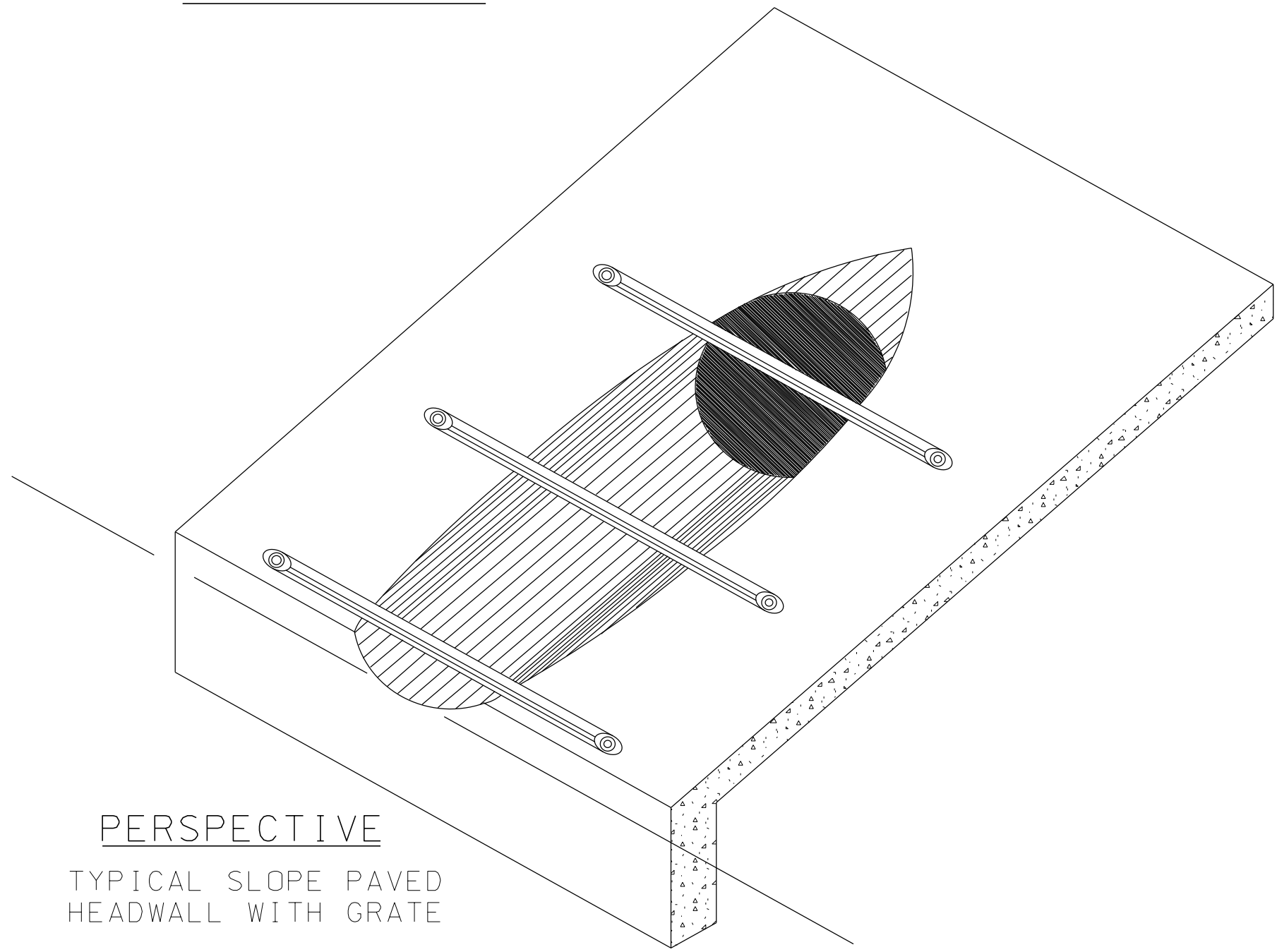
LONGITUDINAL SECTION



END ELEVATION WITH GRATE



GRATE DETAIL



PERSPECTIVE
TYPICAL SLOPE PAVED
HEADWALL WITH GRATE

DIMENSIONS AND QUANTITIES							
PIPE SIZE	AREA SQ FT	SLOPE	B	C	D	CU YDS ONE BARREL	CU YDS ADDITIONAL BARREL
15" Ø	1.2	4:1	2'-5"	5'-3"	1'-11"	0.92	0.30
18" Ø	1.8	4:1	3'-6"	5'-6"	2'-3"	1.06	0.36
24" Ø	3.1	4:1	5'-6"	6'-0"	3'-0"	1.32	0.52
30" Ø	4.9	4:1	7'-7"	6'-6"	3'-9"	1.60	0.72
36" Ø	7.1	4:1	9'-8"	7'-0"	4'-6"	1.86	0.94
42" Ø	9.6	4:1	11'-9"	7'-6"	5'-3"	2.20	1.20
48" Ø	12.6	4:1	13'-9"	8'-0"	6'-0"	2.40	1.46
54" Ø	15.9	4:1	15'-10"	8'-6"	6'-9"	2.60	1.76
15" Ø	1.2	6:1	3'-7"	5'-3"	1'-11"	1.04	0.30
18" Ø	1.8	6:1	5'-1"	5'-6"	2'-3"	1.22	0.40
24" Ø	3.1	6:1	8'-1"	6'-0"	3'-0"	1.58	0.60
30" Ø	4.9	6:1	11'-2"	6'-6"	3'-9"	1.94	0.84
36" Ø	7.1	6:1	14'-2"	7'-0"	4'-6"	2.30	1.12
42" Ø	9.6	6:1	17'-3"	7'-6"	5'-3"	2.68	1.42
48" Ø	12.6	6:1	20'-3"	8'-0"	6'-0"	3.04	1.78
54" Ø	15.9	6:1	23'-4"	8'-6"	6'-9"	3.40	2.18
15" Ø	1.2	10:1	5'-10"	5'-3"	1'-11"	1.24	0.32
18" Ø	1.8	10:1	8'-4"	5'-6"	2'-3"	1.54	0.46
24" Ø	3.1	10:1	13'-5"	6'-0"	3'-0"	2.08	0.72
30" Ø	4.9	10:1	18'-5"	6'-6"	3'-9"	2.66	1.06
36" Ø	7.1	10:1	23'-5"	7'-0"	4'-6"	3.20	1.46
42" Ø	9.6	10:1	28'-6"	7'-6"	5'-3"	3.78	1.90
48" Ø	12.6	10:1	33'-6"	8'-0"	6'-0"	4.32	2.42
54" Ø	15.9	10:1	38'-6"	8'-6"	6'-9"	4.88	3.02
15" Ø	1.2	20:1	11'-9"	5'-3"	1'-11"	1.84	0.42
18" Ø	1.8	20:1	16'-8"	5'-6"	2'-3"	2.40	0.62
24" Ø	3.1	20:1	26'-8"	6'-0"	3'-0"	3.38	1.06

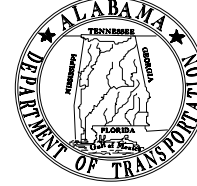
GENERAL NOTES

1. THE FILL IS TO BE PLACED AND ALL SHORING REMOVED BEFORE THE SLOPE PAVING IS PLACED.
2. QUANTITIES SHOWN INCLUDE TWO (2) SLOPE PAVED HEADWALLS WITH TOE WALLS.
3. DIMENSIONS AND QUANTITIES SHOWN APPLIES TO CONCRETE, CORRUGATED METAL PIPE, AND CORRUGATED HDPE PIPE. CONCRETE QUANTITIES ARE SUFFICIENT WHEN HEADWALLS FOR ARCH PIPE IS DESIRABLE.
4. CONCRETE PIPE SHALL BE BEVELED BY SAWING AFTER SLOPE PAVING HAS BEEN PLACED AND SUFFICIENTLY CURED (SOME HAND FINISHING MAY BE NECESSARY.) METAL PIPE SHALL BE SHOP CUT. CORRUGATED HDPE PIPE MAY BE FIELD BEVELED PRIOR TO PAVING OR SHOP CUT.
5. CONTRACTOR SHALL INSURE THROUGH MECHANICAL MEANS OR OTHER APPROVED DEVICES THAT CONNECTION BETWEEN BEVELED PIPE END AND CONCRETE WILL NOT BE DETACHED. CORRUGATED HDPE PIPE SHALL HAVE 1/2" Ø x 6" GALVANIZED HOOK BOLTS WITH WASHERS LOCATED AT 30° OC FOR THE TOE AND 1/2" Ø x 6" GALVANIZED THREADED HEX HEAD BOLTS WITH WASHERS LOCATED ON 2'-0" CENTERS FOR SIDES. ANCHOR BOLTS INTO CONCRETE.
6. SLOPE PAVED HEADWALL WITHOUT GRATE SHALL BE CLASS 1. SLOPE PAVED HEADWALL WITH GRATE SHALL BE CLASS 2.
7. A 24" PIPE WITH GREATER THAN A 30° SKEW AND 30" OR GREATER IN DIAMETER SHALL HAVE A CLASS 2 END TREATMENT WHEN TERMINATED WITHIN THE CLEAR ZONE.
8. PIPE FOR GRATE SHALL BE SCHEDULE 40, GALVANIZED (ASTM A53) HARDWARE SHALL BE GALVANIZED ACCORDING TO SPECIFICATIONS.
9. RAW METAL EXPOSED BY CUTTING AND DRILLING OF PIPE FOR GRATE ASSEMBLY WILL REQUIRE A GALVANIZING REPAIR PAINT IN ACCORDANCE WITH SECTION 855.31 OF ALDOT SPECIFICATIONS.

--SPECIFICATIONS--
CURRENT ALABAMA DEPARTMENT OF TRANSPORTATION

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REVISIONS
1. Changed notes 3, 4, & 5 to allow the use of HDPE pipe.
09-12-97 by C.J.S.
2. Adjusted Note No. 7 requiring use of Grate on 01-02-09 by W.W.A.



ALABAMA DEPARTMENT
OF TRANSPORTATION
1409 COLISEUM BOULEVARD
MONTGOMERY, AL 36130-3050

DESIGN BUREAU SPECIAL DRAWING

CONCRETE SLOPE PAVED HEADWALL
AND GRATE FOR SIDEDRAIN PIPE

Bureau Std Engr: D.J.W.
DRAWN BY: _____ DATE DRAWN: 02-08-91

SPECIAL DRAWING NO
HW-614-SP

INDEX NO
61913

TABLE OF DIMENSIONS AND QUANTITIES

	PIPE DIA.	H	L1	L2	W	W1
4:1 SLOPE	18"	3'-2"	8'-8"	8'-3"	2'-11"	1'-11"
	24"	3'-9"	11'-0"	10'-8"	3'-6"	2'-6"
	30"	4'-5"	13'-8"	13'-0"	4'-1"	3'-1"
6:1 SLOPE	18"	3'-2"	12'-8"	12'-1"	2'-11"	1'-11"
	24"	3'-9"	16'-2"	15'-9"	3'-6"	2'-6"

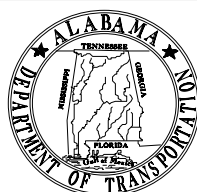
GENERAL NOTES

- 28 DAY CONCRETE COMPRESSIVE STRENGTH: TO BE 4000 P.S.I.
- REINFORCING STEEL: TO BE IN ACCORDANCE WITH SPECIFICATIONS. MINIMUM YIELD STRENGTH=60 K.S.I.
- PIPE FOR GRATE TO BE IN ACCORDANCE WITH ASTM A53 GRADE B OR ASTM A501. PIPE SHALL BE HOT-DIPPED GALVANIZED IN ACCORDANCE WITH ASTM A53. THRU-BOLTS, WASHER PLATES, AND NUTS AND EXPANSION BOLTS AND WASHERS SHALL BE GALVANIZED ACCORDING TO SPECIFICATIONS.
- METAL SURFACES EXPOSED BY CUTTING AND DRILLING OF PIPE GRATE ASSEMBLY WILL REQUIRE A GALVANIZING REPAIR PAINT IN ACCORDANCE WITH SECTION 855.15 OF THE SPECIFICATIONS.
- THE PRECAST CONCRETE END SECTIONS ARE LIMITED TO 0° THRU 15° SKEW.
- PRECAST CONCRETE END SECTIONS WITHOUT GRATES SHALL BE CLASS 1. PRECAST CONCRETE END SECTIONS WITH GRATES SHALL BE CLASS 2.
- PIPE LARGER THAN 24" IN DIAMETER SHALL HAVE CLASS 2 CONCRETE END SECTIONS WHEN TERMINATED WITHIN THE CLEAR ZONE.
- FOR SPECIFIC INSTALLATION PROCEDURES, CONTACT THE PRECAST END SECTION VENDOR.

--SPECIFICATIONS--

CURRENT ALABAMA DEPARTMENT OF TRANSPORTATION

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ALABAMA DEPARTMENT OF TRANSPORTATION
1409 COLISEUM BOULEVARD
MONTGOMERY, AL 36130-3050

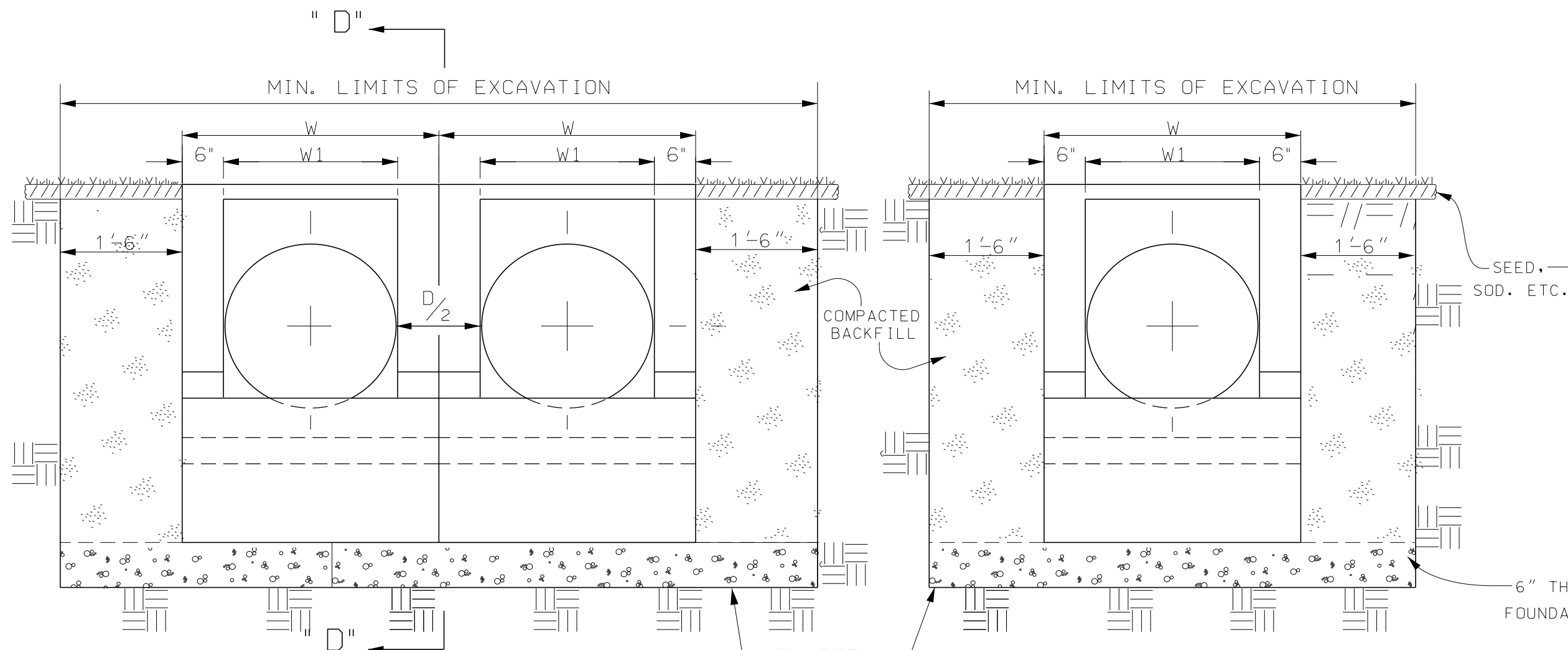
DESIGN BUREAU SPECIAL DRAWING

PRECAST CONCRETE SLOPE PAVED HEADWALL AND GRATE FOR SIDEDRAIN PIPE, 18" THRU 30", 15 DEGREES MAX SKEW

Bureau Std Engr: D.J.W.
DRAWN BY: J.F.T. DATE DRAWN: JULY, 2008

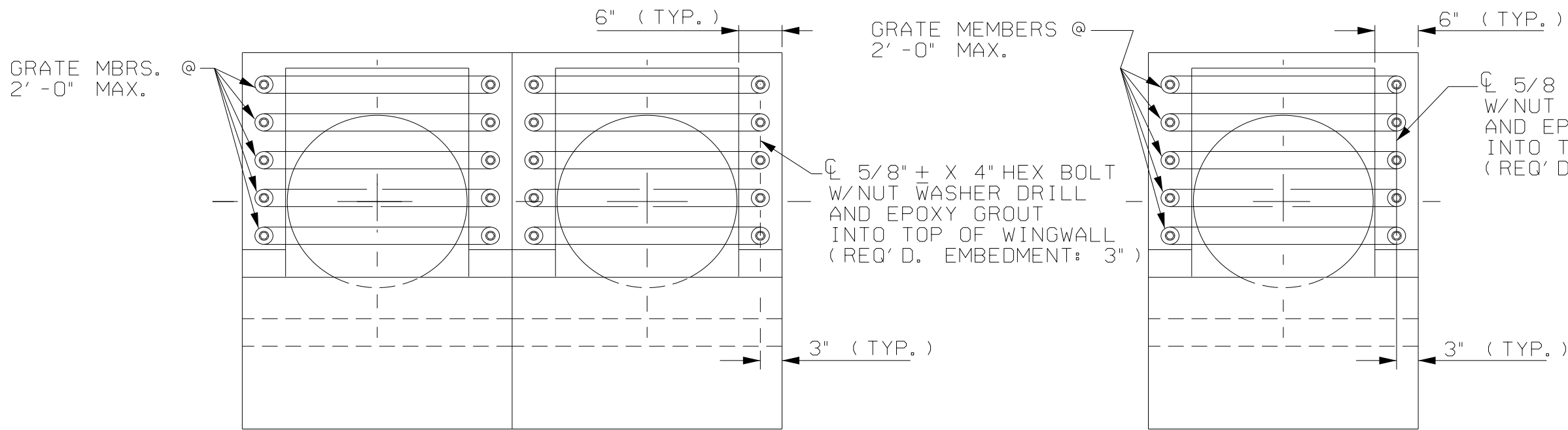
SPECIAL DRAWING NO
HW-614-SP (PC)

INDEX NO
61916



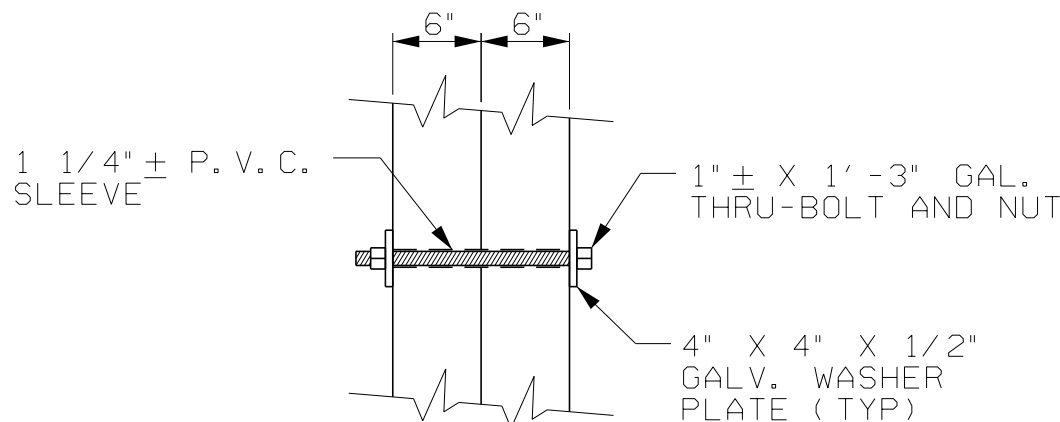
DOUBLE PIPE INSTALLATION
END ELEVATION

SINGLE PIPE INSTALLATION
END ELEVATION

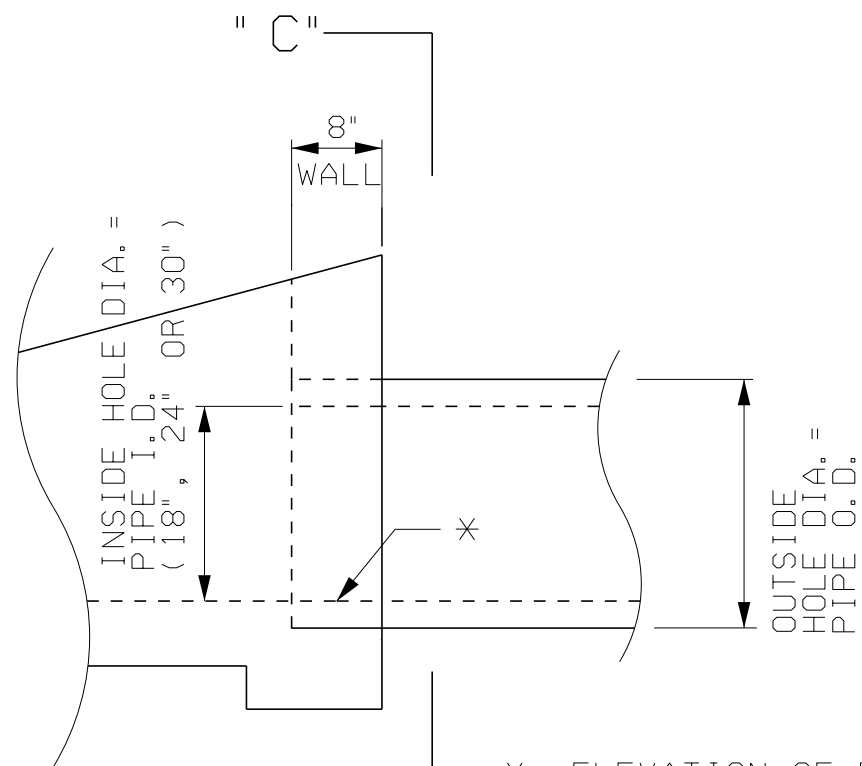


DOUBLE PIPE INSTALLATION
W/GRATE

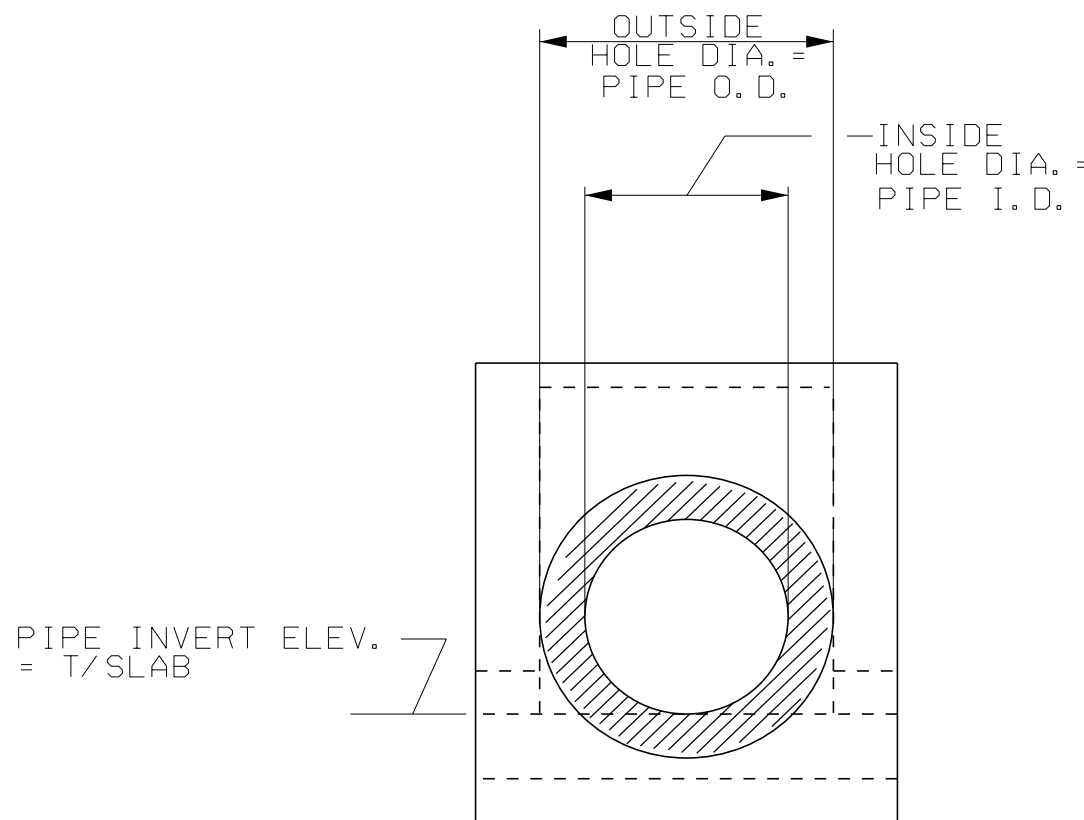
SINGLE PIPE INSTALLATION
W/GRATE



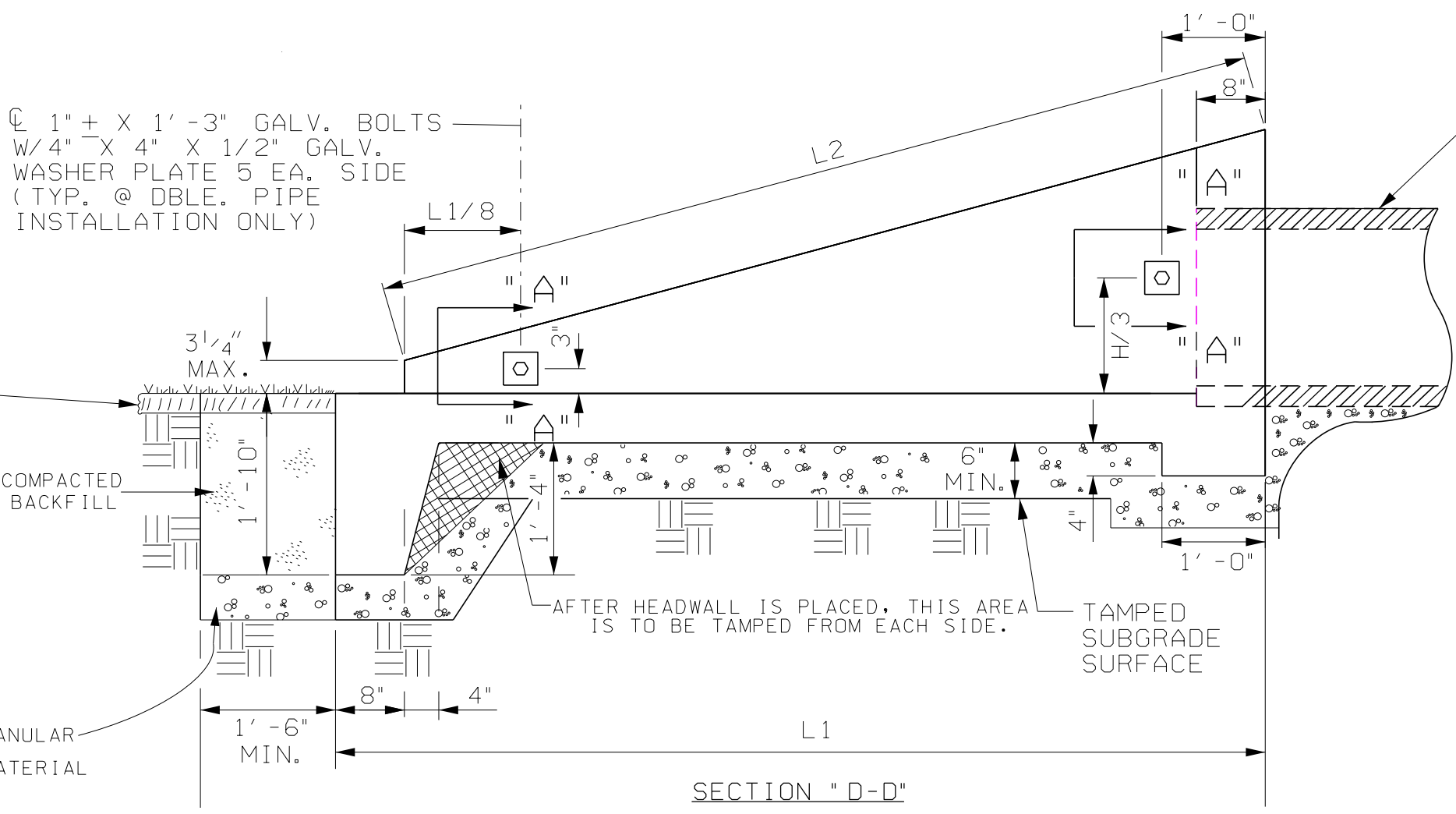
SECTION "A-A"
WALL CONNECTION DETAIL
(@ DBL. PIPE INSTL. ONLY)



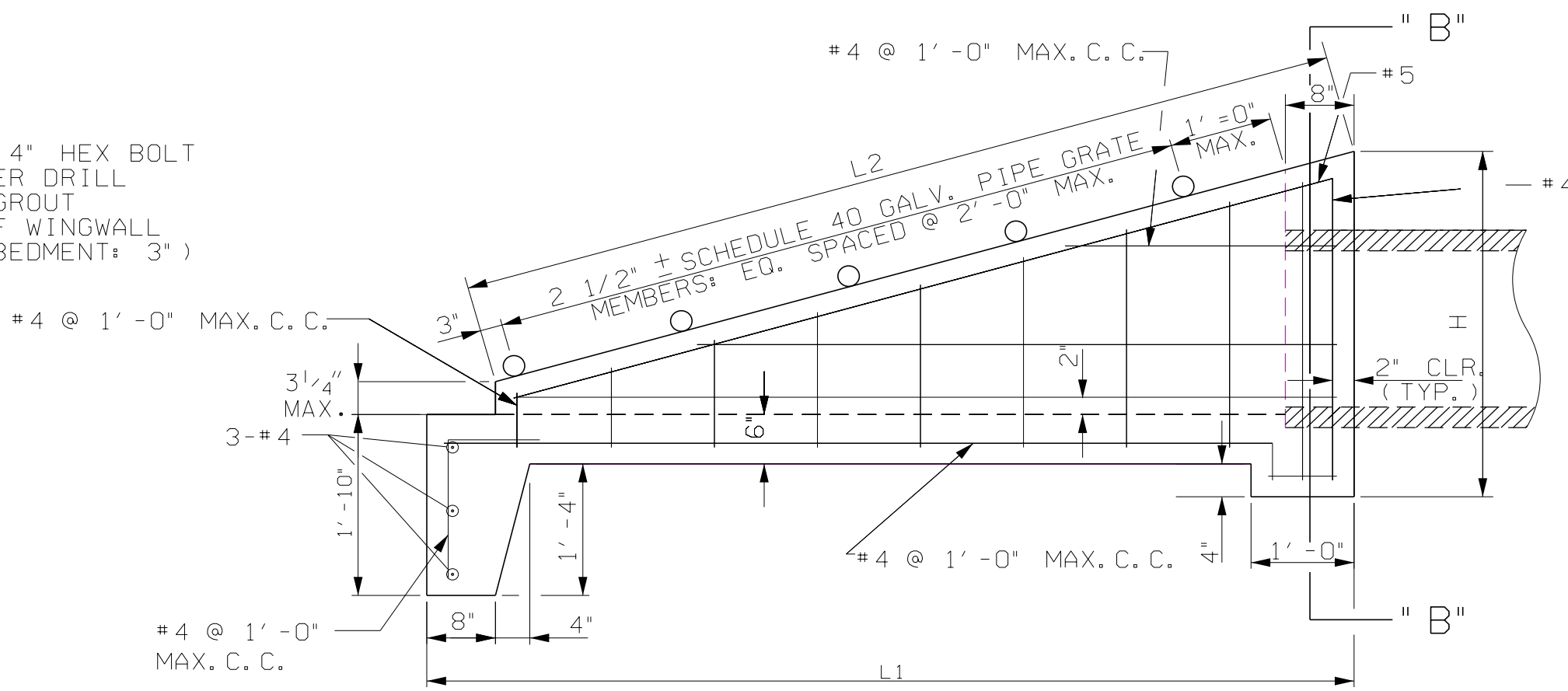
PIPE ENTRANCE INTO HEADWALL



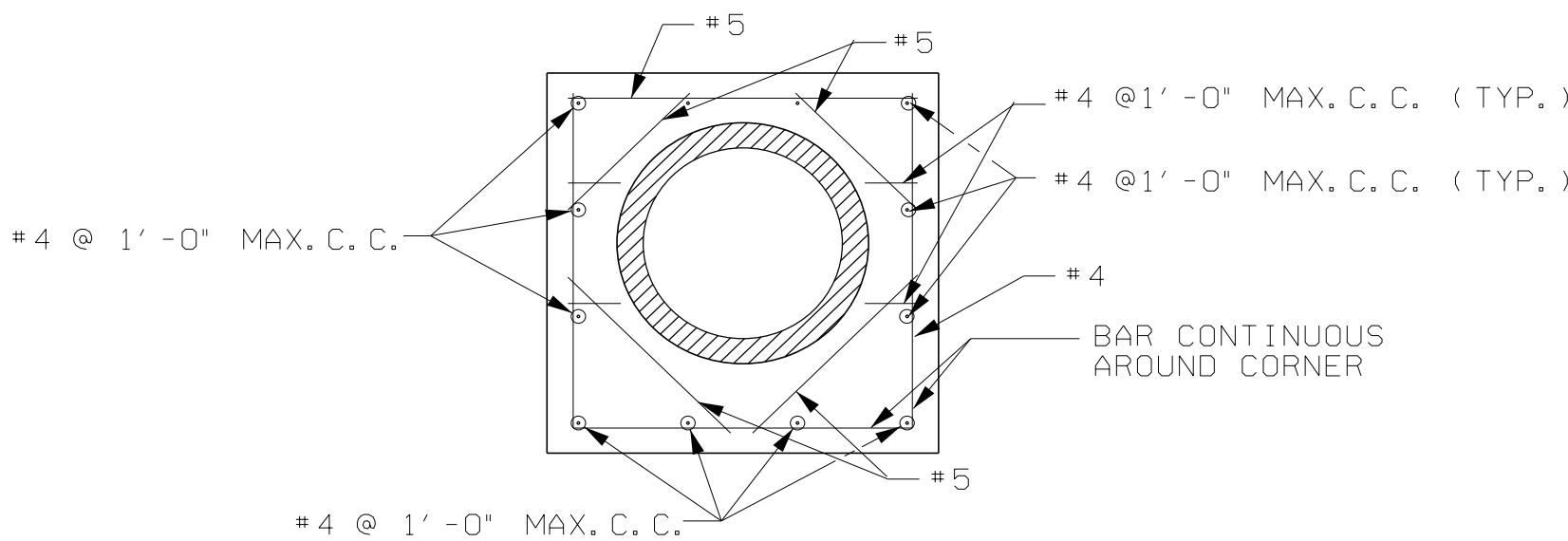
ELEVATION "C-C"



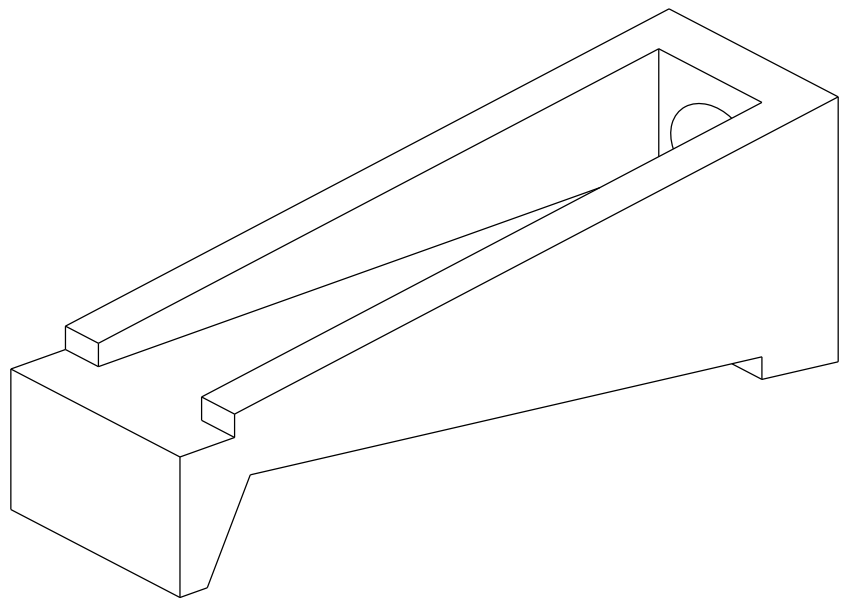
SECTION "D-D"



LONGITUDINAL ELEVATION
(SHOWING DIMENSIONS AND REINFORCING STEEL)



SECTION "B-B"
(SHOWING REINFORCING STEEL)



ISOMETRIC VIEW

NOT TO SCALE