

RIVERSIDE COUNTY FLOOD CONTROL
AND WATER CONSERVATION DISTRICT

STANDARD DRAWINGS



Jason E. Uhley
General Manager - Chief Engineer

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REVISION LOG

STANDARD DRAWING NUMBER	ORIGINAL DATE	EFFECTIVE DATE
CB100	11-1971	01-2005
CB101	06-1971	04-2004
CB102	05-1972	04-2004
CB103	11-1971	04-2004
CB104	06-1971	04-2004
CB105	05-1986	04-2004
CB106	06-1971	04-2004
CB107	06-1971	04-2004
CB108	06-1971	04-2004
CB109	06-1971	04-2004
CB110	10-1973	04-2004
LD201	11-1971	04-2004
LD202	06-1971	04-2004
JS226	06-1971	07-2019
JS227	06-1971	07-2019
JS228	06-1971	07-2019
JS229	11-1971	07-2019
JS230	08-2015	08-2015
JS231	11-1980	07-2019
JS232	06-1986	07-2019
JS233	10-2009	07-2019
MH251	06-1971	01-2011
MH252	06-1971	01-2011
MH253	06-1971	01-2011
MH254	06-1971	01-2011
MH255 (DELETED)	06-1971	04-2004
MH256	05-1972	04-2004
MH257	06-1971	04-2004
MH258	05-1972	04-2004
MH259	06-1971	04-2004
MH260	09-2016	08-2017
MH261	04-2004	04-2004
TS301	06-1971	01-2011
TS302	05-1972	01-2011
TS303	05-1972	01-2011
TS304	05-1972	01-2011
CH323	10-2009	10-2009
CH324	10-2009	10-2009
CH325	10-2009	10-2009
CH326	09-1971	04-2005
CH327	07-1976	04-2004
CH328	11-1971	04-2004
CH329	09-1976	01-2005
CH330	05-1972	04-2004
CH331	05-1972	04-2004
CH332	11-1971	04-2004

CH333		05-1984	04-2004
CH334		10-2009	10-2009
CH335		10-2009	10-2009
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BX403	(DELETED)	05-1972	04-2004
M801		02-1995	01-2005
M802	(DELETED)		
M803		06-1971	04-2004
M804	(DELETED)	11-1971	04-2004
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M807		06-1971	04-2004
M808		06-1971	04-2004
M809	(DELETED)	06-1971	04-2004
M810	(DELETED)	06-1971	04-2004
M811	(DELETED)	06-1971	04-2004
M812	(DELETED)		
M813	(DELETED)	05-1972	04-2004
M814		07-1974	04-2004
M815		10-1975	09-2017
M816		10-1975	04-2004
M817		10-1975	04-2004
M818		03-1982	04-2004
M819		08-1977	04-2004
M820		04-1981	04-2004
M821	(DELETED)	10-1982	04-2004
M822	(DELETED)	11-1982	04-2004
M823		06-1988	04-2004
M824		06-1988	04-2004
M825		06-1988	04-2004
M826		11-1991	04-2004
M827		04-2004	04-2004

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Revised 07/10/19

L.A.C.F.C.D. No. 2-D162, 2-D163



1. DIMENSIONS: UNLESS OTHERWISE SPECIFIED.
V' = 6" @ W = 7', 9" @ W = 14', 12" @ W = 21'
V = SHALL BE SHOWN ON THE PLANS.
W = SHALL BE SHOWN ON THE PLANS
(7 FOOT MIN.)
T = 6" IF V IS 4' OR LESS.
T = 8" IF V IS LESS THAN 8'.
T = 10" IF V IS 8' OR MORE.
D = 18" UNLESS OTHERWISE SPECIFIED.
A' = 38" UNLESS OTHERWISE SPECIFIED.
2. STRUCTURAL CONCRETE SHALL BE CLASS "A"
P.C.C. (6 SACK)
3. THE REINFORCING STEEL SHALL BE NUMBER 4
DEFORMED BARS. CLEARANCE SHALL BE 1/2"
FROM THE BOTTOM OF THE SLAB. SEE NOTE 7.
4. THE SURFACE OF ALL EXPOSED CONCRETE SHALL
CONFORM TO SLOPE, GRADE, COLOR, FINISH AND
SCORING IN THE EXISTING OR PROPOSED CURB &
WALK ADJACENT TO THE BASIN. THE BASIN FLOOR
SHALL BE GIVEN A TIGHT WOOD FLOAT FINISH.
CURVATURE OF THE LIP AND SIDEWALLS AT THE
GUTTER OPENING SHALL NOT BE MADE BY
PLASTERING. THE OUTLET PIPE SHALL BE TRIMMED
TO FINAL SHAPE AND LENGTH BEFORE THE
CONCRETE IS POURED.
5. STEPS:
3/4" PLAIN ROUND GALVANIZED STEEL STEPS
SHALL BE INSTALLED 16" APART WHEN V
EXCEEDS 4'-6". THE TOP STEP SHALL
BE 6" BELOW THE TOP SURFACE AND SHALL
BE 2 1/2" CLEAR FROM THE WALL .
ALL OTHER STEPS SHALL BE 4" CLEAR
FROM THE WALL. ONLY ONE STEP 12" FROM THE
BOTTOM SHALL BE INSTALLED IF V IS 4'-6"
OR LESS. ALL STEPS SHALL BE ANCHORED NOT
LESS THAN 4" INTO THE WALL OF THE BASIN.
6. CURB, GUTTER AND LOCAL DEPRESSIONS SHALL
BE CLASS "B" CONCRETE.
7. SEE STANDARD DRAWING CB106 FOR WALL &
FLOOR STEEL REINFORCING.



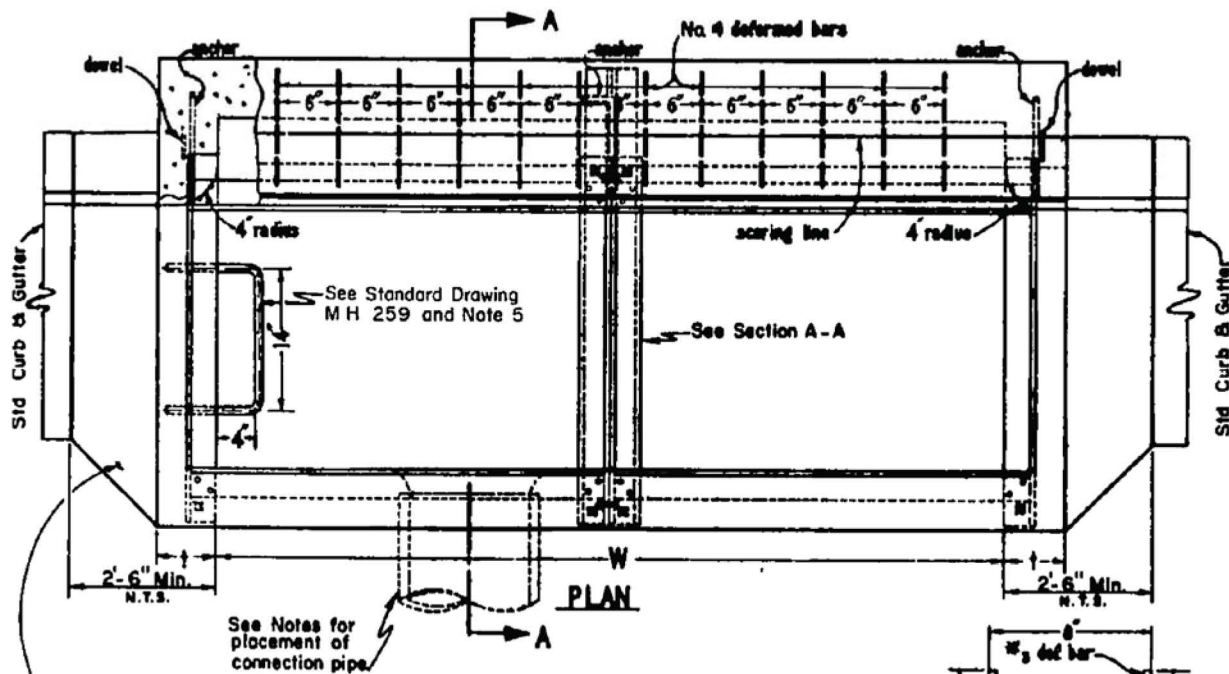
RIVERSIDE COUNTY FLOOD CONTROL
AND
WATER CONSERVATION DISTRICT

APPROVED BY: 

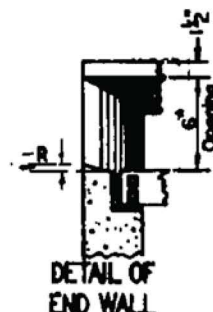
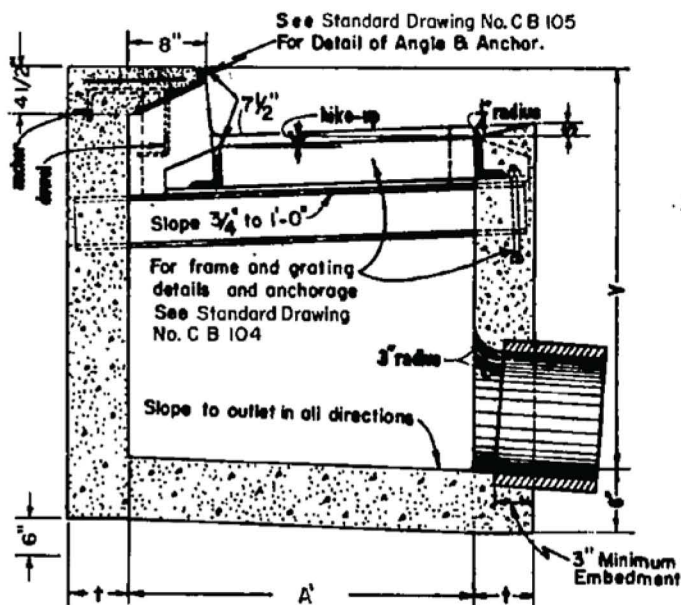
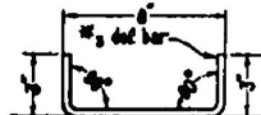
CHIEF ENGINEER

DATE: JAN. 10, 2005 R.E. NO. 32.336

STANDARD DRAWING NUMBER CB100



SEE STANDARD DRAWING No. LD202
NOTE 1(a) FOR APPROPRIATE LOCAL
DEPRESSION.



STEEL LIST						
No. of gratings	No. Def. bars	12" long	5/16" x 10"	Face Plate	Dowels	Anchors
1	5	3'-11"	2	2	2	2
2	12	7'-4"	2	3	2	3
3	19	10'-10"	2	4	2	4

See notes



A'	GRATE TYPE
34"	R.C.F.C. STD. CB104
32"	CALTRANS STD. D77-B



RIVERSIDE COUNTY FLOOD CONTROL
AND
WATER CONSERVATION DISTRICT

APPROVED BY: *Warren D. Williams*

CHIEF ENGINEER

DATE: April 5, 2004

R.C.E. NO. 32336

CATCH BASIN
NO. 4

STANDARD DRAWING NUMBER CB101
SHEET 1 OF 2

NOTES FOR CATCH BASIN NO. 4

1. Dimensions: Unless otherwise specified.

V = 3.5 feet.

T = 6 inches, if V is 4 feet or less.

T = 8 inches, if V is between 4 feet and 8 feet.

T = 10 inches, if V is 8 feet or over.

W = 2 feet, 11-3/8 inches for one grating.

Add 3 feet, 5-3/8 inches for each additional grating.

Hike-up shall be parallel to plane of gutter - slope 3/4 inch to 1 foot.

Slope of floor parallel with curb shall be 1 in 12.

S = 1 1/2 inches.

R = 3/4 inch.

2. Concrete shall be Class "A" Portland Cement Concrete (6.0 Sack).
3. The reinforcing steel shall be Number 4 deformed bars. Clearance shall be 1-1/2 inches from top of slab. See standard drawing CB106 and note 3.
4. The surface of all exposed concrete shall conform to slope, grade, color, finish, and scoring in the existing of proposed curb and walk adjacent to the basin. The basin floor shall be given a tight wood float finish. Curvature of the lip and sidewalls at the gutter opening shall not be made by plastering. The outlet pipe shall be trimmed to final shape and length before the concrete is poured.
5. Steps: 3/4 inch plain round galvanized steel steps are required as follows:

If V is 4.5 feet or less, no steps are required.

If V is more than 4.5 feet, and not more than 5.0 feet, install one step 12 inches above floor of basin.

If V is more than 5.0 feet, install steps 16 inches apart, with the top step 6 inches below the top of grating.

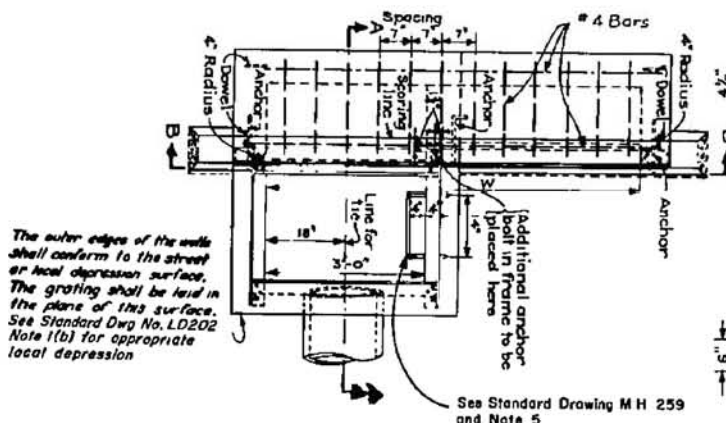
All steps shall be 4 inches clear from the wall, and anchored not less than 4 inches in wall of basin.



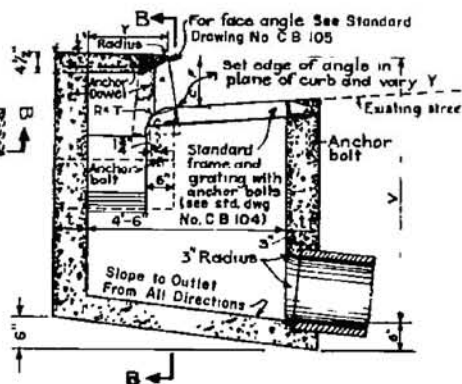
RIVERSIDE COUNTY FLOOD CONTROL AND WATER CONSERVATION DISTRICT	
APPROVED BY:	<i>Warren D. Williams</i>
CHIEF ENGINEER	
DATE: April 5, 2004	R.C.E. NO. 32336

CATCH BASIN
NO. 4

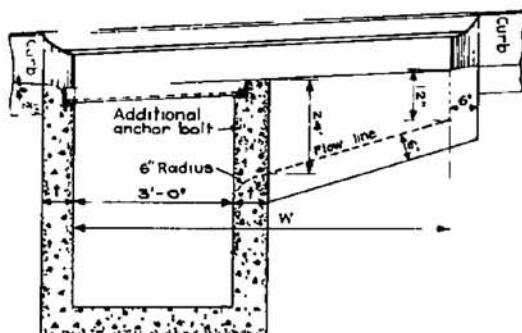
STANDARD DRAWING NUMBER CB101
SHEET 2 OF 2



PLAN



SECTION A-A



SECTION B-B



NOTES

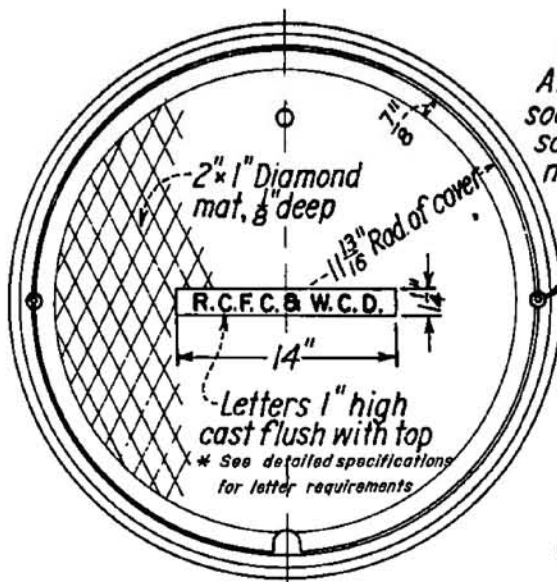
1. DIMENSIONS: UNLESS OTHERWISE SPECIFIED $V = 4.5$ FEET. $W = 7.0$ FEET
 $T = 6$ INCHES IF V IS 5 FEET OR LESS. $T = 8$ INCHES IF V IS BETWEEN 5 FT. & 6 FEET.
 $T = 10$ INCHES IF V IS 6 FEET OR MORE. $Y = 2$ FEET 3 INCHES
2. CONCRETE SHALL BE CLASS "A" PORTLAND CEMENT CONCRETE (6.0 SACK).
3. THE REINFORCING STEEL SHALL BE NUMBER 4 DEFORMED BARS. CLEARANCE SHALL BE $1\frac{1}{2}$ " FROM THE BOTTOM OF THE SLAB. SEE STANDARD DRAWING CB106-NOTE 3
4. THE SURFACE OF ALL EXPOSED CONCRETE SHALL CONFORM TO SLOPE, GRADE, COLOR, FINISH, AND SCORING IN THE EXISTING OR PROPOSED CURB AND WALK ADJACENT TO THE BASIN. THE BASIN FLOOR SHALL BE GIVEN A TIGHT WOOD FLOAT FINISH. CURVATURE OF THE LIP AND SIDEWALLS AT THE GUTTER OPENING SHALL NOT BE MADE BY PLASTERING. THE OUTLET PIPE SHALL BE TRIMMED TO FINAL SHAPE AND LENGTH BEFORE THE CONCRETE IS POURED.
5. STEPS: $\frac{3}{4}$ INCH PLAIN ROUND GALVANIZED STEEL STEPS SHALL BE INSTALLED 16 INCHES APART WHEN V EXCEEDS 4 FEET 6 INCHES. THE TOP STEP SHALL BE 6 INCHES BELOW THE TOP SURFACE AND SHALL BE $2\frac{1}{2}$ INCHES CLEAR FROM THE WALL. ALL OTHER STEPS SHALL BE 4 INCHES CLEAR FROM THE WALL. ONLY ONE STEP 12 INCHES FROM THE BOTTOM SHALL BE INSTALLED IF V IS 4 FEET 6 INCHES OR LESS. ALL STEPS SHALL BE ANCHORED NOT LESS THAN 4 INCHES INTO THE WALL OF THE BASIN.



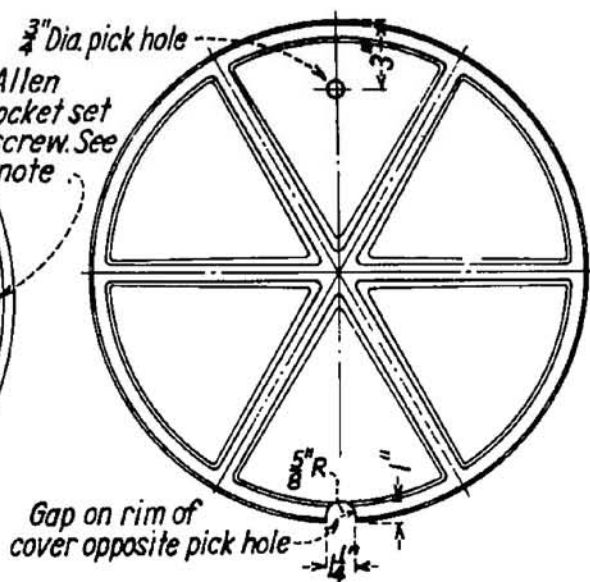
RIVERSIDE COUNTY FLOOD CONTROL AND WATER CONSERVATION DISTRICT	
APPROVED BY: <i>Warren D. Willms</i>	
CHIEF ENGINEER	
DATE: April 5, 2004	R.C.E. NO. 32338

CATCH BASIN
NO. 6

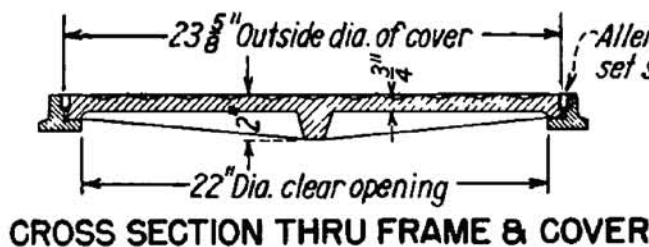
STANDARD DRAWING NUMBER CB102



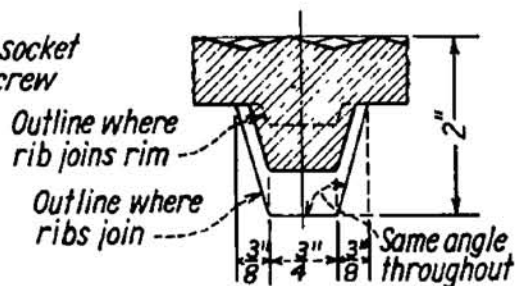
TOP OF MANHOLE FRAME & COVER
TOTAL WT. = 130 lbs.



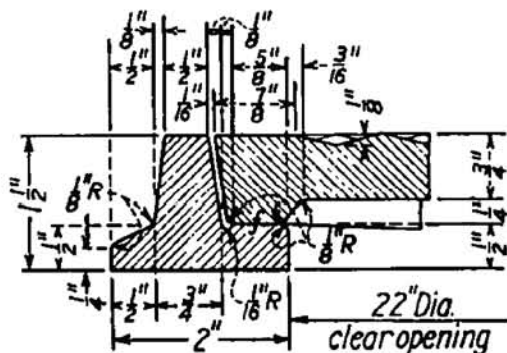
BOTTOM OF MANHOLE COVER



CROSS SECTION THRU FRAME & COVER



CROSS SECTION THRU RIB AT MID RADIUS



CROSS SECTION THRU RIM

NOTES

1. Frame and cover shall be gray cast iron conforming to the latest A.S.T.M. standard A48, class 30 or better. Galvanize per A.S.T.M. A385.
2. Install two 3/4" x 3/4" Allen socket set screws, 90° to pick hole, in holes drilled and tapped 1" in depth. Galvanize per A.S.T.M. A153.
3. Frame and cover shall be tested for accuracy of fit and shall be marked in sets before delivery. Retap frame as required to suit set screws.



RIVERSIDE COUNTY FLOOD CONTROL
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APPROVED BY:
Warren O. Willits
CHIEF ENGINEER

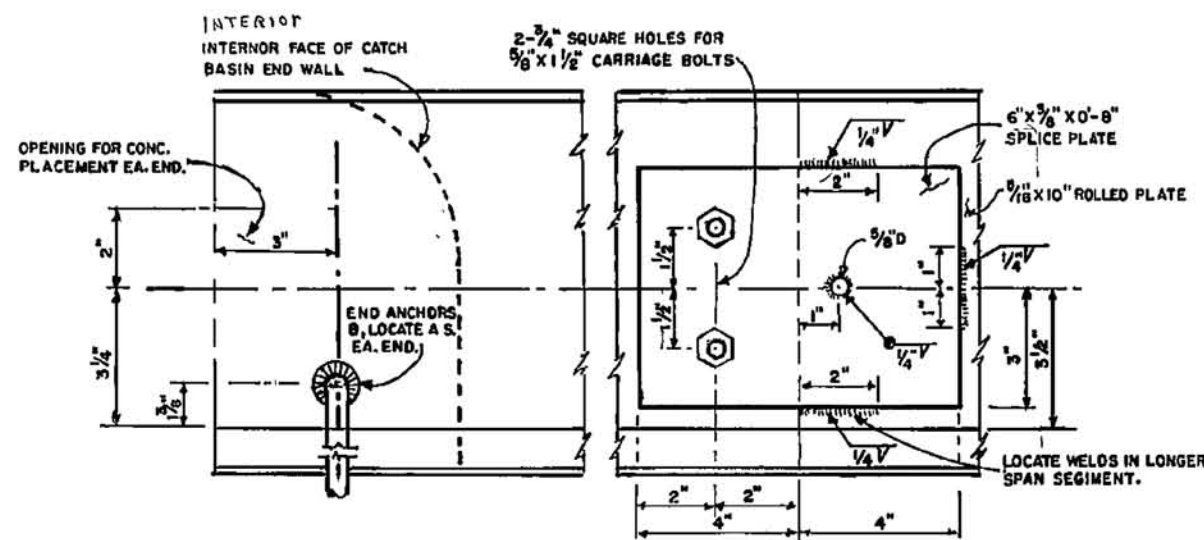
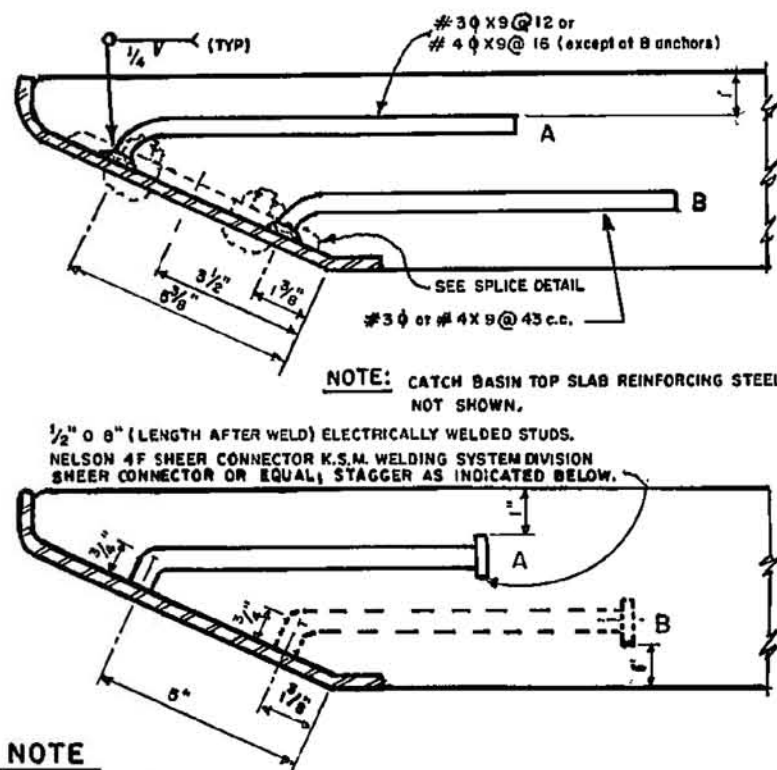
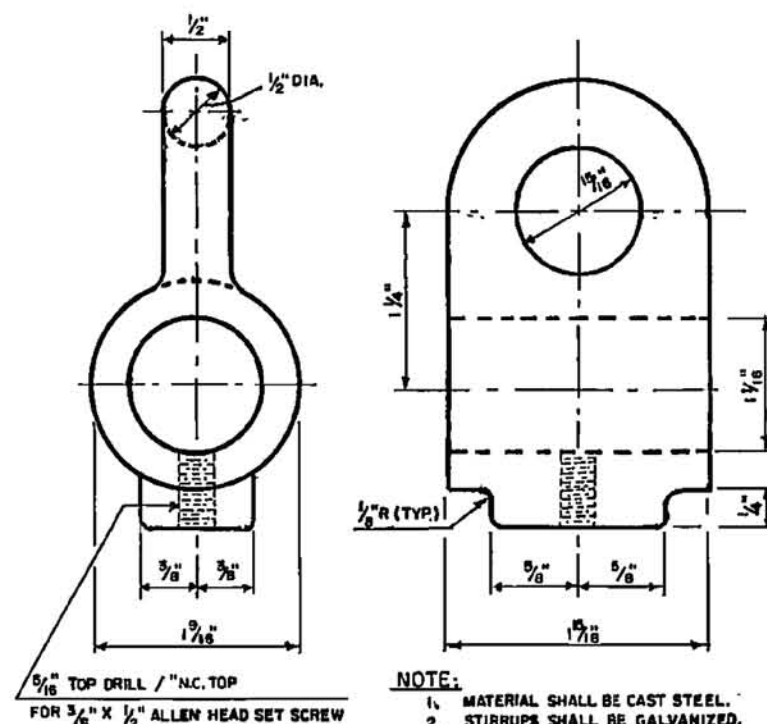
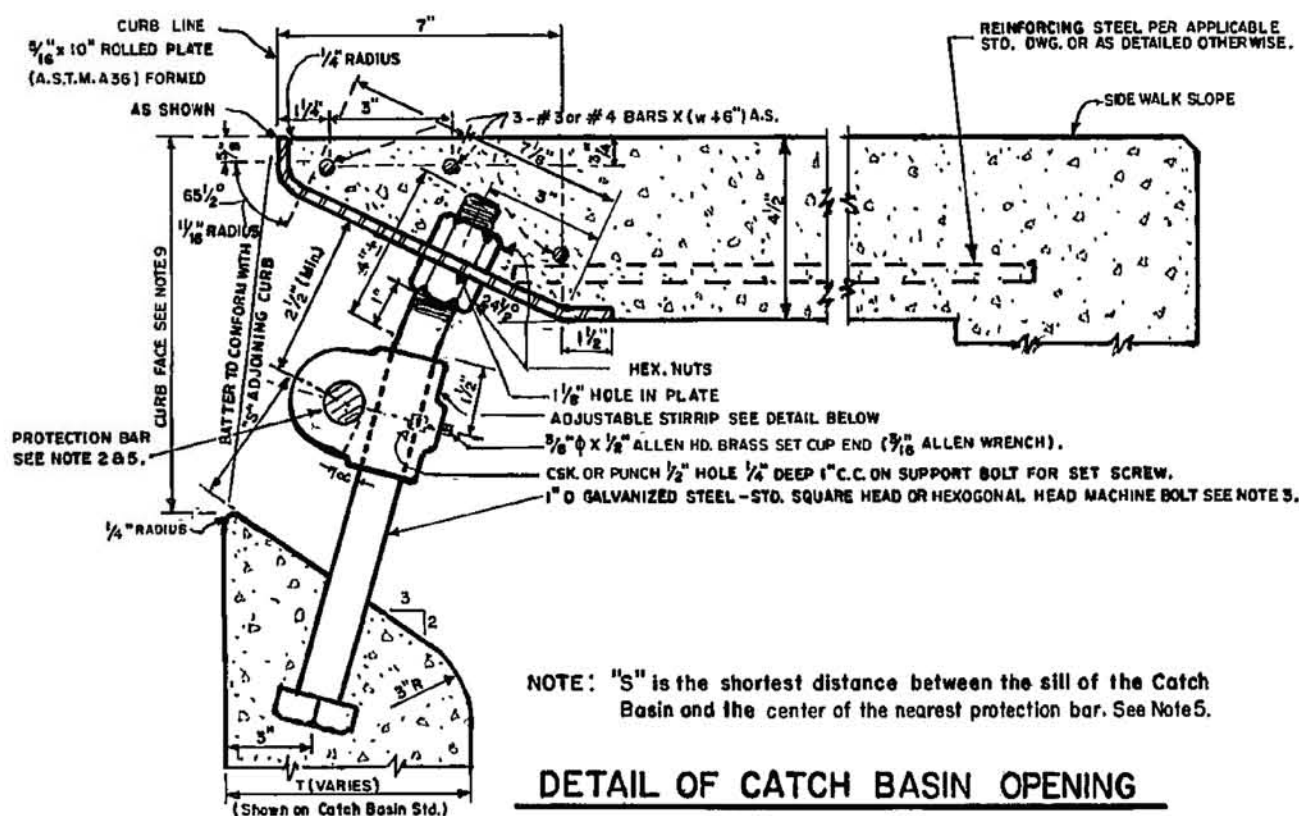
DATE: April 5, 2004

**MANHOLE FRAME &
COVER FOR CATCH BASINS**

STANDARD DRAWING NUMBER CB103

NOTES

- SUPPORT BOLT ANGLE ∞ SHALL VARY TO CONFORM WITH BATTER OF ADJOINING CURB.
- PROTECTION BAR SHALL BE INSTALLED AND SUPPORT BOLTS SPACED, ACCORDING TO SHEET 2 of 2.
- SUPPORT BOLTS SHALL BE EQUAL IN LENGTH TO CURB FACE + 4" $\pm$ FOR ALL CURB BATTERS.
- ALL EXPOSED METAL PARTS SHALL GALVANIZED AFTER FABRICATION.
- PROTECTION BAR SPACING, PROTECTION BAR "S" SHALL BE INSTALLED WHEN THE MINIMUM CLEAR OPENING OF THE CATCH BASIN EXCEEDS 6" BAR "S" SHALL BE PLACED SUCH THAT NO MINIMUM CLEAR OPENING EXCEED 6".
 - WHEN ONE BAR IS REQUIRED "S" SHALL BE 6 3/4" HOWEVER THIS SHALL BE REDUCED IF NECESSARY SO THAT THE CENTER OF THE PROTECTION BAR IS NOT LESS THAN 2 1/4" FROM THE ROLLED PLATE.
 - WHEN TWO OR MORE BARS ARE REQUIRED "S" SHALL BE 6 3/4" WITH REMAINING BARS SPACED AT 6 3/4" c.c. THE SPACING OF TOP BAR SHALL BE REDUCED IF NECESSARY SO THAT THE CENTER OF THE BAR IS NOT LESS THAN 2 1/2" FROM THE ROLLED PLATE.
- WHERE CATCH BASIN ARE TO BE CONSTRUCTED ON CURVES, THE MAXIMUM CHORD LENGTH FOR FACE PLATE SHALL BE SUCH THAT THE MAXIMUM DIMENSION FROM SAID CHORD (MEASURED PERPENDICULAR THERETO) TO THE TRUE CURVE WILL NOT EXCEED ONE INCH. WHERE MORE THAN ONE CHORD IS REQUIRED, CHORD LENGTH SHALL BE EQUAL.
- WHERE LENGTH OF FACE PLATE IS BETWEEN 22' AND 43', TWO SECTIONS MAY BE USED WHEN LENGTH EXCEEDS 43', THREE SECTIONS MAY BE USED. SECTIONS SHALL BE SPLICED ACCORDING TO THE SPLICE DETAIL. SPLICE SHALL BE PLACED ONE FOOT FROM SUPPORT BOLT SEE SHEET 2 of 2.
- LENGTH OF FACE PLATE IS W + 12" FOR ALL CATCH BASINS EXCEPT THE DRIVEWAY CATCH BASIN.
- CATCH BASIN OPENING = NORMAL CURB FACE + 4" INCHES UNLESS OTHERWISE SPECIFIED.
- SPACING OF ALL ANCHORAGE**
 - SET END ANCHORS 3" FROM ENDS OF FACE PLATE.
 - PLACE ONE A ANCHOR AT EACH SIDE OF ANY AND ALL SPLICE JOINTS AND WITHIN 6" THEREOF.



NOTE

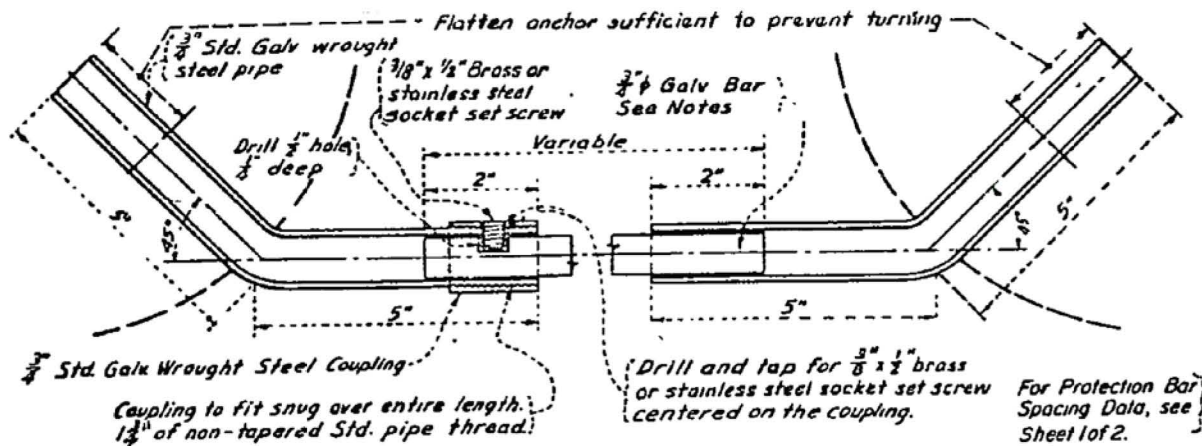
Reinforcing Steel and Splice not shown Above Details. Space Anchors approximately evenly at 15" max. c.c. between end anchors and anchors at splice joints except omit at B anchor location. Space B anchors at approximately 45" max. between end anchors.

ALTERNATE METHODS FOR FACE PLATE ANCHORAGE

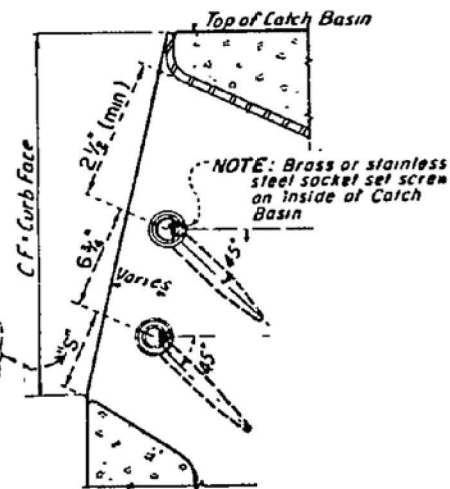
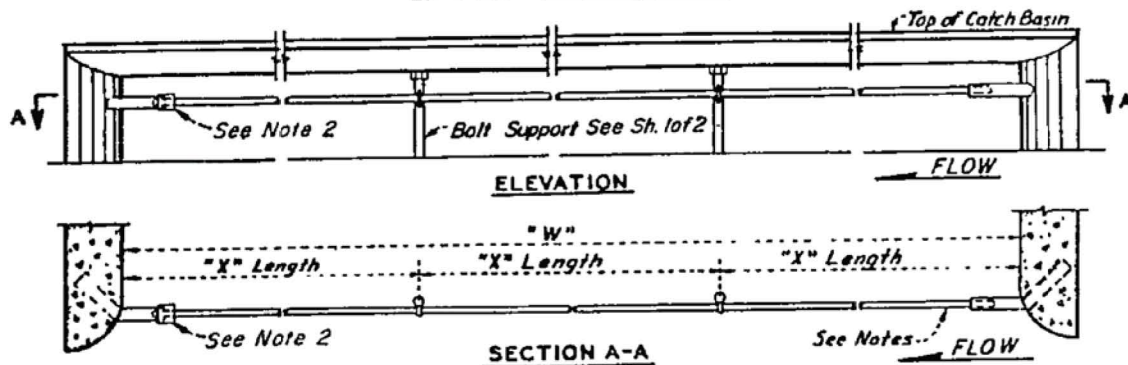


RIVERSIDE COUNTY FLOOD CONTROL AND WATER CONSERVATION DISTRICT	
APPROVED BY:	<i>Warren D. Williams</i>
CIVIL ENGINEER	
DATE: April 5, 2004	R.C.E. NO. 32336

DETAIL OF CATCH BASIN OPENING & INSTALLATION DETAILS
STANDARD DRAWING NUMBER CB105
SHEET NO. 1 OF 2



DETAIL OF ANCHOR



SECTION SHOWING LOCATION OF ANCHOR AT WALL OF CATCH BASIN

"W" (in.)	NUMBER OF SUPPORT BOLTS	NUMBER OF "X" LENGTHS
5' to 10'	1	2
10' to 15'	2	3
15' to 20'	3	4
20' to 25'	4	5
25' to 30'	5	6

NOTES:

- All bars shall be $\frac{3}{4}$ " Galv, hot-rolled steel per A.S.T.M Designation A-36. Bar lengths shall not exceed 21', and shall be cut to fit in field. When "W" is over 21', protection bar shall consist of two or more sections depending upon length of basin. Location of special support bars and additional socket set screw shall be determined by the Engineer in the field.
- Install coupling at downstream end of catch basin opening

RIVERSIDE COUNTY FLOOD CONTROL
AND
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APPROVED BY: *Warren O. Williams*
CHIEF ENGINEER

DATE: April 5, 2004

R.C.E. NO. 32336

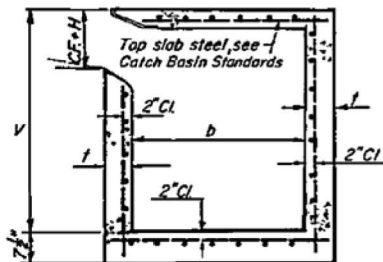
STANDARD DRAWING NUMBER CB105
SHEET NO. 2 OF 2

REMOVABLE PROTECTION
BAR FOR CATCH BASINS

W OF C.B.	V(ft.)	1	FRONT WALL STEEL		REAR & END WALLS & FLOOR STEEL	
From	To	(in)	Hor.	Vert.	Each Way	
to 7'	4	6	#3 @ 6"	#3 @ 6"	#3 @ 6"	
to 7'	4	8	#4 @ 12"	#4 @ 12"	#4 @ 12"	
to 7'	8	12	#4 @ 10"	#4 @ 10"	#4 @ 10"	
14'	4	6	#3 @ 6"	#3 @ 6"	#3 @ 6"	
14'	4	8	#4 @ 12"	#4 @ 12"	#4 @ 12"	
14'	8	10	#4 @ 8"	#4 @ 12"	#4 @ 10"	
14'	10	12	#4 @ 6"	#4 @ 12"	#4 @ 10"	

WALL AND FLOOR STEEL

CATCH BASIN REINFORCEMENT—"W" to 14' (Incl.)



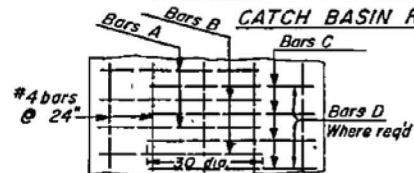
SECTION 1

Top Slab Steel, See Catch Basin Standards

V(ft.)	1	FRONT WALL STEEL		REAR WALL STEEL			END WALL STEEL
From	To	(in)	Bars A & B	Bars C	Bars D	Bars E	Hor. & Vert.
4	6	8	#3 @ 24"	#3 @ 12"	—	#4 @ 24"	#3 @ 18"
4	5	8	#3 @ 20"	#3 @ 12"	—	#4 @ 24"	#3 @ 14"
5	6	8	#3 @ 12"	#3 @ 10"	—	#4 @ 24"	#3 @ 14"
6	7	8	#4 @ 17"	#3 @ 8 1/2"	—	#4 @ 24"	#3 @ 14"
7	8	8	#4 @ 13"	#3 @ 6 1/2"	—	#4 @ 24"	#3 @ 14"
8	9	10	#4 @ 15"	#3 @ 7 1/2"	—	#4 @ 20"	#3 @ 11"
9	10	10	#4 @ 12"	#4 @ 12"	—	#4 @ 20"	#3 @ 11"
10	11	10	#5 @ 15"	—	#4 @ 11"	#4 @ 18"	#3 @ 11"
11	12	10	#6 @ 18"	—	#4 @ 9"	#4 @ 13"	#3 @ 11"
X=(V+1)-(CF+H+4 1/2')			Y=(b+21 1/2')/2 + 15 dia. - 2"				

WALL AND FLOOR STEEL

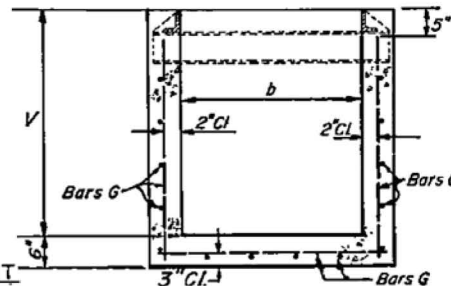
CATCH BASIN REINFORCEMENT—"W" GREATER THAN 14'



FLOOR REINFORCEMENT SECTION 2

V(ft.)	1	SIDE & END WALL STEEL	
From	To	(in)	Bars G
4	6	8	#3 @ 6"
4	8	8	#4 @ 6"
8	12	10	#5 @ 6"

GRATING BASIN REINFORCEMENT



NOTES

1. Wall & floor reinforcing shown hereon shall be used with Catch Basin Standard Drawings.
2. Reinforcing steel shown hereon shall be used in all Catch Basins on State Highways regardless of basin length or depth.
3. Provide wall & floor steel reinforcing when the following V depths are equaled or exceeded.
 Basin length=W Basin depth=V
 To 7.0' 10'
 7' To 14.0' 7'
 14' To 21.0' 6'
 Over 21.0' All Depths

Reinforcing steel shown hereon shall be used in all catch basins when excavation or soil conditions require both sides of the walls to be formed regardless of basin length or depth.



RIVERSIDE COUNTY FLOOD CONTROL AND WATER CONSERVATION DISTRICT

APPROVED BY: *Warren D. Williams*

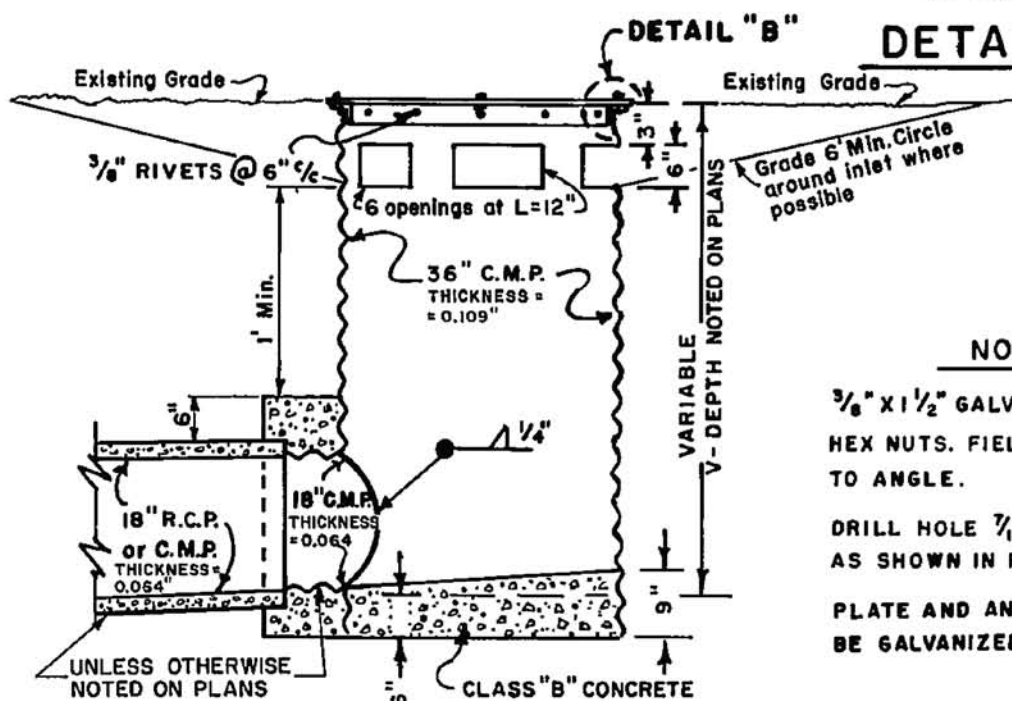
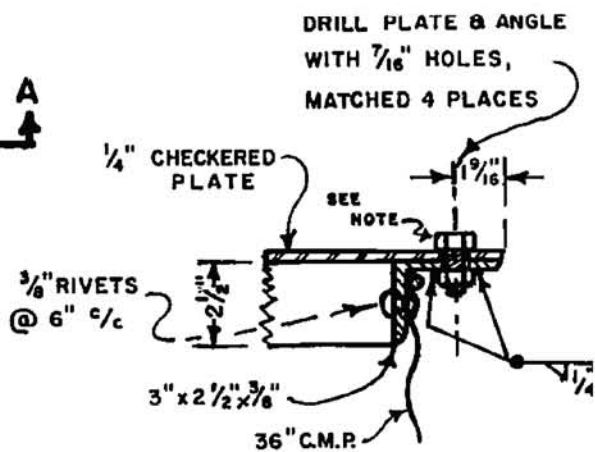
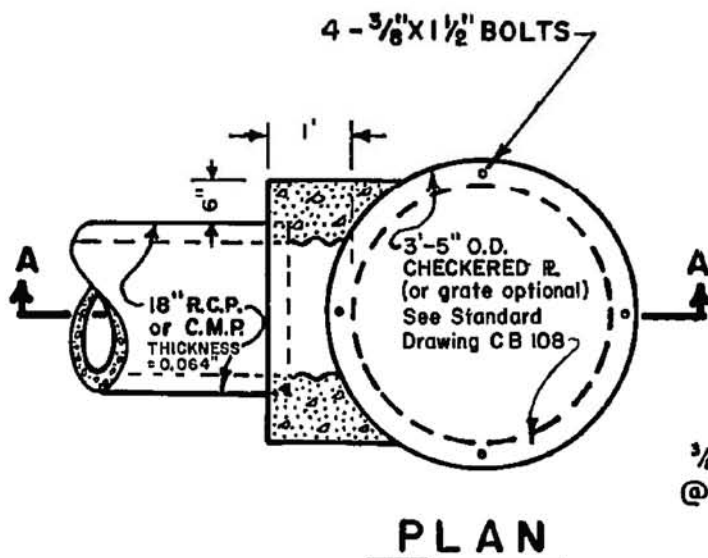
CHIEF ENGINEER

DATE: April 5, 2004

R.C.E. NO. 32336

CATCH BASIN REINFORCEMENT

STANDARD DRAWING NUMBER CB106



NOTES

3/8" x 1 1/2" GALVANIZED BOLTS WITH HEX NUTS. FIELD WELD EACH NUT TO ANGLE.

DRILL HOLE 7/16" MATCHED 4 PLACES AS SHOWN IN PLAN.

PLATE AND ANGLE ASSEMBLY SHALL BE GALVANIZED.

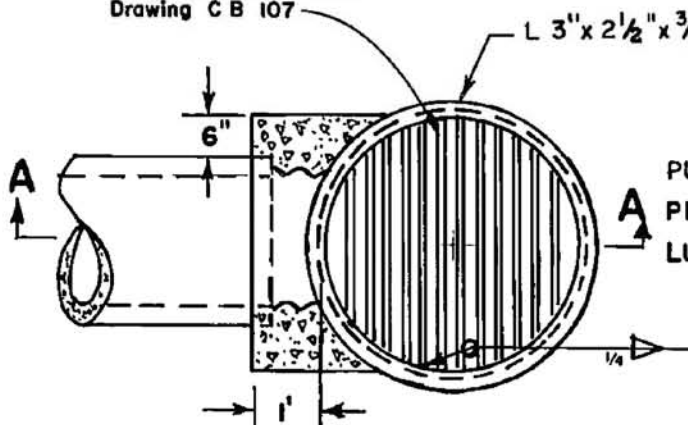


RIVERSIDE COUNTY FLOOD CONTROL AND WATER CONSERVATION DISTRICT	
APPROVED BY:	<i>Warren D. Williams</i>
CHIEF ENGINEER	
DATE: April 5, 2004	

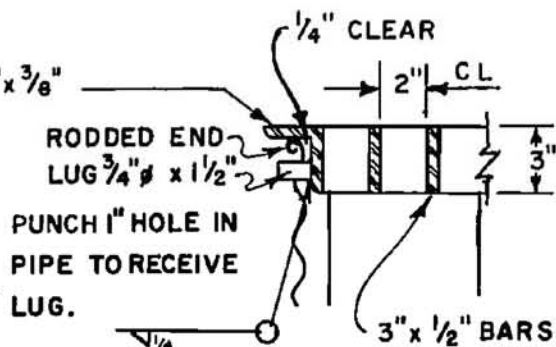
**INLET TYPE IX
(CHECKERED PLATE)
FOR TEMPORARY USE ONLY**

STANDARD DRAWING NUMBER CB107

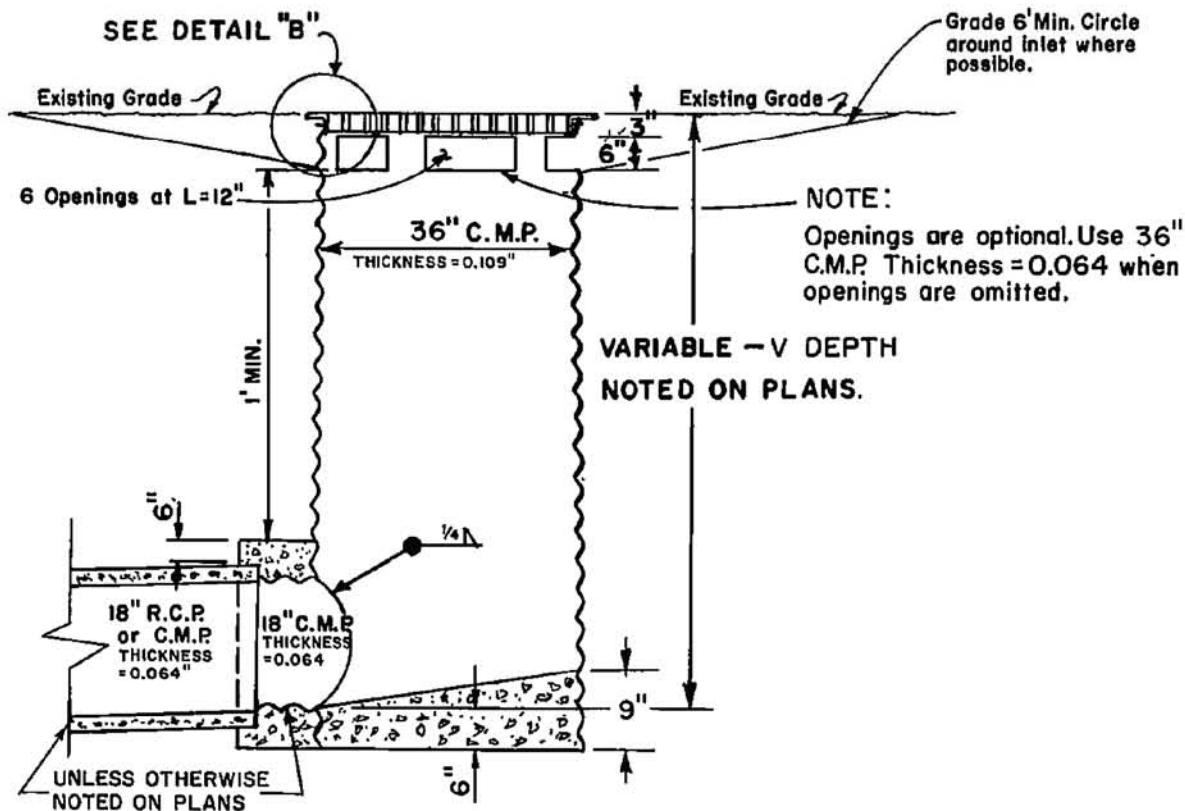
GRATE (or checkered R.
optional) See Standard
Drawing C B 107



PLAN



DETAIL "B"



SECTION A-A

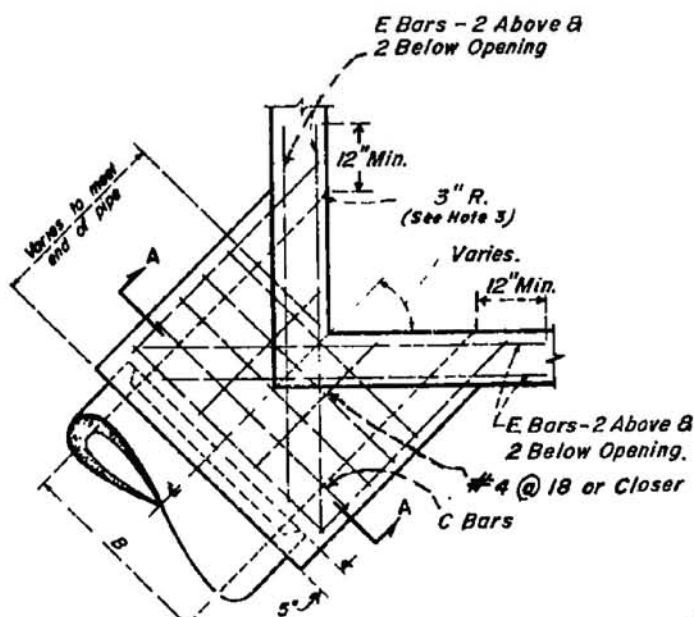
NOTES:

1. PLACE GRATE BARS PARALLEL TO FLOW.
2. GRATE AND FRAME SHALL BE GALVANIZED.

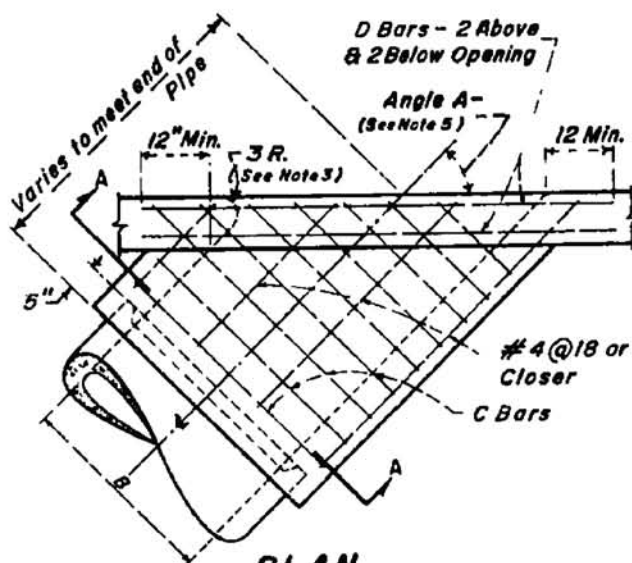


RIVERSIDE COUNTY FLOOD CONTROL AND WATER CONSERVATION DISTRICT	
APPROVED BY:	<i>Warren D. Willits</i>
CHIEF ENGINEER	
DATE: April 5, 2004	

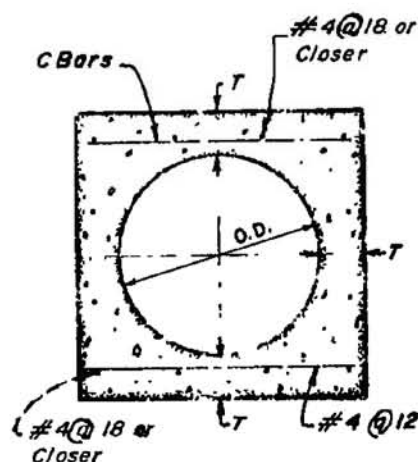
INLET TYPE X
(GRATE DETAILS)
FOR TEMPORARY USE ONLY
STANDARD DRAWING NUMBER CB108



**PLAN
CORNER CONNECTION**



**PLAN
SIDE CONNECTION**



SECTION A-A

NOTES

1. Reinforcing steel shall be $1\frac{1}{2}$ " clear from inside face of concrete unless otherwise shown.
2. Reinforcing steel for inside face of Catch Basin wall shall be cut at center of opening and bent into walls of monolithic connection. Reinforcing steel for outside face of Catch Basin wall shall be cut 2" clear of opening.
3. Connection shall be poured monolithic with Catch Basin. The rounded edge of outlet shall be constructed by pouring concrete against a curved form with a radius of 3."
4. Floor of structure shall be steel-troweled to spring line.
5. Connections shall be constructed where
(a). Pipes, 12 inches through 72 inches in diameter, inlet or outlet through corner of Catch Basin at an angle less than 40°
(b). Angle A, for pipes 24 inches through 30 inches in diameter, is less than 45° .

B	T	C bars	D & E bars	B	T	C bars	D & E bars
12"	4"			42"	7 1/4"		
15"	4 1/4"			45"	7 3/4"		
18"	4 1/2"			48"	8"		
21"	5"			51"	8 1/4"		
24"	5 1/4"			54"	8 1/2"		
27"	5 1/2"			57"	9"		
30"	6"			60"	9 1/4"		
33"	6 1/4"			63"	9 1/2"		
36"	6 1/2"			66"	10"		
39"	7"			69"	10 1/4"		
				72"	11"		

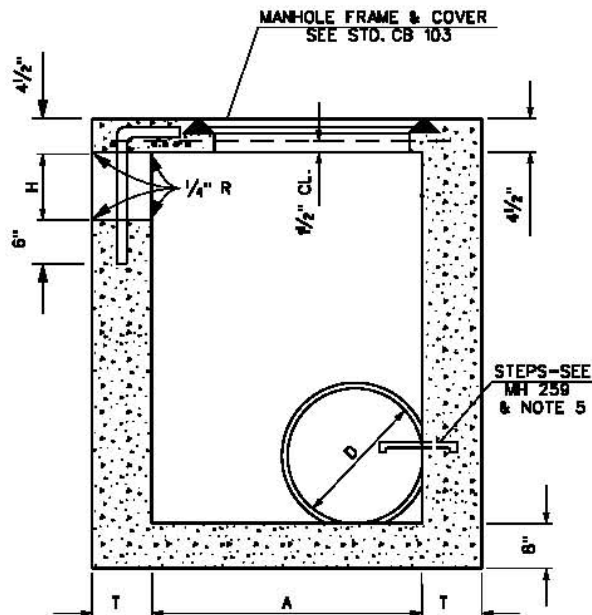
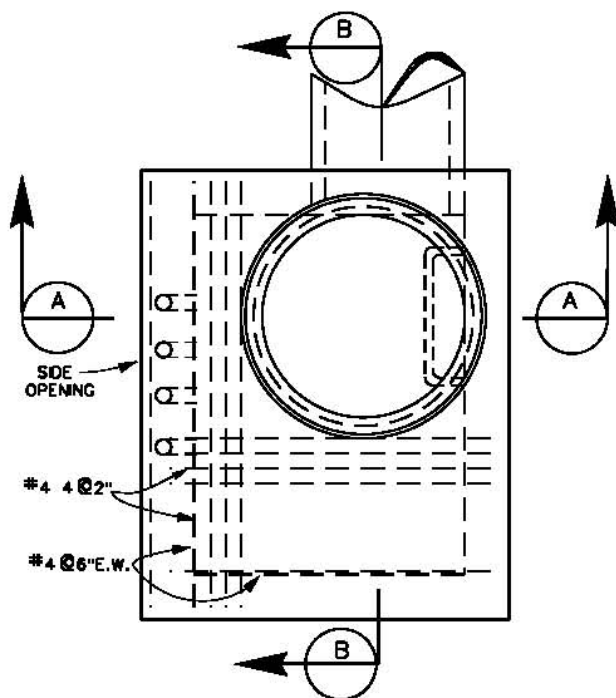


RIVERSIDE COUNTY FLOOD CONTROL
AND
WATER CONSERVATION DISTRICT

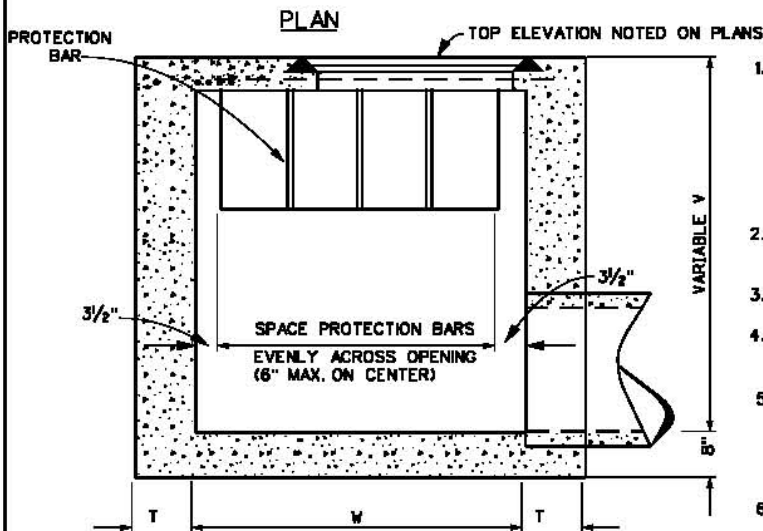
APPROVED BY: *Warren D. Willmats*
CHIEF ENGINEER
DATE: April 5, 2004

**SPECIAL CONNECTIONS
TO CATCH BASIN**

STANDARD DRAWING NUMBER CB109



SECTION A



SECTION B

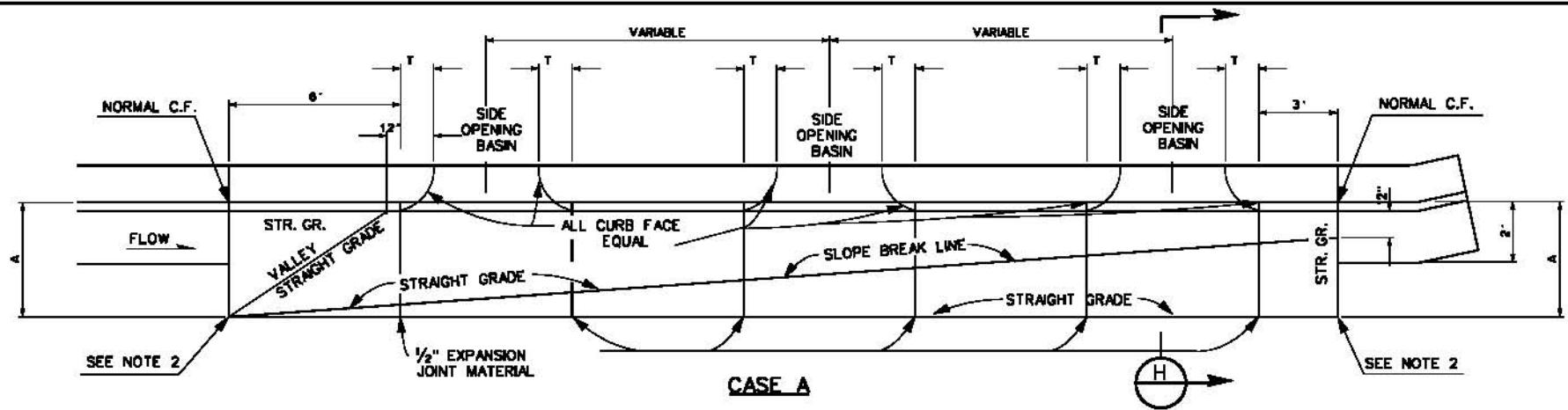
1. DIMENSIONS:
 H = 9" OR AS NOTED ON PLANS
 V = SHALL BE SHOWN ON THE PLANS (8" MAX.)
 W = SHALL BE 36" OR AS NOTED ON PLANS.
 T = 6" IF V IS 4' OR LESS.
 T = 8" IF V IS 8' OR LESS
 D = 18" UNLESS OTHERWISE SPECIFIED.
 A = 36" UNLESS OTHERWISE SPECIFIED.
2. SEE STANDARD DRAWING CB 106 FOR WALL AND FLOOR STEEL REINFORCING
3. STRUCTURAL CONCRETE SHALL BE CLASS "A".
4. REINFORCING STEEL SHALL BE NO. 4 DEFORMED BARS. CLEARANCE SHALL BE $\frac{1}{2}$ " FROM BOTTOM OF SLAB.
5. THE BASIN FLOOR SHALL BE GIVEN A TIGHT WOOD FLOAT FINISH. CURVATURE OF THE LIP & SIDEWALLS AT THE SIDE OPENING SHALL NOT BE MADE BY PLASTERING. THE OUTLET PIPE SHALL BE TRIMMED TO FINAL SHAPE & LENGTH BEFORE THE CONCRETE IS POURED.
6. STEPS: $\frac{3}{4}$ " PLAN ROUND GALVANIZED STEEL STEPS SHALL BE INSTALLED 16" APART WHEN V EXCEEDS 4'-6". THE TOP STEP SHALL BE 6" BELOW THE TOP SURFACE & SHALL BE $2\frac{1}{2}$ " CLEAR FROM THE WALL. ALL OTHER STEPS SHALL BE 4" CLEAR FROM THE WALL. ONLY ONE STEP 12" FROM THE BOTTOM SHALL BE ANCHORED NOT LESS THAN 4" INTO THE WALL OF THE BASIN.
7. PROTECTION BARS ARE PLAN ROUND STEEL BARS 1" DIAMETER AND SHALL BE INSTALLED WITH ENDS EMBEDDED 6".
8. ALL EXPOSED METAL PARTS SHALL BE GALVANIZED.
9. SLOPE BOTTOM TO OUTLET FROM ALL DIRECTIONS.



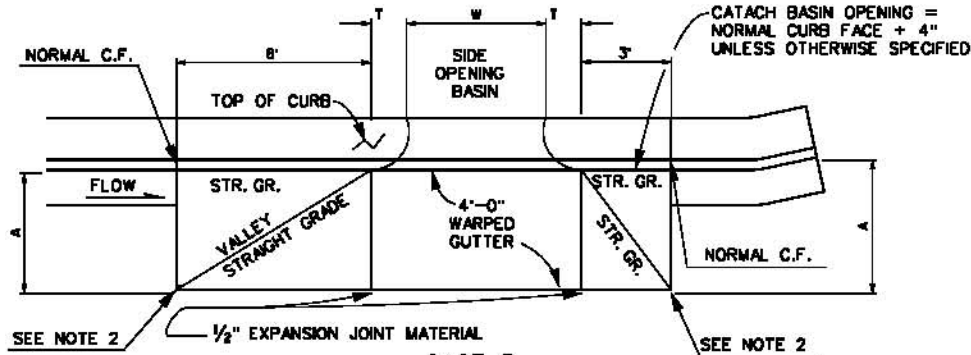
RIVERSIDE COUNTY FLOOD CONTROL
AND
WATER CONSERVATION DISTRICT
APPROVED BY:
CHIEF ENGINEER
DATE: April 15, 2004

CONCRETE
DROP INLET

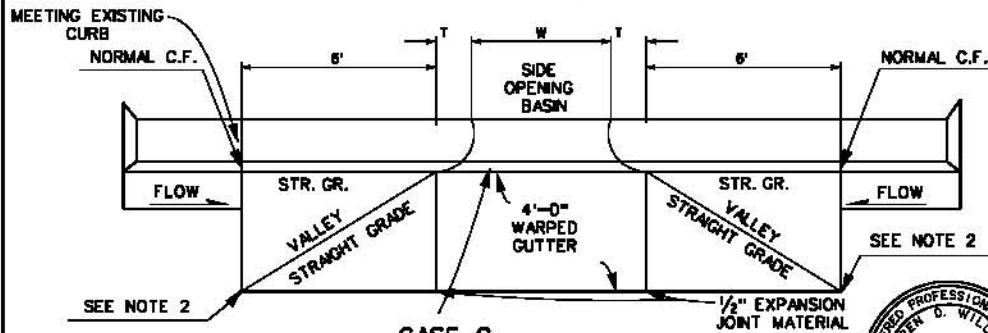
STANDARD DRAWING NUMBER CB110



CASE A

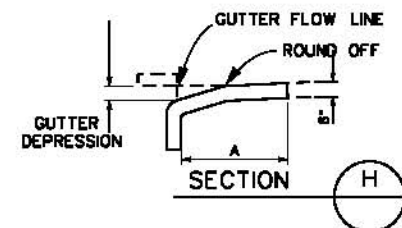


CASE B



CASE C

CATCH BASIN OPENING =
NORMAL CURB FACE + 4"
UNLESS OTHERWISE SPECIFIED



NOTES

1. LOCAL DEPRESSION SHALL BE CASE B OTHERWISE SPECIFIED ON GENERAL PLAN.
2. ELEVATIONS AT OUTER CORNERS SHOWN ON GENERAL PLAN. IF NO ELEVATIONS ARE SPECIFIED, THE OUTER EDGE OF LOCAL DEPRESSION SHALL CONFORM TO FINISHED STREET SURFACE.
3. A = 4' UNLESS OTHERWISE SPECIFIED.
T = SEE STANDARD DRAWING CB-100, NOTE 1.
W = SEE STANDARD DRAWING CB-100, NOTE 1.
4. WHERE NO CURB EXIST, CURBS SHALL BE CONSTRUCTED BETWEEN ENDS OF LOCAL DEPRESSION. CURB SECTION SHALL CONFORM TO THAT OF CONTROLLING AGENCY.
5. DEPRESSION SHALL BE CLASS "B" CONCRETE



RIVERSIDE COUNTY FLOOD CONTROL
AND
WATER CONSERVATION DISTRICT

APPROVED BY:

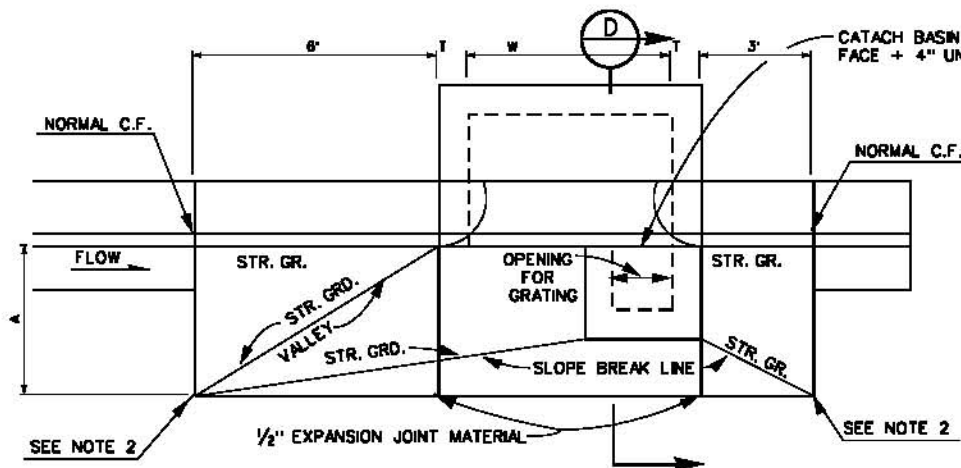
CHIEF ENGINEER

DATE: April 5, 2004

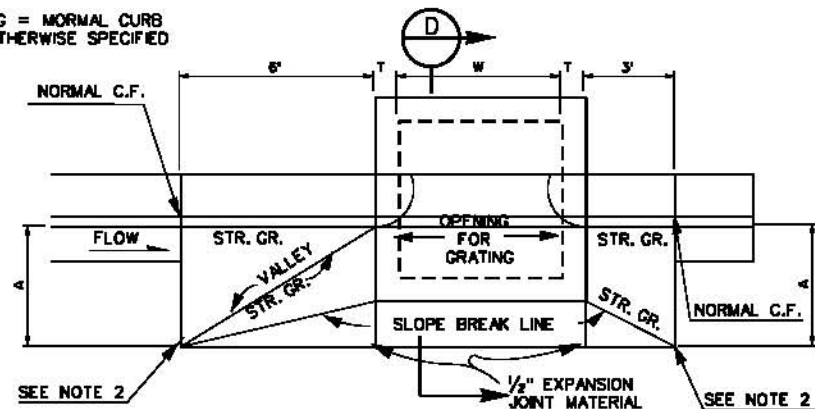
R.C.E. NO. 32336

LOCAL DEPRESSION
NO. 2

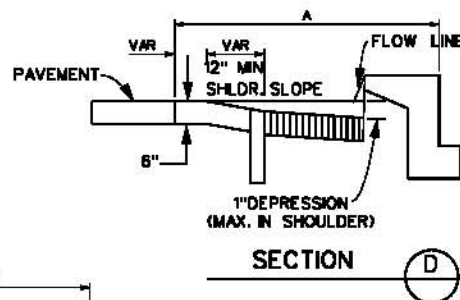
STANDARD DRAWING NUMBER LD201



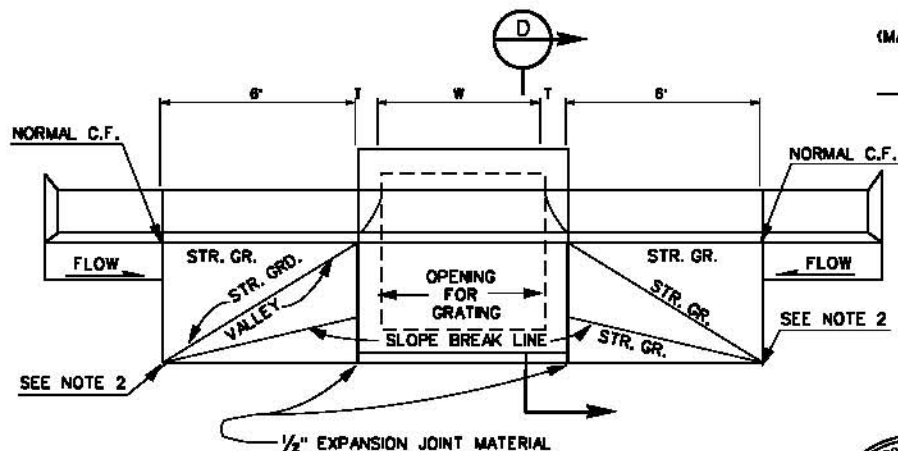
CASE B



CASE A



SECTION



CASE C

NOTES

1. LOCAL DEPRESSION SHALL BE:
(A) CASE "A" FOR CATCH BASIN NO. 4 (SEE STANDARD DRAWING CB 101) UNLESS OTHERWISE SPECIFIED.
(B) CASE "B" FOR CATCH BASIN NO. 6 (SEE STANDARD DRAWING CB 102) UNLESS OTHERWISE SPECIFIED.
2. ELEVATIONS AT OUTER CORNERS SHOWN ON PROJECT DRAWINGS. IF NO ELEVATIONS ARE SPECIFIED, THE OUTER EDGE OF LOCAL DEPRESSION SHALL CONFORM TO FINISHED STREET SURFACE.
3. A= 4' UNLESS OTHERWISE SPECIFIED.
T= SEE STANDARD DRAWING CB101 OR CB102
W= SEE STANDARD DRAWING CB101 OR CB102
4. WHERE NO CURB EXIST, CURBS SHALL BE CONSTRUCTED BETWEEN ENDS OF LOCAL DEPRESSION. CURB SECTION SHALL CONFORM TO THAT OF CONTROLLING AGENCY.
5. DEPRESSION SHALL BE CLASS "B" CONCRETE



RIVERSIDE COUNTY FLOOD CONTROL AND WATER CONSERVATION DISTRICT	
APPROVED BY: <i>Warren D. Williams</i>	
CHIEF ENGINEER	
DATE: April 5, 2004	R.C.E. NO. 32336

**LOCAL DEPRESSION
NO. 3**

STANDARD DRAWING NUMBER LD202

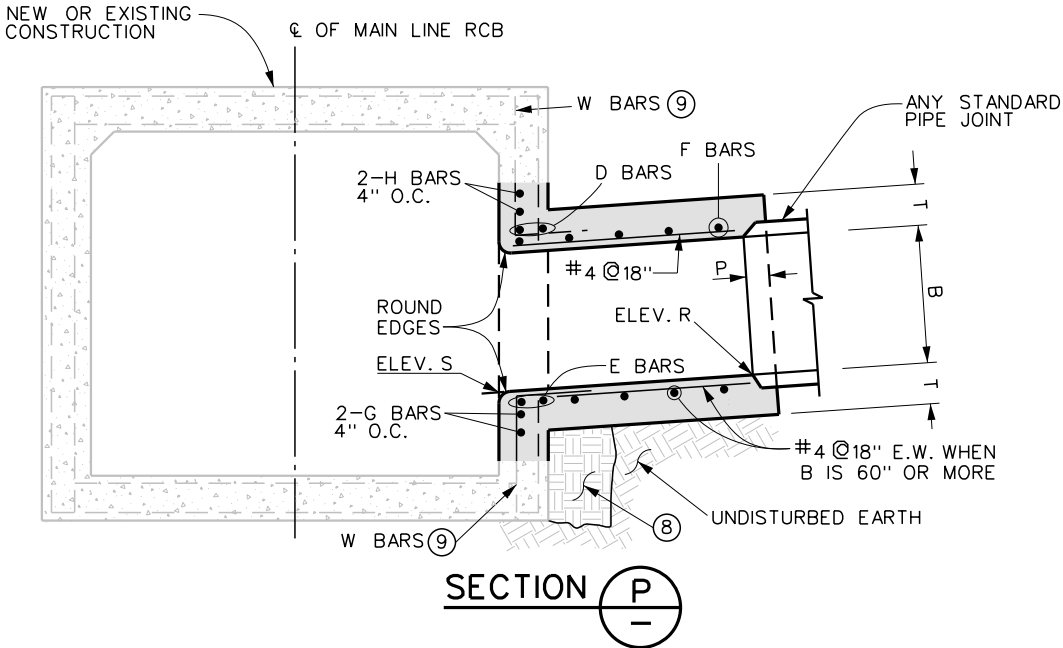
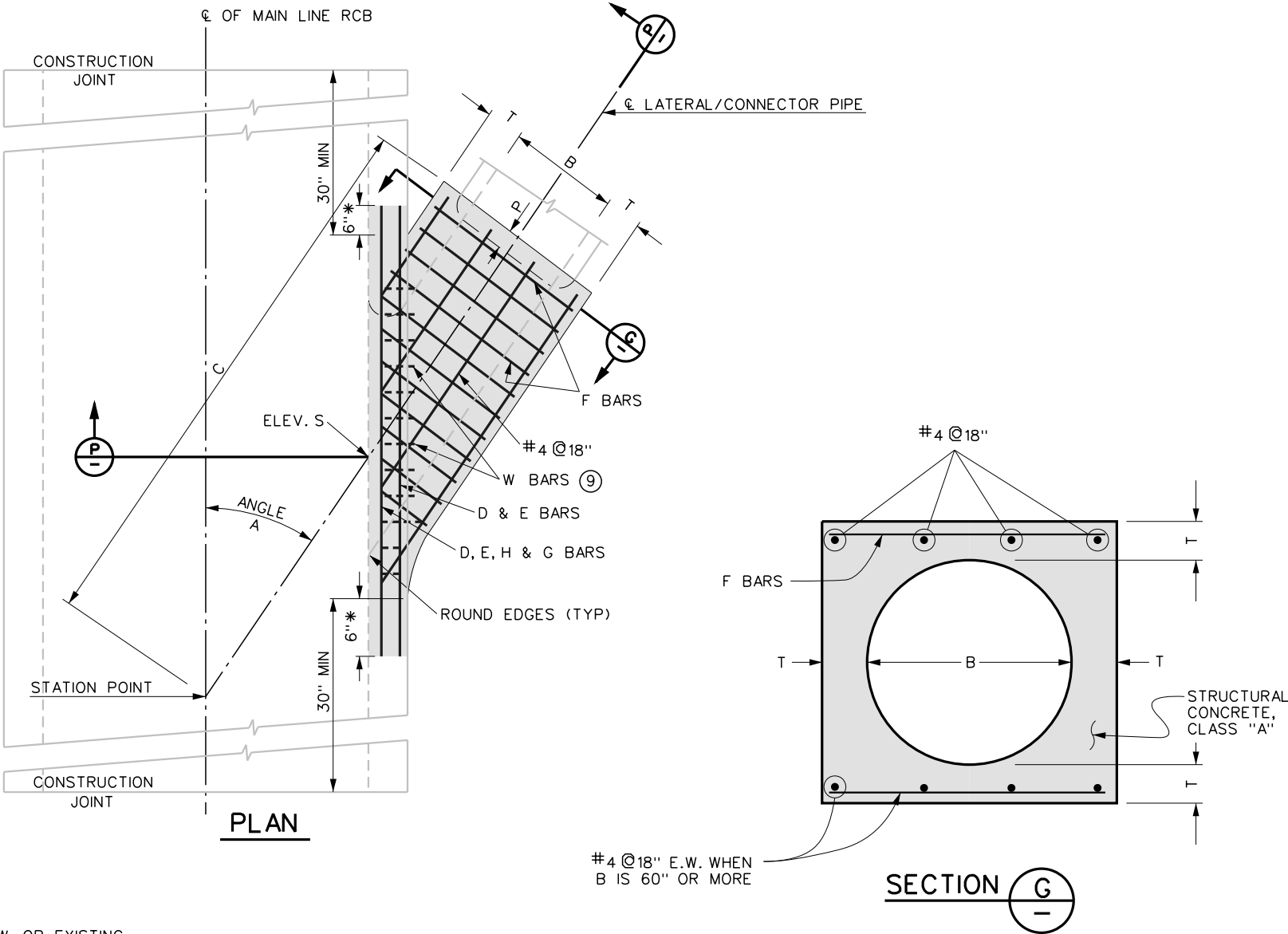
L.A.C.F.C.D. STD. NO. 2-D189 (MODIFIED)

TABLES
FOR DIMENSIONS AND BAR SIZES

B (INCHES)	T (INCHES)	P (INCHES)	B (INCHES)	T (INCHES)	P (INCHES)	B (INCHES)	T (INCHES)	P (INCHES)
12	5	5	42	7 1/2	5	90	13 1/4	5
15	5		45	7 3/4		96	14	8
18	5		48	8		102	15 1/2	
21	5		51	8 1/2		108	16	
24	5 1/4		54	9		114	16 1/2	
27	5 1/2		57	9 1/4		120	17	
30	6		60	9 1/2		126	17	
33	6 1/4		63	10		132	17 1/2	
36	6 1/2		66	10 1/4		138	17 1/2	
39	7		69	10 3/4		144	18	
#5		D,E,H AND G BARS	#6		D,E,H AND G BARS	#7		D,E,H AND G BARS
#4 @6"		F BARS	#5 @6"		F BARS	#6 @6"		F BARS

NOTES

- FOR NEW CAST-IN-PLACE CONSTRUCTION, JUNCTION STRUCTURE SHALL BE POURED MONOLITHICALLY WITH MAIN LINE STORM DRAIN, MANHOLE, OR TRANSITION.
 - THE NEED FOR AN EDGE BEAM AND/OR ADDITIONAL REINFORCEMENT SHALL BE INVESTIGATED BY THE ENGINEER FOR ANY ONE OF THE FOLLOWING CONDITIONS:
 - ANGLE A IS LESS THAN 30°
 - TOP OF INLET PIPE IS LESS THAN 6" BELOW THE SOFFIT.
 - FLOW LINE OF INLET PIPE IS LESS THAN 7" ABOVE THE FLOOR OF THE MAIN LINE AT THE INSIDE FACE.
 - VALUES FOR A, B, C, ELEV. R, AND ELEV. S SHALL BE SPECIFIED ON PROJECT DRAWINGS. VALUES FOR T ARE SHOWN IN TABLES HEREIN.
 - STATIONS SPECIFIED ON DRAWINGS APPLY AT THE INTERSECTION OF CENTER LINES OF MAIN LINE AND LATERALS, UNLESS OTHERWISE NOTED.
 - UNLESS OTHERWISE SHOWN, ALL REINFORCING STEEL SHALL BE NEW STRAIGHT, DEFORMED STEEL BARS AND SHALL BE KEPT 1 1/2" CLEAR FROM INSIDE FACE OF CONCRETE.
 - WHERE DESIGN VELOCITIES EXCEED 20 FT/SEC, CONCRETE COVER ON THE INSIDE FACE SHALL BE INCREASED TO PROVIDE ADDITIONAL COVER OVER THE REINFORCED STEEL AS SPECIFIED ON THE PROJECT DRAWINGS.
 - FLOOR OF STRUCTURE SHALL BE STEEL-TROWELED TO THE SPRING LINE.
 - PLACE CLASS B CONCRETE, OR COMPACT SOIL UNDER STRUCTURE TO RELATIVE DENSITY REQUIRED BY SPECIFICATIONS. FILL MAY BE OMITTED IF STRUCTURE IS LAID ON UNDISTURBED EARTH TO MAIN LINE WALL.
 - W BARS ARE MAIN LINE WALL STEEL (INTERIOR CURTAIN), AND SHALL BE CUT IN CENTER OF OPENING AND BENT INTO TOP AND BOTTOM OF JUNCTION STRUCTURE.
- * LIMITS OF EXISTING CONSTRUCTION REMOVAL.



RIVERSIDE COUNTY FLOOD CONTROL AND WATER CONSERVATION DISTRICT	
APPROVED BY: GENERAL MANAGER / CHIEF ENGINEER DATE: 7-2-2019 R.C.E. NO. 59795	APPROVED BY: CHIEF, DESIGN & CONSTRUCTION DATE: 7-2-2019 R.C.E. NO. 70355

JUNCTION STRUCTURE
NO. 1
STANDARD DRAWING NUMBER JS226
SHEET 1 OF 1

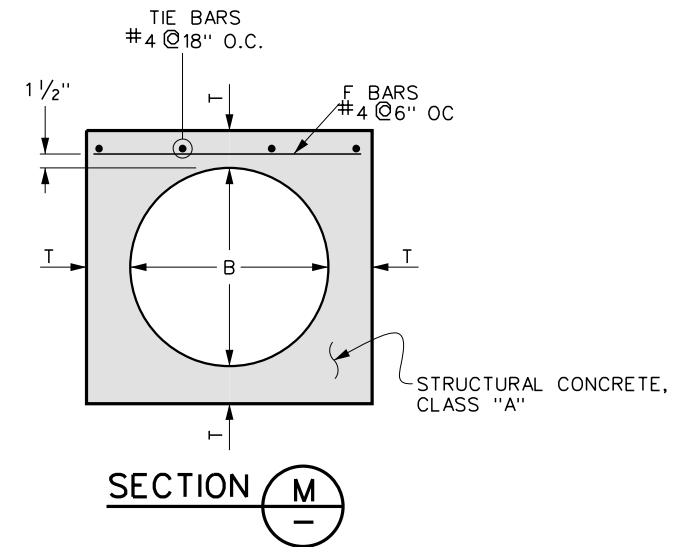
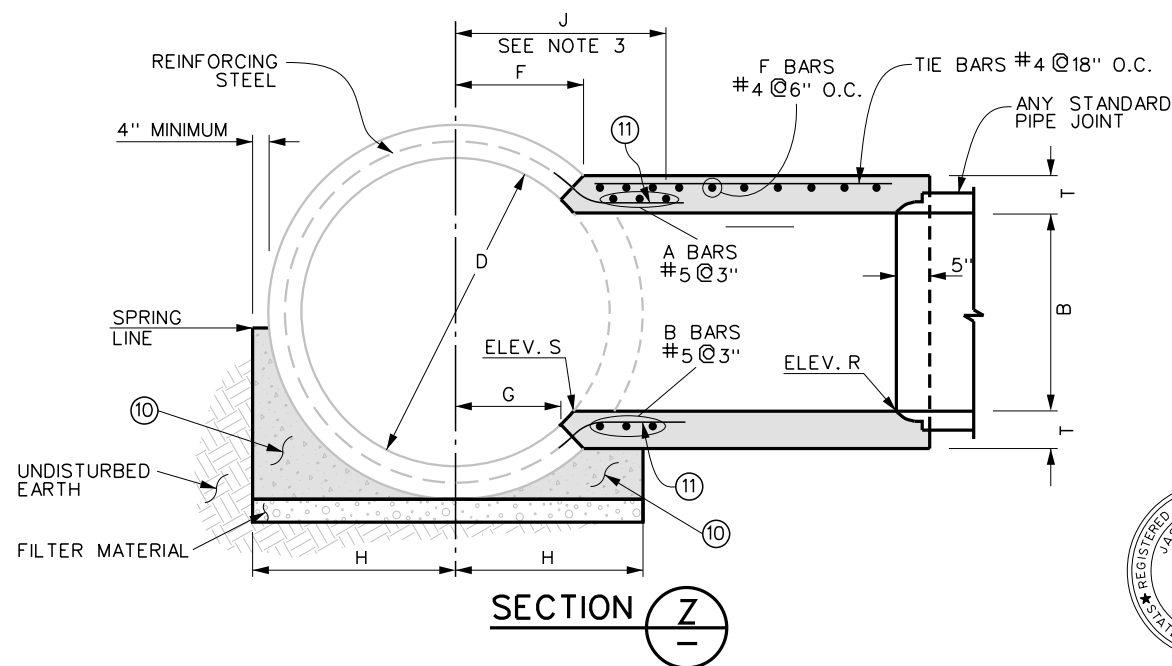
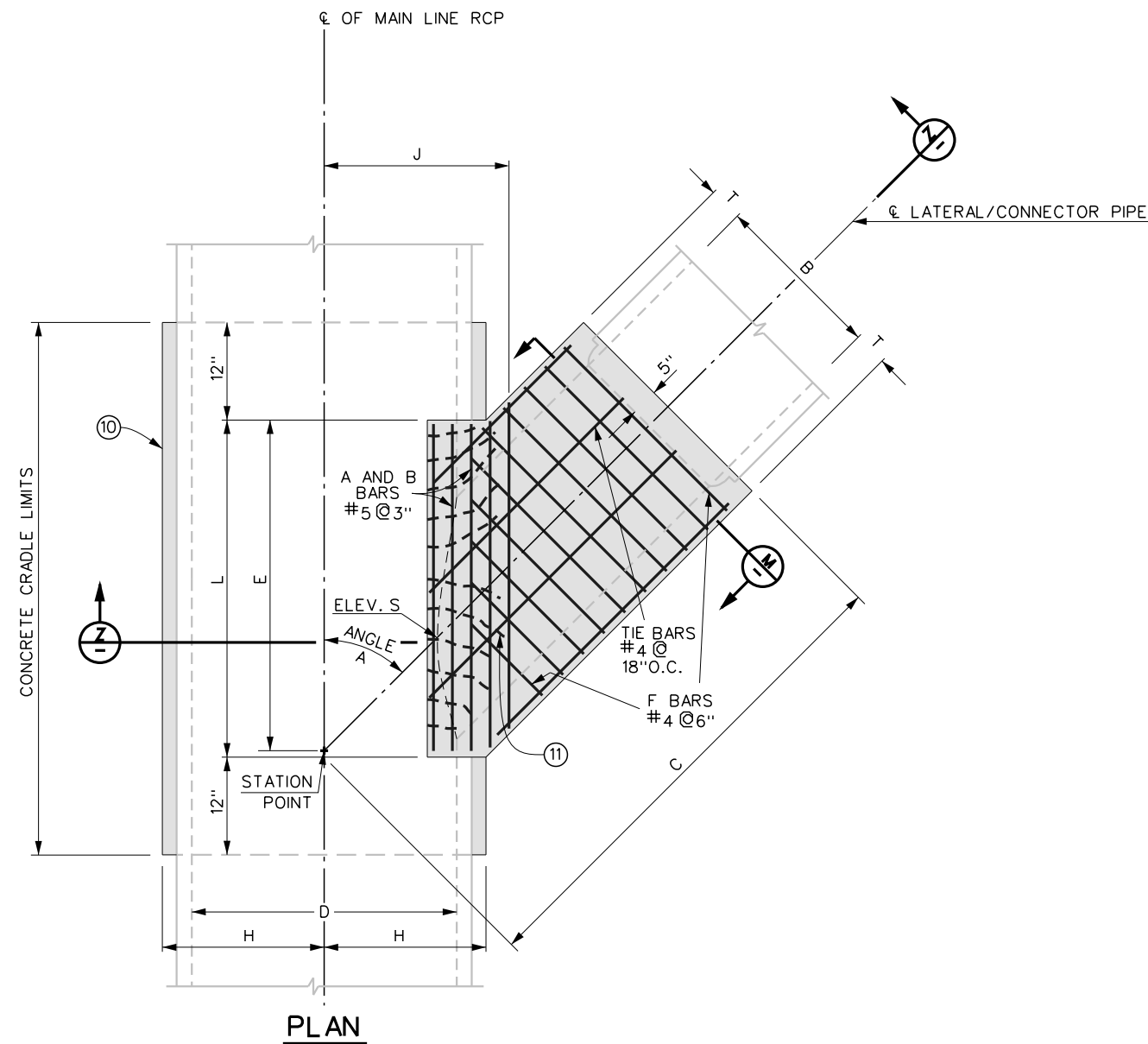
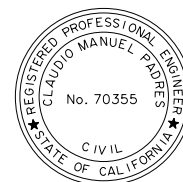


TABLE OF VALUES
FOR DIMENSIONS

B (INCHES)	T (INCHES)
8	5
12	5
15	5
18	5
21	5
24	5½
27	5½
30	6
33	6½
36	6½
39	7

NOTES

- THIS JUNCTION STRUCTURE SHALL BE USED WHEN THE OUTSIDE DIAMETER OF THE LATERAL IS GREATER THAN ½ THE DIAMETER D OF THE MAIN LINE; OR WHEN THE INSIDE DIAMETER B OF THE LATERAL IS GREATER THAN 24". B SHALL NOT EXCEED 0.75 D OR 39".
- VALUES FOR A, B, C, D, E, F, G, L, ELEV. R, AND ELEV. S SHALL BE SPECIFIED ON PROJECT DRAWINGS.
- A AND B BARS SHALL BE CARRIED TO NOT LESS THAN J DISTANCE IN INCHES FROM CENTER LINE $J = (7/12)D + 6"$
- RECTANGULAR OPENING IN MAIN LINE PIPE SHALL BE CUT WITHIN LIMITS NORMAL TO PIPE SURFACE (DIMENSION L) WITHOUT DAMAGING STEEL.
- UNLESS OTHERWISE SHOWN, ALL REINFORCING STEEL SHALL BE NEW, STRAIGHT, DEFORMED STEEL BARS AND SHALL BE KEPT 1½" CLEAR FROM INSIDE FACE OF CONCRETE.
- WHERE DESIGN VELOCITIES EXCEED 20 FT/SEC, CONCRETE COVER ON THE INSIDE FACE SHALL BE INCREASED TO PROVIDE ADDITIONAL COVER OVER THE REINFORCED STEEL AS SPECIFIED ON THE PROJECT DRAWINGS.
- FLOOR OF STRUCTURE SHALL BE STEEL-TROWELED TO SPRING LINE.
- NO MORE THAN ONE OPENING SHALL BE MADE IN ANY ONE SECTION OF PIPE, AND SHALL NOT BE MADE WITHIN 12" OF A MAIN LINE JOINT.
- STATIONS SPECIFIED ON DRAWINGS APPLY AT THE INTERSECTION OF CENTERLINES OF MAIN LINE AND LATERALS, UNLESS OTHERWISE NOTED.
- PIPE SHALL BE CRADLED IN CLASS B CONCRETE EXTENDING LONGITUDINALLY TO POINTS 1 FT. BEYOND THE LIMITS OF L. MINIMUM H SHALL BE: $H = \frac{1}{2}$ OUTSIDE PIPE DIAMETER + 4 INCHES. CRADLE MAY BE OMITTED ON SIDE OPPOSITE LATERAL INLET WHEN CONSTRUCTED IN CONNECTION WITH EXISTING PIPE STORM DRAIN.
- MAIN LINE REINFORCEMENT IN PIPE SHALL BE CUT IN CENTER OF OPENING AND BENT TO UNIFORM DISTANCE FROM TOP AND BOTTOM OF JUNCTION STRUCTURE.

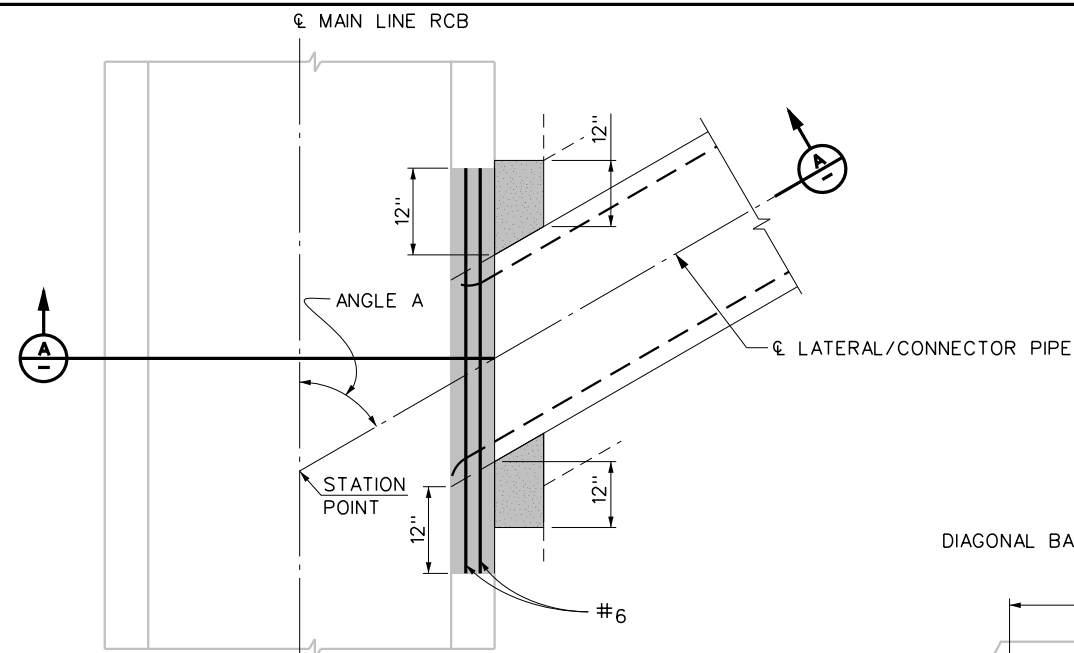


RIVERSIDE COUNTY FLOOD CONTROL AND WATER CONSERVATION DISTRICT	
APPROVED BY: GENERAL MANAGER/CHIEF ENGINEER DATE: 7-2-2019 R.C.E. NO. 59795	APPROVED BY: CHIEF, DESIGN & CONSTRUCTION DATE: 7-2-2019 R.C.E. NO. 70355

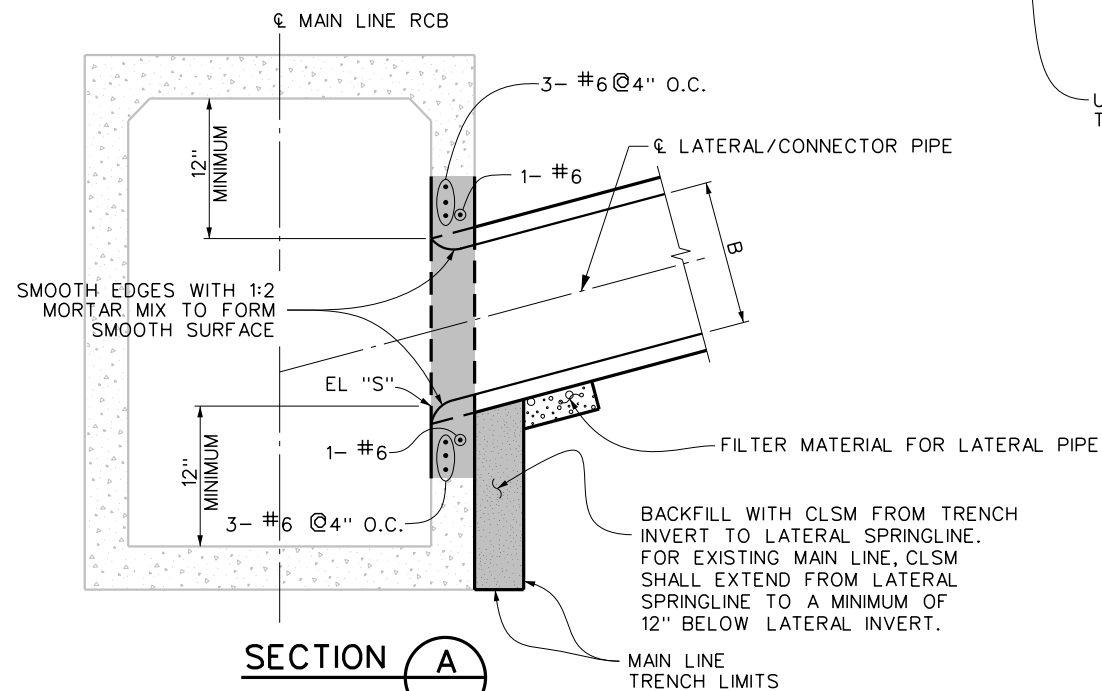
JUNCTION STRUCTURE
NO. 2

STANDARD DRAWING NUMBER JS227
SHEET 1 OF 1

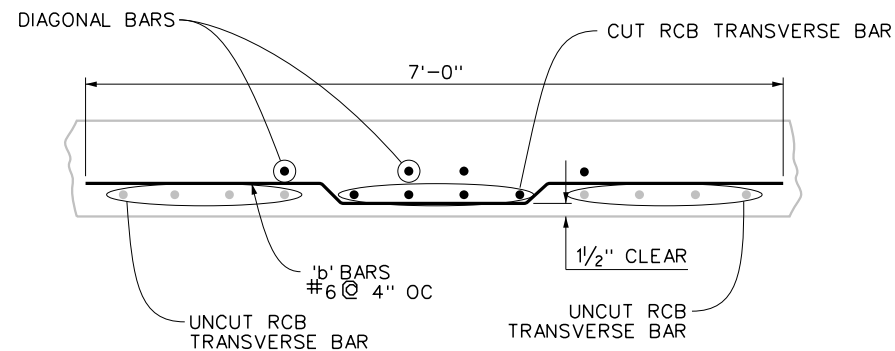
L.A.C.F.C.D. STD. NO. 2-D191 (MODIFIED)



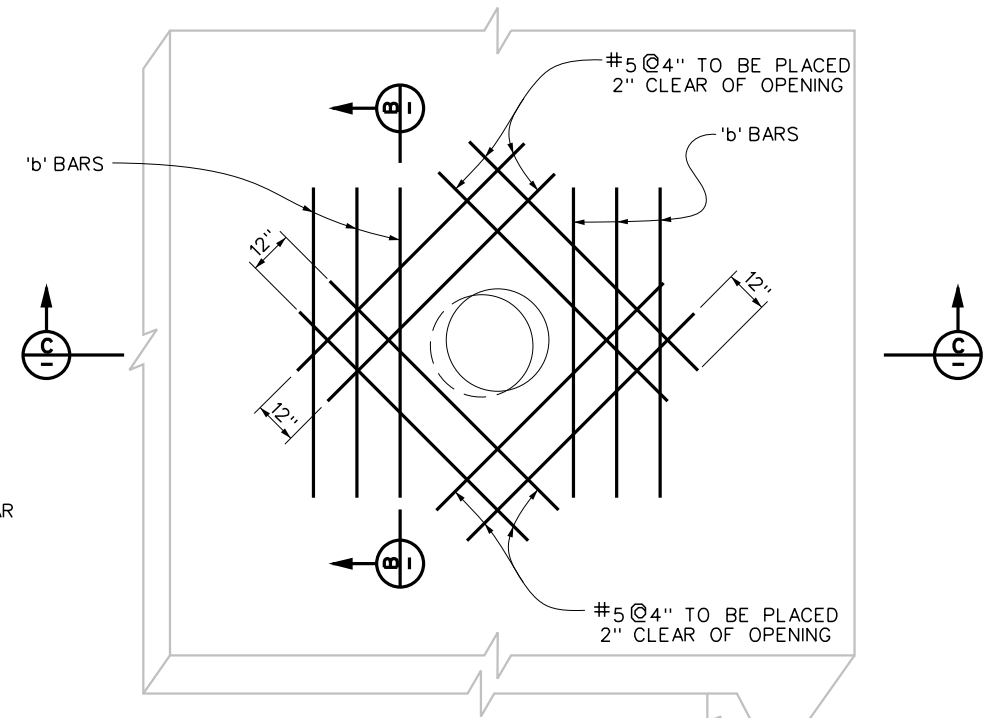
PLAN
BOX WALL ENTRANCE COLUMN SUPPORT



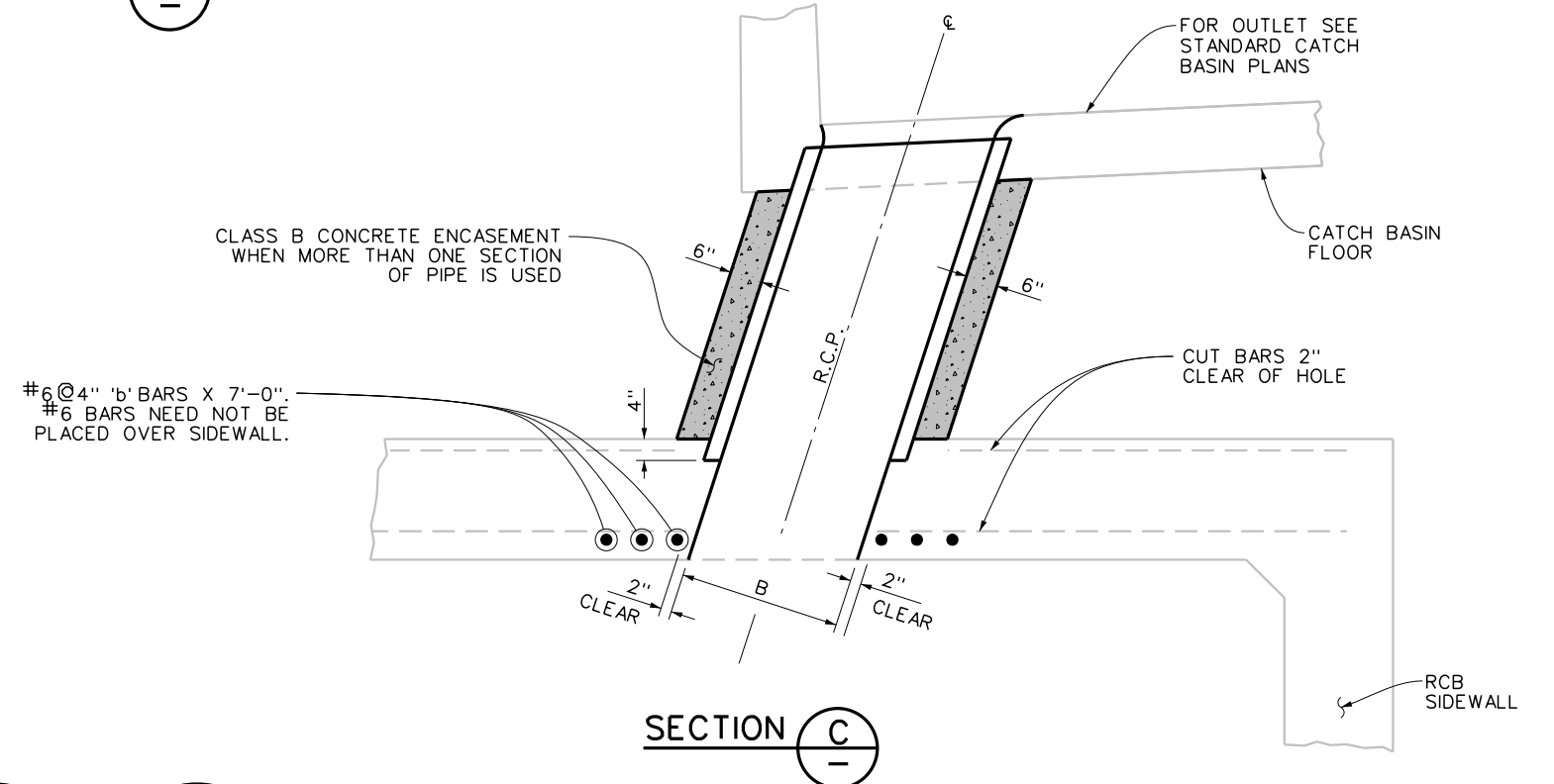
SECTION A
BOX WALL ENTRANCE COLUMN SUPPORT



SECTION B



TOP SLAB ENTRANCE
RCB REINFORCEMENT OMITTED FOR CLARITY



SECTION C

NOTES

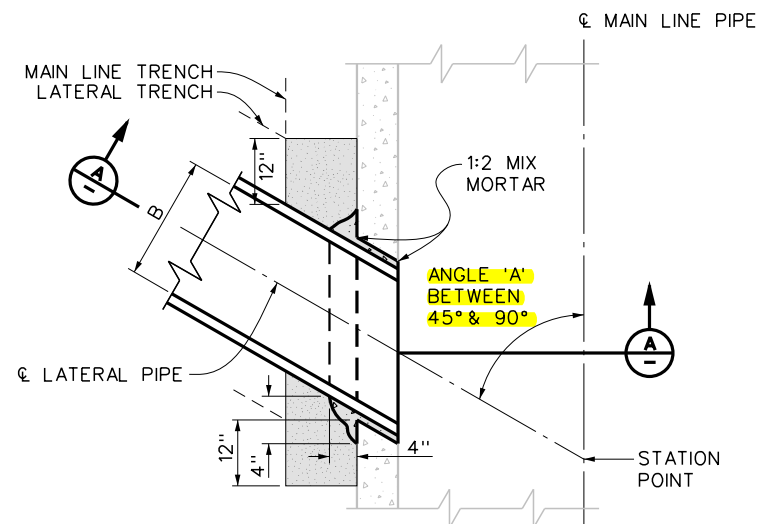
1. LATERAL SIZE: "B"=30" OR LESS (USE JS NO.1 FOR B>30").
2. APPLICABLE FOR NEW OR EXISTING CAST-IN-PLACE RCB MAIN LINE CONSTRUCTION. SPECIAL DESIGN REQUIRED FOR ALL CONNECTIONS INTO PRCB.
3. ANGLE A SHALL BE BETWEEN 45° AND 90°.
4. ELEV. S SHALL BE SPECIFIED ON PROJECT DRAWINGS.
5. NO MORE THAN ONE OPENING SHALL BE MADE IN ANY 10-FOOT LENGTH OF MAIN LINE RCB WITHOUT A SPECIAL STRUCTURAL DESIGN.
6. MAIN LINE REINFORCING STEEL SHALL BE CUT TO 2" CLEAR OF PIPE OPENING.
7. LATERAL OPENING SHALL NOT BE MADE WITHIN 24" OF A MAIN LINE JOINT.



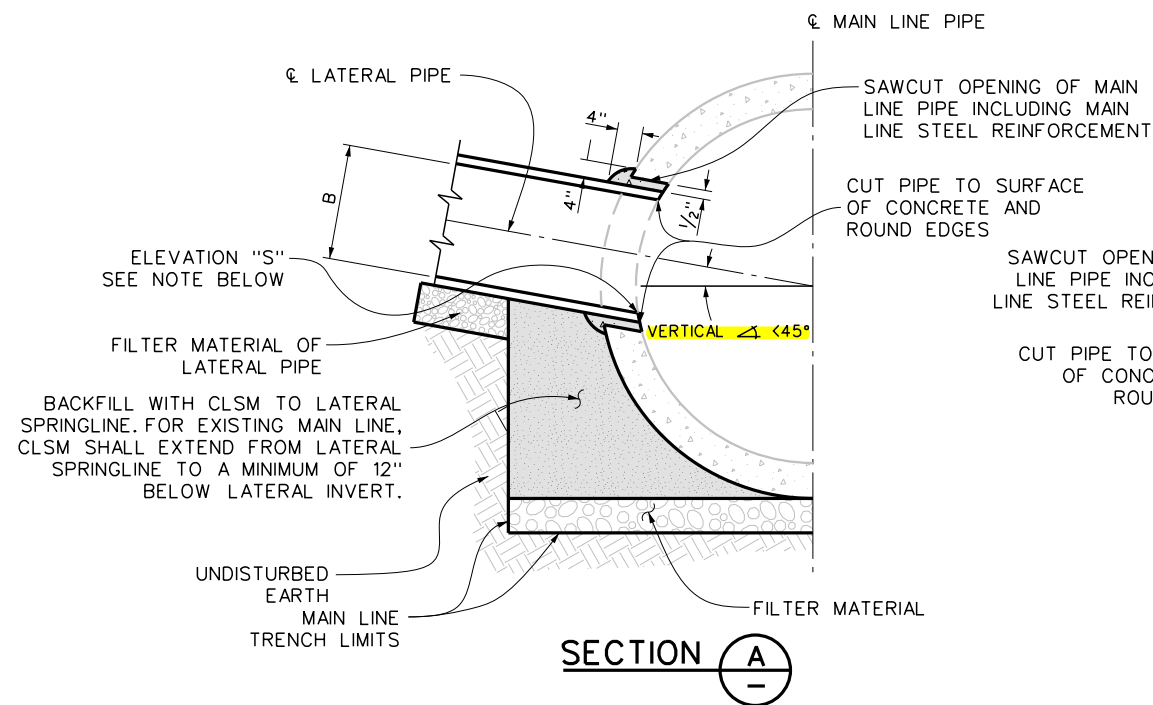
RIVERSIDE COUNTY FLOOD CONTROL AND WATER CONSERVATION DISTRICT	
APPROVED BY: GENERAL MANAGER / CHIEF ENGINEER DATE: 7-2-2019	APPROVED BY: CHIEF, DESIGN & CONSTRUCTION DATE: 7-2-2019
R.C.E. NO. 59795	R.C.E. NO. 70355

JUNCTION STRUCTURE
NO. 3

STANDARD DRAWING NUMBER JS228
SHEET 1 OF 1



**PLAN
PIPE WALL COLUMN SUPPORT**

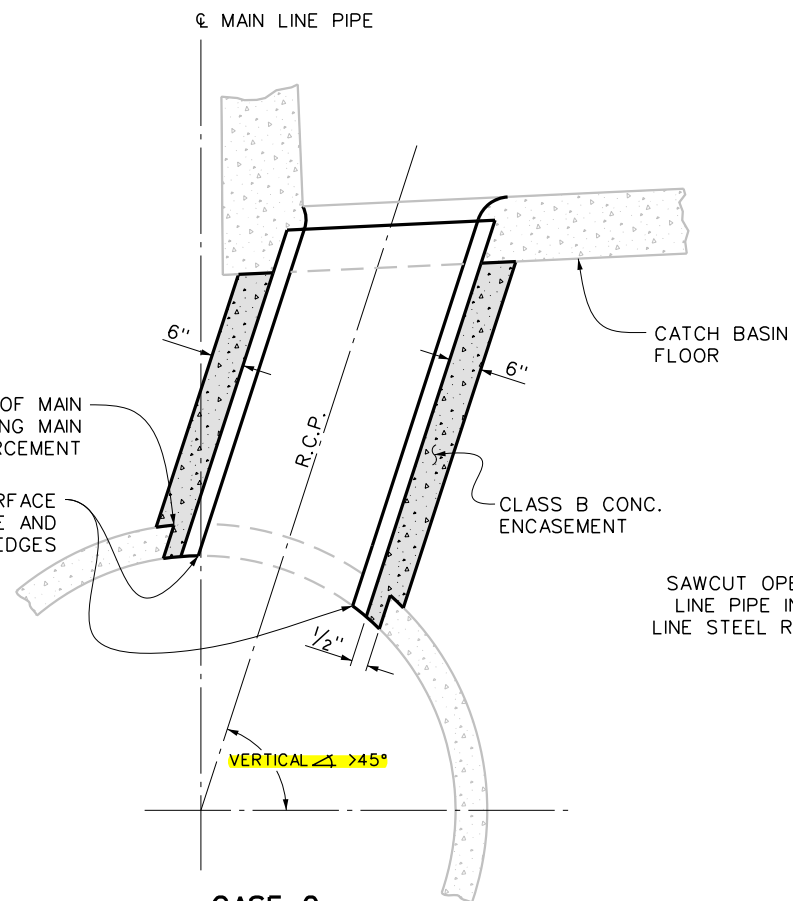


SECTION A

**CASE 1
(VERTICAL < 45° OR LESS)**

NOTES: CASES 1 & 2

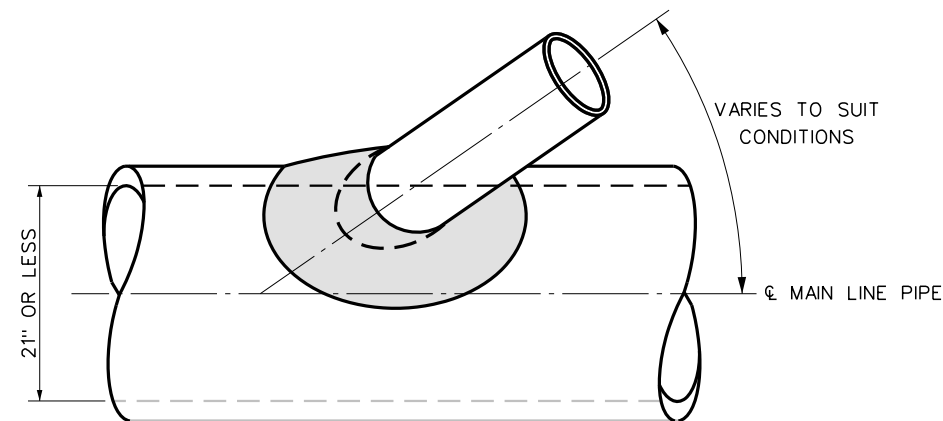
1. **B SHALL BE 24" OR LESS, AND IN NO CASE SHALL THE OUTSIDE DIAMETER OF THE INLET PIPE EXCEED ONE-HALF THE INSIDE DIAMETER OF THE MAIN LINE. IF VERTICAL < 45° OR LESS, USE CASE 1. IF VERTICAL > 45°, USE CASE 2.**
2. CL OF INLET SHALL BE RADIAL TO THE MAIN STORM DRAIN EXCEPT WHEN ELEVATION "S" IS SHOWN ON PROJECT DRAWING PROFILE.
3. THE MINIMUM OPENING INTO THE EXISTING STORM DRAIN SHALL BE THE OUTSIDE DIAMETER OF THE CONNECTING PIPE PLUS 1 INCH.
4. STATION POINT AS SHOWN ON PROJECT DRAWING PLAN VIEW.
5. NO MORE THAN ONE OPENING SHALL BE MADE IN ANY ONE SECTION OF PIPE, AND SHALL NOT BE MADE WITHIN 12" OF A MAIN LINE JOINT.



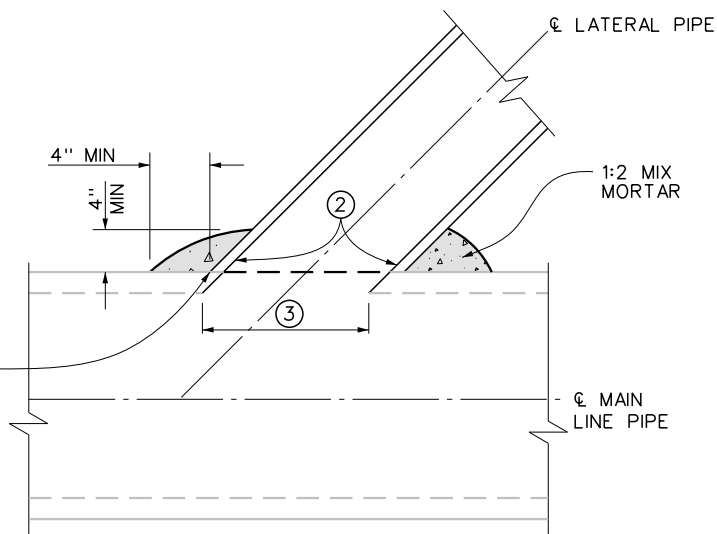
**CASE 2
CATCH BASIN ABOVE STORM DRAIN
(VERTICAL > 45°)**

NOTE: CASE 2

1. ALL CONNECTOR PIPES (WITHIN THE VERTICAL ANGLES SPECIFIED FOR CASE 2) SHALL BE ENCASED WHEN LAID WITHIN THE MAIN LINE EXCAVATED TRENCH, OR WHEN LAID ON FILL WHICH HAS NOT BEEN DENSIFIED.



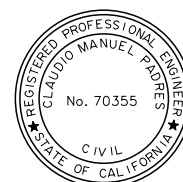
**CASE 3
SADDLE CONNECTION PLAN
(MAIN LINE PIPE 21" DIAMETER OR LESS)**



**CASE 3
SADDLE CONNECTION DETAIL**

NOTES: CASE 3

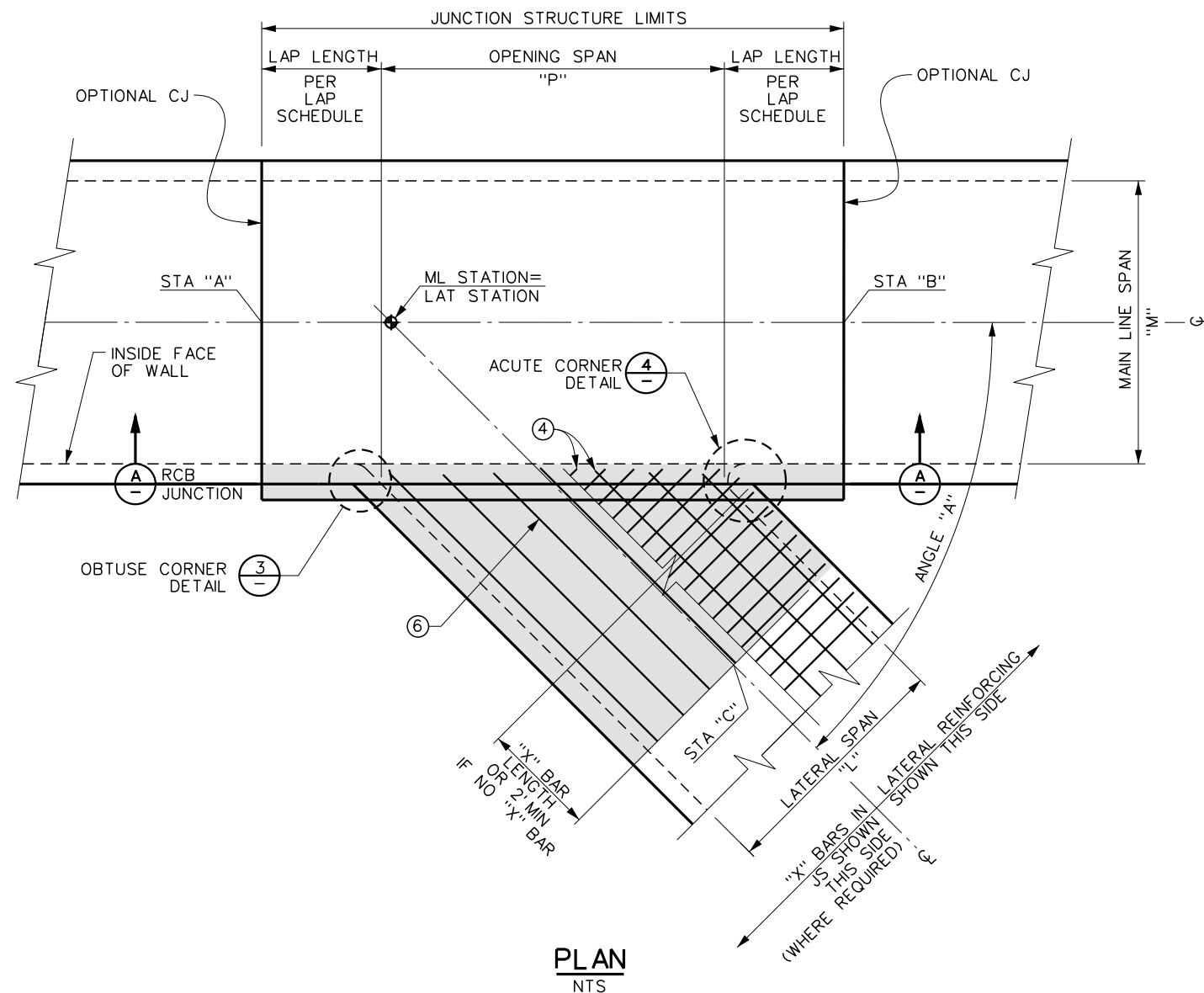
1. CONNECTIONS TO **MAIN LINE PIPES 21" OR LESS IN DIAMETER** WITHOUT JUNCTION STRUCTURES OR PRECAST Y BRANCHES SHALL BE MADE WITH SADDLES.
2. TRIM OR CUT LATERAL PIPE TO CREATE SADDLE CONNECTION THAT FITS SNUGLY OVER THE OUTSIDE OF THE MAIN LINE PIPE. SADDLE ALIGNMENT SHALL MATCH LATERAL ALIGNMENT LINE.
3. THE OPENING INTO THE MAIN LINE PIPE SHALL BE CUT AND TRIMMED TO MATCH THE INSIDE DIMENSIONS OF THE LATERAL PIPE.



RIVERSIDE COUNTY FLOOD CONTROL AND WATER CONSERVATION DISTRICT	
APPROVED BY: <i>[Signature]</i> GENERAL MANAGER / CHIEF ENGINEER DATE: 7-2-2019	APPROVED BY: <i>[Signature]</i> CHIEF DESIGN & CONSTRUCTION DATE: 7-2-2019
R.C.E. NO. 59795	R.C.E. NO. 70355

**JUNCTION STRUCTURE
NO. 4**

STANDARD DRAWING NUMBER JS229
SHEET 1 OF 1



PLAN
NTS

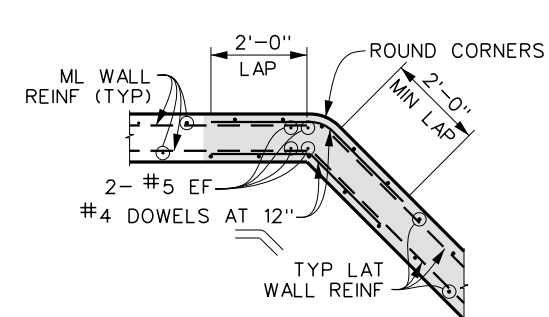
f'c = 3,600 PSI Fy = 60,000 PSI	
BAR SIZE	ALL BARS
#3	1'-1"
#4	1'-6"
#5	1'-9"
#6	2'-2"
#7	2'-10"
#8	3'-8"
#9	4'-8"
#10	5'-11"
#11	7'-3"

LAP SCHEDULE

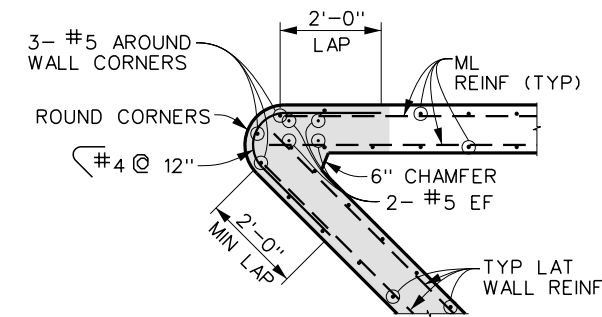
NOTES:

- FOR INSTRUCTION ON USE OF THIS STANDARD, GENERAL NOTES AND DESIGN TABLES, SEE SHEET 3. VARIABLES B, H, N AND S PROVIDED IN TABLES A, B, OR C ON SHEET 3. DESIGN CASE SHALL BE SHOWN ON PLANS.
- PROTECT EXISTING REINFORCING. NOT ALL REINFORCING SHOWN. ANY BARS EXPOSED SHALL HAVE CONCRETE REMOVED TO 1". CONTINUE EXISTING LONGITUDINAL WALL STEEL THROUGH LAP LENGTH SHOWN.
- ROUGHEN SURFACE TO APPROXIMATE 1/4" AMPLITUDE. SURFACE SHALL BE CLEANED AND FREE OF LAITANCE.
- CUT LATERAL REINFORCING WHERE INTERSECTS WITH INSIDE OF MAINLINE RCB WALL, MAINTAIN 1/2" CLEAR FROM INSIDE FACE.
- ABBREVIATIONS SHALL BE AS DEFINED:

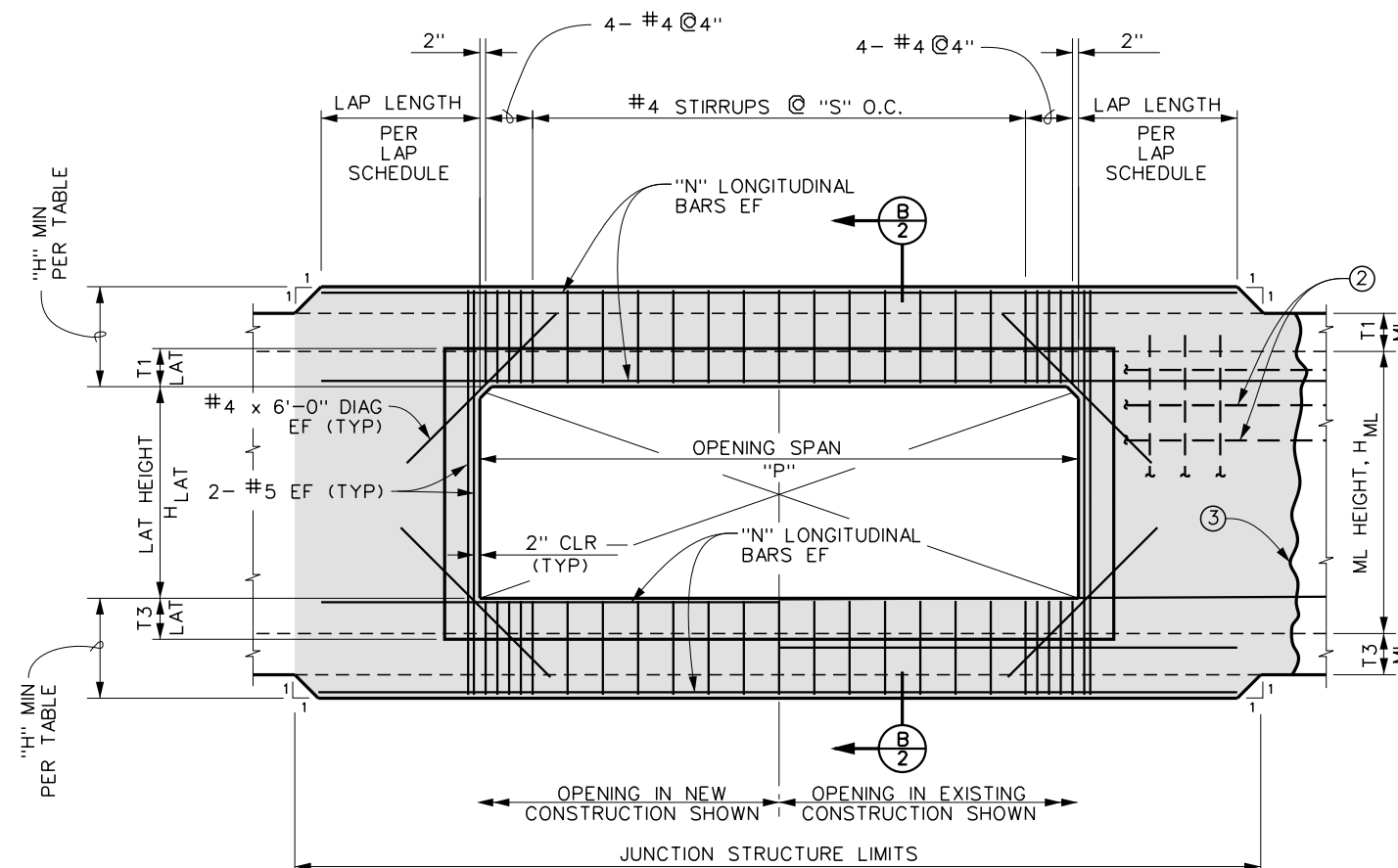
ML	MAIN LINE
LAT	LATERAL
T1	DECK THICKNESS PER CALTRANS STANDARD PLANS OR PROJECT DRAWINGS
T3	INVERT THICKNESS PER CALTRANS STANDARD PLANS OR PROJECT DRAWINGS
- "X" BAR, SEE TABLE ON SHEET 3 AND DETAIL 1 ON SHEET 2.



DETAIL 3
OBTUSE WALL CORNER
NTS



DETAIL 4
ACUTE WALL CORNER
NTS



SECTION A
NTS

Michael Baker
INTERNATIONAL
14725 ALTON PARKWAY
IRVINE, CALIFORNIA 92618-2027
949.472.3505 • FAX 949.472.8373



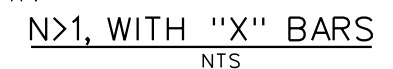
RIVERSIDE COUNTY FLOOD CONTROL
AND
WATER CONSERVATION DISTRICT

APPROVED BY: *[Signature]*
GENERAL MANAGER-CHIEF ENGINEER
DATE: 08/2015

APPROVED BY: *[Signature]*
CHIEF, DESIGN & CONSTRUCTION
DATE: 08/2015

R.C.E. NO. 32336 R.C.E. NO. 44684

JUNCTION STRUCTURE
NO. 5
STANDARD DRAWING NUMBER JS230
SHEET 1 OF 3



TYPICAL SECTION

BEAM SECTION
SEE NOTE ⑤
NTS

(B
1)

NOTES:

1. VARIABLES B, H, N AND S PROVIDED IN TABLES A, B OR C ON SHEET 3.
- ② DEPTH OF THICKENED SLAB SHALL MATCH THE MAIN LINE DECK OR INVERT, WHICHEVER IS GREATER.
- ③ CUT LATERAL REINFORCING OF MAINLINE RCB WALL TO MAINTAIN 1½" CLEAR FROM INSIDE FACE.
- ④ OMIT HORIZONTAL TIES AND BARS WHERE TIE IS WITHIN LATERAL SLAB, INVERT OR THICKENED EDGE.
- ⑤ SAMPLE CONFIGURATIONS OF LATERAL, MAIN LINE AND JUNCTION STRUCTURE GEOMETRIES ARE SHOWN. PLEASE NOTE THE POSITION OF THE LATERAL TO THE MAINLINE MAY VARY, SUCH AS MATCHING OR OFFSET INVERT ELEVATIONS, AND MATCHING OR OFFSET TOP SLAB ELEVATIONS. REINFORCING STEEL SHOP DRAWINGS SHOWING SPECIFIC GEOMETRY AND REINFORCING SHALL BE SUBMITTED TO THE DISTRICT FOR REVIEW AND APPROVAL.
6. ABBREVIATIONS SHALL BE AS DEFINED:

ML	MAIN LINE
LAT	LATERAL
T1	DECK THICKNESS PER CALTRANS STANDARD PLANS OR PROJECT DRAWINGS
T3	INVERT THICKNESS PER CALTRANS STANDARD PLANS OR PROJECT DRAWINGS
- ⑦ "X" BAR, SEE TABLE ON SHEET 3 AND DETAIL 1.



DESIGN NOTES

DESIGN SPECIFICATIONS:
AASHTO LRFD BRIDGE DESIGN SPECIFICATIONS,
2012 (SIXTH EDITION) WITH CALIFORNIA
AMENDMENTS (AASHTO-CA BDS-6)

LOADING:
LIVE LOAD: (AASHTO LRFD 3.6.1.2)
HL-93 CONSISTS OF DESIGN TRUCK OR
DESIGN TANDEM AND DESIGN LANE LOAD.

IMPACT FACTOR: (APPLY TO ROOF SLAB ONLY)
IM = 33(1.0-0.125DE) = 33 at 2'-FT Fill, 0 OTHERWISE
(AASHTO LRFD 3.6.2.2)
DE = MINIMUM DEPTH OF EARTH COVER

EARTH LOAD:
VERTICAL EARTH PRESSURE: 140 pcf

LOAD FACTORS:
AASHTO LRFD TABLE 3.4.1.1 & TABLE 3.4.1.2
STRENGTH I: U=1.35 (DC+EV) + 1.75 (LL+IM+LS)
STRENGTH IV: U=1.50(DC+EV)

STRENGTH REDUCTION FACTORS:
φ = 0.90 SHEAR & MOMENT

UNIT STRESSES:
f'c = 3,600 psi
fy = 60,000 psi

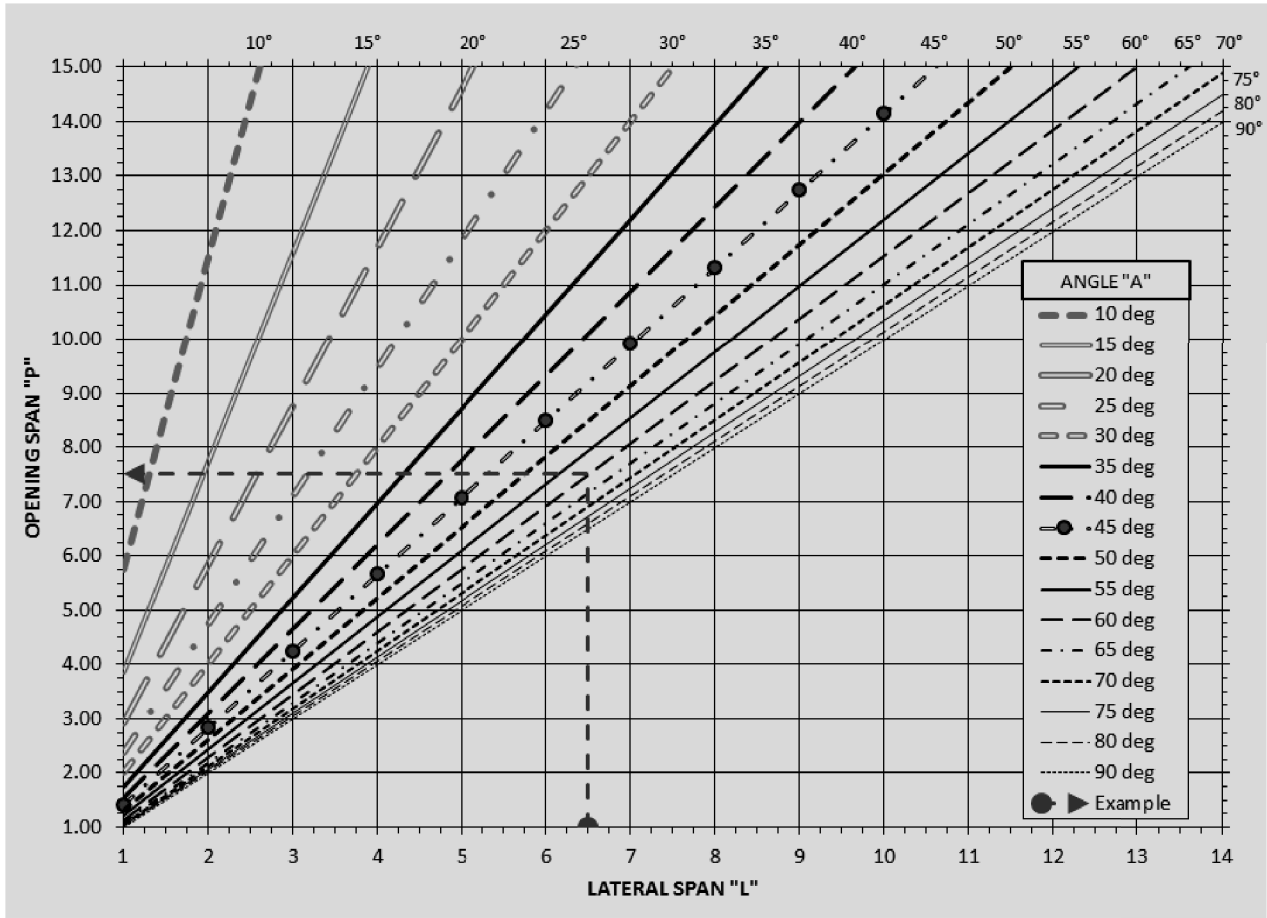
SHEAR:
 $V_c = 0.0676\sqrt{f'_c} + 4.6 \frac{A_s}{b d_e} \frac{V_u d_e}{M_u} b \times d_e$ (Kips)
 $V_c \leq 0.126\sqrt{f'_c} b \times d_e$ (Kips)
 V_c SHALL NOT BE LESS THAN $0.0948\sqrt{f'_c} b \times d_e$
FOR FRAME MEMBERS AND $0.0791\sqrt{f'_c} b \times d_e$
FOR SIMPLY SUPPORTED MEMBERS.

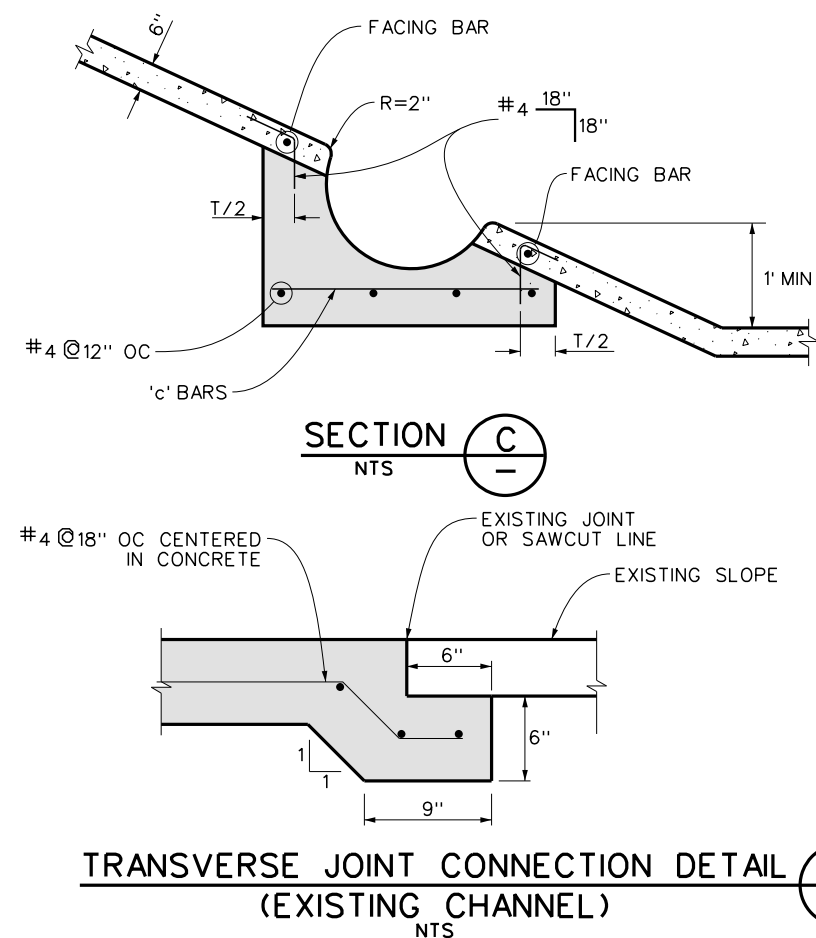
STRUCTURAL GENERAL NOTES

1. VERIFY ALL DIMENSIONS AND JOB SITE CONDITIONS PRIOR TO THE FABRICATION OF ANY MATERIAL.
2. THESE NOTES AND DETAILS ARE INTENDED TO WORK WITH CALTRANS STANDARD PLANS D80, D81 AND D82 BUT MAY BE USED FOR OTHER RCB DESIGNS AND GEOMETRIES UPON APPROVAL FROM THE PROJECT ENGINEER OF RECORD, AND AS REFERENCED BY PROJECT DRAWINGS.
3. THE PROJECT ENGINEER OF RECORD IS RESPONSIBLE FOR CHECKING THE PROPOSED IMPROVEMENTS ARE WITHIN THE DESIGN LIMITATIONS AND VARIABLES PRESENTED HEREIN.

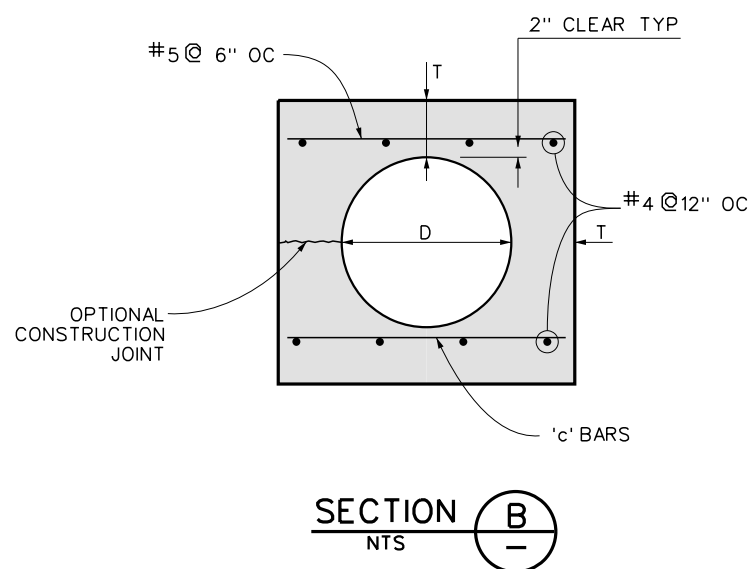
STANDARD DRAWINGS NOTES FOR DESIGN TABLES

1. FOR DEFINITION OF LATERAL SPAN ("L") AND SKEW ("A") AS USED IN THE FOLLOWING NOMOGRAPH, SEE PLAN ON SHEET 1 HERON.
2. THE ENGINEER SHALL SPECIFY THE CONSTRUCTION CONDITION BY DESIGN COVER (TABLE A, B, OR C) AND MAXIMUM MAIN LINE SPAN ("M") AND OPENING SPAN ("P").
EXAMPLE
MAIN LINE SPAN, ("M")=9'-0", EARTH COVER=8'-0",
OPENING SPAN ("P")=7'-8", LATERAL SPAN ("L")=6'6" WITH 60° SKEW
WOULD SPECIFY:
"CONSTRUCT JS NO.5 PER DISTRICT STD. JS230 DESIGN CASE BM10P8".
3. TO ESTIMATE OPENING SPAN BASED ON LATERAL SPAN AND SKEW, SEE "NOMOGRAPH FOR OPENING SPAN" BELOW.
4. BEAM WIDTH SHALL BE AS SPECIFIED OR MATCH MAIN LINE WALL WIDTH, WHICHEVER IS LARGER.
5. BEAM DEPTH SHALL BE AS SPECIFIED OR MATCH MAIN LINE DECK OR INVERT THICKNESS, WHICHEVER IS LARGER.





D (IN)	T (IN)	'c' BARS
18	9	NONE
24	9	
30	9	
36	8	# 4 @ 12"
42	8	
48	8	
54	9	
60	10	
66	11	
72	11	
84	13	



NOTES

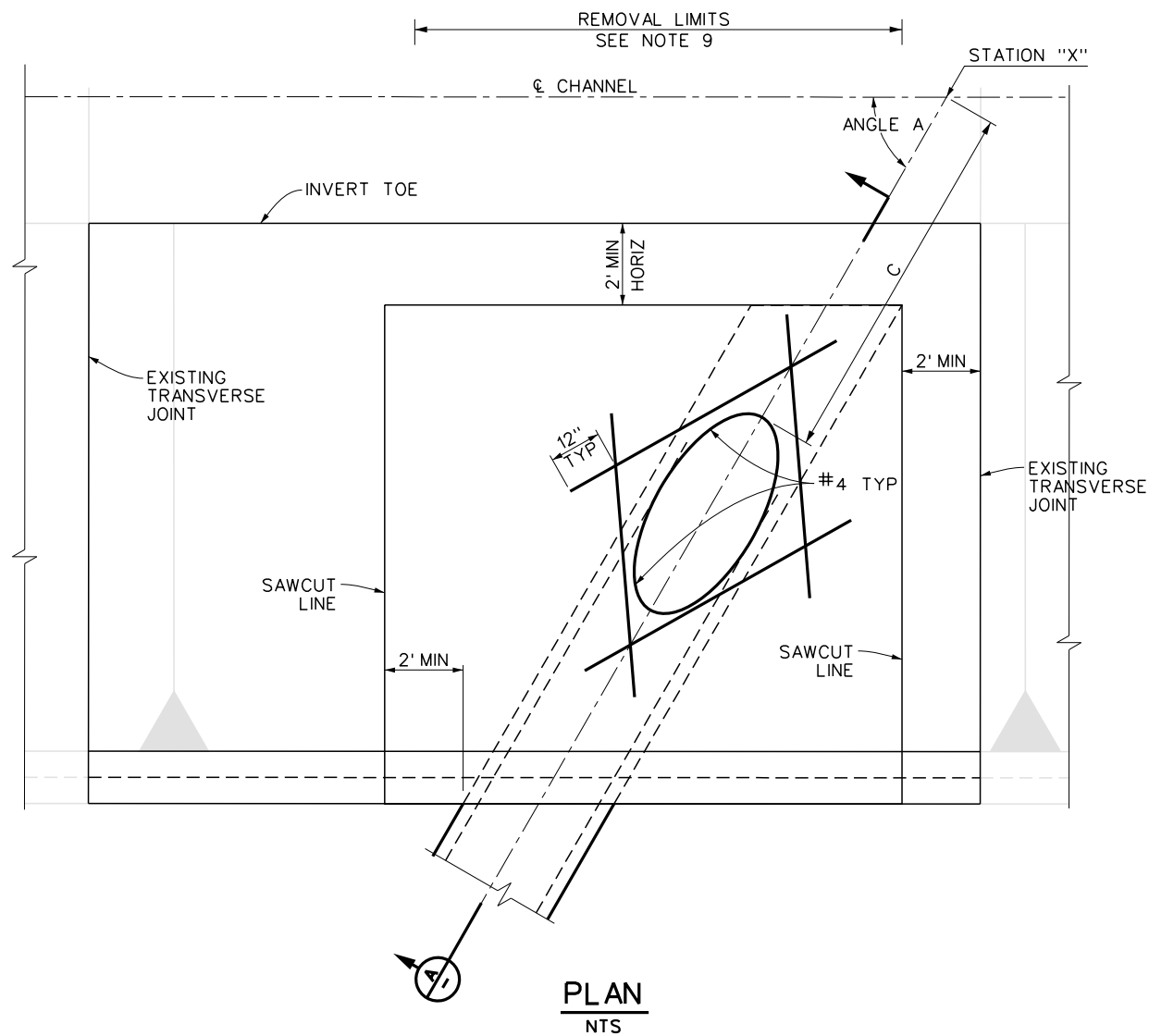
1. ~~2~~ A SHALL BE BETWEEN 45° AND 90°.
2. VALUES FOR D, L, C, EL. R, EL. S, ANGLE A & STATION "X" ARE SHALL BE SPECIFIED ON PROJECT DRAWINGS.
3. REINFORCING BARS SHALL BE PLACED 2" CLEAR FROM FACE OF CONCRETE. TYPICAL UNLESS OTHERWISE NOTED.
4. CONCRETE SHALL BE CLASS "A".
5. REINFORCEMENT SHALL BE PROVIDED IN ALL PORTIONS OF THE JUNCTION STRUCTURE AS INDICATED ON DRAWINGS REGARDLESS OF BAR LENGTH MODIFICATION REQUIRED TO ACHIEVE PROPER CLEARANCES.
6. INSTALLATION OF LATERAL PIPE SHALL BE IN CONFORMANCE TO DISTRICT STD M815.
7. UNLESS OTHERWISE SPECIFIED, REMOVE AND REPLACE CHANNEL SLOPE PANEL PER STD CH326 (INCLUDING SLOPE THICKNESS, REINFORCING STEEL, WEEPHOLES, AND TRANSVERSE JOINTS).
8. TRANSVERSE JOINT CONNECTION SHALL BE CONSTRUCTED PER DETAIL 1 HEREIN FOR EXISTING CHANNELS.



RIVERSIDE COUNTY FLOOD CONTROL AND WATER CONSERVATION DISTRICT	
APPROVED BY:  GENERAL MANAGER / CHIEF ENGINEER DATE: <u>7-2-2019</u>	APPROVED BY:  CHIEF, DESIGN & CONSTRUCTION DATE: <u>7-2-2019</u>
R.C.E. NO. 59795	R.C.E. NO. 703

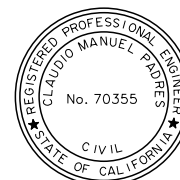
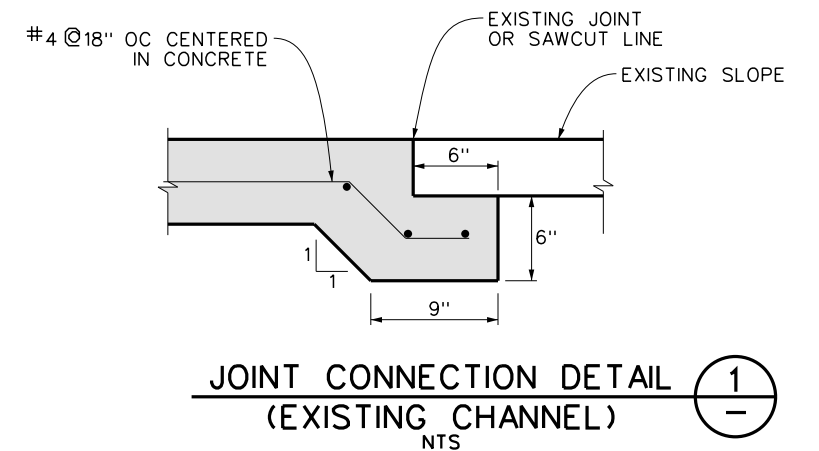
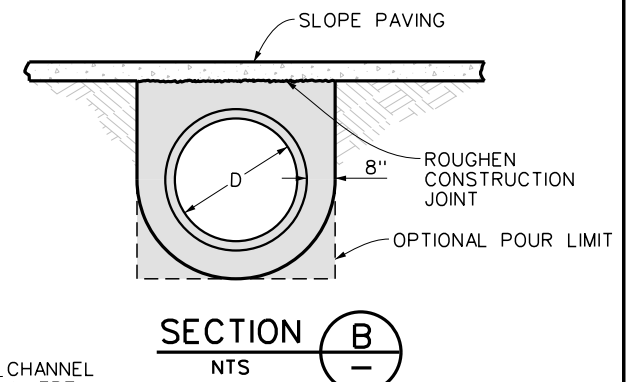
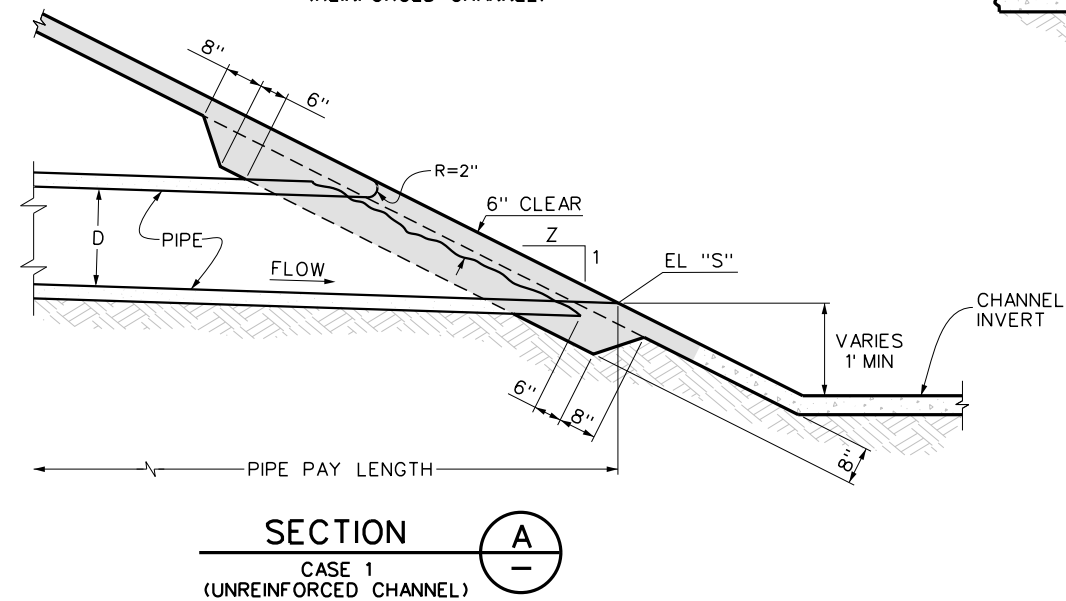
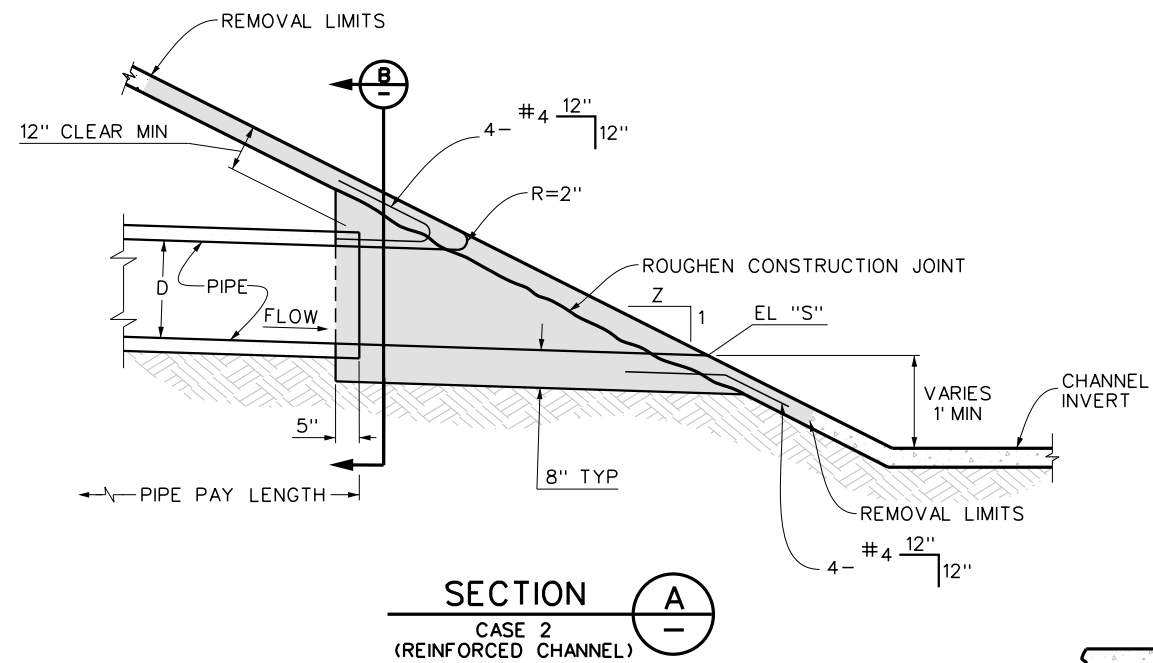
JUNCTION STRUCTURE
NO. 6

STANDARD DRAWING NUMBER JS231
SHEET 1 OF 1



NOTES

1. APPLICABLE TO EXISTING TRAPEZOIDAL CHANNEL ONLY UPON CASE BY CASE APPROVAL BY DISTRICT OTHERWISE USE JS231.
2. HORIZONTAL ANGLE OF CONFLUENCE, "A", MUST BE BETWEEN 60° AND 90°.
3. D SHALL NOT EXCEED 24".
4. SIDE SLOPE, Z, SHALL NOT BE FLATTER THAN 2:1.
5. CONTRACTOR SHALL UTILIZE CASE 1 FOR EXISTING UNREINFORCED CHANNELS AND CASE 2 FOR EXISTING REINFORCED CHANNELS
6. VALUES FOR D, Z, ANGLE A, C, EL. "S", AND STATION "X", SHALL BE SPECIFIED ON PROJECT DRAWINGS.
7. ALL CONCRETE SHALL BE CLASS A.
8. JOINT CONNECTION SHALL BE CONSTRUCTED PER DETAIL 1 HEREIN FOR EXISTING CHANNELS.
9. RECONSTRUCTION OF CHANNEL SLOPE PAVING SHALL BE PER STD DWG CH326 AND AS SHOWN HEREON.



RIVERSIDE COUNTY FLOOD CONTROL AND WATER CONSERVATION DISTRICT	
APPROVED BY: <i>[Signature]</i> GENERAL MANAGER / CHIEF ENGINEER DATE: 7-2-2019	APPROVED BY: <i>[Signature]</i> CHIEF, DESIGN & CONSTRUCTION DATE: 7-2-2019
R.C.E. NO. 59795	R.C.E. NO. 70355

JUNCTION STRUCTURE
NO. 7

STANDARD DRAWING NUMBER JS232
SHEET 1 OF 1



D = INSIDE PIPE DIAMETER (FT)

A = JUNCTION ANGLE TO BE
DETERMINED BY ENGINEER

Z = HORIZONTAL COMPONENT
OF SIDE SLOPE RATIO

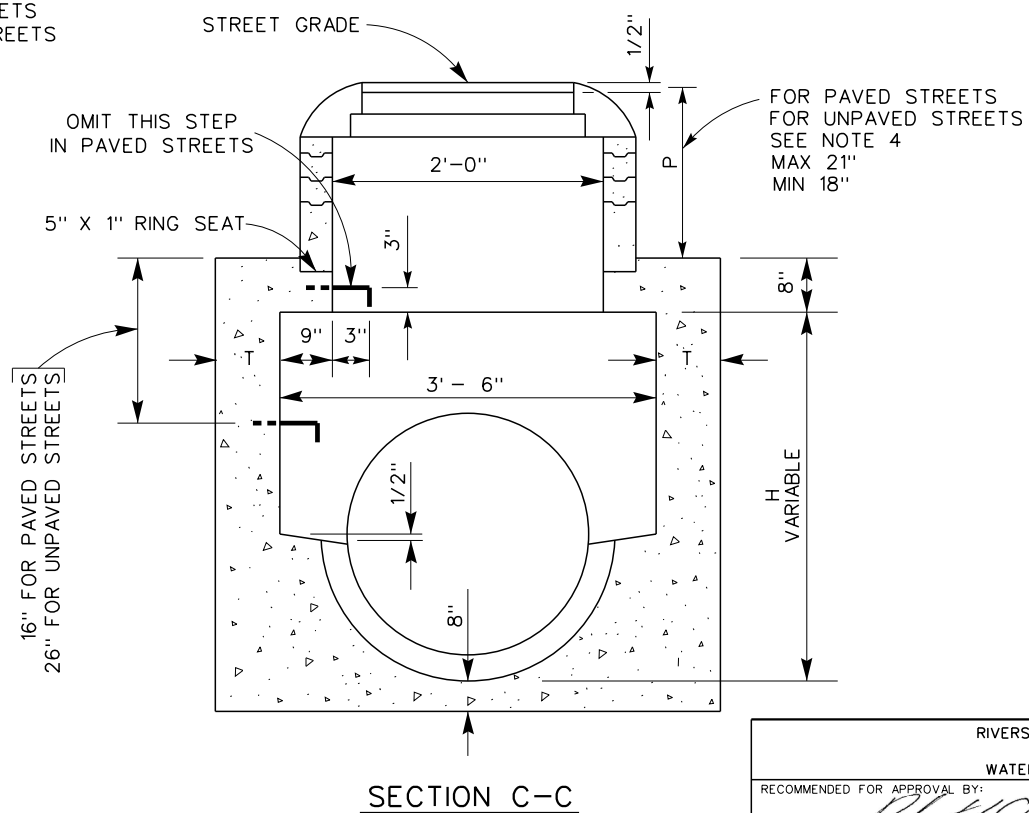
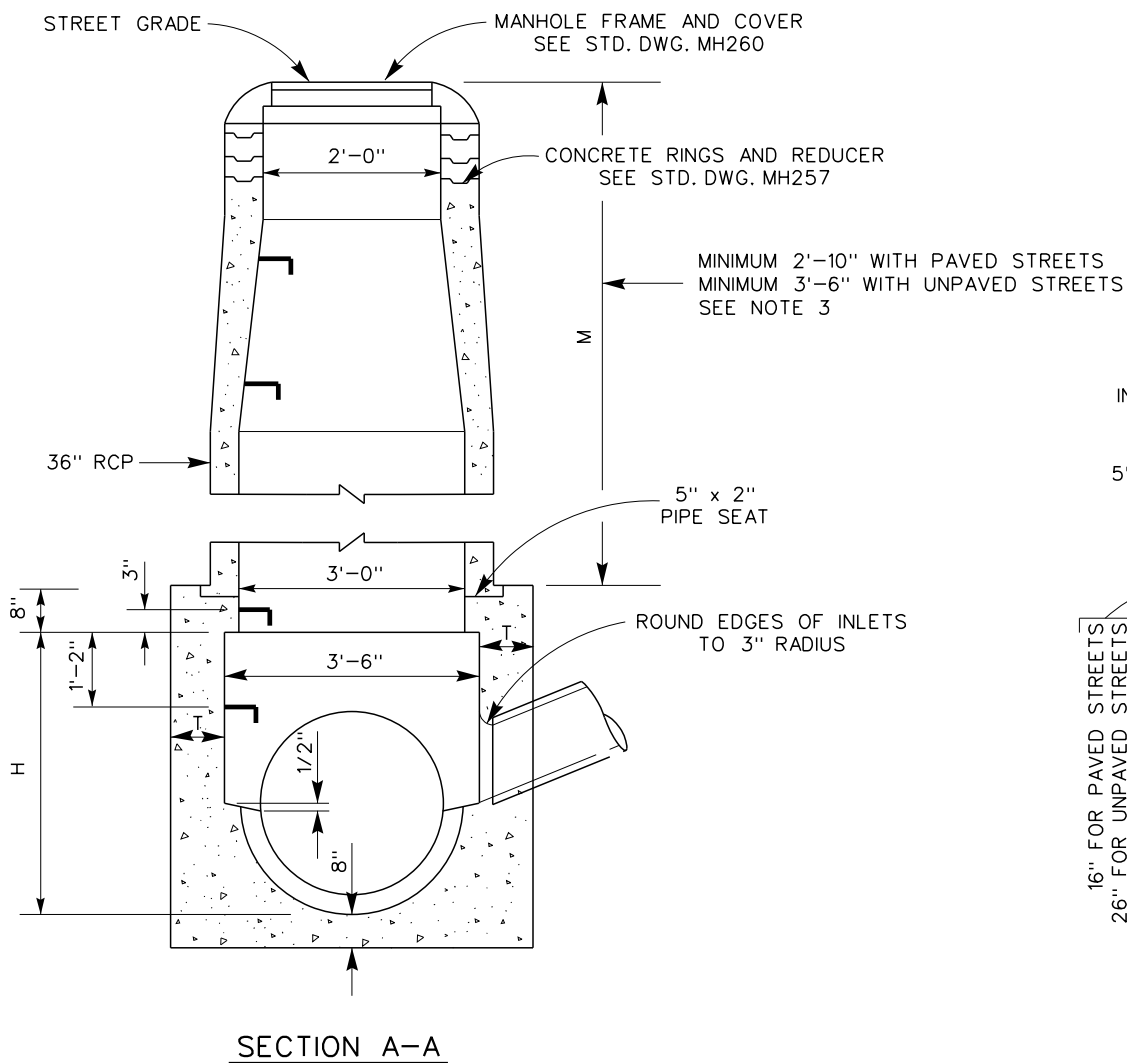
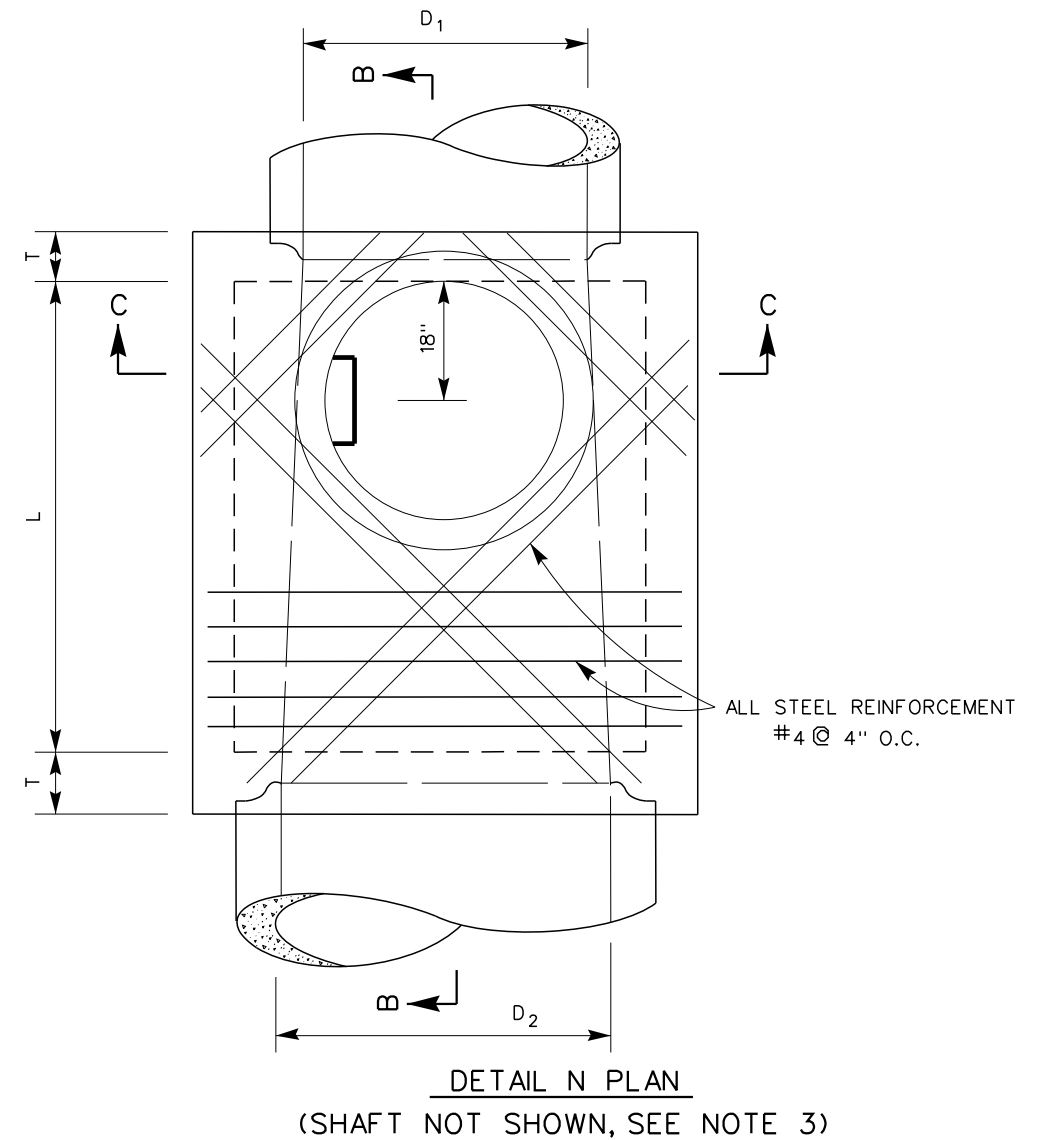
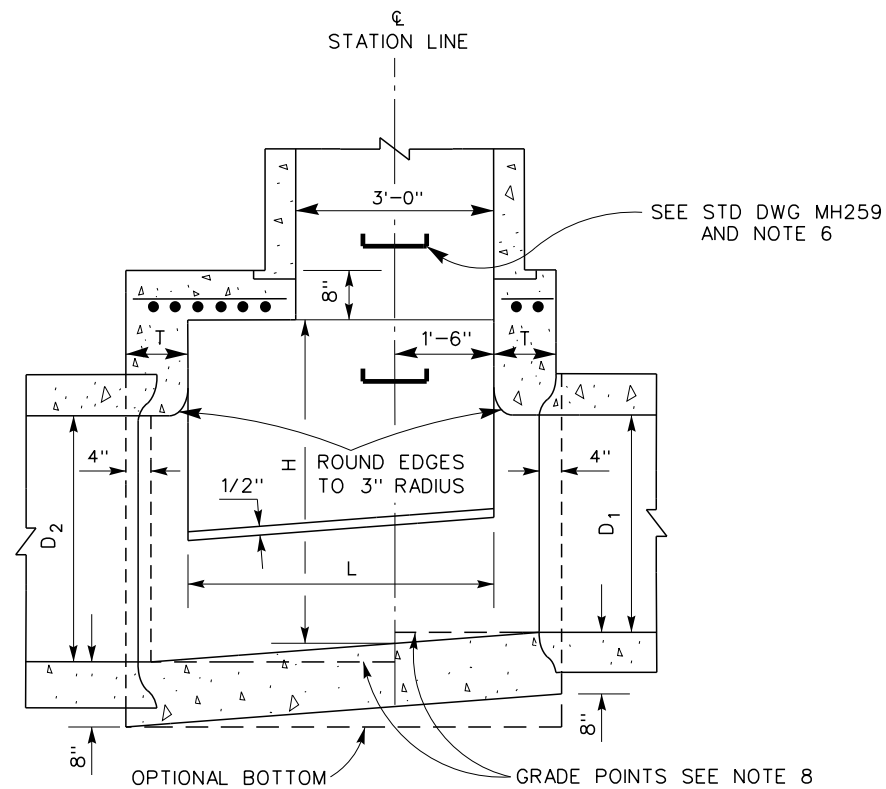
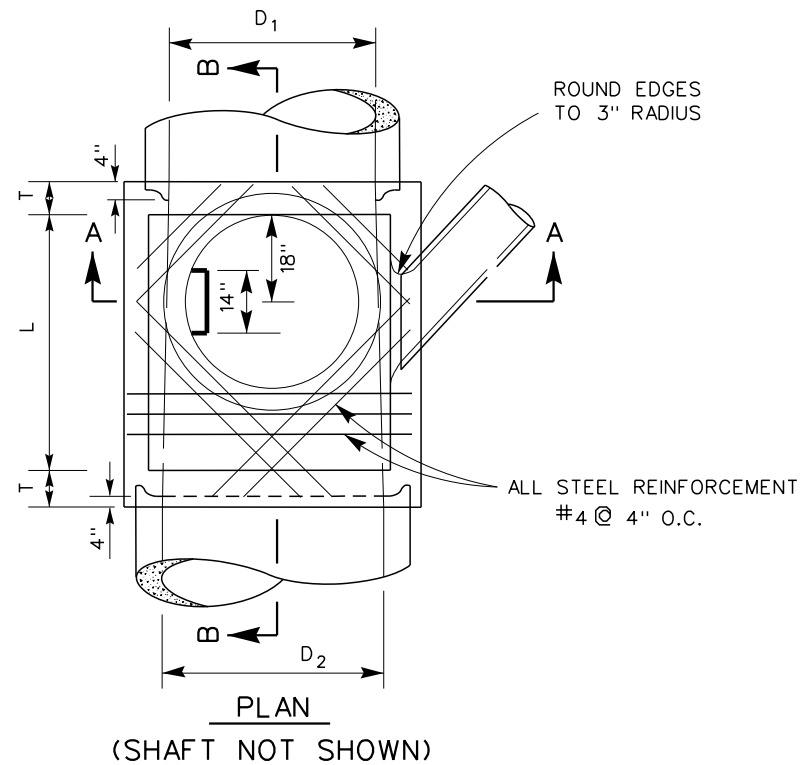
$E_{\min} = \frac{Z(D+2)}{\sin A}$ NOT TO EXCEED TOP OF CHANNEL

1. 1/4 TON CONCRETE ROCK SLOPE PROTECTION PER CALTRANS STANDARD SPECIFICATION SECTION 72, CURRENT EDITION. NO ROCK ENERGY DISSIPATOR REQUIRED WHEN LATERAL Q IS LESS THAN 10 CFS.
2. CONCRETE MAY EXTEND TO TOP OF SLOPE FOR ROCK LINED CHANNEL.
3. IF "Y" IS GREATER THAN OR EQUAL TO B/2, EXTEND CONCRETED ROCK SLOPE PROTECTION ACROSS ENTIRE BASE WIDTH OF CHANNEL AND 4 FEET UP THE OPPOSITE SLOPE, OR AS APPROVED BY THE ENGINEER.
4. SEE STANDARD CH326 FOR SLOPE PAVING AND CUTOFF WALL (REINF.) DETAILS.



RIVERSIDE COUNTY FLOOD CONTROL AND WATER CONSERVATION DISTRICT	
APPROVED BY:  GENERAL MANAGER/CHIEF ENGINEER	APPROVED BY:  CHIEF, DESIGN & CONSTRUCTION
DATE: <u>7-2-2019</u> R.C.E. NO. 59795	DATE: <u>7-2-2019</u> R.C.E. NO. 70355

JUNCTION STRUCTURE
NO. 8
(SOFT-BOTTOM CHANNEL)
STANDARD DRAWING NUMBER JS233
SHEET 1 OF 1

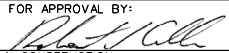
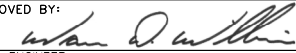


RIVERSIDE COUNTY FLOOD CONTROL AND WATER CONSERVATION DISTRICT	
RECOMMENDED FOR APPROVAL BY: <i>[Signature]</i> CHIEF, DESIGN & CONSTRUCTION	APPROVED BY: <i>[Signature]</i> CHIEF ENGINEER
DATE: JANUARY 2011	DATE: JANUARY 2011
R.E. No. 44684	R.C.E. No. 32336

MANHOLE NO. 1
STANDARD DRAWING NUMBER MH251
SHEET 1 OF 2

NOTES

1. HEIGHT H SHALL BE NOT LESS THAN 4'-0" BUT MAY BE INCREASED AT OPTION OF CONTRACTOR PROVIDED THAT THE VALUE OF M SHALL NOT BE LESS THAN THE MINIMUM SPECIFIED AND THAT THE REDUCER SHALL BE USED. FOR H (IN SEC. C-C) SEE NOTE 4.
2. LENGTH L SHALL BE 4' UNLESS OTHERWISE SHOWN ON IMPROVEMENT PLAN. L MAY BE INCREASED OR LOCATION OF MANHOLE SHIFTED TO MEET PIPE ENDS, AT THE OPTION OF CONTRACTOR, EXCEPT THAT ANY CHANGE IN LOCATION OF MANHOLE MUST BE APPROVED BY THE ENGINEER.
3. SHAFT SHALL BE CONSTRUCTED AS PER SECTION C-C AND DETAIL N WHEN DEPTH M FROM STREET GRADE TO TOP OF BOX IS LESS THAN 2'-10 1/2" FOR PAVED STREETS OR 3'-6" FOR UNPAVED STREETS.
4. DEPTH P MAY BE REDUCED TO AN ABSOLUTE LIMIT OF 6" WHEN LARGER VALUES OF P WOULD REDUCE H (IN SECTION C-C) TO BE 3'-6" OR LESS.
5. T SHALL BE 8" FOR VALUES OF H UP TO AND INCLUDING 8'.
T SHALL BE 10" FOR VALUES OF H OVER 8'.
6. STEPS SHALL BE 3/4" ROUND, GALVANIZED STEEL AND ANCHORED NOT LESS THAN 4" IN THE WALLS OF STRUCTURES. UNLESS OTHERWISE SHOWN, STEPS SHALL BE SPACED 16" ON CENTER. THE LOWEST STEP SHALL BE NOT MORE THAN 2' ABOVE THE INVERT.
7. REINFORCING STEEL SHALL BE ROUND, DEFORMED, BARS, NO. 4 AND 1 1/2" CLEAR FROM INSIDE FACE OF CONCRETE.
8. STATIONS REFER TO PLAN AND PROFILE SHEETS. ELEVATIONS AT $\&$ AND PROLONGED INVERT GRADE LINE. SEE NOTE 2 FOR SHIFTING LOCATION.
9. RINGS, REDUCER AND PIPE FOR ACCESS SHAFT SHALL BE SEATED IN CEMENT MORTAR AND NEATLY POINTED OR WIPED INSIDE SHAFT.
10. FLOOR OF MANHOLE SHALL BE STEEL TROWELED TO SPRINGLINE.
11. CONCRETE SHALL BE CLASS "A".
12. WHERE PRESSURE MANHOLE NO. 1 IS SPECIFIED ON PLANS SEE STD DWG MH256 AND MH258.

RIVERSIDE COUNTY FLOOD CONTROL AND WATER CONSERVATION DISTRICT	
RECOMMENDED FOR APPROVAL BY:  CHIEF, DESIGN & CONSTRUCTION DATE: <u>JANUARY 2011</u>	APPROVED BY:  CHIEF ENGINEER DATE: <u>JANUARY 2011</u>
R.E. No. 44684	R.C.E. No. 32336

MANHOLE NO. 1

STANDARD DRAWING NUMBER MH251
SHEET 2 OF 2

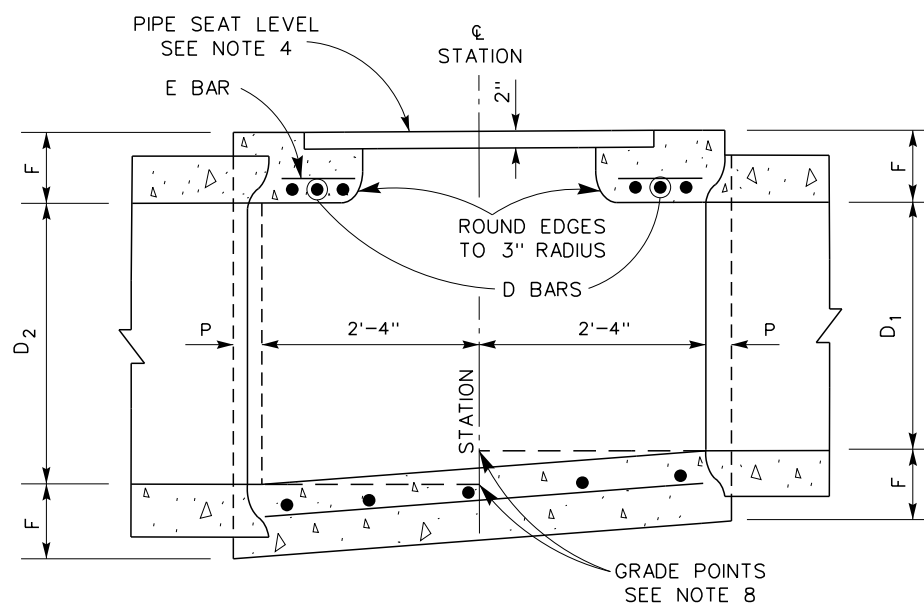
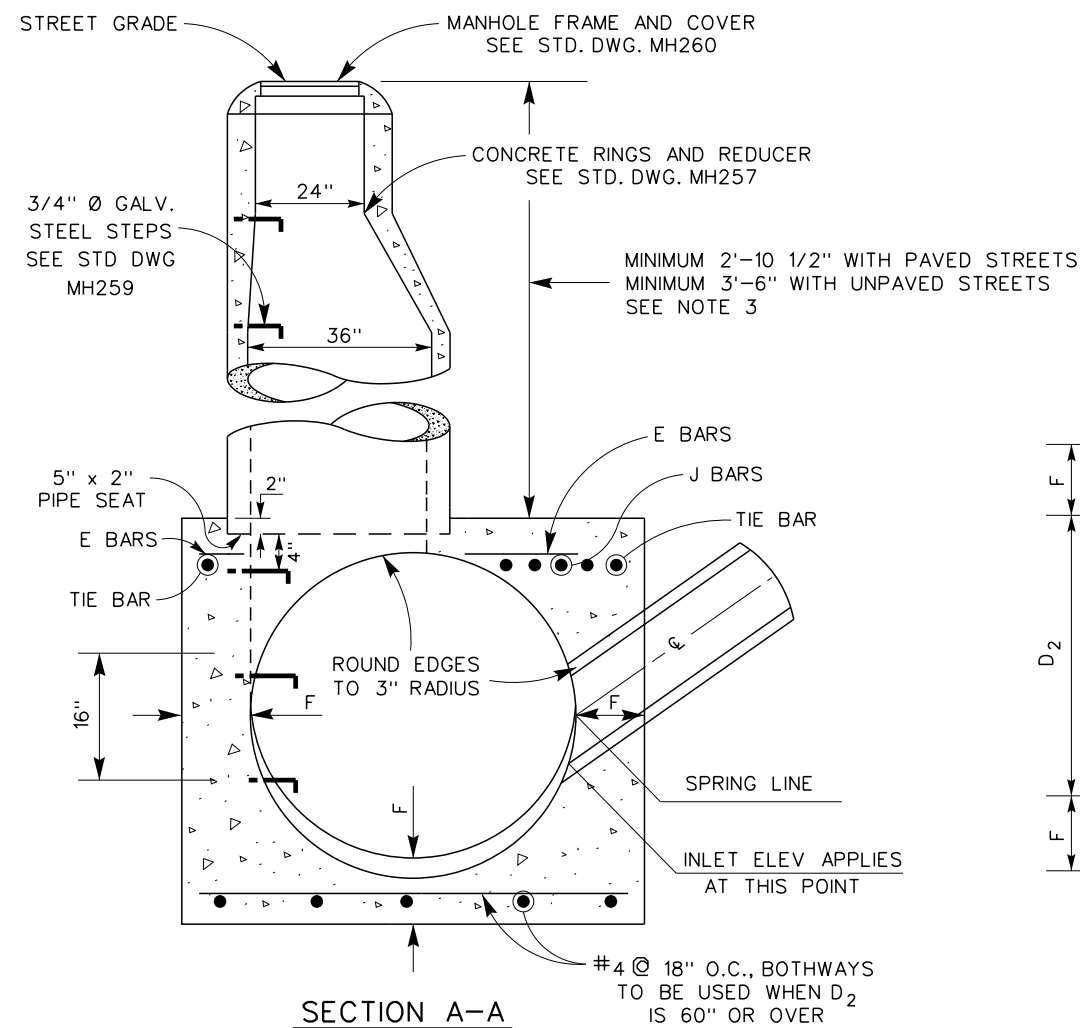
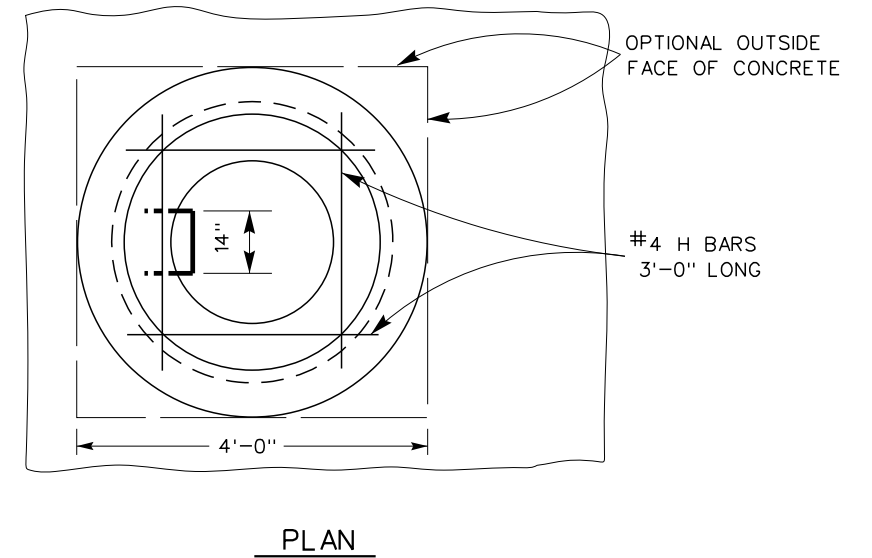
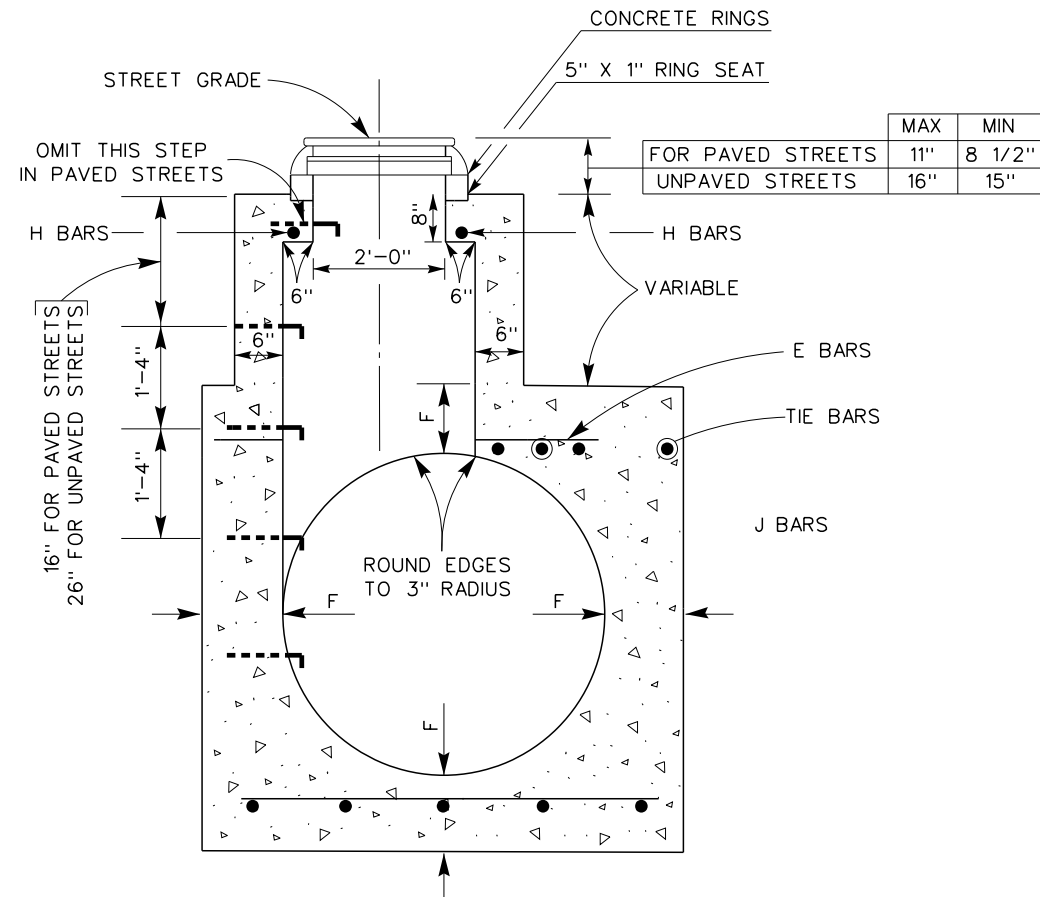
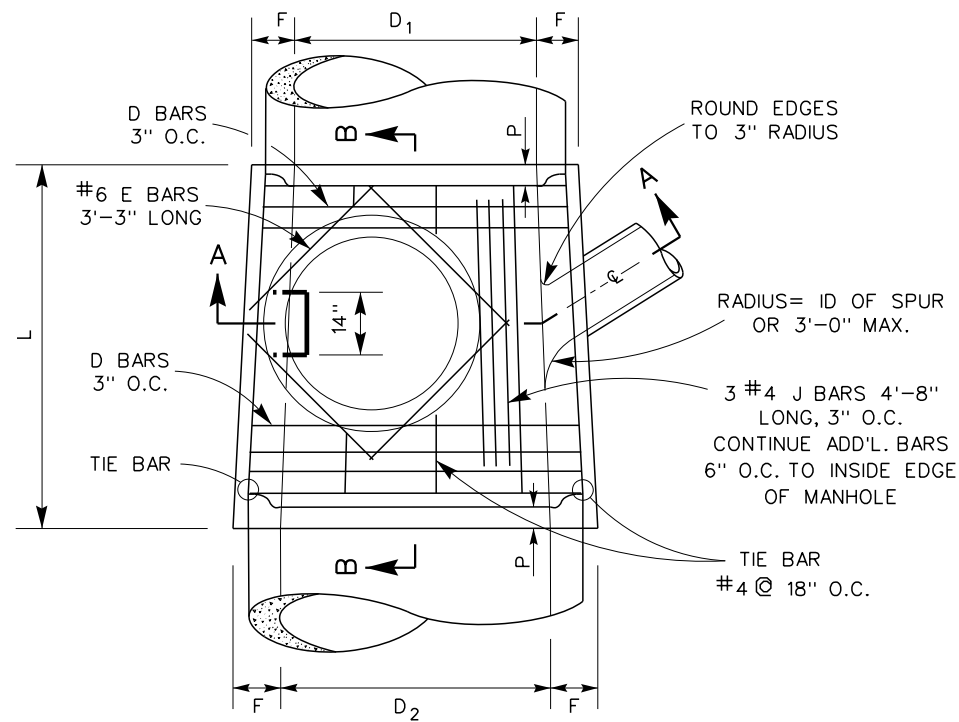


TABLE OF VALUES FOR "F"			
* D ₂ , D ₁	F	* D ₂ , D ₁	F
36"	6 1/2"	78"	11 3/4"
39"	7"	84"	12 1/2"
42"	7 1/2"	90"	13 1/4"
45"	7 3/4"	96"	14"
48"	8"	102"	15 1/2"
51"	8 1/2"	108"	16"
54"	9"	114"	16 1/2"
57"	9 1/4"	120"	17"
60"	9 1/2"	126"	17"
63"	10"	132"	17 1/2"
66"	10 1/4"	138"	17 1/2"
69"	10 3/4"	144"	18"
72"	11"		

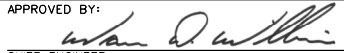
* USE D₂, OR D₁ WHICHEVER IS GREATER

RIVERSIDE COUNTY FLOOD CONTROL AND WATER CONSERVATION DISTRICT	
RECOMMENDED FOR APPROVAL BY: <i>[Signature]</i> CHIEF, DESIGN & CONSTRUCTION DATE: JANUARY 2011	APPROVED BY: <i>[Signature]</i> CHIEF ENGINEER DATE: JANUARY 2011
R.E. No. 44684	R.C.E. No. 32336

MANHOLE NO. 2
STANDARD DRAWING NUMBER MH252
SHEET 1 OF 2

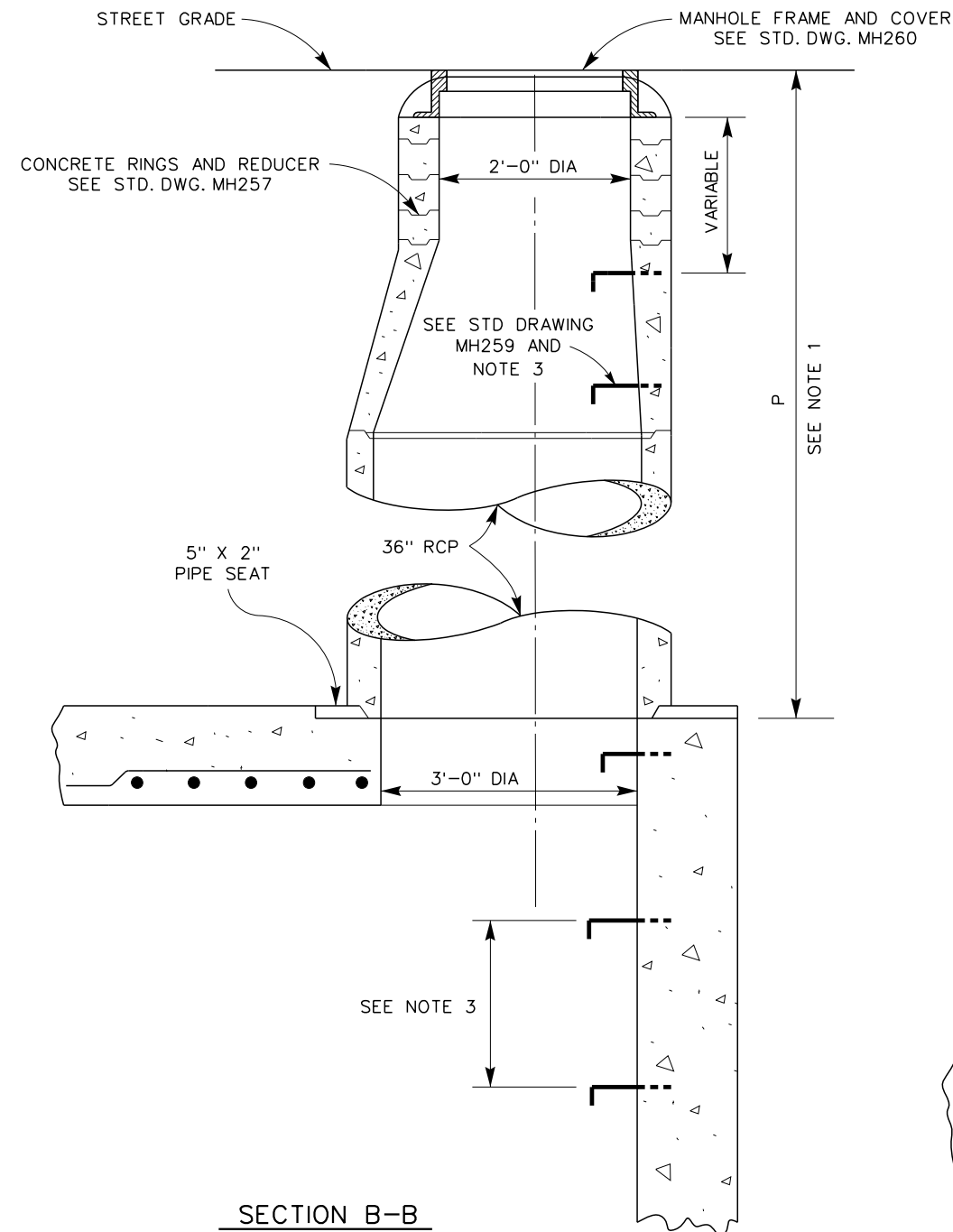
NOTES

1. TABLE OF VALUES FOR F ARE ON PLAN SHEET 1.
2. CENTER OF MANHOLE SHAFT SHALL BE LOCATED OVER CENTER LINE OF STORM DRAIN WHEN DIAMETER D_1 IS 48" OR LESS, IN WHICH CASE PLACE E BARS SYMETRICALLY AROUND SHAFT AT 45° WITH CENTERLINE AND OMIT J BARS.
3. DETAIL M WHEN DEPTH OF MANHOLE FROM STREET GRADE TO TOP OF BOX IS LESS THAN 2'-10 1/2" FOR PAVED STREET OR 3'-6" FOR UNPAVED STREET, CONSTRUCT MONOLITHIC SHAFT AS PER DETAIL M. SHAFT FOR ANY DEPTH OF MANHOLE MAY BE CONSTRUCTED AS PER DETAIL M. WHEN DIAMETER D_1 IS 48" OR LESS, CENTER OF SHAFT MAY BE LOCATED AS PER NOTE 2.
4. THICKNESS OF DECK SHALL VARY WHEN NECESSARY TO PROVIDE LEVEL PIPE SEAT, BUT SHALL NOT BE LESS THAN TABULAR VALUES FOR F SHOWN ON PLAN SHEET 1.
5. REINFORCING STEEL SHALL BE ROUND, DEFORMED, STRAIGHT BARS, 1 1/2" CLEAR FROM INSIDE FACE OF CONCRETE UNLESS OTHERWISE SHOWN.
6. STEPS SHALL BE 3/4" ROUND, GALVANIZED STEEL AND ANCHORED NOT LESS THAN 4" IN THE WALLS OF STRUCTURE UNLESS OTHERWISE SHOWN THE SPACING SHALL BE 16". THE LOWEST STEP SHALL BE NOT MORE THAN 2'-0" ABOVE THE INVERT. SEE STD DWG MH259.
7. RINGS, REDUCER AND PIPE FOR ACCESS SHAFT BE SEATED IN CEMENT MORTAR AND NEATLY POINTED OR WIPED INSIDE SHAFT.
8. STATIONS OF MANHOLES SHOWN ON PLAN APPLY AT CENTER OF SHAFT ELEVATIONS SHOWN AT STATIONS REFER TO PROLONGED INVERT GRADE LINES.
9. FLOOR OF MANHOLE SHALL BE STEEL TROWELED TO SPRINGLINE.
10. BODY OF MANHOLE SHALL BE POURED IN ONE CONTINUOUS OPERATION, EXCEPT THAT THE CONSTRUCTION JOINT WITH A LONGITUDINAL KEYWAY MAY BE PLACED AT THE SPRINGLINE.
11. LENGTH L AND EMBEDMENT P SHALL HAVE THE FOLLOWING VALUES, UNLESS OTHERWISE SHOWN ON THE PLAN
 FOR $D_2 = 96"$ OR LESS, $L = 5'-6"$, $P = 5'$
 $D_2 = \text{OVER } 96"$, $L = 6'-0"$, $P = 8'$
 L MAY BE INCREASED OR LOCATION OF MANHOLE SHIFTED TO MEET PIPE ENDS WHEN L IS GREATER THAN THAT SHOWN ABOVE IS SPECIFIED D BARS SHALL BE CONTINUED 6" O.C.
12. D BARS SHALL BE #4 FOR $D_2 = 39"$ OR LESS #5 FOR $D_2 42"$ TO 84" INCLUSIVE AND #6 FOR $D_2 = 90"$ OR OVER TIE BARS SHALL BE #4 BARS.
13. STRUCTURAL CONCRETE SHALL BE CLASS "A".
14. CENTERLINE OF INLET PIPE TO INTERSECT INSIDE FACE OF CONE AT SPRINGLINE UNLESS SHOWN OTHERWISE.
15. WHERE PRESSURE MANHOLE NO. 2 IS SPECIFIED ON PLANS SEE STD DWG MH256 AND MH258.

RIVERSIDE COUNTY FLOOD CONTROL AND WATER CONSERVATION DISTRICT	
RECOMMENDED FOR APPROVAL BY:  CHIEF, DESIGN & CONSTRUCTION DATE: <u>JANUARY 2011</u>	APPROVED BY:  CHIEF ENGINEER DATE: <u>JANUARY 2011</u>
R.E. No. 44684	R.C.E. NO. 32336

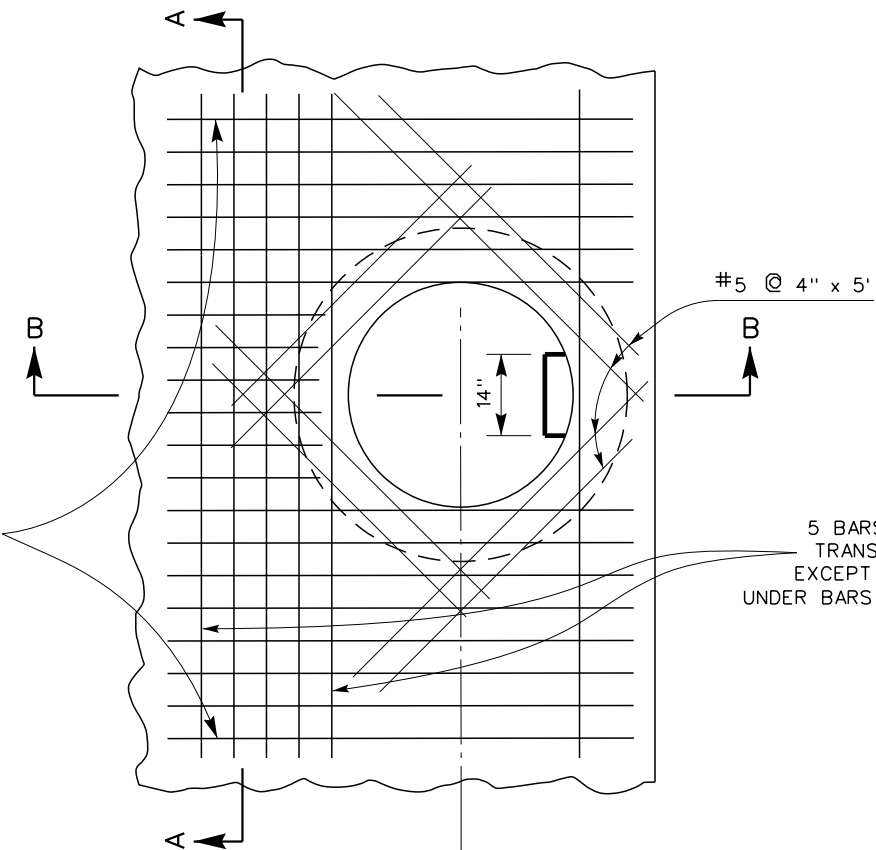
MANHOLE NO. 2

STANDARD DRAWING NUMBER MH252
SHEET 2 OF 2

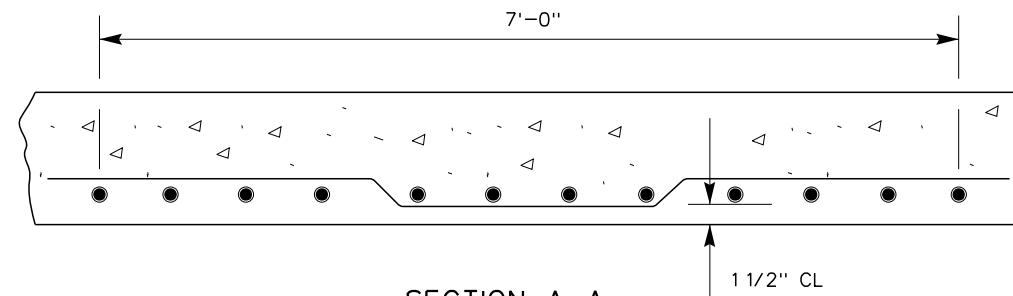


SECTION B-B
MANHOLE FOR BOX
SECTION STORM DRAIN
NTS

SIZE AND SPACING OF STEEL AS SHOWN
ON IMPROVEMENT PLAN, EXCEPT THAT 5
BARS ON EACH SIDE OF SHAFT SHALL BE
NOT SMALLER THAN #5 @ 4" OR EQUIVALENT



PLAN
(SHAFT NOT SHOWN)
NTS



SECTION A-A
NTS

NOTE

1. DEPTH P: WHEN DEPTH P FROM STREET GRADE TO TOP OF PIPE SEAT IS LESS THAN 2' - 10 1/2" IN PAVED STREETS OR 3' - 6" IN UNPAVED STREETS, CONSTRUCT 2' DIAMETER SHAFT, USING CONCRETE RINGS AS PER STANDARD PLAN FOR CONCRETE RINGS; OTHERWISE, CONSTRUCT 3' SHAFT AS SHOWN ON THIS PLAN.
2. STATIONS SHOWN ON IMPROVEMENT PLANS REFER TO CENTER LINE OF SHAFT.
3. STEPS SHALL BE 3/4" ROUND GALVANIZED STEEL ANCHORED NOT LESS THAN 4" IN WALLS OF STRUCTURE AND UNLESS OTHERWISE SHOWN SHALL BE SPACED 16" ON CENTERS. THE LOWEST STEP SHALL BE NOT MORE THAN 2' ABOVE THE FLOOR.
4. WHERE PRESSURE MANHOLE NO. 3 IS SPECIFIED ON PLANS SEE STD DWG MH256 AND MH258.

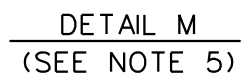
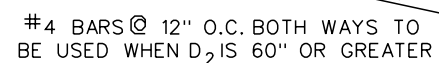
RIVERSIDE COUNTY FLOOD CONTROL AND WATER CONSERVATION DISTRICT	
RECOMMENDED FOR APPROVAL BY: <i>[Signature]</i> CHIEF, DESIGN & CONSTRUCTION	APPROVED BY: <i>[Signature]</i> CHIEF ENGINEER
DATE: JANUARY 2011	DATE: JANUARY 2011
R.E. No. 44684	R.C.E. No. 32336

MANHOLE NO. 3

STANDARD DRAWING NUMBER MH253



* USE D_2 , OR D_1 , WHICHEVER IS GREATER, OR B



MANHOLE NO. 4

STANDARD DRAWING NUMBER MH254

SHEET 1 OF 2

NOTES

1. VALUES FOR A, B, C, D₁, D₂, ELEVATION R AND ELEVATION S ARE SHOWN ON THE IMPROVEMENT PLAN TABLE OF VALUES FOR F AND T HEREON.
2. LATERALS: IF LATERALS ENTER ON BOTH SIDES OF MANHOLE, ACCESS SHAFT SHALL BE LOCATED ON SIDE RECEIVING THE SMALLER LATERAL.
3. CENTER OF MANHOLE SHAFT SHALL BE LOCATED OVER CENTER LINE OF STORM DRAIN WHEN D₁ IS 48" OR LESS, IN WHICH CASE PLACE 8 E BARS SYMMETRICALLY AROUND SHAFT AT 45° WITH CENTER LINE
4. LENGTH L MAY BE INCREASED AT OPTION OF CONTRACTOR TO MEET PIPE ENDS, BUT ANY CHANGE IN LOCATION OF SPUR MUST BE APPROVED BY THE ENGINEER.
5. DETAIL M: WHEN DEPTH OF MANHOLE FROM STREET GRADE TO TOP OF BOX IS LESS THAN 2'-10 1/2" FOR PAVED STREETS OR 3'-6" FOR UNPAVED STREETS, CONSTRUCT MONOLITHIC SHAFT AS PER DETAIL M. THE CONTRACTOR SHALL HAVE THE OPTION OF CONSTRUCTING SHAFT AS PER DETAIL M FOR ANY DEPTH OF MANHOLE WHEN DIAMETER D₁ IS 48" OR LESS, CENTER OF SHAFT SHALL BE LOCATED AS PER NOTE 3.
6. REINFORCING STEEL SHALL BE ROUND, DEFORMED, STRAIGHT BARS, 1 1/2" CLEAR FROM INSIDE FACE UNLESS OTHERWISE SHOWN. TIE BARS SHALL BE NO. 4 AND SPACED 18" ON CENTERS OR CLOSER.
7. CONCRETE SHALL BE CLASS A, 1 1/2" AGGREGATE.
8. STEPS SHALL BE 3/4" ROUND, GALVANIZED STEEL AND ANCHORED NOT LESS THAN 6" IN THE WALLS OF STRUCTURE UNLESS OTHERWISE SHOWN THE SPACING SHALL BE 16" ON CENTERS. THE LOWEST STEP SHALL BE NOT MORE THAN 2' ABOVE THE INVERT.
9. RINGS, REDUCER AND PIPE FOR ACCESS SHAFT SHALL BE SEATED IN CEMENT MORTAR AND NEATLY POINTED OR WIPED INSIDE SHAFT.
10. FLOOR OF MANHOLE SHALL BE STEEL TROWELED TO SPRINGLINE.
11. BODY OF MANHOLE, INCLUDING SPUR, SHALL BE POURED IN ONE CONTINUOUS OPERATION, EXCEPT THAT THE CONTRACTOR SHALL HAVE THE OPTION OF PLACING AT THE SPRINGLINE A CONSTRUCTION JOINT WITH LONGITUDINAL KEYWAY AND REBAR DOWELS.
12. THE MAXIMUM COVER ABOVE THIS STRUCTURE SHALL BE 25'. IF THE COVER EXCEEDS 25' A SPECIAL STRUCTURE SHALL BE DESIGNED FOR THE COVER AND DETAILED ON THE PROJECT DRAWING.
13. P SHALL BE 5" UNLESS DIAMETER EXCEEDS 96" THEN P= 8".
14. WHERE PRESSURE MANHOLE NO. 4 IS SPECIFIED ON PLANS SEE STD DWG MH256 AND MH258.

** TABLE OF VALUES FOR F AND T

* D ₂ , D ₁	F	* D ₂ , D ₁	F	B	T	B	T
12"	4"	63"	10"	12"	4"	63"	10"
15"	4 1/4"	66"	10 1/4"	15"	4 1/4"	66"	10 1/4"
18"	4 1/2"	69"	10 3/4"	18"	4 1/2"	69"	10 3/4"
21"	5"	72"	11"	21"	5"	72"	11"
24"	5 1/4"	78"	11 3/4"	24"	5 1/4"	78"	11 3/4"
27"	5 1/2"	84"	12 1/2"	27"	5 1/2"	84"	12 1/2"
30"	6"	90"	13 1/4"	30"	6"	90"	13 1/4"
33"	6 1/4"	96"	14"	33"	6 1/4"	96"	14"
36"	6 1/2"	102"	15 1/2"	36"	6 1/2"	102"	15 1/2"
39"	7"	108"	16"	39"	7"	108"	16"
42"	7 1/2"	114"	16 1/2"	42"	7 1/2"	114"	16 1/2"
45"	7 3/4"	120"	17"	45"	7 3/4"	120"	17"
48"	8"	126"	17"	48"	8"	126"	17"
51"	8 1/2"	132"	17 1/2"	51"	8 1/2"	132"	17 1/2"
54"	9"	138"	17 1/2"	54"	9"	138"	17 1/2"
57"	9 1/4"	144"	18"	57"	9 1/4"	144"	18"
60"	9 1/2"			60"	9 1/2"		

RIVERSIDE COUNTY FLOOD CONTROL
AND
WATER CONSERVATION DISTRICT

RECOMMENDED FOR APPROVAL BY:

CHIEF, DESIGN & CONSTRUCTION

DATE: JANUARY 2011

R.E. No. 44684

APPROVED BY:

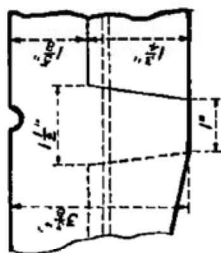
CHIEF ENGINEER

DATE: JANUARY 2011

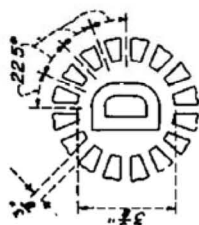
R.C.E. NO. 32336

MANHOLE NO. 4

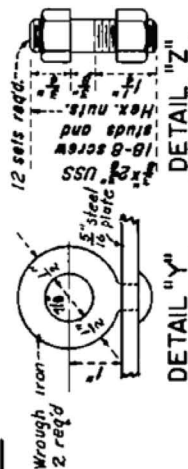
STANDARD DRAWING NUMBER MH254
SHEET 2 OF 2



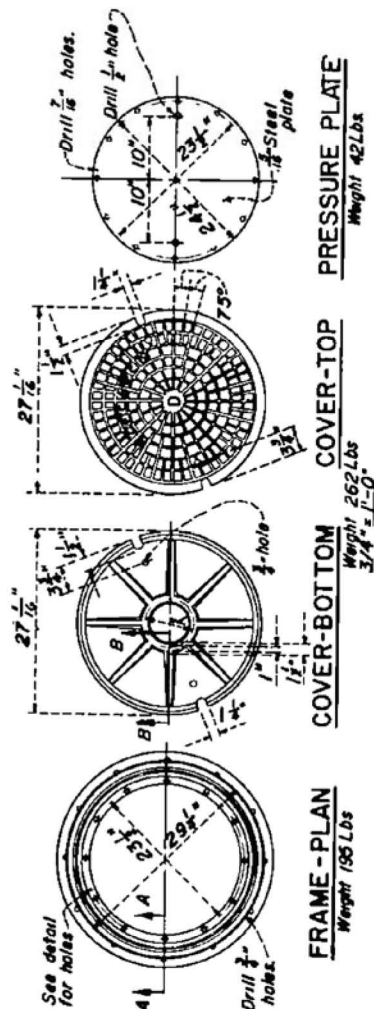
SECTION B-B



LETTER DETAIL (3"=1'-0")



SECTION A-A
Half Size



FRAME-PLAN
Wegert 195 Lbs

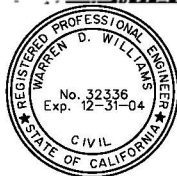
COVER-BOTTOM

COVER-TOP

PRESSURE PLATE
Weight 42Lbs

NOTES:

- 1 Manhole Frame and Cover shall be made of gray cast iron conforming to the latest ASTM standard A48, class 30 or Better Pressure Plate shall be steel
- 2 All parts of the Manhole Frame and Cover except machined surfaces shall be coated with asphaltum paint
- 3 Manhole Frame and Cover shall be tested for accuracy of fit and shall be marked in sets before delivery. The Cover shall fit the Frame snugly but not tightly
- 4 Weights of Frame, Cover, and Pressure Plate shall not vary more than two percent from those given herein.
5. This structure shall be used with Standard Pressure Manhole Shaft, See Standard Drawing MH258. It may be used for hydrostatic heads up to 25 above steel plate.



RIVERSIDE COUNTY FLOOD CONTROL
AND
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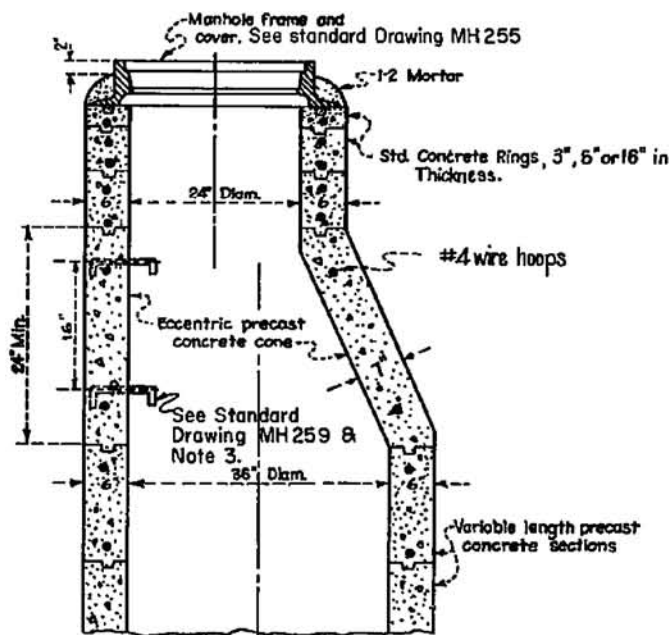
CHIEF ENGINEER

DATE: April 5, 2004

R.C.E. NO. 32336

MANHOLE FRAME & COVER
PRESSURE TYPE

STANDARD DRAWING NUMBER MH256

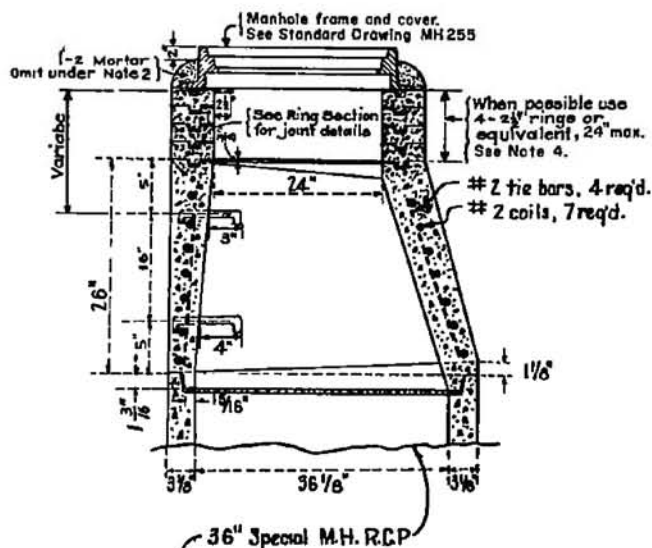


**VERTICAL SECTION
OF PLAIN CONCRETE
ECCENTRIC MANHOLE SHAFT**

24 inch rings shall be reinforced with two round steel hoops; 6 inch and 8 inch rings shall be reinforced with four hoops, tied with No. 14 A.S. & W. gauge wire 8 inches on centers.



**CROSS SECTION
OF REINFORCED
CONCRETE RING**



**VERTICAL SECTION
OF REINFORCED CONCRETE
ECCENTRIC MANHOLE SHAFT**

NOTES

1. ALL JOINTS shall be filled with 1-2 mortar and neatly pointed or wiped on inside of shaft.
2. COLLAR of 1-2 mortar around cover frame shall be omitted in rock and oil streets and in paved streets.

3. STEPS shall be 3/4 inch round galvanized steel. Top step shall be placed directly beneath the manhole cover frame.

Width of all steps shall be 14 inches between leg centers. Except where shown otherwise, spacing of steps in shaft shall be 16 inches on center.

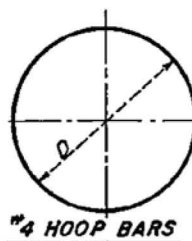
4. ECCENTRIC MANHOLE shaft, reducer, and rings may be plain concrete. For unreinforced sections, the minimum thickness shall be 6 inches. The concrete used shall be Class "A".



RIVERSIDE COUNTY FLOOD CONTROL AND WATER CONSERVATION DISTRICT	
APPROVED BY:	<i>Warren D. Williams</i>
CHIEF ENGINEER	
DATE: April 5, 2004	R.C.E. NO. 32338

**MANHOLE SHAFT FOR
CAST PIPE**

STANDARD DRAWING NUMBER MH257



*-Electrically butt weld ends or
lap ends of bar 18"*

Where H is more than 4'-0" $D=3-1\frac{3}{4}$ " for topmost hoop in shaft; each lower hoop in succession increases $3\frac{1}{4}$ " in diameter to a maxi-
of 4'-0" in the vertical portion of the shaft.

1. If "H" is less than 1'-6", $W = 2'-0"$
 If "H" is between 1'-6" and 2'-6", $W = 2'-6"$
 If "H" is 2'-6" or more, $W = 3'-0"$
 If "H" is more than 4'-0", bring walls vertically to 4'-0 1/2" below surface and taper from 3'-0" to 2'-0" as shown.
2. This structure shall be used with Standard Pressure Manhole Frame and Cover, See Standard Drawing MH 256. It may be used for hydrostatic heads up to 25' above the steel plate.
3. Concrete shall be Class "A"



APPROVED BY:

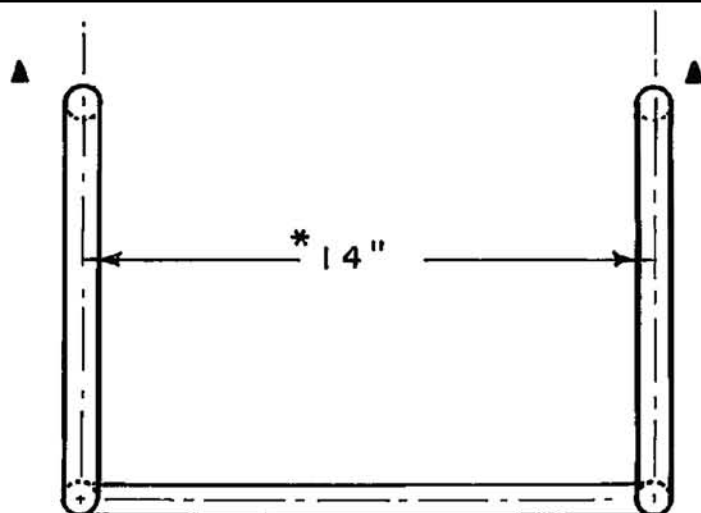
CHIEF ENGINEER

DATE: April 5, 2004

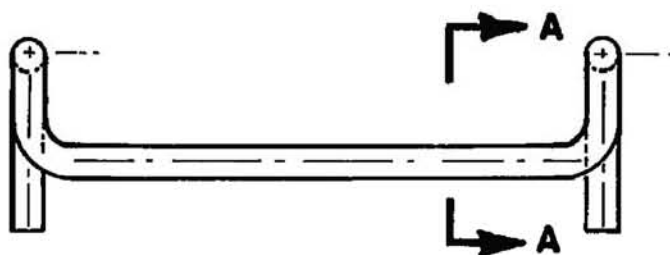
R.C.E. NO. 32336

STANDARD PRESSURE MANHOLE SHAFT

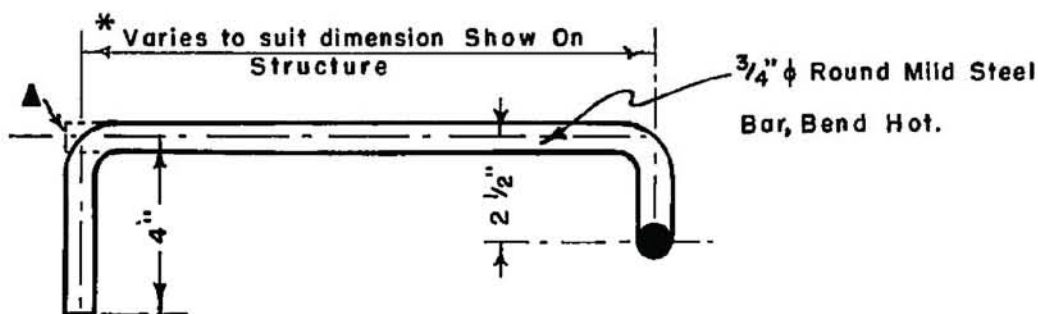
STANDARD DRAWING NUMBER MH258



PLAN VIEW



FRONT ELEVATION



SECTION A-A
GALVANIZE AFTER BENDING

NOTE:

THIS DETAIL SHALL BE
USED WHEREVER STEPS
ARE REQUIRED.

Note
▲ = When steel forms
are used eliminate hook
and use upset end.

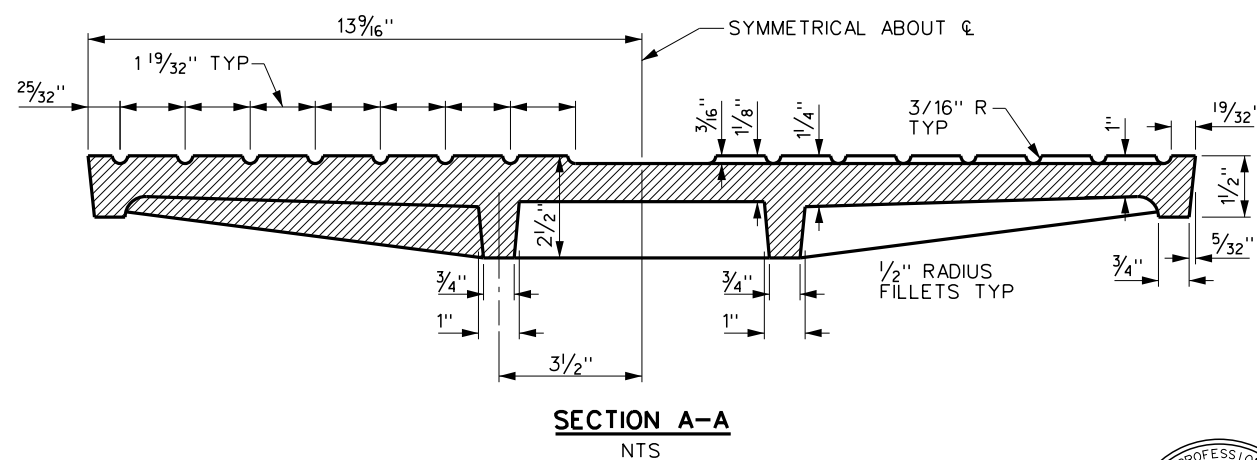
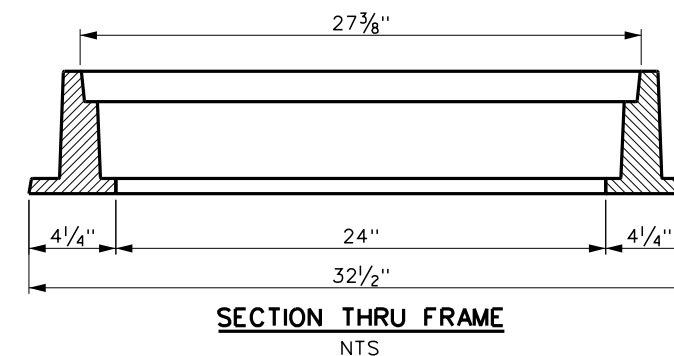
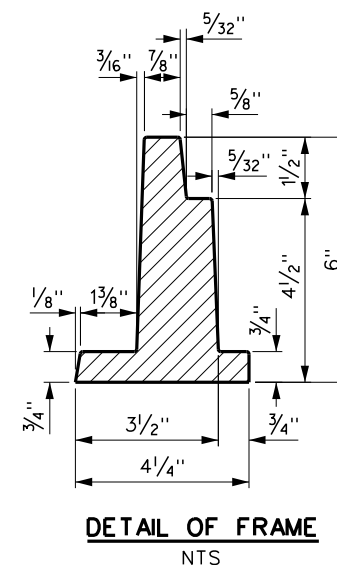
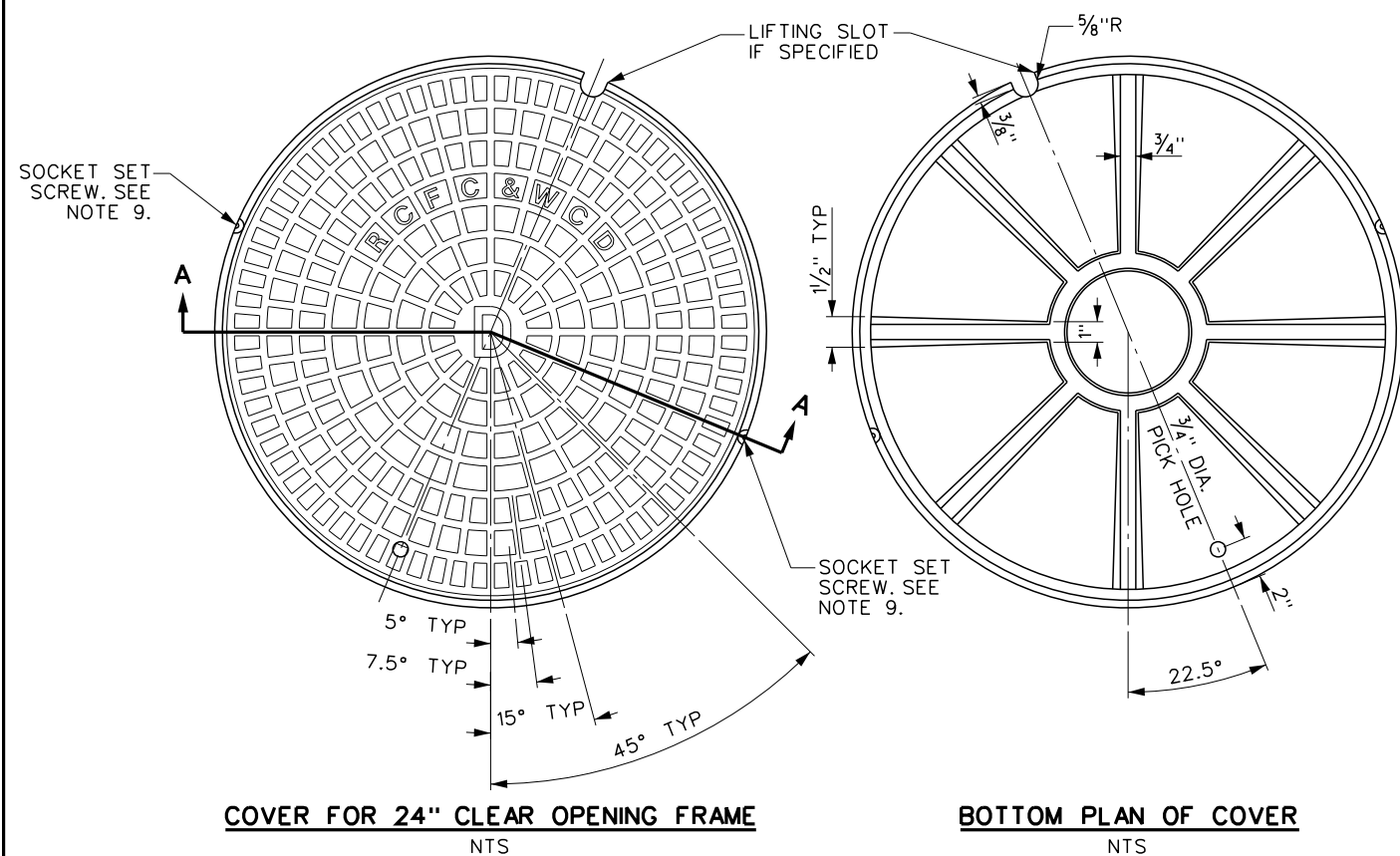


RIVERSIDE COUNTY FLOOD CONTROL AND WATER CONSERVATION DISTRICT	
APPROVED BY:	<i>Warren D. Williams</i>
CHIEF ENGINEER	
DATE: April 5, 2004	

R.C.E. NO. 32338

**STANDARD
DROP STEP**

STANDARD DRAWING NUMBER MH259

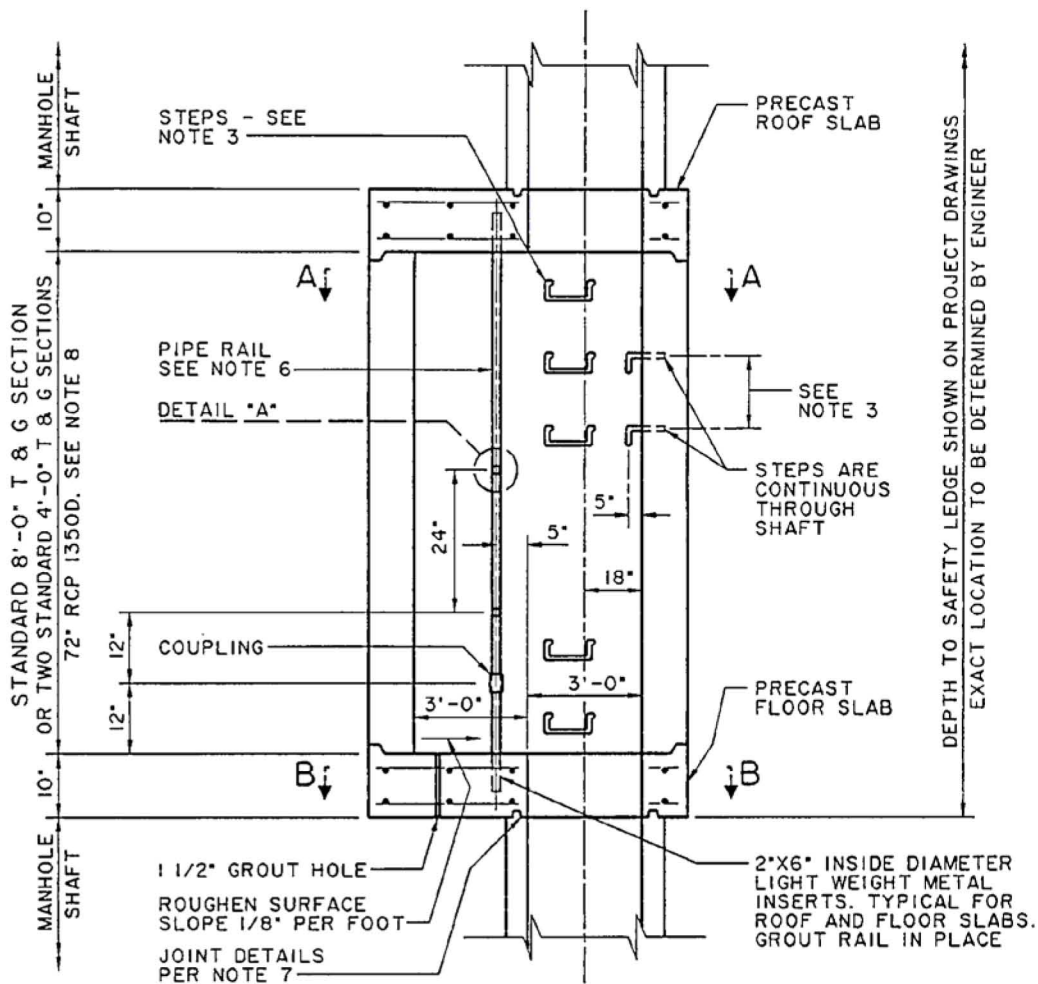


NOTES

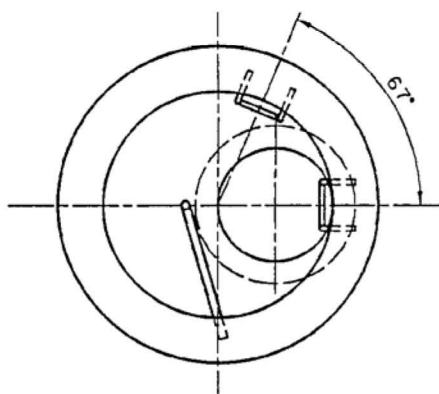
1. THE CAST IRON USED SHALL CONFORM WITH ASTM A-48 CLASS 35B.
2. THE FRAME AND COVER SHALL BE COATED WITH ASPHALTUM OR BITUMINOUS PAINT AFTER TESTING AND INSPECTION.
3. COVERS SHALL BE CAST WITH THE LETTERS "D" AND "RCFC&WCD". THE LETTER "D" SHALL BE APPROXIMATELY 2 1/2" HIGH WITH 1/2" LINE WIDTH AND PLACED IN THE CENTER OF THE COVER. ALL LETTERS SHALL BE FLUSH WITH THE FINISHED SURFACE OF THE COVER.
4. FOUNDRY IDENTIFYING MARK, HEAT AND DATE SHALL BE CAST ON THE BOTTOM OF THE COVER AND ON THE INSIDE OF THE FRAME.
5. IMPORTED COVERS AND FRAMES SHALL HAVE THE COUNTRY OF ORIGIN MARKING IN COMPLIANCE WITH FEDERAL REGULATIONS.
6. WEIGHT OF FRAME SHALL BE 265 POUNDS. WEIGHT OF COVER SHALL BE 175 POUNDS. ACTUAL WEIGHTS SHALL BE WITHIN A RANGE OF 95% TO 110%.
7. THE MANHOLE FRAME AND COVER SHALL BE INSPECTED BY THE ENGINEER PRIOR TO SHIPMENT TO THE JOB SITE. ACCEPTANCE WILL BE INDICATED BY THE AGENCY'S MARK.
8. THE PROOF LOAD FOR TEST METHOD B OF THE STANDARD SPECIFICATION IS 40,700 POUNDS.
9. ALL COVERS SHALL BE PROVIDED WITH SOCKET SET SCREW LOCKING DEVICES. DRILL AND TAP TWO HOLES TO A DEPTH OF ONE INCH AT 90 DEGREES TO PICK HOLE AND INSTALL 3/4 INCH X 3/4 INCH STAINLESS STEEL SOCKET SET SCREWS WITH 3/8 INCH RECESSED HEX HEAD. ALL THREADS SHALL BE N.C.



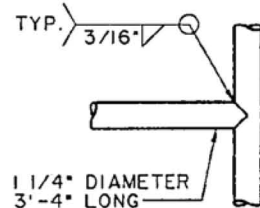
RIVERSIDE COUNTY FLOOD CONTROL AND WATER CONSERVATION DISTRICT		24-INCH MANHOLE FRAME AND COVER	
APPROVED BY: <i>[Signature]</i>	APPROVED BY: <i>[Signature]</i>	STANDARD DRAWING NUMBER MH260 SHEET 1 OF 1	
GENERAL MANAGER-CHIEF ENGINEER	CHIEF, DESIGN & CONSTRUCTION		
DATE: 09-21-2016	DATE: 09-21-2016		
R.C.E. No. 59795	R.C.E. No. 44684		



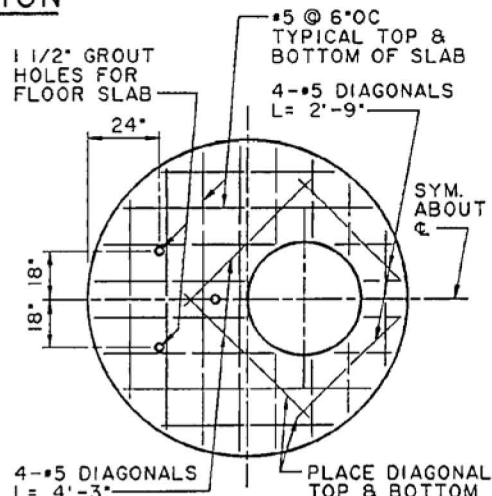
VERTICAL SECTION



SECTION A-A



DETAIL "A"
ROTATED 90°



SECTION B-B
REINFORCEMENT DETAILS
FOR FLOOR AND ROOF SLABS



RIVERSIDE COUNTY FLOOD CONTROL AND WATER CONSERVATION DISTRICT	
APPROVED BY:	<i>Warren D. Williams</i>
CHIEF ENGINEER	
DATE: April 5, 2004	R.C.E. NO. 32336

**MANHOLE SHAFT
SAFETY LEDGE**

STANDARD DRAWING NUMBER MH261
SHEET 1 OF 2

NOTES

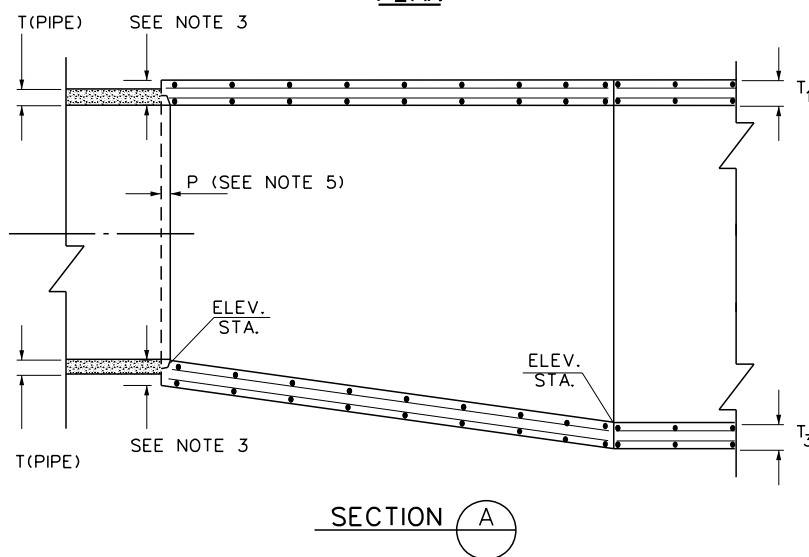
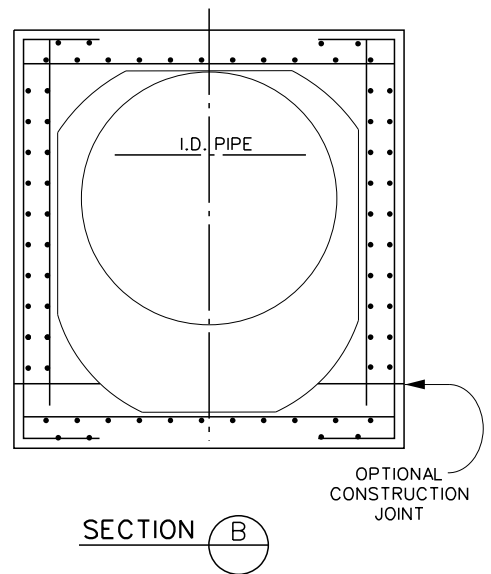
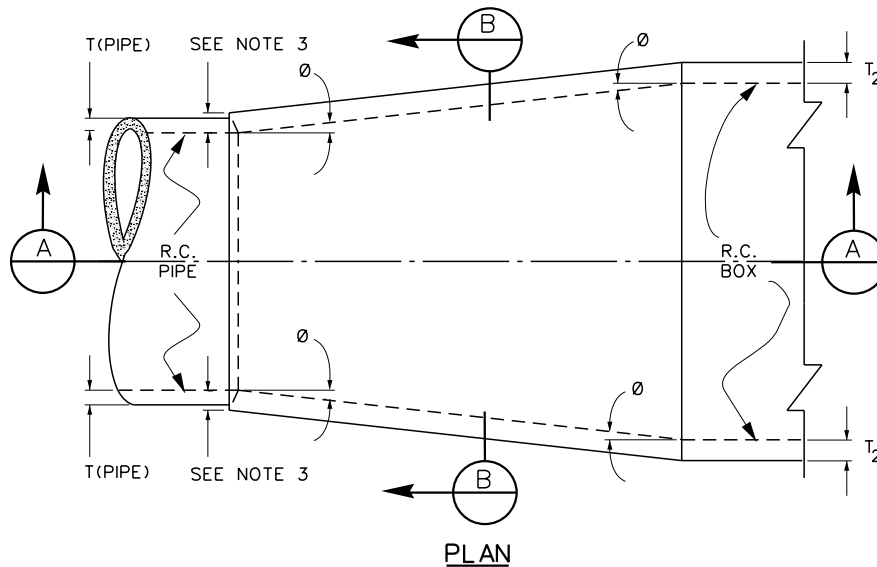
1. MANHOLE SHAFT SAFETY LEDGE WILL BE NOTED ON THE PROJECT DRAWINGS WHEN REQUIRED. IT IS TO BE CONSTRUCTED IN DEEP MANHOLE SHAFTS 20' OR GREATER IN DEPTH.
2. A SAFETY LEDGE SHALL NOT BE USED IF A PRESSURE MANHOLE IS REQUIRED.
3. STEPS SHALL CONFORM TO STANDARD DRAWING MH259 AND SHALL BE ANCHORED 4" IN THE WALL OF THE STRUCTURE. STEPS SHALL BE PLACED TO MATCH THE SPACING OF THE MANHOLE SHAFT.
4. REINFORCEMENT SHALL BE PER ASTM A 615, GRADE 40 AND SHALL TERMINATE 2" CLEAR OF CONCRETE SURFACES UNLESS OTHERWISE SHOWN.
5. GROUT HOLES, PIPE AND FITTINGS SHALL BE PROVIDED IN THE FLOOR SLAB. PRESSURE GROUTING SHALL BE USED TO FILL VOIDS AND TO SECURE UNIFORM BEARING. THE GROUT SHALL BE NEAT CEMENT GROUT AND GROUTING PRESSURES SHALL BE AS DETERMINED IN THE FIELD BY THE ENGINEER.
6. PIPE RAIL SHALL BE FABRICATED OF 1 1/4" STANDARD GALVANIZED PIPE COMPOSED OF TWO SECTIONS 7'-6" & 18" IN LENGTH JOINED BY A GALVANIZED COUPLING. THE COUPLING SHALL BE THREADED A MINIMUM OF 2" ON EACH PIPE LENGTH.
7. ROOF AND FLOOR SLABS SHALL BE PRECAST AND KEYED FOR REINFORCED CONCRETE PIPE SECTIONS AS SHOWN. ALL JOINTS SHALL BE FILLED WITH CLASS C MORTAR AND NEATLY POINTED OR WIPED ON THE INSIDE.
8. 72" RCP SHALL BE PROVIDED WITH TWO CIRCULAR CAGES OF REINFORCEMENT.



RIVERSIDE COUNTY FLOOD CONTROL AND WATER CONSERVATION DISTRICT	
APPROVED BY: 	
CHIEF ENGINEER	
DATE: April 5, 2004	R.C.E. NO. 32336

MANHOLE SHAFT
SAFETY LEDGE

STANDARD DRAWING NUMBER MH261
SHEET 2 OF 2



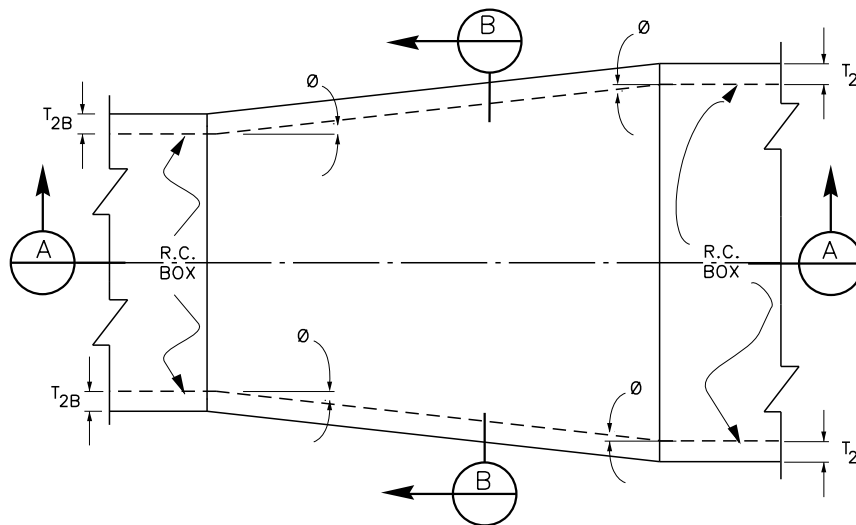
NOTES

1. THE HORIZONTAL ANGLE OF DIVERGENCE OR CONVERGENCE, θ , SHALL NOT EXCEED $5^{\circ} 45'$.
2. REINFORCING STEEL BAR SIZES, SPACING PATTERN AND COVER OVER THE STEEL SHALL BE THAT OF THE BOX SECTION. THE BAR LENGTHS SHALL VARY UNIFORMLY THROUGHOUT THE TRANSITION.
3. THE CONCRETE THICKNESS SHALL BE THAT OF THE BOX SECTION UNLESS THE WALL THICKNESS OF THE PIPE PLUS 4" IS GREATER, IN WHICH CASE THE CONCRETE THICKNESS SHALL VARY UNIFORMLY FROM THAT OF THE BOX SECTION TO THAT OF THE PIPE WALL PLUS 4".
4. THE INTERIOR SURFACE SHALL BE SMOOTH AND VARY UNIFORMLY BETWEEN THE TWO ADJOINING SECTIONS.
5. AT PIPE JUNCTURE, EMBEDMENT P SHALL BE 5" FOR PIPE SIZES OF 96" OR LESS AND 8" FOR PIPE OVER 96".
6. CONSTRUCTION JOINTS OF THE SAME DIMENSIONS AS THOSE OF THE BOX MAY BE CARRIED THROUGH THE TRANSITION STRUCTURE AT CONTRACTOR'S OPTION. SEE SECTION B ABOVE.
7. THE TRANSITION STRUCTURE SHALL BE CONSTRUCTED IN ACCORDANCE WITH THE GENERAL STRUCTURAL NOTES APPLYING TO BOX AS SHOWN ON THE PROJECT DRAWINGS.
8. STRUCTURAL CONCRETE SHALL BE CLASS "A".

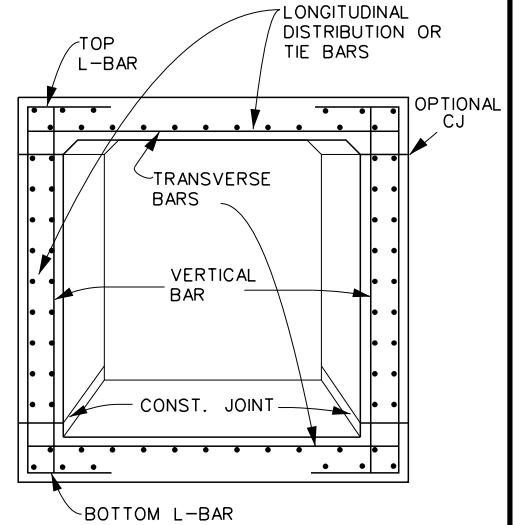
RIVERSIDE COUNTY FLOOD CONTROL AND WATER CONSERVATION DISTRICT	
RECOMMENDED FOR APPROVAL BY: CHIEF, DESIGN & CONSTRUCTION DATE: JANUARY 2011	APPROVED BY: CHIEF ENGINEER DATE: JANUARY 2011
R.E. No. 44684	R.C.E. NO. 32336

TRANSITION STRUCTURE
NO. 1

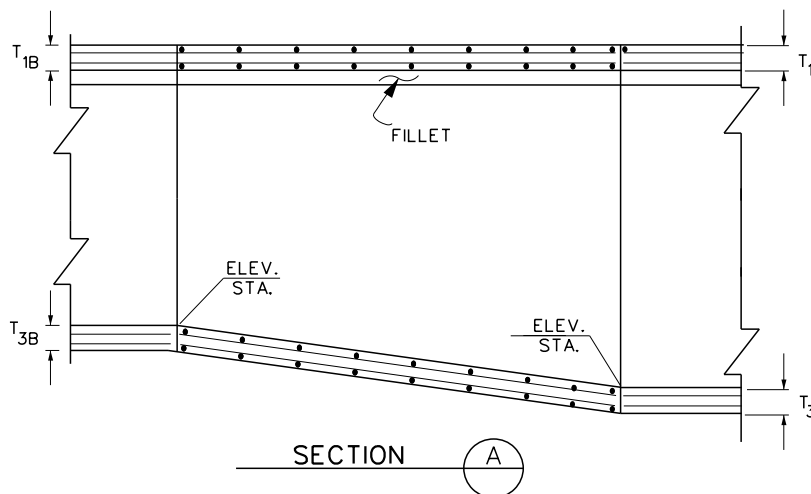
STANDARD DRAWING NUMBER TS301



PLAN



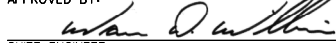
SECTION B



SECTION A

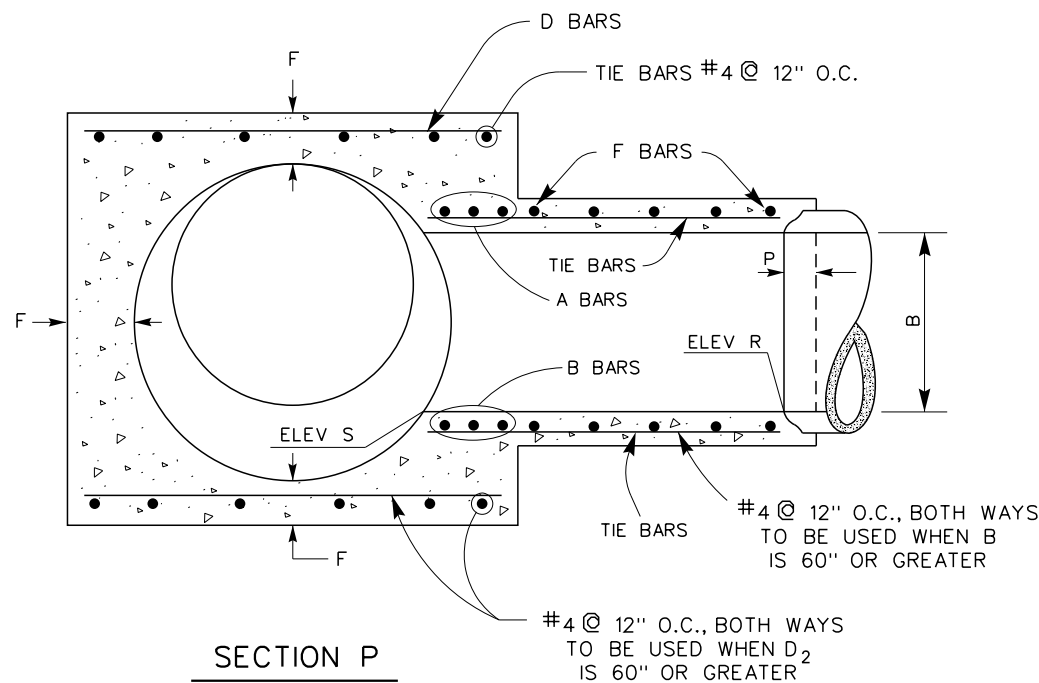
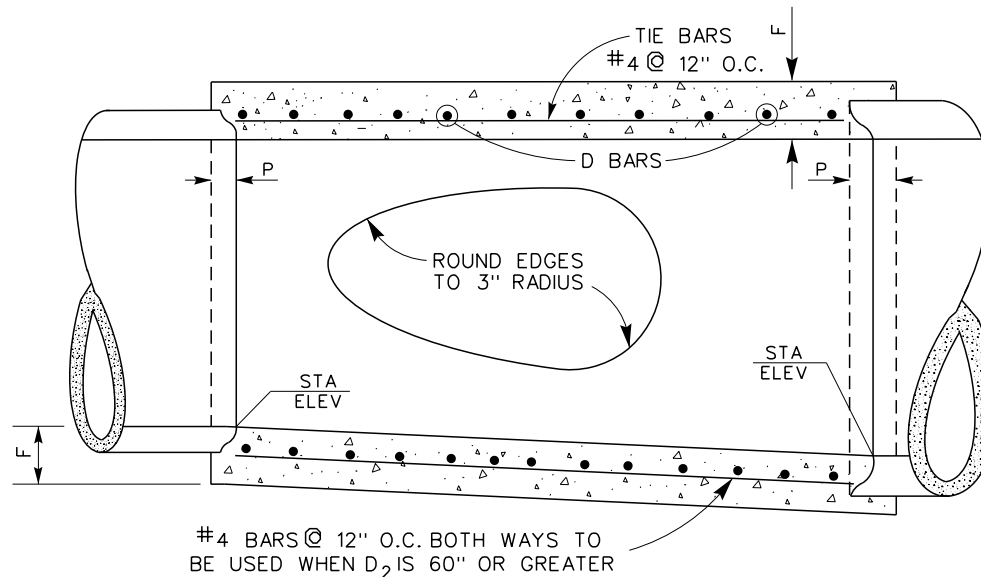
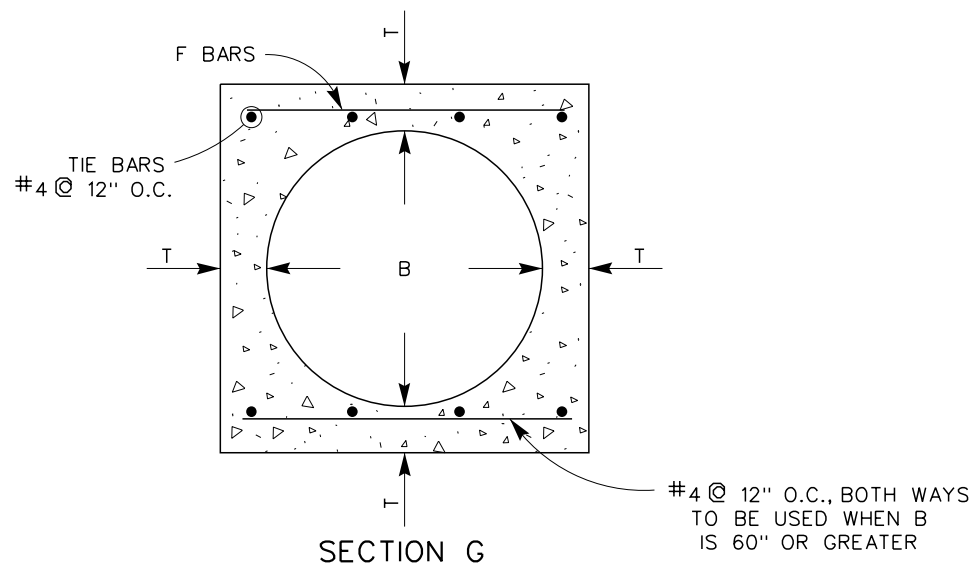
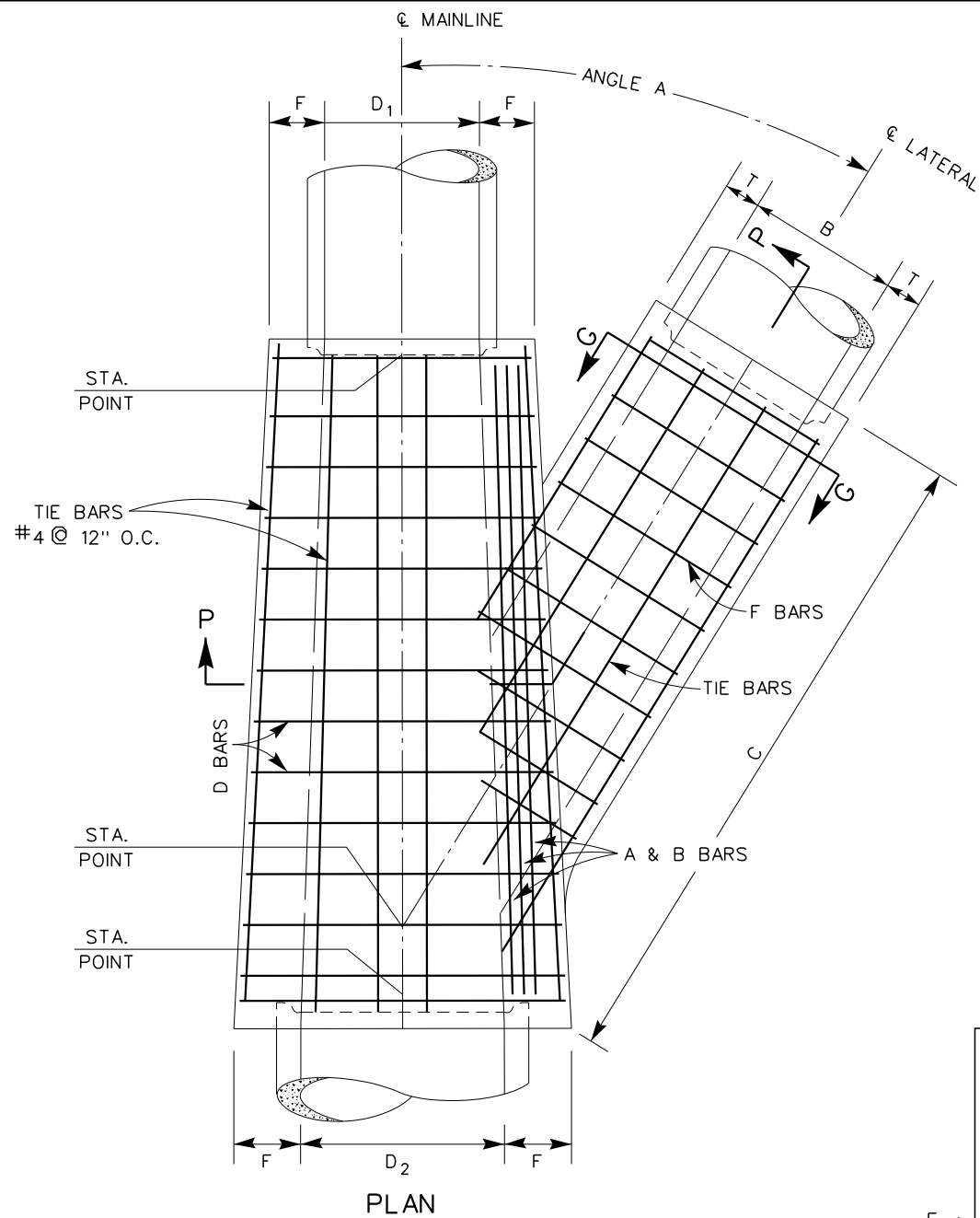
NOTES

1. THE HORIZONTAL ANGLE OF DIVERGENCE OR CONVERGENCE, $\emptyset$, SHALL NOT EXCEED $5^{\circ}45'$.
2. DETAILS OF CONSTRUCTION JOINTS SHALL BE AS SHOWN ON THE PROJECT DRAWINGS FOR SINGLE BARREL BOX STRUCTURE.
3. THE REINFORCING STEEL BAR SIZES, SPACING AND COVER OVER THE STEEL OF STRAIGHT TRANSVERSE BARS IN TOP OR BOTTOM SLABS, OF L-BARS IN TOP OR BOTTOM CORNERS, OF STRAIGHT VERTICAL BARS IN SIDE WALLS AND OF LONGITUDINAL DISTRIBUTION AND TIE BARS IN TOP OR BOTTOM SLABS OR SIDE WALLS SHALL BE THOSE OF WHICHEVER ADJOINING BOX SECTION PROVIDES THE GREATER STEEL AREA FOR EACH TYPE OF BAR. THE BAR LENGTHS SHALL VARY UNIFORMLY THROUGHOUT THE TRANSITION.
4. THE THICKNESS OF THE WALL AND SLABS SHALL BE THOSE OF THE ADJOINING BOX SECTION AT EACH END OF THE TRANSITION AND SHALL VARY UNIFORMLY BETWEEN THE TWO ENDS.
5. STRUCTURAL CONCRETE SHALL BE CLASS "A".
6. THE TRANSITION STRUCTURE SHALL BE CONSTRUCTED IN ACCORDANCE WITH THE GENERAL STRUCTURAL NOTES APPLYING TO BOX STRUCTURES, AS SHOWN ON THE PROJECT DRAWINGS.

RIVERSIDE COUNTY FLOOD CONTROL AND WATER CONSERVATION DISTRICT	
RECOMMENDED FOR APPROVAL BY:  CHIEF, DESIGN & CONSTRUCTION DATE: JANUARY 2011	APPROVED BY:  CHIEF ENGINEER DATE: JANUARY 2011
R.E. No. 44684	R.C.E. NO. 32336

TRANSITION STRUCTURE
NO. 2

STANDARD DRAWING NUMBER TS302



TABLE

*D ₂ , D ₁ , OR B	F OR T	A OR B BARS	D OR F BARS	P
12	4	# 5 @ 3" O.C.	# 4 @ 6" O.C.	5"
18	4 1/2			
24	5 1/4			
30	6			
36	6 1/2	# 6 @ 3" O.C.	# 5 @ 6" O.C.	
42	7 1/2			
48	8			
54	9			
60	9 1/2			
66	10 1/4			
72	11			
84	12 1/2	# 7 @ 3" O.C.	# 6 @ 6" O.C.	
90	13 1/4			
96	14			
102	15 1/2			
108	16			
114	16 1/2			
120	17	# 6 @ 6" O.C.	# 8"	
126	17			
132	17 1/2			
138	17 1/2			
144	18			

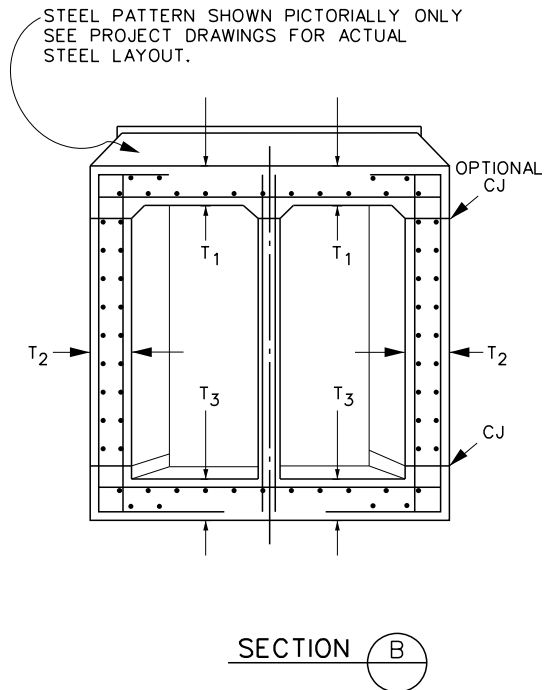
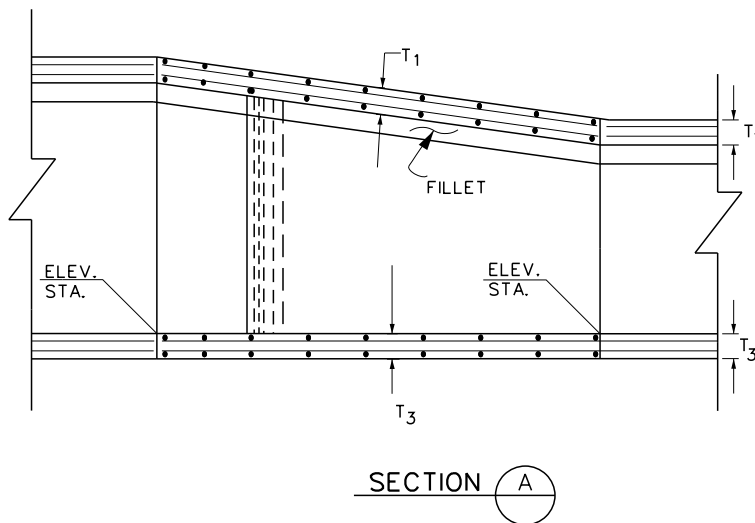
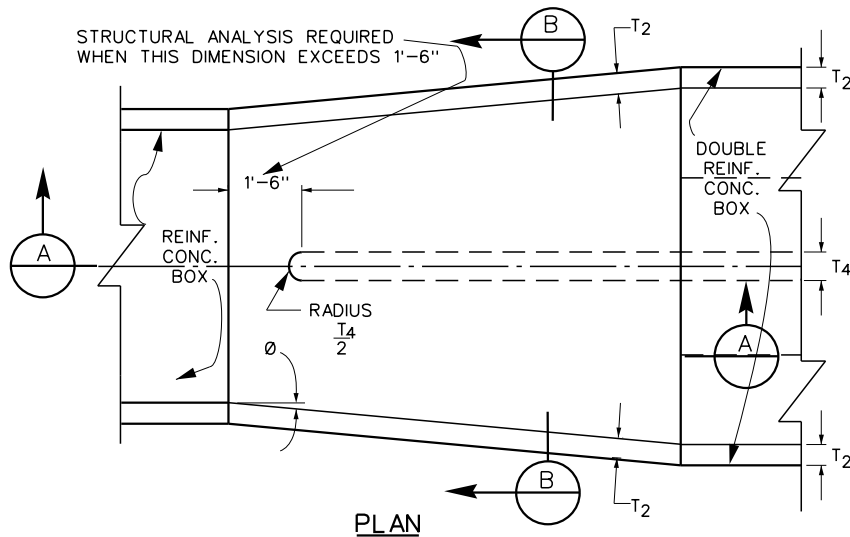
* USE D₂, OR D₁, WHICHEVER IS GREATER, OR B

NOTES

1. NUMBER OF A&B BARS SHOWN IS REPRESENTATIONAL. SEE TABLE FOR SPACING & BAR COUNT.
2. VALUES FOR A, B, C, D₁, D₂, ELEV. R AND ELEV. S ARE SHOWN ON IMPROVEMENT PLAN. LENGTH OF THE STRUCTURE MAY BE INCREASED TO MEET PIPE ENDS USING D BARS IN EXTENDED PORTION OF SAME DIMENSION AND SPACING AS SPECIFIED.
3. CONCRETE SHALL BE CLASS "A". FLOOR OF THE STRUCTURE SHALL BE STEEL-TROWELED TO SPRING LINE. STRUCTURE SHALL BE POURED IN ONE CONTINUOUS OPERATION, EXCEPT THAT THE CONTRACTOR SHALL HAVE THE OPTION OF PLACING AT THE SPRING LINE A CONSTRUCTION JOINT WITH A LONGITUDINAL KEYWAY.
4. REINFORCING STEEL CLEAR COVER SHALL BE 1/2" ON INSIDE. TIE BARS SHALL BE NO.4 AND SPACED 12" C/C.
5. WHEN DIMENSION "C" IS NOT SPECIFIED THE SPUR SHALL NOT BE CONSTRUCTED AND A & B BARS SHALL BE OMITTED.
6. THE MAXIMUM COVER ABOVE THIS STRUCTURE SHALL BE 25'. IF THE COVER EXCEEDS 25', A SPECIAL STRUCTURE SHALL BE DESIGNED FOR THE COVER AND DETAILED ON THE PROJECT DRAWINGS.

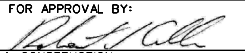
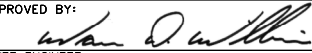
RIVERSIDE COUNTY FLOOD CONTROL AND WATER CONSERVATION DISTRICT	
RECOMMENDED FOR APPROVAL BY: CHIEF, DESIGN & CONSTRUCTION DATE: JANUARY 2011	APPROVED BY: CHIEF ENGINEER DATE: JANUARY 2011
R.E. No. 44684	R.C.E. No. 32336

TRANSITION STRUCTURE NO. 3
STANDARD DRAWING NUMBER TS303



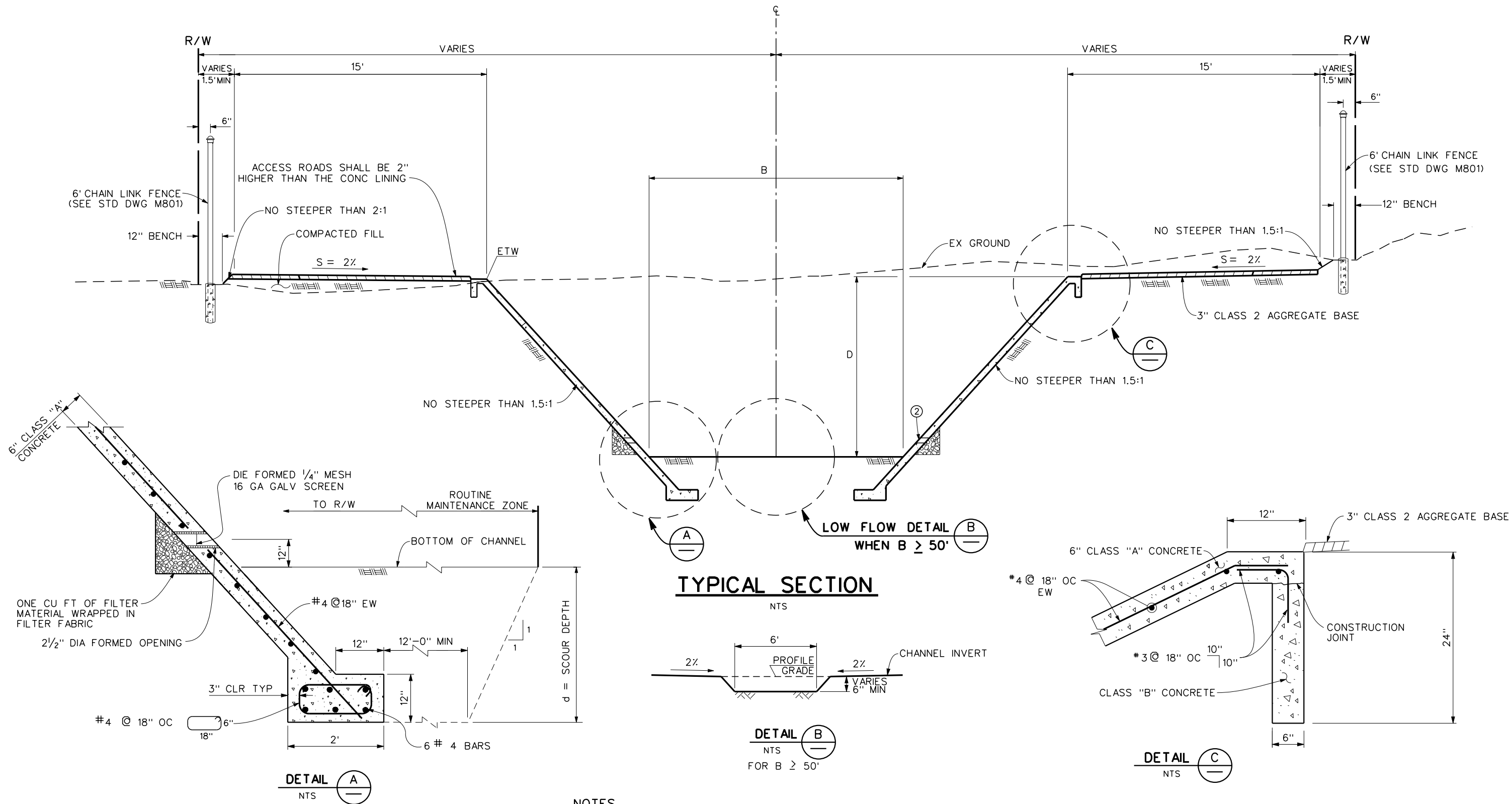
NOTES

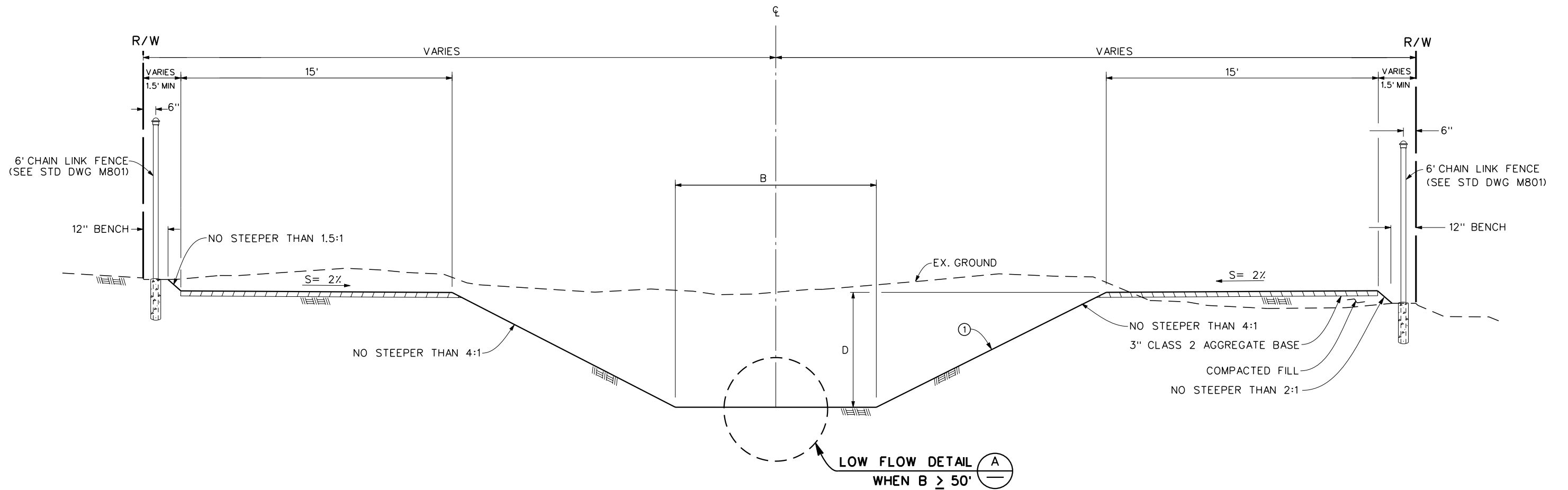
1. THE HORIZONTAL ANGLE OF DIVERGENCE OR CONVERGENCE, θ , SHALL NOT EXCEED $5^\circ 45'$.
2. THE REINFORCING STEEL BAR SIZES, SPACING AND OUTSIDE COVER SHALL BE THAT OF DOUBLE BOX SECTION. FOR CURVED TRANSITIONS, SPACE BAR ON CENTER LINE & PLACE TRANSVERSE STEEL RADIALLY. THE BAR LENGTHS & DIMENSIONS SHALL VARY UNIFORMLY THROUGH OUT TRANSITION. LONGITUDINAL BARS SHALL BE CONTINUED THROUGH THE JOINTS WITH THE TRANSITION STRUCTURE.
3. THE CONCRETE THICKNESS SHALL BE THAT OF THE DOUBLE BOX SECTION.
4. STRUCTURAL CONCRETE SHALL BE CLASS "A".

RIVERSIDE COUNTY FLOOD CONTROL AND WATER CONSERVATION DISTRICT	
RECOMMENDED FOR APPROVAL BY:  CHIEF, DESIGN & CONSTRUCTION	APPROVED BY:  CHIEF ENGINEER
DATE: JANUARY 2011	DATE: JANUARY 2011
R.E. No. 44684	R.C.E. No. 32336

TRANSITION STRUCTURE
NO. 4

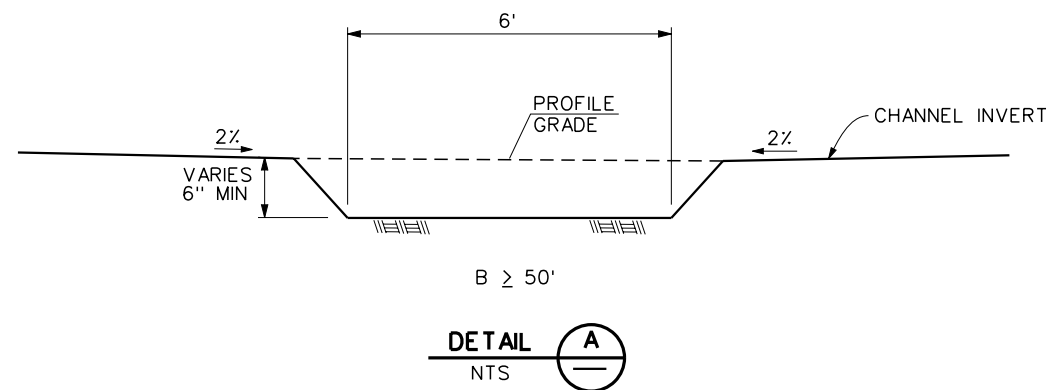
STANDARD DRAWING NUMBER TS304





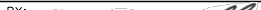
TYPICAL SECTION

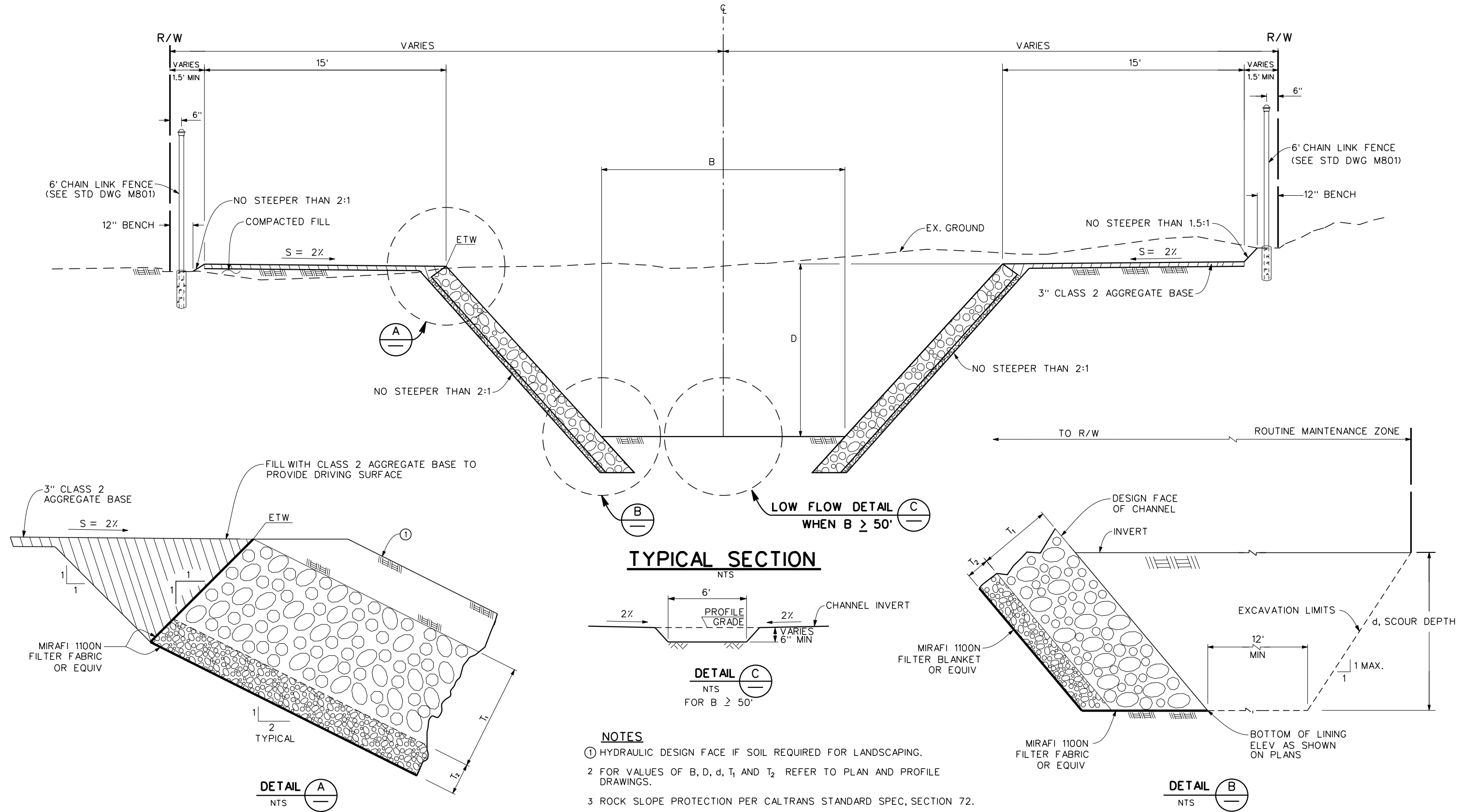
NTS



NOTES

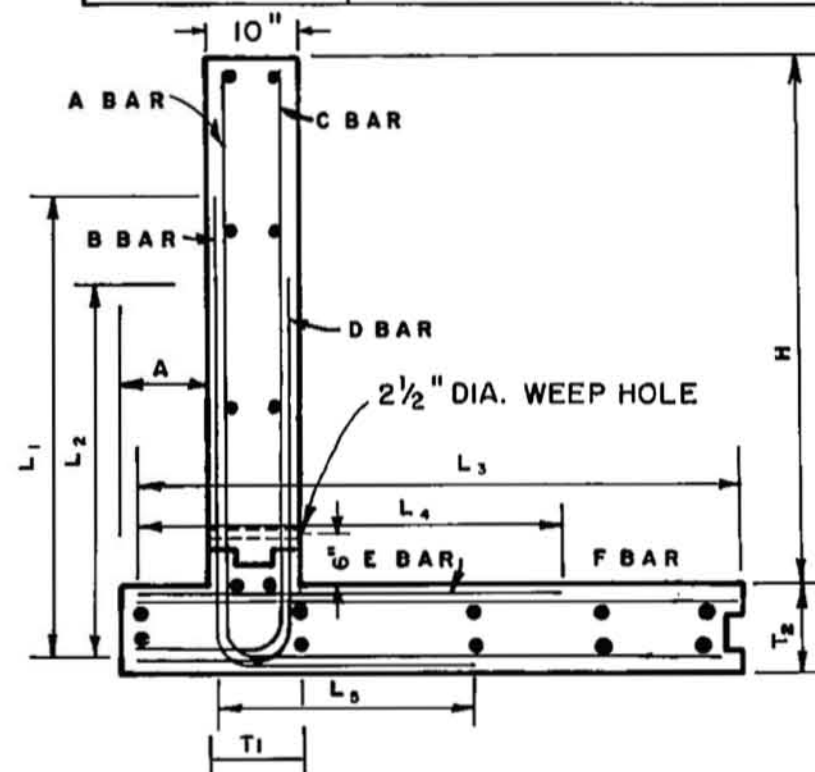
- ① HYDROSEED PER SPECIFICATIONS
- 2 D & B SHALL BE SPECIFIED ON THE PLANS.

RIVERSIDE COUNTY FLOOD CONTROL AND WATER CONSERVATION DISTRICT				UNLINED CHANNEL STANDARD DRAWING NUMBER CH324	
RECOMMENDED FOR APPROVAL BY:		APPROVED BY:			
					
CHIEF, DESIGN & CONSTRUCTION		CHIEF ENGINEER			
DATE: <u>OCTOBER 2009</u>		R.E. No. 44684		DATE: <u>OCTOBER 2009</u>	
				R.C.E. No. 32336	

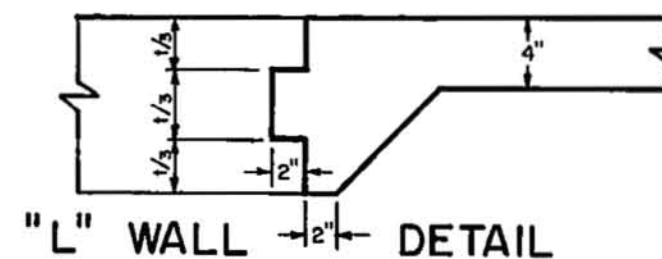


DETAIL SCHEDULE

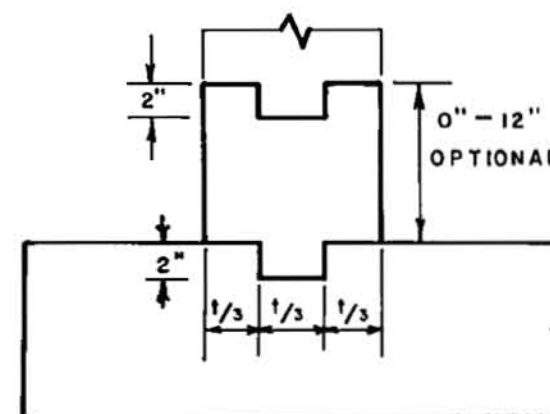
LOCATION	SCHEDULE
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[illegible][illegible]

TYPICAL SECTION



CORNER JOINT



NOTES

1. Structural concrete shall be Class "A".
 2. All longitudinal bars shall be #4 @ 18 inches. Place bars in bottom slab symmetrically about centerline. Place bars in walls starting at top with 2 inches of clear cover.
 3. Clear cover for steel shall be 2 inches each face for walls and 3 inches each face for bottom slab.
 4. Steel is dimensioned to back of bar bend.
 5. For construction on curves, straight transverse bars in slab shall be aligned radially with spacing measured at centerline. For L-bars in walls, spacing shall be measured between vertical legs of bars.
 6. All transverse construction joints shall be in a vertical plane normal to the centerline and the spacing thereof shall not exceed 50 feet or be less than 10 feet. Continuous keyways (in both slabs and walls) conforming to longitudinal keyway shown for bottom corner joint will be required at all joints with #4 x 3 feet long dowels at 12 inch spacing placed at the center of sections with 18 inches wrapped to prevent bond. A complete curtain of transverse steel shall be placed 3 inches from each face of the joint and longitudinal steel will not be continuous through the joint.
 7. Weep holes shall be formed as shown at a spacing of 10 feet with one cubic foot of filter material wrapped in filter fabric placed at each hole.
 8. All splices are subject to approval by the Engineer.
 9. All quantities shown are approximate.
- X STANDARD FORMAT

X STANDARD FORMAT TO BE USED AS FULL SIZE DRAWINGS



RIVERSIDE COUNTY FLOOD CONTROL AND WATER CONSERVATION DISTRICT	
APPROVED BY: <i>William D. ...</i> CHIEF ENGINEER	DATE: April 5, 2004
	R.C.E. NO. 3

"L" WALL
STEEL PLACEMENT
DIAGRAM

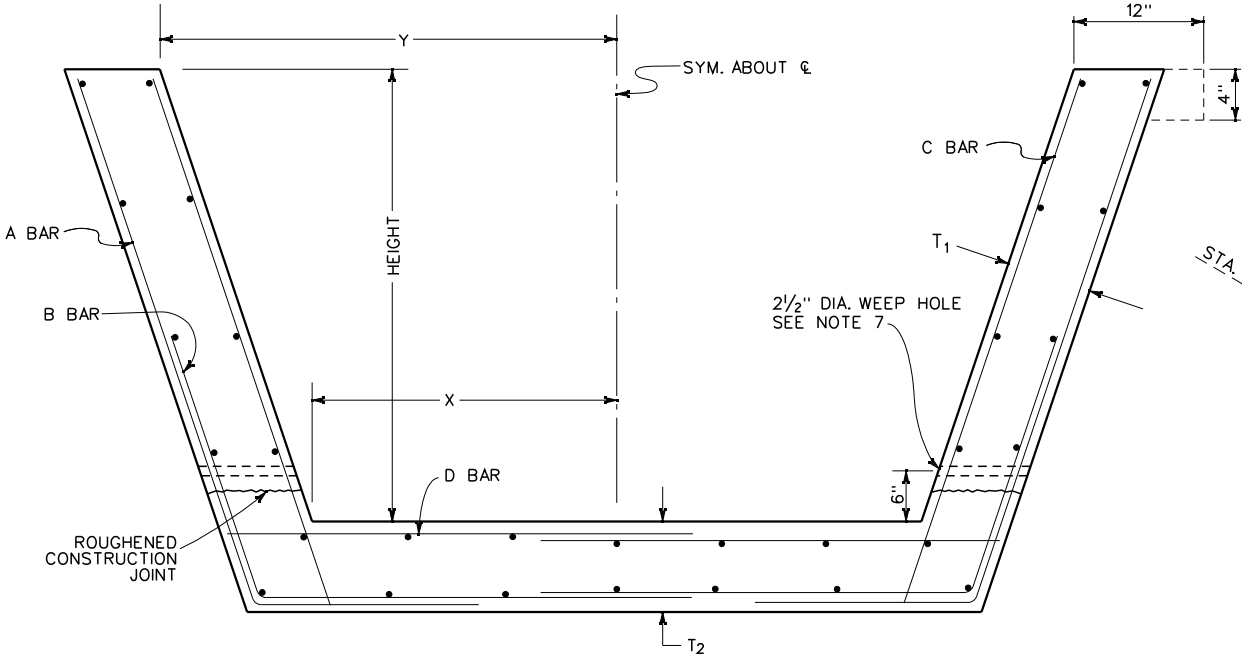
STANDARD DRAWING NUMBER CH328

DATA	DETAIL	SCHEDULE
STATION TO STATION		
X		
Y		
HEIGHT		
WALLS T ₁		
BOTTOM SLAB T ₂		
A BARS		
HORIZ. LENGTH		
SLOPE LENGTH		
B BARS		
HORIZ. LENGTH		
SLOPE LENGTH		
C BARS		
SLOPE LENGTH		
D BARS		
HORIZ. LENGTH		
CONCRETE C.Y./L.F.		
STEEL LBS./L.F.		

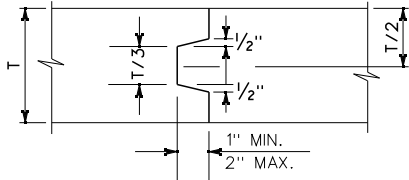
SPLICES			
BAR	LENGTH	SEC.	REMARKS

DESIGN DATA

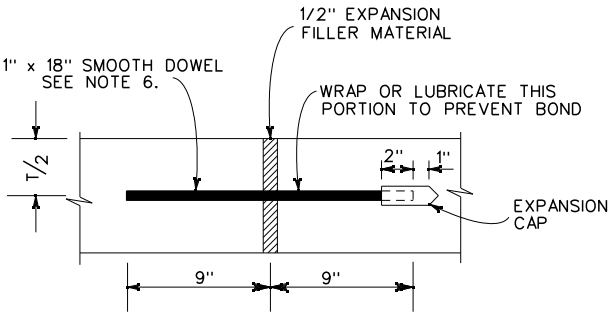
LIVE LOAD =
SOIL DENSITY =
ALLOWABLE STRESSES:
f_c =
f_c =
f_y =
f_s =



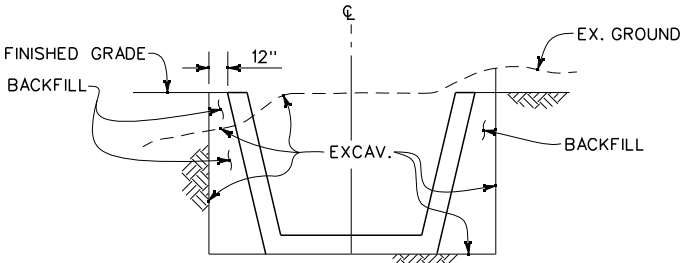
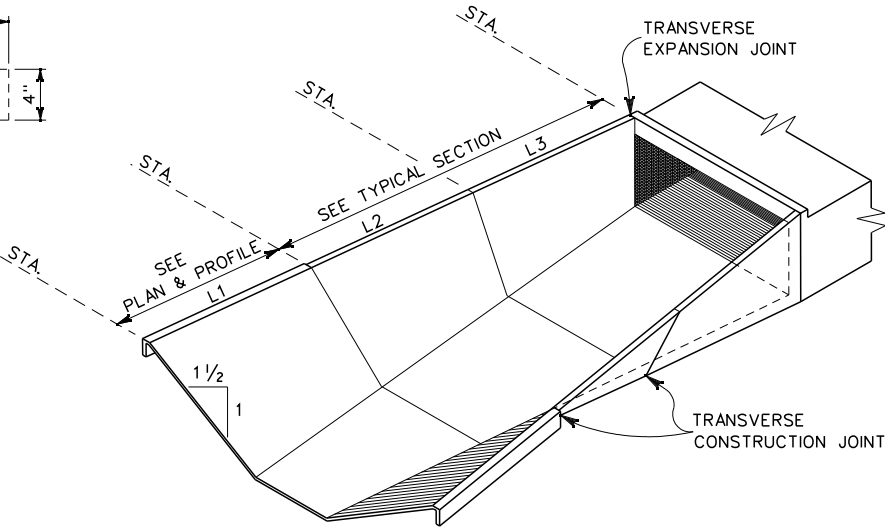
TYPICAL SECTION
NTS



TRANSVERSE CONSTRUCTION JOINT
DETAIL A



TRANSVERSE EXPANSION JOINT
DETAIL B



L2 AND L3
PAY LINES

NOTES

1. STRUCTURAL CONCRETE SHALL BE CLASS "A".
2. ALL LONGITUDINAL BARS SHALL BE #4 @ 18 INCHES. PLACE BARS IN BOTTOM SLAB SYMMETRICALLY ABOUT CENTERLINE. PLACE BARS IN WALLS STARTING AT TOP WITH 2 INCHES CLEAR COVER.
3. CLEAR COVER FOR STEEL SHALL BE 2 INCHES EACH FACE FOR WALLS AND 3 INCHES EACH FACE FOR BOTTOM SLAB.
4. STEEL IS DIMENSIONED TO BACK OF BAR BEND.
5. FOR CONSTRUCTION ON CURVES, STRAIGHT TRANSVERSE BARS IN THE SLAB SHALL BE ALIGNED RADially WITH SPACING MEASURED AT WALLS. FOR L-BARS IN WALLS, SPACING SHALL BE MEASURED BETWEEN VERTICAL LEGS OF BARS.
6. ALL TRANSVERSE CONSTRUCTION JOINTS SHALL BE IN A VERTICAL PLANE NORMAL TO THE CENTERLINE. CONTINUOUS KEYWAYS SHALL BE CONSTRUCTED AS SHOWN IN DETAIL A. A COMPLETE CURTAIN OF TRANSVERSE STEEL SHALL BE PLACED 3 INCHES FROM EACH FACE OF THE JOINTS AND LONGITUDINAL STEEL WILL NOT BE CONTINUOUS THROUGH THE JOINTS. AN EXPANSION JOINT SHALL BE CONSTRUCTED BETWEEN THE REINFORCED CONCRETE TRANSITION AND REINFORCED CONCRETE BOX SECTIONS AS SHOWN DETAIL B. DOWELS SHALL BE PLACED AT 18 INCH SPACING CENTERED IN THE MIDDLE OF THE BOTTOM SLAB AND THE TOP THIRD OF SIDE WALLS. A MINIMUM OF 3 DOWELS PER SLAB AND WALLS SHALL BE PLACED.
7. WEEPHOLES SHALL BE FORMED IN BOTH WALLS PER STD. CH326 AT A SPACING OF 10 FEET.
8. ALL QUANTITIES SHOWN ARE APPROXIMATE.
9. ALL SPLICES ARE SUBJECT TO APPROVAL BY THE ENGINEER.
10. SECTION L1 PAY LIMIT PER STANDARD CH326.
11. THE LENGTH OF SECTIONS L1, L2 AND L3 ARE NOT NECESSARILY EQUAL. THE TOP OF TRANSITION SHALL BE STRAIGHT ALONG ITS ENTIRE LENGTH.

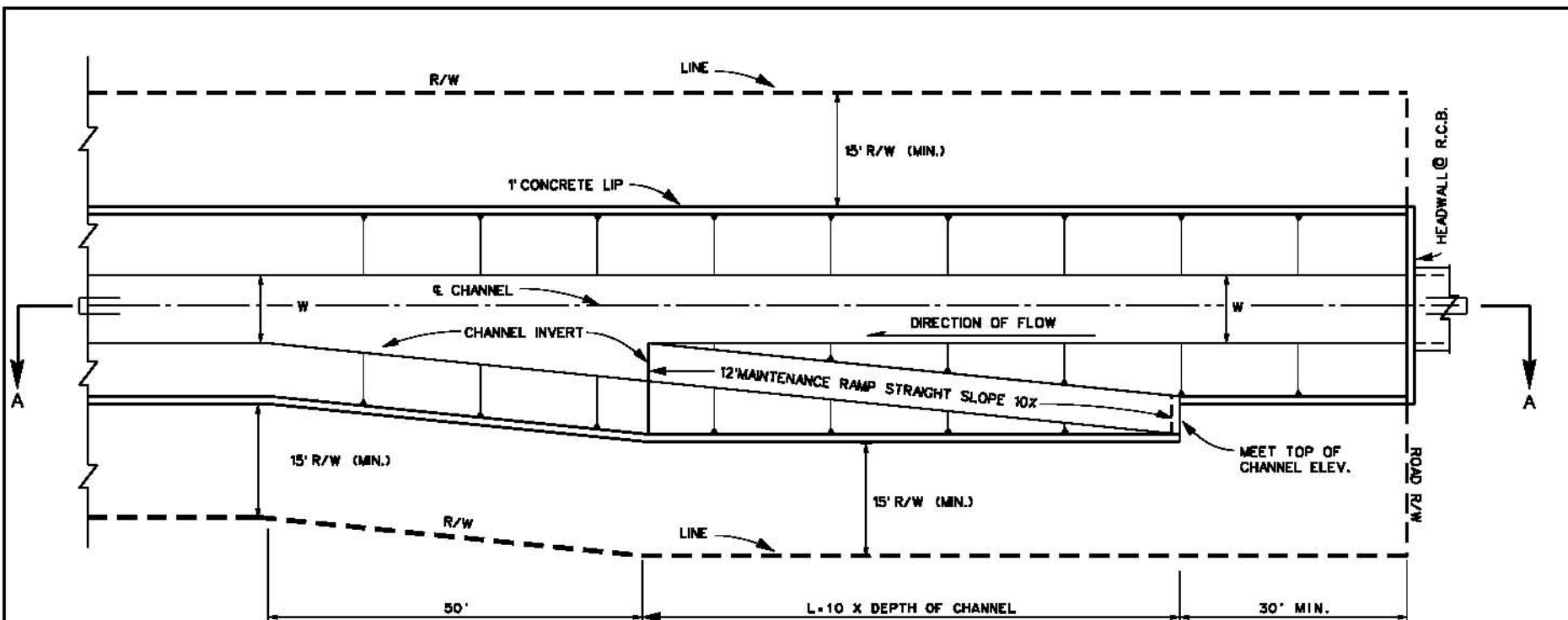
* STANDARD FORMAT TO BE USED AS FULL SIZE DRAWING
REINFORCING BAR SPACING FOR STRUCTURAL WALL SECTIONS SHALL NOT BE GREATER THAN 6" E.W. FOR AIR PLACED CONCRETE CONSTRUCTION.



RIVERSIDE COUNTY FLOOD CONTROL AND WATER CONSERVATION DISTRICT	
APPROVED BY:	<i>Warren D. Williams</i>
CHIEF ENGINEER	
DATE: JAN. 10, 2005	R.C.E. NO. 32336

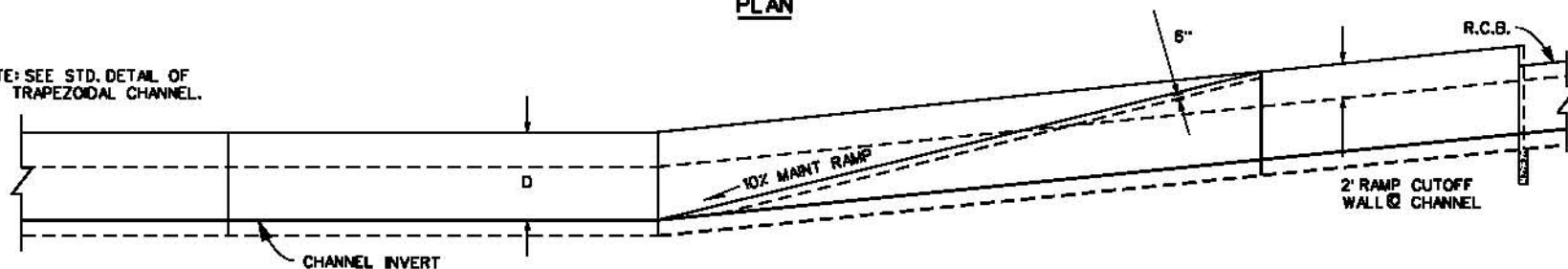
TRANSITION
STRUCTURAL DETAILS

STANDARD DRAWING NUMBER CH329



PLAN

NOTE: SEE STD. DETAIL OF
TRAPEZOIDAL CHANNEL.



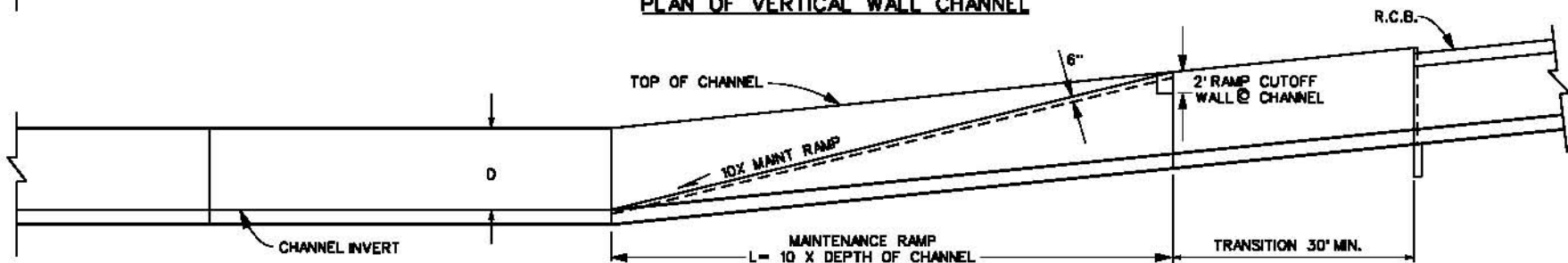
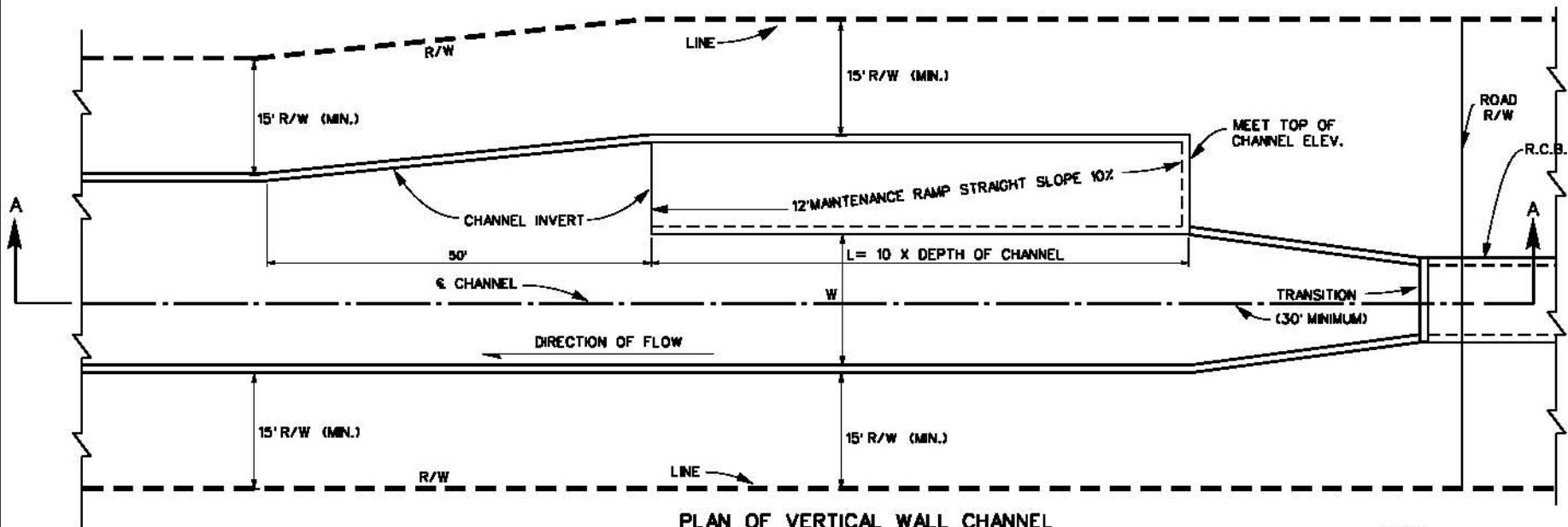
SECTION A-A



RIVERSIDE COUNTY FLOOD CONTROL AND WATER CONSERVATION DISTRICT	
APPROVED BY:	<i>Warren D. Williams</i>
CHEF ENGINEER	
DATE: April 5, 2004	R.C.E. NO. 32336

**MAINTENANCE RAMP
FOR
TRAPEZOIDAL CHANNEL**

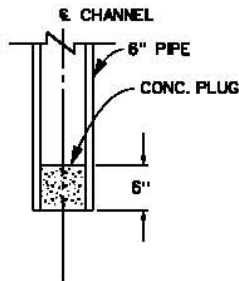
STANDARD DRAWING NUMBER CH330



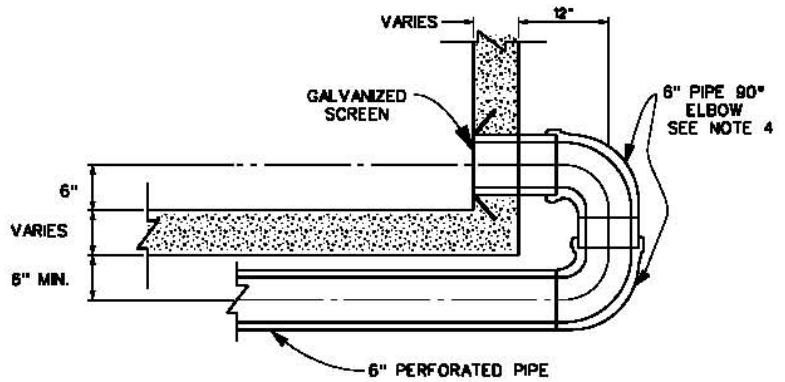
RIVERSIDE COUNTY FLOOD CONTROL AND WATER CONSERVATION DISTRICT	
APPROVED BY:	<i>Warren D. Williams</i>
CHIEF ENGINEER	
DATE: April 5, 2004	R.C.E. NO. 32336

**MAINTENANCE RAMP
FOR
VERTICAL WALL CHANNEL**

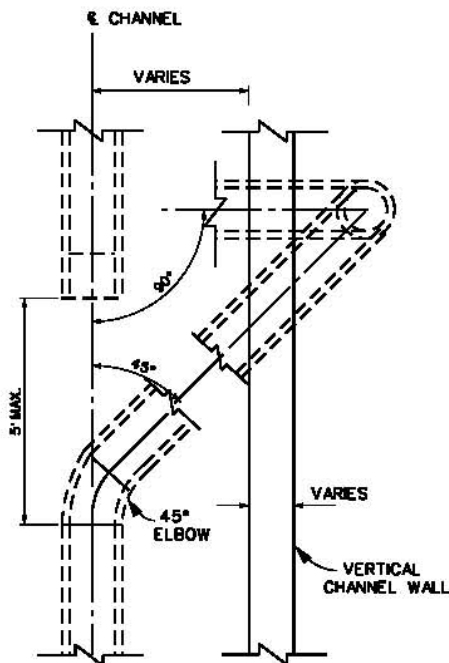
STANDARD DRAWING NUMBER CH331



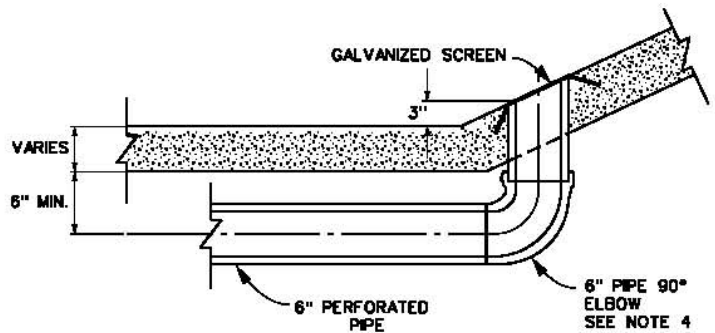
PLUG DETAIL



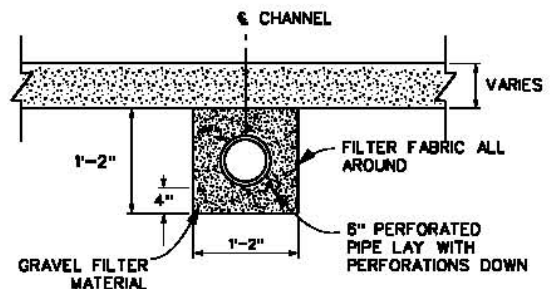
TYPICAL OUTLET IN VERTICAL CHANNEL WALL



PLAN VERTICAL & SLOPED WALL



TYPICAL OUTLET IN SLOPED CHANNEL WALL



TYPICAL SUBDRAIN

NOTES

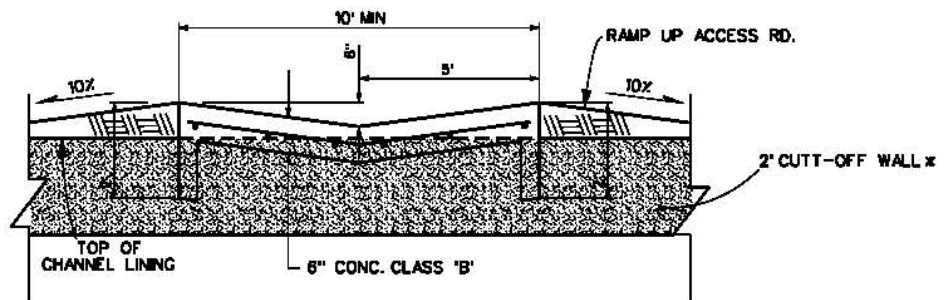
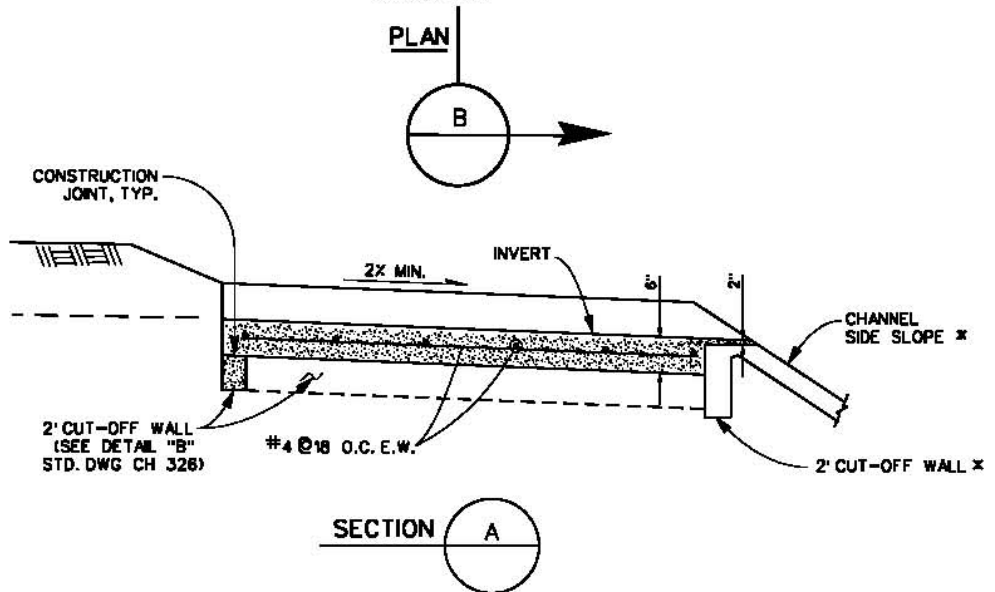
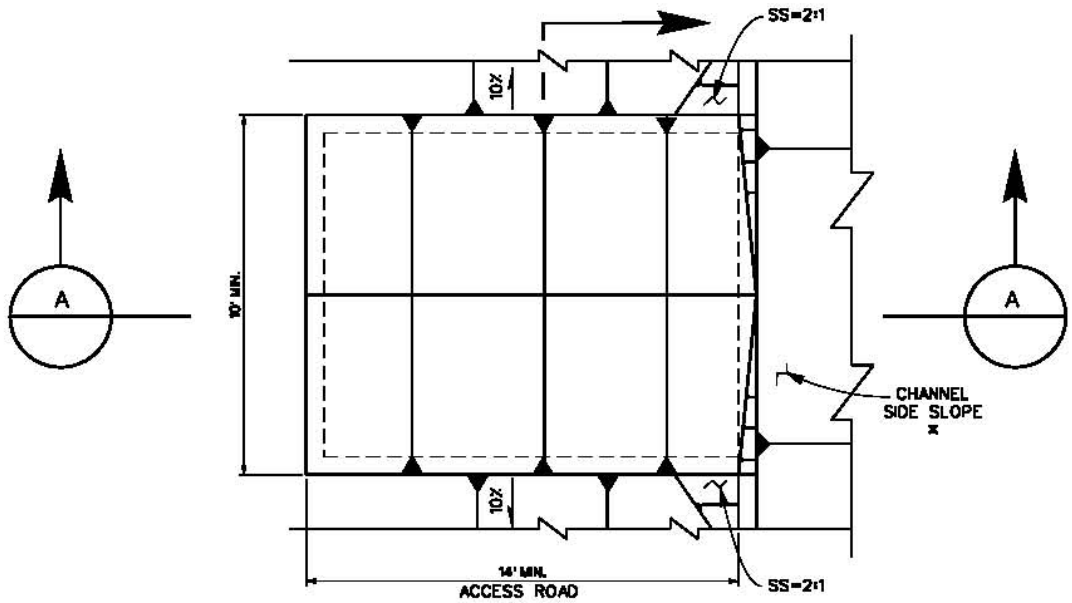
1. DRAIN PIPE OUTLETS SHALL BE COVERED WITH $\frac{1}{2}$ " MESH GALVANIZED SCREEN, ANCHORED IN CONCRETE A MINIMUM OF 4", OF 16 GAGE WIRE OR HEAVIER.
2. SUBDRAIN OUTLET SHALL BE CONSTRUCTED AT 300' INTERVALS, ALONG THE CHANNEL CENTERLINE, AS LOCATED ON THE PLANS OR IN THE SPECIFICATIONS; AND/OR AS DIRECTED BY ENGINEER.
3. SUBDRAIN SHALL BEGIN AND END WITHIN 5' OF BOX CULVERTS UNLESS THE PLANS SPECIFICALLY REQUIRE THE SUBDRAIN TO BE CONTINUOUS UNDER THE BOX.
4. OPTIONAL TO USE 90° ELBOW OR OTHER SPECIALS, AS APPROVED BY THE ENGINEER



RIVERSIDE COUNTY FLOOD CONTROL AND WATER CONSERVATION DISTRICT	
APPROVED BY:	<i>Warren D. Williams</i>
CHIEF ENGINEER	
DATE: April 15, 2004	R.C.E. NO. 32336

**SUBDRAINS
LAYOUT, SECTIONS
& DETAILS**

STANDARD DRAWING NUMBER CH332



*** NOTES:**

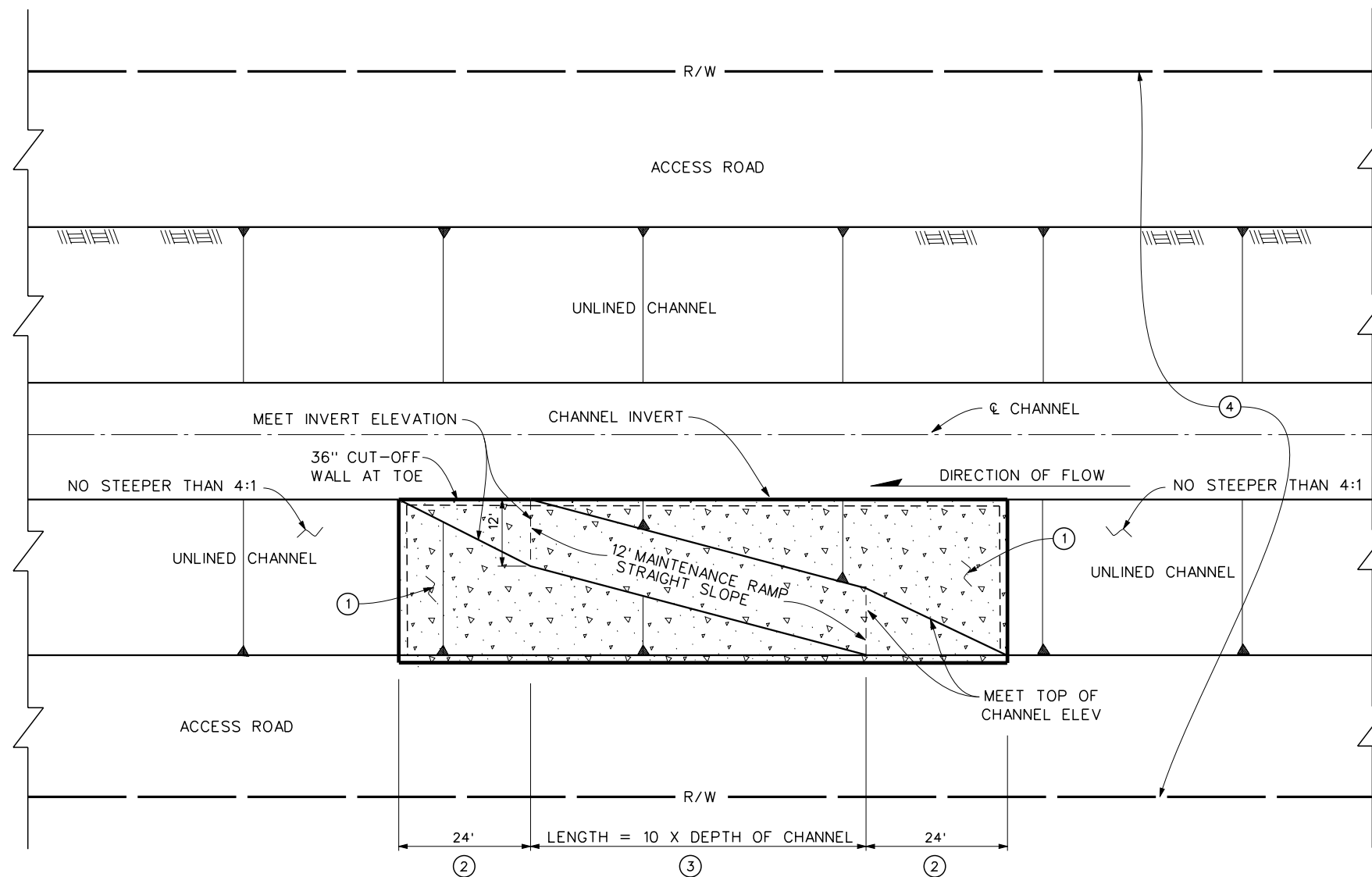
DRAINAGE APRON MAY ALSO BE USED FOR RECTANGULAR CHANNEL ACCESS ROADS.



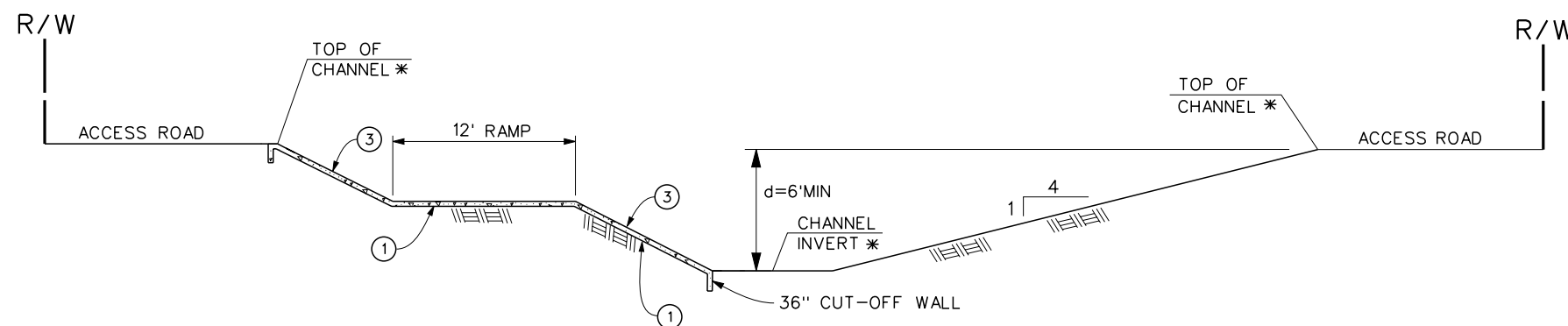
RIVERSIDE COUNTY FLOOD CONTROL AND WATER CONSERVATION DISTRICT	
APPROVED BY: <i>Warren D. Williams</i>	
CHIEF ENGINEER	
DATE: April 15, 2004	R.C.E. NO. 32336

**DRAINAGE APRON
FOR
ACCESS ROAD**

STANDARD DRAWING NUMBER CH333



PLAN
NTS



TYPICAL SECTION
*ELEV PER PLAN AND PROFILE
NTS

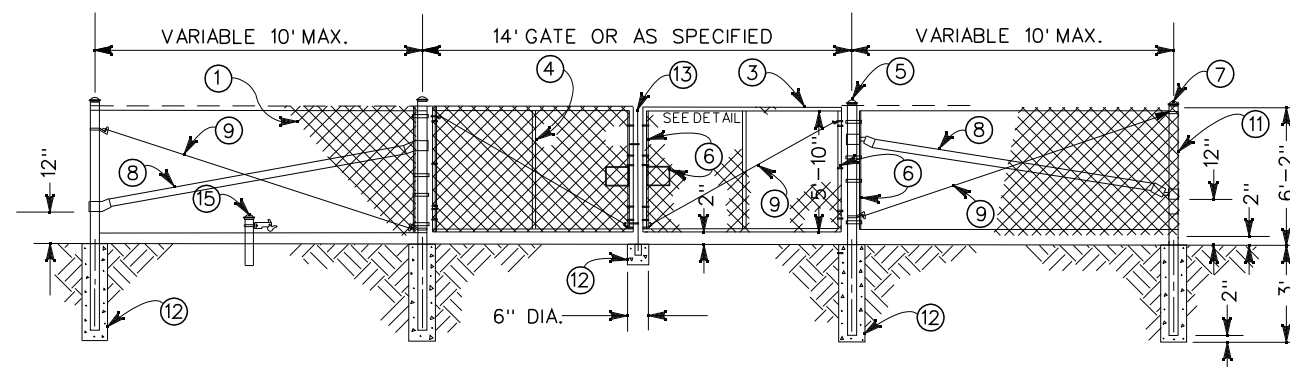
NOTES

- ① ALL CONCRETE STRUCTURAL SECTIONS PER STD DWG CH326. EXTEND CUT-OFF WALL TO 36 INCHES AT TOE OF SLOPE.
- ② SIDE SLOPE SHALL VARY FROM 4:1 TO $(4d - 12)/d:1$.
- ③ SIDE SLOPE RATIO SHALL BE $(4d - 12)/d:1$.
- ④ SEE PLAN AND PROFILE DRAWINGS FOR DIMENSIONS.
- 5 MAINTENANCE RAMPS TO BE PROVIDED AT EVERY REACH OF CHANNEL WITH A MAXIMUM SPACING OF 2600'. PROVIDE RAMP AT EACH CROSSING OR PROVIDE A CULVERT-8' MIN WIDTH X 7' MIN HEIGHT.
- 6 MATERIALS OTHER THAN CONCRETE MAY BE USED AS APPROVED BY THE GENERAL MANAGER-CHIEF ENGINEER.

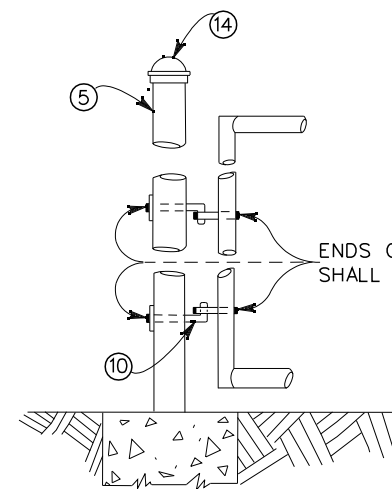
RIVERSIDE COUNTY FLOOD CONTROL AND WATER CONSERVATION DISTRICT	
RECOMMENDED FOR APPROVAL BY: <i>[Signature]</i> CHIEF, DESIGN & CONSTRUCTION DATE: <u>OCTOBER 2009</u>	APPROVED BY: <i>[Signature]</i> CHIEF ENGINEER DATE: <u>OCTOBER 2009</u>
R.E. No. 44684	R.C.E. No. 32336

**MAINTENANCE RAMP
FOR
UNLINED CHANNEL**

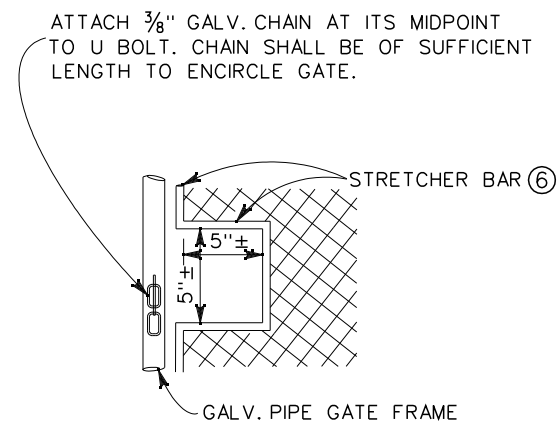
STANDARD DRAWING NUMBER CH334



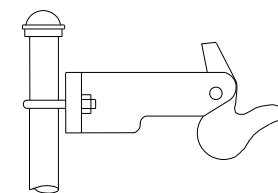
14' DOUBLE DRIVE GATE



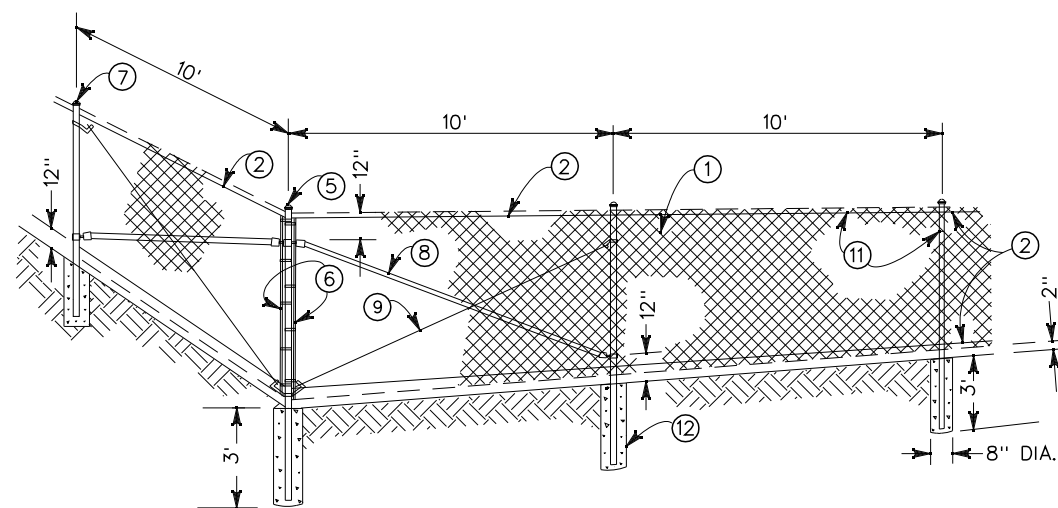
HINGE DETAIL



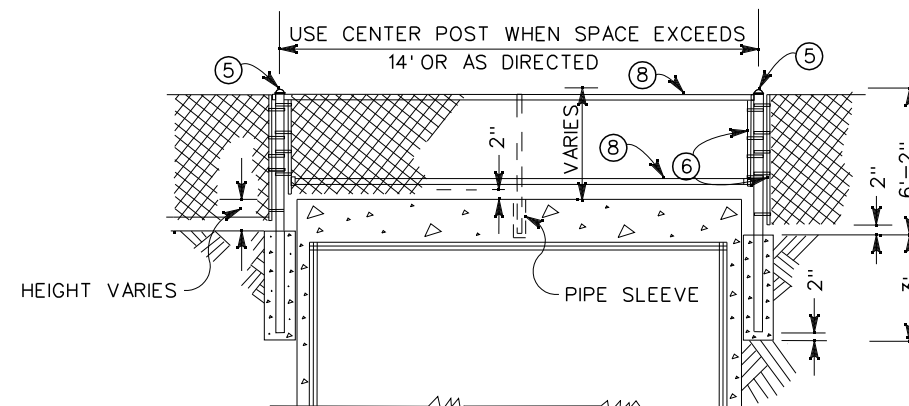
GATE LOCKING DETAIL



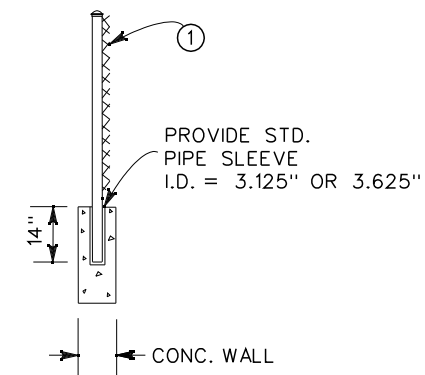
GATE KEEPER



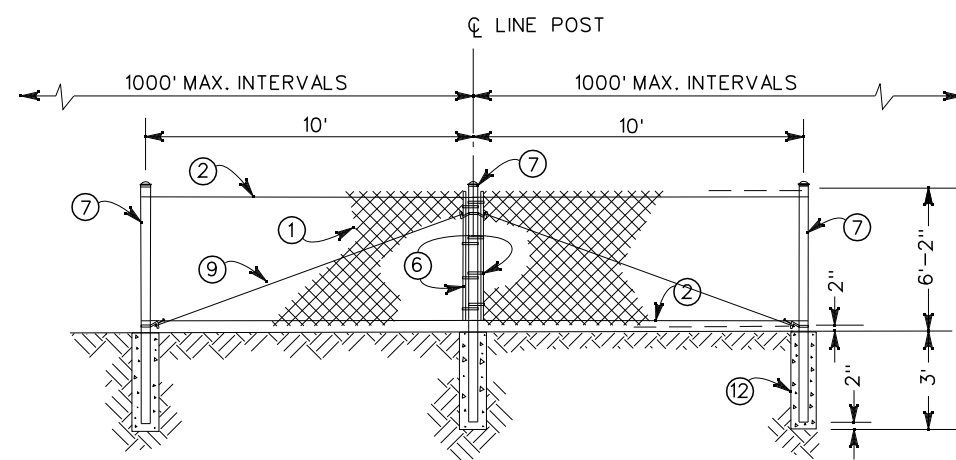
END OR CORNER POST ASSEMBLY



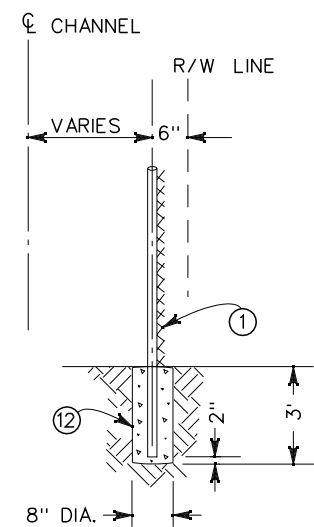
HEADWALL FENCE ASSEMBLY



CHANNEL WALL FENCE



TRUSS POST ASSEMBLY



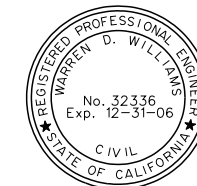
FENCE LOCATION

NOTE

- ① CHAIN LINK FENCE 72" FABRIC (9 GAGE)
- ② 7 GAGE SPRING STEEL TENSION WIRE
- ③ 1.660" O.D. GALV. PIPE FOR GATE FRAME. TIE FABRIC TO TOP AND BOTTOM OF FRAME.
- ④ 1.660" O.D. GALV. STIFFENER.
- ⑤ GATE, END & CORNER POSTS 2.875" O.D.
- ⑥ STRETCHER BAR 3/16" X 3/4" MIN.
- ⑦ LINE POST 2.375" O.D.
- ⑧ BRACE REQUIRED ACROSS ALL HEADWALLS OR PARAPETS. 1.660" O.D.
- ⑨ 3/8" TENSION ROD WITH TENSION ADJUSTMENT.
- ⑩ HINGE BOLTS 5/8"
- ⑪ GAGE 11 WIRE TIES
- ⑫ 2000 p.s.i. (4 SACK CONC.)
- ⑬ PLUNGER ROD
- ⑭ CAPS ON ALL POSTS
- ⑮ GATE KEEPER

NOTE

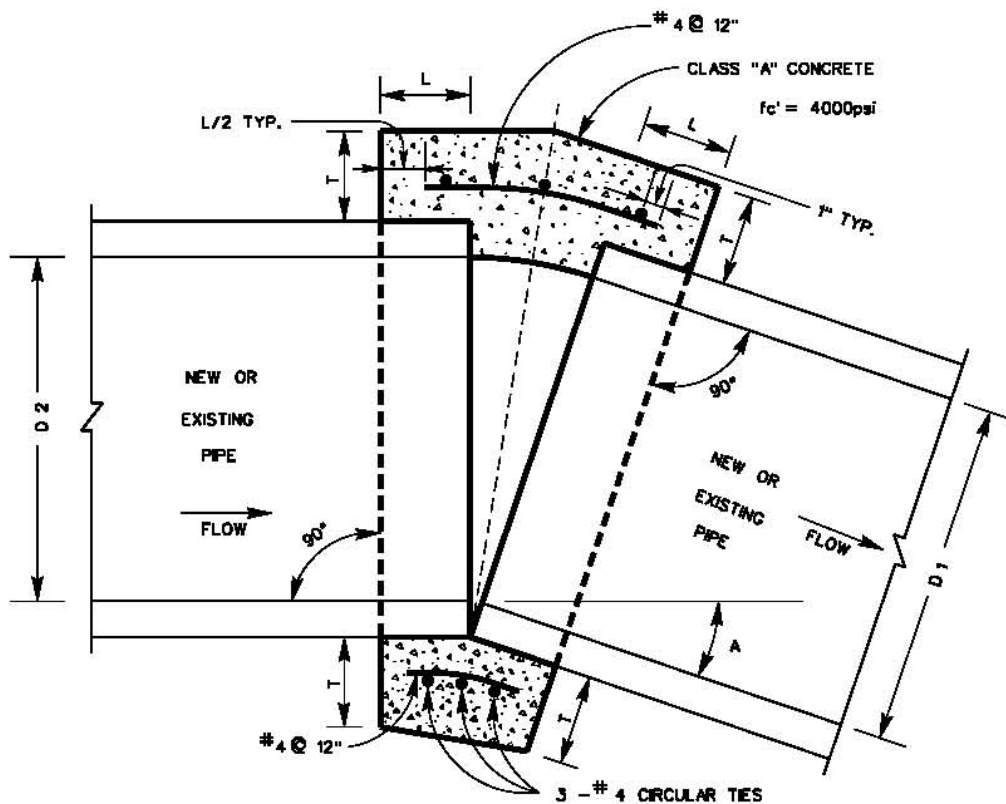
FENCING MATERIAL SHALL CONFORM TO SECTION 206-6 OF STD. SPEC. FOR PUBLIC WORKS CONSTRUCTION. LATEST EDITION EXCEPT THE FENCE FABRIC SHALL HAVE A KNUCKLED FINISH ON ONE EDGE AND A TWISTED AND BARBED FINISH ON THE OTHER EDGE.



RIVERSIDE COUNTY FLOOD CONTROL AND WATER CONSERVATION DISTRICT	
APPROVED BY: <i>Warren D. Williams</i>	
CHIEF ENGINEER	
DATE: JAN. 10, 2005	R.C.E. NO. 32336

CHAIN LINK FENCE DETAILS

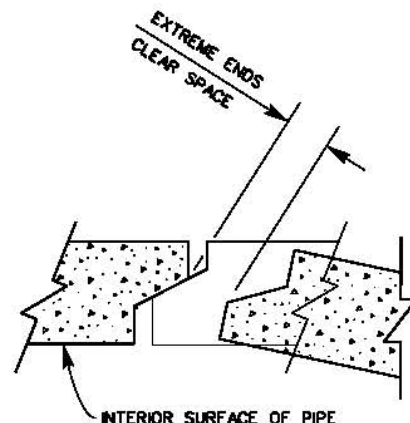
STANDARD DRAWING NUMBER M801



D	L	T
12"	1.0'	4"
18"	1.0'	5"
24"	1.0'	6"
36"	1.5'	8"
48"	1.5'	10"
57"	1.5'	10"
60"	1.75'	11"
66"	1.75'	11"

NOTES

1. A CONCRETE COLLAR IS REQUIRED WHERE THE CHANGE IN GRADE EXCEEDS 0.10 FT. PER FOOT, OR IF CHANGE IN ALIGNMENT EXCEEDS 0.10 FT. PER FOOT.
2. IF THE EXTREME ENDS OF THE PIPE LEAVE A CLEAR SPACE THAT IS GREATER THAN 1", BUT LESS THAN 6", A CONCRETE COLLAR IS REQUIRED (SEE DETAIL A THIS SHEET). IF THE CLEAR SPACE IS 6" OR GREATER, A TRANSITION STRUCTURE IS REQUIRED.
3. CONCRETE COLLAR SHALL NOT BE USED FOR A SIZE CHANGE ON THE MAIN LINE.
4. WHERE PIPES OF DIFFERENT DIAMETERS ARE JOINED WITH A CONCRETE COLLAR, L AND T SHALL BE THOSE OF THE LARGER PIPE. $D = D_1$ OR D_2 , WHICHEVER IS GREATER.
5. FOR PIPE LARGER THAN 66" A SPECIAL COLLAR DETAIL IS REQUIRED.
6. FOR PIPE SIZE NOT LISTED USE THE NEXT SIZE LARGER.
7. OMIT REINFORCING ON PIPES 24" AND LESS IN DIAMETER AND ON ALL PIPES WHERE ANGLE A IS LESS THAN 10°.
8. WHERE REINFORCING IS REQUIRED THE DIAMETER OF THE CIRCULAR TIES SHALL BE $D + (2 \times \text{WALL THICKNESS}) + 8"$.
9. WHEN D_1 IS EQUAL TO OR LESS THAN D_2 JOIN INVERTS AND WHEN D_1 IS GREATER THAN D_2 JOIN SOFFITS.
10. PIPE MAY BE CORRUGATED METAL PIPE, CONCRETE PIPE, OR REINFORCED CONCRETE PIPE.



DETAIL "A"
TYPICAL JOINT FOR
REINFORCED CONCRETE PIPE

APIWA STD. PLAN 380-1
L.A.C.F.C. 2-0393

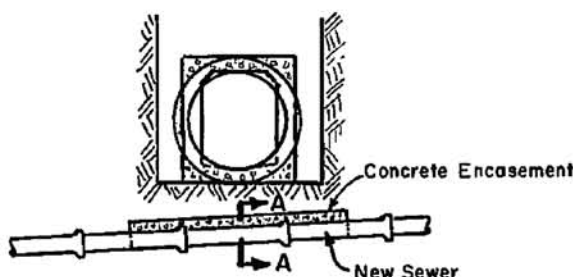


RIVERSIDE COUNTY FLOOD CONTROL AND WATER CONSERVATION DISTRICT	
APPROVED BY: <i>Warren D. Willits</i>	
CHIEF ENGINEER	
DATE: April 15, 2004	R.C.E. NO. 32336

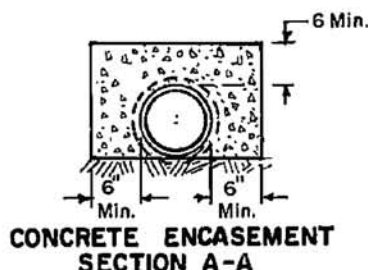
**CONCRETE COLLAR
FOR
PIPE 12 INCHES THROUGH
66 INCHES**
STANDARD DRAWING NUMBER MB03

NOTES

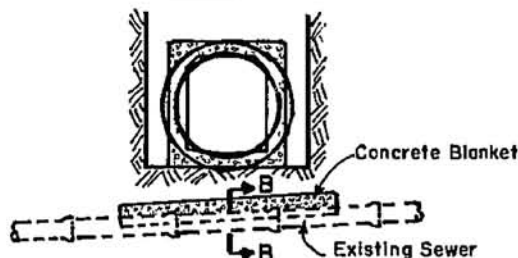
- Concrete for encasement and blanket shall be CLASS "B" concrete.
- The concrete encasement or blanket shall extend across the full width of the storm drain trench plus an additional 12" inches into undisturbed earth on each side of the storm drain trench.
- When the clearance between the bottom of the storm drain and the top of the sewer is between 6 inches and 18" inches the sewer shall be encased for Case I or blanketed for Case II as shown below.



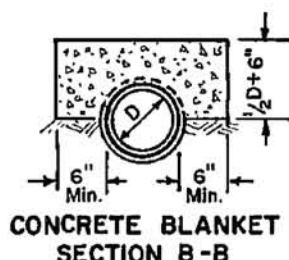
TYPICAL SECTION



PROTECTION FOR NEW SEWERS - CASE I



TYPICAL SECTION



PROTECTION FOR EXISTING SEWERS - CASE II

NOTES

1. CAST IN-PLACE STORM DRAINS

(a.) When the clearance between the bottom of the storm drain and the top of the sewer is less than 6 inches, the sewer shall be encased monolithically with the base of the storm drain; in addition it shall be constructed or replaced, as the case may be, with standard cast iron soil pipe, in the case of house connections, or with class "B" or class "150" cast iron pipe, in the case of main line sewers.

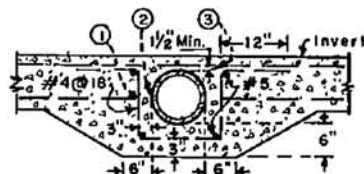
(b.) When the bottom slab of the cast-in-place storm drain intersects sewers under 15 inches in diameter, construct per typical encasement as shown below.

2. PRECAST PIPE STORM DRAINS

When the clearance between the bottom of the storm drain and the top of the sewer is less than 6 inches, the sewer shall be encased, in addition it shall be constructed or replaced with standard cast iron soil pipe, in the case of house connections, or with class "B" or class "150" cast iron pipe, in the case of main line sewers.

3. WRAP 1/2" MASTIC AROUND SEWER PIPE.

- Cut off 2" clear of C.I.P.
- Construct C.I.P. or replace existing sewer pipe with C.I.P.
- Clearance between the top of the sewer pipe and the steel reinforcement shall be a minimum of 1 1/8"



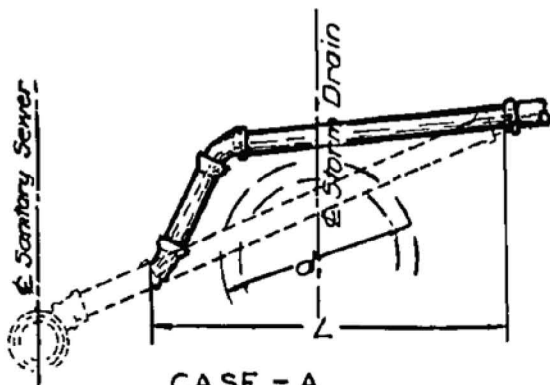
TYPICAL ENCASMENT WHERE SEWER IS IN BASE AND APPROXIMATELY AT RIGHT ANGLES TO STORM DRAIN



RIVERSIDE COUNTY FLOOD CONTROL AND WATER CONSERVATION DISTRICT	
APPROVED BY: <i>Warren D. Willatts</i>	
CHIEF ENGINEER	
DATE: April 5, 2004	R.C.E. NO. 32338

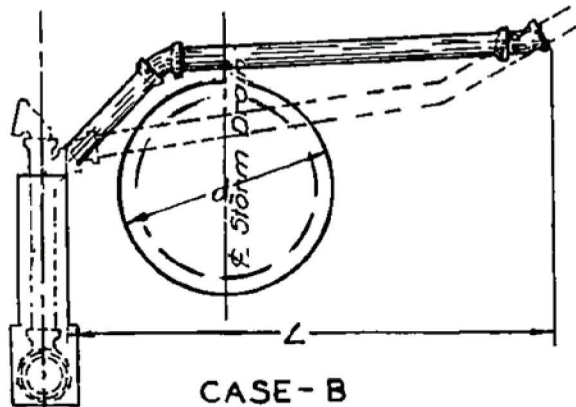
**SANITARY SEWER
PROTECTION**

STANDARD DRAWING NUMBER M807



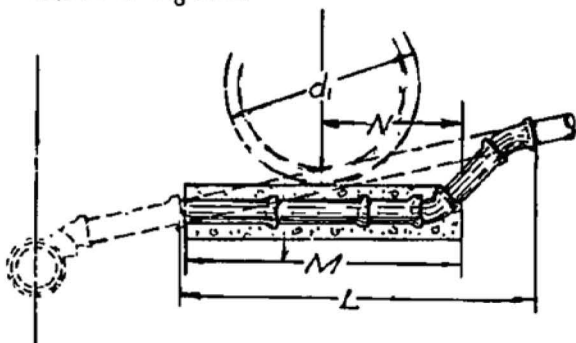
CASE - A

Above Storm Drain to House Connection - Specials required: 2-4 $\frac{1}{8}$ Bends



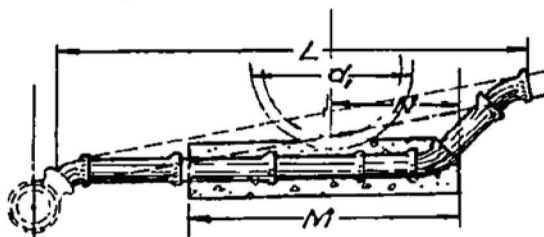
CASE - B

Above Storm Drain to Chimney - Specials required: 2-4 $\frac{1}{8}$ Bends.



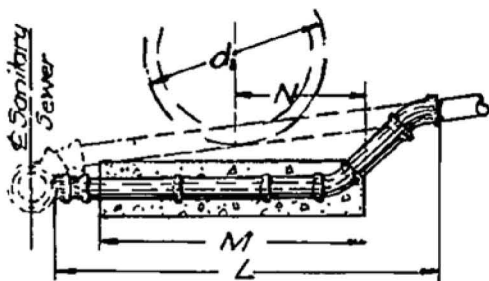
CASE - C

Below Storm Drain to House Connection - Specials required: 2-4 $\frac{1}{8}$ Bends



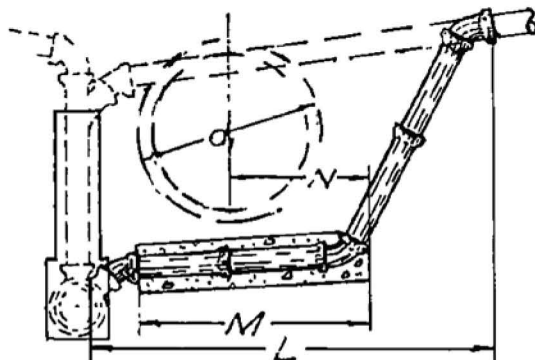
CASE - D

Below Storm Drain to Y-Connection - Specials required: 3-4 $\frac{1}{8}$ Bends.



CASE - E

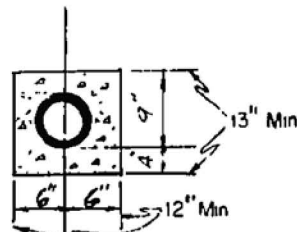
Below Storm Drain to Flat Saddle - Specials required: 3-4 $\frac{1}{8}$ Bends, 1 Saddle



CASE - F

Below Storm Drain to Saddle - Specials required: 3-4 $\frac{1}{8}$ Bends, 1 Saddle

FOR NOTES SEE STANDARD
DRAWING No. 808 SHEET 2

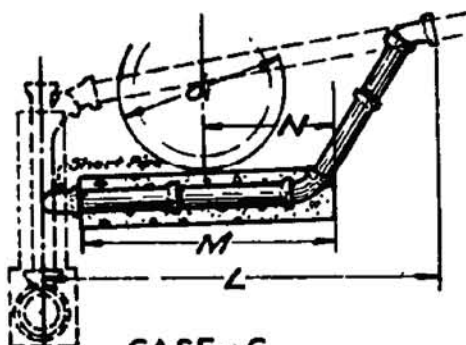


Cross Section of Concrete Reinforcement
For 4" Pipe



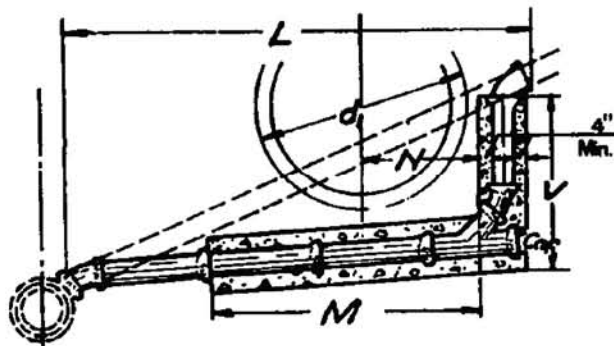
RIVERSIDE COUNTY FLOOD CONTROL AND WATER CONSERVATION DISTRICT	
APPROVED BY:	<i>Warren D. Willams</i>
CHIEF ENGINEER	
DATE: April 5, 2004	R.C.E. No. 32336

REMODELING DETAILS
HOUSE CONNECTION
SEWERS
STANDARD DRAWING NUMBER M808
SHEET 1 OF 2



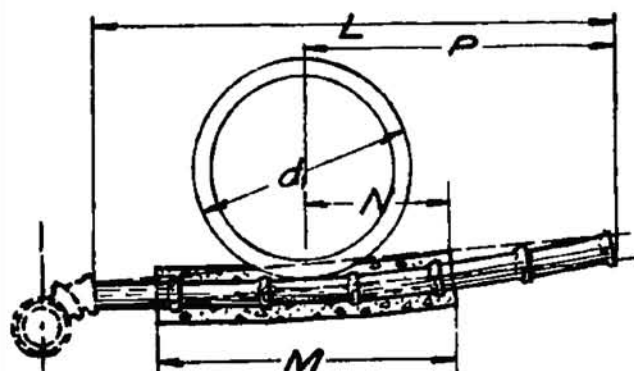
CASE-G

Below Storm Drain to Chimney-Specials required: 2-4" $\frac{1}{8}$ Bends.



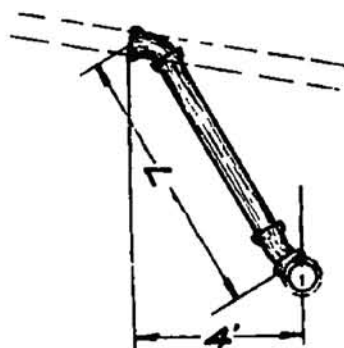
CASE-H

Below Storm Drain to Y-Specials required: 3-4" $\frac{1}{8}$ Bends, 1-4"x4" Y.



CASE-K

Below Storm Drain to House Connection. Slope slightly modified.



CASE-R

Connection with New Sewer-Specials required: 2-4" $\frac{1}{8}$ Bends.

NOTES

- Existing pipes are indicated by broken lines.
- Pipes to be constructed are indicated by full lines.
- All pipes shall be 4" internal diameter, or shall match existing lateral.
- All bends shall be 4" - $\frac{1}{8}$ bends unless specified otherwise.
- Concrete reinforcement, cross section shown sheet 1 shall be used on all pipes to be constructed under storm drain, top portion within 1' of storm drain to be omitted.
- Dimensions:
 - L is specified on plan as the average total length.
 - M = (d + 24") less enough to avoid a fraction of a foot.
 - N = $\frac{1}{2}$ M, except where specified otherwise on plan.
 - R used for CASE-K, is specified where L does not extend to the bend.
 - V, used for CASE-H, is specified to the nearest foot and in summary, is itemized as Concrete Reinforcement for 6" pipe.
- A 4" Saddle, where used, shall be connected to the pipe constituting the existing Y or T, or to the next lower pipe length.



RIVERSIDE COUNTY FLOOD CONTROL
AND
WATER CONSERVATION DISTRICT

APPROVED BY: *Warren D. Willard*
CHIEF ENGINEER

DATE: April 5, 2004

REMOLDING DETAILS
HOUSE CONNECTION
SEWERS

STANDARD DRAWING NUMBER M808
SHEET 2 OF 2

ABBREVIATIONS

AH	AHEAD	LBS	POUNDS
BK	BACK	LD	LOCAL DEPRESSION
AASHTO	AMERICAN ASSOCIATION OF STATE HIGHWAY AND TRANSPORTATION OFFICIALS	LF	LINEAL FEET
AB	AGGREGATE BASE	LONG	LONGITUDINAL
ABND	ABANDONED	LS	LUMP SUM OR LAND SURVEYOR
AC	ASPHALT CONCRETE	LT	LEFT
ACP	ASBESTOS CEMENT PIPE	L&T	LEAD & TACK
PT	ANGLE POINT	MAX	MAXIMUM
APPROX	APPROXIMATE	MCD	MULTIPLE CEMENT DUCT
ASTM	AMERICAN SOCIETY FOR TESTING MATERIALS	MEAS	MEASURED
APWA	AMERICAN PUBLIC WORKS ASSOCIATION	MH	MANHOLE
AWWA	AMERICAN WATER WORKS ASSOCIATION	MIN	MINIMUM
b	CHANNEL BASE WIDTH	MTD	MULTIPLE TILE DUCT (TEL)
BC	BEGINNING OF CURVE	MVC	MIDDLE OF VERTICAL CURVE
BCR	BEGINNING OF CURVE RETURN	N	NORTH
BM	BENCH MARK	NAD	NORTH AMERICAN DATUM
BNSF	BURLINGTON NORTHERN SANTA FE	NAVD	NORTH AMERICAN VERTICAL DATUM
BVC	BEGINNING OF VERTICAL CURVE	NGVD	NATIONAL GEODETIC VERTICAL DATUM
CALC	CALCULATED	NGS	NATIONAL GEODETIC SURVEY
CB	CATCH BASIN	NLY	NORTHERLY
CC	CENTER TO CENTER	NO.++	NUMBER
CF	CURB FACE OR CUBIC FEET	N&T	NAIL & TIN
cfs	CUBIC FEET PER SECOND	NTS	NOT TO SCALE
C&G	CURB AND GUTTER	OC	ON CENTER
CIPP	CAST IN PLACE PIPE	OD	OUTSIDE DIMENSION
CIP	CAST IRON PIPE	OR	OFFICIAL RECORD
CJ	CONSTRUCTION JOINT	PCC	POINT OF COMPOUND CURVATURE OR PORTLAND CEMENT CONCRETE
CL	CLASS	PI	POINT OF INTERSECTION
CLR	CLEAR	PL OR R	PROPERTY LINE
C	CENTERLINE	PP	POWER POLE
CML&C	CEMENT MORTAR LINED AND COATED	PPM	PARTS PER MILLION
CMP	CORRUGATED METAL PIPE	PRC	POINT OF REVERSE CURVATURE
CMPA	CORRUGATED METAL PIPE ARCH	PSI	POUNDS PER SQUARE INCH
CO	CLEAN OUT	PVC	POLYVINYL CHLORIDE PIPE
CONC	CONCRETE	PVMT	PAVEMENT
CONST	CONSTRUCT	Q	RATE OF FLOW (cfs)
COR	CORNER	R	RADIUS OR RANGE
CP	CONTROL POINT	RCB	REINFORCED CONCRETE BOX
CSP	CORRUGATED STEEL PIPE	RCE	REGISTERED CIVIL ENGINEER
CY	CUBIC YARDS	RCFC&WCD	RIVERSIDE COUNTY FLOOD CONTROL AND WATER CONSERVATION DISTRICT
D	DEPTH	RCP	REINFORCED CONCRETE PIPE
Δ	CURVE TOTAL DEFLECTION ANGLE	RR	RAILROAD
DG	DECOMPOSED GRANITE	R/S	RECORD OF SURVEY
DIA	DIAMETER	RT	RIGHT
DP	DUCTILE IRON PIPE	R/W	RIGHT OF WAY
DN	DOWN	S	SOUTH OR SLOPE
D/W	DRIVEWAY	SS	SIDE SLOPE OR SANITARY SEWER
DWG	DRAWING	SD	STORM DRAIN
E	EAST OR ELECTRICAL	SEC	SECTION
EA	EACH	SHI	SHEET
EC	END OF CURVE	SIG	SIGNAL
ECR	END OF CURVE RETURN	SL	STREET LIGHT
EF	EACH FACE	SLY	SOUTHERLY
ELEV	ELEVATION	SPRR	SOUTHERN PACIFIC RAILROAD
ELY	EASTERLY	SF	SQUARE FEET
EP	EDGE OF PAVEMENT	SY	SQUARE YARDS
EQ	EQUATION OR EQUAL	STA	STATION
EVC	END OF VERTICAL CURVE	STD	STANDARD
EW	EACH WAY	S&T	SPIKE & TIN
EX	EXISTING	S/W	SIDEWALK
EXCAV	EXCAVATION	T	TANGENT, THICKNESS, TOWNSHIP OR TELEPHONE
EX GND	EXISTING GROUND	TBM	TEMPORARY BENCH MARK
F	FIRE	TC	TOP OF CURB
FB	FIELD BOOK	TCE	TEMPORARY CONSTRUCTION EASEMENT
FD	FOUND	TRAFF	TRAFFIC
FG	FINISHED GRADE	TR	TRACT
FH	FIRE HYDRANT	TRANS	TRANSITION
E,FL	FLOW LINE	TS	TRANSITION STRUCTURE
fps	FEET PER SECOND	TW	TOP OF WALL
FT	FEET OR FOOT	TYP	TYPICAL
FWY	FREEWAY	UPRR	UNION PACIFIC RAILROAD
G	GAS	USC&GS	UNITED STATES COAST AND GEODETIC SURVEY
GALV	GALVANIZED	USGS	UNITED STATES GEOLOGICAL SURVEY
H	HEIGHT	V	VELOCITY OF FLOW OR DEPTH OF CATCH BASIN
HC	HOUSE CONNECTION	VABM	VERTICAL ANGLE BENCH MARK
HDPE	HIGH DENSITY POLYETHYLENE	VAR	VARIABLE OR VARIES
HGL	HYDRAULIC GRADE LINE	VC	VERTICAL CURVE
HORIZ	HORIZONTAL	VCP	VITRIFIED CLAY PIPE
ID	INSIDE DIMENSION	VERT	VERTICAL
IN	INCH OR INCHES	VPI	VERTICAL POINT OF INTERSECTION
IP	IRON PIPE	W	WEST, WIDTH OR WATER
IRR	IRRIGATION	WLY	WESTERLY
JS	JUNCTION STRUCTURE	WS	WATER SURFACE
L	LENGTH		

LINE TYPES

ASPHALT BERM	ASPHALT BERM ROLLED
BLOCK WALL	
CENTERLINE	
CONTOURS	
CULVERT, EXISTING	
CURB & GUTTER, EXISTING	
DELINEATORS	
EASEMENT, TEMPORARY CONSTRUCTION	TCE
EASEMENT, UTILITY	
ELECTRICAL LINE	E
FENCE, CHAIN LINK, EXISTING	
FENCE, CHAIN LINK, PROPOSED	
FENCE, WIRE	
FENCE, WOODEN	
FLOW LINE	
GAS LINE, ID IN INCHES	G4
GUARD RAIL	
IRRIGATION LINE, ID IN INCHES	IRR12
OIL LINE, ID IN INCHES	OIL10
RAILROAD SIGNAL LINE	RR SIG
RAILROAD TRACKS	
RETAINING WALL	
RIGHT OF WAY, FLOOD CONTROL	R/W
RIGHT OF WAY, STREET	R/W
ROAD, DIRT	
SANITARY SEWER, ID IN INCHES	SS12
SIDE SLOPE	
SPRINKLERS	
STORM DRAIN, EXISTING, ID IN INCHES	SD24
STREET LIGHT CONDUIT	SL
TELEPHONE CABLE	T
TELEPHONE, MULTIPLE TILE DUCT	T(MTD)
TELEPHONE, MULTIPLE CEMENT DUCT	T(MCD)
TRAFFIC SIGNAL LINE	TRAF

SYMBOLS

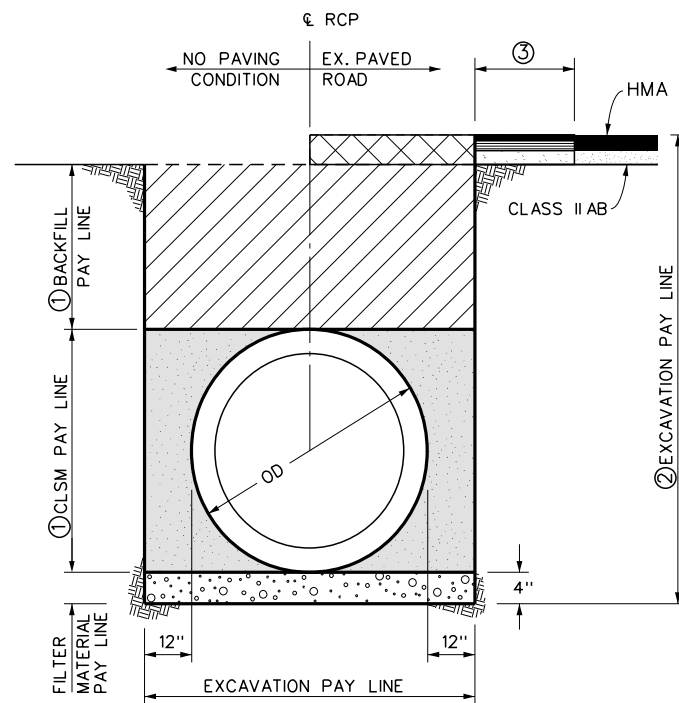
BARRICADE	
BILLBOARD	
BUSHES	
CATCH BASIN, PROPOSED	
CONTROL POINT	
ELECTROLIER (S) ON POLE	
ELECTROLIER ON POLE, CANTILEVER ARM	
ELECTROLIER ON POWER POLE, CANTILEVER ARM	
FIRE HYDRANT	
GATE, DOUBLE DRIVE	
HEDGE	
HYDRAULIC GRADE LINE	HGL
MAIL BOX	
MANHOLE COVER, EXISTING	
MANHOLE COVER, PROPOSED	
METER, WATER OR GAS	
NORTH ARROW	
POLE, GUY WITH ANCHORS	
POLE, POWER OR TELEPHONE	
SIGN, STREET	
SOIL BORINGS	BH-1
TRAFFIC DETECTOR LOOP	
TREE, OTHER THAN PALM	
TREE, PALM	
VALVE, WATER OR GAS	
WATER SURFACE PROFILE	



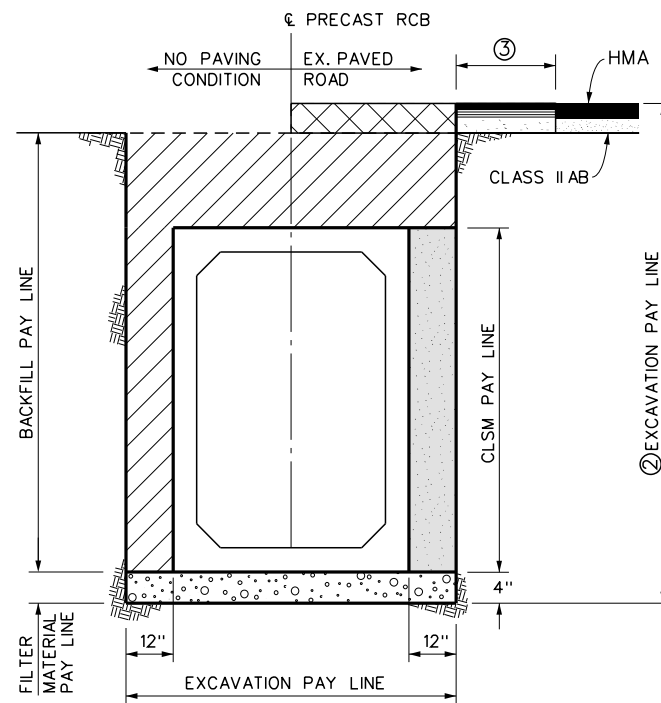
RIVERSIDE COUNTY FLOOD CONTROL AND WATER CONSERVATION DISTRICT	
APPROVED BY:	<i>Warren D. Williams</i>
DATE:	April 5, 2004
CIVIL	R.C.E. NO. 32336

ABBREVIATIONS AND SYMBOLS

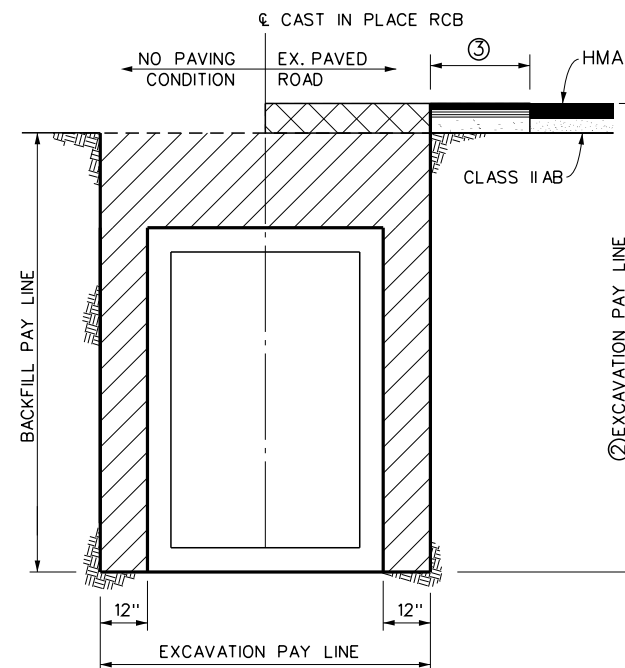
STANDARD DRAWING NUMBER M814



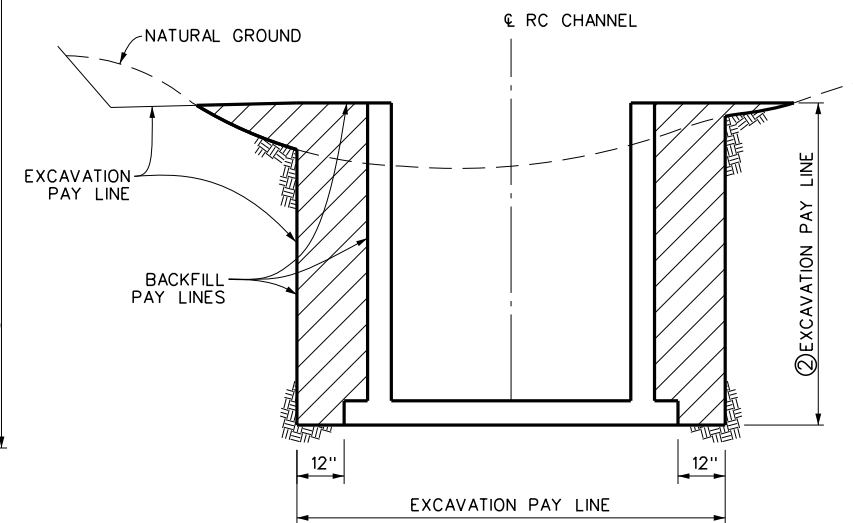
**RCP PAY LINES
NORMAL CONDITION**



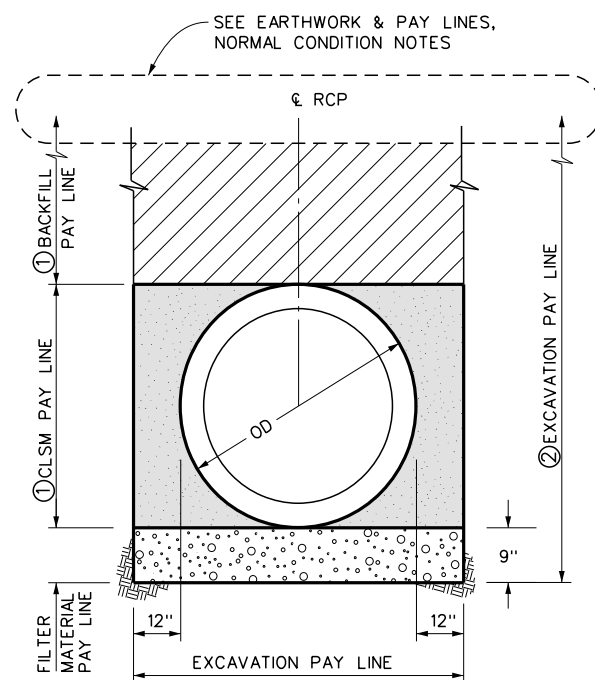
**PRECAST RCB PAY LINES
NORMAL CONDITION**



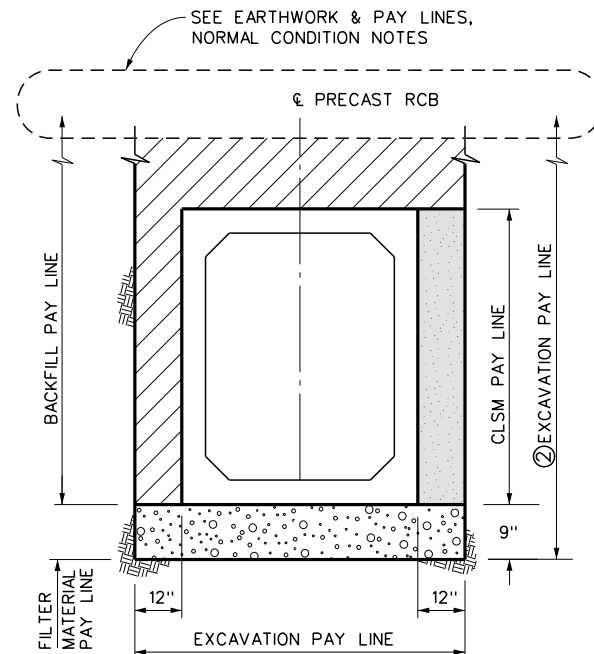
**CAST IN PLACE RCB PAY LINES
NORMAL CONDITION**



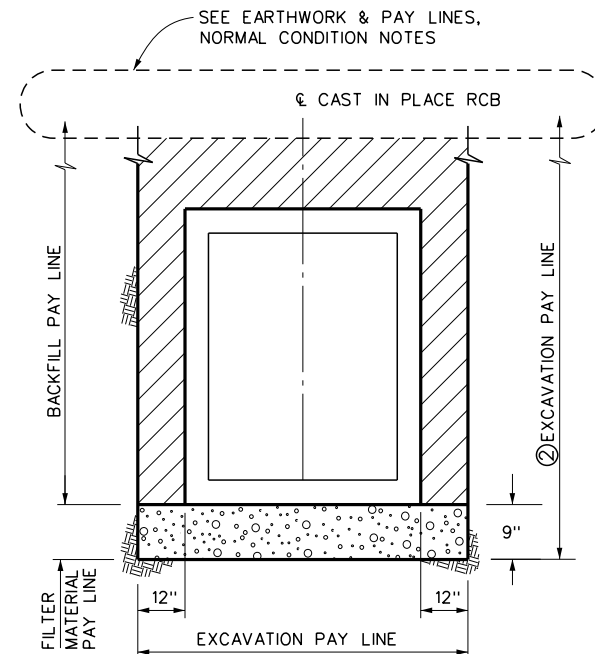
**RC CHANNEL PAY LINES
NORMAL CONDITION**



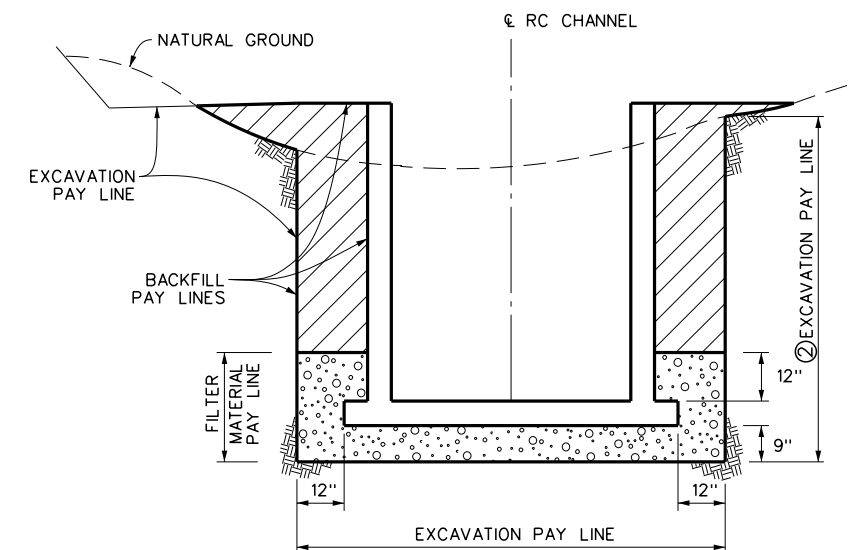
**RCP PAY LINES
GROUNDWATER CONDITION**



**PRECAST RCB PAY LINES
GROUNDWATER CONDITION**

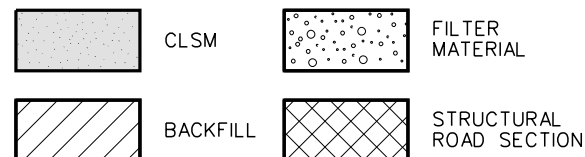


**CAST IN PLACE RCB PAY LINES
GROUNDWATER CONDITION**



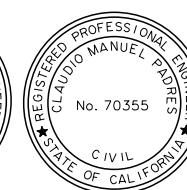
**RC CHANNEL PAY LINES
GROUNDWATER CONDITION**

LEGEND

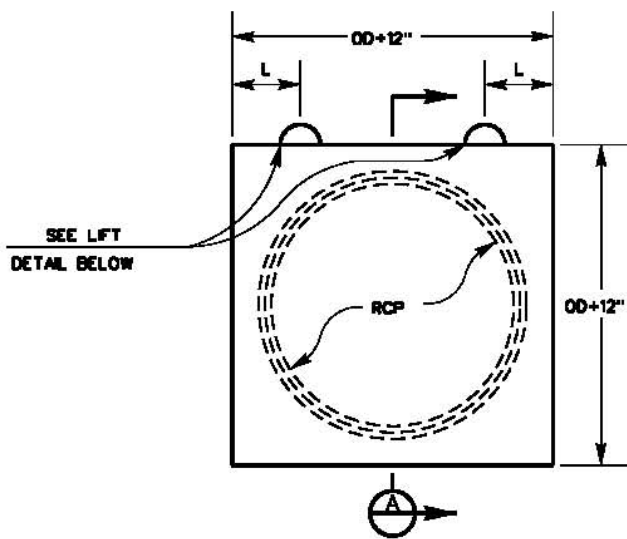


NOTES

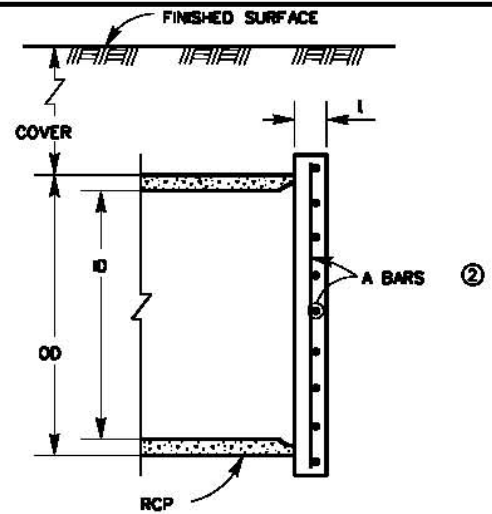
- FOR RCP WITH COVER LESS THAN OR EQUAL TO 2 FEET, THE CLSM AND BACKFILL SHALL BE REPLACED WITH CONCRETE SLURRY ($f'_c=2,000$ PSI MINIMUM) TO A MINIMUM OF 4 INCHES AND A MAXIMUM OF 12 INCHES ABOVE THE TOP OF THE PIPE.
- IF PAVEMENT IS NOT INCLUDED IN EXCAVATION, THE EXCAVATION PAY LINES WILL BE TO THE EXISTING GROUND. SURFACE ELEVATIONS WILL BE ESTABLISHED BY FIELD SURVEYS.
- PAVING/HMA RESTORATION LIMITS TO BE SHOWN ON PAVING PLANS OR PER CITY OR COUNTY PAVEMENT RESTORATION PLAN



RIVERSIDE COUNTY FLOOD CONTROL AND WATER CONSERVATION DISTRICT		EXCAVATION AND BACKFILL PAY LINES STANDARD DRAWING NUMBER M815 SHEET 1 OF 1
APPROVED BY: <i>[Signature]</i> GENERAL MANAGER/CHIEF ENGINEER DATE: SEPTEMBER 2017	APPROVED BY: <i>[Signature]</i> CHIEF, DESIGN & CONSTRUCTION DATE: SEPTEMBER 2017	
R.C.E. NO. 59795	R.C.E. NO. 70355	

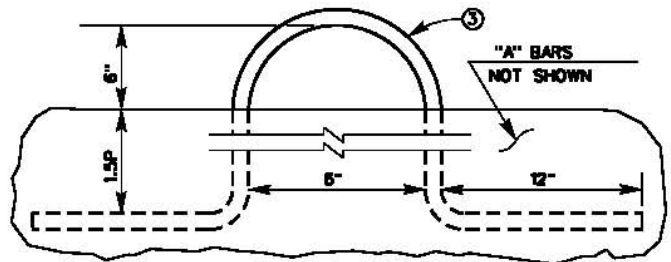


FRONT VIEW

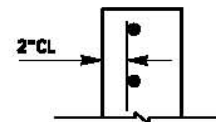


SECTION A

ID (IN)	MAX COVER (FT)	t (IN)	A BARS	L, P
48	5	4	4 @ 9	1'-8"
	10	4	4 @ 6	
	15	5	4 @ 8	
60	5	4	4 @ 6	1'-8"
	10	5	4 @ 8	
	15	5	5 @ 6	
66	5	5	4 @ 6	1'-10"
	10	5	5 @ 8	
	15	5	5 @ 8	
72	5	5	4 @ 6	2'-0"
	10	5	5 @ 8	
	15	5	6 @ 8	
78	5	5	5 @ 6	2'-2"
	10	5	6 @ 6	
	15	6	6 @ 6	
84	5	5	5 @ 6	2'-4"
	10	5	6 @ 6	
	15	6	6 @ 5	
90	5	5	6 @ 6	2'-5"
	10	6	6 @ 6	
	15	6	6 @ 5	
96	5	5	6 @ 6	2'-7"
	10	6	6 @ 5	
	15	6	7 @ 6	



LIFT DETAIL



DETAIL

NOTES

1. CONCRETE SHALL BE CLASS 'A'.
2. ALL REINFORCING STEEL SHALL BE CENTERED IN BULKHEAD EXCEPT FOR PIPE DIAMETER GREATER THAN 96", VERTICAL "A" BARS SHALL BE PLACED AT 2" CLEAR FROM THE INSIDE FACE OF THE BULKHEAD. HORIZONTAL "A" BARS SHALL BE PLACED TOWARDS OUTSIDE FACE OF BULKHEAD PER DETAIL.
3. LIFTS SHALL BE WOVEN STEEL CABLE WITH SAME MINIMUM DIAMETER (d) AS "A" BARS. WEAVE CABLE THROUGH HORIZONTAL "A" BARS. COAT EXPOSED PORTION OF CABLE LIFTS WITH AN APPROVED BITUMINOUS PAINT PRIOR TO BACKFILLING TRENCH.



RIVERSIDE COUNTY FLOOD CONTROL
AND
WATER CONSERVATION DISTRICT

APPROVED BY: *Warren D. Willits*

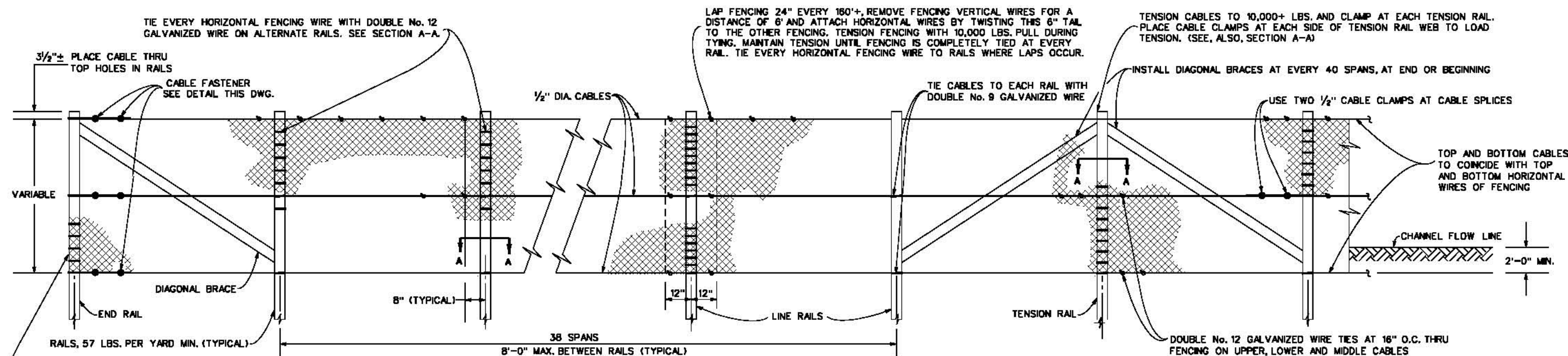
CHIEF ENGINEER

DATE: Apr 15, 2004

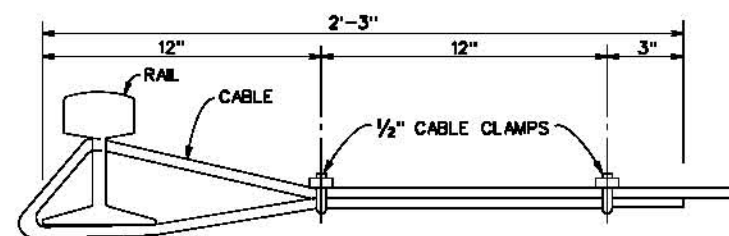
R.C.E. NO. 32336

CONCRETE BULKHEAD

STANDARD DRAWING NUMBER M816



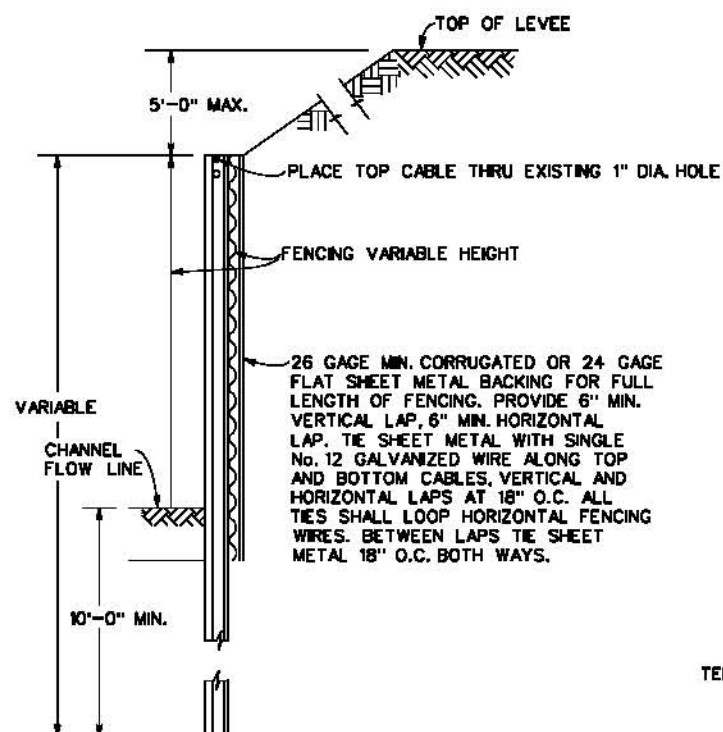
DETAIL OF FENCING FASTENING & BRACING



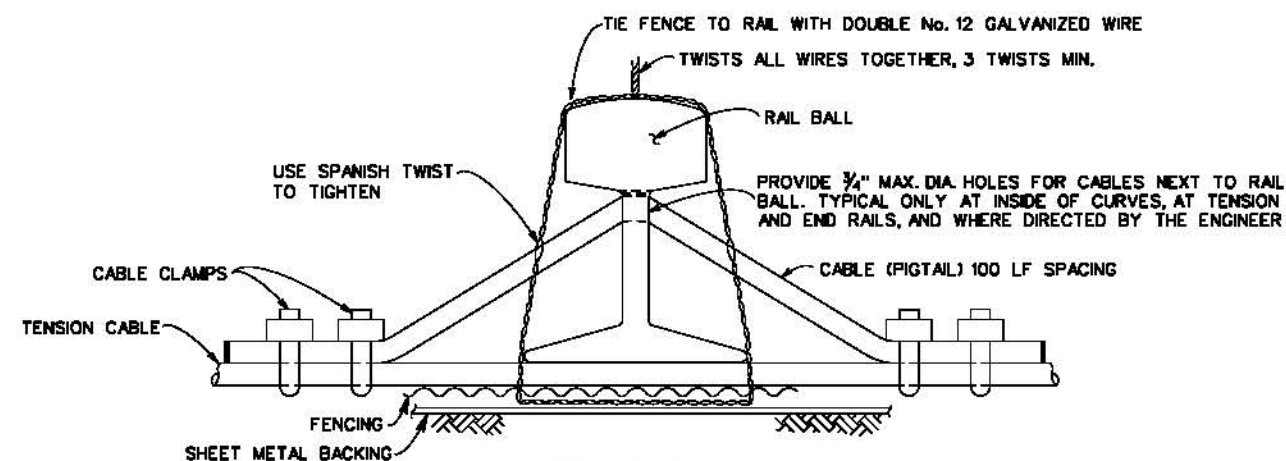
DETAIL OF CABLE FASTENING

GENERAL NOTES:

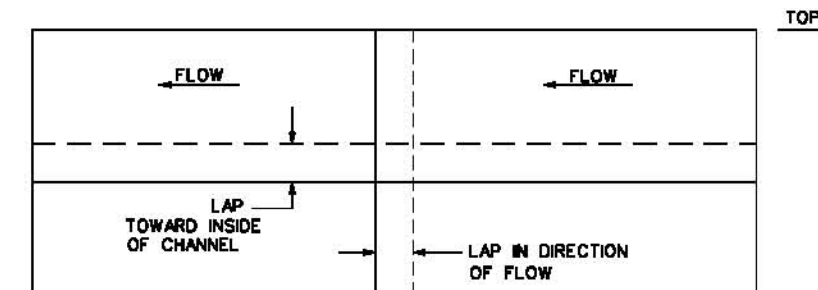
1. THE TERM "ENGINEER", WHERE IT APPEARS HEREON, SHALL BE TAKEN TO MEAN THE AUTHORIZED REPRESENTATIVE OF THE DISTRICT.
2. USED CABLE AND RAIL MAY BE USED AS APPROVED BY THE ENGINEER. USED CABLE SHALL BE $\frac{3}{8}$ " MIN. DIA.
3. DIAGONAL BRACES ARE 11 LBS. MINIMUM WEIGHT PER YARD. WELD BRACES TO RAILS WITH A MIN. OF 9" OF $\frac{3}{8}$ " FILLET WELD, SYMMETRICALLY PLACED. CUT ENDS OF BRACES TO FIT SNUGLY AGAINST RAILS PRIOR TO WELDING.
4. RAILS SHALL BE 15 FOOT MINIMUM LENGTH, AND 57 LBS. MINIMUM WEIGHT PER YARD.
5. THE TERM "FENCING", WHERE IT APPEARS HEREON, SHALL BE TAKEN TO MEAN NEW COLORADO FUEL & IRON, TYPE J-3, V-MESH FENCE FABRIC, OF SPECIFIED HEIGHT, OR AN APPROVED EQUIVALENT.
6. ALL GALVANIZED WIRE SHALL BE ANNEALED AND OF SUFFICIENT STRENGTH TO PROVIDE A SATISFACTORY CONNECTION.



TYPICAL SECTIONS



SECTION A-A
(TYPICAL AT ALL RAILS)

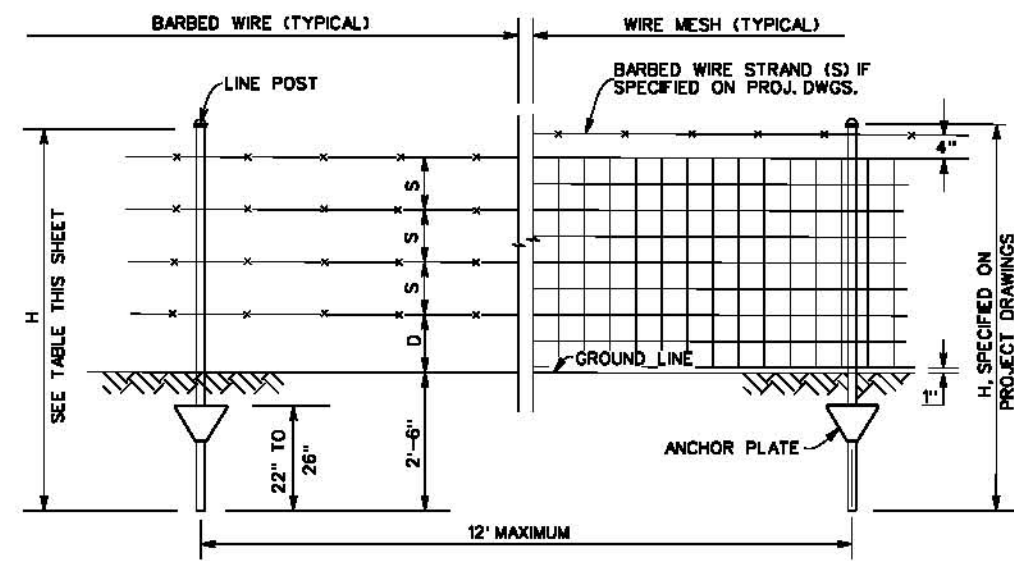


SHEET METAL LAP DETAIL

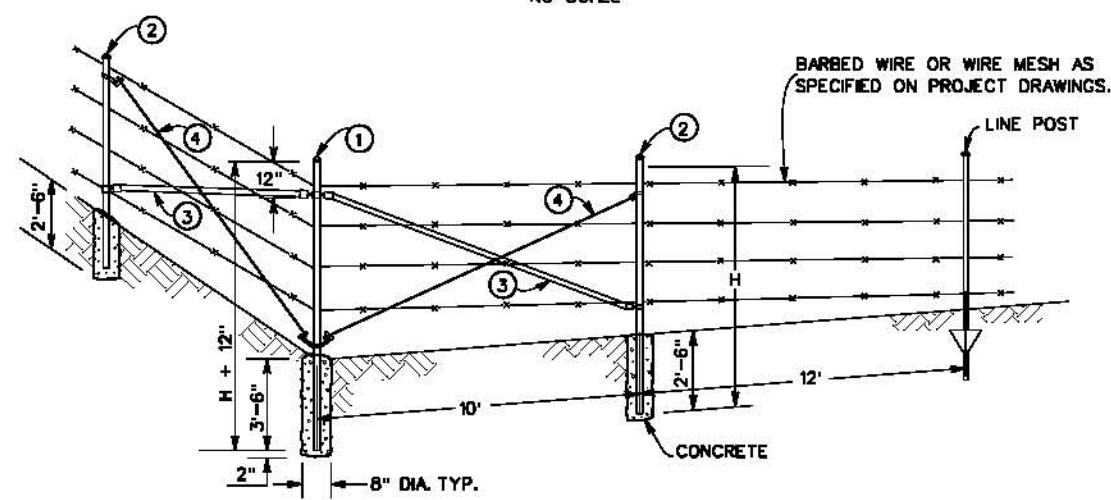


RIVERSIDE COUNTY FLOOD CONTROL AND WATER CONSERVATION DISTRICT	
APPROVED BY:	<i>Warren D. Williams</i>
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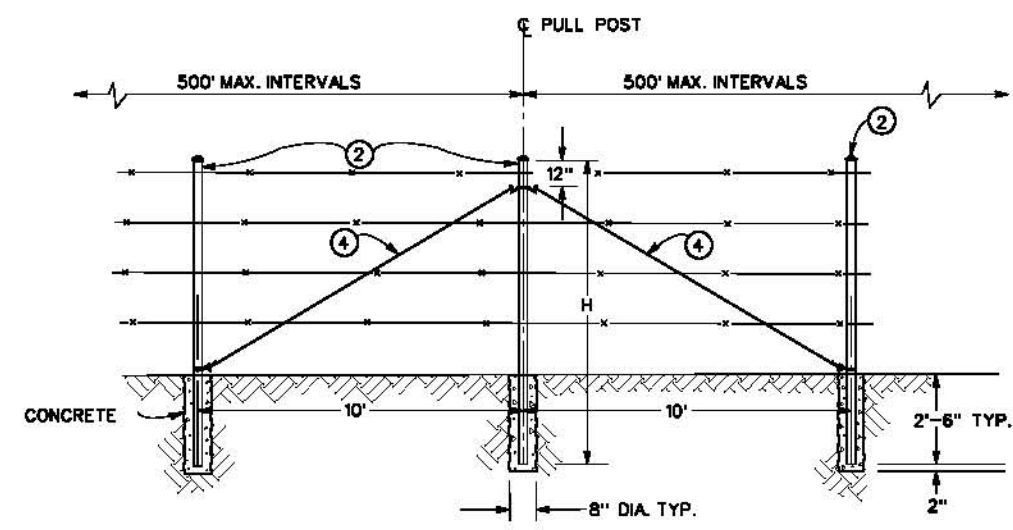
RAIL & WIRE
REVTMENT
(WITH SHEET METAL BACKING)
STANDARD DRAWING NUMBER M817



LINE POSTS
NO SCALE



END OR CORNER POST ASSEMBLY



PULL POST ASSEMBLY
NO SCALE

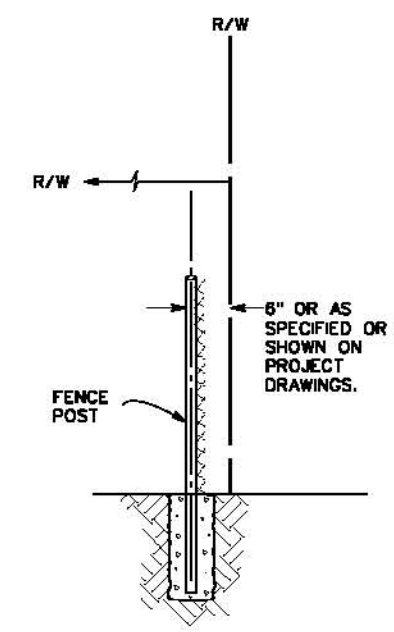
BARBED WIRE FENCE DIMENSIONS

NUMBER OF WIRE STRANDS	3	4	5
H	6'-6"	7'-0"	7'-0"
S	12"	12"	10"
D	15"	15"	12"

- ① ROUND METAL POST, 2.875" O.D.
- ② ROUND METAL POST, 2.375" O.D.
- ③ ROUND METAL BRACE, 1.660" O.D.
- ④ 3/8" TENSION ROD WITH TENSION ADJUSTMENT.

NOTES:

- SEE PROJECT DRAWINGS FOR NUMBER OF STRANDS OF BARBED WIRE OR WIDTH OF WIRE MESH.
- BARBED WIRE SHALL BE 4-POINT ROUND BARBS, SPACED APPROXIMATELY 5-INCHES APART, AND WOUND ON TWO STRANDS OF WIRE. WIRE SIZE SHALL BE No. 12 1/2-GAGE WIRE STRANDS AND No. 14-GAGE BARBS. BARBED WIRE SHALL CONFORM TO ASTM A121, CLASS 1.
- WIRE MESH SHALL BE FABRIC CONFORMING TO ASTM A121, CLASS 1. IT SHALL HAVE VERTICAL STAYS SPACED APART AS NOTED ON THE DRAWINGS. THE TOP AND BOTTOM WIRES SHALL BE 10-GAGE AND THE INTERMEDIATE WIRES AND VERTICAL STAYS SHALL BE 12 1/2-GAGE.
- LINE POSTS SHALL BE 1 3/8"x1 3/8"x1/8 TEE SHAPED STEEL POSTS, AND SHALL BE PROVIDED WITH A TAPERED ANCHOR PLATE SECURELY ATTACHED THERETO AT APPROXIMATELY 22 TO 26 INCHES FROM THE BOTTOM OF THE POST, UNLESS OTHERWISE SPECIFIED. THE ANCHOR PLATE SHALL HAVE A MINIMUM AREA OF 20 SQUARE INCHES AND SHALL BE CUT FROM NOT LESS THAN 8-GAGE METAL. THE LINE POST AND ANCHOR PLATE SHALL BE PAINTED GREEN.
- FENCING MATERIAL FOR THE END, CORNER, AND PULL POST ASSEMBLIES SHALL CONFORM TO SECTION 206-6 OF THE LATEST EDITION OF THE STANDARD SPECIFICATIONS FOR PUBLIC WORKS CONSTRUCTION.
- LINE POSTS SHALL BE DRIVEN INTO THE GROUND. END, CORNER AND PULL POST ASSEMBLIES SHALL BE SET IN CONCRETE AND CURED FOR 7 DAYS BEFORE ERECTING BARBED WIRE STRANDS.
- BARBED WIRE SHALL BE ERECTED IN THE FOLLOWING ORDER: TOP STRAND FIRST, BOTTOM STRAND SECOND; REMAINING STRANDS THIRD.
- WIRE USED TO FASTEN BARBED WIRE AND WIRE MESH TO POSTS SHALL BE GALVANIZED AND 11-GAGE OR HEAVIER. CLIPS AND HOG RINGS SHALL BE 9-GAGE OR HEAVIER.
- END OF CORNER POST ASSEMBLY SHALL BE INSTALLED WHERE A CHANGE IN FENCE DIRECTION IS GREATER THAN 15°.
- LINE POSTS ON CURVES SHALL BE VERTICAL AFTER BARBED WIRE STRANDS ARE ERECTED & DRAWN TAUT. SPACING OF LINE POST SHALL BE ADJUSTED IN THE FIELD TO SUIT SOIL CONDITIONS AND CURVATURE OF THE FENCE. SPACING SHALL BE UNIFORM ON CURVES. MINIMUM SPACING SHALL BE 8 FEET AND MAXIMUM SPACING SHALL BE 12 FEET.
- SPLICES FOR BARBED WIRE SHALL BE DOUBLE WESTERN UNION.
- CONCRETE SHALL BE 4 SACK, 2000 PSIA 28 DAYS.
- ALL MATERIALS SHALL BE APPROVED BY THE ENGINEER PRIOR TO ERECTION.
- ERECTION METHODS AND ALL SPLICES ARE SUBJECT TO APPROVAL BY THE ENGINEER.



FENCE LOCATION
NO SCALE

SUPERCEDES DRAWING OF SAME No. DATED MAR. 31, 1982



RIVERSIDE COUNTY FLOOD CONTROL AND WATER CONSERVATION DISTRICT	
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WIRE FENCE DETAILS
STANDARD DRAWING NUMBER M818

REINFORCED CONCRETE RECTANGULAR CHANNEL

WALL RADIUS FEET	MAX. LENGTH WALL CHORD FEET
LESS THAN 50	SMOOTH CURVE
50 TO 90	2
91 TO 400	4
401 TO 600	8
601 TO 1000	16
1001 TO 3000	24
GREATER THAN 3000	50

REINFORCED CONCRETE BOX

WALL RADIUS FEET	MAX. LENGTH WALL CHORD FEET
LESS THAN 45	SMOOTH CURVE
45 TO 90	8
91 TO 200	16
201 TO 600	24
GREATER THAN 600	50

NOTE:

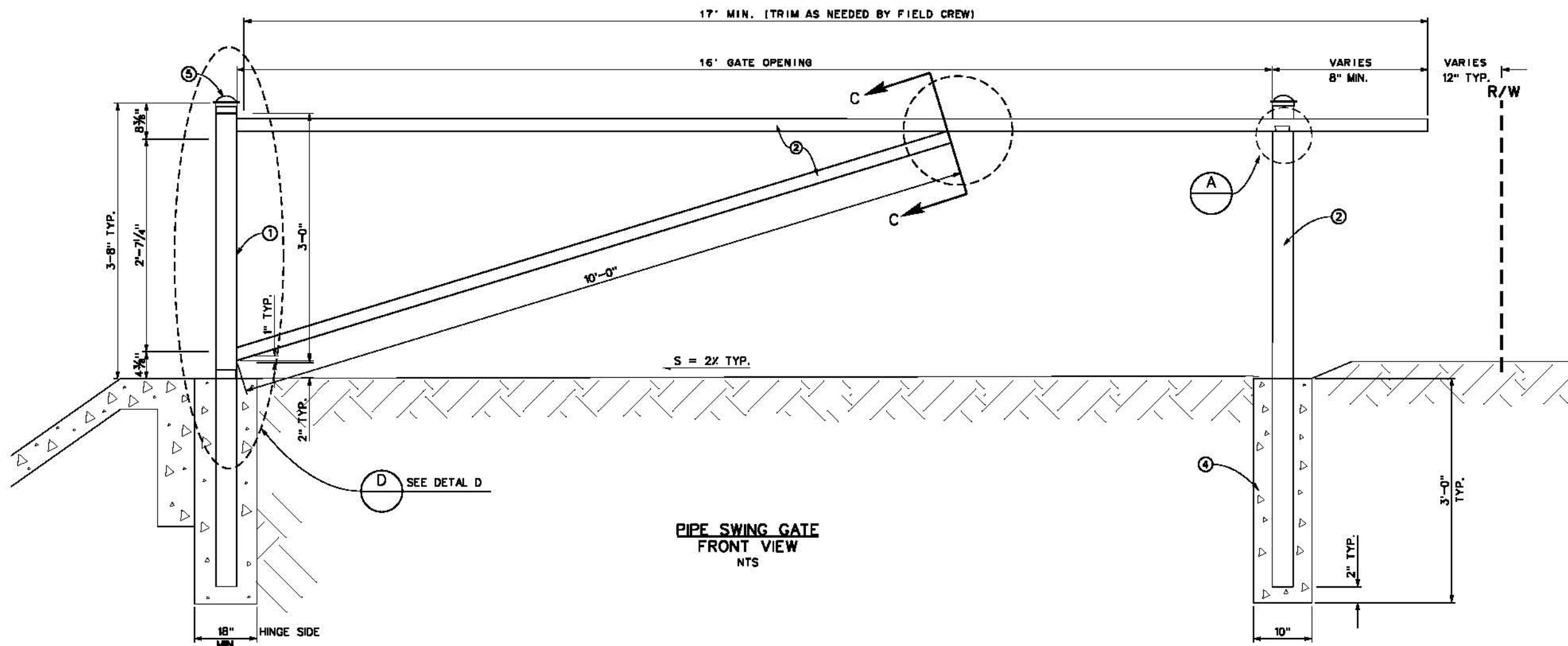
1. THE CONTRACTOR MAY FORM CURVED STRUCTURES IN ACCORDANCE WITH THE ABOVE CRITERIA UNLESS OTHERWISE SPECIFIED ON THE PROJECT DRAWINGS. MAXIMUM LENGTH OF WALL CHORD SHALL BE BASED ON THE INSIDE WALL RADIUS. CHORD LENGTH SHALL BE UNIFORM THROUGHOUT EACH CURVE.
2. PROPOSED FORMING ON CURVES SHALL BE APPROVED BY THE DISTRICT PRIOR TO CONSTRUCTION.



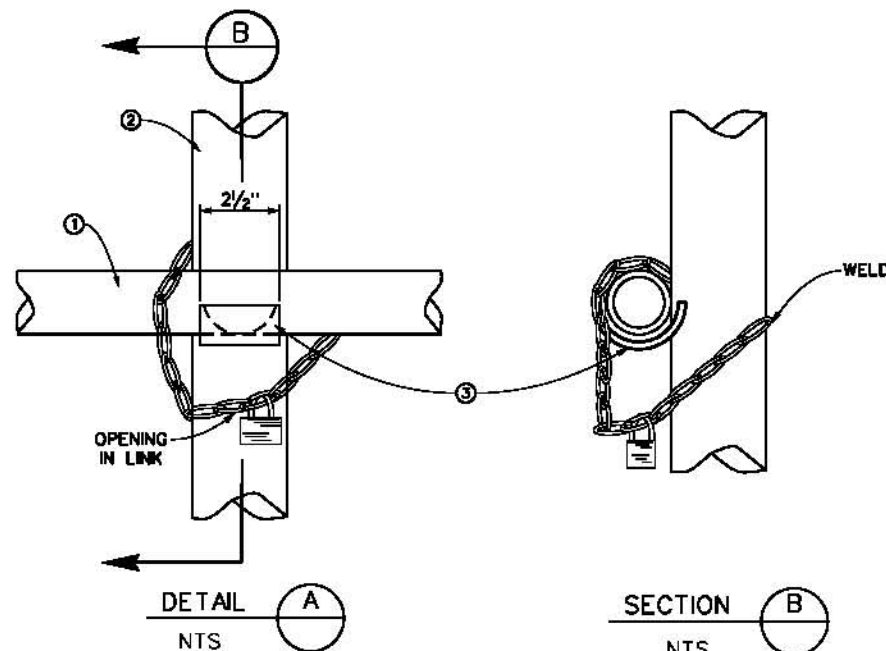
RIVERSIDE COUNTY FLOOD CONTROL AND WATER CONSERVATION DISTRICT	
APPROVED BY:	<i>Warren D. Willams</i>
CHIEF ENGINEER	
DATE: April 5, 2004	R.C.E. NO. 32336

MAXIMUM
CHORD LENGTHS FOR
CURVED SECTIONS

STANDARD DRAWING NUMBER M819



PIPE SWING GATE
FRONT VIEW
NTS

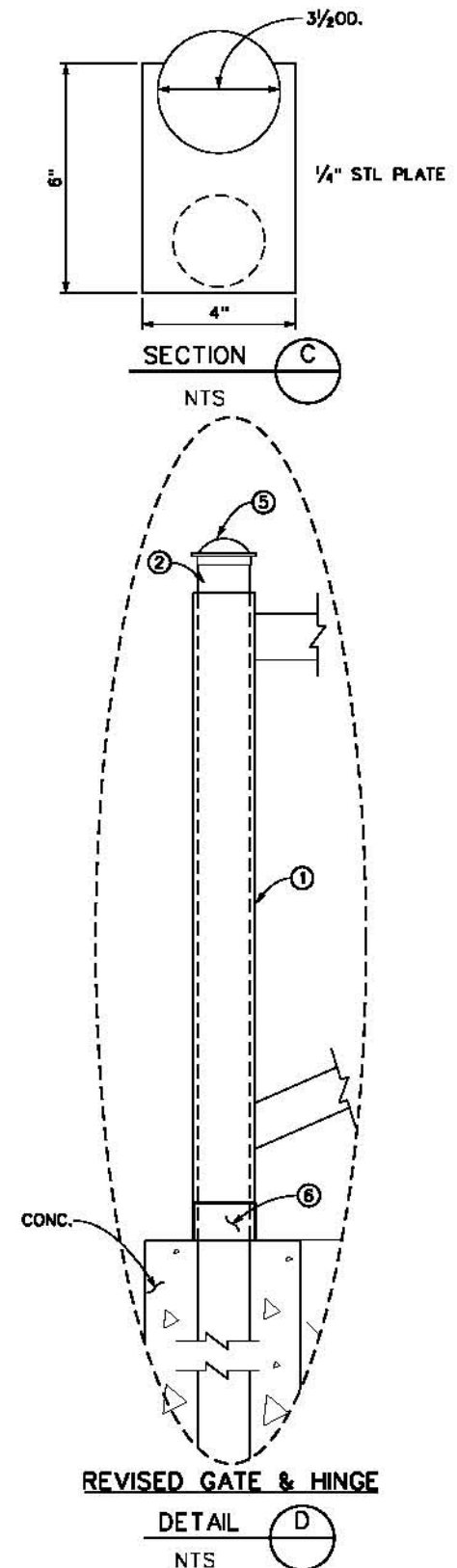


DETAIL A
NTS

SECTION B
NTS

NOTES

- 1 GALVANIZED IRON PIPE 3 1/2" O.D. WALL THICKNESS 0.318".
- 2 GALVANIZED IRON PIPE 2.875" O.D. WALL THICKNESS 0.276".
- 3 GATE REST, ONE-HALF OF GALVANIZED IRON PIPE 3 1/2" O.D. GRIND TO FIT VERTICAL POST. FIELD WELD.
- 4 CLASS "B" CONCRETE.
- 5 POST ANCHORED IN CONCRETE SHALL HAVE CAPS.
- 6 2" FREE STANDING PIVOT SLEEVE 3 1/2" WALL THICKNESS 0.318".
- 7 3/8" GALVANIZED CHAIN, FIELD WELD ONE LINK TO VERTICAL POST. PROVIDE OPENING IN LINKS FOR PADLOCK AS SHOWN. CHAIN SHALL BE OF SUFFICIENT LENGTH TO ENIRCLE HORIZONTAL PIPE.
- 8 MATERIALS AND CONSTRUCTION METHODS SHALL CONFORM TO THE APPLICABLE PORTION OF SECTION 206-6, 210-3 AND 304-3 OF "STANDARD SPECIFICATIONS FOR PUBLIC WORKS CONSTRUCTION," LATEST EDITION.

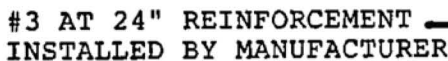


REVISD GATE & HINGE
DETAIL D
NTS



RIVERSIDE COUNTY FLOOD CONTROL AND WATER CONSERVATION DISTRICT	
APPROVED BY:	<i>Warren D. Williams</i>
CHIEF ENGINEER	
DATE: April 5, 2004	R.C.E. NO. 32336

PIPE
SWING GATE
STANDARD DRAWING NUMBER MB20

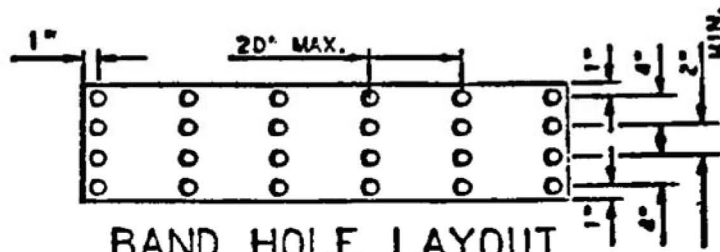


NOTES

NO SCALE

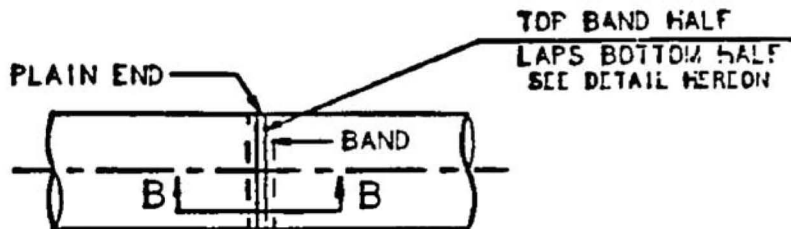
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STANDARD DRAWING NUMBER M823



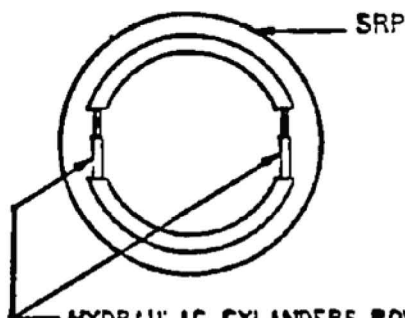
BAND HOLE LAYOUT

N.T.S.



ELEVATION

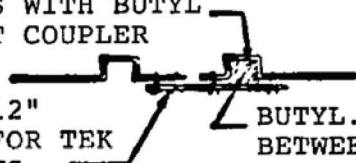
N.T.S.



HYDRAULIC CYLINDERS POWERED BY MANUAL PUMP TO EXERT PRESSURE AGAINST COUPLER TO PIPE WALL DURING INSTALLATION

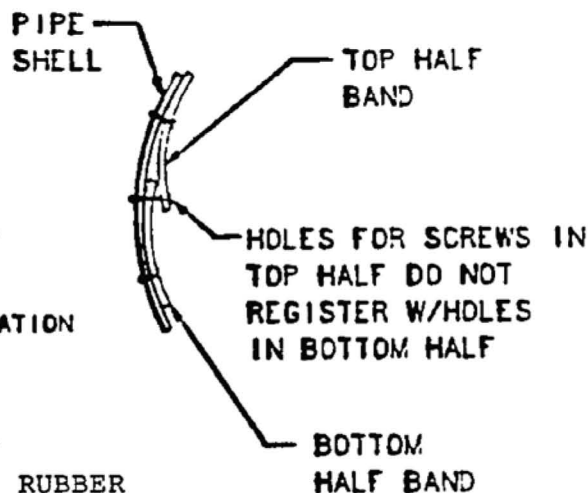
FILL RIBS WITH BUTYL RUBBER AT COUPLER

BAND MIN. 12" PREPUNCH FOR TEK NO. 3 SCREWS



SECTION "B-B"

N.T.S.



BAND LAP DETAIL

N.T.S.

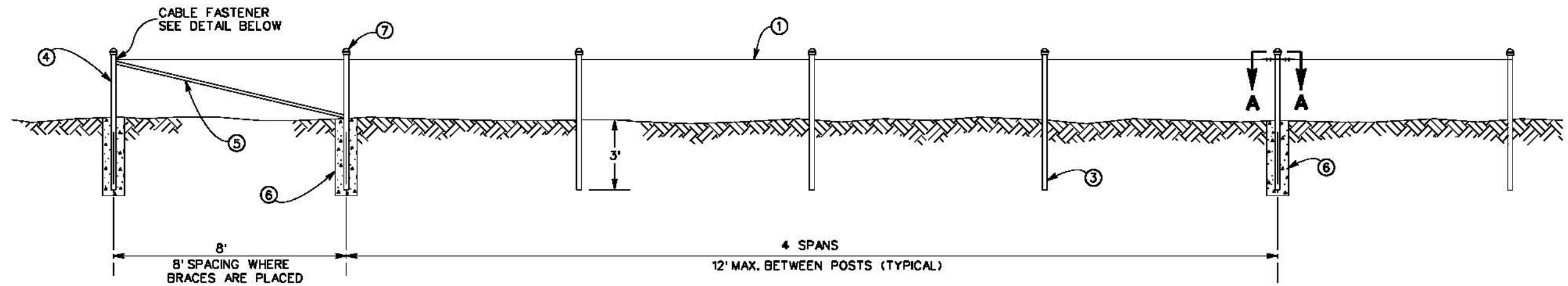
BANDING DETAIL : 48" DIA. AND LARGER PIPES



RIVERSIDE COUNTY FLOOD CONTROL AND WATER CONSERVATION DISTRICT	
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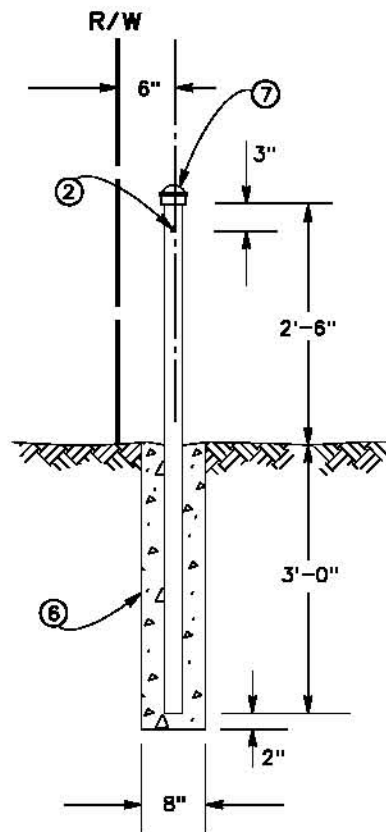
**SPIRAL RIB PIPE
BANDING DETAIL**

STANDARD DRAWING NUMBER M825



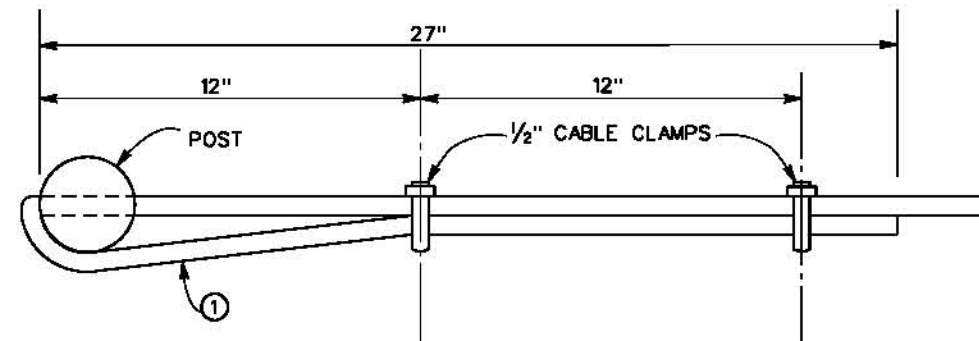
DETAIL OF FENCING FASTENING & BRACING

N.T.S.



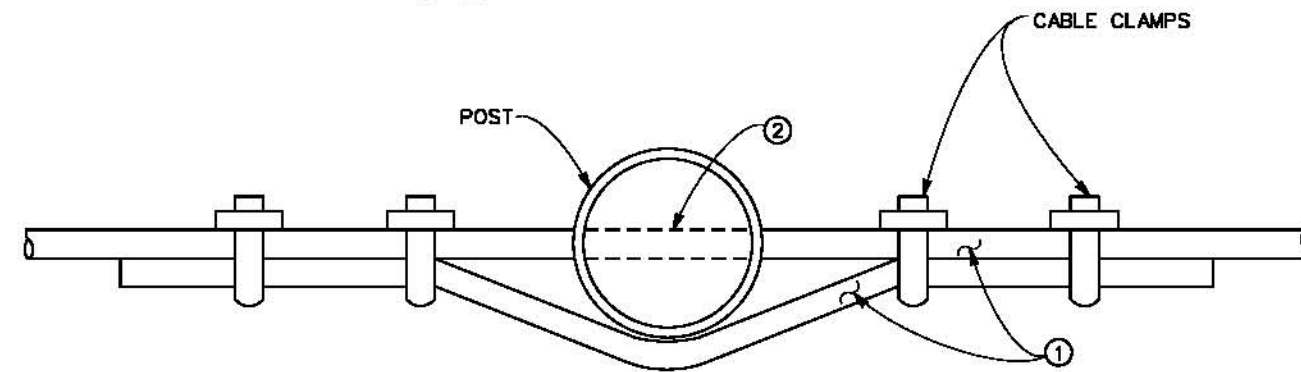
TYPICAL SECTION

N.T.S.



CABLE FASTENER DETAIL

N.T.S.



SECTION A-A

(PIGTAIL)
(TYPICAL EVERY FOURTH POST)
N.T.S.

GENERAL NOTES

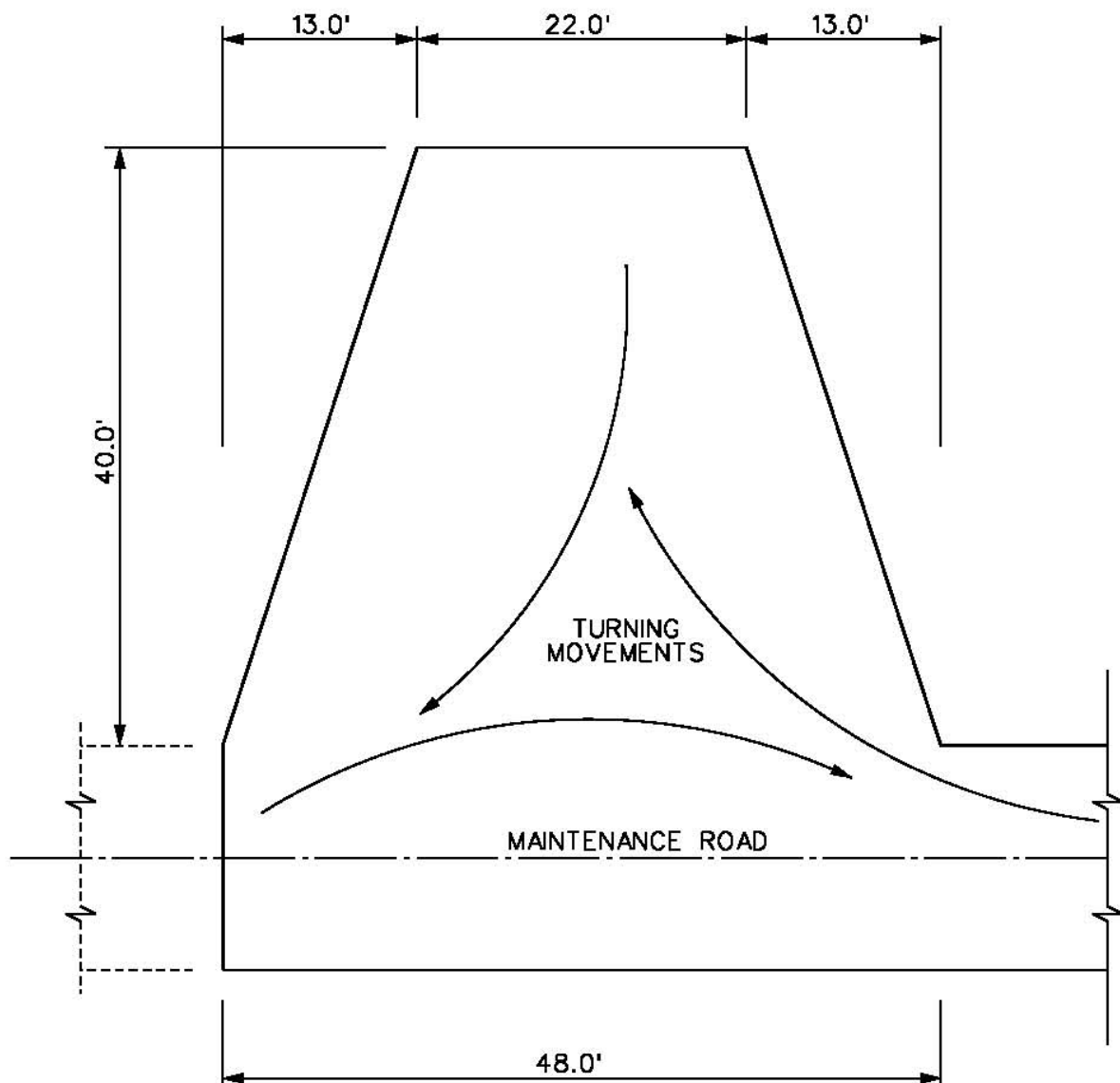
- ① 1/2" DIAMETER CABLE.
- ② 3/4" DIAMETER HOLES FOR CABLE THRU CENTER OF POSTS. PROVIDE ADEQUATE TENSION IN THE CABLE TO MINIMIZE SAG BETWEEN SPANS.
- ③ LINE POSTS 2 3/8" O.D.
- ④ GATE, END AND CORNER POSTS 2 3/8" O.D.
- ⑤ DIAGONAL BRACE AT EVERY ANGLE POINT AND IN END SPANS 2 3/8" O.D. WELDED IN PLACE.
- ⑥ 2000 PSI (4 SACK CONC.) AT EVERY 4TH POST, EVERY ANGLE POINT, BRACE POINT AND AT ENDS.
- ⑦ CAPS ON ALL POSTS.
8. THERE SHOULD BE ENOUGH TENSION IN THE CABLE TO MINIMIZE SAG BETWEEN SPANS.
9. THE TERM "ENGINEER", WHERE IT APPEARS HEREON, SHALL BE TAKEN TO MEAN THE AUTHORIZED REPRESENTATIVE OF THE DISTRICT.
10. RAIL MAY BE USED IN PLACE OF POSTS AS APPROVED BY THE ENGINEER.
11. USED CABLE, RAIL OR POSTS MAY BE USED AS APPROVED BY THE ENGINEER. USED CABLE SHALL BE 1/2" MIN. DIA.



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CABLE FENCE DETAIL

STANDARD DRAWING NUMBER M826



RIVERSIDE COUNTY FLOOD CONTROL
AND
WATER CONSERVATION DISTRICT

APPROVED BY: *Warren D. Williams*

CHIEF ENGINEER

DATE: April 15, 2004

R.C.E. NO. 32336

VEHICULAR
TURN AROUND AREA

STANDARD DRAWING NUMBER M827