



APPROVED	<i>Robert C. White</i>	DATE	7/14/78
PUBLIC WORKS DIRECTOR - R.C.E. 18793			
①	Note Revision	WJ	8-25-80
②	Defined Approval	BR	4-7-82
③	Changed Riverside Fdy to Alhambra	WJ	7-7-82
④	Added Prime to C, E, L, and Sheet 3.	WJ	12/7/82
MARK	REVISIONS	APPR.	DATE

CITY OF RIVERSIDE
PUBLIC WORKS DEPT. - ENGINEERING DIV.
MANHOLE JM
STANDARD DRAWING NO. 432
 Sheet 1 of 3

NOTES



- 1 - VALUES for A, B, C, D₁, D₂, E, L, Elevation R, and Elevation S are shown on the improvement plan (see Sheet 3 of 3). 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. Laterals shall be designated on improvement plan as right or left, facing in the direction of stationing.
- 3 - CENTER OF MANHOLE SHAFT shall be located over center line of main storm drain when D₁ is 48" or less, in which case place 4 E bars symmetrically around shaft at 45° with center line.
- 4 - LENGTH L (shown on improvement plan) may be increased at option of Contractor to meet pipe ends, but any change in location of spur must be approved by the City Engineer.
- 5 - DETAIL M : When depth of manhole from street grade to top of box is less than 2'-10½" 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, 1½" clear from face of concrete unless shown otherwise. Tie bars shall be No. 3 and spaced 18" on centers or closer. Steel schedule detailed on improvement plan.
- 7 - CONCRETE shall be in accordance with the table of Concrete Specifications.
- 8 - STEPS shall be ¾" round, galvanized steel and anchored not less than 6 inches in the walls of structure. Unless otherwise shown the spacing shall be 1'-5" on centers. The lowest step shall be not more than 2 feet above the invert. (Alhambra Fdy. A-3320 or Equal Approved by City.)
- 9 - RINGS, REDUCER, AND PIPE for access shaft shall be seated in cement mortar and neatly pointed or wiped inside shaft.
- 10 - STATIONS of manholes shown on improvement plan apply at intersection of center lines of main line and spur. Elevations shown at stations refer to prolonged invert grade lines.
- 11 - FLOOR of manhole shall be steel troweled to springing line.
- 12 - BODY of manhole, including spur, shall be poured in one continuous operation, except that the Contractor shall have the option of placing at the springing line a construction joint with longitudinal keyway.
- 13 - ELEVATION "S" applies at center of main line on prolongation of invert of spur.

TABLE OF BAR SIZES		
D ₂ or B	A & B bars	D or F bars
12"-39"	No. 5 at 3"	No. 4 at 6"
42"-84"	No. 6 at 3"	No. 5 at 6"
90"-144"	No. 7 at 3"	No. 6 at 6"



TABLE OF VALUES FOR F AND T			
D ₂	F	B	T
12"	4"	12"	4"
15"	4½"	15"	4½"
18"	4¾"	18"	4¾"
21"	5"	21"	5"
24"	5½"	24"	5½"
27"	5¾"	27"	5¾"
30"	6"	30"	6"
33"	6½"	33"	6½"
36"	6¾"	36"	6¾"
39"	7"	39"	7"
42"	7½"	42"	7½"
45"	7¾"	45"	7¾"
48"	8"	48"	8"
51"	8½"	51"	8½"
54"	9"	54"	9"
57"	9½"	57"	9½"
60"	9¾"	60"	9¾"
63"	10"	63"	10"
66"	10½"	66"	10½"
69"	10¾"	69"	10¾"
72"	11"	72"	11"
78"	11½"		
84"	12½"		
90"	13½"		
96"	14"		

CONCRETE SPECIFICATIONS	
F	CONCRETE CLASS
4" - 7"	560 - C - 3250
7½" - 9½"	560 - C - 3250
10" - 14"	560 - B - 3250

14 - COVER shall have letter D in center.

(ADAPTED FROM CITY OF LOS ANGELES STD. PLAN NO. B - 1528)

APPROVED *Robert C. White* DATE *7/14/78*
PUBLIC WORKS DIRECTOR - R.C.E. 18793

MARK	REVISIONS	APPR.	DATE
	defined approval	DZR	4-7-82
	Changed Riverside Fdy to Alhambra	<i>White</i>	7-7-82
	Added Table Of Bar Sizes	<i>White</i>	11-9-82
	Added Sheet 3.	<i>White</i>	1/27/84

CITY OF RIVERSIDE
PUBLIC WORKS DEPT. - ENGINEERING DIV.

MANHOLE JM

STANDARD DRAWING NO.

432

Sheet 2 of 3

STORM DRAIN MAIN								
		ANGLE	30	40	50	60	70	80
D/02		VALUE						
12	C	2.2	1.8	1.6	1.5	1.4	1.3	1.3
	E	1.9	1.5	1.2	1.0	0.8	0.6	0.6
15	C	2.5	2.0	1.8	1.6	1.5	1.5	1.5
	E	2.2	1.7	1.3	1.1	0.9	0.7	0.7
18	C	2.8	2.3	2.0	1.8	1.7	1.6	1.6
	E	2.4	1.8	1.4	1.1	0.9	0.7	0.7
21	C	3.1	2.5	2.2	2.0	1.9	1.8	1.8
	E	2.7	2.0	1.6	1.2	1.0	0.7	0.7
24	C	3.4	2.7	2.4	2.2	2.0	2.0	2.0
	E	3.0	2.2	1.7	1.3	1.0	0.8	0.8
27	C	3.7	3.0	2.6	2.3	2.2	2.1	2.1
	E	3.2	2.4	1.8	1.4	1.1	0.8	0.8
30	C	4.0	3.2	2.8	2.5	2.4	2.3	2.3
	E	3.5	2.6	2.0	1.5	1.1	0.8	0.8
33	C	4.3	3.4	3.0	2.7	2.5	2.4	2.4
	E	3.8	2.8	2.1	1.6	1.2	0.8	0.8
36	C	4.6	3.7	3.2	2.9	2.7	2.6	2.6
	E	4.0	2.9	2.2	1.7	1.2	0.9	0.9
39	C	4.9	3.9	3.4	3.0	2.9	2.7	2.7
	E	4.3	3.1	2.4	1.8	1.3	0.9	0.9
42	C	5.3	4.2	3.6	3.2	3.0	2.9	2.9
	E	4.6	3.3	2.5	1.9	1.4	0.9	0.9
45	C	5.5	4.4	3.8	3.4	3.2	3.1	3.1
	E	4.9	3.5	2.6	2.0	1.4	0.9	0.9
48	C	5.8	4.6	4.0	3.6	3.3	3.2	3.2
	E	5.1	3.7	2.7	2.0	1.5	1.0	1.0
51	C	6.2	4.9	4.2	3.8	3.5	3.4	3.4
	E	5.4	3.9	2.9	2.1	1.5	1.0	1.0
54	C	6.5	5.2	4.4	4.0	3.7	3.5	3.5
	E	5.7	4.1	3.0	2.2	1.6	1.0	1.0
57	C	6.8	5.4	4.6	4.1	3.8	3.7	3.7
	E	5.9	4.2	3.1	2.3	1.6	1.1	1.1
60	C	7.1	5.6	4.8	4.3	4.0	3.8	3.8
	E	6.2	4.4	3.3	2.4	1.7	1.1	1.1
63	C	7.4	5.9	5.0	4.5	4.2	4.0	4.0
	E	6.5	4.6	3.4	2.5	1.8	1.1	1.1
66	C	7.7	6.1	5.2	4.7	4.3	4.2	4.2
	E	6.7	4.8	3.5	2.6	1.8	1.1	1.1
69	C	8.0	6.4	5.4	4.9	4.5	4.3	4.3
	E	7.0	5.0	3.7	2.7	1.9	1.2	1.2
72	C	8.3	6.6	5.6	5.0	4.7	4.5	4.5
	E	7.3	5.2	3.8	2.8	1.9	1.2	1.2
75	C	8.6	6.8	5.8	5.2	4.8	4.6	4.6
	E	7.5	5.3	3.9	2.8	2.0	1.2	1.2
78	C	9.0	7.1	6.0	5.4	5.0	4.8	4.8
	E	7.8	5.5	4.0	2.9	2.0	1.2	1.2
81	C	9.3	7.3	6.2	5.6	5.2	4.9	4.9
	E	8.1	5.7	-4.2	3.0	2.1	1.3	1.3
84	C	9.6	7.6	6.4	5.7	5.3	5.1	5.1
	E	8.4	5.9	4.3	3.1	2.2	1.3	1.3
87	C	9.9	7.8	6.6	5.9	5.5	5.3	5.3
	E	8.6	6.1	4.4	3.2	2.2	1.3	1.3
90	C	10.2	8.1	6.8	6.1	5.7	5.4	5.4
	E	8.9	6.3	4.6	3.3	2.3	1.4	1.4
93	C	10.5	8.3	7.0	6.3	5.8	5.6	5.6
	E	9.2	6.5	4.7	3.4	2.3	1.4	1.4
96	C	10.8	8.5	7.2	6.5	6.0	5.7	5.7
	E	9.4	6.7	4.8	3.5	2.4	1.4	1.4

STORM DRAIN LATERAL								
		ANGLE	30	40	50	60	70	80
B		VALUE						
12	C	1.9	1.5	1.2	1.0	0.8	0.6	0.6
	E	2.2	1.8	1.6	1.5	1.4	1.3	1.3
15	C	2.2	1.7	1.3	1.1	0.9	0.7	0.7
	E	2.5	2.0	1.8	1.6	1.5	1.5	1.5
18	C	2.4	1.8	1.4	1.1	0.9	0.7	0.7
	E	2.8	2.3	2.0	1.8	1.7	1.6	1.6
21	C	2.7	2.0	1.6	1.2	1.0	0.7	0.7
	E	3.1	2.5	2.2	2.0	1.9	1.8	1.8
24	C	3.0	2.2	1.7	1.3	1.0	0.8	0.8
	E	3.4	2.7	2.4	2.2	2.0	2.0	2.0
27	C	3.2	2.4	1.8	1.4	1.1	0.8	0.8
	E	3.7	3.0	2.6	2.3	2.2	2.1	2.1
30	C	3.5	2.6	2.0	1.5	1.1	0.8	0.8
	E	4.0	3.2	2.8	2.5	2.4	2.3	2.3
33	C	3.8	2.8	2.1	1.6	1.2	0.8	0.8
	E	4.3	3.4	3.0	2.7	2.5	2.4	2.4
36	C	4.0	2.9	2.2	1.7	1.2	0.9	0.9
	E	4.6	3.7	3.2	2.9	2.7	2.6	2.6
39	C	4.3	3.1	2.4	1.8	1.3	0.9	0.9
	E	4.9	3.9	3.4	3.0	2.9	2.7	2.7
42	C	4.6	3.3	2.5	1.9	1.4	0.9	0.9
	E	5.3	4.2	3.6	3.2	3.0	2.9	2.9
45	C	4.9	3.5	2.6	2.0	1.4	0.9	0.9
	E	5.5	4.4	3.8	3.4	3.2	3.1	3.1
48	C	5.1	3.7	2.7	2.0	1.5	1.0	1.0
	E	5.8	4.6	4.0	3.6	3.3	3.2	3.2
51	C	5.4	3.9	2.9	2.1	1.5	1.0	1.0
	E	6.2	4.9	4.2	3.8	3.5	3.4	3.4
54	C	5.7	4.1	3.0	2.2	1.6	1.0	1.0
	E	6.5	5.2	4.4	4.0	3.7	3.5	3.5
57	C	5.9	4.2	3.1	2.3	1.6	1.1	1.1
	E	6.8	5.4	4.6	4.1	3.8	3.7	3.7
60	C	6.2	4.4	3.3	2.4	1.7	1.1	1.1
	E	7.1	5.6	4.8	4.3	4.0	3.8	3.8
63	C	6.5	4.6	3.4	2.5	1.8	1.1	1.1
	E	7.4	5.9	5.0	4.5	4.2	4.0	4.0
66	C	6.7	4.8	3.5	2.6	1.8	1.1	1.1
	E	7.7	6.1	5.2	4.7	4.3	4.2	4.2
69	C	7.0	5.0	3.7	2.7	1.9	1.2	1.2
	E	8.0	6.4	5.4	4.9	4.5	4.3	4.3
72	C	7.3	5.2	3.8	2.8	1.9	1.2	1.2
	E	8.3	6.6	5.6	5.0	4.7	4.5	4.5
75	C	7.5	5.3	3.9	2.8	2.0	1.2	1.2
	E	8.6	6.8	5.8	5.2	4.8	4.6	4.6
78	C	7.8	5.5	4.0	2.9	2.0	1.2	1.2
	E	9.0	7.1	6.0	5.4	5.0	4.8	4.8
81	C	8.1	5.7	4.2	3.0	2.1	1.3	1.3
	E	9.3	7.3	6.2	5.6	5.2	4.9	4.9
84	C	8.4	5.9	4.3	3.1	2.2	1.3	1.3
	E	9.6	7.6	6.4	5.7	5.3	5.1	5.1
87	C	8.6	6.1	4.4	3.2	2.2	1.3	1.3
	E	9.9	7.8	6.6	5.9	5.5	5.3	5.3

EXAMPLE:
Given:
D₂ = 60"
B = 39"
A = 50°
Find: C', E', & L'

SOLUTION:
1. Enter Storm Drain Main Table with Given D₂ & A. C_M = 4.8 ft. E_M = 3.3 ft.
2. Enter Storm Drain Lateral Table with Given B & A. C_L = 2.4 ft. E_L = 3.4 ft.
3. C' = C_M + C_L = 4.8 ft. + 2.4 ft. = 7.2 ft.
4. E' = E_M + E_L = 3.3 ft. + 3.4 ft. = 6.7 ft.
5. L' = E' + 1 ft. = 6.7 ft. + 1 ft. = 7.7 ft.

APPROVED	<i>Robert C. White</i>	DATE	12/27/84
PUBLIC WORKS DIRECTOR - R.C.E. 19793			
△ CORRECTED VALUES AND CHANGED EQUATION	Why	12-23-84	
MARK	REVISIONS	APPR.	DATE

CITY OF RIVERSIDE
PUBLIC WORKS DEPT. - ENGINEERING DIV.

MANHOLE JM

STANDARD DRAWING NO. 432
Sheet 1 of 3