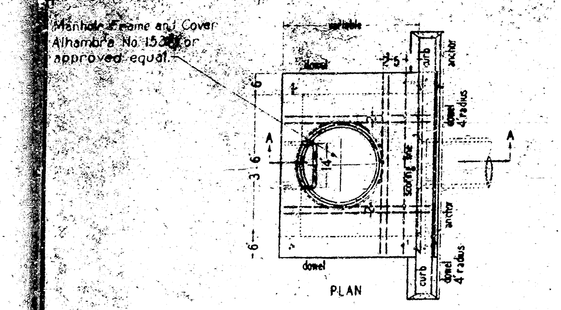
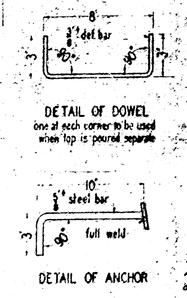
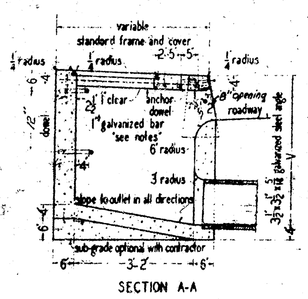
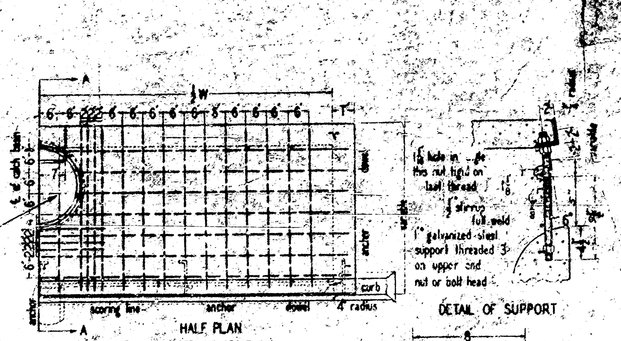
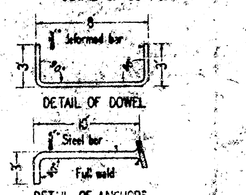






STEEL LIST	
⅝" deformed bars 3'-11" long	6
⅝" deformed bars 4'-4" long	5
3½"x3½"x¼ 4'-6" galvanized angle	1
1" plain galvanized bar 4'-2" long	See notes
¾" galvanized steps	See notes
Dowels see detail	4
Anchors see detail	2





STEEL LIST
All reinforcing ⅝" deformed bars

Size of opening	Bars 3'-0" long	Bars 4'-0" long	Bars 4'-6" long	Bars 21'-6" long	Bars 28'-6" long	Dowels	Anchors	Steps	Protection bar	Galvanized support	¾" galvanized steps at angle
14'	3	32	7	0	0	4	5	galvanized	1	1	15'-0"
21'	3	46	0	7	0	4	7	galvanized	2	2	22'-0"
28'	3	60	0	0	7	4	9	galvanized	3	3	29'-0"

GENERAL NOTES

CATCH BASINS

CONCRETE used in catch basins shall be in accordance with General Specifications of the City of San Bernardino.

CONNECTION pipes may be placed in any position around the walls provided they point in the proper direction and the position is otherwise consistent with the improvement plan.

CURVATURE of the lip and sidewalls at gutter opening shall be formed by curved forms and shall not be made by plastering.

FLOOR of basin shall be given a steel-troweled finish and shall slope from all directions to the outlet. For Type B catch basin slope of floor parallel with curb shall be 1 to 12 unless otherwise specified.

MANHOLE shall be placed along back wall near outlet.

OUTLET pipe shall be trimmed to the final shape and length before concrete is poured.

PROTECTION BAR: Horizontal plain round galvanized steel protection bar shall be used when curb face is 6 inches or more. Bar shall be embedded 5 inches at each end.

REINFORCING STEEL shall be ⅝-inch round deformed bars. Clearance shall be 1 inch from bottom of slab.

STEPS: ¾-inch plain round galvanized steel steps (12 inches apart) required when V is greater than 4 feet 6 inches. The top step shall be 6 inches below the surface and shall be 2½ inches from the wall. Only one step (12 inches from the bottom) if V is 4 feet 6 inches or less. No steps required if V is 3 feet 6 inches or less. Steps shall be anchored not less than 5 inches in wall of the basin.

SUPPORTS: 1 inch plain round galvanized steel supports shall be placed 7 feet apart. Stirrups shall be welded to supports when curb face is 15 inches or more.

SURFACE of all exposed concrete shall conform in slope, grade, color, finish, and scoring to existing or proposed curb and walk adjacent to the basin.

MANHOLES

CONCRETE as specified for Catch Basins.

CENTER OF MANHOLE SHAFT shall be located over center line of storm drain when diameter D₁ is 48" or less; in which case place E bars symmetrically around shaft at 45° with center line.

LENGTH L shall be 5'-6" unless shown otherwise on improvement plan. At option of Contractor L may be increased or location of manhole shifted to meet pipe ends.

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 - Center of Manhole Shaft.

THICKNESS OF DECK shall vary when necessary to provide level pipe seat, but shall not be less than tabular values for F shown on Manhole Plan.

REINFORCING STEEL shall be round, deformed bars, 1½" clear from face of concrete unless shown otherwise. Sizes and lengths are shown in table below.

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'-6" above the invert.

RINGS, REDUCER, AND PIPE for access shaft shall be seated in mortar and neatly pointed or wiped inside the shaft.

STATIONS of manholes shown on improvement plan apply at center of shaft. Elevations shown at stations refer to prolonged invert grade lines.

FLOOR of manhole shall be steel-troweled to springing line.

BODY of manhole 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 a longitudinal keyway.

STEEL TABLE FOR MANHOLES

Diam D₁	D bars No. Reqd.	D bars Size	D bars Length	E bars No. Reqd.	E bars Size	E bars Length	Diam D₂	F bars No. Reqd.	F bars Size	F bars Length	T bars No. Reqd.	T bars Size	T bars Length
36"	6	⅝" ø	3'-10"	4	½" ø	2'-9"	63"	6	½" ø	6'-0"	6	½" ø	6'-3"
39"	6	"	4'-2"	4	"	2'-11"	66"	6	"	7'-0"	8	"	6'-8"
42"	6	"	4'-6"	4	"	3'-2"	69"	6	"	7'-4"	8	"	6'-8"
45"	6	"	4'-10"	4	"	3'-5"	72"	6	"	7'-7"	8	"	6'-8"
48"	6	"	5'-1"	4	"	3'-7"	75"	6	"	8'-3"	8	"	6'-8"
51"	6	"	5'-5"	6	"	4'-9"	84"	6	"	8'-11"	10	"	6'-8"
54"	6	"	5'-9"	6	"	5'-1"	90"	6	½" ø	9'-6"	10	"	6'-8"
57"	6	"	6'-1"	6	"	5'-6"	96"	6	"	10'-1"	10	"	6'-8"
60"	6	"	6'-4"	6	"	5'-11"							

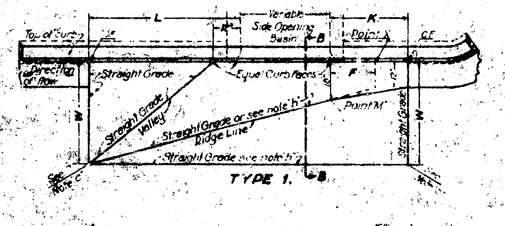
D bars shall be spaced 3" o.c. E bars shall be spaced 4" o.c. Tie bars shall be ½" ø, spaced 18" o.c. or closer.

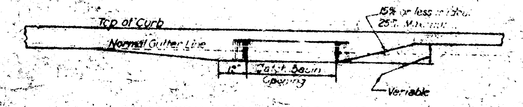
When L is greater than 5'-6" is specified on improvement plan, continue D bars at 6" o.c.

Lengths shown in table are for longest bars. Where shorter bars are required, bend or cut to meet field requirements.

CATCH BASIN "A"

DIMENSIONS: V = 3 feet 6 inches unless otherwise specified.





NOTES.

a - The Local Depression shall be curved in two planes 8 inches thick.

b - When specified in connection with a concrete base other than with integral curb, Local Depression shall be provided monolithic with said base.

c - Elevations at outer corners shown or given in plan in inches below or above the elevation of the top of the nearest curb. If no elevations are specified, the outer edge of Local Depression shall conform to finished street surface.

d - Stakes shall be set to grade lining the valley and along the ridge line (or the edge of actual depressed area). Stakes at points "M" and "N" shall be set on a straight grade between tops of end headers. If on a vertical curve see note h. These stakes shall not be removed until just before the final finishing.

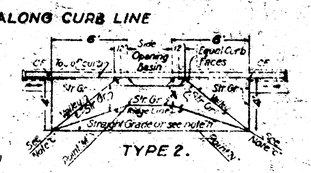
f - W = 4 feet unless otherwise specified.

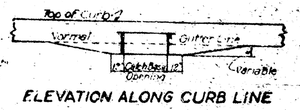
L = 6
K = 3
A = Area of Local Depression.
F = 3 feet when no curb face is shown at point "X" otherwise F = K.

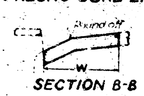
g - A curb face shown on the general plan less than K distance below basin shall be applied at point X with F = 3 feet.

h - Special details governing the construction of this Local Depression on vertical curve shown on general plan.

i - Indicated curb faces (C.F.) shown on general plans.



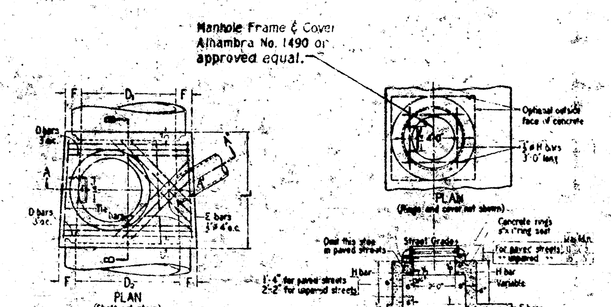




STANDARD LOCAL DEPRESSION FOR SIDE OPENING BASINS

CATCH BASIN "B"

DIMENSIONS:
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 more.
V = 4 feet unless otherwise specified.
W = 14 feet unless otherwise specified.



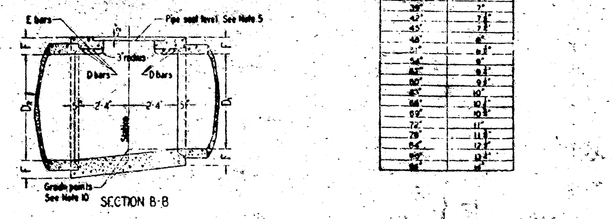


TABLE OF VALUES FOR F	
No.	F
36	6'-1"
39	6'-4"
42	6'-7"
45	7'-0"
48	7'-3"
51	8'-0"
54	8'-3"
57	8'-6"
60	8'-9"
63	9'-0"
66	9'-3"
69	9'-6"
72	9'-9"
75	10'-0"
78	10'-3"
81	10'-6"
84	10'-9"
87	11'-0"
90	11'-3"
93	11'-6"
96	11'-9"

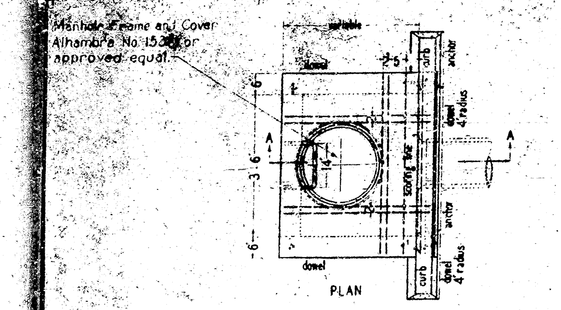
MANHOLE

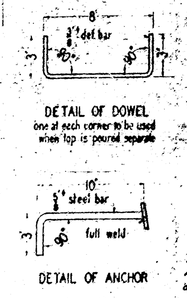
DEPARTMENT OF ENGINEERING
CITY OF SAN BERNARDINO

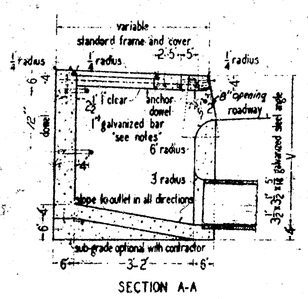
DETAIL OF STANDARD
STORM DRAIN STRUCTURES

SUBMITTED BY
APPROVED
Dec. 20 19
CITY

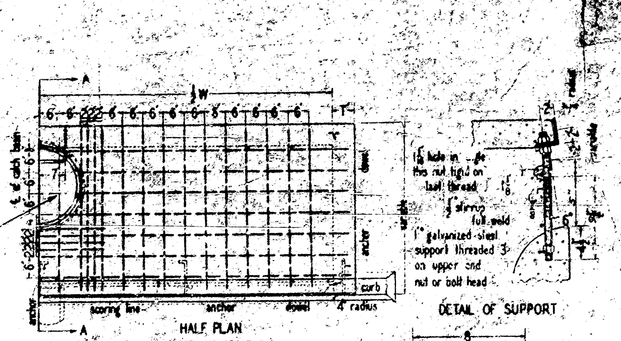
DRAWING NO.
419

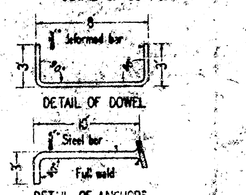






STEEL LIST	
⅝" deformed bars 3'-11" long	6
⅝" deformed bars 4'-4" long	5
3½"x3½"x¼ 4'-6" galvanized angle	1
1" plain galvanized bar 4'-2" long	See notes
¾" galvanized steps	See notes
Dowels see detail	4
Anchors see detail	2





STEEL LIST
All reinforcing ⅝" deformed bars

Size of opening	Bars 3'-0" long	Bars 4'-0" long	Bars 4'-6" long	Bars 21'-6" long	Bars 28'-6" long	Dowels	Anchors	Steps	Protection bar	Galvanized support	¾" galvanized steps at angle
14'	3	32	7	0	0	4	5	galvanized	1	1	15'-0"
21'	3	46	0	7	0	4	7	galvanized	2	2	22'-0"
28'	3	60	0	0	7	4	9	galvanized	3	3	29'-0"

GENERAL NOTES

CATCH BASINS

CONCRETE used in catch basins shall be in accordance with General Specifications of the City of San Bernardino.

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FLOOR of basin shall be given a steel-troweled finish and shall slope from all directions to the outlet. For Type B catch basin slope of floor parallel with curb shall be 1 to 12 unless otherwise specified.

MANHOLE shall be placed along back wall near outlet.

OUTLET pipe shall be trimmed to the final shape and length before concrete is poured.

PROTECTION BAR: Horizontal plain round galvanized steel protection bar shall be used when curb face is 6 inches or more. Bar shall be embedded 5 inches at each end.

REINFORCING STEEL shall be ⅝-inch round deformed bars. Clearance shall be 1 inch from bottom of slab.

STEPS: ¾-inch plain round galvanized steel steps (12 inches apart) required when V is greater than 4 feet 6 inches. The top step shall be 6 inches below the surface and shall be 2½ inches from the wall. Only one step (12 inches from the bottom) if V is 4 feet 6 inches or less. No steps required if V is 3 feet 6 inches or less. Steps shall be anchored not less than 5 inches in wall of the basin.

SUPPORTS: 1 inch plain round galvanized steel supports shall be placed 7 feet apart. Stirrups shall be welded to supports when curb face is 15 inches or more.

SURFACE of all exposed concrete shall conform in slope, grade, color, finish, and scoring to existing or proposed curb and walk adjacent to the basin.

MANHOLES

CONCRETE as specified for Catch Basins.

CENTER OF MANHOLE SHAFT shall be located over center line of storm drain when diameter D₁ is 48" or less; in which case place E bars symmetrically around shaft at 45° with center line.

LENGTH L shall be 5'-6" unless shown otherwise on improvement plan. At option of Contractor L may be increased or location of manhole shifted to meet pipe ends.

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 - Center of Manhole Shaft.

THICKNESS OF DECK shall vary when necessary to provide level pipe seat, but shall not be less than tabular values for F shown on Manhole Plan.

REINFORCING STEEL shall be round, deformed bars, 1½" clear from face of concrete unless shown otherwise. Sizes and lengths are shown in table below.

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'-6" above the invert.

RINGS, REDUCER, AND PIPE for access shaft shall be seated in mortar and neatly pointed or wiped inside the shaft.

STATIONS of manholes shown on improvement plan apply at center of shaft. Elevations shown at stations refer to prolonged invert grade lines.

FLOOR of manhole shall be steel-troweled to springing line.

BODY of manhole 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 a longitudinal keyway.

STEEL TABLE FOR MANHOLES

Diam D₁	D bars No. Reqd.	D bars Size	D bars Length	E bars No. Reqd.	E bars Size	E bars Length	Diam D₂	F bars No. Reqd.	F bars Size	F bars Length	T bars No. Reqd.	T bars Size	T bars Length
36"	6	⅝" ø	3'-10"	4	½" ø	2'-9"	63"	6	½" ø	6'-0"	6	½" ø	6'-3"
39"	6	"	4'-2"	4	"	2'-11"	66"	6	"	7'-0"	8	"	6'-8"
42"	6	"	4'-6"	4	"	3'-2"	69"	6	"	7'-4"	8	"	6'-8"
45"	6	"	4'-10"	4	"	3'-5"	72"	6	"	7'-7"	8	"	6'-8"
48"	6	"	5'-1"	4	"	3'-7"	75"	6	"	8'-3"	8	"	6'-8"
51"	6	"	5'-5"	6	"	4'-9"	84"	6	"	8'-11"	10	"	6'-8"
54"	6	"	5'-9"	6	"	5'-1"	90"	6	½" ø	9'-6"	10	"	6'-8"
57"	6	"	6'-1"	6	"	5'-6"	96"	6	"	10'-1"	10	"	6'-8"
60"	6	"	6'-4"	6	"	5'-11"							

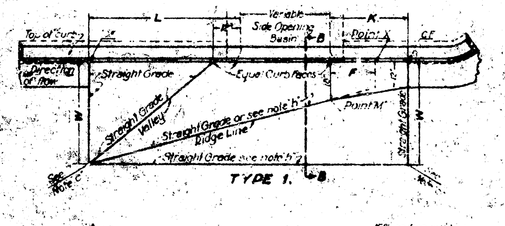
D bars shall be spaced 3" o.c. E bars shall be spaced 4" o.c. Tie bars shall be ½" ø, spaced 18" o.c. or closer.

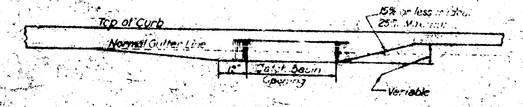
When L is greater than 5'-6" is specified on improvement plan, continue D bars at 6" o.c.

Lengths shown in table are for longest bars. Where shorter bars are required, bend or cut to meet field requirements.

CATCH BASIN "A"

DIMENSIONS: V = 3 feet 6 inches unless otherwise specified.





NOTES.

a - The Local Depression shall be curved in two planes 8 inches thick.

b - When specified in connection with a concrete base other than with integral curb, Local Depression shall be provided monolithic with said base.

c - Elevations at outer corners shown or given in plan in inches below or above the elevation of the top of the nearest curb. If no elevations are specified, the outer edge of Local Depression shall conform to finished street surface.

d - Stakes shall be set to grade lining the valley and along the ridge line (or the edge of actual depressed area). Stakes at points "M" and "N" shall be set on a straight grade between tops of end headers. If on a vertical curve see note h. These stakes shall not be removed until just before the final finishing.

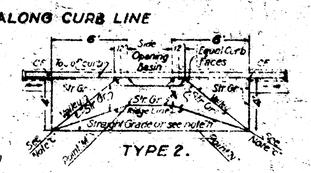
f - W = 4 feet unless otherwise specified.

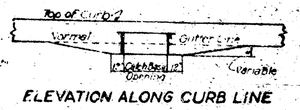
L = 6
K = 3
A = Area of Local Depression.
F = 3 feet when no curb face is shown at point "X" otherwise F = K.

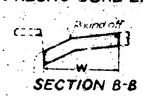
g - A curb face shown on the general plan less than K distance below basin shall be applied at point X with F = 3 feet.

h - Special details governing the construction of this Local Depression on vertical curve shown on general plan.

i - Indicated curb faces (C.F.) shown on general plans.



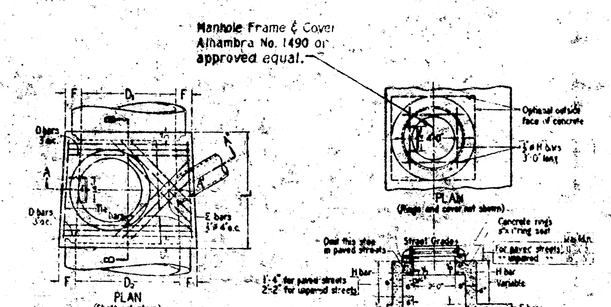




STANDARD LOCAL DEPRESSION FOR SIDE OPENING BASINS

CATCH BASIN "B"

DIMENSIONS:
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 more.
V = 4 feet unless otherwise specified.
W = 14 feet unless otherwise specified.



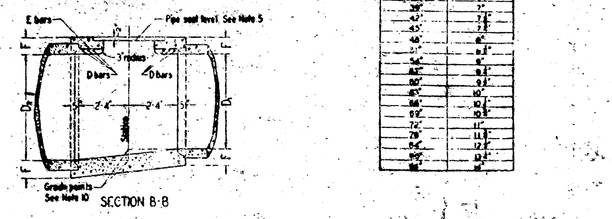


TABLE OF VALUES FOR F	
No.	F
36	6'-1"
39	6'-4"
42	6'-7"
45	7'-0"
48	7'-3"
51	8'-0"
54	8'-3"
57	8'-6"
60	8'-9"
63	9'-0"
66	9'-3"
69	9'-6"
72	9'-9"
75	10'-0"
78	10'-3"
81	10'-6"
84	10'-9"
87	11'-0"
90	11'-3"
93	11'-6"
96	11'-9"

MANHOLE

DEPARTMENT OF ENGINEERING
CITY OF SAN BERNARDINO

DETAIL OF STANDARD
STORM DRAIN STRUCTURES

SUBMITTED BY
APPROVED
Dec. 20 19
CITY

DRAWING NO.
419