COUNTY OF SAN DIEGO

Regional Standards Drawings
March 1976

Chris:
Chuck:
Elmer: SHO
John: R
Dan:
Jack: JAR

COUNTY OF SAN DIEGO

PUBLIC WORKS AGENCY

INTRA-AGENCY MEMO

DATE 3-4-76

TO: Development Engr. & Review Staff

FROM: Al Krier

SUBJECT: New Regional Standard Drawings

The new Regional Standard Drawings have been distributed. For those projects already in the design stage, we will not impose any new standards; they can follow the old ones. However, we may want to encourage the engineer to use certain new standards which are beneficial to all concerned.

In determining whether new standard Drawings should be used on a project, the following will apply:

If the project has not received final approval by the Planning commission, the new standards will apply; if a project has already, as of this date, received final approval by the Plan. Comm. then the old standards can be used.

FORM PWA24 (9/70-0S5)

COUNTY OF SAN DIEGO
CALIFORNIA
COUNTY ENGINEER DEPARTMENT

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Traffic Signals and Safety Lighting

For general information on traffic standards used by the County Engineer, refer to the following Department of Transportation (State of California) "Division of Highways" Standard Plans:

ES-1A	Traffic	Signal	&	Highway	Lighting	Installations
ES-1B	"	"	"	"	"	"
ES-2A-10	"	"	"	"	"	"
ES-2B-6	"	"	"	"	"	"
ES-3A-6	"	"	"	"	"	"
ES-3B-18	"	"	"	"	"	"
ES-3C	"	"	"	"	"	"
ES-6B-2	"	"	"	Lighting	Standards	"
ES-6C-2	"	"	"	"	"	"

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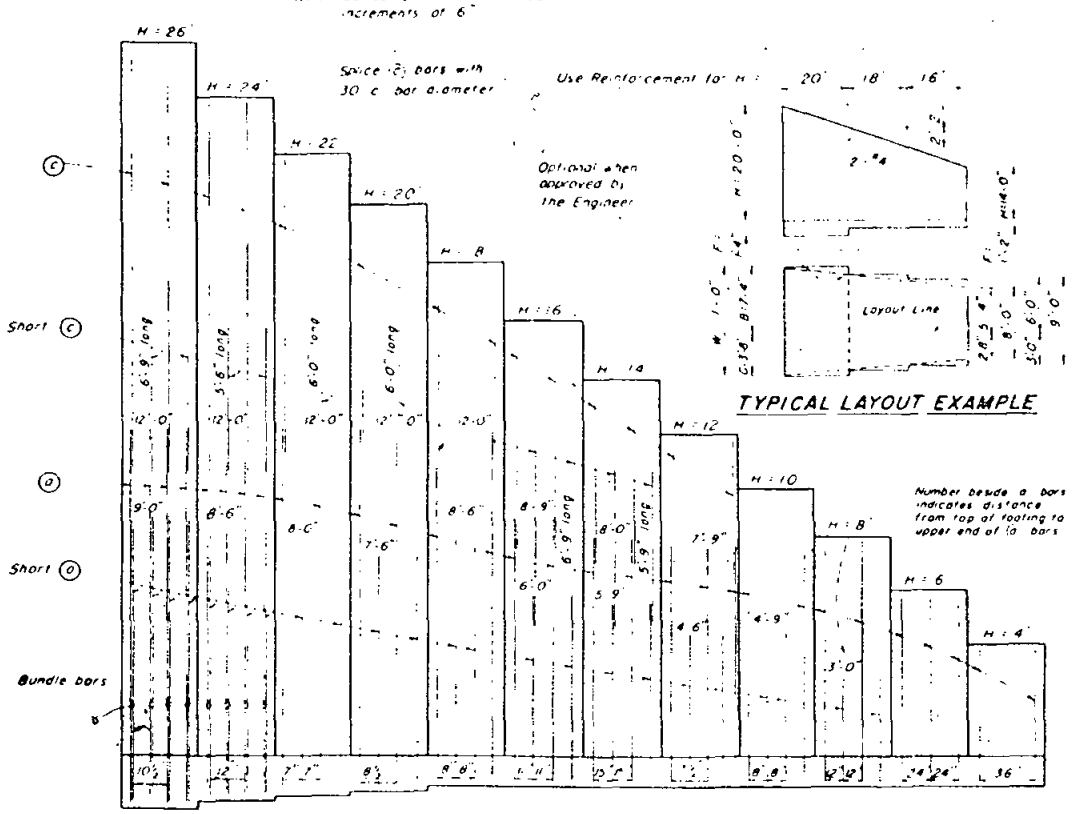
REVISIONS				APPROVALS		
DESCRIPTION	BY	APPROVED	DATE	COUNTY ENGINEER	H. M. Taylor	11/18/70

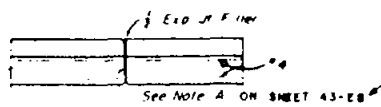
Note: Bar cut-offs may be varied in increments of 6"



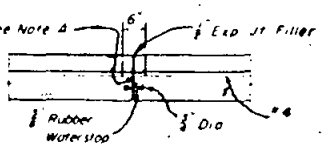
ELEVATION

TABLE OF REINFORCING STEEL DIMENSIONS AND DATA

H	26'	24'	22'	20'	18'	16'	14'	12'	10'	8'	6'	4'
W	14'-3"	13'-3"	12'-0"	11'-0"	10'-0"	9'-0"	8'-0"	7'-2"	6'-2"	5'-2"	4'-2"	3'-2"
C	4'-9"	4'-5"	4'-0"	3'-8"	3'-4"	3'-0"	2'-8"	2'-4"	2'-0"	1'-8"	1'-4"	1'-0"
B	9'-6"	8'-10"	8'-0"	7'-4"	6'-8"	6'-0"	5'-4"	4'-10"	4'-2"	3'-6"	2'-10"	2'-2"
F Spread Ftg	1'-10"	1'-8"	1'-6"	1'-4"	1'-2"	1'-2"	1'-2"	1'-2"	1'-2"	1'-2"	1'-2"	1'-2"
E Concrete Pile	2'-1"	1'-11"	1'-9"	1'-7"	1'-5"	1'-5"	1'-5"	1'-5"	1'-5"	1'-5"	1'-5"	1'-5"
G Steel or Timber Pile	2'-4"	2'-2"	2'-0"	1'-10"	1'-8"	1'-8"	1'-8"	1'-8"	1'-8"	1'-8"	1'-8"	1'-8"
S	2'-4"	2'-3"	1'-11"	1'-10"	1'-9"	1'-8"	1'-7"	1'-6"	1'-5"	1'-4"	1'-3"	1'-2"
(c) bars	#8 @ 10½	#8 @ 12	#7 @ 14	#7 @ 17	#6 @ 24	#5 @ 11	#5 @ 15	#5 @ 30				
(d) bars	#11 @ 10½	#11 @ 12	#11 @ 7	#11 @ 8½	#10 @ 8	#10 @ 11	#10 @ 15	#6 @ 7½	#5 @ 8	#5 @ 12	#5 @ 24	#5 @ 36
(b) bars	#10 @ 10½	#10 @ 12	#10 @ 7	#10 @ 8½	#9 @ 8	#9 @ 11	#9 @ 15	#5 @ 7½	#4 @ 8	#4 @ 12	#5 @ 24	#5 @ 36
(d) bars, number-size	2 - #7	2 - #7	4 - #7	4 - #7	4 - #7	6 - #7	6 - #7	6 - #7	6 - #7			
(e) bars, number-size	4 - #7	4 - #7	8 - #7	8 - #7	8 - #7	10 - #7	10 - #7	10 - #7	10 - #7	6 - #6	6 - #6	6 - #6
Toe Pressure PSF	5040	4640	4480	4000	3590	3290	2980	2640	2270	1930	1570	1240
Spread Ftg Conc	Conc C/ft	71.8	63.1	52.1	45.0	38.5	33.8	29.5	24.3	20.2	16.3	12.6	8.9
Spread Ftg Steel	Steel lb/ft	393	308	309	233	177	123	90	56	47	28	20	14
Conc pile ftg	Conc C/ft	73.4	64.4	53.1	45.8	39.0	34.1	29.5	25.2	20.8	16.7	12.8	8.8
pile ftg	Steel lb/ft	413	348	339	262	205	160	126	92	82	39	31	24



PLAN OF WALL WITH EXPANSION JOINT ONLY

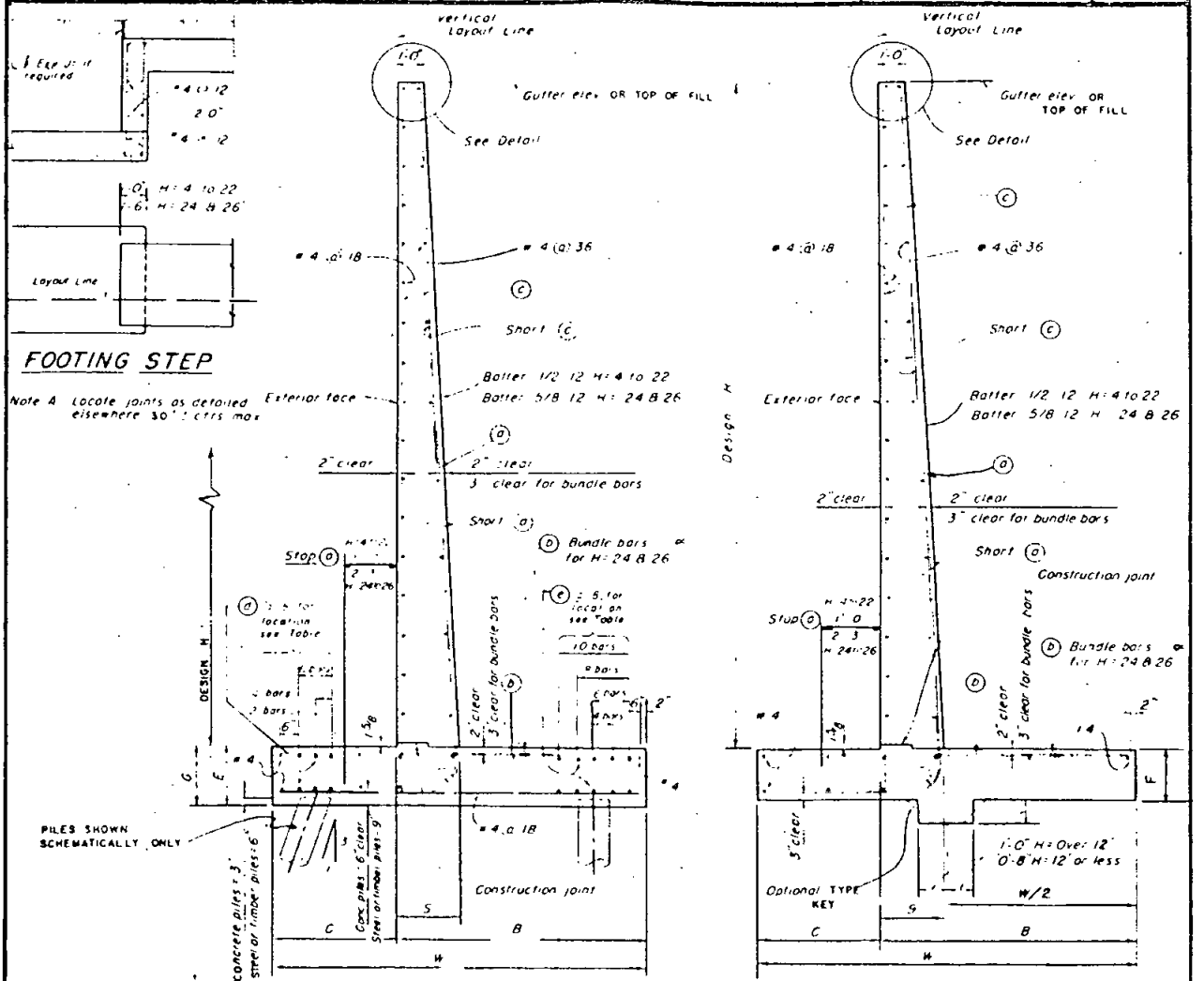


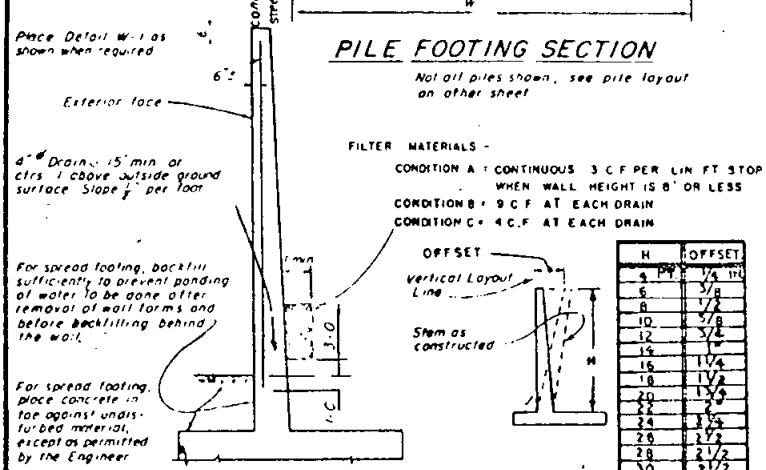
PLAN OF WALL WITH DETAIL W-1

SPECIFICATION REFERENCE	COUNTY OF SAN DIEGO STANDARD DRAWING CANTILEVER RETAINING WALL TYPE 1A ELEVATION SEE SHEET C-52 FOR GENERAL NOTES SEE DWG. NO. C-43 FOR SECTIONS	SCALE NONE DRAWING NO. C-42

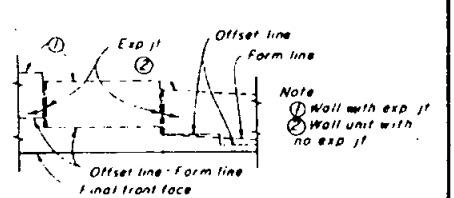
11-21-72

REVISIONS				APPROVALS		
DESCRIPTION	BY	APPROVED	DATE	COUNTY ENGINEER	[signature]	4/10/72





H	OFFSET
4 PT	1/4 IN
6	3/8
8	1/2
10	5/8
12	3/4
14	1"
16	1 1/4
18	1 1/2
20	1 3/4
22	2"
24	2 1/4
26	2 1/2
28	2 1/2
30	2 1/2



DRAINAGE

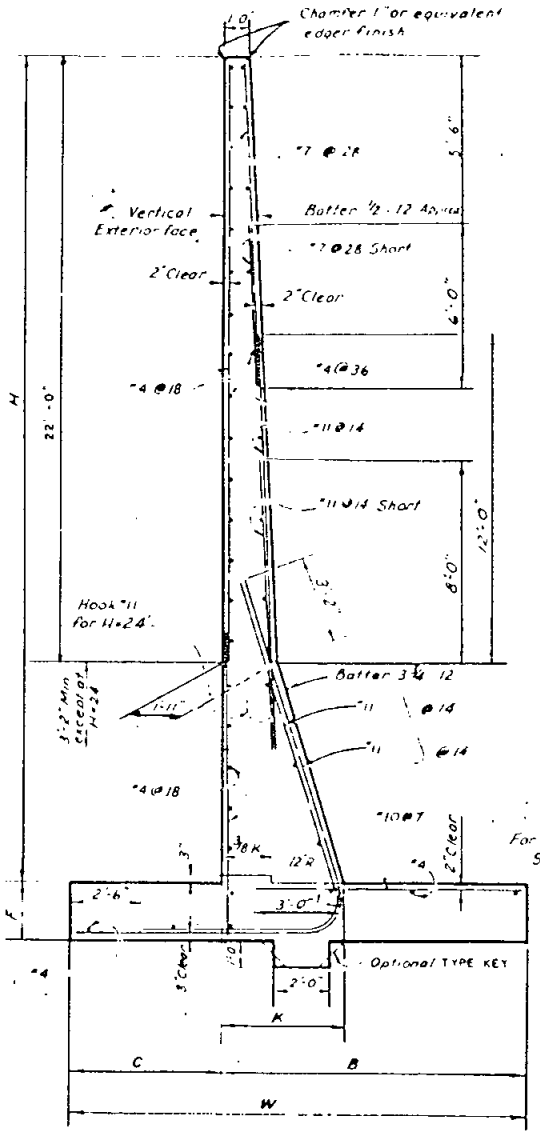
OFFSET VALUES

PLAN OF OFFSET LAYOUT

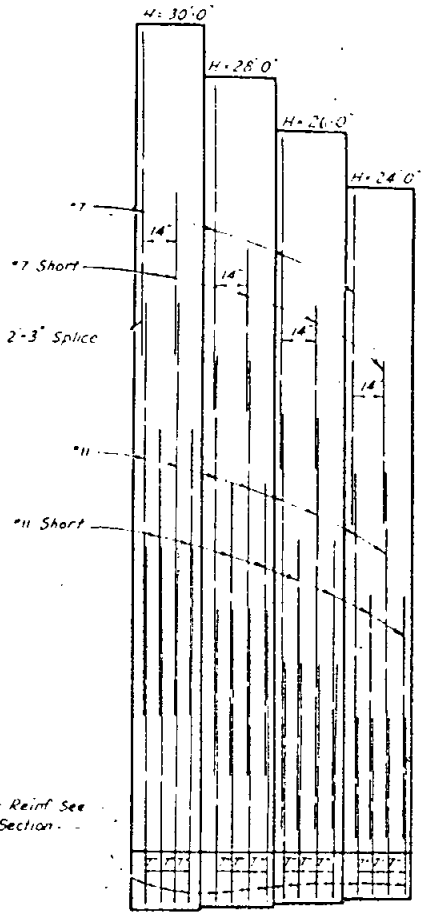
WALL OFFSET

SPECIFICATION REFERENCE	COUNTY OF SAN DIEGO STANDARD DRAWING	SCALE NONE
	CANTILEVER RETAINING WALL	DRAWING NO.
	TYPE IA SECTIONS	C-43
	SEE DWG. NO. C-42 FOR ELEVATION	
	SEE DWG. C-52 FOR GENERAL NOTES	

REVISIONS				APPROVALS		
DESCRIPTION	BY	APPROVED	DATE	COUNTY ENGINEER	H.M. Taylor	11/10/72



SECTION

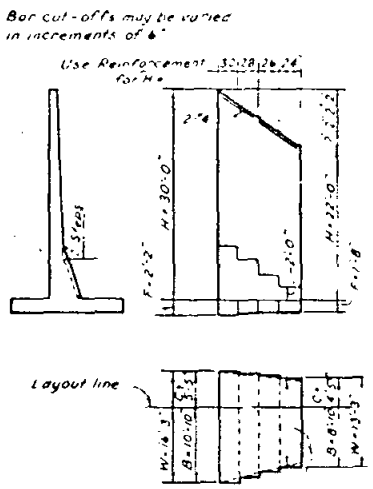


ELEVATION

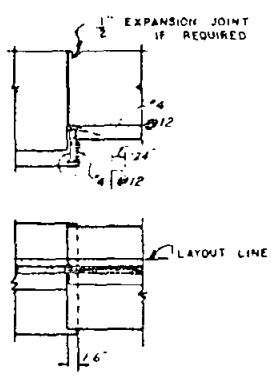
TABLE OF DATA AND REINFORCEMENT				
H	30'	28'	26'	24'
W	16'-3"	15'-3"	14'-3"	13'-3"
C	5'-5"	5'-1"	4'-9"	4'-5"
B	10'-10"	10'-2"	9'-6"	8'-10"
F	2'-2"	2'-0"	1'-10"	1'-8"
K	4'-5"	3'-9½"	3'-2"	2'-6½"
Conc CF/Fr	94.7	81.7	70.4	60.7
Reinf Lbs/Fr	44.4	40.8	37.9	34.8
Tot Pres Lbs	5790	5440	5040	4650
H Comp lbs	20100	18360	15950	13730
V Comp lbs	48330	42440	36870	31750
e ft	2.56	2.43	2.25	2.08

SPECIFICATION REFERENCE	COUNTY OF SAN DIEGO STANDARD DRAWING	
	CANTILEVER RETAINING WALL TYPE 2 ELEVATION & SECTION SEE DWG. NO. C-45 FOR CONSTRUCTION DETAILS SEE SHEET C-52 FOR GENERAL NOTES	SCALE NONE DRAWING NO. C-44

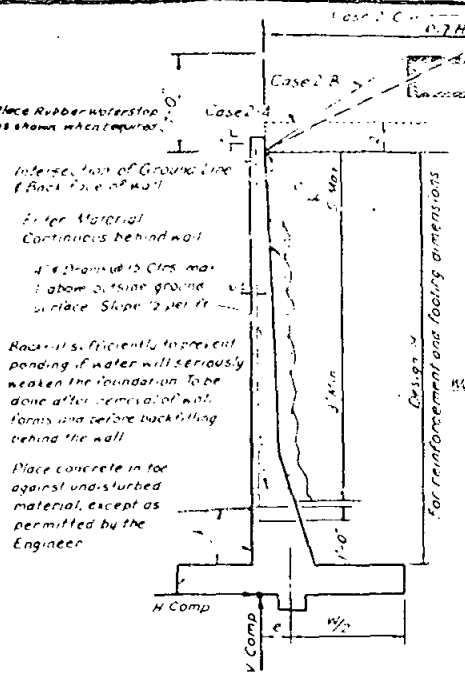
REVISIONS				APPROVALS		
DESCRIPTION	BY	APPROVED	DATE	COUNTY ENGINEER	H. M. Taylor	11/10/72



TYPICAL LAYOUT EXAMPLE



FOOTING STEP



DESIGN AND DRAINAGE

ALTERNATIVE TOP OF WALL

Wall to be used for Loading Cases Shown

2-A 2 Level Surcharge

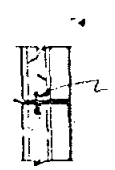
2-B 1½ 1 Slope terminating as shown Surcharge Loading shall be either a part of the 7'-0" dimension or terminate at a distance of 0.7H from the backface of wall as shown

2-C 2 1 Slope Unlimited

Loading Notes

Surcharge is a load which replaces a live load or dead load with an equivalent weight of earth

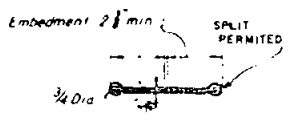
For an H20 S16 44 truck live load use a 2-Level Surcharge



½" Chamfer on exposed face

½" Expansion joint fill with expansion joint filler. Joint to extend from top of footing to top of wall. Locate joints AT 30'± Ctrs MAX OR AS SHOWN ON APPROVED PLANS.

PLAN OF EXPANSION JOINT

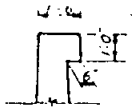


RUBBER WATERSTOP

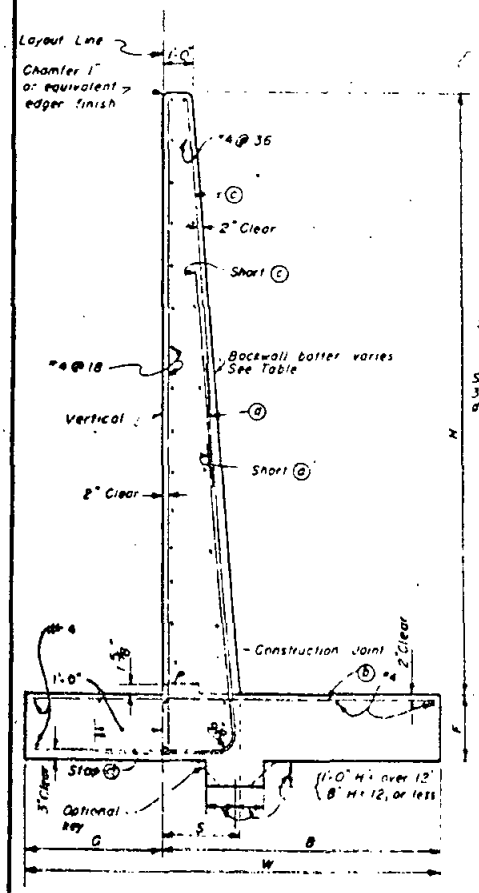
Use only when watertight joint is required

SPECIFICATION REFERENCE	COUNTY OF SAN DIEGO STANDARD DRAWING	
	CANTILEVER RETAINING WALL	SCALE NONE
	TYPE 2 CONSTRUCTION DETAILS	DRAWING NO.
	SEE DWG. NO. C-44 FOR ELEVATION & SECTION	C-45
	SEE SHEET C-52 FOR GENERAL NOTES	

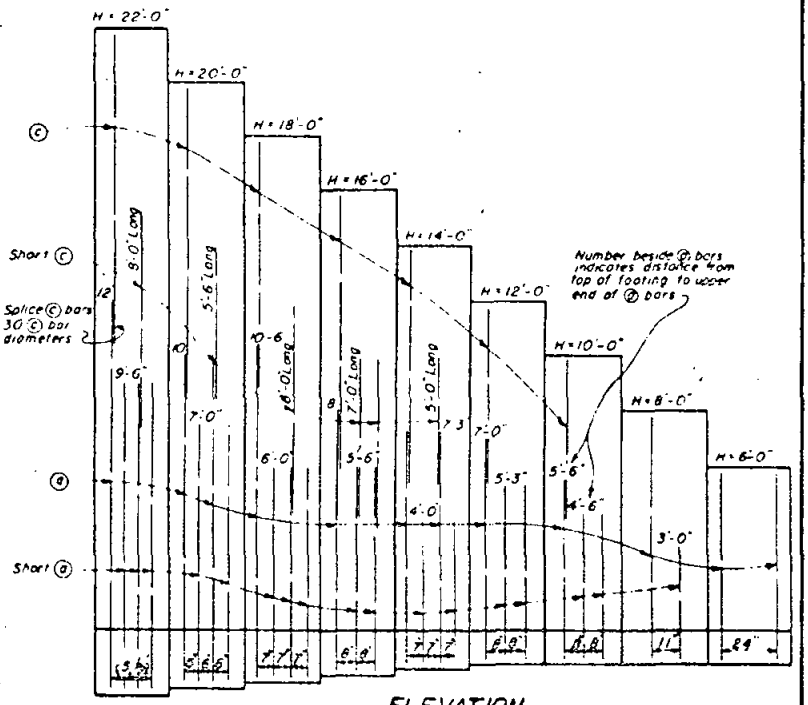
REVISIONS				APPROVALS		
DESCRIPTION	BY	APPROVED	DATE	COUNTY ENGINEER	H. M. Taylor	11/10/72



ALTERNATIVE TOP OF WALL



SECTION

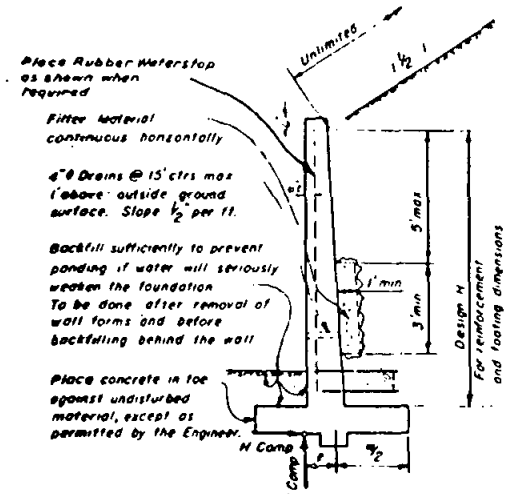


ELEVATION

TABLE OF REINFORCING STEEL DIMENSIONS AND DATA									
H	22	20	18	16	14	12	10	8	6
W	14'-10"	13'-0"	11'-4"	10'-1"	8'-10"	7'-7"	6'-4"	5'-1"	3'-10"
C	5'-8"	4'-8"	3'-10"	3'-5"	3'-0"	2'-7"	2'-2"	1'-9"	1'-4"
B	9'-2"	8'-4"	7'-6"	6'-8"	5'-10"	5'-0"	4'-2"	3'-4"	2'-6"
F	2'-4"	2'-1"	1'-10"	1'-7"	1'-4"	1'-2"	1'-2"	1'-2"	1'-2"
S	2'-7 1/4"	2'-3"	1'-11 1/4"	1'-8"	1'-7"	1'-6"	1'-5"	1'-4"	1'-3"
BW Batter	7/8 12	3/4 12	5/8 12	1/2 12	1/2 12	1/2 12	1/2 12	1/2 12	1/2 12
"c" Bars	#8 @ 11	#8 @ 12	#8 @ 14	#6 @ 8	#6 @ 14	#5 @ 24	#5 @ 24		
"a" Bars	#11 @ 5 1/2	#11 @ 6	#11 @ 7	#11 @ 8	#9 @ 7	#8 @ 8	#6 @ 8	#5 @ 11	#5 @ 24
"b" Bars	#11 @ 5 1/2	#11 @ 6	#11 @ 7	#11 @ 8	#9 @ 7	#8 @ 8	#6 @ 8	#5 @ 11	#5 @ 24
Conc Cu/Ft	76.3	61.6	49.2	39.3	31.9	24.8	20.4	16.2	12.2
Steel lbs/Ft	45.4	34.9	27.3	21.1	13.9	9.4	5.4	3.2	2.1
Toe Press	6980	6570	6390	5660	4970	4150	3570	2960	2330
H Comp lbs	37400	30600	24250	18900	14450	10470	7360	4900	2780
V Comp lbs	58780	48450	38390	29910	23030	16790	11900	7870	4670
e	1.84	1.87	1.78	1.55	1.33	1.10	.94	.77	.59
Coefficient of friction = 0.63									

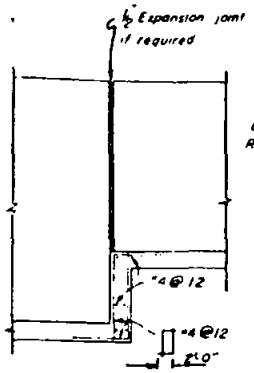
SPECIFICATION REFERENCE	COUNTY OF SAN DIEGO STANDARD DRAWING	SCALE NONE
	CANTILEVER RETAINING WALL TYPE 3 ELEVATION & SECTION SEE DWG. NO. C-47 FOR CONSTRUCTION DETAILS SEE SHEET C-52 FOR GENERAL NOTES	DRAWING NO. C-46

REVISIONS				APPROVALS		
DESCRIPTION	BY	APPROVED	DATE	COUNTY ENGINEER	H.M. Taylor	10/21/72

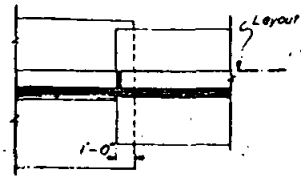


DESIGN AND DRAINAGE

Wall to be used for 1½ 1 Unlimited Sloping Surcharge

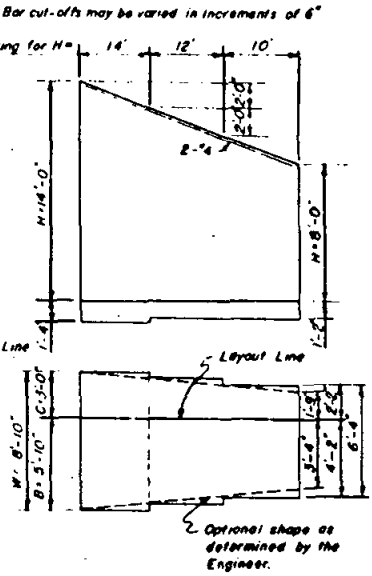


ELEVATION

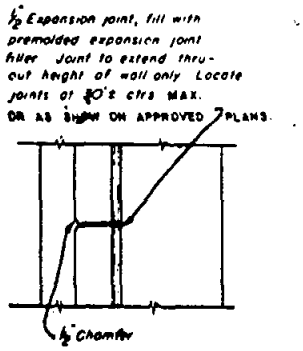


PLAN

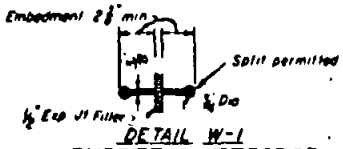
FOOTING STEPS



TYPICAL LAYOUT EXAMPLE



PLAN OF EXPANSION JOINT



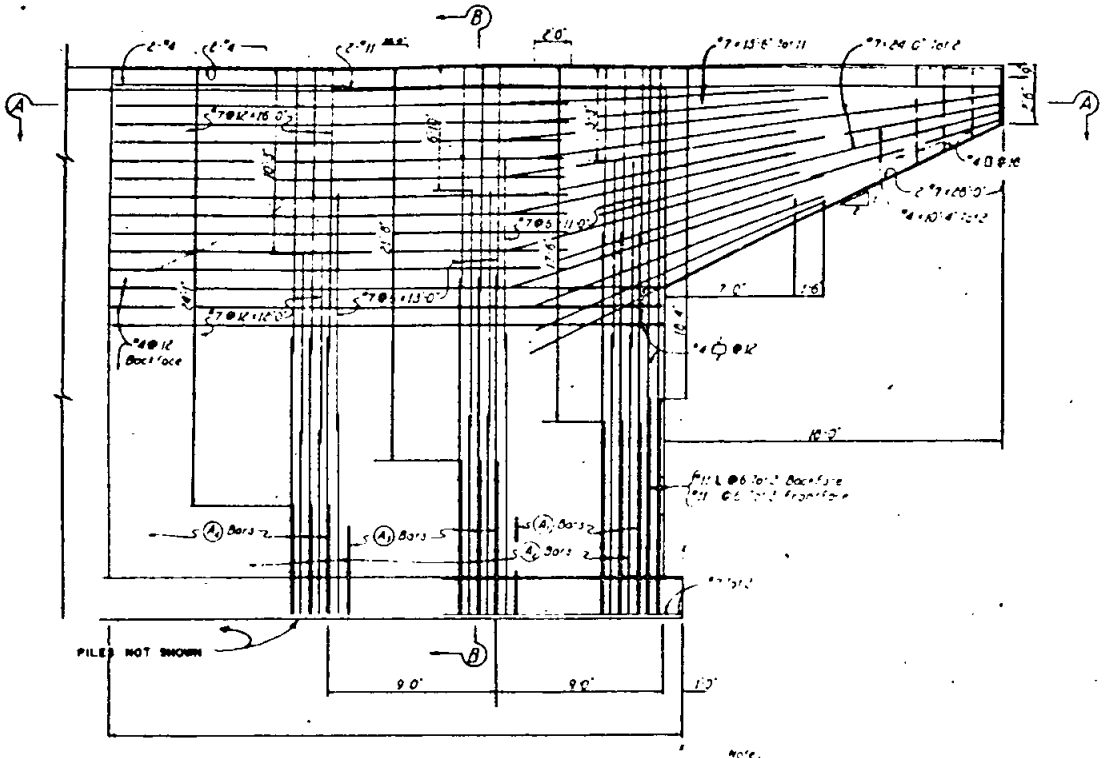
DETAIL W-1

RUBBER WATERSTOP

Use only when watertight joint is required

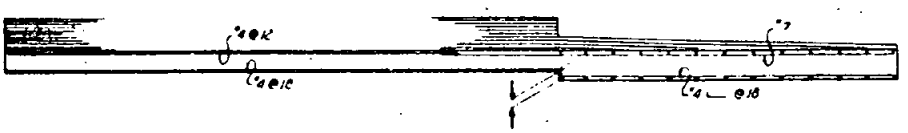
SPECIFICATION REFERENCE	COUNTY OF SAN DIEGO STANDARD DRAWING CANTILEVER RETAINING WALL TYPE 3 CONSTRUCTION DETAILS SEE DWG. NO. C-46 FOR ELEVATION & SECTIONS SEE SHEET C-52 FOR GENERAL NOTES	SCALE NONE DRAWING NO. C-47

REVISIONS				APPROVALS		
DESCRIPTION	BY	APPROVED	DATE	COUNTY ENGINEER	H.M. Taylor	[illegible]



ELEVATION

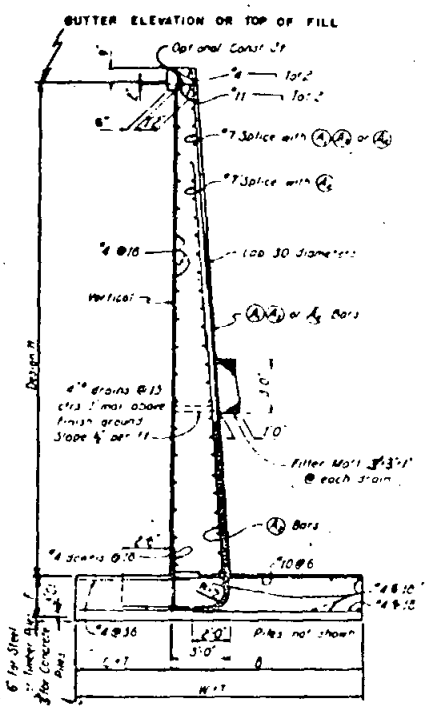
Note:
All bars to be lapped
20 diameters except as noted



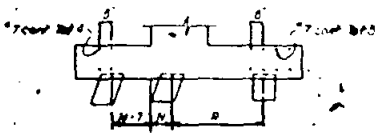
SECTION A-A

SPECIFICATION REFERENCE	COUNTY OF SAN DIEGO STANDARD DRAWING	
	WING WALL DETAILS FOR CANTILEVER WALLS – ELEVATION SEE DWG. NO. C-49 FOR SECTIONS SEE SHEET C-52 FOR GENERAL NOTES	SCALE NONE DRAWING NO. C-48

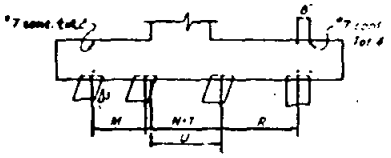
REVISIONS				APPROVALS		
DESCRIPTION	BY	APPROVED	DATE	COUNTY ENGINEER	H. M. Taylor	11/8/72



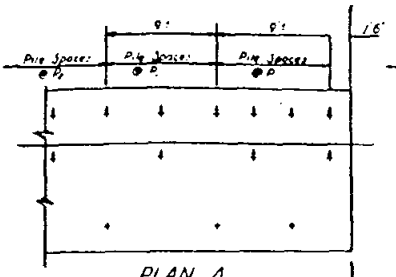
SECTION B-B



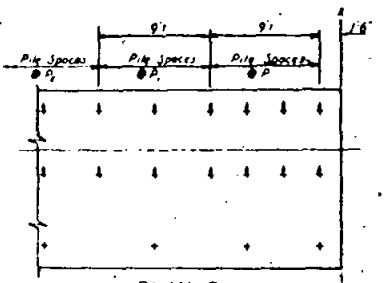
TYPICAL FOR PLANS A & B



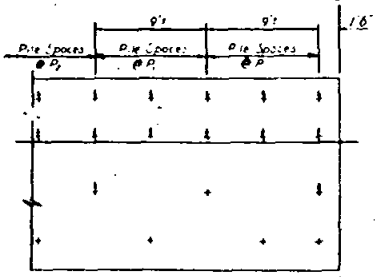
TYPICAL FOR PLAN C



PLAN A



PLAN B



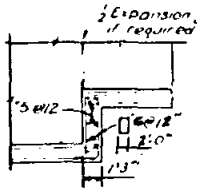
PLAN C

H	20		22		24		26		28	
W	10'-6"		12'0"		13'5"		14'3"		15'5"	
B	7'0"		8'0"		8'10"		9'6"		10'2"	
C	3'6"		4'0"		4'5"		4'9"		5'1"	
T	1'10"		2'0"		2'1"		2'3"		2'5"	
M	2'0"		2'2"		3'0"		3'6"		4'0"	
U					3'1"		4'2"		4'1"	
N	3'0"		3'0"		3'6"		3'9"		3'8"	
R	4'6"		4'11"		5'6"		5'7"		5'9"	
Wall Batter	¾:12		¾:12		⅞:12		⅞:12		⅞:12	
A_1 Bars	1-#11@12		2-#11@12 bundle		2-#11@12 bundle		2-#11@12 bundle		2-#11@12 bundle	
A_2 Bars	1-#11@12		1-#11@12		1-#11@12		1-#11@12		1-#11@12	
A_3 Bars	1-#11@12		1-#11@12		1-#11@12		2-#11@12 bundle		2-#11@12 bundle	
A_4 Bars	1-#11@12		1-#11@12		1-#11@12		1-#11@12		2-#11@12 bundle	
Pile Load Kips	64	90	64	90	64	90	64	90	64	90
P max	3'0"	4'9"	3'0"	3'3"	3'0"	4'3"	3'0"	3'7"	3'0"	3'10"
P_1 max	3'9"	5'3"	3'6"	4'1"	4'3"	6'0"	4'0"	4'8"	3'6"	4'7"
P_2 max	4'3"	6'0"	4'2"	3'7"	4'10"	6'6"	4'3"	5'8"	3'9"	5'3"
T	0	0	6"	0	6"	0	6"	0	6"	0
Plan	A	A	B	A	C	C	C	C	C	C

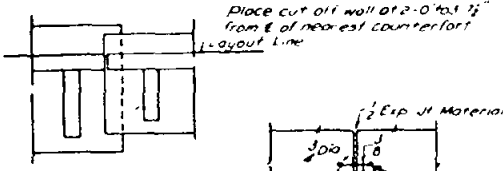
SHEETS C-48 AND C-49 ARE FOR DESIGN REFERENCE ONLY. ALL WING WALL DETAILS AND INTERPRETATIONS THEREOF SHALL BE SUBJECT TO APPROVAL BY THE ENGINEER.

SPECIFICATION REFERENCE	COUNTY OF SAN DIEGO STANDARD DRAWING	
	WING WALL DETAILS FOR	SCALE NONE
	CANTILEVER WALLS – SECTIONS	DRAWING NO.
	SEE DWG. NO. C-48 FOR ELEVATION	C-49
	SEE SHEET C-52 FOR GENERAL NOTES	

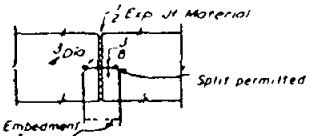
REVISIONS				APPROVALS		
DESCRIPTION	BY	APPROVED	DATE	COUNTY ENGINEER	H. M. Taylor	11/6/72



SIDE ELEVATION

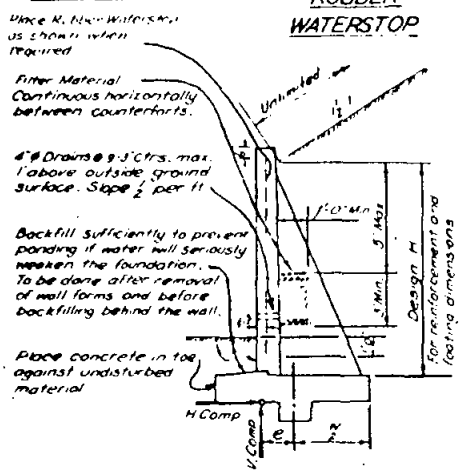


PLAN



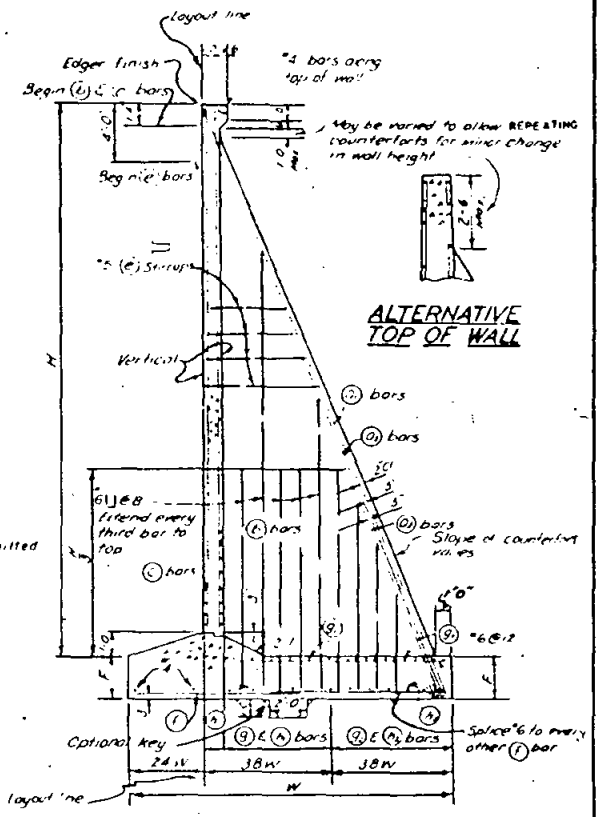
FOOTING STEP

RUBBER WATERSTOP



DESIGN AND DRAINAGE

Wall to be used for the unlimited Sloping Surcharge



ALTERNATIVE TOP OF WALL

SECTION

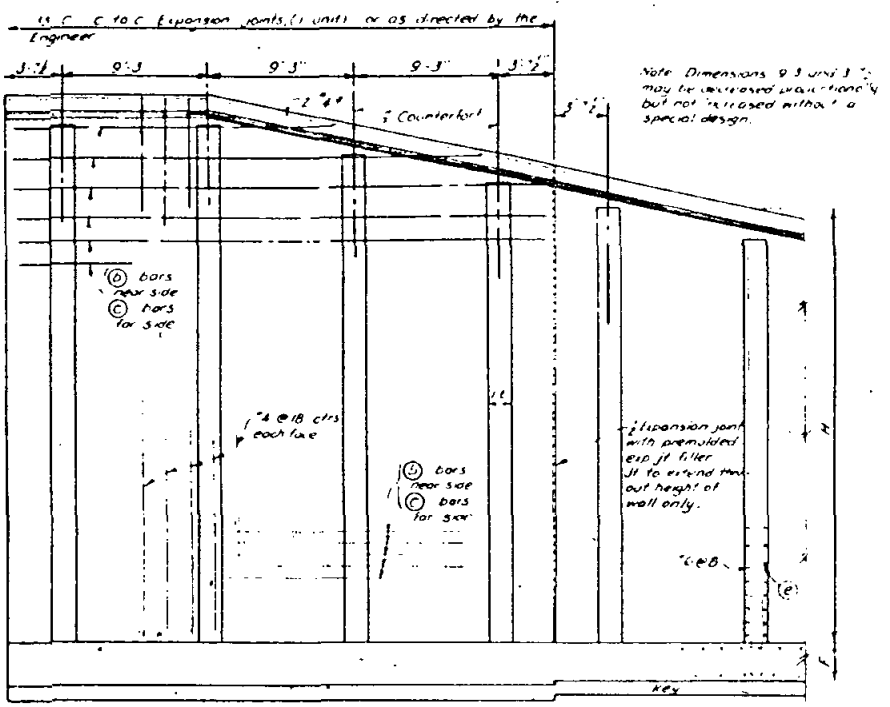
TABLE OF REINFORCING STEEL DIMENSIONS & DATA

H	30'	28'	26'	24'	22'	20'	18'
W	21'-0"	19'-6"	18'-3"	16'-10"	15'-6"	14'-1"	12'-10"
F	2'-6"	2'-3"	2'-3"	2'-0"	2'-0"	2'-0"	1'-9"
(i) bars, edge counterfort	3'-11"	3'-11"	3'-11"	3'-11"	3'-11"	3'-11"	2'-11"
length	36'-4"	33'-10"	31'-8"	29'-0"	26'-10"	24'-3"	22'-2"
(a) bars, edge counterfort	3'-11"	3'-11"	2'-11"	3'-11"	3'-11"	2'-11"	2'-11"
length	24'-6"	24'-0"	23'-0"	18'-0"	16'-0"	14'-0"	12'-0"
(j) bars, edge counterfort	3'-11"	2'-11"	2'-11"				
length	18'-3"	17'-6"	16'-6"				
(f) bars, back face, wall	#6						
(c) bars, front face, wall	#6	See table for spacing					
(e) Stirrups, counterfort	#5						
(f) bars, toe	#11 @ 5	#11 @ 8	#11 @ 8	#11 @ 8	#11 @ 8	#11 @ 8	#11 @ 8
length	9'-5"	9'-0"	8'-9"	8'-0"	7'-8"	6'-9"	6'-2"
(g) bars, top of heel	#6@12	#6@12	#6@12	#6@12	#6@12	#5@12	#5@12
(h) bars, top of heel	#6@6	#6@6	#6@6	#6@6	#6@6	#5@6	#5@6
(k) bars, bottom of heel	#6@24	#6@24	#6@24	#6@24	#6@24	#5@24	#5@24
(k) bars, bottom of heel	#6@12	#6@12	#6@12	#6@12	#6@12	#5@12	#5@12
Concrete, cubic ft per lin ft	1223	1064	973	836	751	668	561
Steel, pounds per lin foot	332	493	433	369	331	263	216
Toe Pressure, pounds/sq ft	11,200	10,100	9500	8700	8000	7200	6300
Horizontal Comp. Lbs	77,000	65,200	57,200	48,300	41,100	33,700	27,700
Vertical Comp. Lbs	178,000	140,000	95,000	81,000	68,000	36,000	45,000
eccentricity of resultant	3.30	2.60	2.40	2.20	2.00	1.85	1.70

QUANTITIES BASED ON 35'-0" WALL UNIT INCLUDING 4 COUNTERFORTS

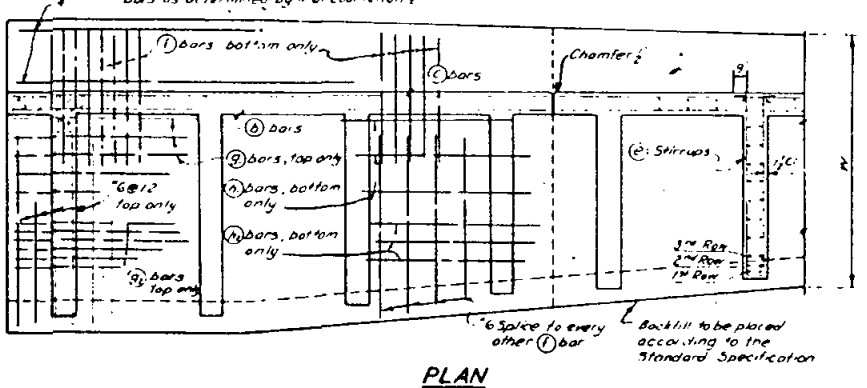
SPECIFICATION REFERENCE	COUNTY OF SAN DIEGO — STANDARD DRAWING	SCALE NONE
	COUNTERFORT RETAINING WALL	DRAWING NO.
	SEE DWG. NO. C-51 FOR SECTIONS & ELEVATION	C-50
	SEE SHEET C-52 FOR GENERAL NOTES	

REVISIONS				APPROVALS		
DESCRIPTION	BY	APPROVED	DATE	COUNTY ENGINEER	H. M. Taylor	11/10/72



ELEVATION

Note Use reinforcing in any unit as determined by maximum "H" in that unit. Use (a) (a₁) and (a₂) bars as determined by H at counterfort ℄



PLAN

TABLE OF SPACING FOR (b) (c) & (e) BARS

Distance below top of wall	(b)	(c)	(e)
Top of wall	24	24	[illegible]
2'	24	24	[illegible]
4'	24	24	24
6'	18	24	24
8'	18	24	24
10'	15	18	18
12'	15	18	18
14'	12	18	18
16'	12	15	15
18'	12	15	15
20'	9	15	12
22'	9	12	12
24'	7	12	9
26'	7	12	9
28'	7	12	9
30'			

SPECIFICATION REFERENCE	COUNTY OF SAN DIEGO STANDARD DRAWING	SCALE NONE
	COUNTERFORT RETAINING WALL	DRAWING NO.
	SEE DWG. NO. C-50 FOR SECTIONS & ELEVATION	C-51
	SEE SHEET C-52 FOR GENERAL NOTES	

REVISIONS				APPROVALS		
DESCRIPTION	BY	APPROVED	DATE	COUNTY ENGINEER	H.M. Taylor	11/15/72
NOTE CHANGES	J.L.B.	D. Kochan	2/1/72			

GENERAL NOTES

DESIGN

A.A.S.H.O. LATEST REVISED EDITION, FILED IN THE GOVERNMENT REFERENCE LIBRARY NO. 625.7.

CONSTRUCTION

COUNTY OF SAN DIEGO STANDARD SPECIFICATIONS

DESIGN CONDITIONS

WALLS ARE TO BE USED FOR THE LOADING CONDITIONS SHOWN FOR EACH TYPE WALL.

DESIGN H MAY BE EXCEEDED BY SIX INCHES BEFORE GOING TO NEXT SIZE.

PASSIVE BEARING PRESSURE OF FOOTING KEY SHALL NOT EXCEED ACTUAL TOE PRESSURE.

SPECIAL FOOTING DESIGN IS REQUIRED WHERE FOUNDATION MATERIAL IS INCAPABLE OF SUPPORTING TOE PRESSURE LISTED IN TABLE.

DESIGN DATA

Fc = 1200 psi ; F'c = 3000 psi

Fs = 20,000 psi n = 10

Earth = 120 pcf and equivalent fluid pressure = 36 psf per foot of height

WALLS SHOWN FOR 1½:1 UNLIMITED SLOPING SURCHARGE ARE DESIGNED IN ACCORDANCE WITH RANKINE'S FORMULA FOR UNLIMITED SLOPING SURCHARGE WITH $\phi = 33^{\circ}42'$.

REINFORCEMENT

COUNTY OF SAN DIEGO STANDARD SPECIFICATIONS

INTERMEDIATE GRADE, HARD GRADE, OR RAIL STEEL DEFORMATION SHALL CONFORM TO ASTM 305.

BARS SHALL LAP 20 DIAMETERS, WHERE SPLICED, UNLESS OTHERWISE SHOWN ON THE PLANS.

BENDS SHALL CONFORM TO THE MANUAL OF STANDARD PRACTICE, A.C.I.

BACKING FOR HOOKS IS FOUR DIAMETERS.

REINFORCEMENT (Continued)

ALL BAR EMBEDMENTS ARE CLEAR DISTANCES TO OUTSIDE OF BAR.

SPACING FOR PARALLEL BARS IS CENTER TO CENTER OF BARS.

RUBBER WATERSTOP

RUBBER WATERSTOP, WHEN REQUIRED, SHALL BE FURNISHED AND PLACED AS SPECIFIED IN THE LATEST EDITION OF THE STATE OF CALIFORNIA DEPARTMENT OF TRANSPORTATION STANDARD SPECIFICATIONS.

CONCRETE

ALL CONCRETE SHALL BE CLASS "A" P.C.C. CONFORMING TO THE COUNTY OF SAN DIEGO STANDARD SPECIFICATIONS.

EXCAVATION AND BACKFILL

EXCAVATION AND BACKFILL SHALL CONFORM TO THE COUNTY OF SAN DIEGO STANDARD SPECIFICATIONS.

COMPACTION OF BACKFILL MATERIAL BY JETTING OR PONDING WITH WATER WILL NOT BE PERMITTED.

EACH LAYER OF BACKFILL SHALL BE MOISTENED AS DIRECTED BY THE ENGINEER AND THOROUGHLY TAMPED, ROLLED OR OTHERWISE COMPACTED UNTIL THE RELATIVE COMPACTION IS NOT LESS THAN 90 PERCENT.

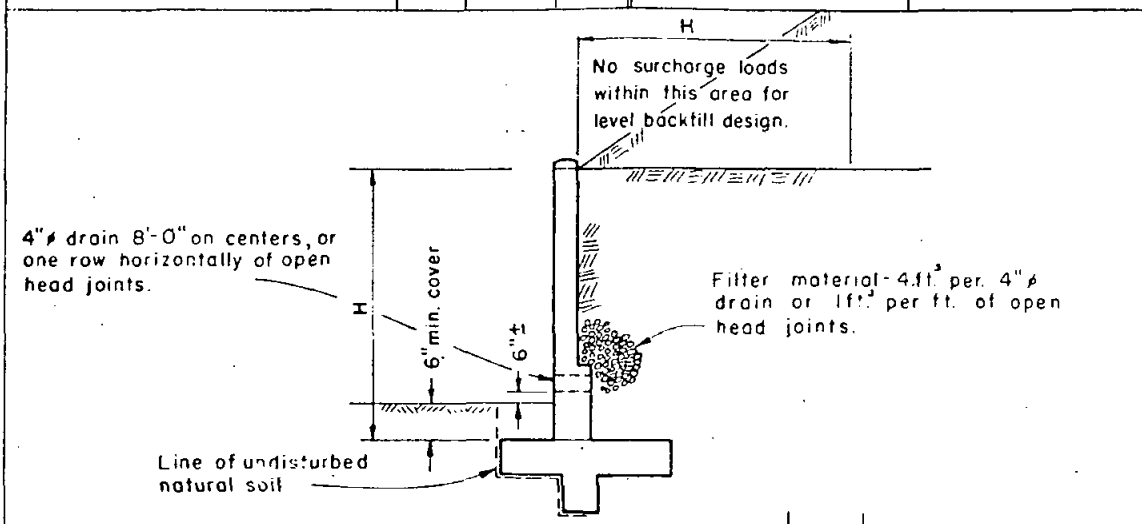
NO BACKFILL MATERIAL SHALL BE DEPOSITED AGAINST CONCRETE RETAINING WALLS UNTIL THE CONCRETE HAS DEVELOPED A STRENGTH OF 2,500 POUNDS PER SQUARE INCH IN COMPRESSION.

SPECIAL COVERAGE

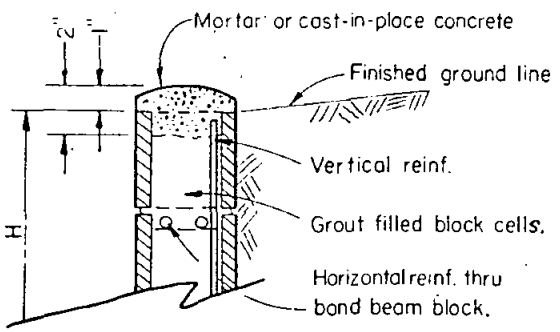
WHERE WALLS ARE CONSTRUCTED ADJACENT TO SALT WATER, THICKNESS OF CONCRETE SHALL BE INCREASED TO PROVIDE THREE-INCH COVERAGE BETWEEN STEEL AND EXPOSED SURFACES.

SPECIFICATION REFERENCE	COUNTY OF SAN DIEGO STANDARD DRAWING	SCALE
	GENERAL NOTES FOR RETAINING WALLS	DRAWING NO.
	SEE DWG. C-42 thru. C-51	C-52

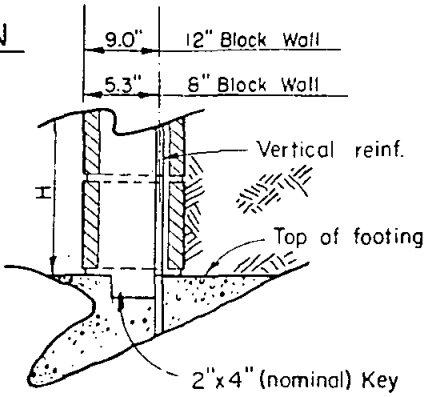
REVISIONS				APPROVALS		
DESCRIPTION	BY	APPROVED	DATE	COUNTY ENGINEER	H. M. Taylor	



TYPICAL SECTION
no scale



CAP DETAIL
no scale

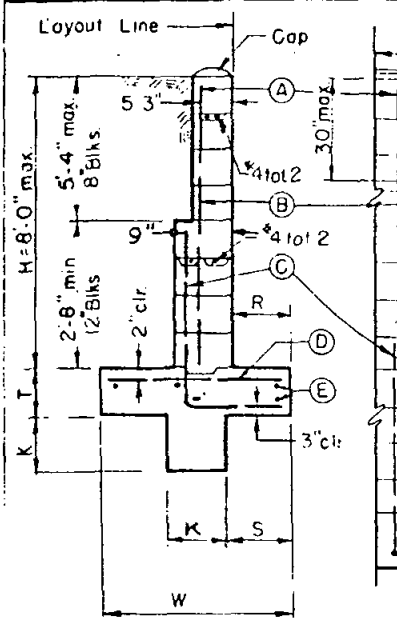


KEY DETAIL
no scale

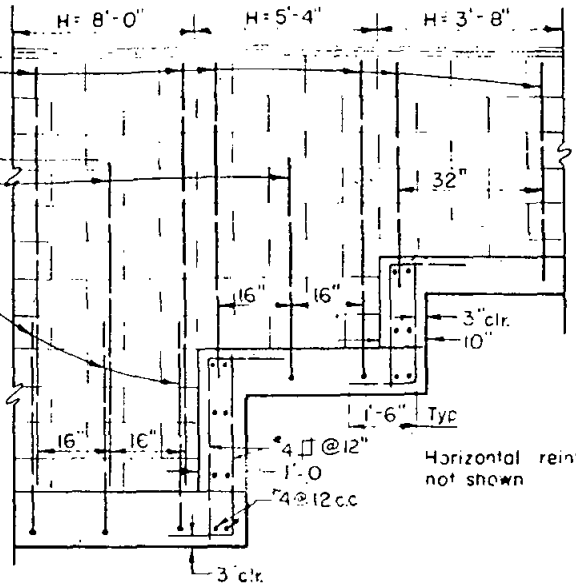
NOTE: All masonry retaining walls shall be constructed with cap, key and drainage details as shown hereon.

SPECIFICATION REFERENCE	COUNTY OF SAN DIEGO STANDARD DRAWING	
	CANTILEVERED MASONRY RETAINING WALL	SCALE NO SCALE
	MISCELLANEOUS DETAILS	DRAWING NO. C-53

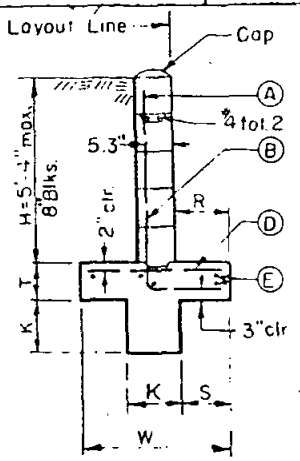
REVISIONS				APPROVALS		
DESCRIPTION	BY	CHECKED	DATE	COUNTY ENGINEER	H.M. Taylor	11/10/72



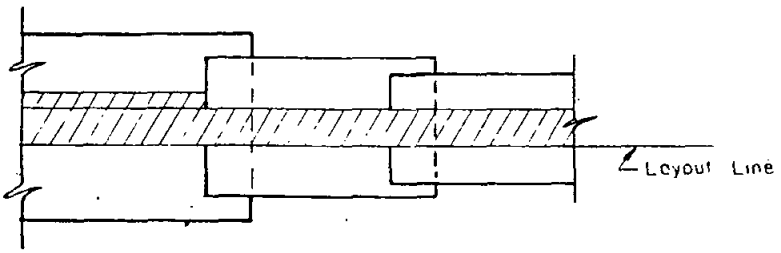
TYP. SECTION
OVER 5'-4"



ELEVATION



TYP. SECTION
5'-4" max.



PLAN

NOTES

1. Refer to Standard Drawing C-53 and C-57 for additional notes and details
2. Fill all block cells with grout

DIMENSIONS AND REINFORCING STEEL			
H (max)	3'-8"	5'-4"	8'-0"
T (min)	8"	10"	1'-0"
W (min)	2'-1"	3'-1"	4'-3"
R	9"	1'-2"	1'-5"
S	8 1/2"	1'-0 1/2"	1'-7 1/2"
K	8"	8"	12"
(A)	*4 @ 32 cc	*4 @ 32 cc	*4 @ 32 cc
(B)		*4 @ 32 cc	*4 @ 32 cc
(C)			*7 @ 16 cc
(D)	*4 @ 32 cc	*4 @ 16 cc	*4 @ 16 cc
(E)	*4 tot. 5	*4 tot. 5	*4 tot. 6
max. soil press	774 psf	1030 psf	1660 psf

SPECIFICATION REFERENCE

COUNTY OF SAN DIEGO STANDARD DRAWING

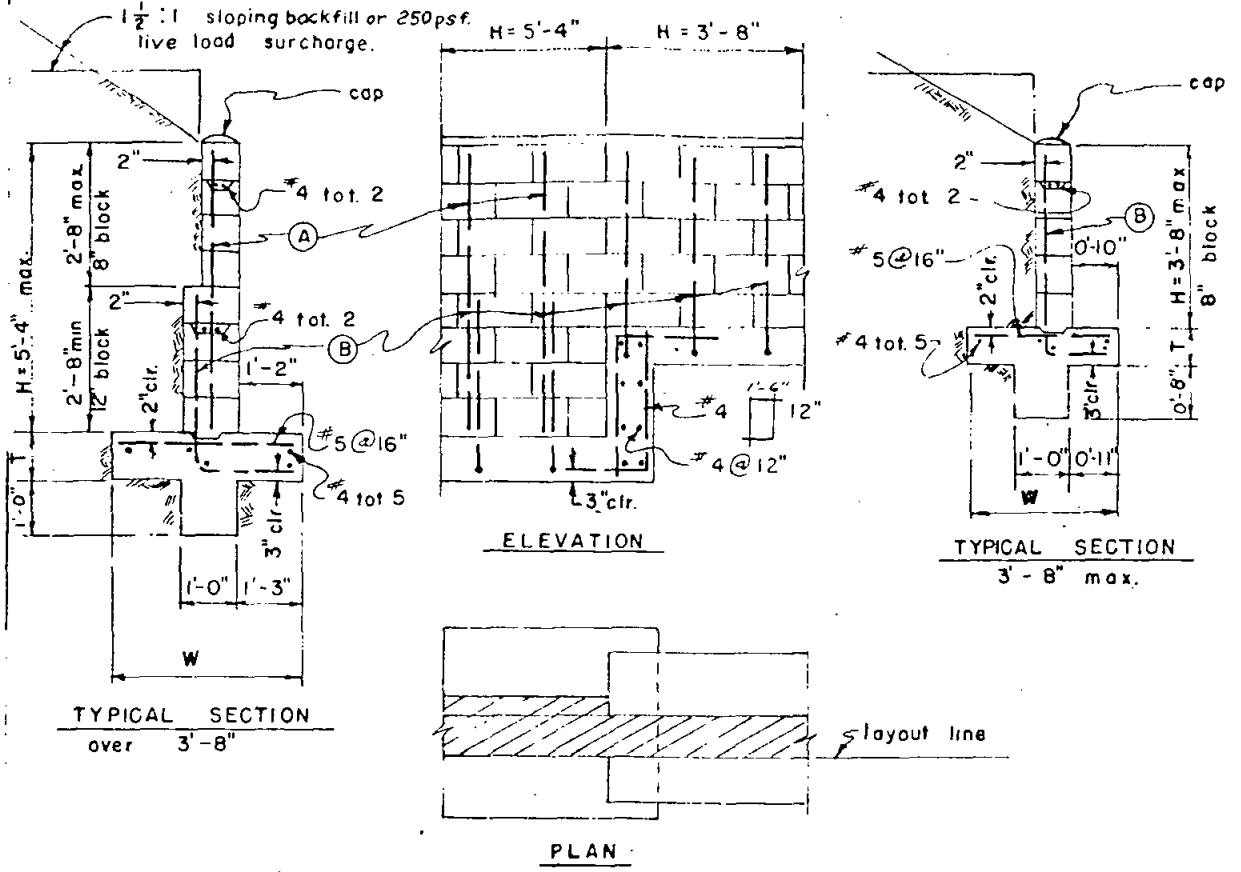
CANTILEVERED MASONRY RETAINING WALL TYPE CM-5

(LEVEL BACKFILL)

SCALE NONE

DRAWING NO C-54

REVISIONS				APPROVALS		
DESCRIPTION	BY	APPROVED	DATE	COUNTY ENGINEER	H. M. Taylor	11/10/77



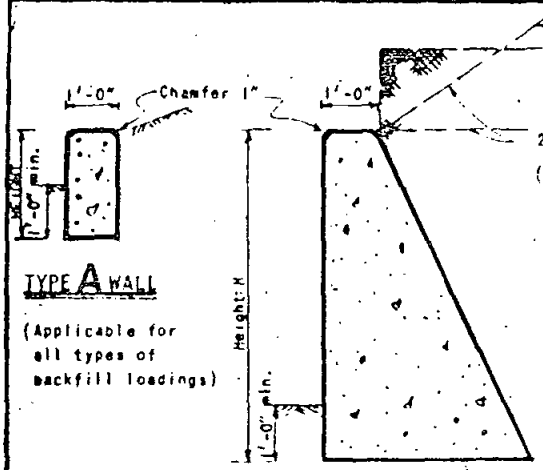
NOTE:

1. Refer to standard drawings C-53 and C-57 for additional notes and details.
2. Fill all cells with grout.

DIMENSIONS AND REINFORCING STEEL		
H max	5'-4"	3'-8"
T min	0'-10"	0'-8"
W min	3'-10"	2'-9"
(A) bars	#4 @ 16"	—
(B) bars	#6 @ 16"	#4 @ 16"
MAX. TOE PRESS. P.S.F.	2000	1400

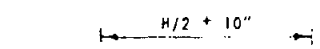
	COUNTY OF SAN DIEGO STANDARD DRAWING	NONE
	CANTILEVERED MASONRY RETAINING WALL TYPE CM-6 (Liveload surcharge or sloping backfill)	DRAWING NO. C-55

REVISIONS				APPROVALS		
DESCRIPTION	BY	APPROVED	DATE	COUNTY ENGINEER	H. E. Taylor	[illegible]

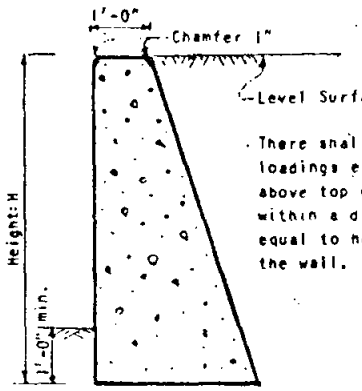


TYPE A WALL

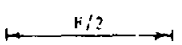
(Applicable for all types of backfill loadings)



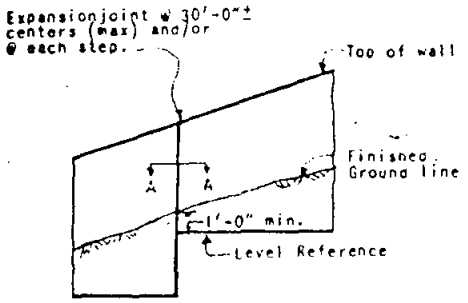
TYPE B WALL



There shall be no loadings extending above top of wall within a distance equal to height of the wall.

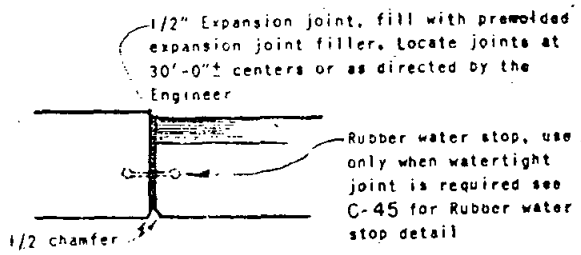


TYPE C WALL

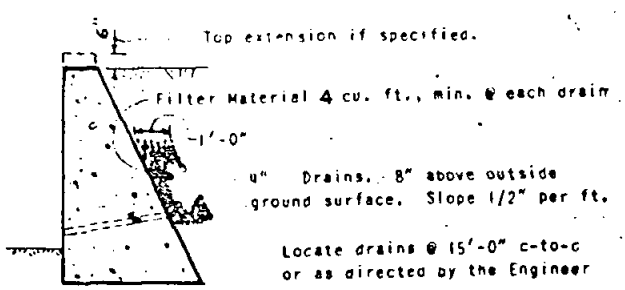


TYPICAL ELEVATION

NOTE: Maximum toe pressure underwall footing = 1 1/2 tons. Special design required where footing material is incapable of supporting this pressure.



SECTION A A.



TYPICAL DRAINAGE WHEN H > 4'-0"

WALL TYPE	HEIGHT	BASE	CONC. CF/FT
A	1'-6"	1'-0"	1.50
	2'-0"	1'-0"	2.00
B	3'-0"	2'-4"	4.99
	4'-0"	2'-10"	7.55
	5'-0"	3'-4"	10.82
	6'-0"	3'-10"	14.49
C	3'-0"	1'-6"	3.75
	4'-0"	2'-0"	6.00
	5'-0"	2'-6"	8.75
	6'-0"	3'-0"	12.00

NOTE: Type A wall height may be exceeded by 3 inches before changing to Type B or Type C.

SPECIFICATION REFERENCE	COUNTY OF SAN DIEGO STANDARD DRAWING GRAVITY RETAINING WALL For General Notes see Drawing C-52 (Articles entitled "Design Conditions", "Reinforcement" and "Special Coverage" shall be voided.)	SCALE NO SCALE DRAWING NO. C-5

REVISIONS				APPROVALS		
DESCRIPTION	BY	APPROVED	DATE	COUNTY ENGINEER	M.M. Taylor	11/10/72
NOTE CHANGES	J.L.B.	R. Kiesow	2/6/69			

GENERAL NOTES

DESIGN

A.A.S.H.O. Latest Revised Edition
Filed in the government reference library No. 625.7, and Uniform Building Code.

CONSTRUCTION

County of San Diego Standard Specifications

DESIGN CONDITIONS

Walls are to be used for the loading conditions shown for each type wall.

Design H shall not be exceeded.

Footing key is required except as shown otherwise or when found unnecessary by the engineer.

Special footing design is required where foundation material is incapable of supporting toe pressure listed in table.

DESIGN DATA

REINFORCED CONCRETE:
Fc=1200 psi Fc=3000 psi
Fs=20,000 psi n=10

REINFORCED MASONRY:
Fm=600 psi Fm=200 psi
Fs=20,000 psi n=50
Earth=120 pcf and equivalent fluid pressure=36 psf per foot of height

Walls shown for 1½:1 unlimited sloping surcharge are designed in accordance with Rankine's formula for unlimited sloping surcharge with $\phi = 33°42'$

REINFORCEMENT

County of San Diego Standard Specificacions

Intermediate grade, hard grade, or rail steel deformation shall conform to ASTM 305.

Bars shall lap 40 diameters, where spliced, unless otherwise shown on the plans.

Bends shall conform to the Manual of Standard practice, A.C.I.

Backing for hooks is four diameters.

All bar embedments are clear distances to outside of bar.

Spacing for parallel bars is center to center of bars.

CONCRETE

All concrete shall be class "A" P.C.C. conforming to the County of San Diego Standard Specifications.

MASONRY

All reinforced masonry retaining wall shall be constructed of regular or light weight standard grade "A" units conforming to ASTM designation C-90-52 and manufactured in accordance with requirements of the Concrete Masonry Association Specifications. All masonry shall conform to the regulations of the Uniform Building Code.

MASONRY MORTAR

The mortar shall consist of one (1) part portland cement to three (3) parts graded mortar sand. Mortar shall be tempered with lime putty in an amount not exceeding twenty-five (25) per cent of the volume of the cement.

MASONRY MORTAR (con't.)

Mortar in horizontal joints shall fully cover all face shell and web members. Vertical joints shall be buttered to a depth greater than the thickness of the face shells of the block. Furrowing of mortar will not be permitted.

GROUT

The grout shall consist of one (1) part portland cement to three (3) parts clean sand for voids less than four inches. If desired, Grout to be used in voids of 4" or greater dimensions, may be mixed of one (1) part portland cement to two (2) parts clean sand to two (2) parts pea gravel. Pea gravel shall be graded such that 100 per cent passes 3/8" sieve and not more than 5 per cent passes the No. 8 sieve. All cells shall be poured solid with grout.

EXCAVATION AND BACKFILL

Excavation and backfill shall conform to the County of San Diego Standard Specifications.

Compaction of backfill material by jetting or ponding with water will not be permitted.

Each layer of backfill shall be moistened as directed by the engineer and thoroughly tamped, rolled or otherwise compacted until the relative compaction is not less than 90 per cent.

No backfill material shall be deposited against masonry retaining walls until the grout has developed a strength of 2,000 pounds per square inch in compression.

OPTIONAL DESIGNS

The wall shown here is not necessarily the most economical solution. It is an acceptable solution for the conditions shown on the drawings. The individual may consult a licensed engineer for more economical solutions for a particular condition.

OPTIONAL MORTAR KEY

Embedment of the first course of block in a poured footing may be omitted by providing a mortar key. The key is formed by embedding a flat 2" X 4" flush with the top of the freshly poured footing. Remove the 2" X 4" after the concrete has started to harden.

OPTIONAL WALL DRAINS

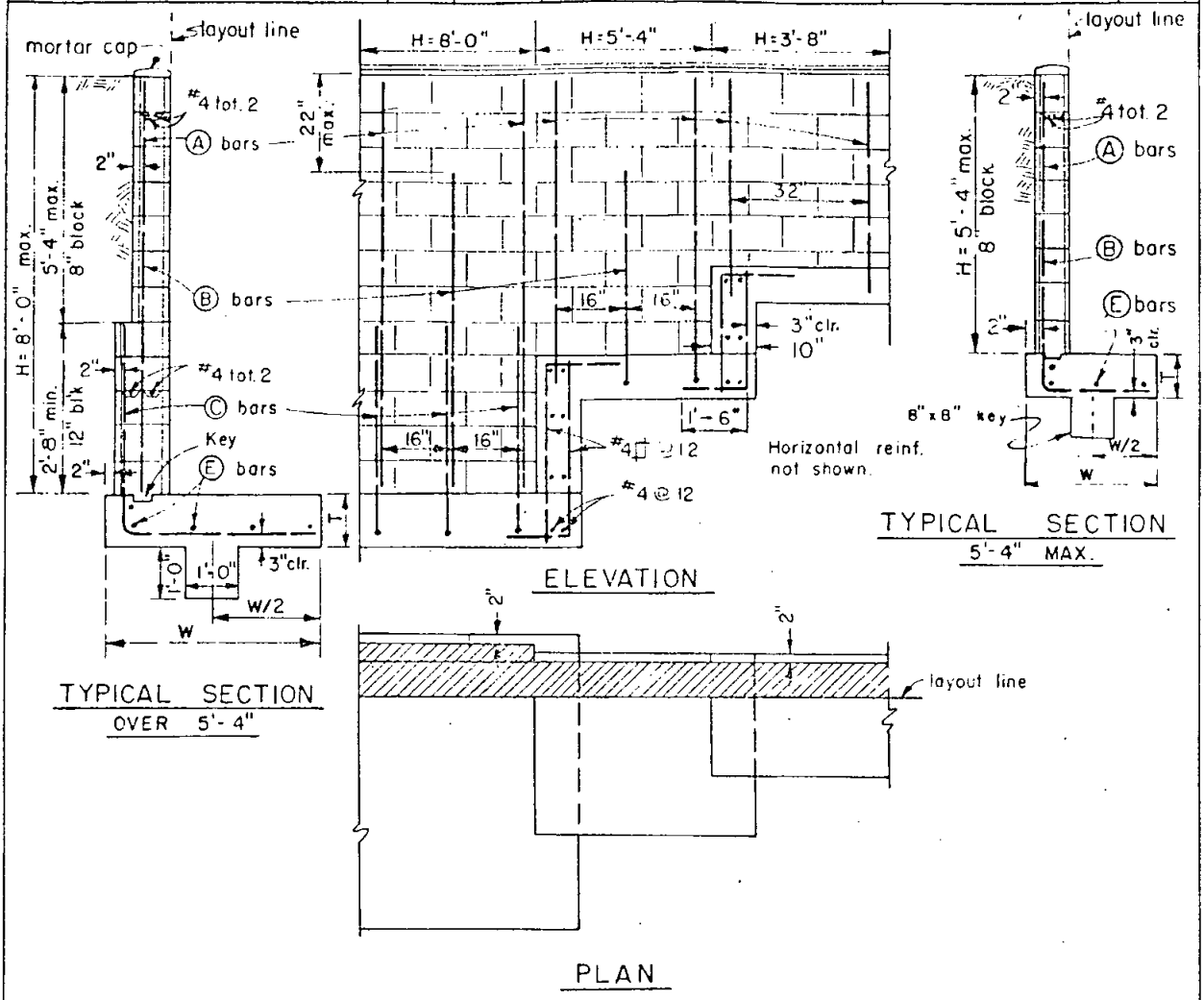
Where the steel spacing is greater than 24" center to center, wall drains may be formed by placing a block on its side. However, all cells below and above the said block shall be grouted solid.

FILTER MATERIAL

See County of San Diego Standard Specifications.

SPECIFICATION REFERENCE	COUNTY OF SAN DIEGO STANDARD DRAWING	
	GENERAL NOTES FOR MASONRY RETAINING WALLS	SCALE
	SEE DWG. C-50 thru C-59	DRAWING NO. C-57

REVISIONS				APPROVALS		
DESCRIPTION	BY	APPROVED	DATE	COUNTY ENGINEER	R.M. Taylor	11-5-72



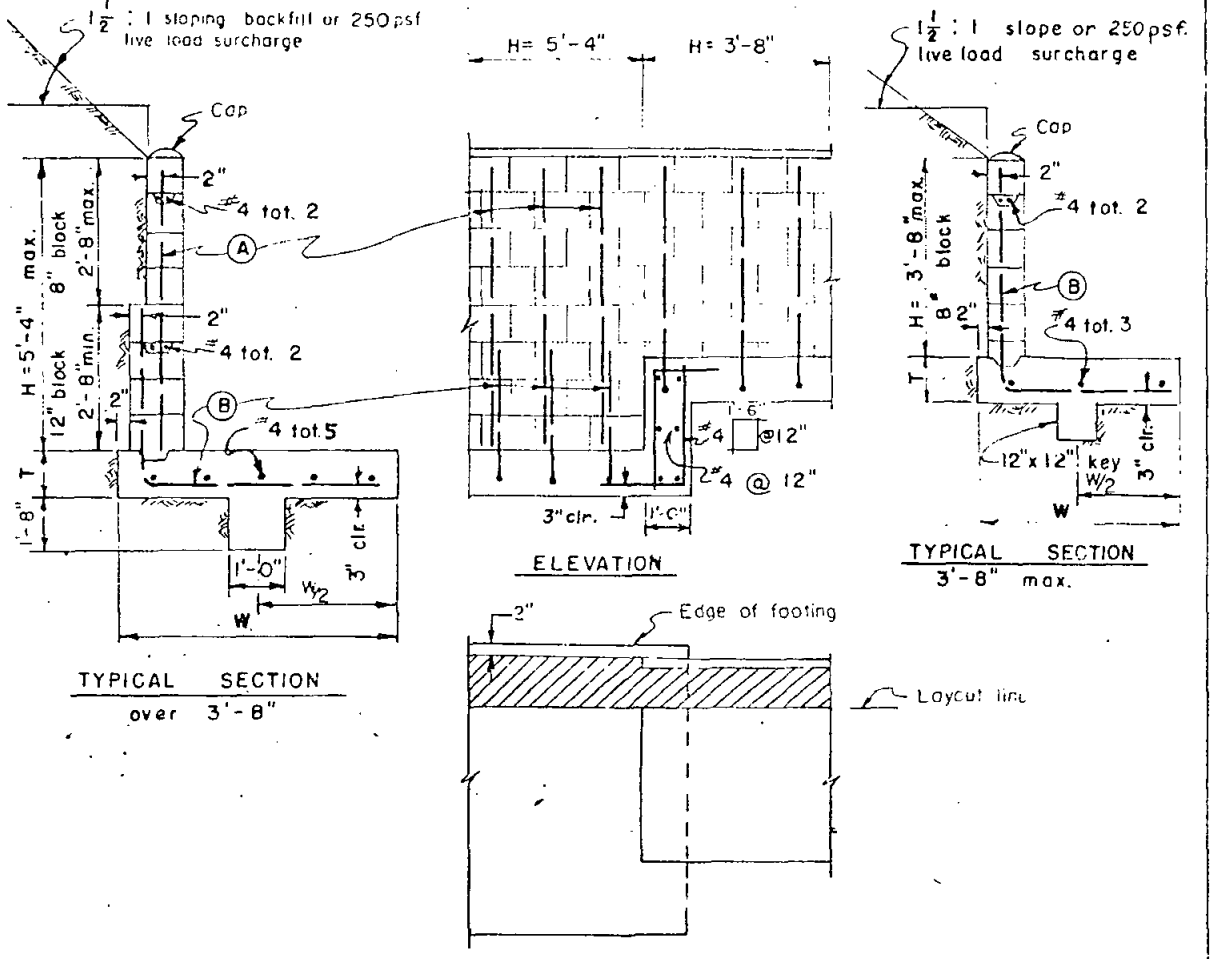
NOTES:

1. Refer to standard drawings C-53 and C-57 for additional notes and details.
2. Fill all block cells with grout.

DIMENSIONS AND REINFORCING STEEL			
H (max.)	3'-8"	5'-4"	8'-0"
T (min.)	0'-8"	0'-10"	1'-0"
W (min.)	2'-4"	3'-6"	5'-4"
Ⓐ bars	#4 @ 32	#4 @ 32	#4 @ 32
Ⓑ bars	———	#4 @ 32	#4 @ 32
Ⓒ bars	———	———	#6 @ 16
Ⓔ bars	#4 tot. 4	#4 tot. 5	#4 tot. 6
max. soil press. (psf)	500	600	800

SPECIFICATION REFERENCE	COUNTY OF SAN DIEGO STANDARD DRAWING	
	CANTILEVERED MASONRY RETAINING WALL TYPE LM-I (LEVEL BACKFILL)	SCALE NONE DRAWING NO. C-58

REVISIONS				APPROVALS		
DESCRIPTION	BY	APPROVED	DATE	COUNTY ENGINEER	H.M. Taylor	



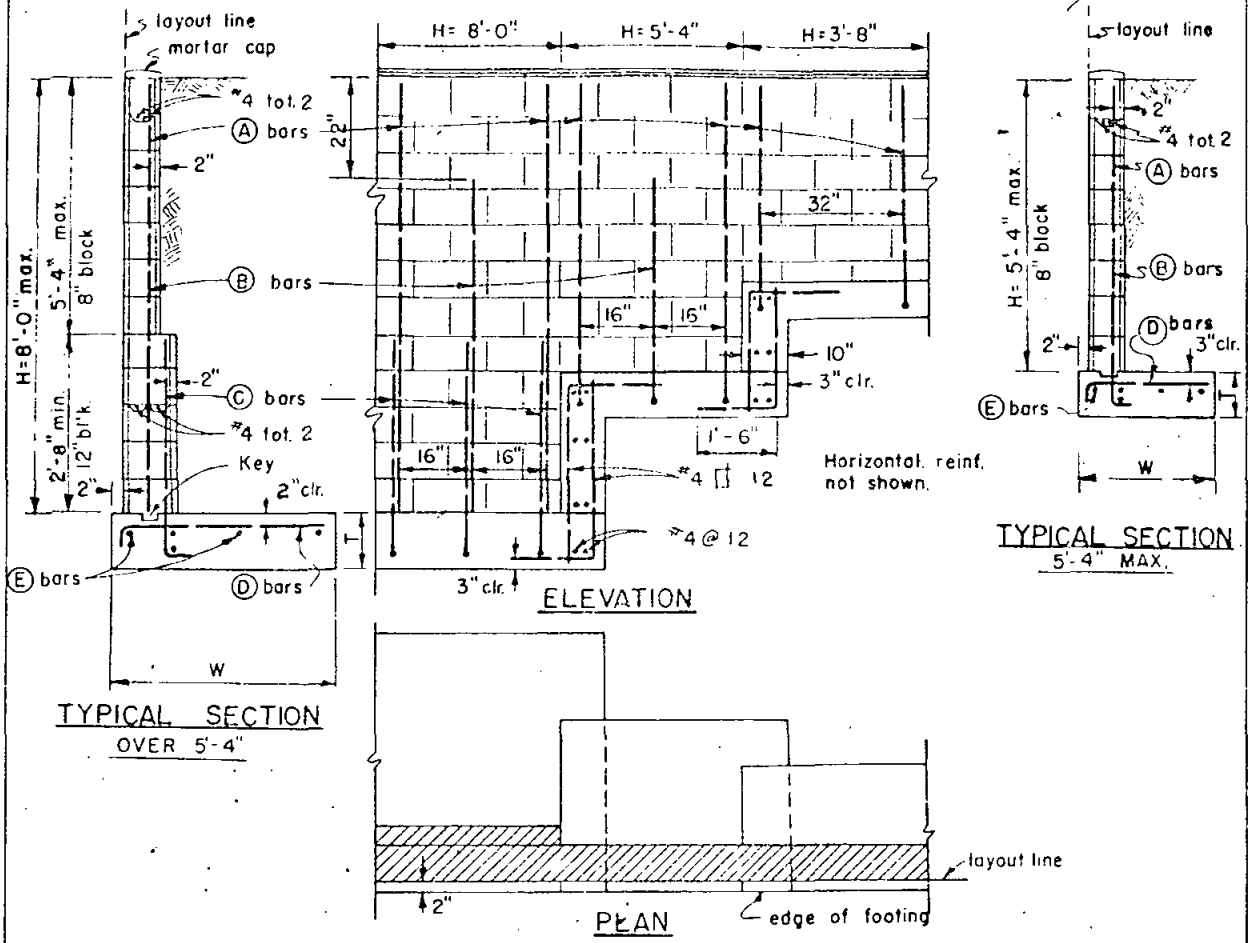
NOTE:

1. Refer to standard drawings C-53 and C-57 for additional notes and detail.
2. Fill all cells with grout.

DIMENSIONS and REINFORCING STEEL		
H max.	5'-4"	3'-8"
T min.	0'-10"	0'-10"
W min.	5'-0"	3'-9"
(A) bars	#4 @ 16"	———
(B) bars	#6 @ 16"	#4 @ 16"
MAX. TOE PRESS. P.S.F.	700	550

APPLICATION REFERENCE	COUNTY OF SAN DIEGO STANDARD DRAWING CANTILEVERED MASONRY RETAINING WALL TYPE LM-2 (Liveload surcharge or sloping backfill)	NONE SCALE DRAWING NO. C-59

REVISIONS				APPROVALS		
DESCRIPTION	BY	APPROVED	DATE	COUNTY ENGINEER	H. M. Taylor	Wiolte



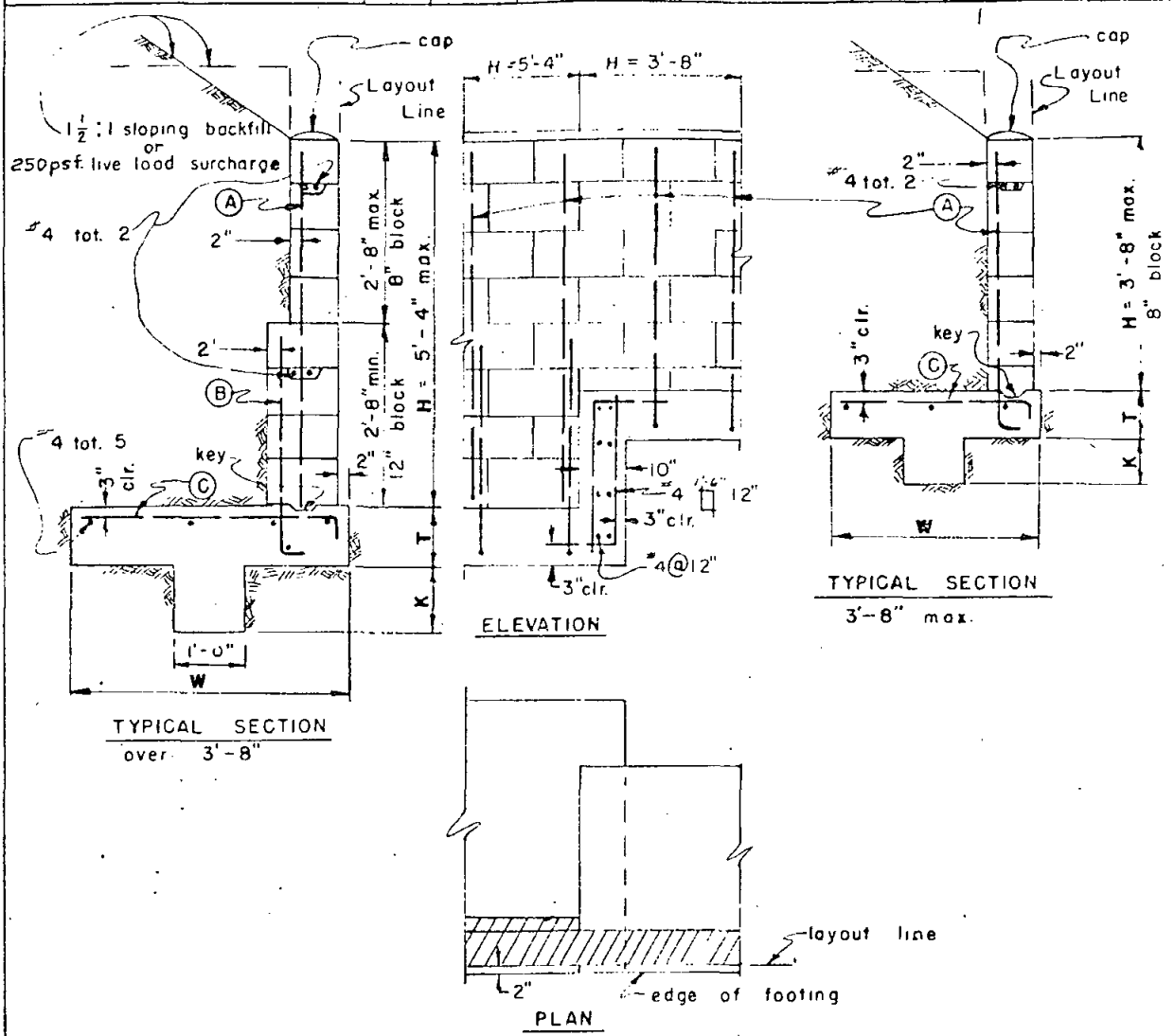
NOTES:

1. Refer to standard drawings C-53 and C-57 for additional notes and details.
2. Fill all blockcells with grout.

DIMENSIONS AND REINFORCING STEEL			
H max.	3'-8"	5'-4"	8'-0
T min.	0'-8"	0'-10"	1'-0"
W min.	2'-4"	3'-2"	4'-9"
Ⓐ bars	#4 @ 32	#4 @ 32	#4 @ 32
Ⓑ bars	—	#4 @ 32	#4 @ 32
Ⓒ bars	—	—	#6 @ 16
Ⓓ bars	#4 @ 32	#4 @ 16	#6 @ 16
Ⓔ bars	#4 tot. 4	#4 tot. 5	#4 tot. 6
max. soil press. (psf)	1100	1600	2200

SPECIFICATION REFERENCE	COUNTY OF SAN DIEGO STANDARD DRAWING	
	CANTILEVERED MASONRY RETAINING WALL TYPE LM-3 (LEVEL BACKFILL)	SCALE NONE DRAWING NO. C-60

REVISIONS				APPROVALS		
DESCRIPTION	BY	APPROVED	DATE	COUNTY ENGINEER	H. M. Taylor	11/10/72



NOTE:

1. Refer to standard drawings C-53 and C-57 for additional notes and details.
2. Fill all cells with grout.

DIMENSIONS and REINFORCING STEEL				
H max	5' - 4"		3' - 8"	
T min	0' - 10"		0' - 8"	
W min	4' - 0"		3' - 0"	
(A) bars	#4 @ 16"		#4 @ 16"	
(B) bars	#6 @ 16"		———	
Surcharge	sloping	live load	sloping	live load
(C) bars	#6 @ 8"	#6 @ 16"	#6 @ 16"	#6 @ 16"
K min	1' - 0"	0' - 8"	1' - 0"	0' - 8"
Toe press.	2700 psf	1900 psf	1700 psf	1430 psf

COUNTY OF SAN DIEGO STANDARD DRAWING

CANTILEVERED MASONRY RETAINING WALL

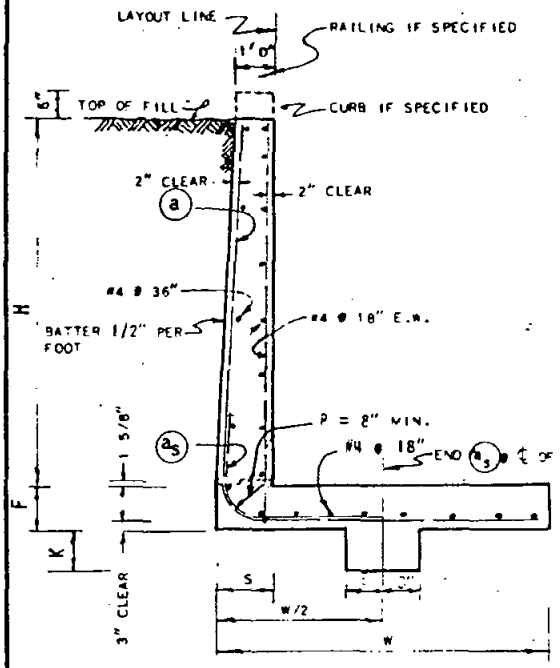
TYPE LM-4

(Liveload surcharge or sloping backfill)

SCALE NONE

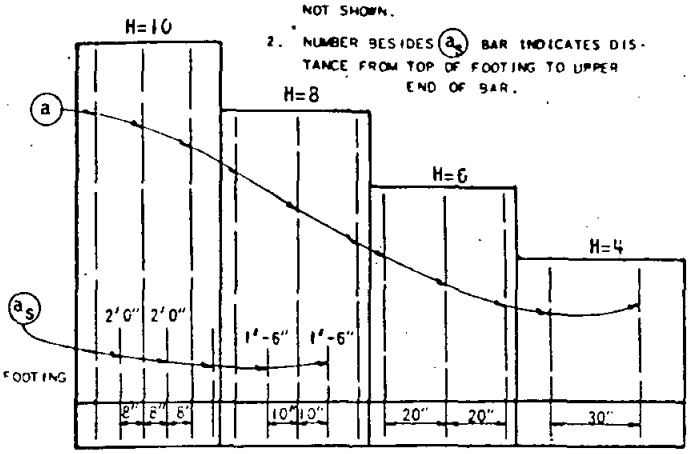
DRAWING NO. C-61

REVISIONS				APPROVALS		
DESCRIPTION	BY	APPROVED	DATE	COUNTY ENGINEER	H. M. Taylor	[illegible]



NOTES:

1. FRONT FACE AND HORIZONTAL REINFORCEMENT NOT SHOWN.
2. NUMBER BESIDES (a_s) BAR INDICATES DISTANCE FROM TOP OF FOOTING TO UPPER END OF BAR.

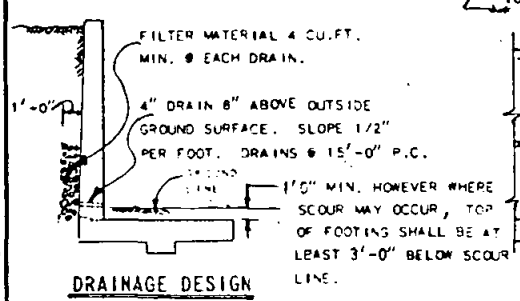


NOTES:

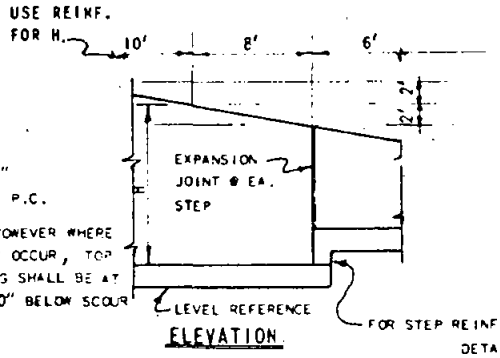
1. There shall be no earth, foundation or other loading extending above design H, within a distance equal to height of the wall.
2. Backfill on top of footing must be placed before backfilling against stem.

TYPICAL SECTION

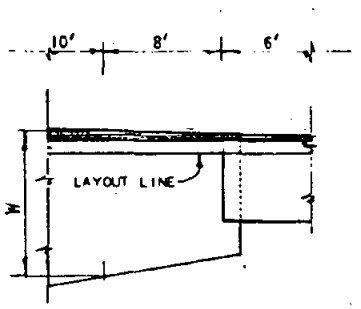
ELEVATION



DRAINAGE DESIGN



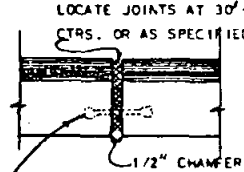
ELEVATION



PLAN

TABLE OF REINF. STEEL, DIMENSION AND DATA				
H	4'-0"	6'-0"	8'-0"	10'-0"
W	3'-0"	3'-10"	4'-10"	5'-6"
F	1'-2"	1'-3"	1'-4"	1'-5"
S	1'-2"	1'-3"	1'-4"	1'-5"
K		0'-8"	0'-8"	1'-0"
(a) bars	#4 @ 30"	#4 @ 20"	#4 @ 20"	#5 @ 16"
(a_s) bars (short)			#4 @ 20"	#5 @ 16"
Toe pressure P.S.F.	660	1070	1200	1225
Conc. CF/Ft.	7.8	12.4	16.7	23.3
Steel lbs/ft.	10.3	14.9	21.71	36.5

1/2" EXP. JT. MATERIAL. LOCATE JOINTS AT 30'-0" CTRS. OR AS SPECIFIED.

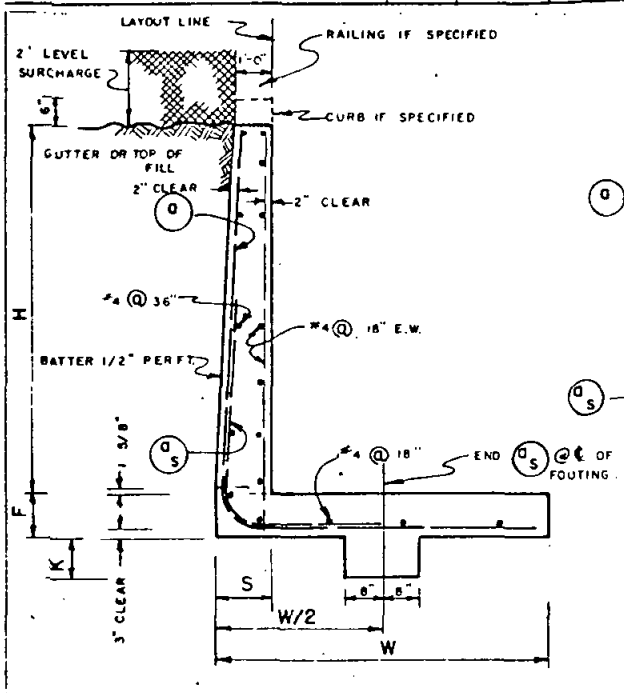


RUBBER WATER STOP. USE ONLY WHEN WATERTIGHT JOINT IS SPECIFIED. SEE C-45

EXPANSION JOINT

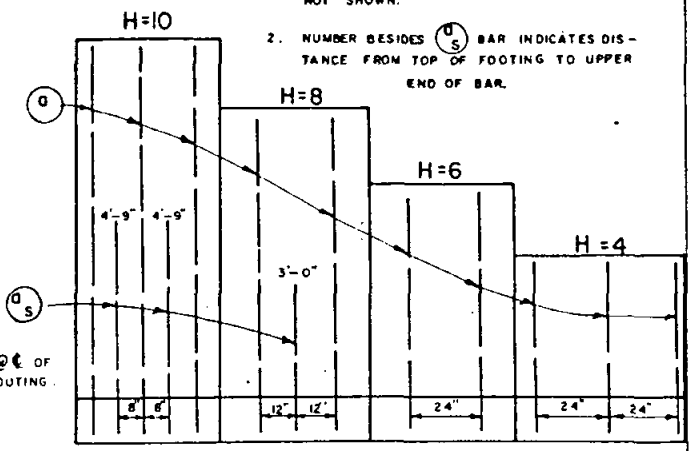
SPECIFICATION REFERENCE	COUNTY OF SAN DIEGO STANDARD DRAWING	
	CANTILEVER RETAINING WALL TYPE "L-1"	SCALE no scale
	FOR GENERAL NOTES SEE DRAWING C-52	DRAWING NO. C-63

REVISIONS				APPROVALS		
DESCRIPTION	BY	APPROVED	DATE	COUNTY ENGINEER	H. M. Taylor	11/10/72



NOTES:

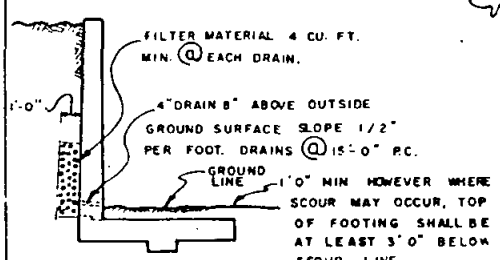
1. FRONT FACE AND HORIZONTAL REINFORCEMENT NOT SHOWN.
2. NUMBER BESIDES (a s) BAR INDICATES DISTANCE FROM TOP OF FOOTING TO UPPER END OF BAR.



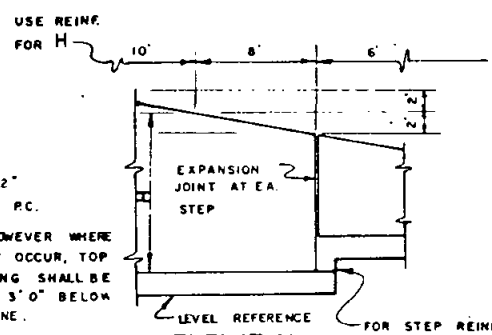
NOTE:
BACKFILL ON TOP OF FOOTING MUST BE PLACED BEFORE BACKFILLING AGAINST STEM.

TYPICAL SECTION

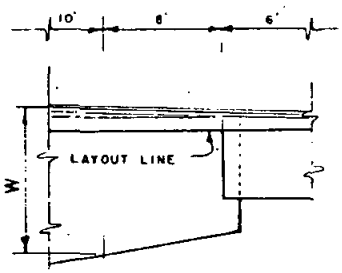
ELEVATION



DRAINAGE DESIGN

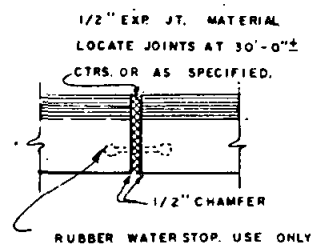


ELEVATION



PLAN

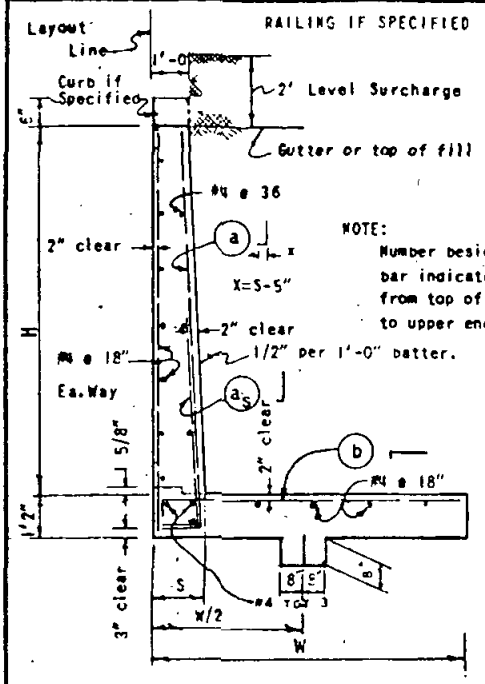
TABLE OF REINF. STEEL, DIMENSION AND DATA				
H	4'-0"	6'-0"	8'-0"	10'-0"
W	3'-9"	5'-3"	6'-9"	9'-0"
F	1'-2"	1'-3"	1'-4"	1'-5"
S	1'-2"	1'-3"	1'-4"	1'-5"
K	0'-8"	0'-8"	1'-0"	1'-3"
(a) bars	#4 @ 24"	#5 @ 24"	#5 @ 24"	#5 @ 16"
(a s) bars (short)			#5 @ 24"	#5 @ 16"
Toe pressure P.S.F.	810	940	1000	1100
Conc. CF/Ft.	9.6	11.2	20.3	27.4
Steel lbs/ft.	13.9	17.3	25.3	42.0



EXPANSION JOINT

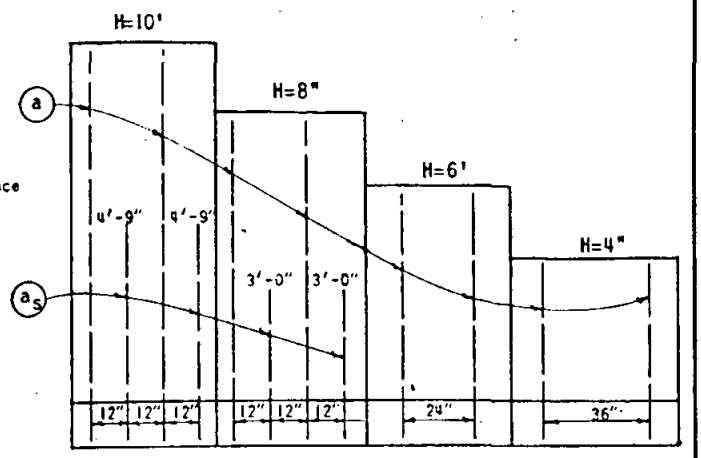
SPECIFICATION REFERENCE	COUNTY OF SAN DIEGO STANDARD DRAWING	No Scale
	CANTILEVER RETAINING WALL TYPE "L-2"	SCALE
	FOR GENERAL NOTES SEE DRAWING C-52	DRAWING NO. C-64

REVISIONS				APPROVALS		
DESCRIPTION	BY	APPROVED	DATE	COUNTY ENGINEER	H. M. Taylor	11/10/72



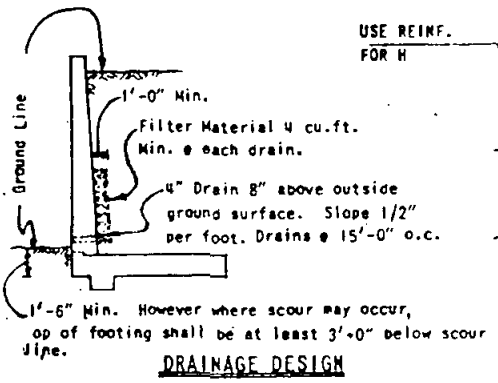
NOTE:
Number besides a_s bar indicates distance from top of footing to upper end of bar.

FRONT FACE AND HORIZONTAL REINFORCEMENT NOT SHOWN.

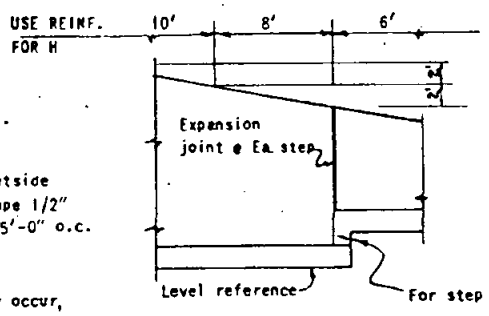


TYPICAL SECTION

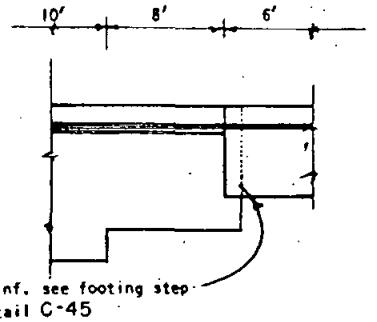
ELEVATION



DRAINAGE DESIGN

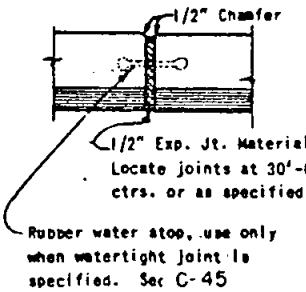


ELEVATION



PLAN

TABLE OF REINF. STEEL DIMENSIONS AND DATA				
H	4'	6'	8'	10'
W	3'-10"	5'-0"	6'-8"	8'-6"
S	1'-2"	1'-3"	1'-4"	1'-5"
a bars	#5 @ 36	#5 @ 24	#5 @ 24	#6 @ 24
a_s bars (short)			#5 @ 24	#6 @ 24
b bars	#5 @ 36	#5 @ 12	#6 @ 12"	#7 @ 12
Toe pressure P.S.F.	1490	2180	2520	2870
Conc. CF/ft.	9.7	13.5	18.0	22.9
Steel lbs/ft.	12.8	20.5	33.0	50.2



EXPANSION JOINT

SPECIFICATION REFERENCE

COUNTY OF SAN DIEGO STANDARD DRAWING

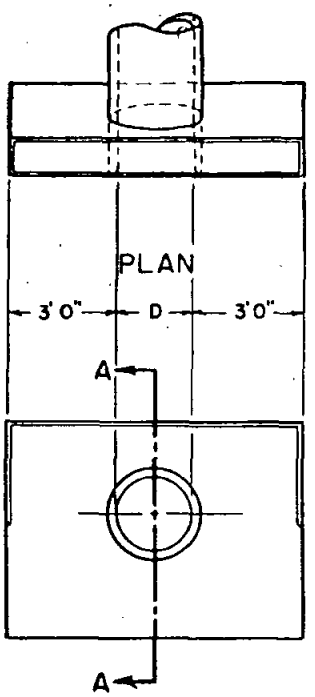
CANTILEVER RETAINING WALL TYPE "L-5"

FOR GENERAL NOTES SEE DRAWING 52-E8

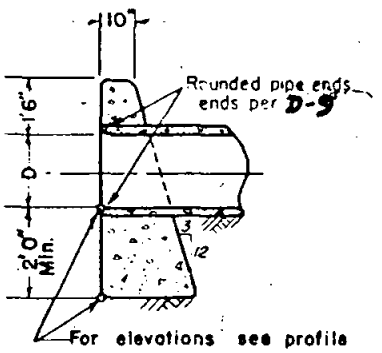
SCALE no scale

DRAWING NO. C-67

REVISIONS				APPROVALS		
DESCRIPTION	BY	APPROVED	DATE	COUNTY ENGINEER	H. A. Taylor	Walter



ELEVATION



SECTION A–A

GENERAL NOTES

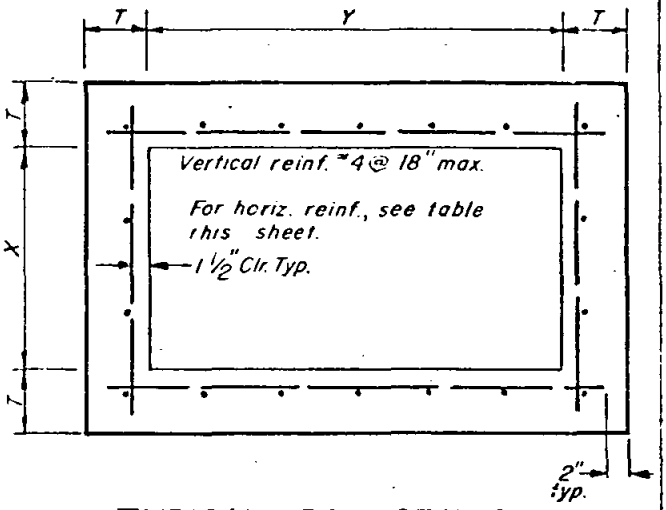
Concrete: All concrete to be Class A
All exposed corners to be chamfered 3/4"
Exposed surfaces to be finished.
"D" = inside diameter of pipe.
Min. denotes Minimum

Legend on plans:

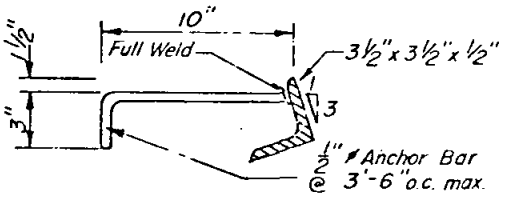
SPECIFICATION REFERENCE	COUNTY OF SAN DIEGO STANDARD DRAWING	SCALE 1" = 4'-0"
	GRAVITY TYPE HEADWALL	DRAWING NO. D-1

REVISIONS				APPROVALS		
DESCRIPTION	BY	APPROVED	DATE	COUNTY ENGINEER	H.M. Taylor	11/10/72
NOTE CHANGE	J.E.B.	A. Kuchel	2/1/71			

BOX SECTION REINFORCEMENT			
MAX SPAN "X" or "Y"	DEPTH "V"	THICKNESS "T"	HORIZ. & FLR REINF.
3'-0" to 4'-0"	4'-0"	6"	#4 @ 18"
4'-1" to 5'-0"		6"	#4 @ 12"
5'-1" to 6'-0"		6"	#4 @ 12"
6'-1" to 7'-0"		6"	#4 @ 12"
7'-1" to 8'-0"		6"	#4 @ 8"
3'-0" to 4'-0"	4'-1" to 8'-0"	6"	#4 @ 18"
4'-1" to 5'-0"		6"	#4 @ 12"
5'-1" to 6'-0"		6"	#4 @ 8"
6'-1" to 7'-0"		6"	#4 @ 6"
7'-1" to 8'-0"		6"	#4 @ 6"
3'-0" to 4'-0"	8'-1" to 12'-0"	6"	#4 @ 15"
4'-1" to 5'-0"		8"	#4 @ 12"
5'-1" to 6'-0"		8"	#4 @ 8"
6'-1" to 7'-0"		8"	#4 @ 6"
7'-1" to 8'-0"		8"	#4 @ 6"
3'-0" to 4'-0"	12'-1" to 16'-0"	6"	#4 @ 12"
4'-1" to 5'-0"		8"	#4 @ 12"
5'-1" to 6'-0"		8"	#4 @ 8"
6'-1" to 7'-0"		8"	#4 @ 6"
7'-1" to 8'-0"		8"	#5 @ 8"
3'-0" to 4'-0"	16'-1" to 20'-0"	8"	#4 @ 12"
4'-1" to 5'-0"		10"	#4 @ 12"
5'-1" to 6'-0"		10"	#4 @ 8"
6'-1" to 7'-0"		10"	#4 @ 6"
7'-1" to 8'-0"		10"	#5 @ 8"
3'-0" to 4'-0"	20'-1" to 24'-0"	8"	#4 @ 12"
4'-1" to 5'-0"		10"	#4 @ 12"
5'-1" to 6'-0"		10"	#4 @ 8"
6'-1" to 7'-0"		10"	#4 @ 6"
7'-1" to 8'-0"		12"	#5 @ 8"



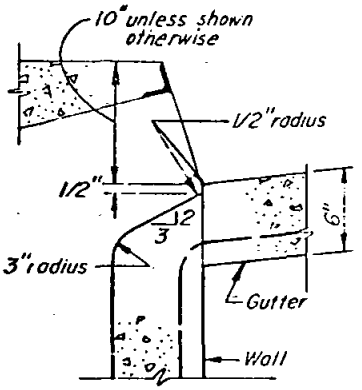
TYPICAL BOX SECTION



FACE ANGLE

NOTES

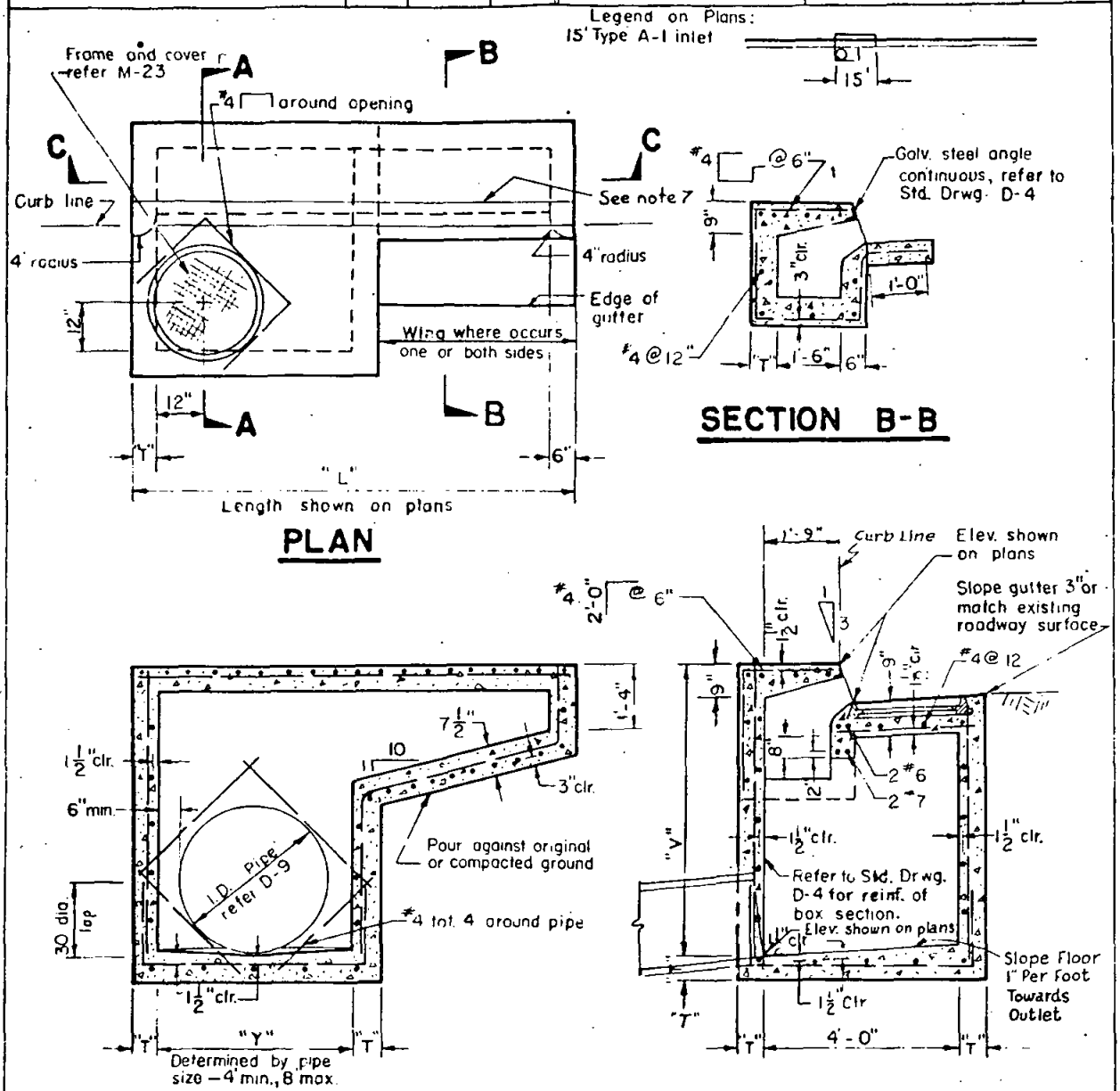
1. Concrete shall be Class "A" with 1 1/2 inch maximum size aggregate.
2. Unless otherwise specified reinforcing steel shall comply with this drawing.
3. Reinforcing steel shall be intermediate grade deformed bars conforming to latest ASTM specifications.
4. All bends shall be in accordance with the latest ACI code.
5. Minimum splice length for reinforcing shall be 30 diameters.
6. Floors shall have a wood trowel finish and except where used as junction boxes, shall have a minimum slope of 1 inch per foot towards the outlet.
7. Face Angle shall be cast into structure continuous for the full length "L".
8. When structure depth "V" exceeds 5 feet, ladder rungs shall be cast into wall @ 15" intervals from 15" above floor to within 12" of top of structure. Where possible place rungs in wall without pipe opening, directly beneath access opening. See D-34 for details.
9. Wall thickness and reinf. steel required may be decreased in accordance with table above as depth "V" to box section is decreased.
10. Face angle and anchor to be hot-dipped galvanized after fabrication.
11. Provide protective steel bar in throat opening when height of opening equals or exceeds 6".



CURB INLET THROAT OPENING

SPECIFICATION REFERENCE	COUNTY OF SAN DIEGO STANDARD DRAWING	
	INLETS AND CLEANOUTS NOTES AND DETAILS	SCALE None DRAWING NO. D-4

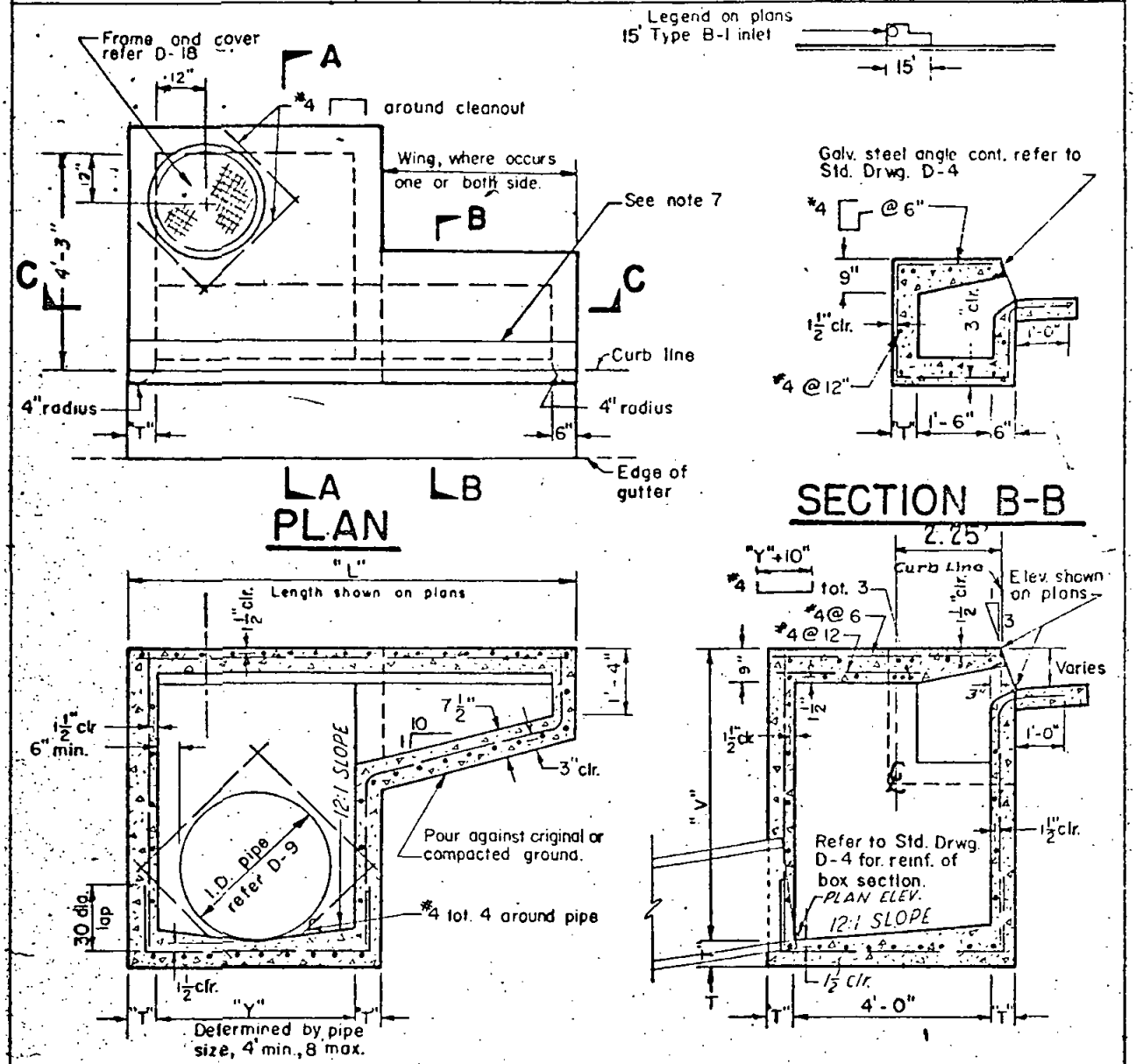
REVISIONS				APPROVALS		
DESCRIPTION	BY	APPROVED	DATE	COUNTY ENGINEER	H.M. Taylor	



1. Refer Standard Drawing D-4 for additional notes and details.
2. Designate types as follows: No wing A, One wing A-1, Two wings A-2.
3. Exposed edges of concrete shall be rounded with a radius of $\frac{1}{2}$ inch.
4. Surface of top slab shall be finished as specified for sidewalks in the Standard Specifications and shall drain towards streets at a slope of $\frac{1}{4}$ inch per foot.
5. Concrete gutter to match adjacent gutters.
6. Expansion joint material shall be placed at the ends of the inlet where the curb is to adjoin.
7. Provide $\frac{1}{4}$" tooled groove in top slab in line with back of adjacent curb.

SPECIFICATION REFERENCE	COUNTY OF SAN DIEGO STANDARD DRAWING	No scale SCALE
	CURB INLET - TYPE A	DRAWING NO. D-5

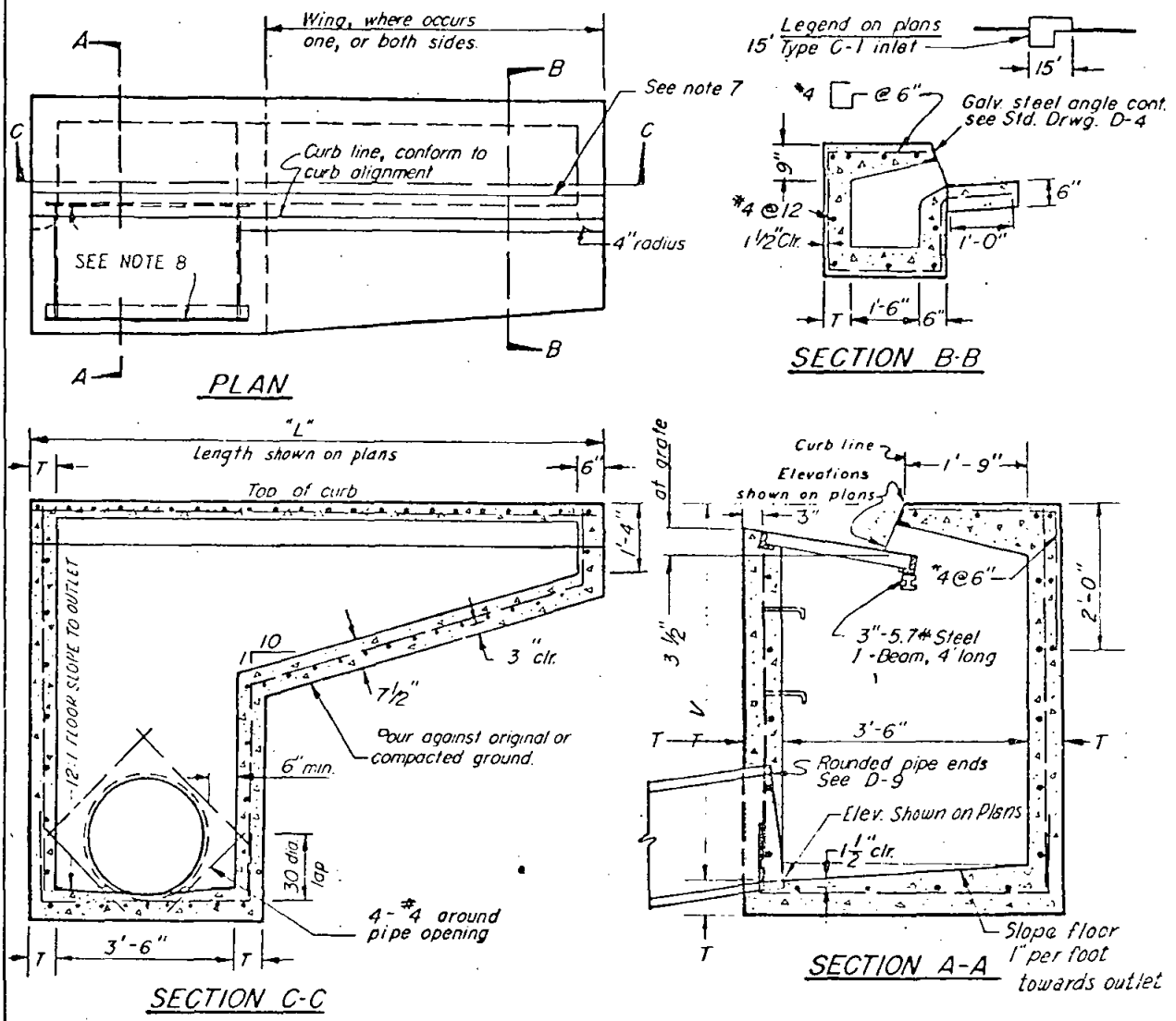
REVISIONS				APPROVALS		
DESCRIPTION	BY	APPROVED	DATE	COUNTY ENGINEER	K.M. Taylor	11/10/70



1. Refer Standard Drawing D-4 for additional notes and details.
2. Designate types as follows: No wing B, One wing B-1, Two wings B-2.
3. Exposed edges of concrete shall be rounded with a radius of $\frac{1}{2}$ inch
4. Surface of top slab shall be finished as specified for sidewalks in the Standard Specifications and shall drain towards street at a slope of $\frac{1}{4}$ inch per foot.
5. Concrete gutter to match adjacent gutters.
6. Expansion joint material shall be placed at the ends of the inlet where the curb is to adjoin.
7. Provide $\frac{1}{4}$" tooled groove in top slab in line with back of adjacent curb.

SPECIFICATION REFERENCE	COUNTY OF SAN DIEGO STANDARD DRAWING	No scale SCALE
	CURB INLET-TYPE B	DRAWING NO. D-6

REVISIONS				APPROVALS		
DESCRIPTION	BY	APPROVED	DATE	COUNTY ENGINEER	H. M. Taylor	[illegible]
NOTE 8 ADDED		J. Kerchner	2/1/24			

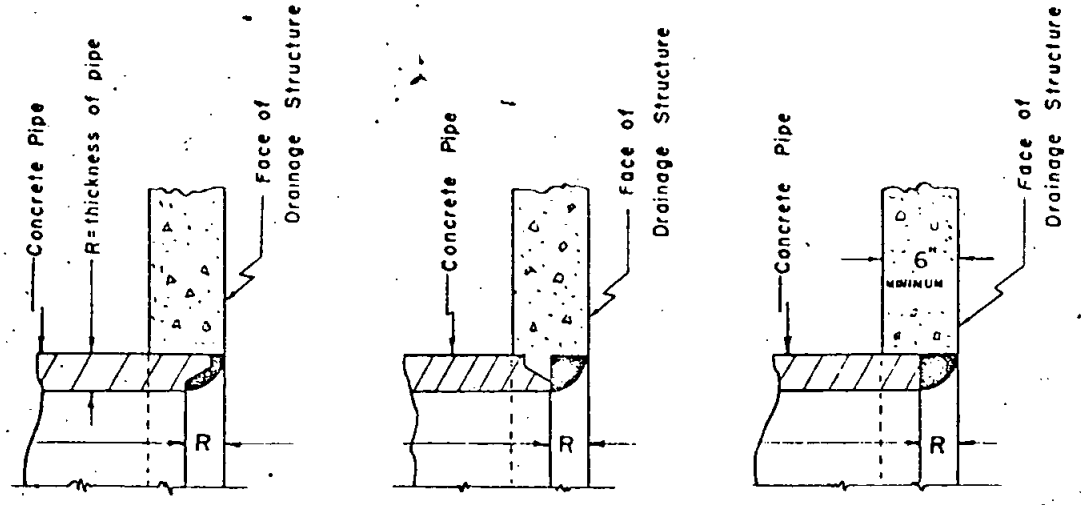


NOTES

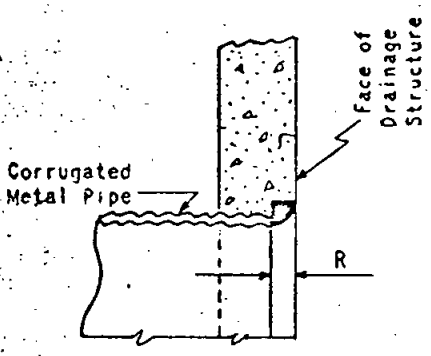
1. Refer Standard Drawing D-4 for additional notes and details.
2. Designate types as follows: No wing C, one wing C-1, two wings C-2.
3. Exposed edges of concrete shall be rounded with a radius of 1/2 inch.
4. Surface of top slab shall be finished as specified for sidewalks in the Standard Specifications and shall drain towards street at a slope of $\frac{1}{4}$ inch per foot.
5. Concrete gutter to match adjacent gutters.
6. Expansion joint material shall be placed at the ends of the inlet where the curb is to adjoin.
7. Provide $\frac{1}{4}$" tooled groove in top slab in line with back of adjacent curb.
8. A special size frame & grate is required.

SPECIFICATION REFERENCE	COUNTY OF SAN DIEGO STANDARD DRAWING	
	CURB INLET — TYPE C	SCALE None DRAWING NO. D-7

REVISIONS				APPROVALS		
DESCRIPTION	BY	APPROVED	DATE	COUNTY ENGINEER	H.M. Taylor	11/10/52



The rounded areas may be built up of Cement Mortar or poured in place with the drainage structure.

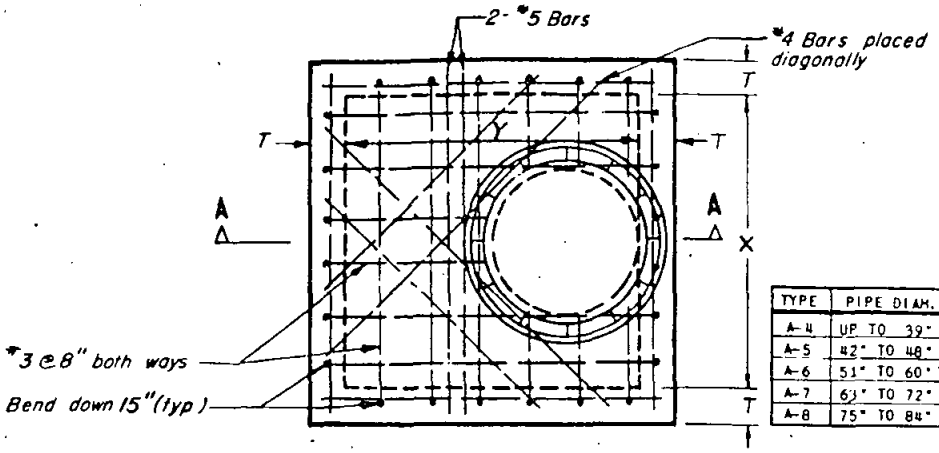


$$R = \frac{\text{INSIDE DIAMETER OF PIPE}}{10}$$

SPECIFICATION REFERENCE	COUNTY OF SAN DIEGO STANDARD DRAWING	SCALE 1/2" = 1'-0"
	ROUNDED PIPE ENDS IN DRAINAGE STRUCTURES	DRAWING NO. D-9

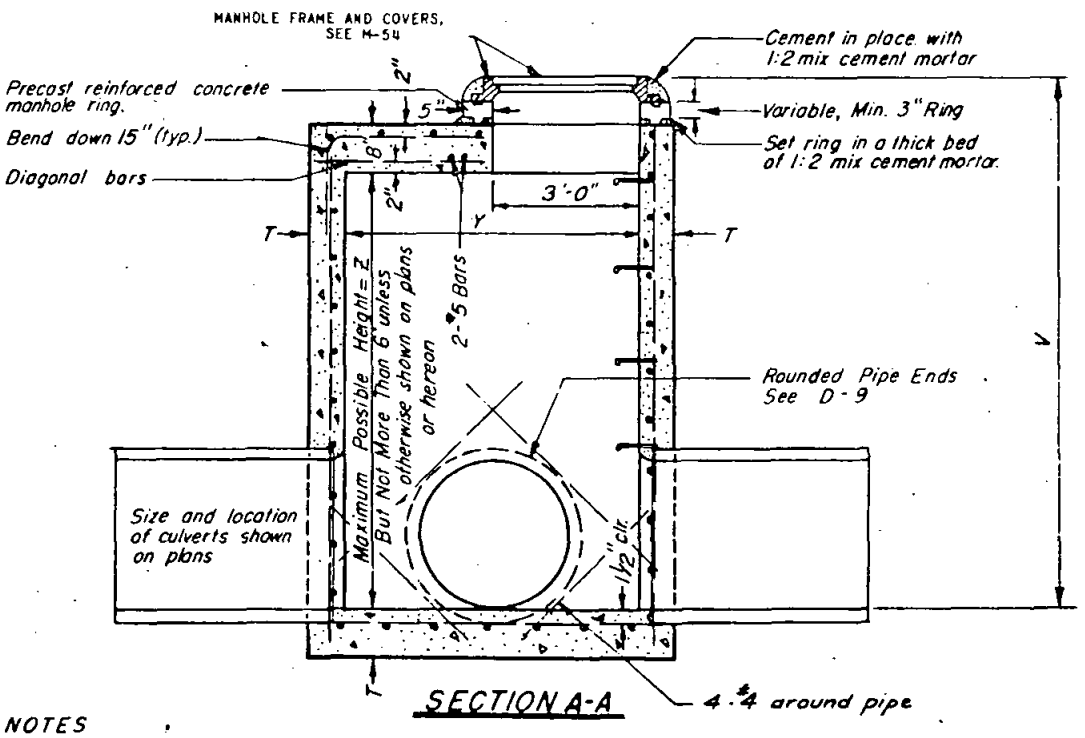
REVISIONS				APPROVALS		
DESCRIPTION	BY	APPROVED	DATE	COUNTY ENGINEER	R. E. Taylor	11/10/22

Legend on plans



TYPE	PIPE DIAM.	Y	X	Z
A-4	UP TO 39"	4'	4'	—
A-5	42" TO 48"	5'	4'	—
A-6	51" TO 60"	6'	4'	—
A-7	63" TO 72"	7'	4'	7'
A-8	75" TO 84"	8'	4'	8'

PLAN



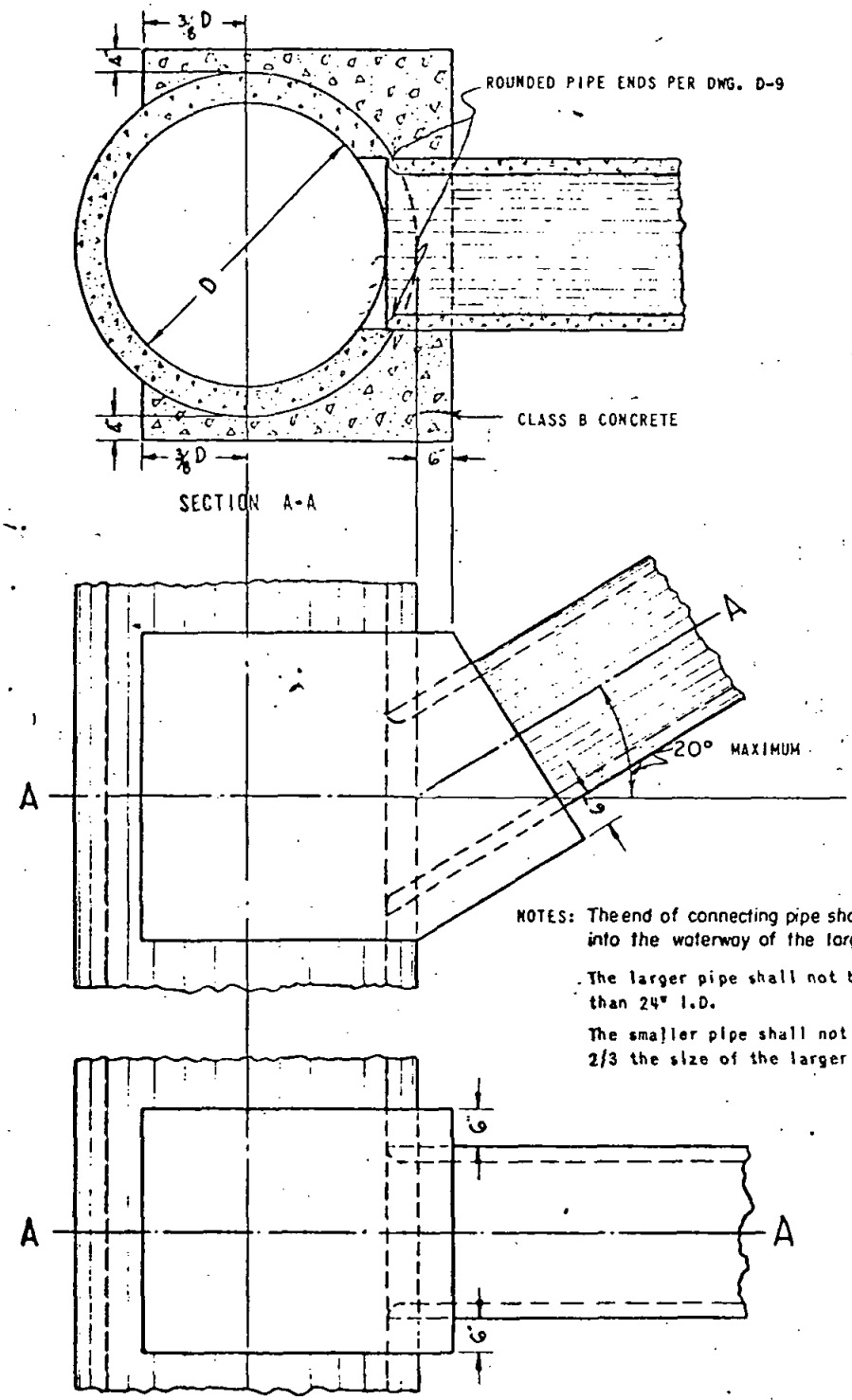
SECTION A-A

NOTES

1. Refer to standard drawing D-4 for additional notes and details.
2. In unpaved areas, except streets, raise cover to 6" min. above finish grade. In streets, raise cover to finish grade.

SPECIFICATION REFERENCE	COUNTY OF SAN DIEGO STANDARD DRAWING	
	STORM DRAIN CLEANOUT	0 1 2 FT.
	TYPE A	SCALE 1/2" = 1'-0"
		DRAWING NO. D-11

REVISIONS				APPROVALS		
DESCRIPTION	BY	APPROVED	DATE	COUNTY ENGINEER	H. M. Taylor	11/10/72



NOTES: The end of connecting pipe shall not project into the waterway of the larger pipe.

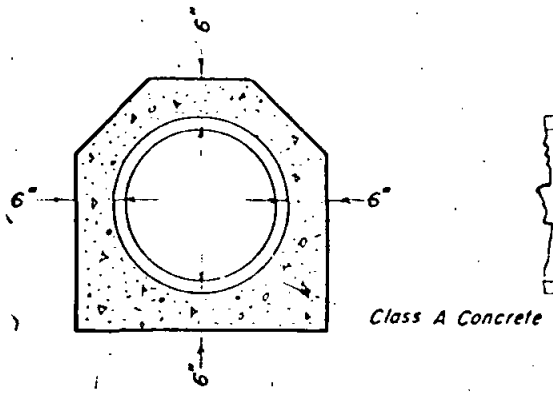
The larger pipe shall not be less than 24" I.D.

The smaller pipe shall not be more than 2/3 the size of the larger pipe.

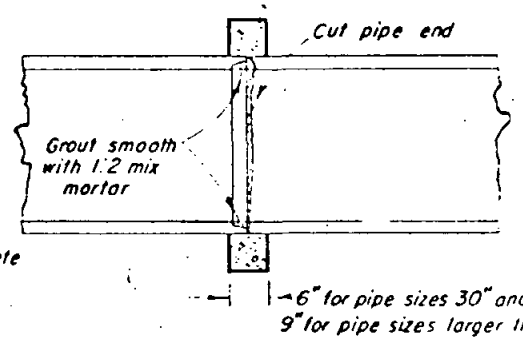
Legend on plans:

SPECIFICATION REFERENCE	COUNTY OF SAN DIEGO STANDARD DRAWING	SCALE NONE
	CONCRETE LUG	DRAWING NO. D-12

REVISIONS				APPROVALS		
DESCRIPTION	BY	APPROVED	DATE	COUNTY ENGINEER	H. M. Taylor	11/10/72

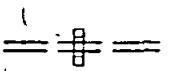


ELEVATION



SECTION

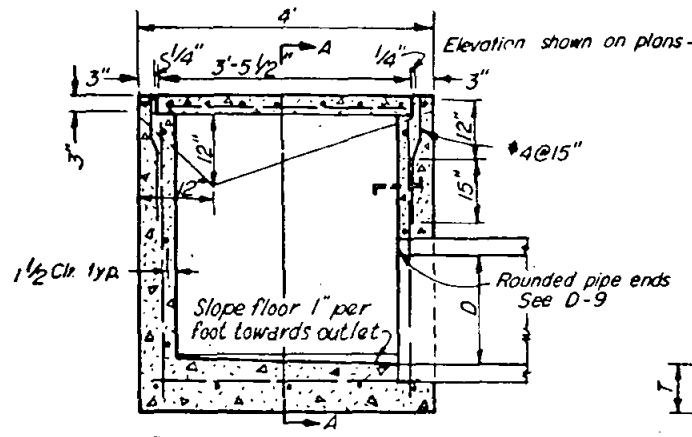
Legend on Plans



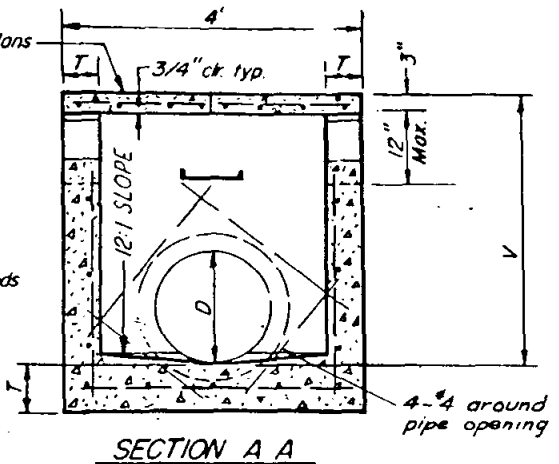
SPECIFICATION REFERENCE	COUNTY OF SAN DIEGO STANDARD DRAWING	0 — 1'-0"
	PIPE COLLAR	SCALE 3/4" = 1'-0"
		DRAWING NO. D-14

REVISIONS				APPROVALS		
DESCRIPTION	BY	APPROVED	DATE	COUNTY ENGINEER	H.M. Taylor	Walter

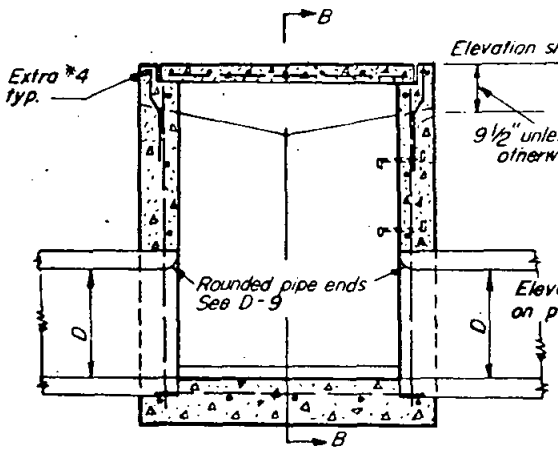
Legend on plans



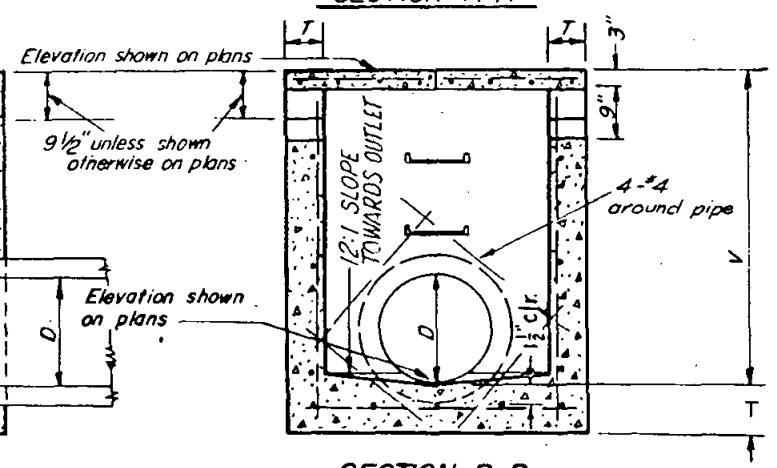
TYPE I DROP INLET



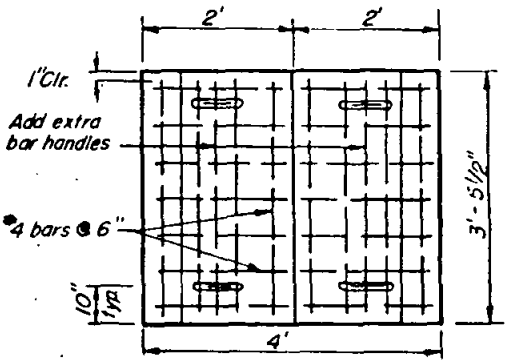
SECTION A A



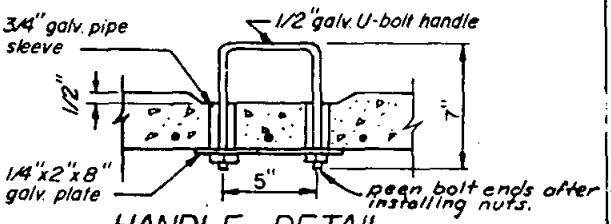
TYPE J DROP INLET



SECTION B-B



CONCRETE COVER



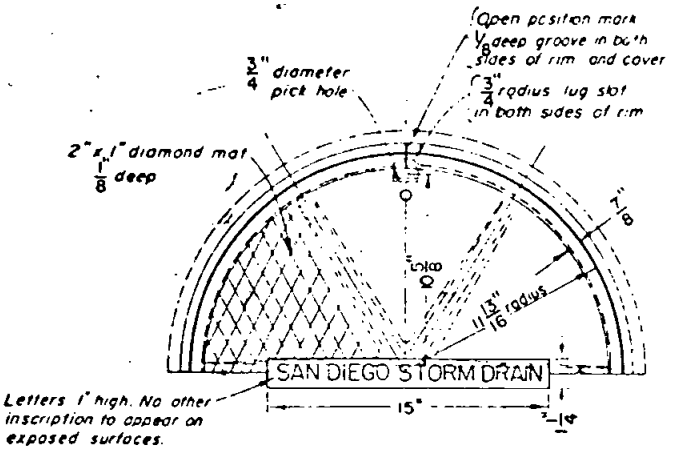
HANDLE DETAIL

NOTES:

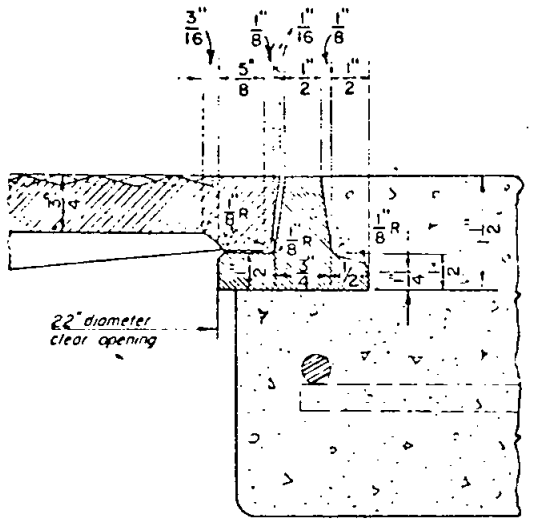
1. Refer to Standard Drawing D-4 for additional notes and details.
2. Type I and type J drop inlets are the same with the exception of the openings.
3. All exposed edges on top of inlet to be rounded to 1/2" radius.
4. Openings on both sides unless shown otherwise on plans.

SPECIFICATION REFERENCE	COUNTY OF SAN DIEGO STANDARD DRAWING	
	TYPE I AND TYPE J INLETS	SCALE 1/2" = 1'-0" (0 1 2 FT.)
		DRAWING NO. D-15

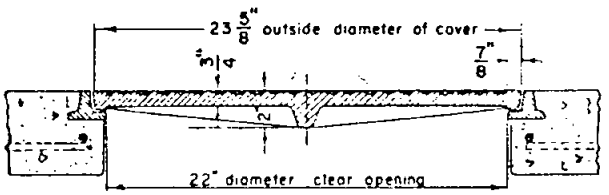
REVISIONS				APPROVALS		
DESCRIPTION	BY	APPROVED	DATE	COUNTY ENGINEER	A.M. Taylor	11/10/72



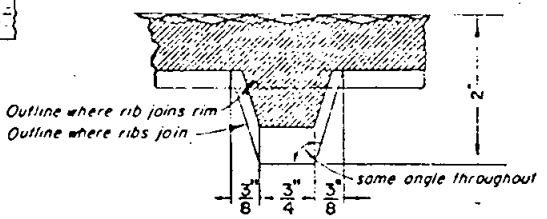
TOP OF FRAME & COVER



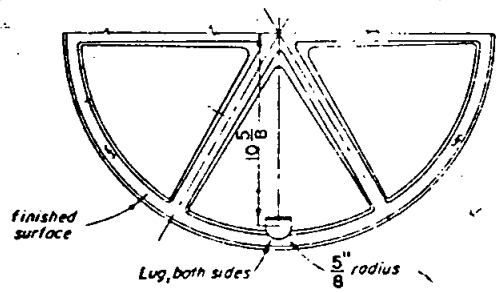
SECTION THROUGH RIM



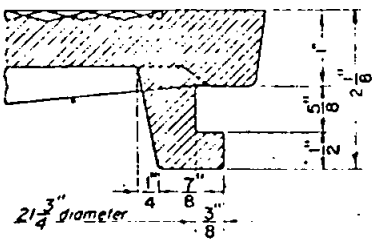
SECTION THROUGH FRAME & COVER



SECTION THROUGH RIB AT MID RADIUS



BOTTOM OF COVER

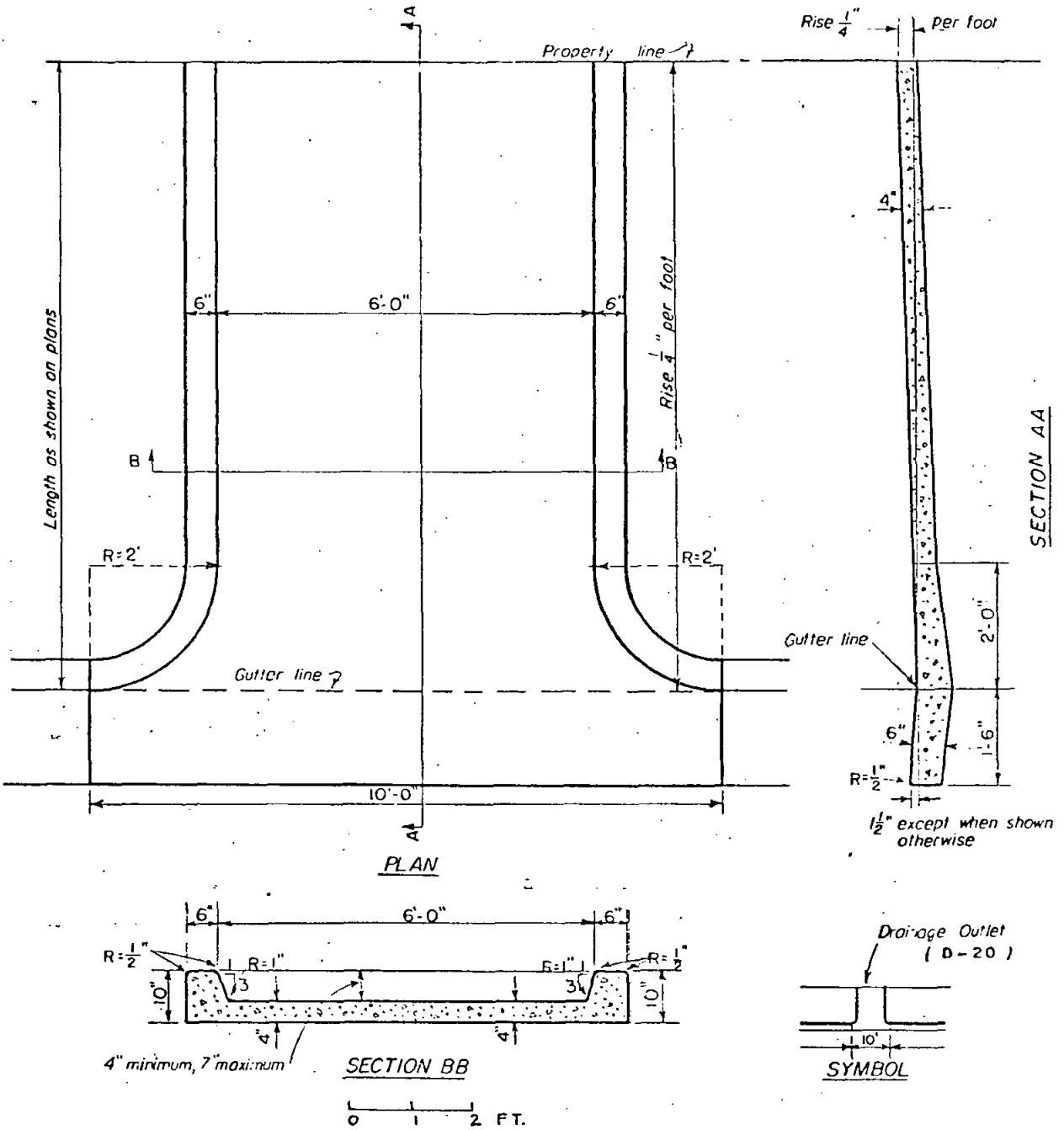


SECTION THROUGH LUG

Notes: Frame and cover shall be cast iron
Inlet frame and cover for use in sidewalk area only

SPECIFICATION REFERENCE	COUNTY OF SAN DIEGO STANDARD DRAWING	SCALE None
	INLET FRAME AND COVER	DRAWING NO. D-18

REVISIONS				APPROVALS		
DATE	DESCRIPTION	BY	APPROVED	COUNTY ENGINEER	H. M. Taylor	[illegible]
2/1/79	REMOVED REFER. TO CLASS "A" P.C.C.	J.E.B.	[illegible]			



Specification Reference					

COUNTY OF SAN DIEGO . ENGINEERING DEPARTMENT

STANDARD

DRAINAGE OUTLET

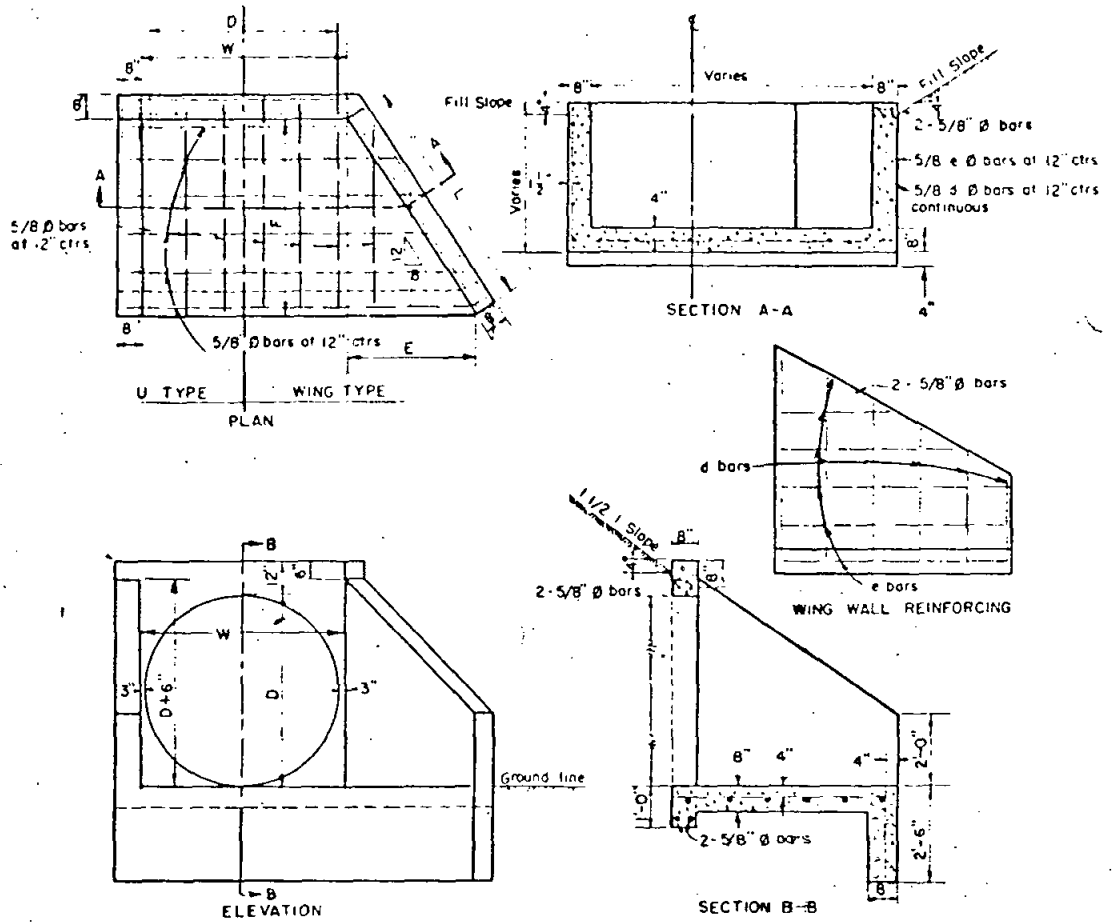
(For Sidewalk Areas)

DRAWING NUMBER

D-20

FORM 147 (500 4-83)

REVISIONS				APPROVALS		
DESCRIPTION	BY	APPROVED	DATE	COUNTY ENGINEER	H. M. Taylor	1/10/72



WING & U TYPE HEADWALLS FOR 42" TO 84" PIPES (1 1/2 : 1 FILL SLOPES)

DIAM OF PIPE	DIMENSIONS L	E	F	AREA OF WATERWAY SQ FT	W	SINGLE PIPE U TYPE CONCRETE CU YDS	U TYPE STEEL LBS	WING TYPE CONCRETE CU YDS	WING TYPE STEEL LBS	DOUBLE PIPE DIAM OF PIPE	AREA OF WATERWAY SQ FT	W	U TYPE CONCRETE CU YDS	U TYPE STEEL LBS	WING TYPE CONCRETE CU YDS	WING TYPE STEEL LBS
42"	3'-7 1/4	2'-0"	3'-0"	9.62	4'-0"	1.57	117	1.90	135	42"	19.24	9'-10"	2.69	190	3.16	214
48"	4'-6"	2'-6"	3'-9"	12.56	4'-6"	1.97	153	2.48	184	48"	25.12	11'-2"	3.43	252	4.06	286
54"	5'-4 7/8"	3'-0"	4'-6"	15.90	5'-0"	2.41	190	3.07	246	54"	31.80	12'-5"	4.24	319	5.06	368
60"	6'-3 3/4"	3'-6"	5'-3"	19.63	5'-6"	2.88	239	3.75	294	60"	39.26	13'-10"	5.13	386	6.17	442
66"	7'-2 1/2"	4'-0"	6'-0"	23.76	6'-0"	3.38	294	4.52	356	66"	47.52	15'-2"	6.08	454	7.20	516
72"	8'-1 3/8"	4'-6"	6'-9"	28.27	6'-6"	3.93	369	5.52	417	72"	56.54	16'-6"	7.11	522	8.30	588
78"	9'-0"	5'-0"	7'-6"	33.18	7'-0"	4.50	444	6.70	503	78"	67.36	17'-4"	8.20	595	9.50	693
84"	9'-10 3/4"	5'-6"	8'-3"	38.48	7'-6"	5.21	540	8.15	619	84"	76.96	18'-8"	9.50	687	10.80	786

NOTE - Dimensions E and L apply to Wing type only

GENERAL NOTES

Concrete All concrete to be class A
All exposed corners to be chamfered 3/4"
Exposed surfaces to have standard finish

Reinforcing Steel All reinforcing steel to be round deformed bars of structural grade

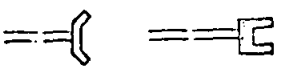
Multiple Pipes to be set with longitudinal center lines 1 2/3 diameters of pipe apart.

Skewed Pipes Dimension W to be increased to take care of increased width or length due to skew or multiple pipes

Tops of headwalls on grade culverts shall be placed parallel to profile grade when the grades are 3% or more.

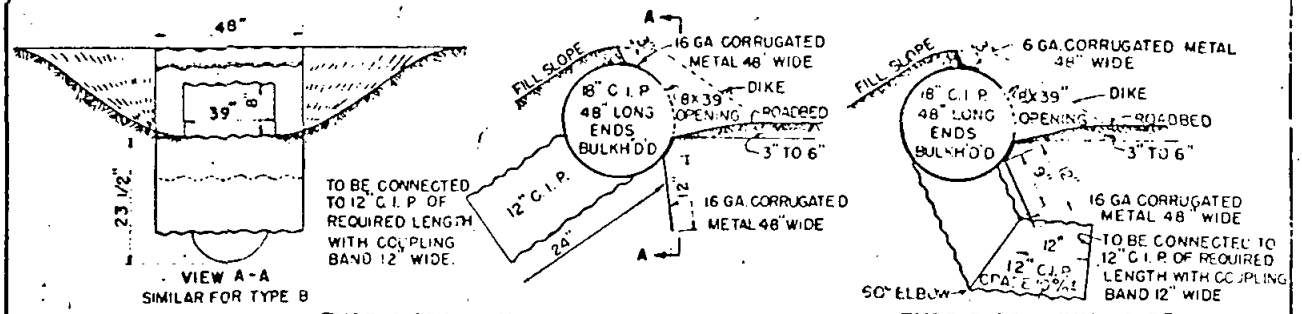
Quantities shown in tables are for 1 headwall.

LEGEND ON PLANS



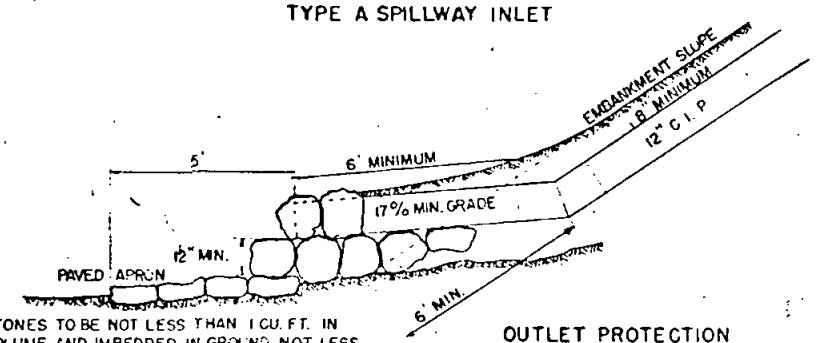
SPECIFICATION REFERENCE	COUNTY OF SAN DIEGO STANDARD DRAWING	NONE
	WING & U - TYPE HEADWALLS	SCALE
	FOR 42" TO 84" PIPES	DRAWING NO.
		D-24

REVISIONS				APPROVALS		
DESCRIPTION	BY.	APPROVED	DATE	COUNTY ENGINEER	H. W. Taylor	11/15/72



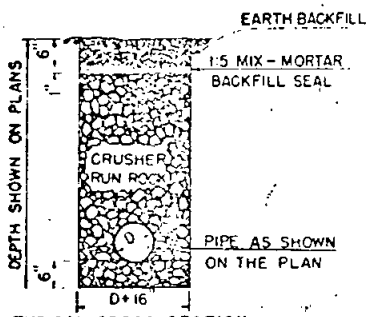
TYPE A SPILLWAY INLET

TYPE B SPILLWAY INLET

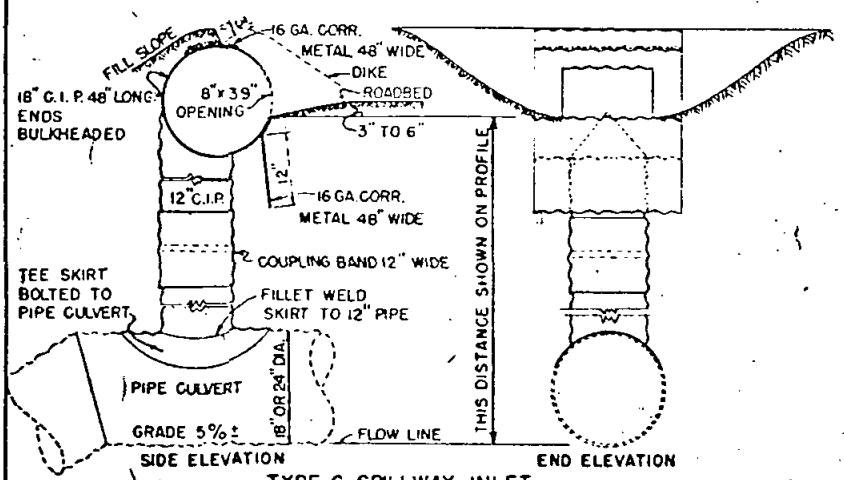


STONES TO BE NOT LESS THAN 1 CU. FT. IN VOLUME AND IMBEDDED IN GROUND NOT LESS THAN 6". APRON TO HAVE A WIDTH OF 4'.

OUTLET PROTECTION FOR TYPE A ASSEMBLIES



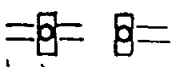
TYPICAL CROSS SECTION
UNDERDRAIN



TYPE C SPILLWAY INLET

C.I.P. MEANS CORRUGATED IRON PIPE.
BULKH'D'D MEANS BULKHEADED.
GA. MEANS GAGE.
CORR. MEANS CORRUGATED
MIN. MEANS MINIMUM.
DIA. MEANS DIAMETER.

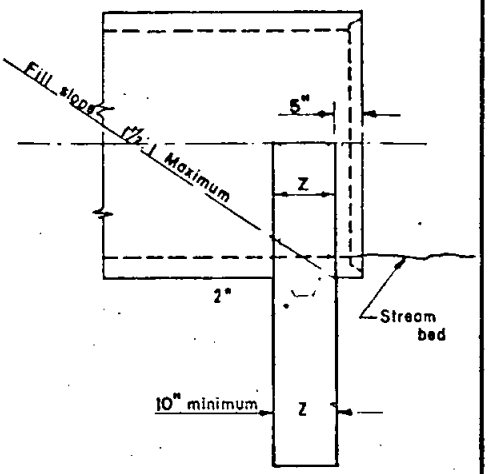
LEGEND ON PLAINS



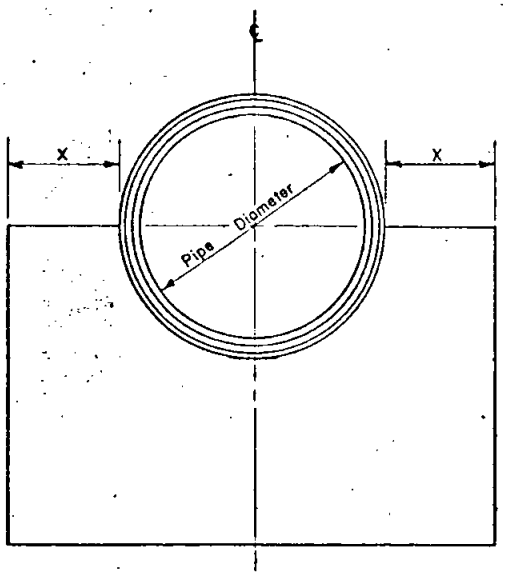
SPECIFICATION REFERENCE	COUNTY OF SAN DIEGO STANDARD DRAWING	NONE SCALE
	Type A, B & C Spillway Inlets and Underdrrain	DRAWING NO. D-25

REVISIONS				APPROVALS		
DESCRIPTION	BY	APPROVED	DATE	COUNTY ENGINEER	H. H. Taylor	11-10-72

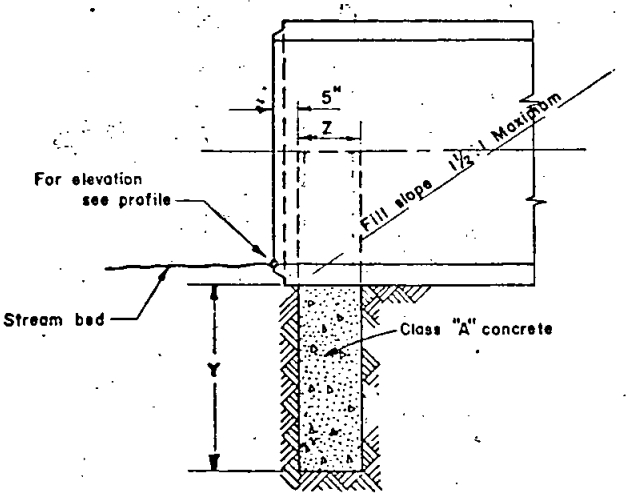
PIPE DIAMETER	X	Y	Z
12" to 24"	1'-0"	2'-0"	10"
21" to 36"	1'-6"	2'-6"	12"
39" to 48"	2'-0"	3'-0"	12"
51" to 60"	2'-6"	3'-0"	14"
63" & LARGER	3'-0"	3'-0"	16"



SIDE ELEVATION



FACE ELEVATION



CENTER LINE SECTION

GENERAL NOTES

A curtain wall shall be used in place of a headwall at culvert ends where extension of the culvert is considered imminent, or no fill slope is retained.

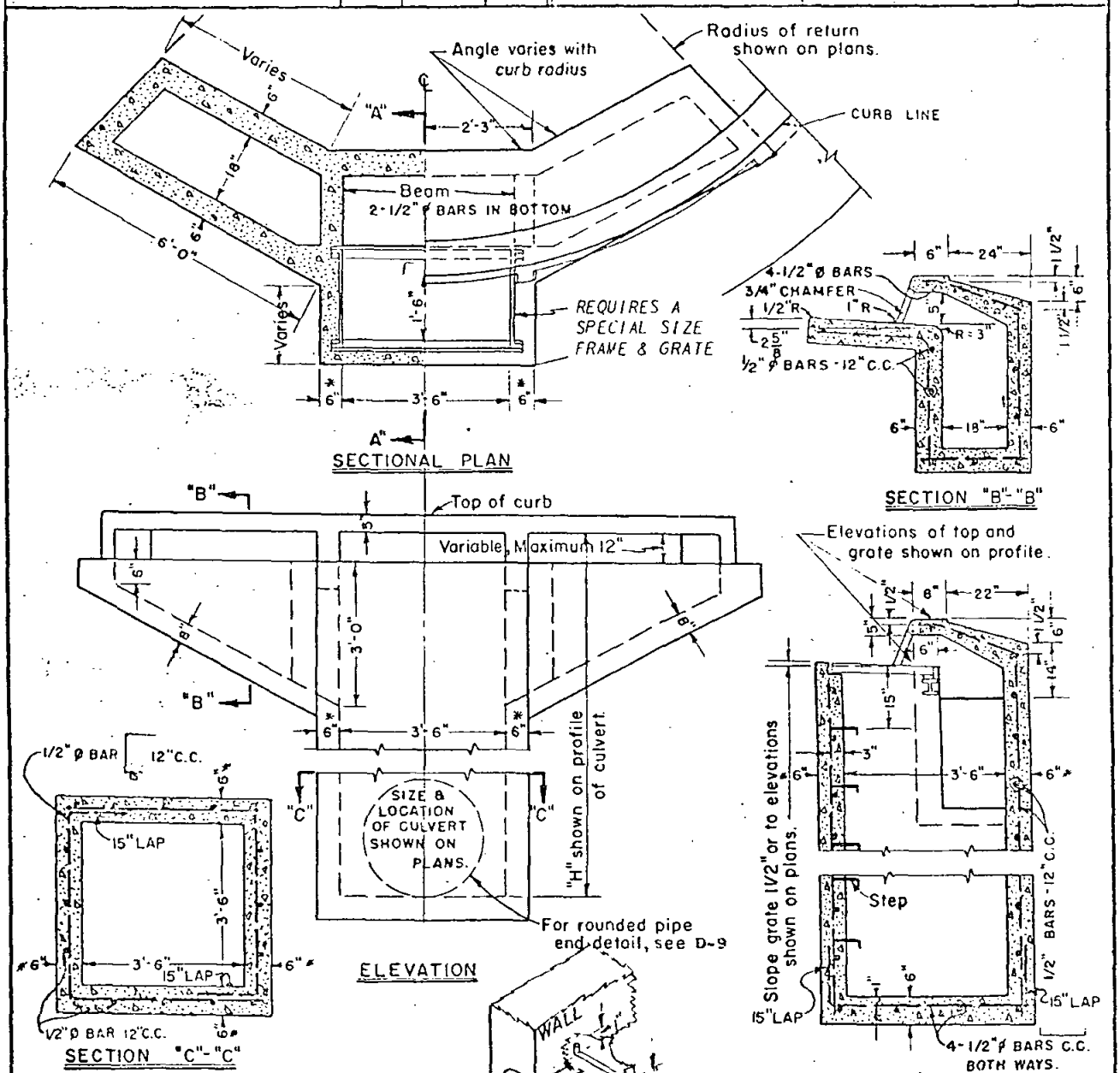
The dimension "Y" shall be increased if unstable material is encountered.

Keep the pipe-end clear of obstruction to permit easy placing of culvert extension.

Legend on plans:

SPECIFICATION REFERENCE	COUNTY OF SAN DIEGO STANDARD DRAWING	0 1 2 FT. SCALE ½" = 1'-0"
	CURTAIN WALL	DRAWING NO. D-28

REVISIONS				APPROVALS		
DESCRIPTION	BY	APPROVED	DATE	COUNTY ENGINEER	H. M. Taylor	11-10-72
COMMENT ON FRAME & GRATE	J.E.B.	[illegible]	2/1/74			



* NOTE: For sections extending deeper than 12'-0" below top of inlet, wall thickness shall be increased to 8". Special design required for "H" greater than 16'-0".

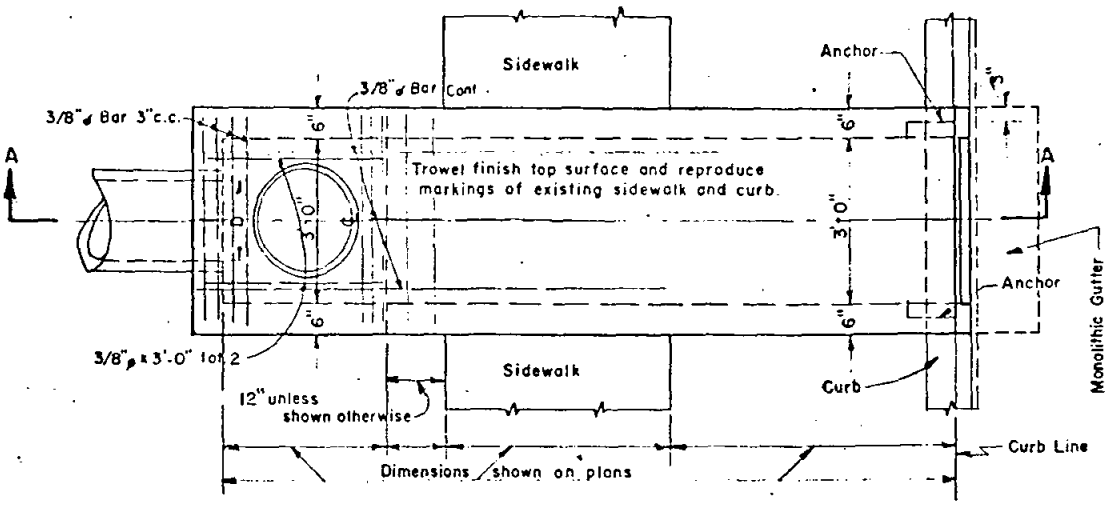
NOTE: When height exceeds 5', cast 5/8" round galvanized iron steps in wall, 15" apart.

NOTE: All concrete shall be Class A.
All reinforcing shall be deformed bars.

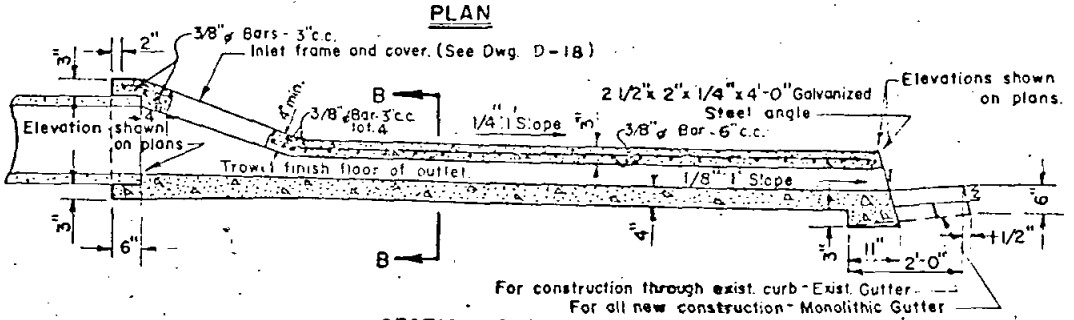
Legend on plans:

SPECIFICATION REFERENCE	COUNTY OF SAN DIEGO STANDARD DRAWING	SCALE 0 1 2 FT. 3/8" = 1'-0"
	TYPE G CURB INLET	DRAWING NO. D-34

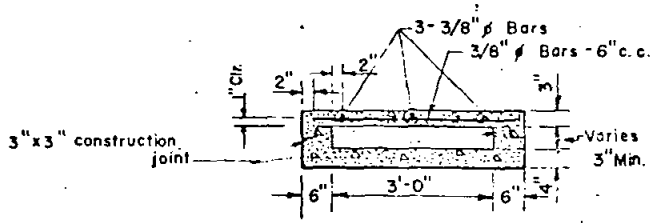
REVISIONS				APPROVALS		
DESCRIPTION	BY	APPROVED	DATE	COUNTY ENGINEER	H. W. Taylor	11-10-72



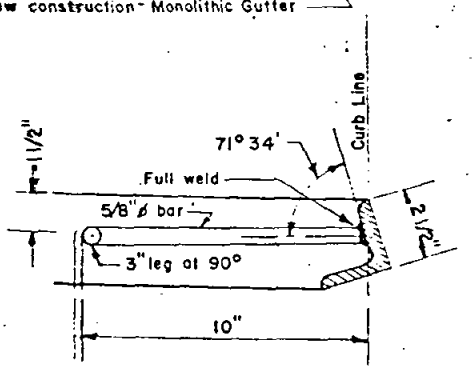
PLAN



SECTION A-A



SECTION B-B



DETAIL OF ANCHOR

No Scale

NOTES:

All concrete shall be Class A.

Cut sidewalk and curb in accordance with drawing- G-33

D = inside diameter of pipe.

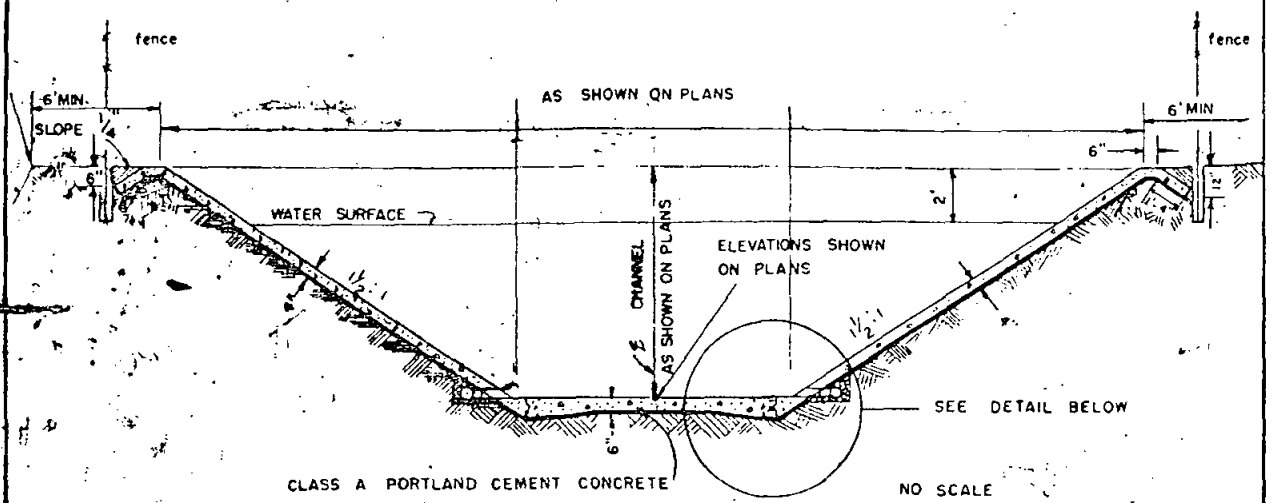
Section to be sloped laterally with top conforming to the grades of the existing sidewalk and curb.

The use of this type structure is restricted to locations having had the advance approval of the County Engineer.

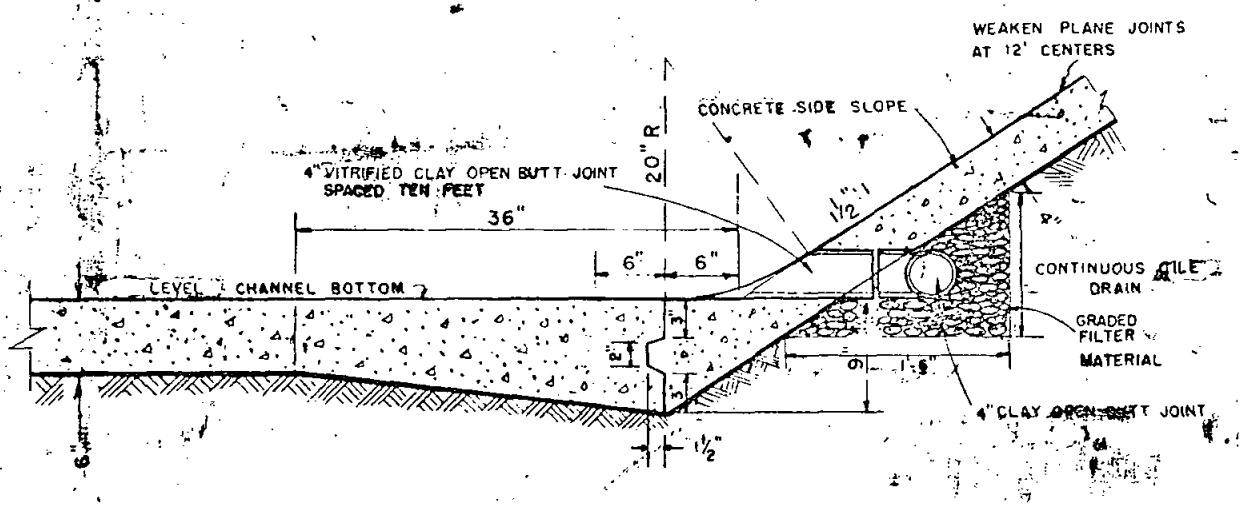
Legend on plans.

SPECIFICATION REFERENCE	COUNTY OF SAN DIEGO STANDARD DRAWING	SCALE 0 1 2 FT. 3/8" = 1'-0"
	CURB OUTLET	DRAWING NO. D-35

REVISIONS				APPROVALS		
DESCRIPTION	BY	APPROVED	DATE	COUNTY ENGINEER	H. M. Toyler	11-19-72



TYPICAL CROSS SECTION OF DRAINAGE CHANNEL



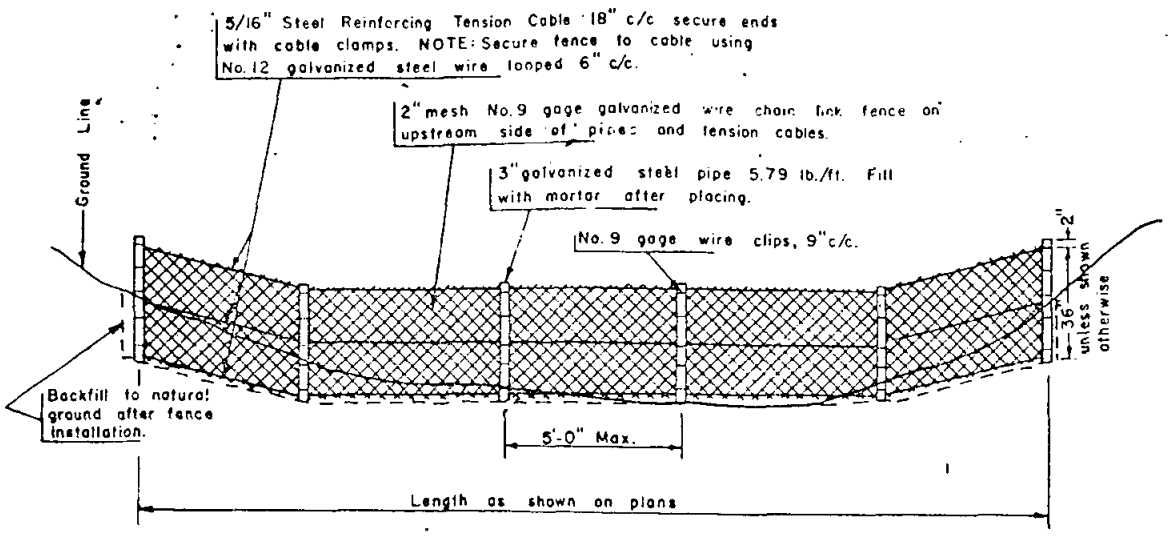
DETAIL

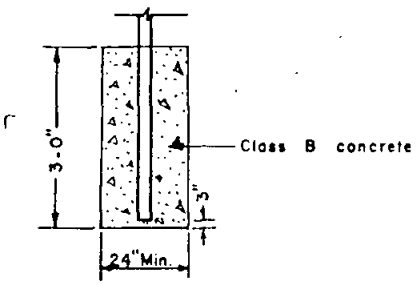
SCALE: 1" = 1'

LEGEND ON PLANS

SPECIFICATION REFERENCE	COUNTY OF SAN DIEGO	STANDARD DRAWING	AS SHOWN SCALE
	DRAINAGE	CHANNEL	DRAWING NO. D-40

REVISIONS				APPROVALS		
DESCRIPTION	BY	APPROVED	DATE	COUNTY ENGINEER	H. M. Taylor	11-10-72

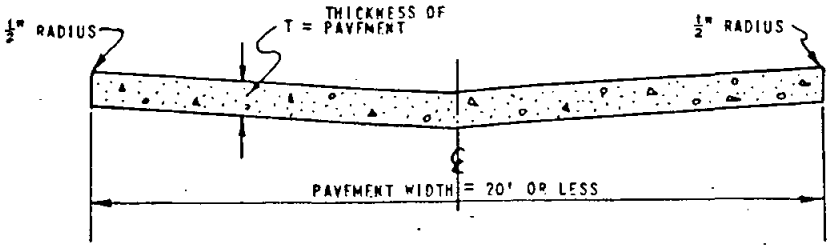




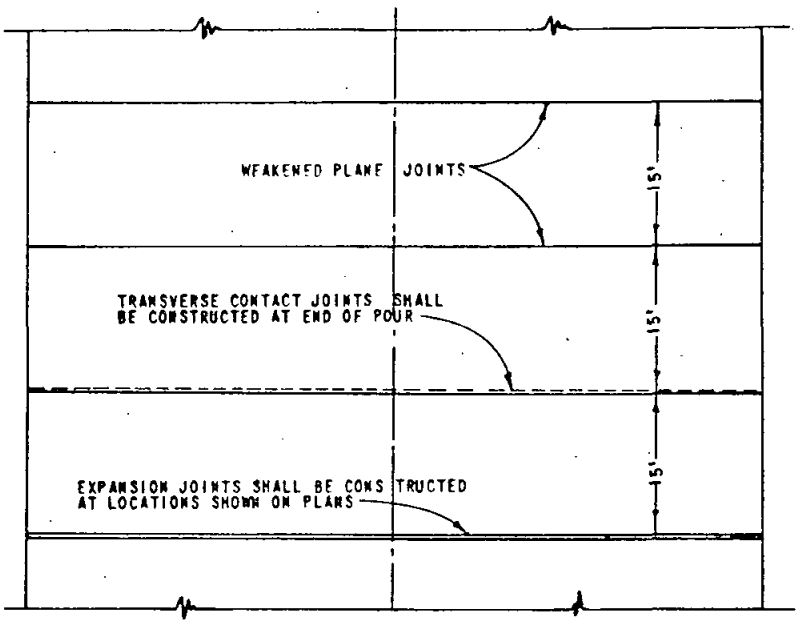
Detail of Footing

SPECIFICATION REFERENCE	COUNTY OF SAN DIEGO STANDARD DRAWING	
	TRASH FENCE	SCALE NONE
		DRAWING NO D-61

REVISIONS				APPROVALS		
DESCRIPTION	BY	APPROVED	DATE	COUNTY ENGINEER	H.L.J. Taylor	11-12-73



TYPICAL SECTION

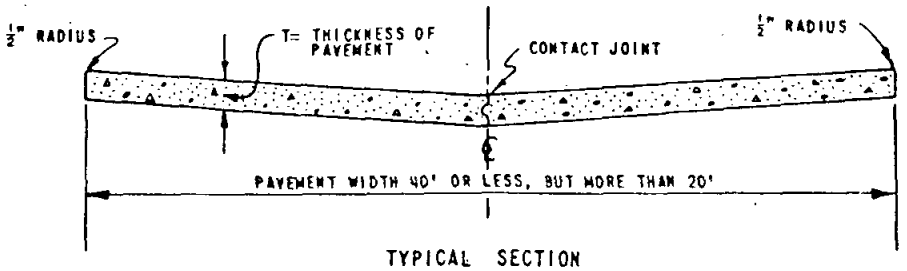


TYPICAL PLAN

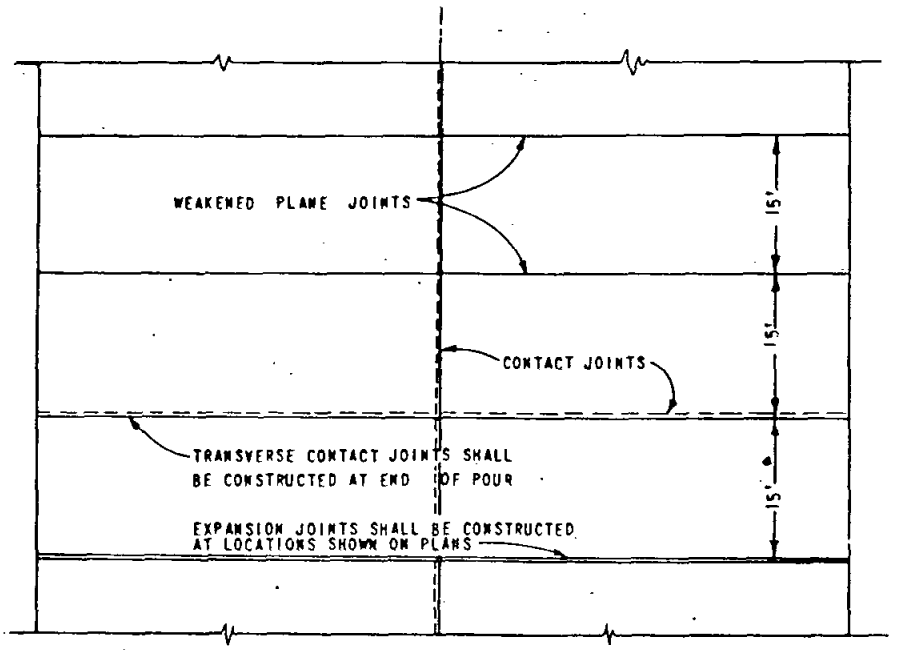
NOTE: ALL CONCRETE SHALL BE CLASS A.
SEE STD. DWG. G-42 FOR JOINT DETAILS
ADJUST 15' INTERVAL BETWEEN TRANSVERSE JOINTS TO MATCH ADJACENT EXISTING IMPROVEMENTS.

SPECIFICATION REFERENCE	COUNTY OF SAN DIEGO STANDARD DRAWING	
	CONCRETE PAVEMENT-ALLEY SECTION 20' width, or less	SCALE NONE DRAWING NO. G-11

REVISIONS				APPROVALS		
DESCRIPTION	BY	APPROVED	DATE	COUNTY ENGINEER	H. M. Taylor	11-10-78



TYPICAL SECTION

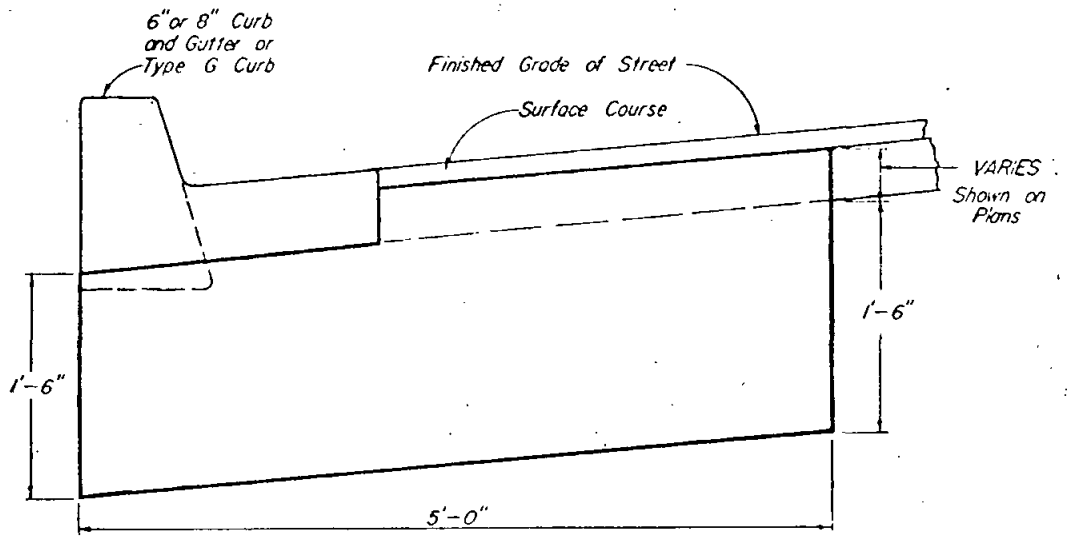


TYPICAL PLAN

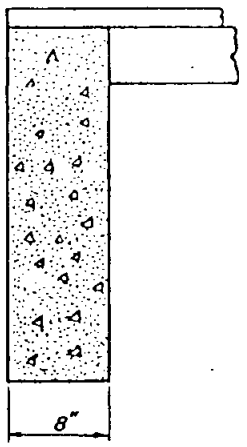
NOTE: ALL CONCRETE SHALL BE CLASS A.
SEE STD. DWG. G-42 FOR JOINT DETAILS
ADJUST 15' INTERVAL BETWEEN TRANSVERSE JOINTS TO MATCH ADJACENT EXISTING IMPROVEMENTS.

SPECIFICATION REFERENCE	COUNTY OF SAN DIEGO STANDARD DRAWING	
	CONCRETE PAVEMENT - ALLEY SECTION	SCALE NONE
	Pavement Width 40' or less, but more than 20'	DRAWING NO. G-12

REVISIONS				APPROVALS		
DESCRIPTION	BY	APPROVED	DATE	COUNTY ENGINEER	H. M. Taylor	11-10-72
REMOVED REFER. TO CLASS "A"	D.E.B.	[illegible]	[illegible]			



ELEVATION

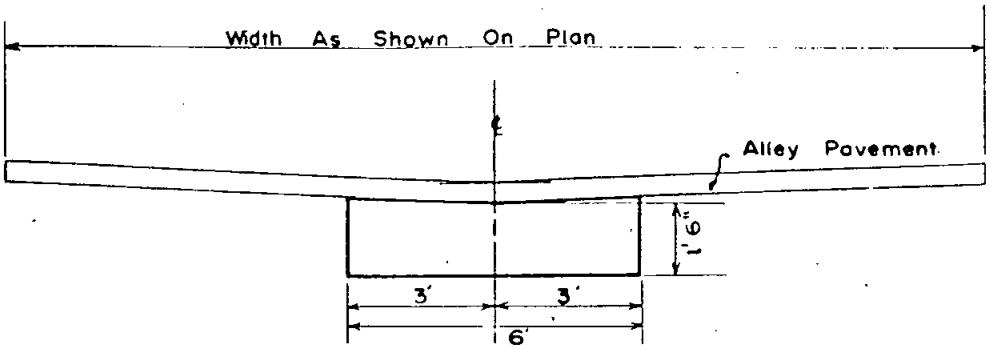


SECTION

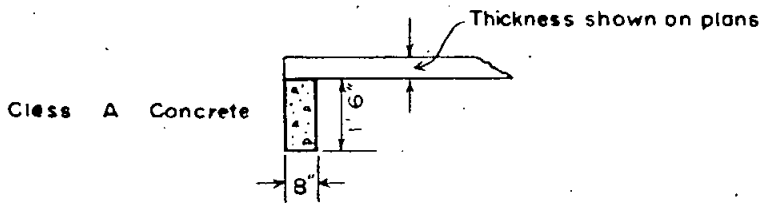
Legend on plan

SPECIFICATION REFERENCE	COUNTY OF SAN DIEGO STANDARD DRAWING	SCALE 1" = 1'-0"
	CUTOFF WALL AT END OF PAVEMENT	DRAWING NO. G-27

REVISIONS				APPROVALS		
DESCRIPTION	BY	APPROVED	DATE	COUNTY ENGINEER	H. M. Taylor	11-10-72



ELEVATION



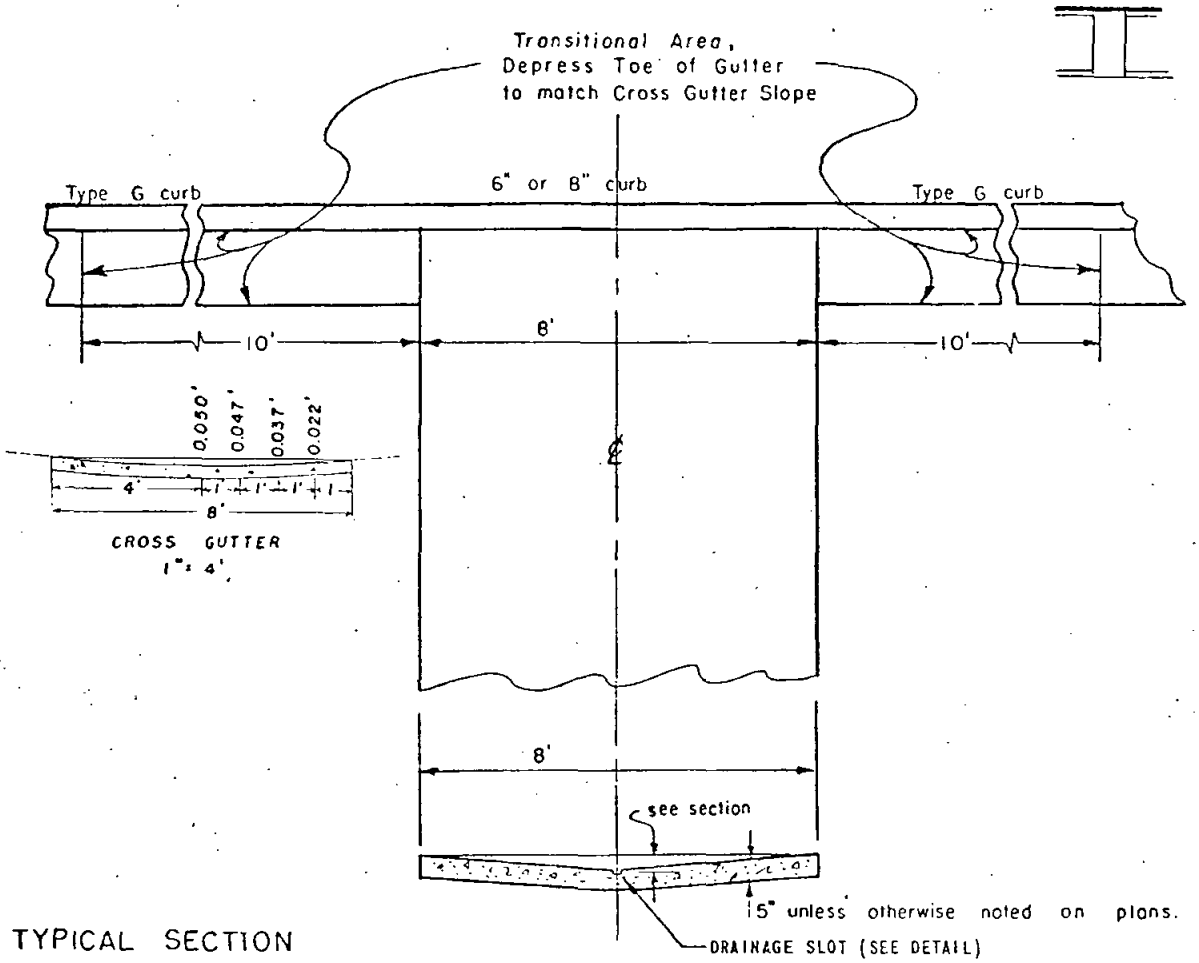
Section at ℄

Legend on plan

SPECIFICATION REFERENCE	COUNTY OF SAN DIEGO STANDARD DRAWING	1" = 3' SCALE
	CUTOFF WALL AT END OF ALLEY PAVEMENT	DRAWING NO. G-28

REVISIONS				APPROVALS		
DESCRIPTION	BY	APPROVED	DATE	COUNTY ENGINEER	H. M. Taylor	11-10-72
NOTE CHANGES	J.E.B.	[illegible]	2/1/74			

Legend as shown on the plans.



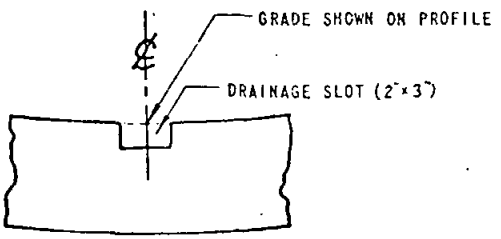
TYPICAL SECTION

NOTES:

Cross gutters shall be constructed in accordance with the County of San Diego Standard Specifications.

Cross gutter to be constructed where the drainage is carried across street and on a grade of at least 0.5%.

Drainage slot shall be constructed only where shown on plans. Slot shall be formed with 2"x3" (S4S).

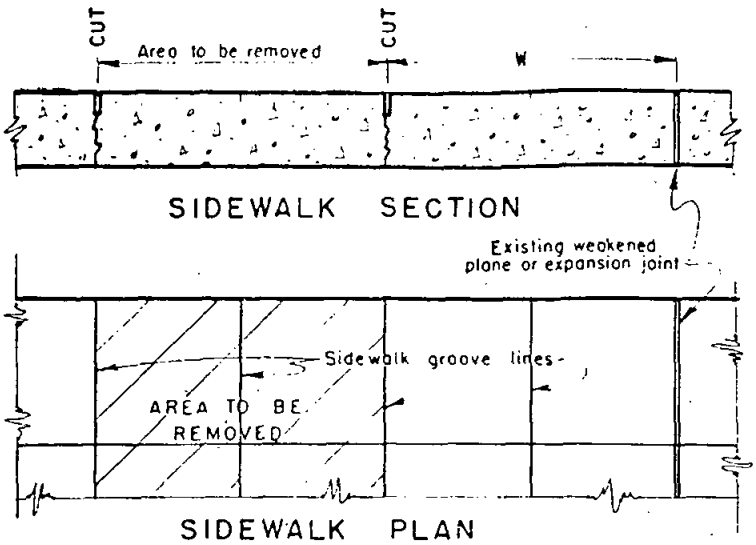


DRAINAGE SLOT DETAIL

(No Scale)

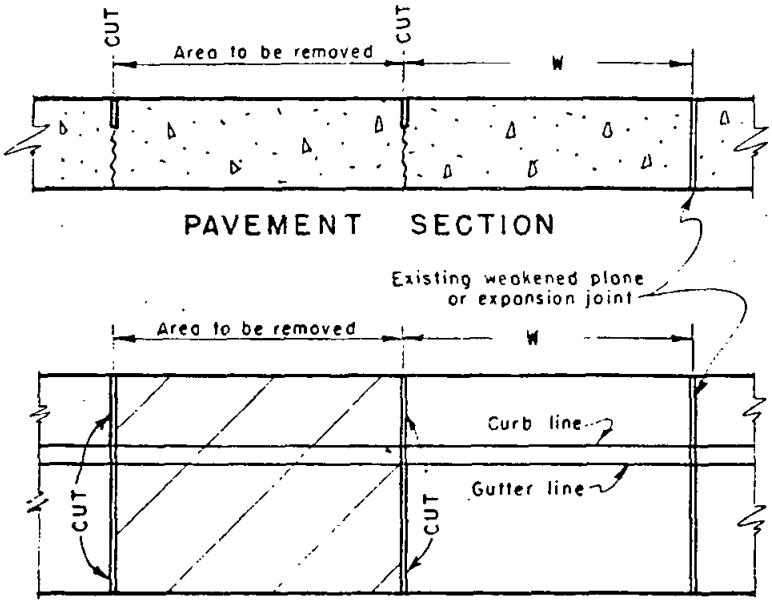
SPECIFICATION REFERENCE	COUNTY OF SAN DIEGO STANDARD DRAWING	
	CROSS GUTTER TYPE A	SCALE 1" = 3'
		DRAWING NO. G-32

REVISIONS				APPROVALS	
DESCRIPTION	BY	APPROVED	DATE	COUNTY ENGINEER	H. M. Taylor 11-10-[illegible]

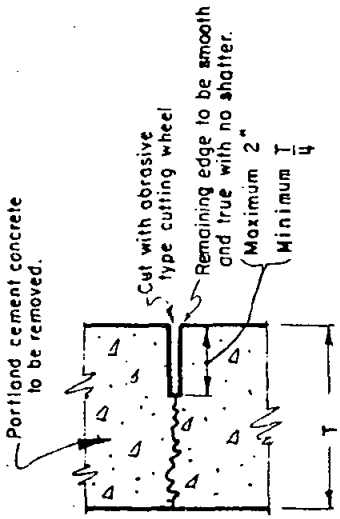


NOTES

1. Remove entire curb and gutter section to construct driveway or to replace with new curb.
2. Remove entire depressed curb and gutter section of abandoned driveways and replace with approved standard curb when other driveways are constructed to serve same property.
3. Remove existing 4" sidewalk and replace with 6" P.C.C. at locations of driveways constructed in commercial zones.
4. Remove and replace paved area adjacent to weakened plane or expansion joint when "W" is equal to or less than two feet.



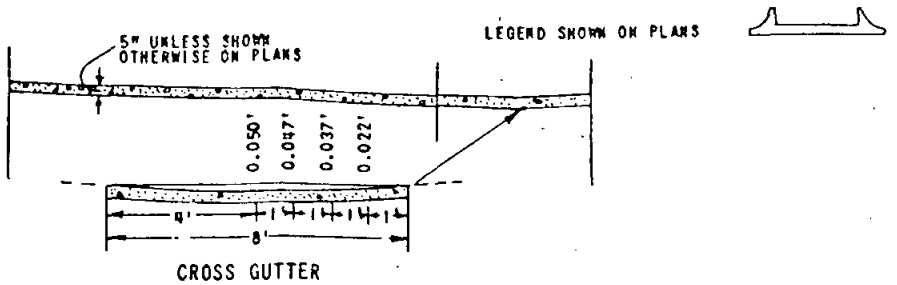
CURB PLAN



SECTION
Showing Cut

SPECIFICATION REFERENCE	COUNTY OF SAN DIEGO STANDARD DRAWING	
	PORTLAND CEMENT CONCRETE CURB GUTTER, SIDEWALK AND PAVEMENT REMOVAL AND REPLACEMENT.	SCALE: NONE DRAWING NO. G-33

REVISIONS				APPROVALS	
DESCRIPTION	BY	APPROVED	DATE	COUNTY ENGINEER	H. W. Taylor 11-10-72



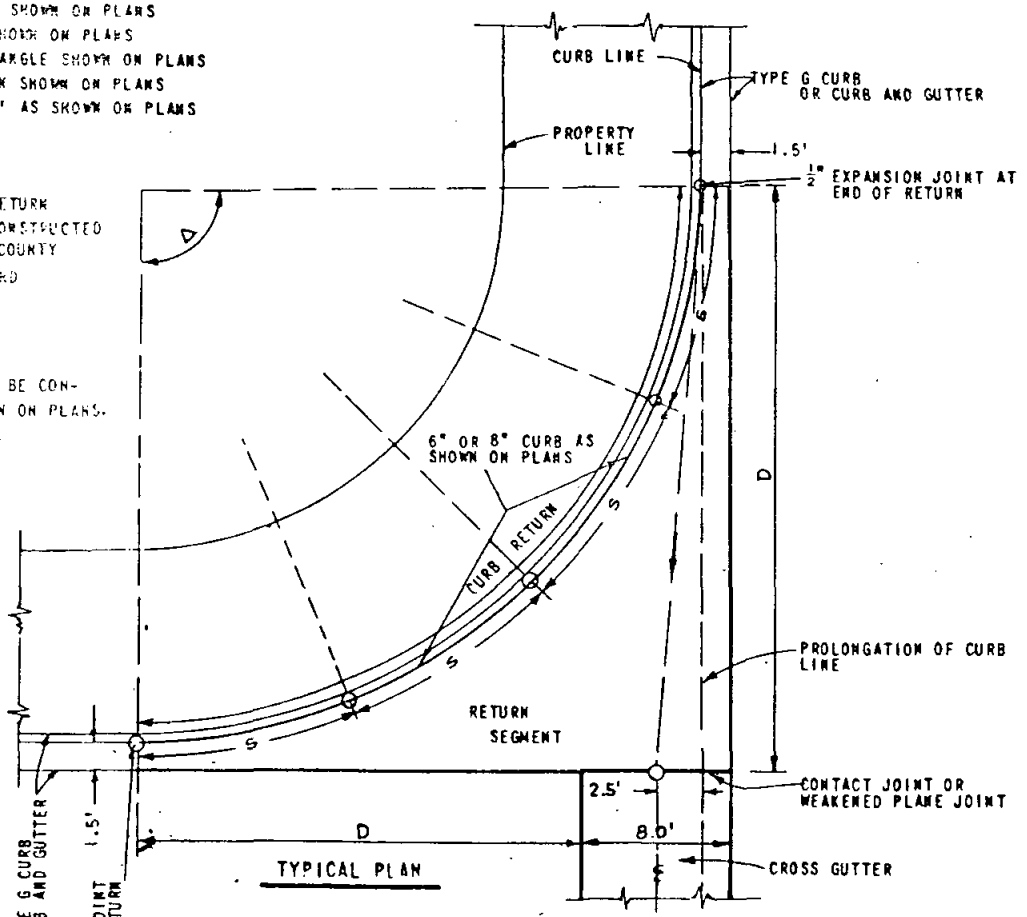
CROSS GUTTER

TYPICAL SECTIONS

NOTE: D = DISTANCE SHOWN ON PLANS
R = RADIUS SHOWN ON PLANS
Δ = CENTRAL ANGLE SHOWN ON PLANS
○ = ELEVATION SHOWN ON PLANS
S = 8' TO 12' AS SHOWN ON PLANS

CROSS GUTTERS AND RETURN SEGMENTS SHALL BE CONSTRUCTED IN ACCORDANCE WITH COUNTY OF SAN DIEGO STANDARD SPECIFICATIONS.

DRAINAGE SLOT SHALL BE CONSTRUCTED WHERE SHOWN ON PLANS. SEE G-32 FOR DETAIL.



TYPICAL PLAN

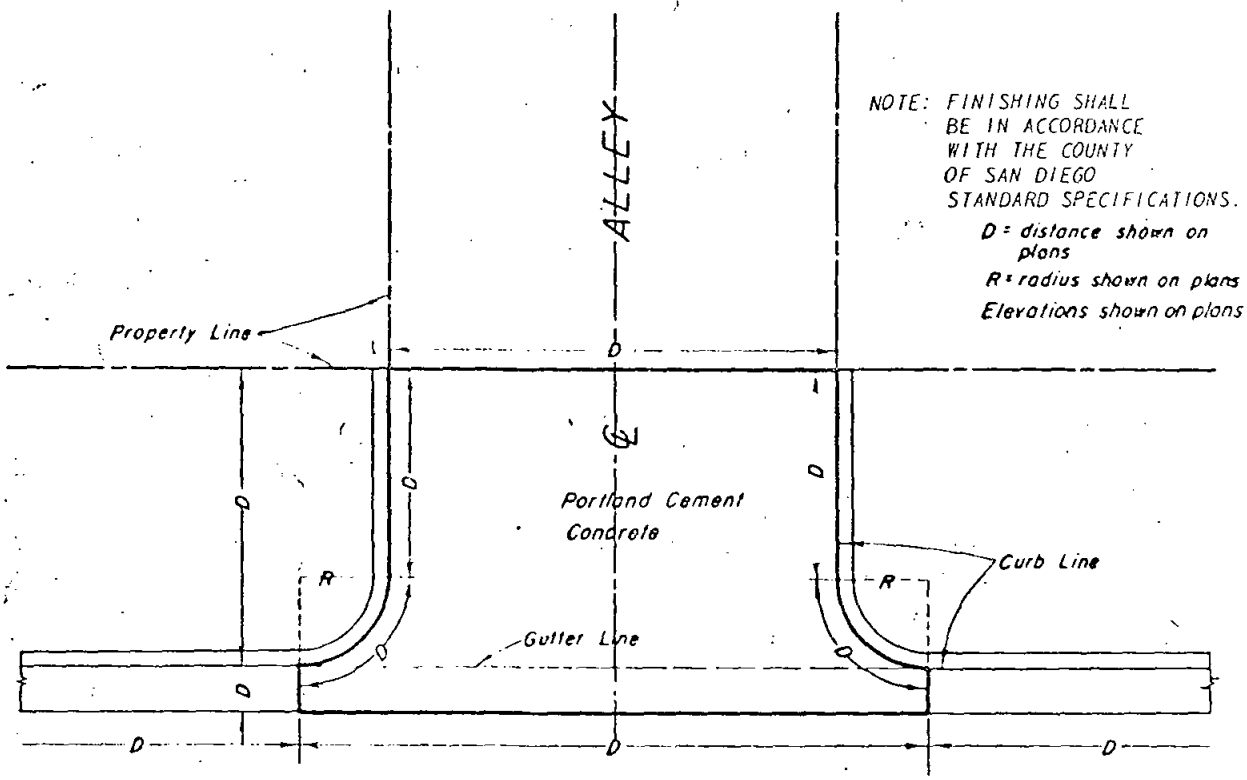
CROSS GUTTER AND RETURN SEGMENT TO BE CONSTRUCTED WHERE DRAINAGE IS CARRIED ACROSS STREET.

ALL CONCRETE SHALL BE CLASS A

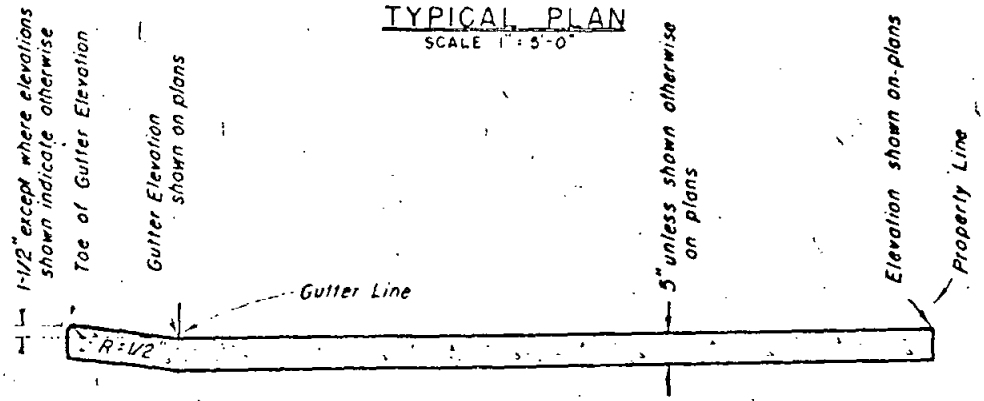
ON ALL CONTACT JOINTS THE TONGUE SHALL BE POURED FIRST. SEE STD. DWG. G-42 FOR JOINT DETAILS.

SPECIFICATION REFERENCE	COUNTY OF SAN DIEGO STANDARD DRAWING	
	CONCRETE CROSS GUTTER AND RETURN SEGMENT	SCALE AS SHOWN DRAWING NO. **G-35**

REVISIONS				APPROVALS		
DESCRIPTION	BY	APPROVED	DATE	COUNTY ENGINEER	[signature]	11-10-7[illegible]
NOTE ADDED	[illegible]	[signature]	2/1/7[illegible]			



TYPICAL PLAN
SCALE 1" = 5'-0"

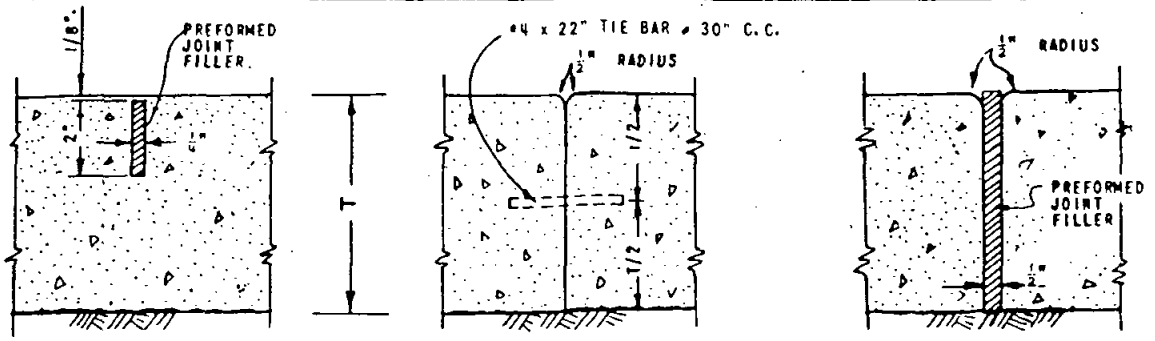


℄ SECTION
SCALE 1" = 2'-0"

Legend on Plans

SPECIFICATION REFERENCE	COUNTY OF SAN DIEGO STANDARD DRAWING	SCALE
	ALLEY APRON	DRAWING NO. G-39

REVISIONS				APPROVALS		
DESCRIPTION	BY	APPROVED	DATE	COUNTY ENGINEER	H M Taylor	4-10-70

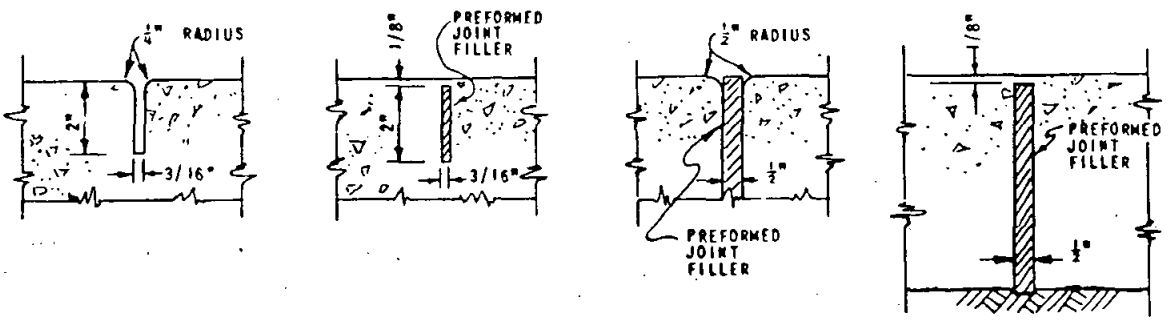


WEAKENED PLANE JOINT — CONTACT JOINT — EXPANSION JOINT

PAVEMENT

WEAKENED PLANE JOINT — EXPANSION JOINT

SIDEWALK



TOP AND CURB FACE — GUTTER SECTION — TOP AND CURB FACE — GUTTER SECTION

WEAKENED PLANE JOINT — EXPANSION JOINT

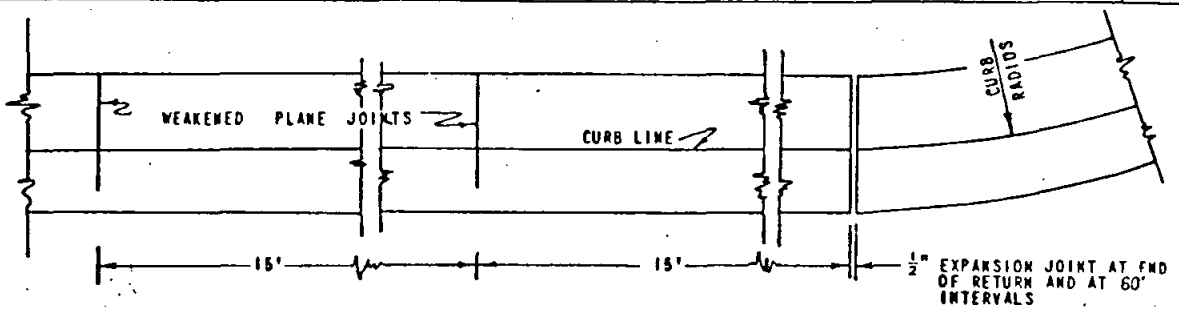
CURB

NOTE: PLACE EXPANSION JOINT FILLER MATERIAL IN TIGHT CONTACT WITH FORMS AND BASE.

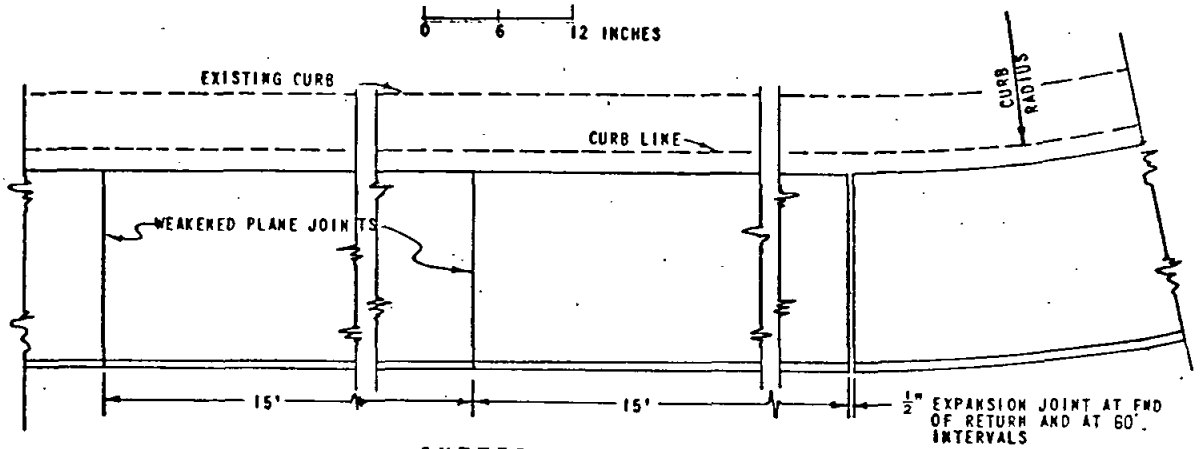
WEAKENED PLANE JOINTS MAY BE SAW CUT.
SEE STANDARD SPECIFICATIONS

SPECIFICATION REFERENCE	COUNTY OF SAN DIEGO STANDARD DRAWING PORTLAND CEMENT CONCRETE JOINTS FOR PAVEMENT, SIDEWALK, CURB AND CROSS GUTTER	SCALE - INCHES 0 2 4 DRAWING NO. G-42

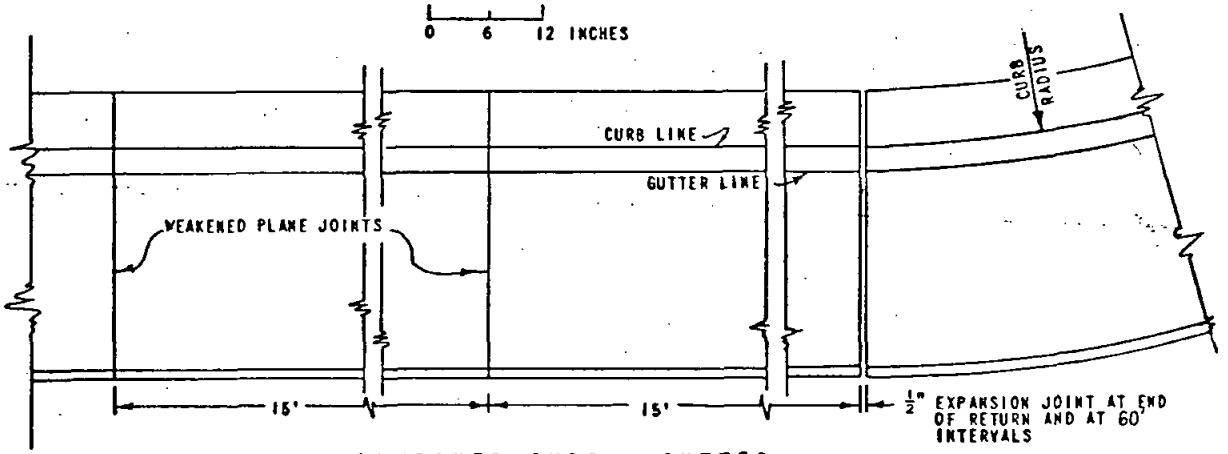
REVISIONS				APPROVALS		
DESCRIPTION	BY	APPROVED	DATE	COUNTY ENGINEER	H. W. Taylor	11-10-72
REMOVE NOTE ON CLASS "A" P.C.C.	J.E.B.	H. Kneland	2/1/74			



CURB
SCALE
0 6 12 INCHES



GUTTER
SCALE
0 6 12 INCHES



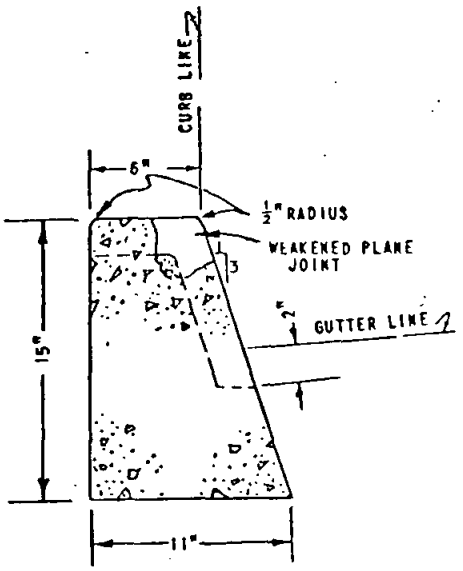
COMBINED CURB & GUTTER
SCALE 0 6 12 INCHES

NOTE:

ADJUST 15' INTERVAL BETWEEN TRANSVERSE JOINTS TO MATCH ADJACENT EXISTING IMPROVEMENTS.
SEE STD. DWG. G-42 FOR JOINT DETAILS.
SEE PROJECT PLANS FOR CURB TYPES.
SEE PROJECT PLANS FOR STREET WIDTH DIMENSIONS.
STREET AND SIDEWALK AREA WIDTHS ARE TO CURB LINE. ISLAND WIDTHS ARE TO GUTTER LINE.

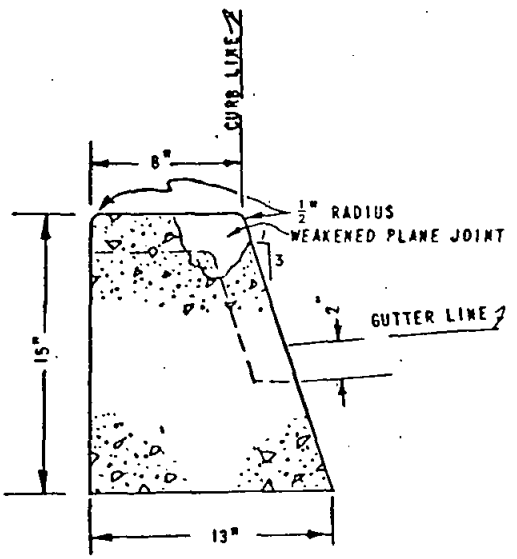
SPECIFICATION REFERENCE	COUNTY OF SAN DIEGO STANDARD DRAWING	
	CURBS AND GUTTERS TYPICAL PLANS	SCALE AS SHOWN DRAWING NO. G-43

REVISIONS				APPROVALS		
DESCRIPTION	BY	APPROVED	DATE	COUNTY ENGINEER	H.M. Taylor	11-10-72
REMOVED NOTE ON CLASS "A" P.C.C.	D.E.B.	[illegible]	2/1/74			



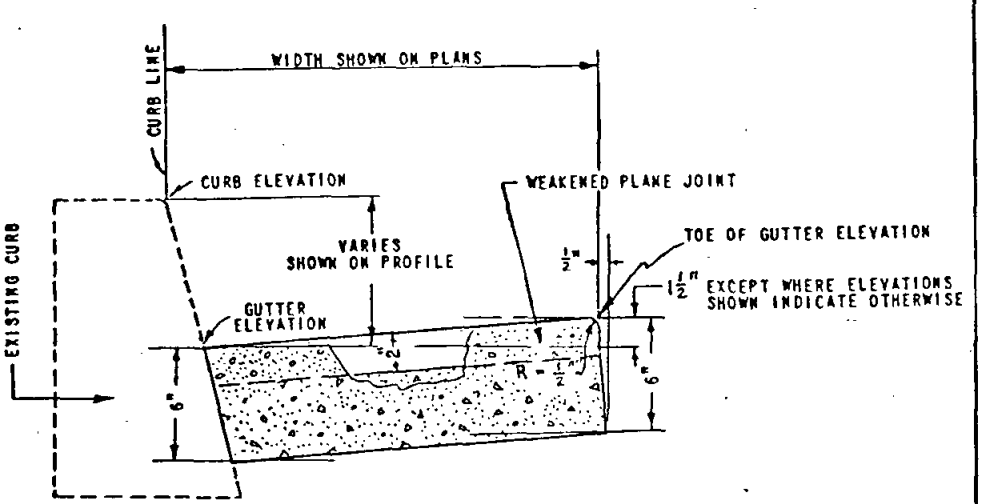
6" CURB

AREA = 0.89 SQ.FT.



8" CURB

AREA = 1.09 SQ.FT.



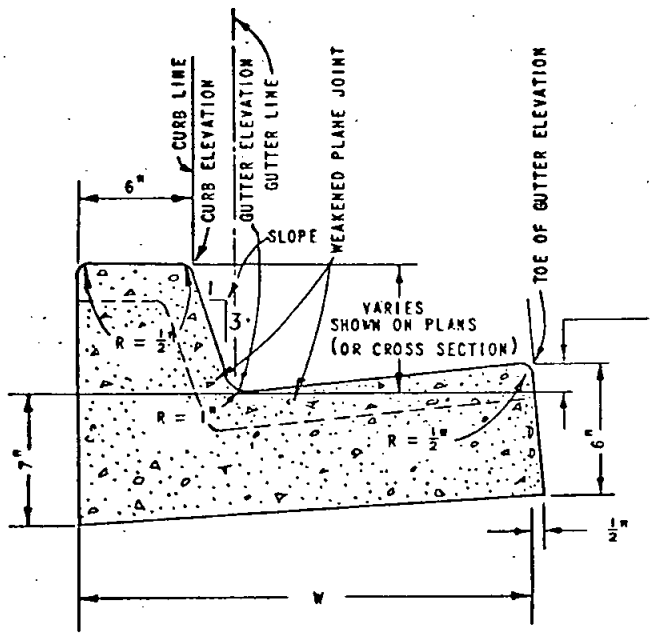
GUTTER

NOTE:

SEE DWG. G-42 FOR JOINT DETAILS.
SEE DWG. G-43 FOR TYPICAL PLANS.

SPECIFICATION REFERENCE	COUNTY OF SAN DIEGO STANDARD DRAWING	
	6" & 8" CURB SECTIONS & GUTTER SECTION	SCALE - INCHES 0 3 6
		DRAWING NO. G-44

REVISIONS				APPROVALS		
DESCRIPTION	BY	APPROVED	DATE	COUNTY ENGINEER	H. M. Taylor	11-10-72
REMOVED NOTE ON CLASS "A" P.C.C.	J.E.B.	R. Kuchard	2/1/74			



TYPE G & H CURB

TYPE	W	*AREA SQ.FT.
G	24"	1.37
H	30"	1.64

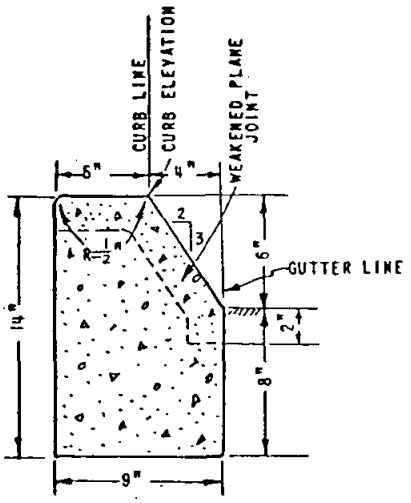
*WITH 6" CURB FACE

NOTE:

SEE DWG. G-42 FOR JOINT DETAILS
SEE DWG. G-43 FOR TYPICAL PLANS

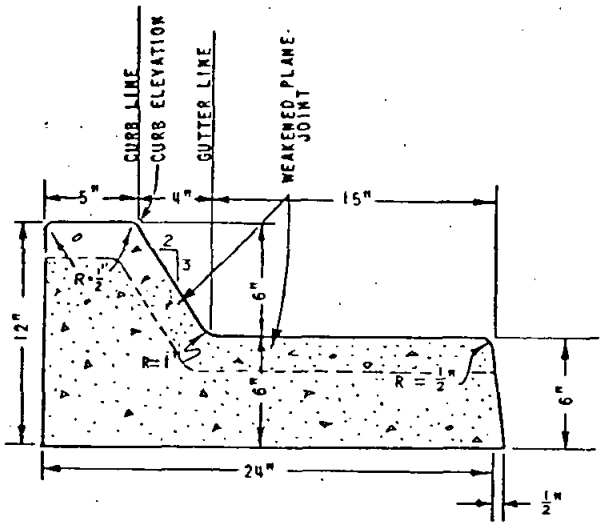
SPECIFICATION REFERENCE	COUNTY OF SAN DIEGO STANDARD DRAWING	
	CURB SECTIONS TYPES G & H	SCALE - INCHES 0 3 6
		DRAWING NO. G-45

REVISIONS				APPROVALS		
DESCRIPTION	BY	APPROVED	DATE	COUNTY ENGINEER	H. M. Taylor	11-10-72
REMOVED NOTE ON CLASS "A" P.C.C.	J.E.B.	R. Kirchand	2/1/74			



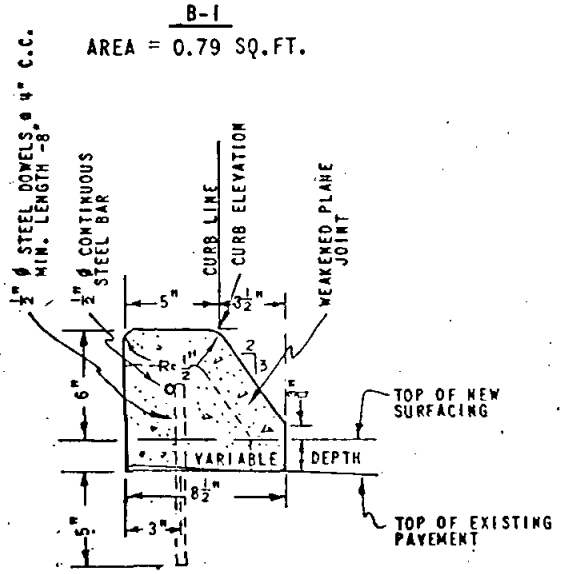
B-1

AREA = 0.79 SQ.FT.

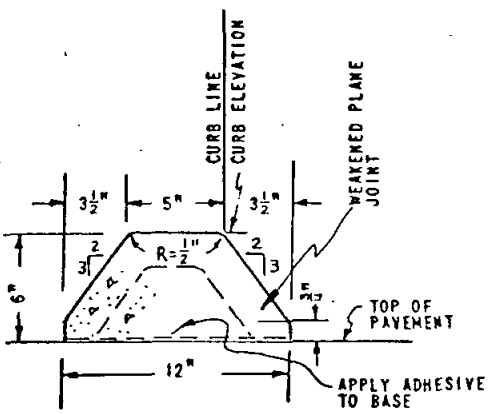


B-2

AREA = 1.29 SQ.FT.



B-3



B-4

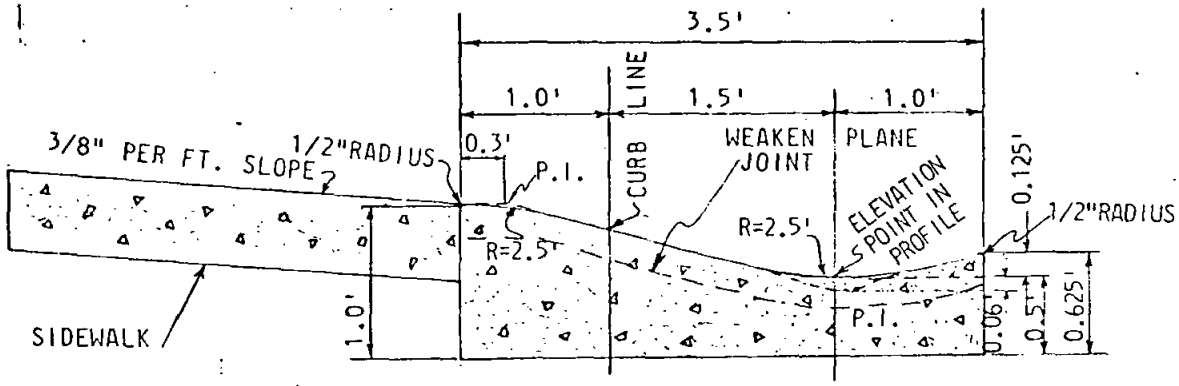
AREA = 0.35 SQ.FT.
(EXTRUDED TYPE)

NOTE:

SEE DWG. G-42 FOR JOINT DETAILS
SEE DWG. G-43 FOR TYPICAL CURB PLANS

SPECIFICATION REFERENCE	COUNTY OF SAN DIEGO STANDARD DRAWING	SCALE - INCHES 0 3 6
	CURB SECTIONS - TYPE B	DRAWING NO. G-46

REVISIONS				APPROVALS		
DESCRIPTION	BY	APPROVED	DATE	COUNTY ENGINEER	H. M. Taylor	11-10-77
NOTE CHANGE	J.E.B.	[illegible]	2/1/74			



TYPICAL SECTION

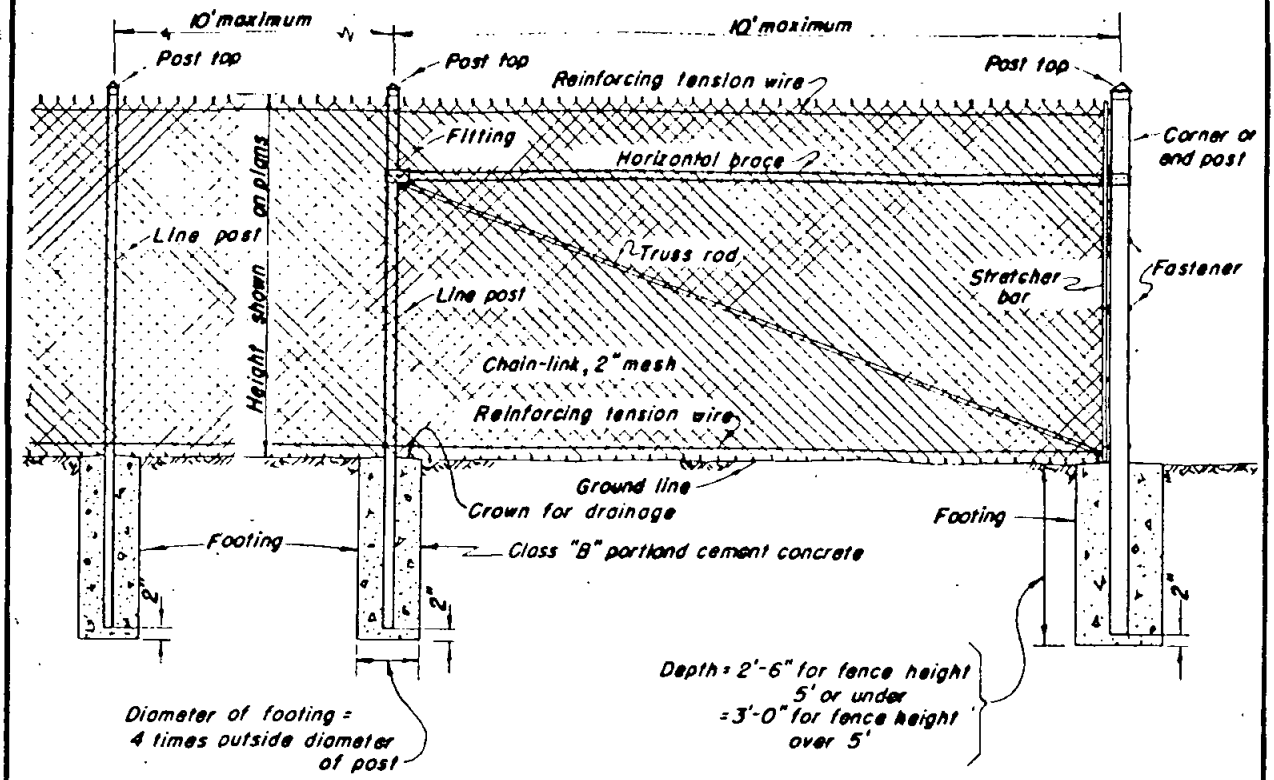
CURB AREA
2.33 □FT.

NOTES:-

1. TRANSITION TO A TYPE "G" CURB WILL BE PROVIDED AT ALL CURB RETURNS, AT ALL DRAINAGE STRUCTURES AND AT ALL CUL-DE-SACS WITH DRAINAGE STRUCTURES.
2. ALL CONCRETE SHALL BE CLASS "B".
3. SEE DRAWING G-42 FOR JOINT DETAILS.
4. SEE DRAWING G-43 FOR TYPICAL PLANS.
5. ALL CONCRETE WATER METER BOX COVERS AND LIDS SHALL BE CAST IRON.

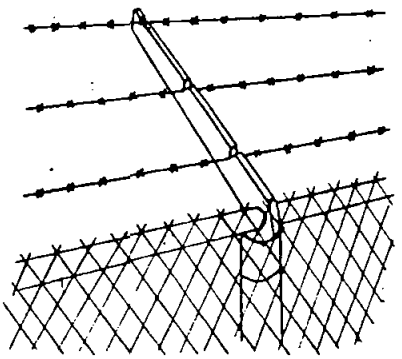
SPECIFICATION REFERENCE	COUNTY OF SAN DIEGO STANDARD DRAWING	
	CURB SECTION	SCALE NONE
	TYPE "D" ROLL CURBS	DRAWING NO. G-57

REVISIONS				APPROVALS		
DESCRIPTION	BY	APPROVED	DATE	COUNTY ENGINEER	[illegible]	[illegible]



ELEVATION

NOTE: All footings shall be class "B" portland cement concrete



Legend on Plans - —×—×—○

NOTE: The following items shall be furnished and installed only when shown on the plans and/or called for in the special conditions:

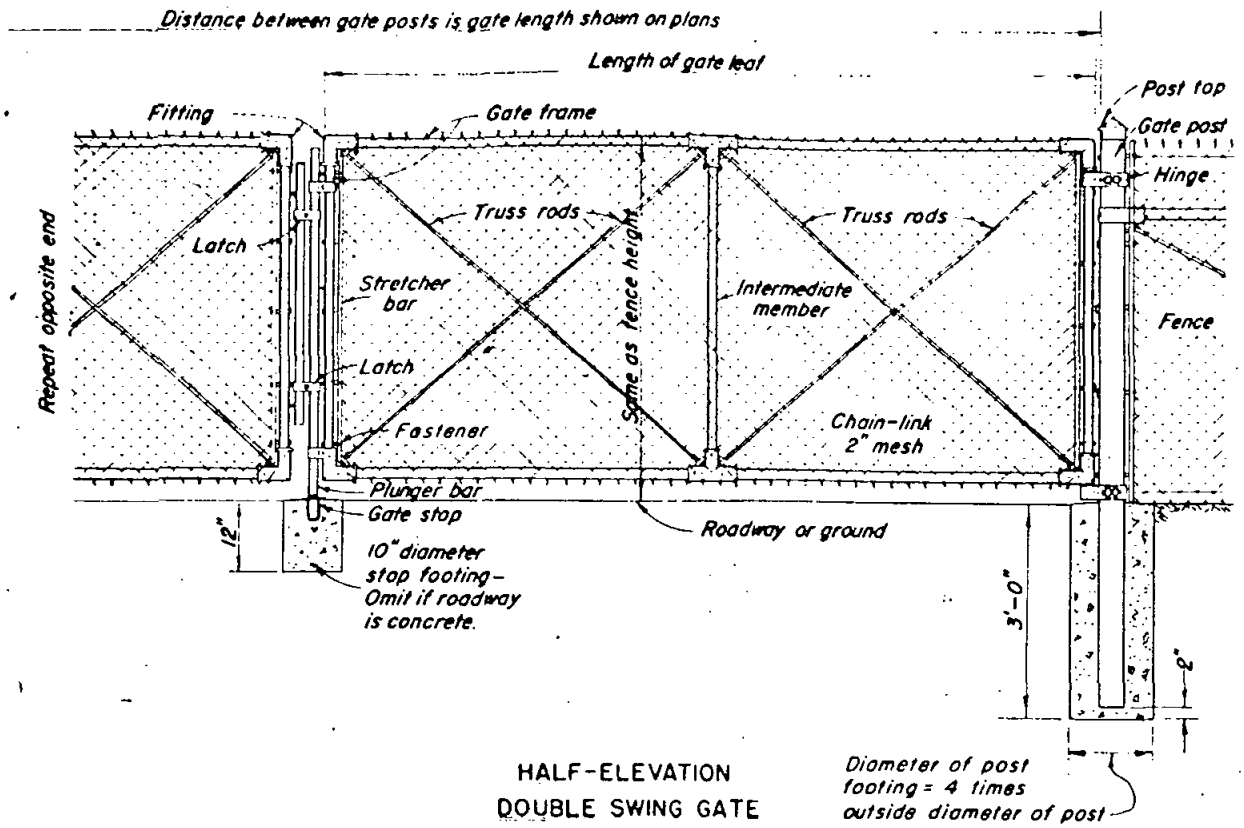
1. Barbed wire
2. Extension arm
3. Top horizontal rail

EXTENSION ARM AND BARBED WIRE

No Scale

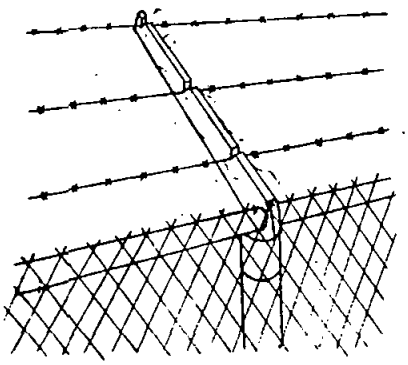
SPECIFICATION REFERENCE	COUNTY OF SAN DIEGO STANDARD DRAWING	SCALE $\frac{1}{2}$" = 1'-0"
	CHAIN LINK FENCE	DRAWING NO. M-4

REVISIONS				APPROVALS		
DESCRIPTION	BY	APPROVED	DATE	COUNTY ENGINEER	H. M. Taylor	11-10-71



HALF-ELEVATION
DOUBLE SWING GATE

NOTE: All footings shall be class "B" portland cement concrete.



EXTENSION ARM AND BARBED WIRE

No Scale

Legend on Plans - —oo—x—o—x

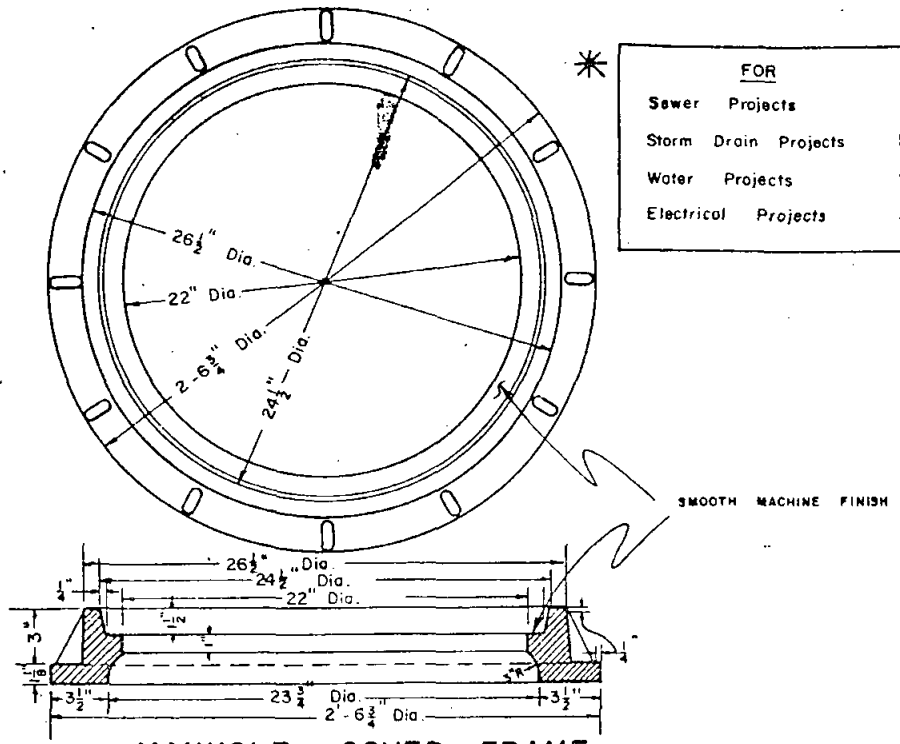
NOTE: The following items shall be furnished and installed only when shown on the plans and/or called for in the special conditions:

1. Barbed wire
2. Extension arm

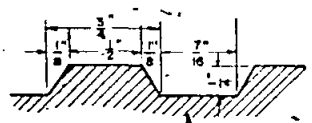
SPECIFICATION REFERENCE	COUNTY OF SAN DIEGO STANDARD DRAWING	
	CHAIN LINK GATE	SCALE
		DRAWING NO. M-5

REVISIONS				APPROVALS		
DESCRIPTION	BY	APPROVED	DATE	COUNTY ENGINEER	H. M. Taylor	11-10-71

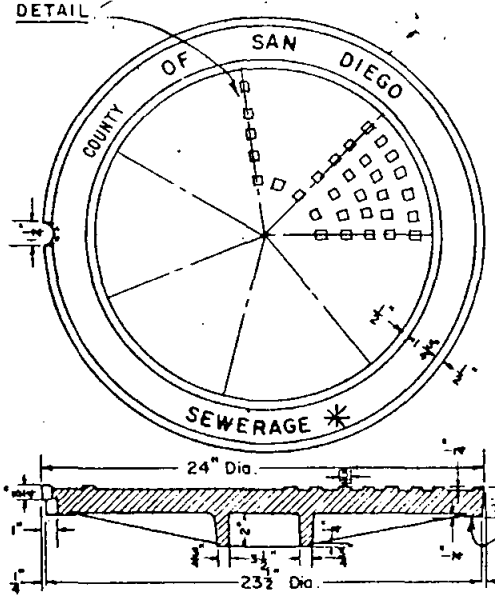
FOR	MARK
Sewer Projects	Sewerage
Storm Drain Projects	Drain
Water Projects	Water
Electrical Projects	Electric

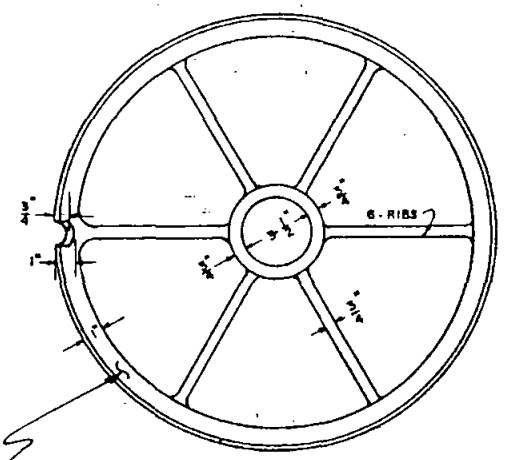


MANHOLE COVER FRAME
CAST IRON WT. 175 LB.



FULL SIZE DETAIL

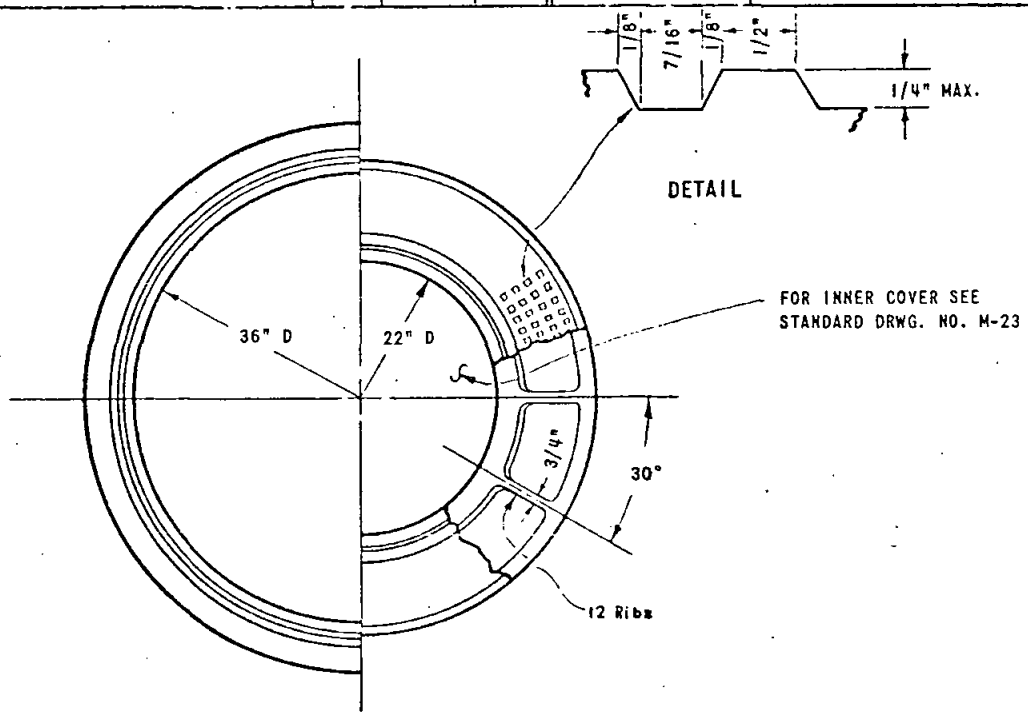




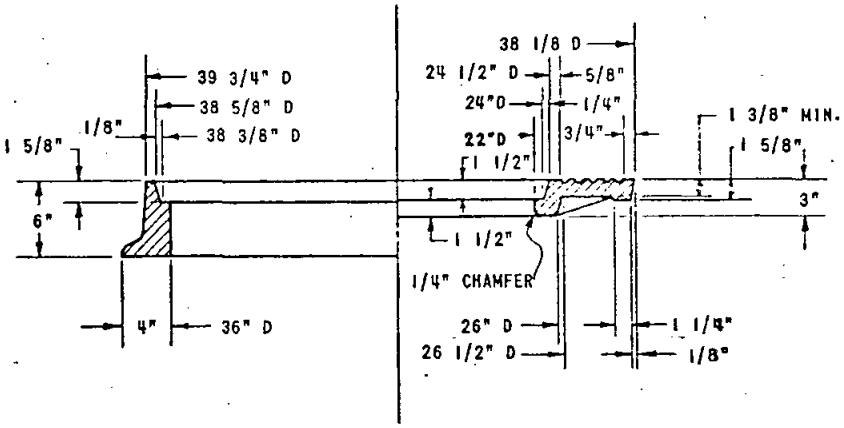
MANHOLE COVER
CAST IRON WT. 155 LB.

SPECIFICATION REFERENCE	COUNTY OF SAN DIEGO STANDARD DRAWING	SCALE 1½" = 1'
	MANHOLE FRAME & COVER	DRAWING NO. M-23

REVISIONS				APPROVALS		
DESCRIPTION	BY	APPROVED	DATE	COUNTY ENGINEER	H.M. Taylor	2-19-74



HALF PLAN
FRAME AND COVER



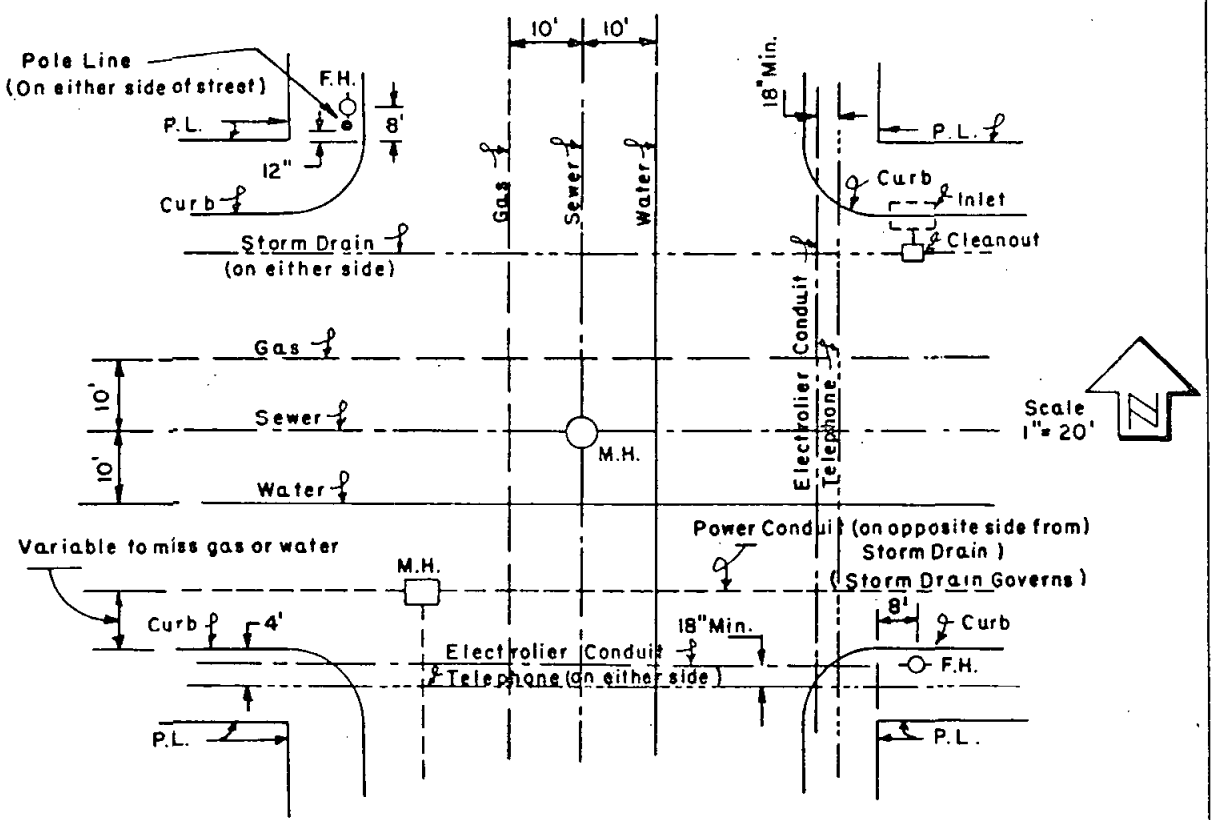
HALF SECTION
FRAME AND COVER

NOTES

1. WEIGHTS:
   INNER COVER - 155 LBS.
   OUTER COVER - 300 LBS.
   FRAME - 330 LBS.
2. MATERIAL: CAST IRON
3. MACHINE SEATS TO PREVENT NOISE
4. FILLET RADII TO BE 1/2"

SPECIFICATION REFERENCE	COUNTY OF SAN DIEGO	STANDARD DRAWING	
	MANHOLE FRAME AND TWO CONCENTRIC COVERS		SCALE
			DRAWING NO. M-54

REVISIONS				APPROVALS		
DESCRIPTION	BY	APPROVED	DATE	COUNTY ENGINEER	H.M. Toy	11-10-72

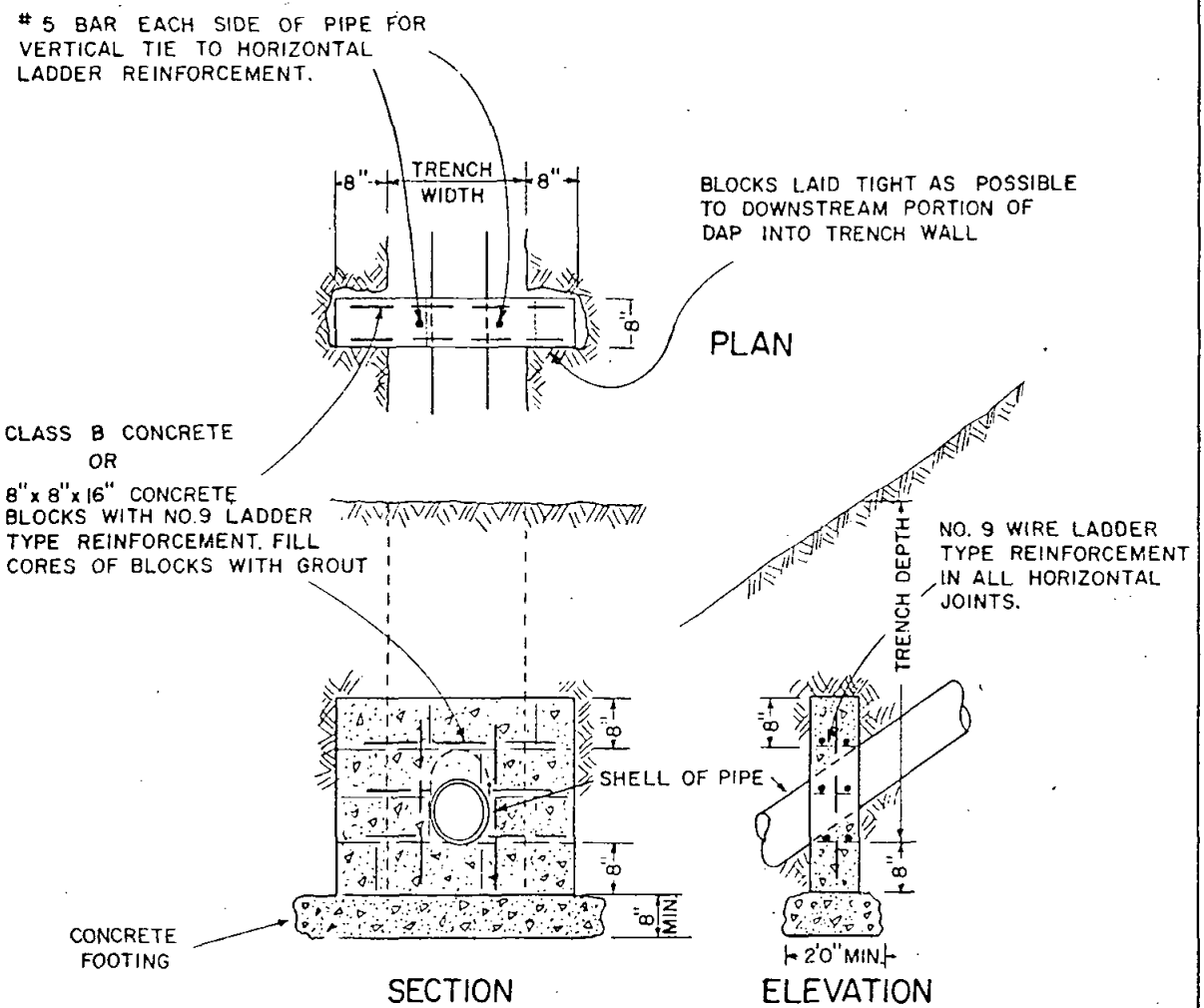


ROADWAY INTERSECTION PLAN

NOTE: This "STANDARD" is a guide only and deviations will be acceptable where conditions dictate. Dimensions shown are desirable but do not govern. The intention is to show the Relative Position of ALL UTILITIES

SPECIFICATION REFERENCE	COUNTY OF SAN DIEGO STANDARD DRAWING	
	GUIDE FOR LOCATION OF PIPES CONDUITS AND UNDERGROUND WORK IN STREETS	SCALE As shown DRAWING NO. P-24

REVISIONS				APPROVALS		
DESCRIPTION	BY	APPROVED	DATE	COUNTY ENGINEER	H. M. Taylor	11-10-72



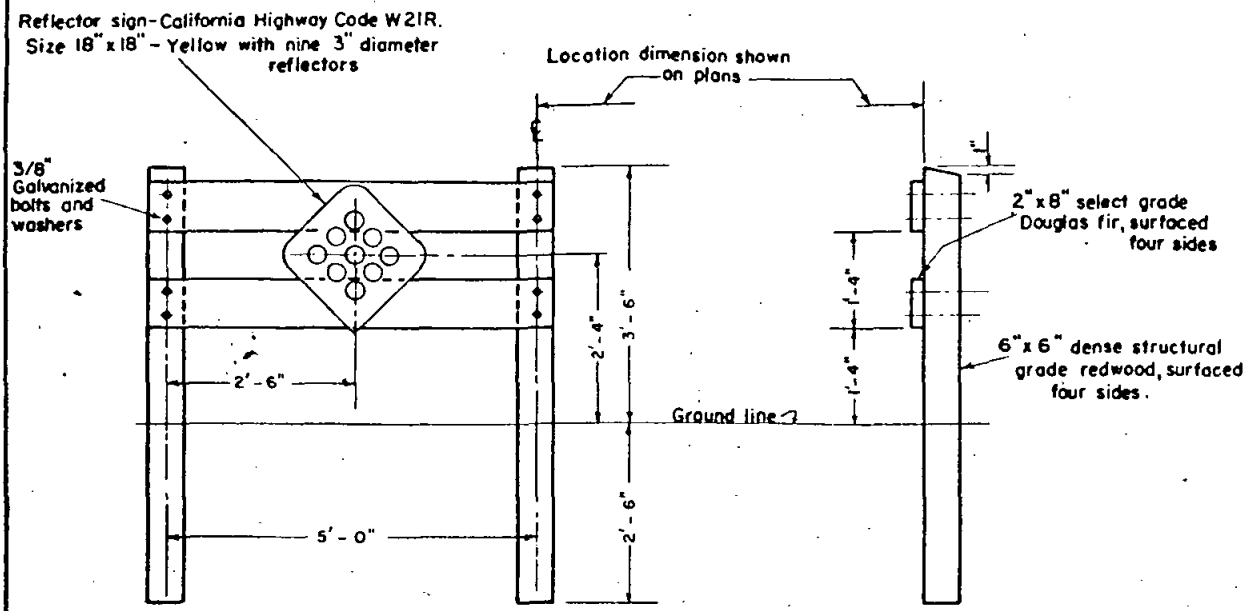
DETAIL PLANS

LEGEND ON PLANS

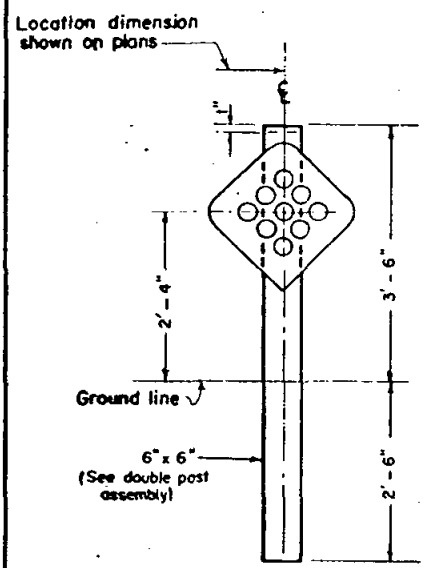
SPECIFICATION REFERENCE	COUNTY OF SAN DIEGO STANDARD DRAWING	
	CONCRETE ANCHOR	SCALE NONE DRAWING NO. S-27

C K

REVISIONS				APPROVALS		
DESCRIPTION	BY	APPROVED	DATE	COUNTY ENGINEER	H. M. Taylor	11-18-72



FRONT VIEW END VIEW



FRONT VIEW

Type C (Double post without reflector sign)
Type CS (Double post with reflector sign)

NOTE: Install Type CS assembly with one (1) only code W21R sign in head-on position for each approaching lane of traffic.

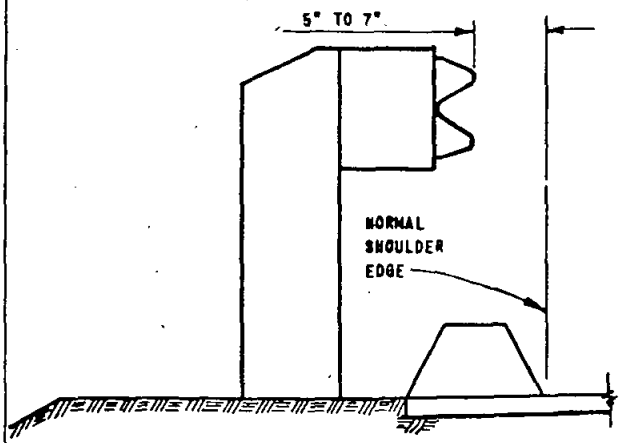
Type D (Single post without reflector sign)
Type DS (Single post with reflector sign)

LEGEND ON PLANS

Type CS Type DS

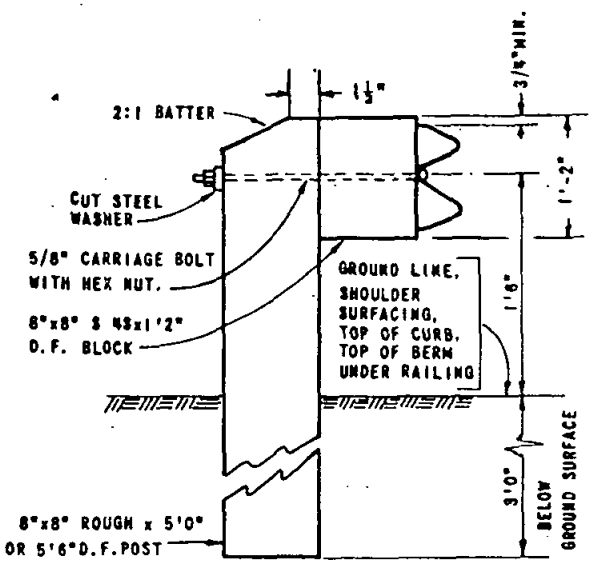
SPECIFICATION REFERENCE	COUNTY OF SAN DIEGO STANDARD DRAWING	
	GUARD POST AND FENCE ASSEMBLY FOR TERMINATING STREETS	SCALE 1/2" = 1'
		DRAWING NO. T-9

REVISIONS				APPROVALS		
DESCRIPTION	BY	APPROVED	DATE	COUNTY ENGINEER	H. M. Taylor	11-19-71



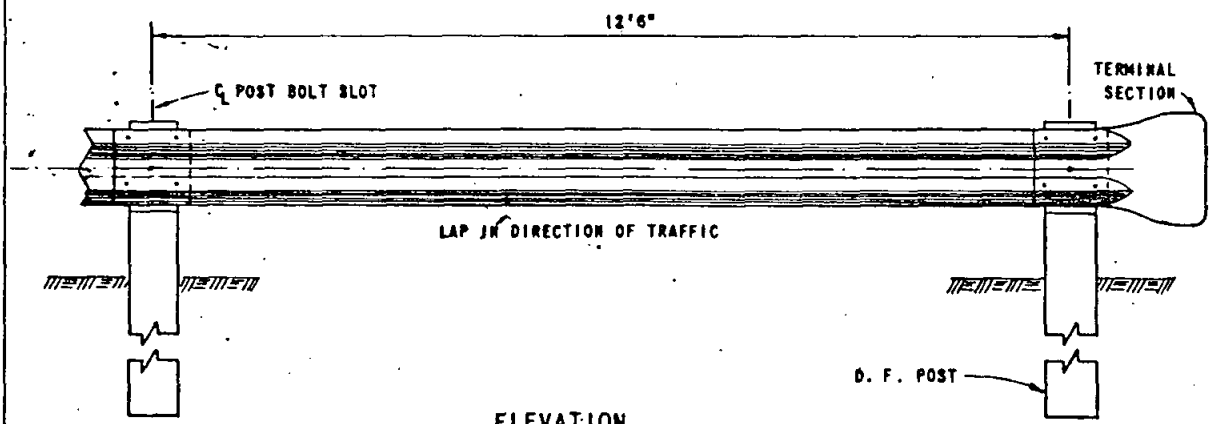
SECTION AT BERM

NOT TO SCALE



SECTION AT SUPPORT

NOT TO SCALE

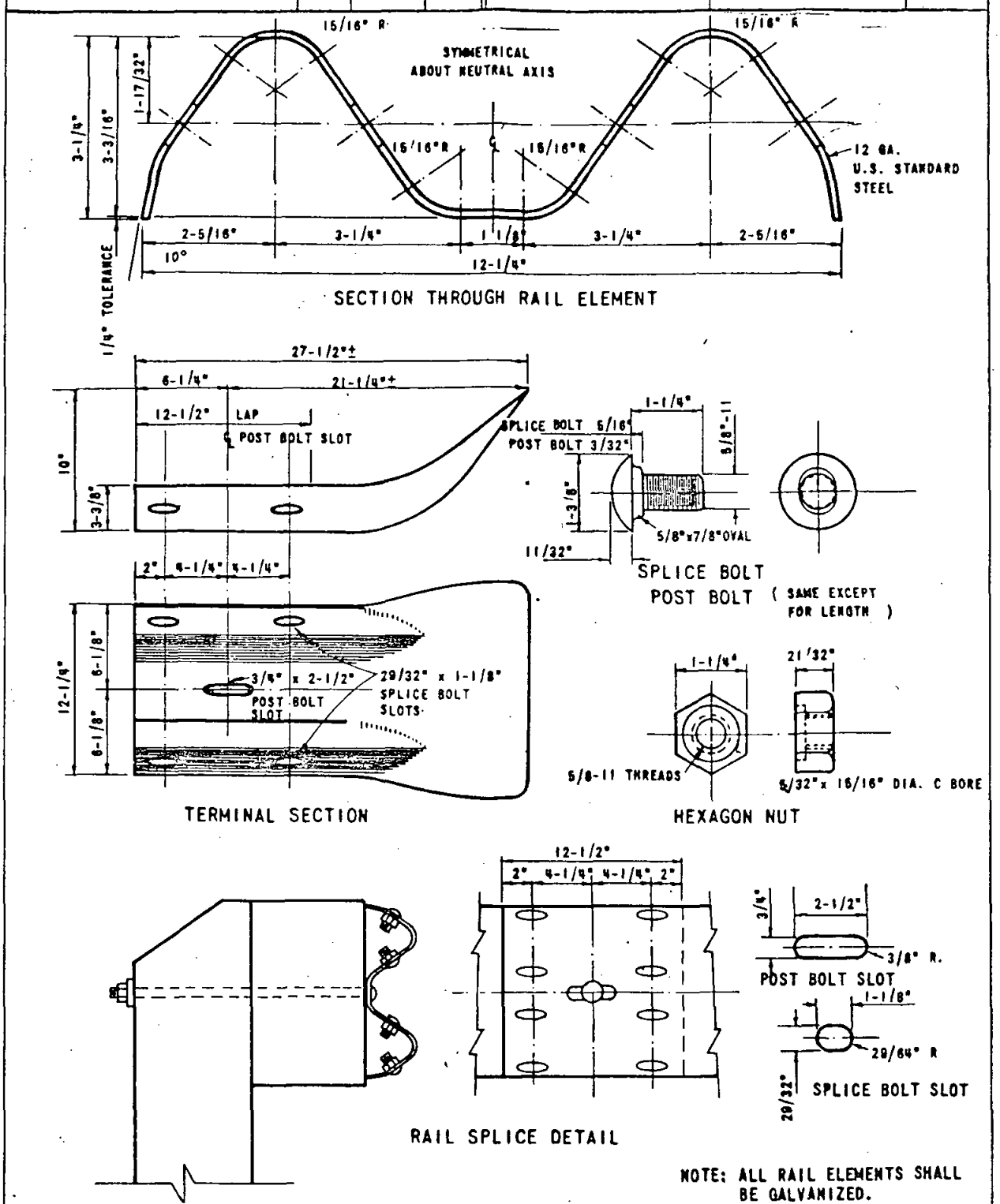


ELEVATION

SCALE: 1" = 2'-0"

SPECIFICATION REFERENCE	COUNTY OF SAN DIEGO STANDARD DRAWING	
	METAL BEAM GUARD RAIL INSTALLATION	SCALE AS SHOWN
		DRAWING NO. T-15

REVISIONS				APPROVALS		
DESCRIPTION	BY	APPROVED	DATE	COUNTY ENGINEER	[signature]	11-10-72



SECTION THROUGH RAIL ELEMENT

TERMINAL SECTION

SPLICE BOLT
POST BOLT (SAME EXCEPT FOR LENGTH)

HEXAGON NUT

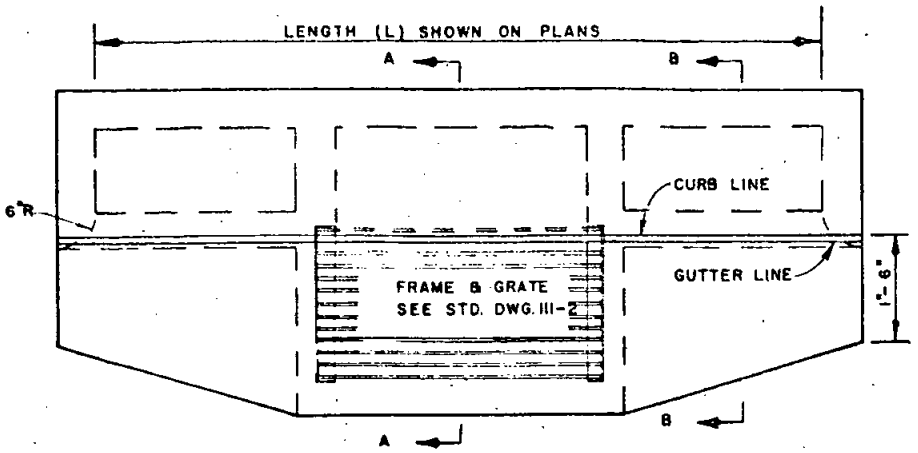
POST BOLT SLOT

SPLICE BOLT SLOT

RAIL SPLICE DETAIL

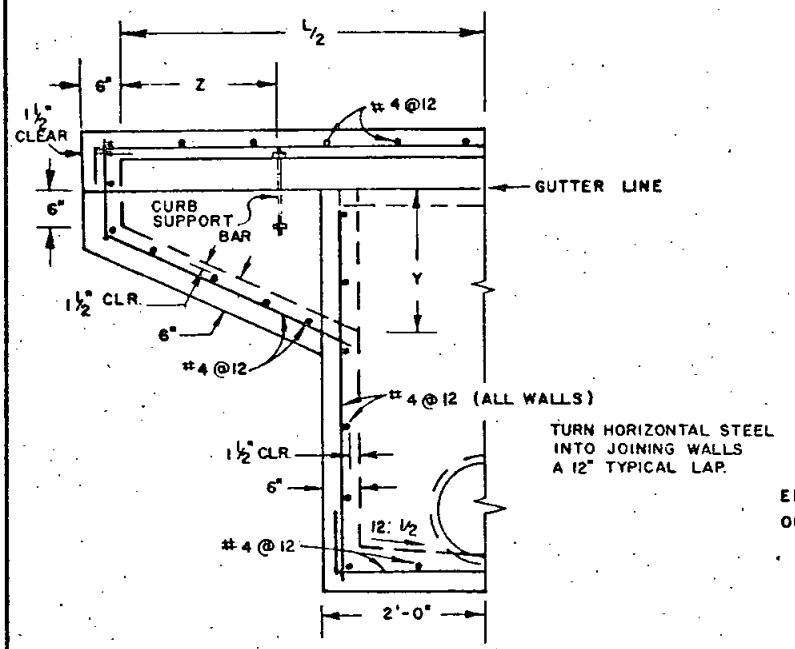
NOTE: ALL RAIL ELEMENTS SHALL BE GALVANIZED.

SPECIFICATION REFERENCE	COUNTY OF SAN DIEGO STANDARD DRAWING	
	METAL BEAM GUARD RAIL DETAIL	SCALE NO SCALE
		DRAWING NO. T-16

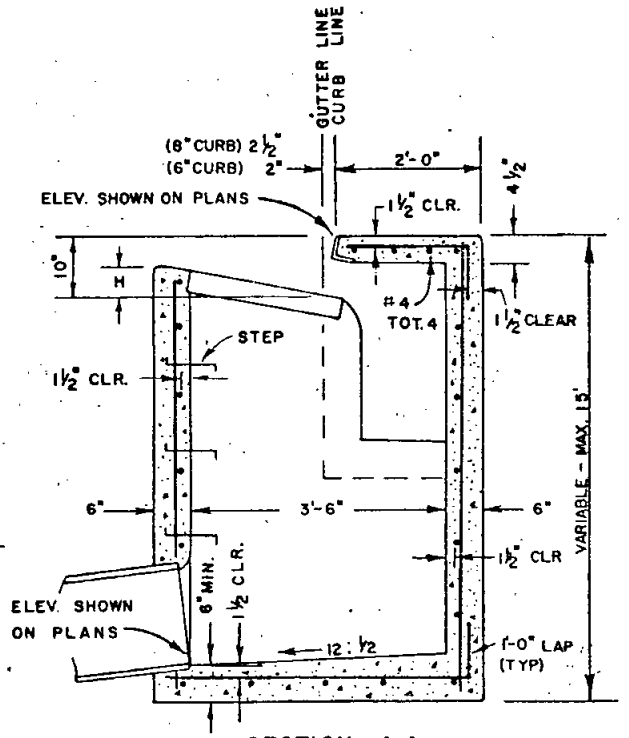


PLAN

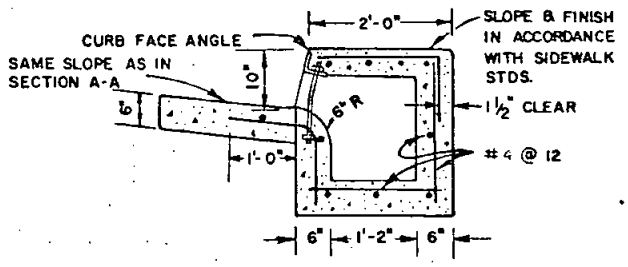
H = 5½" WITH 6" CURB & STD. GUTTER
H = 3½" WITH 8" CURB & STD. GUTTER
H = 2½" WITH STD. GUTTER DEPRESSION



HALF ELEVATION



SECTION A-A

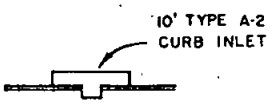


SECTION B-B

L	Y	Z
10'	2'-0"	2'-6"
15'	3'-0"	5'-0"
20'	4'-0"	7'-0"

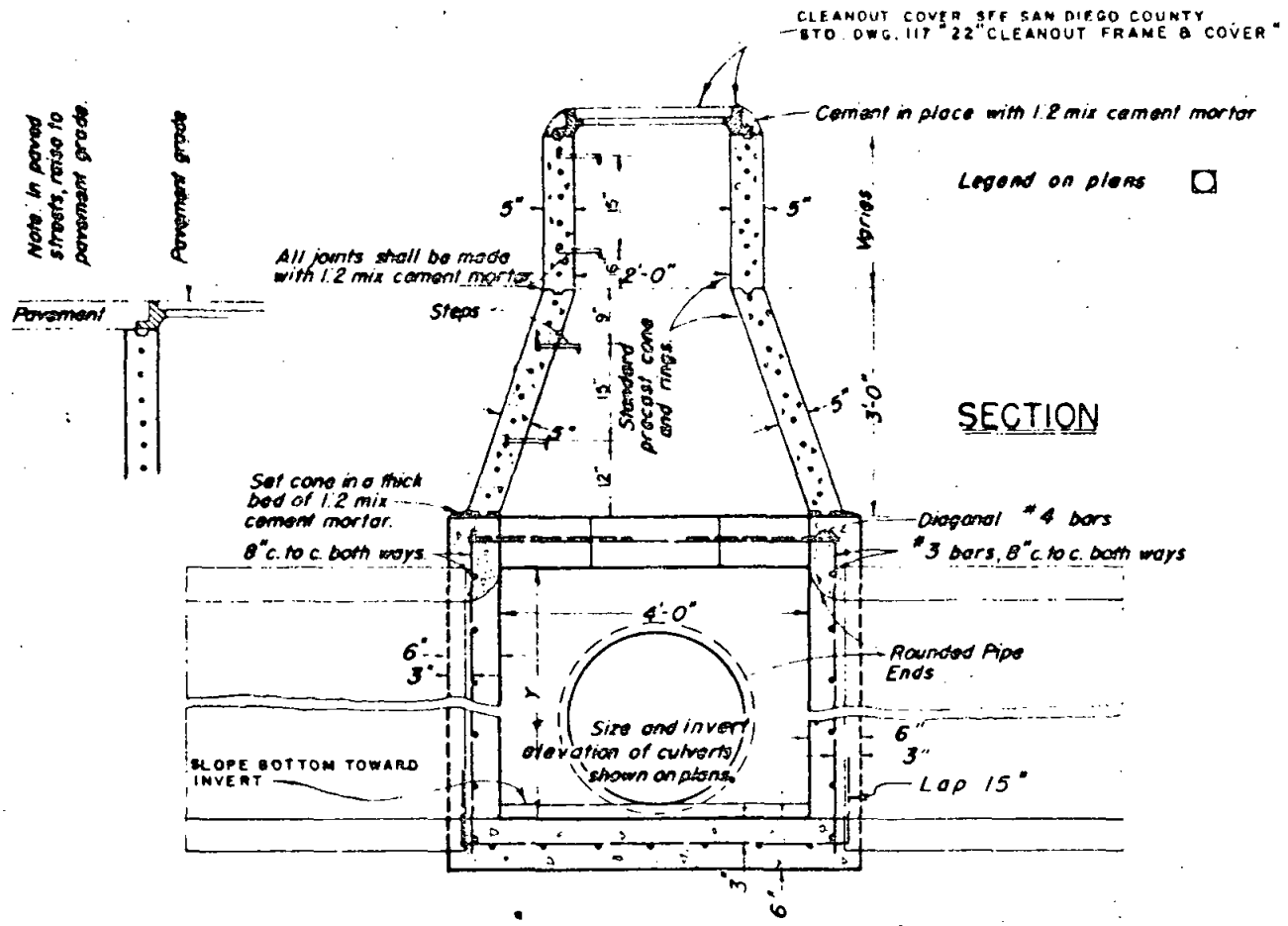
NOTES

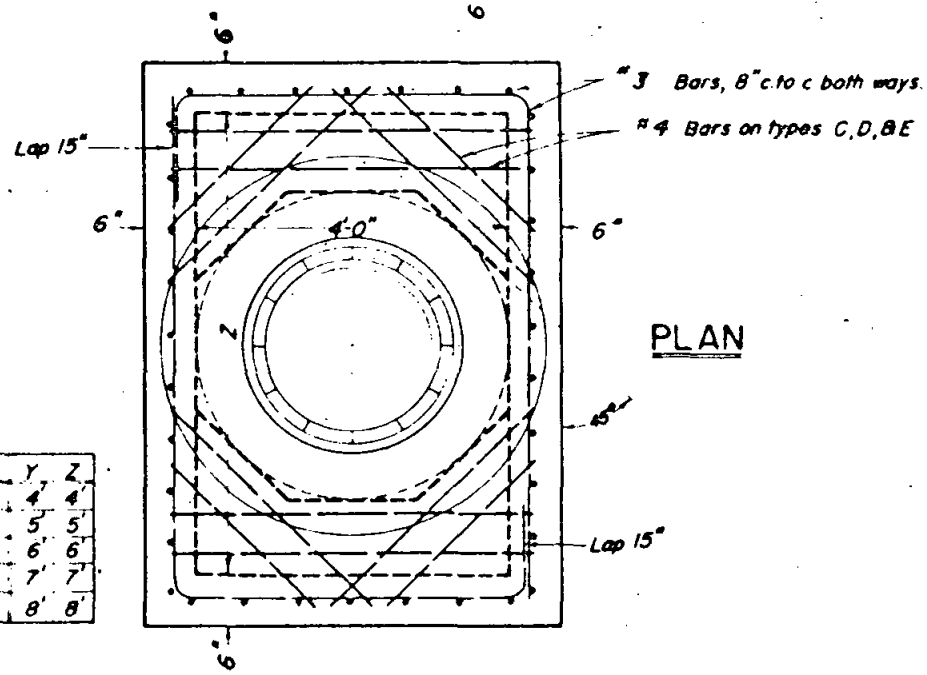
1. FOR ADDITIONAL CONSTRUCTION DETAILS SEE STD. DWG. 131, "DRAINAGE STRUCTURE STANDARD DETAILS"
2. ALL CONCRETE TO BE CLASS "A"
3. STD. GUTTER DEPRESSION TO BE USED WHEN REQ. BY COUNTY ENGINEER SEE STD. DWG. 224
4. CONSTRUCT 10' TRANSITION FROM STD. CURB HEIGHT TO DEPRESSED GUTTER AT EACH END OF INLET.
5. INCREASE IN ALLOWABLE DEPTH SUBJECT TO APPROVAL OF COUNTY ENGINEER.



LEGEND ON PLANS

STD. SPEC. SEC. 51, 52, 73, 90					
DRAWN BY DCK / CHECKED BY [illegible]					
RECOMMENDED BY [illegible]	SAN DIEGO COUNTY ENGINEER DEPARTMENT	REVISION	BY	APPROVED	DATE
APPROVED BY COUNTY ENGINEER	STANDARD DRAWING	SCALE: NONE			
D. K. Spear R.C.E. 8091	TYPE A-2 CURB INLET	DRAWING NUMBER 100-2			
DATE: 10/19/65					

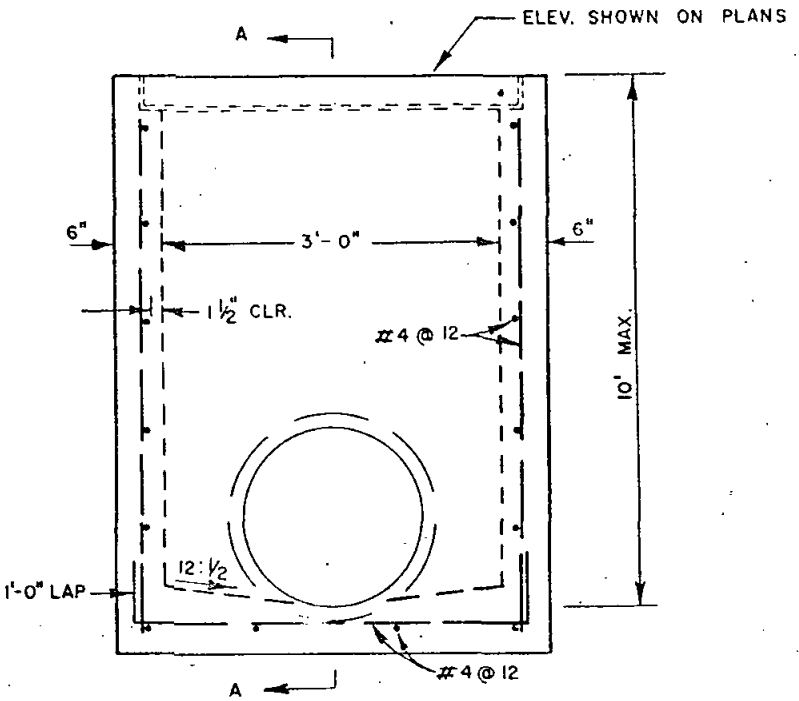




	Y	Z
A for pipes up to 39"	4'	4'
B " " " " 42"-48"	5'	5'
C " " " " 51"-60"	6'	6'
D " " " " 63"-72"	7'	7'
E " " " " 75"-84"	8'	8'

NOTE:
WHEN HEIGHT EXCEEDS 4' CAST 5/8" ROUND WROUGHT IRON STEPS IN WALL A MAXIMUM OF 13" APART. SEE SAN DIEGO COUNTY DWG 131 "DRAINAGE STRUCTURE STANDARD DETAILS"

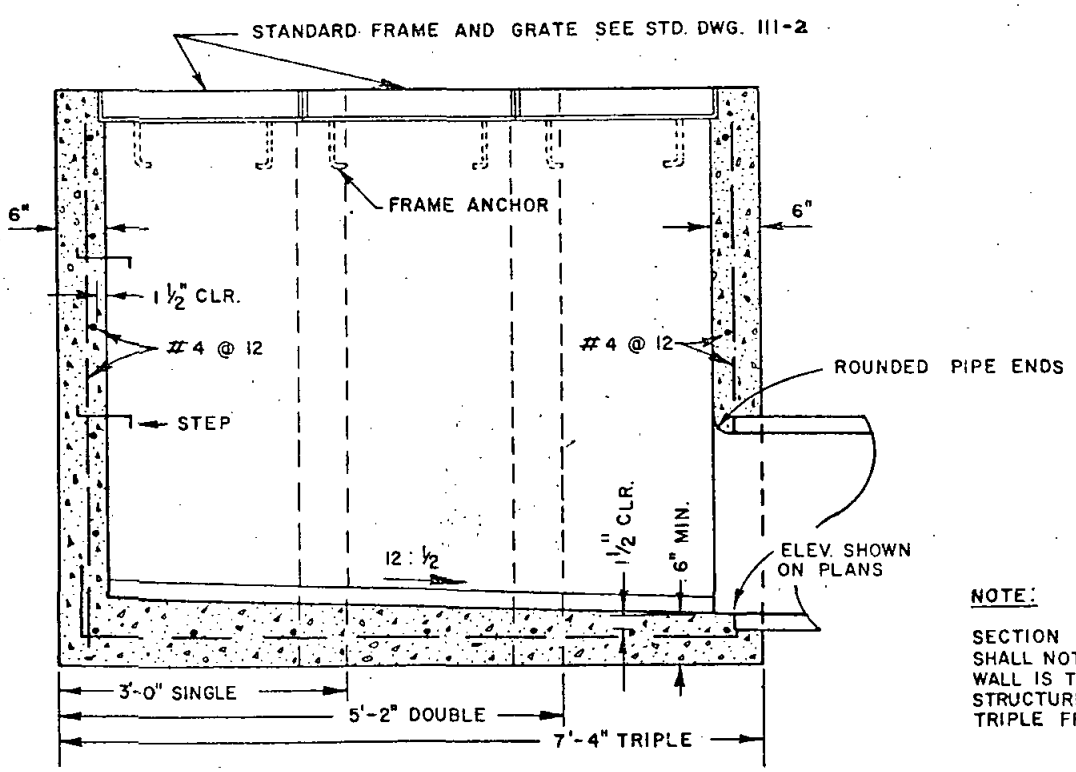
STD SPEC. SEC 51, 52, 73, 90					
DRAWN BY [illegible] CHECKED BY [illegible]					
RECOMMENDED BY [illegible]	SAN DIEGO COUNTY ENGINEER DEPARTMENT	REVISION	BY	APPROVED	DATE
APPROVED BY COUNTY ENGINEER	STANDARD DRAWING	SCALE: NONE			
D. K. [illegible] RCE 8091	STORM DRAIN CLEANOUT TYPES A, B, C, D & E	DRAWING NUMBER 102-1			
DATE 10/10/65					



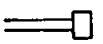
ELEVATION

NOTES

1. ALL CONCRETE SHALL BE CLASS "A"
2. FOR ADDITIONAL CONSTRUCTION DETAILS SEE STD. DWG. 131 "DRAINAGE STRUCTURE STANDARD DETAILS."
3. INCREASE IN ALLOWABLE DEPTH SUBJECT TO APPROVAL BY COUNTY ENGINEER.



SECTION A-A

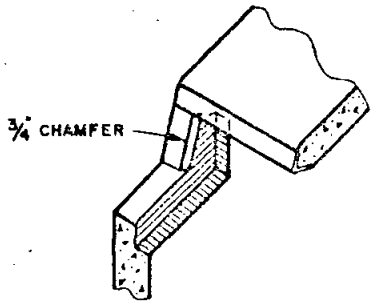


LEGEND ON PLANS

NOTE:

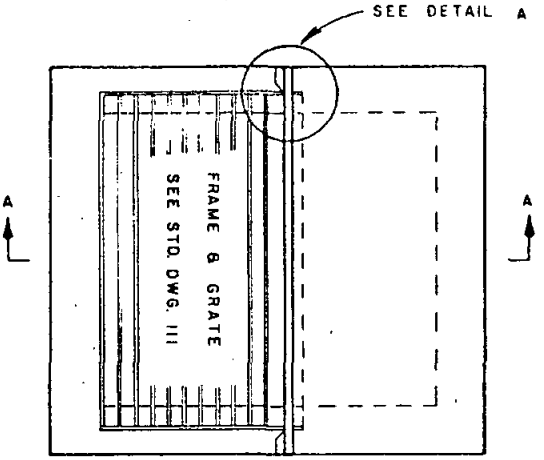
SECTION A-A SHOWS 3 SIZES AND SHALL NOT IMPLY THAT AN INTERIOR WALL IS TO BE BUILT FOR THE STRUCTURES WITH DOUBLE OR TRIPLE FRAME & GRATE.

STD. SPEC. SEC. 51, 52, 73, 90					
DRAWN BY DCL CHECKED BY [illegible]					
RECOMMENDED BY [illegible]	SAN DIEGO COUNTY ENGINEER DEPARTMENT	REVISION	BY	APPROVED	DATE
APPROVED BY COUNTY ENGINEER	STANDARD DRAWING	SCALE: NONE			
[illegible] R.C.E. 8091	TYPE "D" CATCH BASIN	DRAWING NUMBER	107-2		
DATE: 10/18/64	SINGLE, DOUBLE, OR TRIPLE				



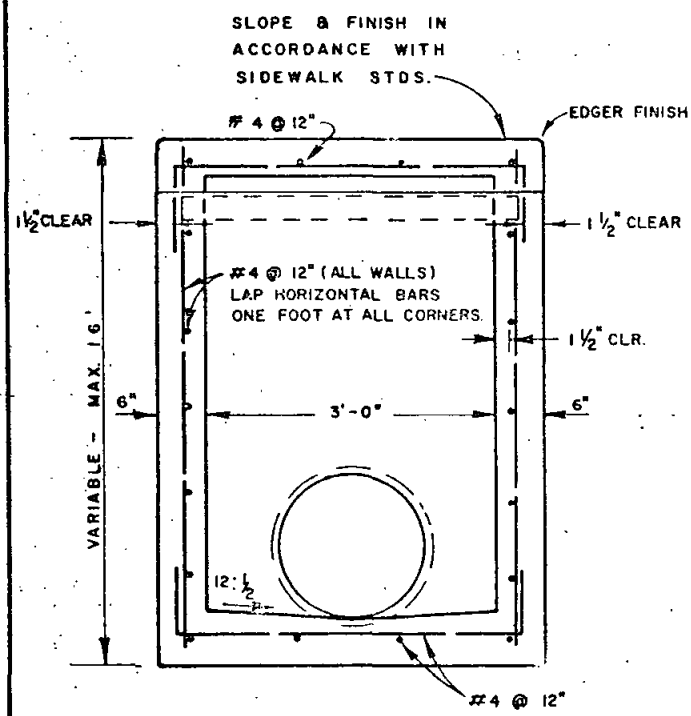
DETAIL A

RECESS FOR GRATE REMOVAL

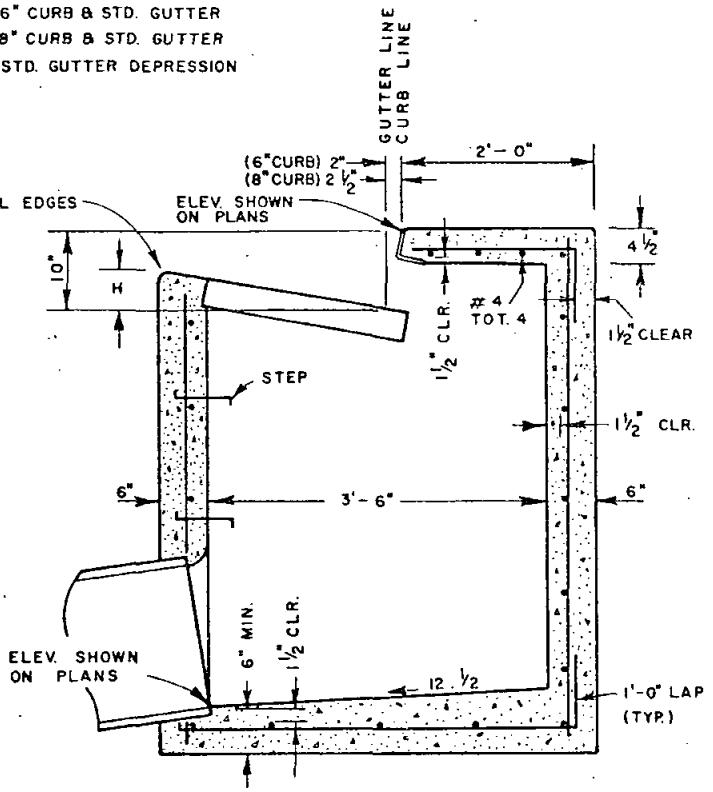


PLAN

H = 5 1/2" WITH 6" CURB & STD. GUTTER
H = 3 1/2" WITH 8" CURB & STD. GUTTER
H = 2 1/2" WITH STD. GUTTER DEPRESSION



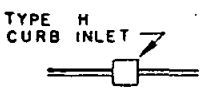
ELEVATION



SECTION A-A

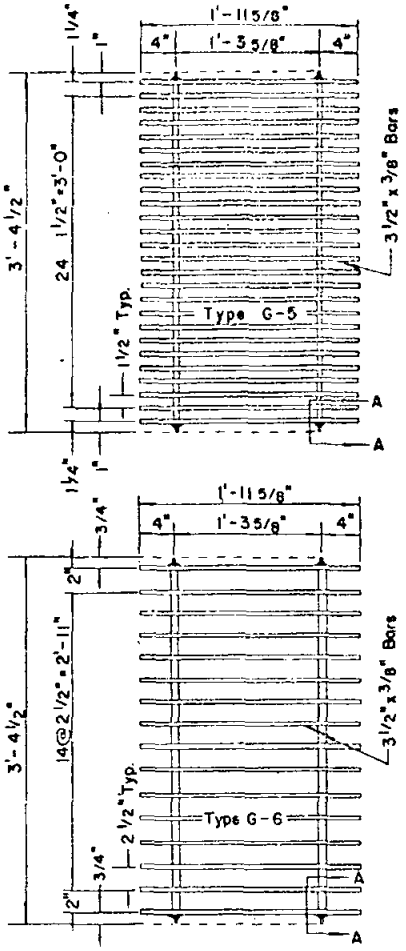
NOTES:

1. ALL CONCRETE SHALL BE CLASS 'A'
2. CONSTRUCT 10' TRANSITION FROM STD. CURB HEIGHT TO DEPRESSED GUTTER AT EACH SIDE OF INLET.
3. FOR ADDITIONAL CONSTRUCTION DETAILS SEE STD. DWG. 131. "DRAINAGE STRUCTURE STANDARD DETAILS"
4. INCREASE IN ALLOWABLE DEPTH SUBJECT TO APPROVAL OF COUNTY SURVEYOR.



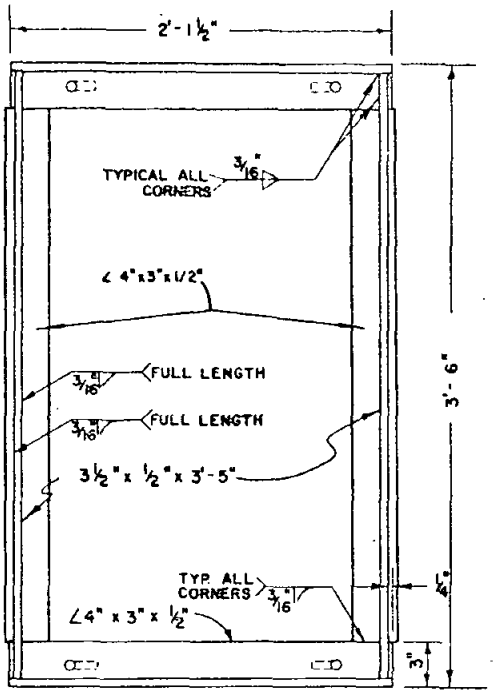
LEGEND ON PLANS

STD. SPEC. SEC. 51, 52, 73, 90					
DRAWN BY DCJ CHECKED BY [illegible]					
RECOMMENDED BY [illegible]	SAN DIEGO COUNTY SURVEYOR — ROAD DEPARTMENT	REVISION	BY	APPROVED	DATE
APPROVED BY COUNTY SURVEYOR	STANDARD DRAWING	SCALE: NONE			
D. K. Sleeper R.C.E. 8091	TYPE H CURB INLET	DRAWING NUMBER 108-1			
DATE: 10/18/[illegible]					



FABRICATED GRATES

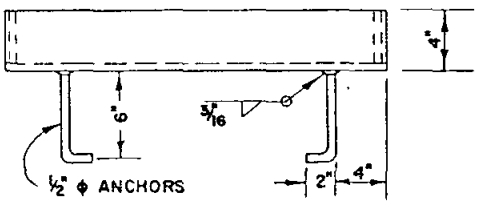
(1)



WELDED STEEL FRAME

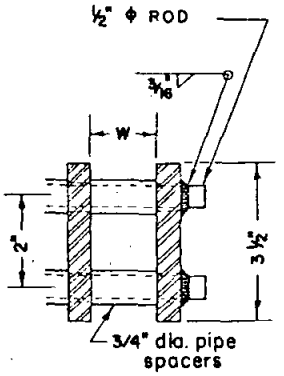
PLAN

GRATE	WGT.
G - 5	261
G - 6	173
FRAME	159

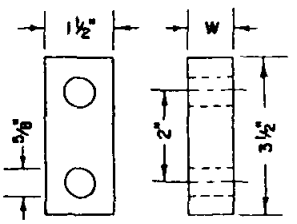


END VIEW

W = 2 1/8" for G-6 (Except end section)
W = 1 1/8 for G-5 (" " ")



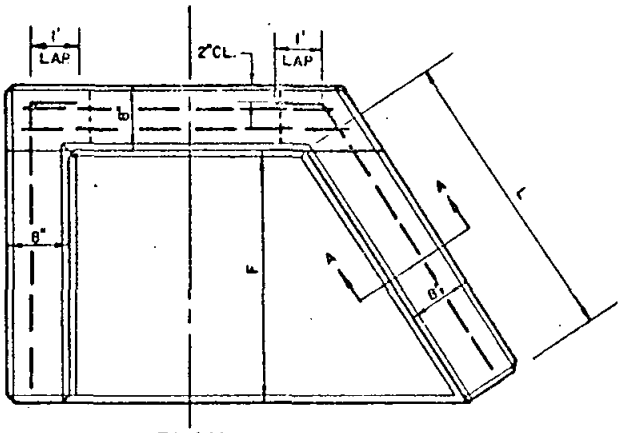
SEC. A-A



ALTERNATE SPACER

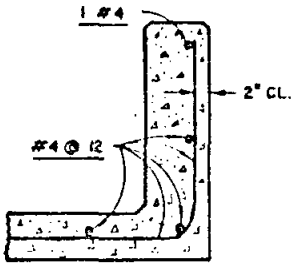
Notes:
1. Grate type shown on plans.

STD. SPEC. SEC. 55, 70	SAN DIEGO COUNTY ENGINEER DEPARTMENT STANDARD DRAWING	(1) Removed grate detail	RH.	[illegible]	2/14/74
DRAWN BY [illegible] CHECKED BY [illegible]					
RECOMMENDED BY [illegible]		REVISION	BY	APPROVED	DATE
APPROVED BY COUNTY ENGINEER	FRAME & GRATES FOR DRAINAGE STRUCTURES	SCALE: NONE			
H. M. Taylor R.C.E. 11458		DRAWING NUMBER. III-4T			
DATE: Sept. 28, 1971					

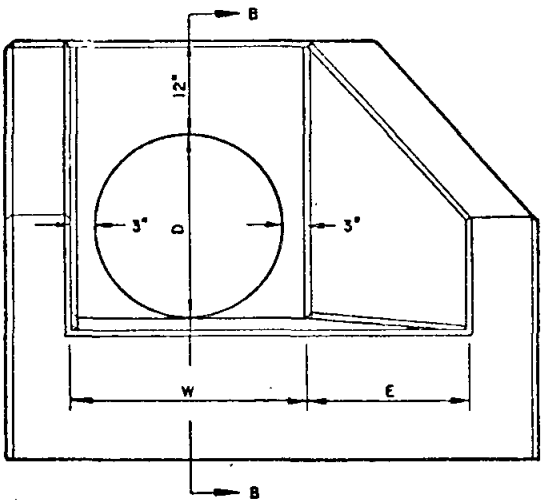


PLAN

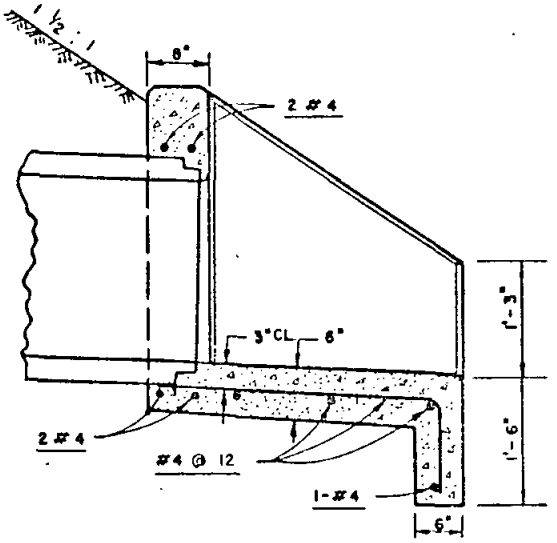
U TYPE WING TYPE



SECTION A-A



ELEVATION



SECTION B-B

DIAM. OF PIPE	DIMENSIONS			SINGLE PIPE					DOUBLE PIPE				
				W	U TYPE		WING TYPE		W	U TYPE		WING TYPE	
	L	E	F		CONC. C.Y.	STEEL LBS.	CONC. C.Y.	STEEL LBS.		CONC. C.Y.	STEEL LBS.	CONC. C.Y.	STEEL LBS.
18"	2'-3 1/8"	1'-3"	1'-10 1/2"	2'-0"	0.55	35	0.63	43	4'-8"	0.82	53	0.90	61
24"	3'-1 7/8"	1'-9"	2'-7 1/2"	2'-6"	0.79	47	0.93	60	5'-10"	1.22	73	1.36	86
30"	4'-0 5/8"	2'-3"	3'-4 1/2"	3'-0"	1.05	71	1.29	85	7'-2"	1.68	109	1.92	123
36"	4'-11 1/2"	2'-9"	4'-1 1/2"	3'-6"	1.33	88	1.69	114	8'-6"	2.19	136	2.55	162

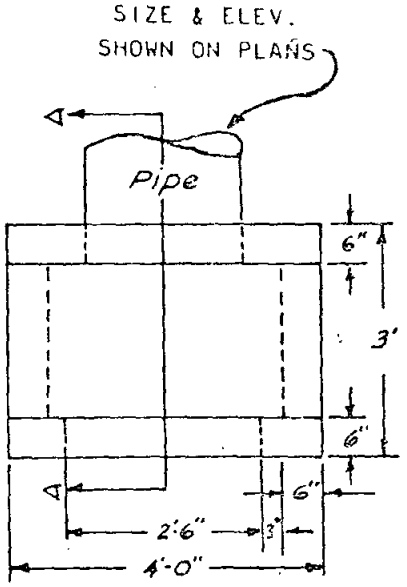
NOTES:

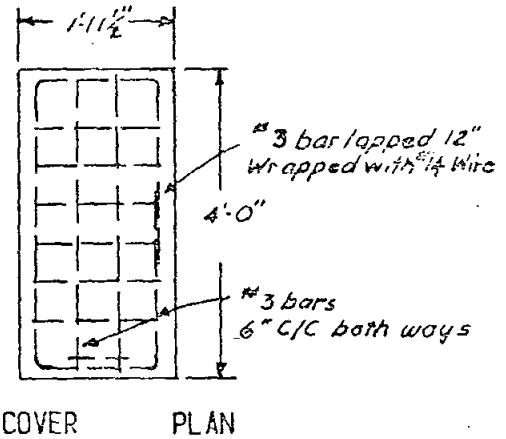
1. ALL CONCRETE SHALL BE CLASS A.
2. ALL EXPOSED CORNERS TO BE CHAMFERED 3/4"
3. MULTIPLE PIPES TO BE SET WITH LONGITUDINAL CENTERS OF PIPE 1 2/3 DIAMETERS APART.
4. TOP OF HEADWALL SHALL BE PLACED APPROXIMATELY PARALLEL. TO PROFILE GRADE WHEN THE GRADE IS 3% OR MORE.

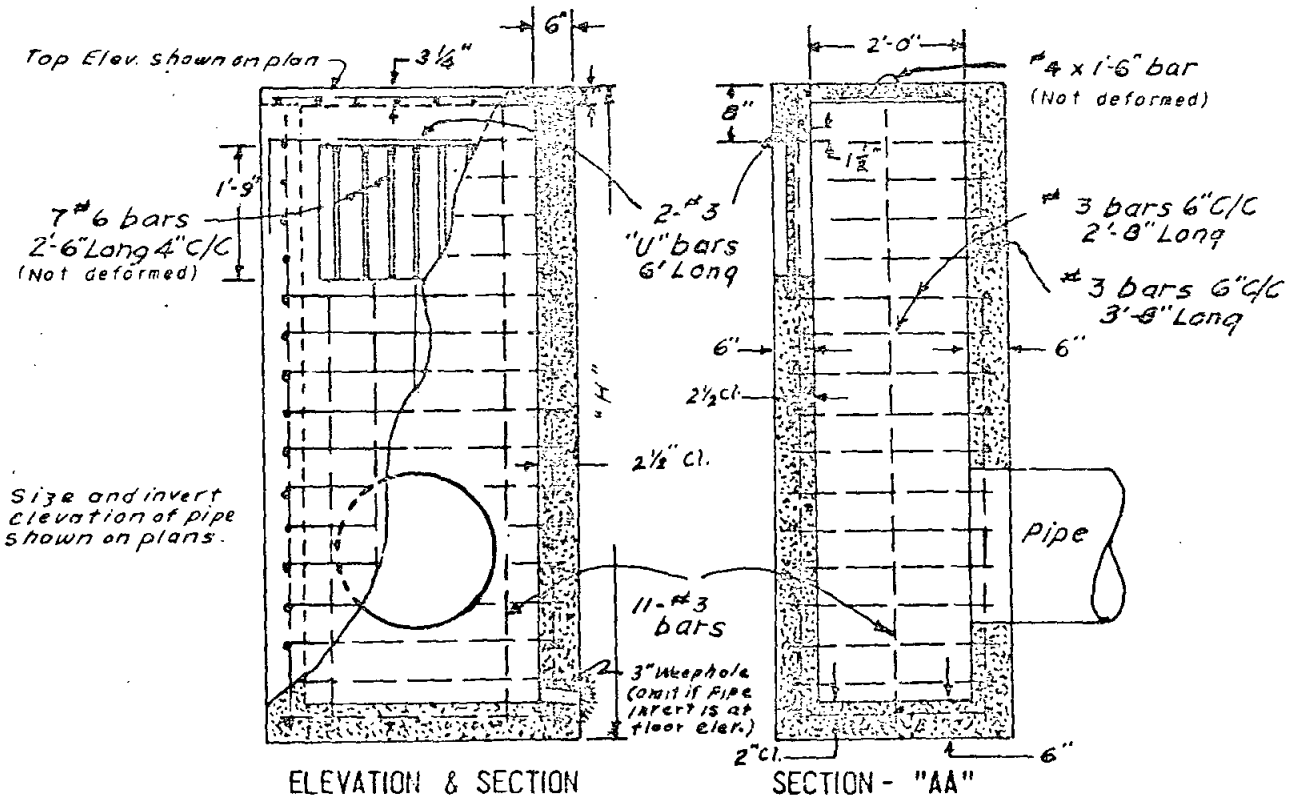
STD. SPEC. SEC: 51, 52, 90	SAN DIEGO COUNTY ENGINEER DEPARTMENT STANDARD DRAWING				
DRAWN BY EMG CHECKED BY GCL					
RECOMMENDED BY	HEADWALLS & ENDWALLS TYPES U & WING	REVISION	BY	APPROVED	DATE
APPROVED BY COUNTY ENGINEER		SCALE: NONE			
D. K. Olsen R.C.E. 8091		DRAWING NUMBER 118-1			
DATE: 1/15/68					

FILE No. 11-25

Revisions	
Date	Approved



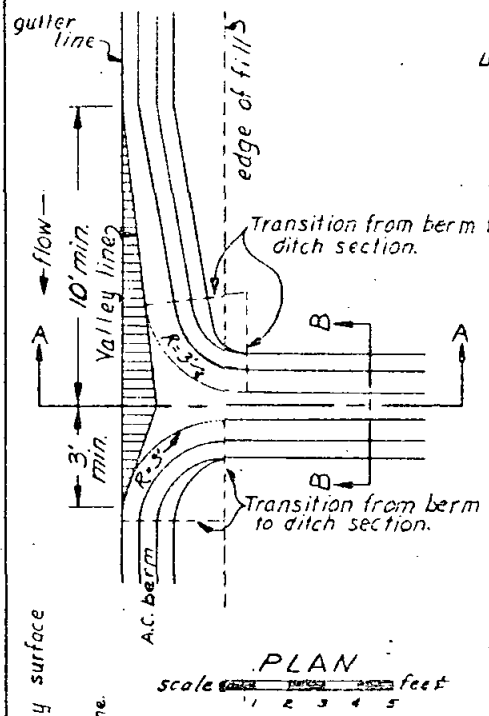


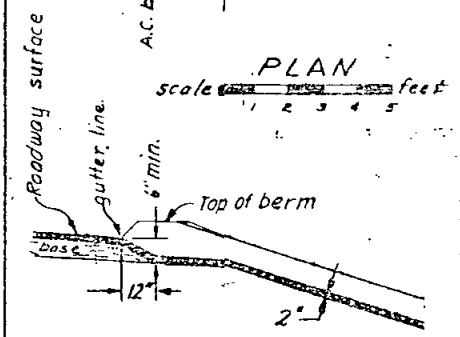


Legend on Plans ====▯

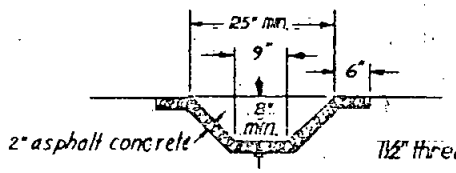
SPECIFICATION REFERENCE	SAN DIEGO COUNTY	STANDARD DRAWING	
Sections: 51, 52, 90	STANDARD TYPE "C" DROP INLET		Scale: NONE
County Surveyor	With end opening grate & Concrete cover		Drawing No.
D. R. Spear			122

ASPHALT CONCRETE SPILLWAY





SECTION A-A



Note: Cross-sectional area of ditch may be rounded, or trapezoidal. Min. top width; 25"; min. depth 8".

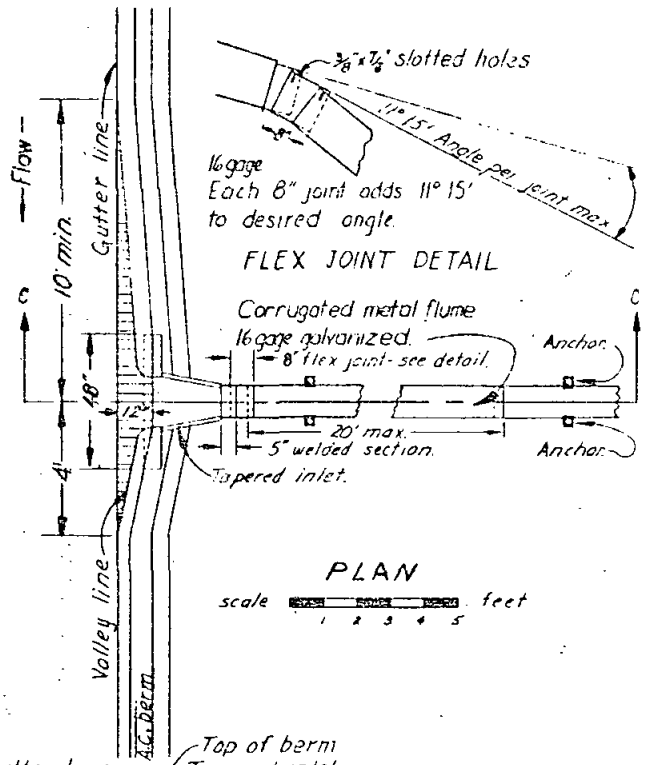
SECTION B-B

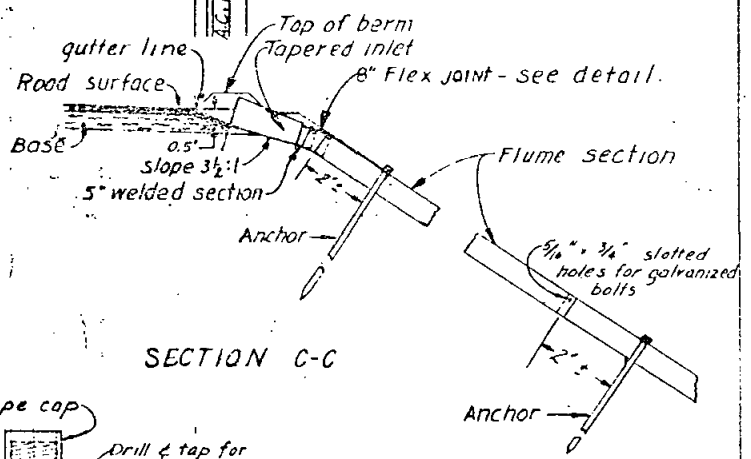
scale feet 1 2 3

NOTES

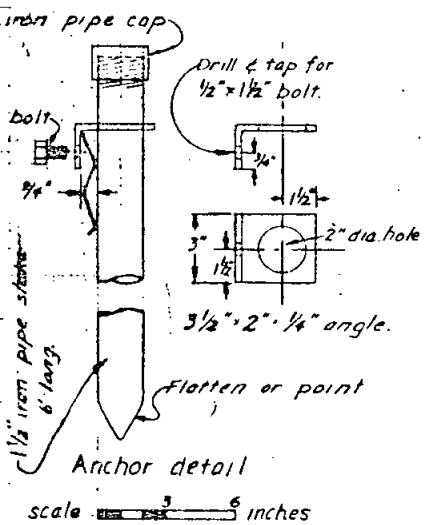
1. A.C. spillway may be used when fill is 5:1 or less and where fill slope is 1½:1 or flatter.
2. Downdrain flume may be used where fill slope is 1½:1 or flatter.
3. Use 10' min. length of gutter transition on each side of downdrain in sag location.
4. All metal parts to be galvanized after fabrication.
5. Metal products similar in design & purpose may be used.

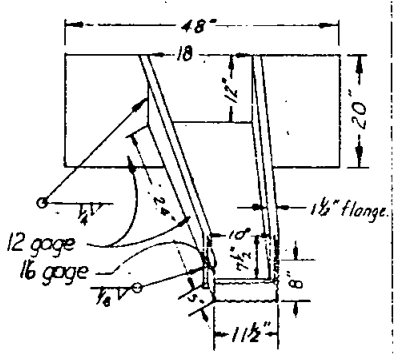
TAPERED INLET & DOWNDRAIN FLUME





SECTION C-C





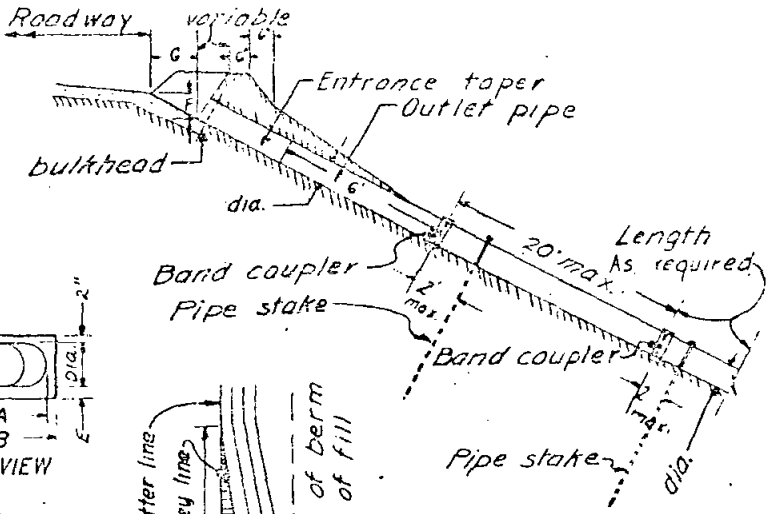
Tapered inlet.
no scale

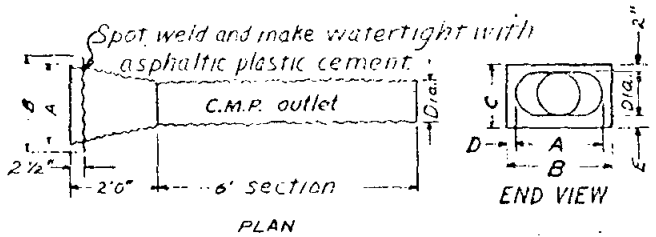
Revision	By	Approved	Date

Standard Specifications	SAN DIEGO COUNTY SURVEYOR – ROAD DEPARTMENT STANDARD DRAWING	Scale: AS shown
Sections: 69		Date Approved: 1-14-63
Drawn by: [illegible] checked by: [illegible]		Drawing No
Recommended by: [illegible]	TAPERED INLET & DOWNDRAIN FLUME ASPHALT CONCRETE SPILLWAY	124-1
Approved by County Surveyor: D. K. [illegible]		

Dimensions to be as tabulated below for Assembly

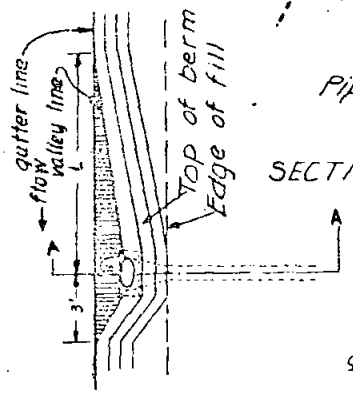
Dia.	A	B	C	D	E	F	G	L
8"	16"	25½"	15"	4¼"	5"	6"	18"	10'
12"	18"	25½"	19"	3¾"	5"	9"	20"	15'
15"	21"	30"	23"	4½"	6"	12"	24"	25'



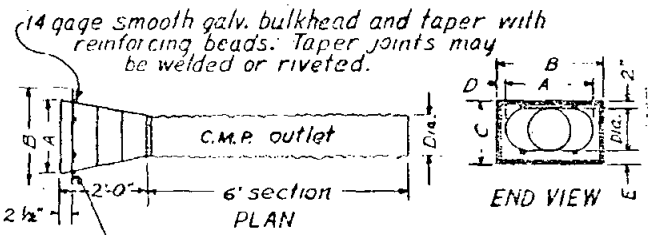


Bulkhead and taper to be galvanized corrugated metal of the same gage as the outlet pipe.

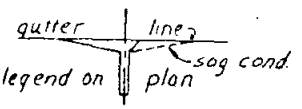
ENTRANCE TAPER ALTERNATIVE A

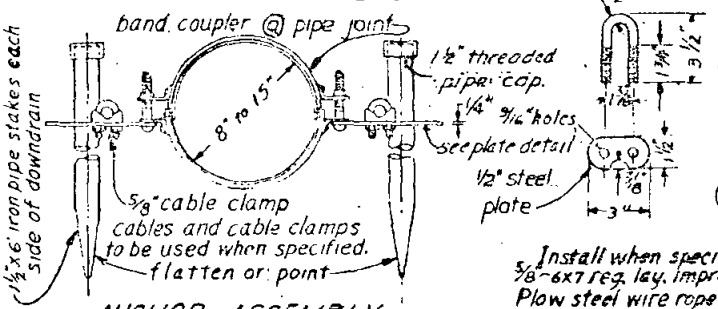


SECTION A-A

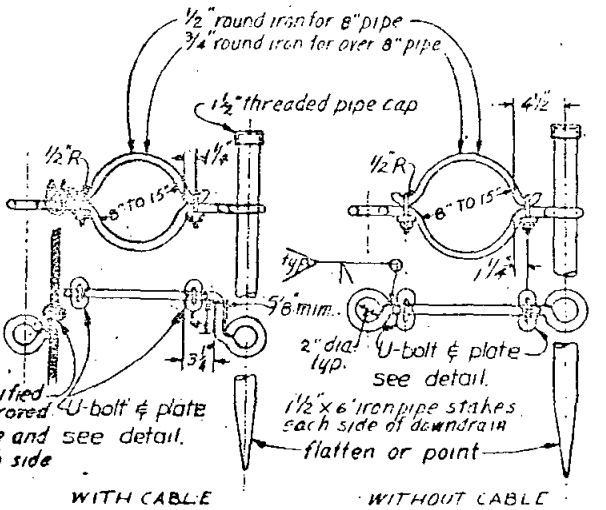


ENTRANCE TAPER ALTERNATIVE B





ANCHOR ASSEMBLY ALTERNATIVE B



ANCHOR ASSEMBLY ALTERNATIVE A

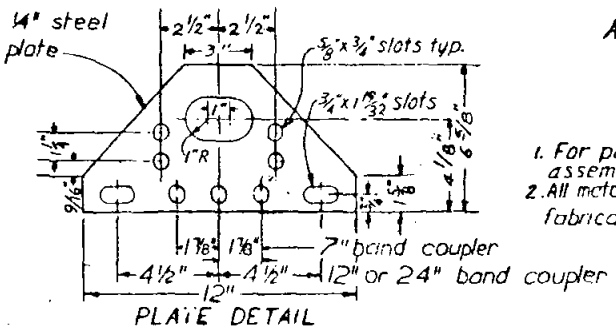


PLATE DETAIL

NOTES

1. For payment purposes; an anchor assembly shall include 2 pipe stakes.
2. All metal parts for anchor assemblies shall be galvanized after fabrication.
3. Products similar in design and purpose may be used.
4. Use L dimension on each side of downdrain in sag location

Revision	By	Approved	Date

Standard Specifications Sections: 69

Drawn by: [illegible] Check by: [illegible]

Recommended by: [illegible]

Approved by County Surveyor: [illegible] R.C.E. 6091

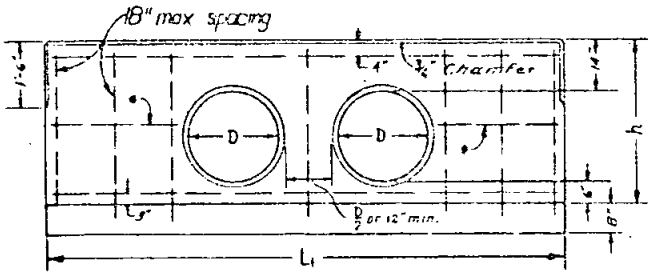
SAN DIEGO COUNTY SURVEYOR — ROAD DEPARTMENT
STANDARD DRAWING

ENTRANCE TAPER AND DOWNDRAIN PIPE

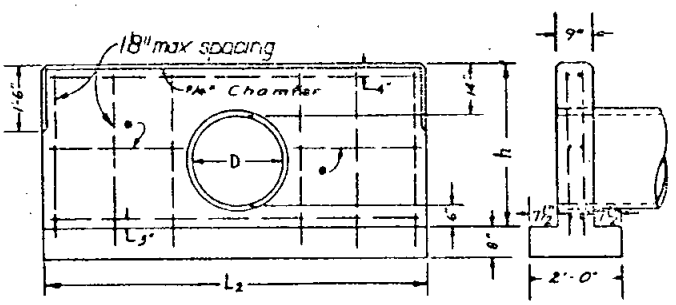
Scale: none

Date Approved: 1-14-63

Drawing No. 125-1



FRONT VIEW

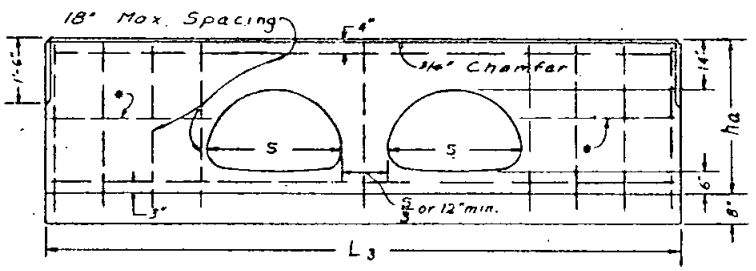


FRONT VIEW SIDE VIEW

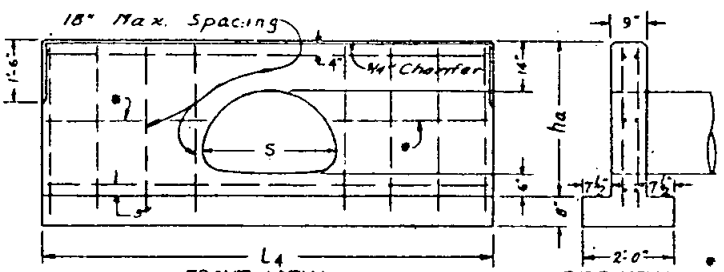
D In	h ft.-In.	Single L2 ft.-In.	Single Vert. Bars	Single Steel lbs.	Single Conc. C.Y.	Double L1 ft.-In.	Double Vert. Bars	Double Steel lbs.	Double Conc. C.Y.
18	3-2	7-0	12	46	0.91	9-6	14	57	1.21
21	3-5	7-6	12	49	1.02	10-6	14	62	1.38
24	3-8	8-6	12	54	1.20	11-6	14	67	1.57
27	3-11	9-6	16	70	1.39	13-0	18	85	1.84
30	4-2	10-0	16	74	1.52	14-0	18	91	2.04
33	4-5	11-0	16	79	1.73	15-0	18	96	2.25
36	4-8	12-0	16	96	1.95	16-6	18	114	2.56
39	4-11	13-6	16	101	2.09	17-6	20	126	2.79
42	5-2	13-6	16	108	2.34	18-6	20	136	3.03
45	5-5	14-6	20	129	2.60	20-0	26	167	3.38
48	5-8	15-0	20	133	2.75	21-0	26	174	3.64
51	5-11	16-0	20	140	3.03	22-6	26	183	3.92
54	6-2	17-0	20	147	3.31	23-6	26	191	4.30

Use headwall tables for concrete pipe and for C.M.P. No deduction in quantities for variations in thickness of pipe walls.

STRAIGHT HEADWALLS. (Round Pipe)



FRONT VIEW



FRONT VIEW SIDE VIEW

S In.	ha ft.-In.	Single L4 ft.-In.	Single Vert. Bars	Single Steel lbs.	Single Conc. C.Y.	Double L3 ft.-In.	Double Vert. Bars	Double Steel lbs.	Double Conc. C.Y.
22	2-9	7-0	12	43	0.87	9-6	14	53	1.14
25	3-0	7-6	12	46	0.93	10-6	14	58	1.26
29	3-3	8-6	12	50	1.08	12-0	14	62	1.50
36	3-6	10-0	16	67	1.35	14-0	18	83	1.81
43	3-11	12-6	16	77	1.50	16-6	18	94	2.26
50	4-3	13-6	16	84	2.00	19-0	18	104	2.70
58	4-8	15-0	20	119	2.33	22-0	22	145	3.31
65	5-0	17-0	20	128	2.61	25-0	22	157	3.92
72	5-4	20-0	24	157	3.45	28-0	28	194	4.54

STRAIGHT HEADWALLS. (Arch Pipe)

LEGEND ON PLANS

* When h or ha exceeds 4'-6" add pairs of horizontal bars as shown. Vertical spacing shall be equal.

NOTES

1. Extend vertical bars 5" into base.
2. All steel reinforcing shall be #4 deformed bars.
3. Steel shall have not less than 2" concrete cover.
4. When more than 2 pipes are used, the length of headwall shall increase by 1½ D for round or 1⅓ S for arch pipe, for each additional pipe. Quantities of concrete & steel shall be increased as required.

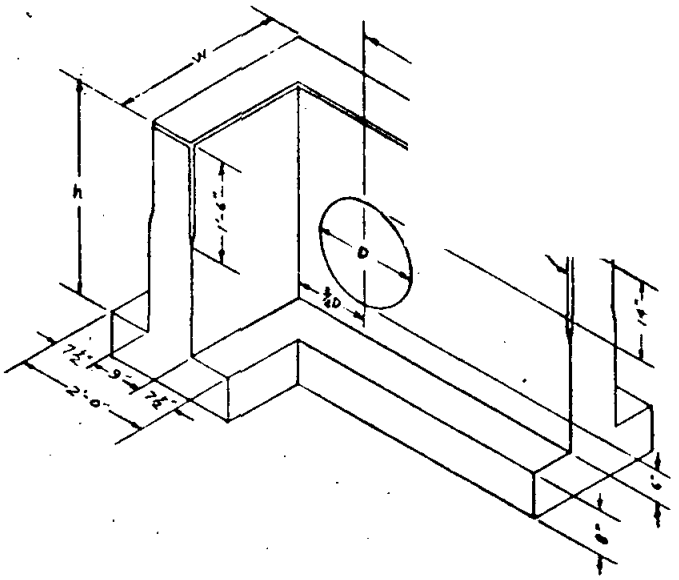
Revision	By	Approved	Date

Standard Specifications, Sections: 51, 52, 90
Drawn by: Irate Check by: FEB
Recommended by: [illegible]
Approved by County Surveyor.
D. K. Spear R.C.E. 9021

SAN DIEGO COUNTY SURVEYOR — ROAD DEPARTMENT.
STANDARD DRAWING.

STRAIGHT HEADWALL
SINGLE AND DOUBLE

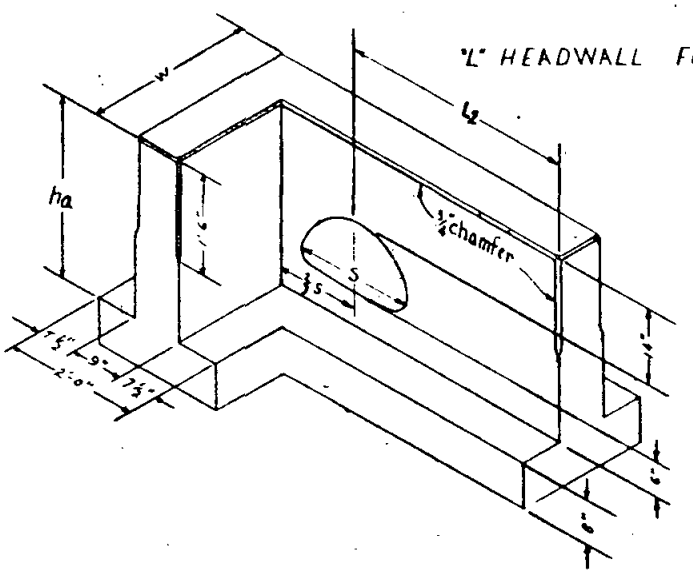
Scale: None
Date Approved: 1-14-63
Drawing No. 126-1



D	h	L1	LENGTH OF W					CONC. CU. YDS.
			2'-0" to 3'-4"	3'-5" to 4'-10"	4'-11" to 6'-4"	6'-5" to 7'-10"	7'-11" to 9'-4"	
			NUMBER OF VERTICAL BARS FOR W					
			6	8	10	12	14	
ins.	ft-ins.	ft.-ins.	Steel LBS. (#4 = .668 lbs. per ft.)					
18	3-2	3-6	40+3W	45+3W				0.59+0.14W
21	3-5	3-9	43+3W	48+3W				0.66+0.14W
24	3-8	4-3	47+3W	52+3W	58+3W			0.79+0.15W
27	3-11	4-9	57+3W	62+3W	68+3W			0.91+0.16W
30	4-2	5-0	60+3W	66+3W	73+3W	78+3W		1.00+0.17W
33	4-5	5-6	64+3W	71+3W	77+3W	83+3W		1.13+0.17W
36	4-8	6-0	74+4W	81+4W	88+4W	94+4W	101+4W	1.28+0.18W
39	4-11	6-3		85+4W	92+4W	99+4W	106+4W	1.39+0.19W
42	5-2	6-9		99+4W	107+4W	104+4W	112+4W	1.54+0.17W
45	5-5	7-3			110+4W	118+4W	126+4W	1.71+0.20W
48	5-8	7-6			113+4W	121+4W	130+4W	1.82+0.21W
51	5-11	8-0				129+4W	138+4W	2.00+0.21W
54	6-2	8-6				135+4W	144+4W	2.18+0.22W

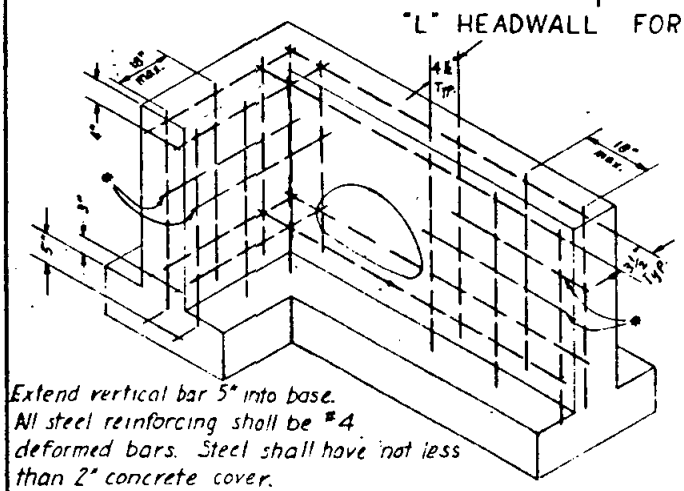
Note: Use headwall table for concrete pipe and for C.M.P. No deduction made in quantity for variation in thickness of pipe wall.

"L" HEADWALL FOR ROUND PIPE



s	ha	L2	LENGTH OF W					CONC. CU. YDS.
			2'-0" to 3'-4"	3'-5" to 4'-10"	4'-11" to 6'-4"	6'-5" to 7'-10"	7'-11" to 9'-4"	
			NUMBER OF VERTICAL BARS FOR W					
			6	8	10	12	14	
ins.	ft-ins.	ft.-ins.	Steel LBS. (#4 = .668 lbs. per ft.)					
22	2-9	3-6	38+3W	43+3W				0.51+0.13W
25	3-0	3-9	42+3W	46+3W				0.57+0.13W
29	3-2	4-3	45+3W	50+3W	55+3W			0.70+0.14W
36	3-6	5-0	57+3W	63+3W	69+3W	73+3W		0.88+0.15W
43	3-11	6-3		71+3W	77+3W	82+3W	87+3W	1.10+0.16W
50	4-3	6-9		78+3W	85+3W	91+3W	98+3W	1.33+0.16W
58	4-8	7-6			108+4W	115+4W	122+4W	1.58+0.18W
65	5-0	8-6				126+4W	133+4W	1.85+0.19W
72	5-4	10-0				149+4W	159+4W	2.24+0.20W

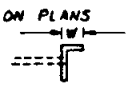
"L" HEADWALL FOR ARCH PIPE



Note: When more than one pipe is used, the distance between pipes shall be D/2 or 12" min. for round pipe and S/3 or 12" min. for arch pipe. Dimensions L_1 & L_2 are from the center of the pipe nearest to the end of headwall as shown.

• When h or ha is greater than 4'-6" add pairs of horizontal bars as shown. Vertical spacing shall be equal.

LEGEND ON PLANS



show length of W on plans.

Extend vertical bar 5" into base.
All steel reinforcing shall be #4 deformed bars. Steel shall have not less than 2" concrete cover.

TYPICAL STEEL PLACEMENT DETAIL

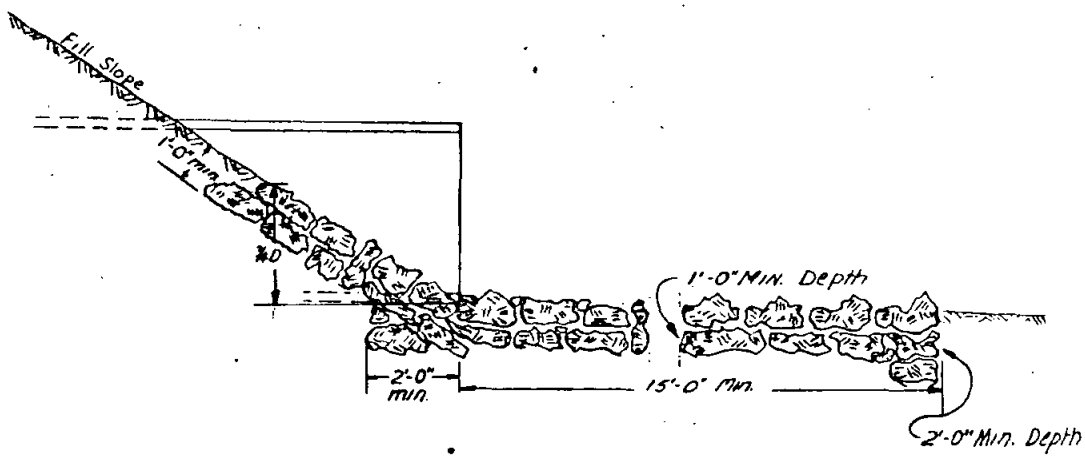
Revision	By	Approved	Date

Standard Specifications
Sections: 51.52, 90
Drawn by: Drake Checked by REB
Recommended by: [illegible]
Approved by County Surveyor:
D. K. Spear R.C.E. 8091

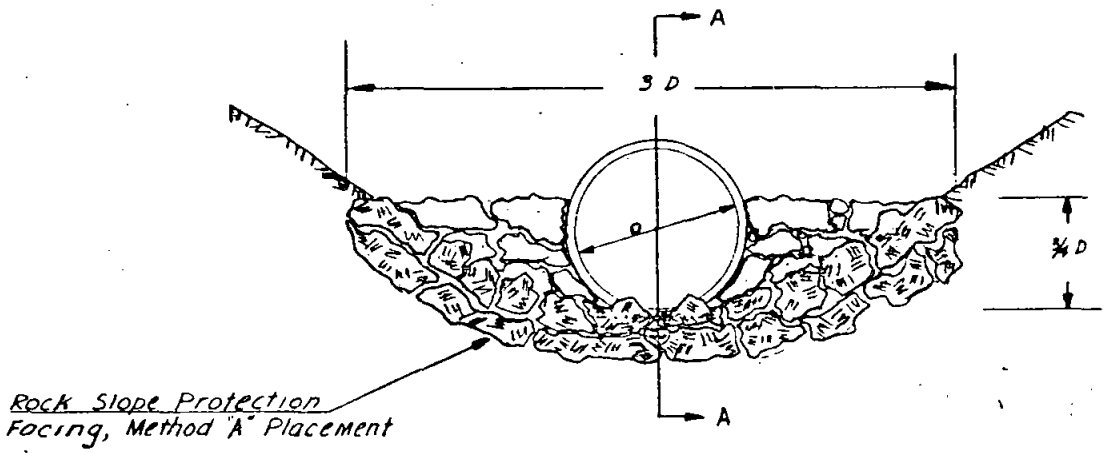
SAN DIEGO COUNTY SURVEYOR — ROAD DEPARTMENT
STANDARD DRAWING

"L" HEADWALL

Scale: None
Date Approved: Nov. 7, 1962
Drawing No.
127-1



SECTION A-A



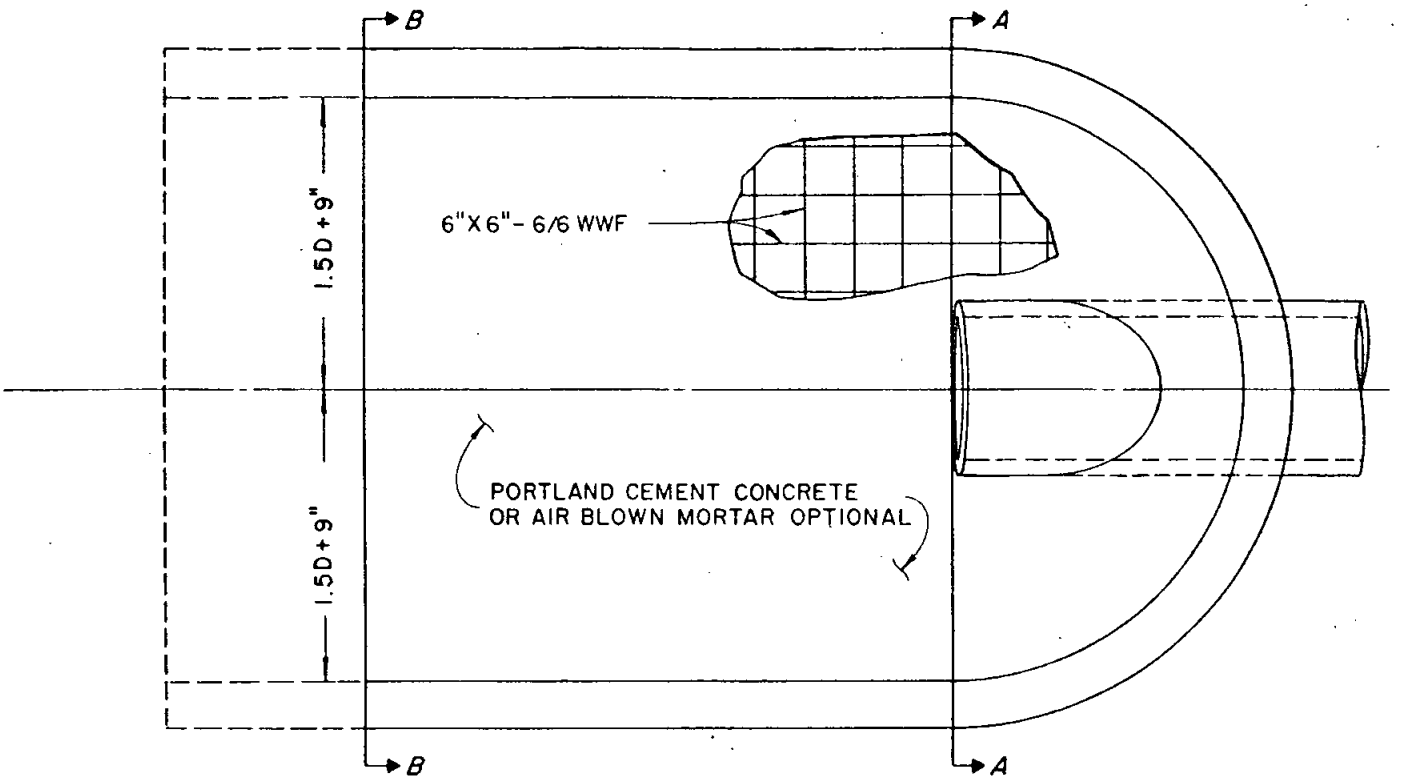
END ELEVATION OF PIPE

Legend on plan

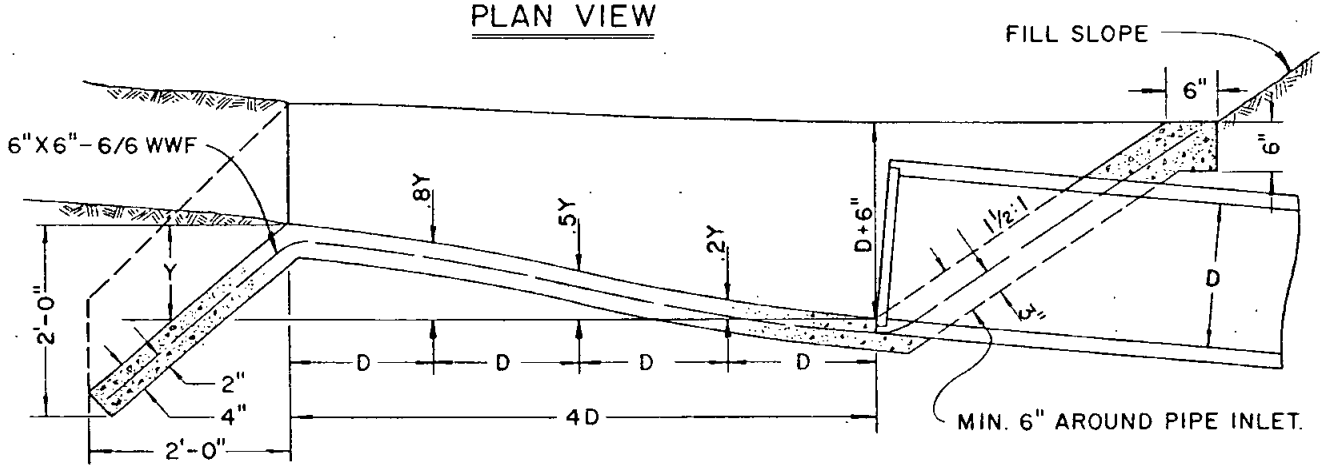
= = =

1. Shape shall conform to outlet channel.
2. Channel or pipe outlet rock slope protection shall be used when outlet velocity exceeds 10 F.P.S. and soil at outlet is susceptible to erosion.

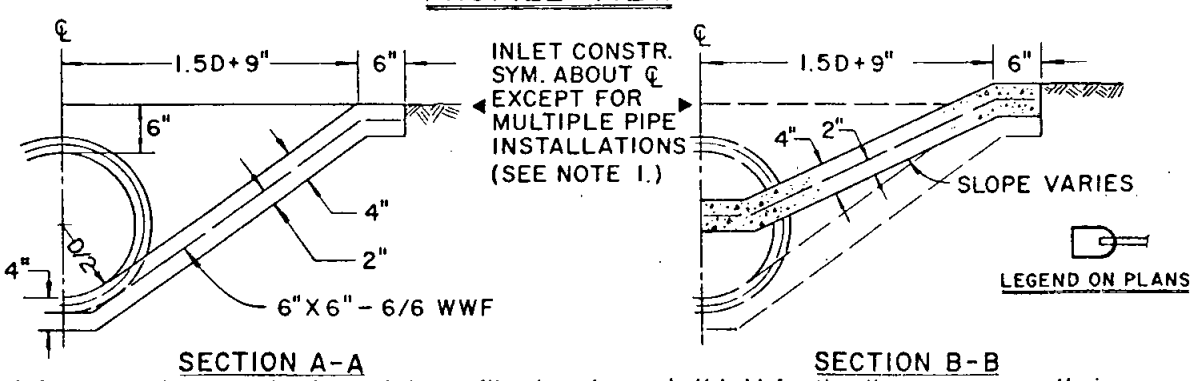
Standard Specifications	SAN DIEGO COUNTY SURVEYOR – ROAD DEPARTMENT STANDARD DRAWING	Revision	By	Approved	Date
Sections 72		Scale None			
Drawn by: Drake Checked by: RGB		Date Approved 2-27-63			
Recommended by: [illegible]	CHANNEL OR PIPE OUTLET FOR ROCK SLOPE PROTECTION AND FLOW INTERUPTION	Drawing No. 128-1			
Approved by County Surveyor: D. K. Gheer R.C.E. 8094					



PLAN VIEW



PROFILE VIEW



SECTION A-A

SECTION B-B

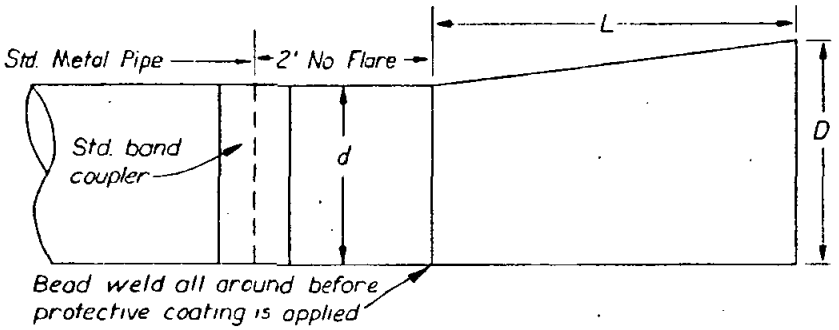
REDUCED SCALE
USE SCALE BELOW
0 1 2 3
3 INCHES ON ORIGINAL PLAN

NOTE: 1. When more than one pipe is used the profile view shown shall hold for the distance across all pipe openings. Sections A-A and B-B shall be from outermost pipe. The distance between pipes shall be D/2 for round and Span/3 for arch pipe. (12" minimum)

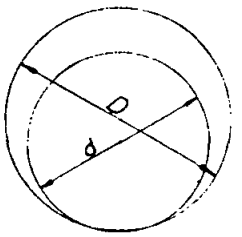
2. Culvert shall be cut off even with apron surface when required by the County Engineer.

3. Applicable only where flared end section cannot be utilized.

STD. SPEC. SEC: 51, 52, 90	SAN DIEGO COUNTY ENGINEER DEPARTMENT STANDARD DRAWING				
DRAWN BY [illegible] CHECKED BY [illegible]					
RECOMMENDED BY [illegible]	TYPE A INLET APRON FOR CULVERTS UP TO 42" DIA.	REVISION	BY	APPROVED	DATE
APPROVED BY COUNTY ENGINEER		SCALE: NONE			
H. M. Taylor R.C.E. 11458		DRAWING NUMBER 129-2			
DATE: Sept. 28 - '71					

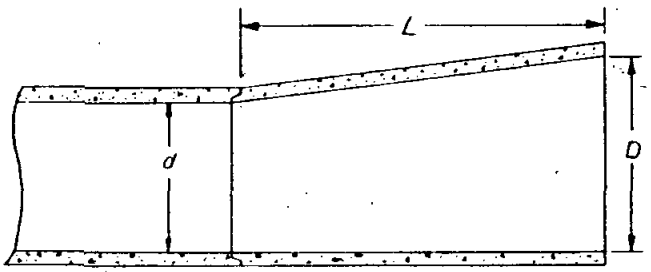


SIDE VIEW

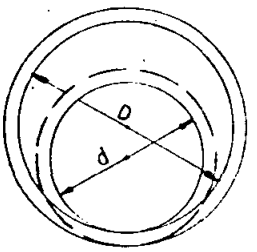


END VIEW

FLARED INLET - CORRUGATED METAL PIPE



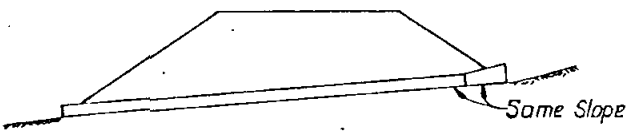
SIDE VIEW SECTION



END VIEW

Note: Wall thickness, steel, & material shall conform to Std. reinforced Conc. pipe.

FLARED INLET - REINFORCED CONCRETE PIPE



36" x 240' C.M.P. (12 ga.) with flared metal inlet (d = 36" D = 42")

INSTALLATION EXAMPLE

General Notes

1. Type of pipe, class or gage & protective coating shall conform to the plans and standard specifications.
2. L dimension equals 8' unless noted otherwise.
3. Diameters of a flared section shall be shown on the plans.
4. The difference between the diameters "D" and d" shall be 6" unless noted otherwise.

Standard Specifications	SAN DIEGO COUNTY SURVEYOR – ROAD DEPARTMENT STANDARD DRAWING	Revision ↑ By ↑ Approved ↑ Date ↑
Sections: 65, 66		Scale: None
Drawn by: Drake Checked by: [illegible]		Date Approved: 2-27-63
Recommended by: [illegible]	CULVERT FLARED INLETS	Drawing No. 130-1
Approved by County Surveyor: D. K. Speer R.C.E. 8091		

SPAN	2'		3'			4'					
HEIGHT	1.6'	2'	2'	3'		2'	3'		4'		
STRENGTH CLASSIFICATION	A	A	A	A	B	A	A	B	A	B	C
MAX. FILL OVER TOP	66		38	38	66	28	28	37	28	37	50
Conc. – Top Slab T_1	6	6	6¼	6¼	8	7	7	8	7	8	9
Conc. – Bottom Slab T_2	6	6	6¼	6¼	8	7	7	8	7	8	9
Conc. – Sidewalls T_3	6	6	6	6	6	6	6	6	6	6	6
Reinforcing Steel – "a" Size: Bar #	4	4	4	4	5	5	5	5	5	5	6
"a" Spacing	3½	3½	3½	3½	4	5	5	4½	5	4½	5
"a" Length	3-2	3-2	4-2	4-2	4-3	5-3	5-3	5-3	5-3	5-3	5-2
"d" Dist. Bars – Top Slab - No. of	2	2	3	3	2	5	5	3	5	3	3
"d" Dist. Bars – Bottom Slab - No. of	2	2	2	2	2	3	3		3		3
"e" Bars Spacing	18	18	18	18	12½	18	18	18	17	13	9½
Spacers Number	12	12	12	12		12	12		14		
Quan. – Concrete: C.Y. per lin. ft.	.17	.18	.23	.27	.31	.29	.33	.36	.36	.40	.43
Quan. – Reinf. lbs per lin. ft.	27	29	34	36	46	44	45	47	48	52	64
Hydraulics – Area A	3	4	6	9		8	12		16		
Hydraulic Radius R	.43	.50	.60	.75		.67	.86		1.00		
Neutral Slope %	.83	.91	.73	.82		.64	.70		.77		
Head Factor k	1.30	1.07	.85	.65		.75	.55		.45		
Entrance Capacity Q_{10}	11	17	26	48		35	64		99		
Design Discharge Q_{100}	18	28	43	79		58	107		163		

SPAN	5'											
HEIGHT	2'		3'		4'				5'			
STRENGTH CLASSIFICATION	A	B	A	B	A	B	C	D	A	B	C	D
MAX. FILL OVER TOP	12	27	12	27	11	26	35	46	11	23	35	46
Conc. – Top Slab T_1	7½	8	7½	8	7½	8	9½	10½	7¼	8	9½	10½
Conc. – Bottom Slab T_2	6	8	6	8	6	8	10	10¾	6	8	10	10¾
Conc. – Sidewalls T_3	6	6	6	6	6	6	6	6	6	6	6	6
Reinforcing Steel – "a" Size: Bar #	5	5	5	5	5	5	6	6	5	5	6	6
"a" Spacing	4	4	4	4	4	4	5	4½	4	4	5	4½
"a" Length	6-3	6-3	6-3	6-3	6-3	6-3	6-2	6-2	6-3	6-3	6-2	6-2
"d" Dist. Bars – Top Slab - No. of	7	3	7	3	7	3		3	7	3		3
"d" Dist. Bars – Bottom Slab - No. of	3		3		3			3	3	3		3
"e" Bars Spacing	18	18	18	18	18	17	13	11	18	12	8½	6½
Spacers Number	14		14		14				16			
Quan. – Concrete: C.Y. per lin. ft.	.32	.37	.40	.41	.40	.44	.51	.54	.43	.48	.55	.57
Quan. – Reinf. lbs per lin. ft.	57	56	59	57	61	60	68	75	63	65	77	87
Hydraulics – Area A	10		15		20				25			
Hydraulic Radius R	.71		.94		1.11				1.25			
Neutral Slope %	.59		.62		.67				.73			
Head Factor k	.69		.49		.39				.34			
Entrance Capacity Q_{10}	43		80		123				172			
Design Discharge Q_{100}	71		132		203				284			

SPAN	6'																				
HEIGHT	2'		3'		4'			5'				6'					7'				
STRENGTH CLASSIFICATION	A	B	A	B	A	B	C	A	B	C	D	A	B	C	D	E	A	B	C	D	E
MAX. FILL OVER TOP	10	18	10	16	10	18	25	9	18	25	36	9	17	25	36	45	9	17	25	36	45
Conc. – Top Slab T_1	8¼	8¼	8¼	8¼	8¼	8¼	9¼	8¼	8¼	9¼	11	8¼	8¼	9¼	11	12	8¼	8¼	9¼	11	12
Conc. – Bottom Slab T_2	6¾	8	6¾	8	6¾	8	9¾	7¼	8¼	10	11¼	7¼	8¼	10½	11¼	12¼	7¼	8¼	10½	11¼	12¼
Conc. – Sidewalls T_3	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6¼	7	6	6	6¼	7	7¾
Reinforcing Steel – "a" Size: Bar #	5	5	5	5	5	5	6	5	5	6	6	5	5	6	7	7	5	5	6	7	7
"a" Spacing	4	4	4	4	4	4	5	4	4	5	4½	4	4	5	5½	5	4	4	5	5½	5
"a" Length	7-3	7-3	7-3	7-3	7-3	7-3	7-2	7-3	7-3	7-2	7-2	7-3	7-3	7-2	7-3	7-5	7-3	7-3	7-2	7-5	7-6
"d" Dist. Bars – Top Slab - No. of	7	4	7	4	7	4		7	4		4	7	4		4	4	7	4		4	4
"d" Dist. Bars – Bottom Slab - No. of	4		4		4			4			4	4			4	4	4			4	4
"e" Bars Spacing	18	18	18	18	18	18	17	18	15½	11½	6½	17	10½	7½	6	5	12	7½	7	5	4½
Spacers Number	12		12		14			16				16					18				
Quan. – Concrete: C.Y. per lin. ft.	.40	.42	.43	.46	.47	.50	.58	.52	.54	.60	.66	.56	.58	.65	.71	.78	.59	.61	.70	.78	.88
Quan. – Reinf. lbs per lin. ft.	64	63	66	65	69	67	74	70	70	80	91	73	78	92	112	127	81	90	99	126	139
Hydraulics – Area A	12		18		24			30				36					42				
Hydraulic Radius R	.75		1.00		1.20			1.36				1.50					1.62				
Neutral Slope %	.53		.56		.59			.62				.66					.71				
Head Factor k	.645		.45		.358			.303				.271					.247				
Entrance Capacity Q_{10}	52		96		148			207				272					343				
Design Discharge Q_{100}	86		159		244			341				449					565				

DUPLICATED FROM STATE STANDARD DRAWING Nº D 80

RECOMMENDED BY: [signature] 6/13/64

[signature] 6/13/64

Note:

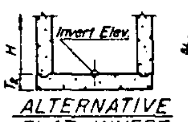
For boxes of height less than that shown in table, use next greater table height slabs, wall dimensions and reinforcing steel, and make necessary changes in bar lengths, number of spacers and quantities.

SPAN	7'												
HEIGHT	3'		4'		5'			6'			7'		
STRENGTH CLASSIFICATION	A	B	A	B	A	B	C	A	B	C	A	B	C
MAX. FILL OVER TOP	16	26	16	26	16	26	35	16	26	35	16	26	35
Conc. – Top Slab T_1	7¼	8¼	7¼	8¼	7¼	8¼	9¾	7¼	8¼	9¾	7¼	8¼	9¾
Conc. – Bottom Slab T_2	7½	8¾	7½	8¾	7½	8¾	10½	7½	8¾	10½	7½	8¾	10½
Conc. – Sidewalls T_3	6	7	6	7	6	7	8½	6	7	8½	6	7	8½
"a" Size: Bar #	5	5	5	5	5	5	6	5	5	6	5	5	6
"a" Spacing	9	7	9	7	9	7	9	9	7	9	9	7	9
"a" Length	6-8	6-9	6-6	6-9	6-8	5-9	6-10	6-8	6-9	6-10	6-8	6-9	6-10
"b" Size: Bar #	5	5	5	5	5	5	6	5	5	6	5	5	6
"b" Spacing	9	7	9	7	9	7	9	9	7	9	9	7	9
"b" Dimension "X"	1-3	1-4	1-3	1-4	1-3	1-4	1-8	1-3	1-4	1-8	1-3	1-4	1-8
"b" Length	3-1	3-2	3-1	3-2	3-1	3-2	3-10	3-1	3-2	3-10	3-1	3-2	3-10
"c" Size: Bar #	5	5	5	5	5	5	6	5	5	6	5	5	6
"c" Spacing	9	7	9	7	9	7	9	9	7	9	9	7	9
"c" Dimension "Y"	1-10	1-11	1-10	1-11	1-10	1-11	2-3	1-10	1-11	2-3	1-10	1-11	2-3
"c" Length	5-2	5-4	6-2	6-4	7-2	7-4	7-10	8-2	8-4	8-10	9-2	9-4	9-10
"c_1" Size: Bar #	5	5	5	5	5	5	6	5	5	6	5	5	6
"c_1" Spacing	9	7	9	7	9	7	9	9	7	9	9	7	9
"c_1" Dimension "Y"	1-10	1-11	1-10	1-11	1-10	1-11	2-3	1-10	1-11	2-3	1-10	1-11	2-3
"c_1" Length	3-8	3-10	3-8	3-10	3-8	3-10	4-6	3-8	3-10	4-6	3-8	3-10	4-6
"d" Bars – Top Slab - No. of	7	4	7	4	7	4	4	7	4	4	7	4	4
"d" Bars – Bottom Slab - No. of	4	4	4	4	4	4	4	4	4	4	4	4	4
"e" Bars Spacing	18	18	18	18	18	18	18	18	18	18	18	18	18
Spacers Total Number	24		28		28			32			36		
Quan. – Concrete: C.Y. per lin. ft.	.47	.56	.51	.60	.55	.64	.78	.58	.68	.84	.62	.73	.89
Quan. – Reinf. lbs. per lin. ft.	107	130	114	138	118	143	168	125	150	176	132	158	184
Hydraulics – Area A	21		28		35			42			49		
Hydraulic Radius R	1.05		1.27		1.46			1.62			1.75		
Neutral Slope %	0.52		0.54		0.57			0.61			0.64		
Head Factor k	0.423		0.332		0.281			0.247			0.224		
Entrance Capacity Q_{10}	112		173		241			317			400		
Design Discharge Q_{100}	185		285		398			523			659		

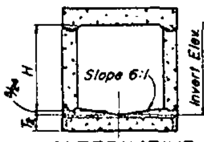
SPAN	8'														
HEIGHT	3'		4'		5'		6'			7'			8'		
STRENGTH CLASSIFICATION	A	B	A	B	A	B	A	B	C	A	B	C	A	B	C
MAX. FILL OVER TOP	13	21	13	21	13	21	13	21	31	13	21	31	13	21	31
Conc. – Top Slab T_1	7¼	8½	7¼	8½	7¼	8½	7¼	8½	10¼	7¼	8½	10¼	7¼	8½	10¼
Conc. – Bottom Slab T_2	7¼	9½	7¼	9½	7¼	9½	7½	9½	11½	7½	9½	11½	7½	9½	11½
Conc. – Sidewalls T_3	6½	7½	6½	7½	6½	7½	6½	7½	9¾	6½	7½	9¾	6½	7½	9¾
"a" Size: Bar #	5	5	5	5	5	5	5	5	6	5	5	6	5	5	6
"a" Spacing	9	7	9	7	9	7	9	7	8	9	7	8	9	7	8
"a" Length	7-7	7-8	7-7	7-8	7-7	7-8	7-7	7-8	7-10	7-7	7-8	7-10	7-7	7-8	7-10
"b" Size: Bar #	5	5	5	5	5	5	5	5	6	5	5	6	5	5	6
"b" Spacing	9	7	9	7	9	7	9	7	8	9	7	8	9	7	8
"b" Dimension "X"	1-6	1-7	1-6	1-7	1-6	1-7	1-6	1-7	1-8	1-6	1-7	1-8	1-6	1-7	1-8
"b" Length	3-4	3-5	3-4	3-5	3-4	3-5	3-4	3-5	3-10	3-4	3-5	3-10	3-4	3-5	3-10
"c" Size: Bar #	5	5	5	5	5	5	5	5	6	5	5	6	5	5	6
"c" Spacing	9	7	9	7	9	7	9	7	8	9	7	8	9	7	8
"c" Dimension "Y"	2-0	2-5	2-0	2-5	2-0	2-5	2-0	2-5	2-8	2-0	2-5	2-8	2-0	2-5	2-8
"c" Length	5-4	5-10	6-4	6-10	7-4	7-10	8-4	8-10	9-3	9-4	9-10	10-3	10-4	10-10	11-3
"c_1" Size: Bar #	5	5	5	5	5	5	5	5	6	5	5	6	5	5	6
"c_1" Spacing	9	7	9	7	9	7	9	7	8	9	7	8	9	7	8
"c_1" Dimension "Y"	2-0	2-5	2-0	2-5	2-0	2-5	2-0	2-5	2-8	2-0	2-5	2-8	2-0	2-5	2-8
"c_1" Length	3-9	4-5	3-9	4-5	3-9	4-5	3-9	4-5	5-0	3-9	4-5	5-0	3-9	4-5	5-0
"d" Bars – Top Slab - No. of	7	5	7	5	7	5	7	5	5	7	5	5	7	5	5
"d" Bars – Bottom Slab - No. of	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5
"e" Bars Spacing	18	18	18	18	18	18	18	18	18	18	18	18	18	18	18
Spacers Total Number	28		32		32		36			40			40		
Quan. – Concrete: C.Y. per lin. ft.	.52	.63	.56	.70	.60	.74	.65	.79	1.00	.69	.83	1.05	.73	.88	1.12
Quan. – Reinf. lbs. per lin. ft.	118	146	125	154	129	159	136	167	211	143	174	220	147	179	225
Hydraulics – Area A	24		32		40		48			56			64		
Hydraulic Radius R	1.09		1.33		1.54		1.71			1.87			2.00		
Neutral Slope %	0.50		0.52		0.54		0.56			0.59			0.62		
Head Factor k	0.404		0.314		0.262		0.229			0.206			0.189		
Entrance Capacity Q_{10}	128		197		276		362			457			558		
Design Discharge Q_{100}	212		326		455		597			753			921		

SPAN	10'																
HEIGHT	4'		5'		6'		7'		8'			9'			10'		
STRENGTH CLASSIFICATION	A	B	A	B	A	B	A	B	A	B	C	A	B	C	A	B	C
MAX. FILL OVER TOP	9	18	9	18	9	18	9	18	8	18	28	8	18	28	8	18	28
Conc. – Top Slab T_1	8	9½	8¼	9¾	8¼	9¾	8½	9¾	8½	9¾	12¼	8½	9¾	12¼	8½	9¾	12¼
Conc. – Bottom Slab T_2	8¾	10½	9	10¾	9	10¾	9¼	11	9¼	11	13¼	9¼	11	13¼	9¼	11	13½
Conc. – Sidewalls T_3	7¼	9½	7¼	9½	7¼	9½	7¼	9½	7¼	9½	11½	8	9½	11½	9	9½	11½
"a" Size: Bar #	6	6	6	6	6	6	6	6	6	6	7	6	6	7	6	6	7
"a" Spacing	11	8	11	8	11	8	11	8	11	8	9	11	8	9	11	8	9
"a" Length	9-5	9-8	9-5	9-8	9-5	9-8	9-5	9-8	9-5	9-8	9-9	9-6	9-8	9-9	9-7	9-8	9-9
"b" Size: Bar #	5	6	5	6	5	6	5	6	5	6	6	5	6	6	5	6	6
"b" Spacing	11	8	11	8	11	8	11	8	11	8	9	11	8	9	11	8	9
"b" Dimension "X"	2-0	2-0	2-0	2-0	2-0	2-0	2-0	2-0	2-0	2-0	2-6	2-0	2-0	2-6	2-0	2-0	2-6
"b" Length	3-10	4-2	3-10	4-2	3-10	4-2	3-10	4-2	3-10	4-2	4-8	3-10	4-2	4-8	3-10	4-2	4-8
"c" Size: Bar #	5	6	5	6	5	6	5	6	5	6	6	5	6	6	5	6	6
"c" Spacing	11	8	11	8	11	8	11	8	11	8	9	11	8	9	11	8	9
"c" Dimension "Y"	2-8	3-4	2-8	3-4	2-8	3-4	2-8	3-4	2-8	3-4	3-6	2-8	3-4	3-6	2-8	3-4	3-6
"c" Length	6-11	7-10	8-1	8-10	9-1	9-10	10-1	10-10	11-1	11-10	12-3	12-1	12-10	13-3	13-1	13-10	14-3
"c_1" Size: Bar #	5	6	5	6	5	6	5	6	5	6	6	5	6	6	5	6	6
"c_1" Spacing	11	8	11	8	11	8	11	8	11	8	9	11	8	9	11	8	9
"c_1" Dimension "Y"	2-8	3-4	2-8	3-4	2-8	3-4	2-8	3-4	2-8	3-4	3-6	2-8	3-4	3-6	2-8	3-4	3-6
"c_1" Length	4-7	5-8	4-7	5-8	4-7	5-8	4-7	5-8	4-7	5-8	6-0	4-7	5-8	6-0	4-7	5-8	6-2
"d" Bars – Top Slab - No. of	9	5	9	5	9	5	9	5	9	5	5	9	5	5	9	5	5
"d" Bars – Bottom Slab - No. of	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5
"e" Bars Spacing	18	18	18	18	18	18	18	18	18	18	18	18	18	18	18	18	18
Spacers Total Number	32		34		36		40		40			44			48		
Quan. – Concrete: C.Y. per lin. ft.	.75	.94	.82	1.02	.86	1.08	.92	1.15	.97	1.21	1.50	1.06	1.26	1.57	1.18	1.32	1.65
Quan. – Reinf. lbs. per lin. ft.	143	221	140	228	154	235	160	244	164	250	265	170	259	273	178	267	281
Hydraulics – Area A	40		50		60		70		80			90			100		
Hydraulic Radius R	1.43		1.67		1.88		2.06		2.22			2.37			2.50		
Neutral Slope %	0.47		0.49		0.51		0.52		0.54			0.56			0.58		
Head Factor k	0.288		0.238		0.205		0.183		0.165			0.155			0.143		
Entrance Capacity Q_{10}	247		345		453		571		698			834			976		
Design Discharge Q_{100}	407		568		747		941		1150			1380			1610		

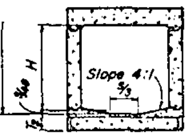
SPAN	12'														
HEIGHT	6'		7'		8'		9'			10'			12'		
STRENGTH CLASSIFICATION	A	B	A	B	A	B	A	B	C	A	B	C	A	B	C
MAX. FILL OVER TOP	5	16	5	16	5	16	5	16	24	5	16	24	5	16	24
Conc. – Top Slab T_1	8¾	11¼	8¾	11¼	8¾	11¼	9	11¼	13¼	9	11¼	13¼	9	11¼	13¼
Conc. – Bottom Slab T_2	8¾	12¼	8¾	12¼	8¾	12¼	9	12½	14¾	9	12½	14¾	9	12½	14¾
Conc. – Sidewalls T_3	7½	10½	7½	10½	7½	10½	8	10½	12½	9	10½	12½	9	10½	12½
"a" Size: Bar #	6	7	6	7	6	7	6	7	7	6	7	7	6	7	7
"a" Spacing	11	10	11	10	11	10	11	10	8	11	10	8	11	10	8
"a" Length	11-3	11-6	11-3	11-6	11-3	11-6	11-4	11-6	11-8	11-5	11-6	11-8	11-5	11-6	11-8
"b" Size: Bar #	6	7	6	7	6	7	6	7	7	6	7	7	6	7	7
"b" Spacing	11	10	11	10	11	10	11	10	8	11	10	8	11	10	8
"b" Dimension "X"	2-8	3-0	2-8	3-0	2-8	3-0	2-8	3-0	3-0	2-8	3-0	3-0	2-8	3-0	3-0
"b" Length	4-10	5-7	4-10	5-7	4-10	5-7	4-10	5-7	5-7	4-10	5-7	5-7	4-10	5-7	5-7
"c" Size: Bar #	6	7	6	7	6	7	6	7	7	6	7	7	6	7	7
"c" Spacing	11	10	11	10	11	10	11	10	8	11	10	8	11	10	8
"c" Dimension "Y"	3-9	3-9	3-9	3-9	3-9	3-9	3-9	3-9	3-9	3-9	3-9	3-9	3-9	3-9	3-9
"c" Length	10-2	10-4	11-2	11-4	12-2	12-4	13-2	13-4	13-6	14-2	14-4	14-6	16-2	16-4	16-6
"c_1" Size: Bar #	6	7	6	7	6	7	6	7	7	6	7	7	6	7	7
"c_1" Spacing	11	10	11	10	11	10	11	10	8	11	10	8	11	10	8
"c_1" Dimension "Y"	3-9	3-9	3-9	3-9	3-9	3-9	3-9	3-9	3-9	3-9	3-9	3-9	3-9	3-9	3-9
"c_1" Length	5-11	6-5	5-11	6-5	5-11	6-6	5-11	6-6	6-8	5-11	6-6	6-8	5-11	6-6	6-8
"d" Bars – Top Slab - No. of	10	6	10	6	10	6	10	6	6	10	6	6	10	6	6
"d" Bars – Bottom Slab - No. of	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6
"e" Bars Spacing	18	18	18	18	18	18	18	18	18	18	18	18	18	18	18
Spacers Total Number	36		44		44		44			48			52		
Quan. – Concrete: C.Y. per lin. ft.	.99	1.38	1.03	1.44	1.08	1.52	1.18	1.56	1.90	1.30	1.65	1.95	1.41	1.78	2.13
Quan. – Reinf. lbs. per lin. ft.	203	293	213	304	218	311	223	317	387	231	326	397	243	341	415
Hydraulics – Area A	72		84		96		108			120			144		
Hydraulic Radius R	2.00		2.21		2.40		2.57			2.73			3.00		
Neutral Slope %	0.46		0.48		0.49		0.51			0.52			0.56		
Head Factor k	0.189		0.167		0.151		0.138			0.128			0.114		
Entrance Capacity Q_{10}	543		686		838		1000			1170			1540		
Design Discharge Q_{100}	896		1130		1380		1650			1930			2540		



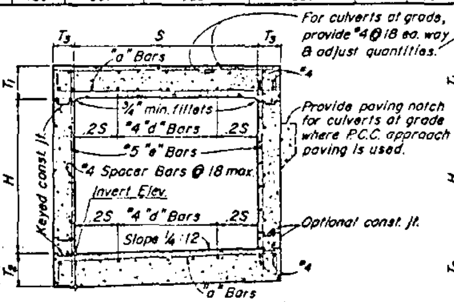
ALTERNATIVE FLAT INVERT



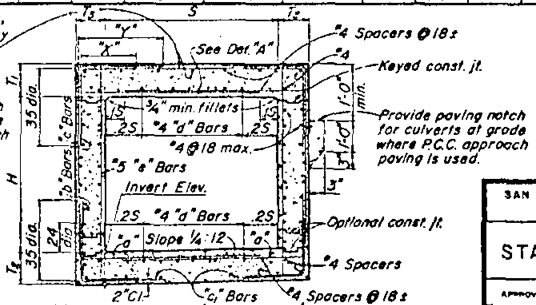
ALTERNATIVE V INVERT



ALTERNATIVE TRAPEZOIDAL INVERT



TYPICAL SECTIONS 2' THRU 6' SPANS



TYPICAL SECTION 7' THRU 12' SPANS

DETAIL "A"

SAN DIEGO COUNTY SURVEYOR – ROAD DEPARTMENT
STANDARD DRAWING

STANDARD SINGLE BOX CULVERTS

APPROVED BY: [signature] COUNTY SURVEYOR R.C.E. 5091

DATE: 6/16/64

DRAWING Nº 140-1

140-1

SPAN	4'										
HEIGHT	2'			3'				4'			
STRENGTH CLASSIFICATION	A	B	C	A	B	C	D	A	B	C	D
MAX. FILL OVER TOP	11	21	32	11	23	34	46	11	23	34	46
Conc. Top Slab T_1	6½	6½	7¼	6½	6½	7½	8½	6½	6½	7½	8½
Conc. Bottom Slab T_2	6	7¼	8½	6	7½	8½	9½	6	7½	8½	9½
Conc. Sidewalls T_3	6	6	6	6	6	6	6	6	6	6	6
Reinforcing Steel "a" Size Bar #	5	4	4	5	4	4	4	5	4	4	4
"a" Spacing	11	11	9	11	10½	8½	7½	11	10½	8½	7½
"a" Length	10-3	10-2	10-2	10-3	10-2	10-2	10-2	10-3	10-2	10-2	10-2
"b" or "b_1" Size Bar #	5	5	5	5	5	5	5	5	5	5	5
"b" or "b_1" Spacing	11	11	9	11	10½	8½	7½	11	10½	8½	7½
Length "b"	9-4	9-4	9-6	9-4	9-4	9-6	9-7	9-4	9-4	9-6	9-7
Length "b_1"	9-4	9-5	9-6	9-4	9-5	9-6	9-7	9-4	9-5	9-6	9-7
"c" Size Bar #	4	5	5	4	5	5	5	4	5	5	5
"c" Spacing	11	11	9	11	10½	8½	7½	11	10½	8½	7½
"c" Length	4-6	4-6	4-6	4-6	4-6	4-6	4-6	4-6	4-6	4-6	4-6
"d" Dist Bars Top Slab-Tot. No.	10	6	6	10	6	6	6	10	6	6	6
"d" Dist Bars Bottom Slab-Tot. No.	6	6	6	6	6	6	6	6	6	6	6
"e" Bars Size Bar #	4	4	4	4	4	4	4	4	4	4	5
"e" Bars Spacing	18	18	18	18	18	16	12	18	12	9	10
Spacers Number	23			26				29			
Quan. Concrete C.Y. per lin ft.	0.47	0.51	0.57	0.53	0.57	0.63	0.69	0.59	0.63	0.69	0.75
Quan. Reinf. Lbs per lin ft.	81	74	84	84	79	91	101	87	85	99	111
Hydraulics Area A	16			24				32			
Hydraulic Radius R	0.67			0.86				1.00			
Neutral Slope %	0.64			0.70				0.77			
Head Factor k	0.75			0.55				0.45			
Entrance Capacity Q_{10}	70			128				198			
Design Discharge Q_{100}	116			214				326			

SPAN	5'													
HEIGHT	2'			3'			4'				5'			
STRENGTH CLASSIFICATION	A	B	C	A	B	C	A	B	C	D	A	B	C	D
MAX. FILL OVER TOP	6	24	36	6	24	36	6	23	34	46	6	23	34	46
Conc. Top Slab T_1	6¾	7¾	9¼	6¾	7¾	9¼	6¾	7¾	9	10¼	6¾	7¾	9¼	10½
Conc. Bottom Slab T_2	6½	8¾	10¼	6½	8¾	10¼	6½	8¾	10	11¼	6¼	8¾	10¼	11½
Conc. Sidewalls T_3	6	6	6	6	6	6	6	6	6	6	6	6	6	5
Reinforcing Steel "a" Size Bar #	5	4	4	5	4	4	5	4	4	4	5	4	4	4
"a" Spacing	10	8½	10	10	8½	10	10	8½	10	9	10	8½	10½	9
"a" Length	12-3	12-2	12-2	12-3	12-2	12-2	12-3	12-2	12-2	12-2	12-3	12-2	12-2	12-2
"b" or "b_1" Size Bar #	5	5	6	5	5	6	5	5	6	6	5	5	6	6
"b" or "b_1" Spacing	10	8½	10	10	8½	10	10	8½	10	9	10	8½	10½	9
Length "b"	11-5	11-6	11-7	11-5	11-6	11-7	11-5	11-6	11-7	11-8	11-5	11-6	11-7	11-9
Length "b_1"	11-4	11-6	11-7	11-4	11-6	11-7	11-4	11-6	11-7	11-8	11-4	11-6	11-7	11-8
"c" Size Bar #	4	5	6	4	5	6	4	5	6	6	4	5	6	6
"c" Spacing	10	8½	10	10	8½	10	10	8½	10	9	10	8½	10½	9
"c" Length	5-6	5-6	5-6	5-6	5-6	5-6	5-6	5-6	5-6	5-6	5-6	5-6	5-6	5-6
"d" Dist Bars Top Slab-Tot. No.	12	6	6	12	6	6	12	6	6	6	12	6	6	6
"d" Dist Bars Bottom Slab-Tot. No.	6	6	6	6	6	6	6	6	6	6	6	6	6	6
"e" Bars Size Bar #	4	4	4	4	4	4	4	4	4	5	4	4	5	6
"e" Bars Spacing	18	18	18	18	18	16	18	12	10	10½	18	8½	9	9
Spacers Number	23			26			29				32			
Quan. Concrete C.Y. per lin ft.	0.58	0.69	0.80	0.63	0.75	0.86	0.69	0.80	0.89	0.95	0.74	0.86	0.97	1.04
Quan. Reinf. Lbs per lin ft.	99	100	109	103	104	112	106	109	119	133	109	116	126	148
Hydraulics Area A	20			30			40				50			
Hydraulic Radius R	0.71			0.94			1.11				1.25			
Neutral Slope %	0.59			0.62			0.67				0.73			
Head Factor k	0.59			0.49			0.39				0.34			
Entrance Capacity Q_{10}	86			160			246				344			
Design Discharge Q_{100}	142			264			406				568			

SPAN	6'													
HEIGHT	3'			4'			5'				6'			
STRENGTH CLASSIFICATION	A	B	C	A	B	C	A	B	C	D	A	B	C	D
MAX. FILL OVER TOP	4	20	34	4	20	34	4	19	33	43	4	19	33	43
Conc. Top Slab T_1	7¼	8¼	10½	7¼	8¼	10½	7¼	8¼	10½	12	7¼	8¼	10½	12
Conc. Bottom Slab T_2	7¼	9½	11½	7¼	9½	11½	7¼	9½	11½	12¾	7¼	9½	11½	12¾
Conc. Sidewalls T_3	5	6	6	6	6	6	6	6	6	6	6	6	6	7½
Reinforcing Steel "a" Size Bar #	5	4	4	5	4	4	5	4	4	4	5	4	4	4
"a" Spacing	9½	11	8½	9½	11	8½	9½	11	8½	10½	9½	11	8½	10½
"a" Length	14-3	14-2	14-2	14-3	14-2	14-2	14-3	14-2	14-2	14-2	14-3	14-2	14-2	14-3
"b" or "b_1" Size Bar #	5	6	6	5	6	6	5	6	6	7	5	6	6	7
"b" or "b_1" Spacing	9½	11	8½	9½	11	8½	9½	11	8½	10½	9½	11	8½	10½
Length "b"	13-6	13-6	13-8	13-6	13-6	13-8	13-6	13-6	13-8	13-9	13-6	13-6	13-8	14-2
Length "b_1"	13-5	13-7	13-8	13-5	13-7	13-8	13-5	13-6	13-8	13-9	13-5	13-6	13-8	14-2
"c" Size Bar #	4	6	6	4	6	6	4	6	6	7	4	6	6	7
"c" Spacing	9½	11	8½	9½	11	8½	9½	11	8½	10½	9½	11	8½	10½
"c" Length	6-6	6-6	6-6	6-6	6-6	6-6	6-6	6-6	6-6	6-6	6-6	6-6	6-6	6-8
"d" Dist Bars Top Slab-Tot. No.	12	6	6	12	6	6	12	6	6	6	12	6	6	6
"d" Dist Bars Bottom Slab-Tot. No.	6	6	6	6	6	6	6	6	6	6	6	6	6	6
"e" Bars Size Bar #	4	4	4	4	4	4	4	4	5	5	4	5	6	6
"e" Bars Spacing	18	18	16	18	14	8½	18	10	9½	7	18	11	9	6
Spacers Number	30			33			36				36			
Quan. Concrete C.Y. per lin ft.	0.77	0.90	1.08	0.85	0.96	1.13	0.88	1.01	1.19	1.30	0.93	1.07	1.25	1.47
Quan. Reinf. Lbs per lin ft.	121	119	147	123	124	155	128	131	164	175	129	137	177	201
Hydraulics Area A	36			48			60				72			
Hydraulic Radius R	1.00			1.20			1.33				1.50			
Neutral Slope %	0.56			0.59			0.62				0.66			
Head Factor k	0.450			0.358			0.305				0.271			
Entrance Capacity Q_{10}	192			296			414				544			
Design Discharge Q_{100}	318			488			692				896			

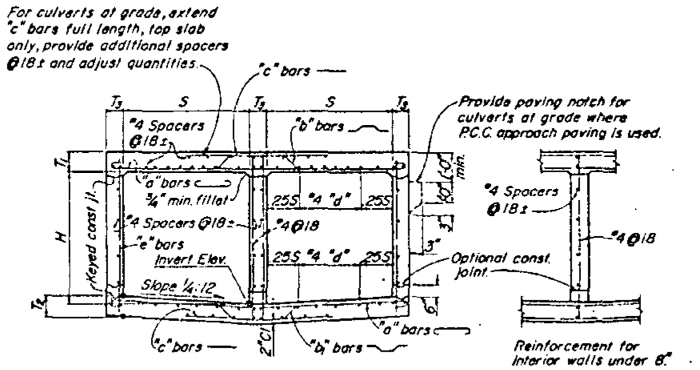
SPAN	8'																
HEIGHT	4'			5'			6'			7'				8'			
STRENGTH CLASSIFICATION	A	B	C	A	B	C	A	B	C	A	B	C	D	A	B	C	D
MAX. FILL OVER TOP	3	14	25	3	14	25	3	14	25	3	14	25	37	3	14	25	37
Conc. Top Slab T_1	8½	9½	12	8½	9½	12	8½	9½	12	8½	9½	12¼	14¼	8½	9½	12¼	14¼
Conc. Bottom Slab T_2	7½	10½	12¾	7½	10¾	12¾	7½	10¾	12¾	7½	10¾	13	15	7½	10¾	13	15½
Conc. Sidewalls T_3	6	6	6	6	6	6	6	6	6	7	7	7	8	7	7	8	8½
Reinforcing Steel "a" Size Bar #	6	4	4	6	4	4	6	4	4	6	4	4	4	6	4	4	4
"a" Spacing	12	9½	10½	12	9½	10	12	9½	10	11½	9½	10	8½	11½	9½	10	8½
"a" Length	18-4	16-2	16-2	18-4	18-2	18-2	18-4	18-2	18-2	18-7	18-5	18-5	18-6	18-7	18-5	18-6	18-7
"b" or "b_1" Size Bar #	5	6	7	6	6	7	6	6	7	6	6	7	7	6	6	7	7
"b" or "b_1" Spacing	12	9½	10½	12	9½	10	12	9½	10	11½	9½	10	8½	11½	9½	10	8½
Length "b"	17-7	17-8	17-9	17-7	17-8	17-9	17-7	17-8	17-9	17-10	17-10	18-0	18-5	17-10	17-10	18-3	18-6
Length "b_1"	17-5	17-8	17-9	17-5	17-8	17-9	17-5	17-8	17-9	17-8	17-11	18-0	18-5	17-6	17-11	19-0	18-7
"c" Size Bar #	4	6	7	4	6	7	4	6	7	4	6	7	7	4	6	7	7
"c" Spacing	12	9½	10½	12	9½	10	12	9½	10	11½	9½	10	8½	11½	9½	10	8½
"c" Length	8-5	8-6	8-6	8-6	8-6	8-6	8-6	8-6	8-6	8-7	8-7	8-7	8-8	8-7	8-7	8-8	8-9
"d" Dist Bars Top Slab-Tot. No.	16	8	8	16	8	8	16	8	8	16	8	8	8	16	8	8	8
"d" Dist Bars Bottom Slab-Tot. No.	8	8	8	8	8	8	8	8	8	8	8	8	8	8	8	8	8
"e" Bars Size Bar #	4	4	4	4	4	5	4	5	6	4	5	6	7	4	5	7	7
"e" Bars Spacing	18	18	10½	18	12	10	18	11½	10	14	9½	7½	8½	11½	8½	7½	8
Spacers Number	41			44			44			47			56	50		60	
Quan. Concrete C.Y. per lin ft.	1.09	1.30	1.55	1.14	1.37	1.61	1.19	1.42	1.66	1.32	1.56	1.83	2.14	1.39	1.62	1.99	2.27
Quan. Reinf. Lbs per lin ft.	169	175	200	172	181	218	173	188	229	185	199	248	239	191	207	284	314
Hydraulics Area A	64			80			96			112				128			
Hydraulic Radius R	1.33			1.54			1.71			1.87				2.00			
Neutral Slope %	0.52			0.54			0.56			0.59				0.62			
Head Factor k	0.314			0.252			0.229			0.206				0.189			
Entrance Capacity Q_{10}	394			552			724			914				1116			
Design Discharge Q_{100}				910			1194			1506				1642			

Note:

For boxes of height less than that shown in table, use next greater table height slabs, wall dimensions and reinforcing steel, and make necessary changes in bar lengths, number of spacers and quantities.

SPAN	10'																
HEIGHT	5'			6'			7'			8'				10'			
STRENGTH CLASSIFICATION	A	B	C	A	B	C	A	B	C	A	B	C	D	A	B	C	D
MAX. FILL OVER TOP	2	17	30	2	17	30	2	17	30	2	16	29	36	2	15	29	36
Conc. Top Slab T_1	8¾	12¾	16	8¾	12¾	16	8¾	12¾	16	8¾	12¾	16	17¼	8¾	12¾	16	17½
Conc. Bottom Slab T_2	8¼	13½	16½	8¼	13½	16½	8¼	13¾	16¾	8¾	13½	16½	18¼	8¾	13½	16½	18½
Conc. Sidewalls T_3	6	6	6	6	6	6	6	6½	7	7	7	7½	8½	8	8	9	10
Reinforcing Steel "a" Size Bar #	6	4	4	6	4	4	6	4	4	6	4	4	4	6	4	4	4
"a" Spacing	11	10	10	11	9½	10	11	9½	10	11	10	10	9	11	10	10	9
"a" Length	22-4	22-2	22-2	22-4	[illegible]	[illegible]	22-4	22-4	22-5	22-7	22-5	22-7	22-10	22-10	22-8	22-11	23-2
"b" or "b_1" Size Bar #	6	7	8	6	7	8	6	7	8	6	7	8	8	6	7	8	8
"b" or "b_1" Spacing	11	10	10	11	9½	10	11	9½	10	11	10	10	9	11	10	10	9
Length "b"	21-7	21-10	22-0	21-7	21-10	22-0	21-7	21-11	22-3	21-10	21-1	22-4	22-9	22-1	22-4	22-9	23-1
Length "b_1"	21-5	21-10	22-0	21-5	21-10	22-0	21-5	21-11	22-3	21-9	22-0	22-4	22-9	22-0	22-3	22-8	23-2
"c" Size Bar #	6	7	8	6	7	8	6	7	8	6	7	8	8	6	7	8	8
"c" Spacing	11	10	10	11	9½	10	11	9½	10	11	10	10	9	11	10	10	9
"c" Length	10-6	10-6	10-6	10-6	10-6	10-6	10-6	10-7	10-7	10-7	10-7	10-8	10-9	10-8	10-8	10-9	10-10
"d" Dist Bars Top Slab-Tot. No.	18	10	10	18	10	10	18	10	10	18	10	10	10	18	10	10	10
"d" Dist Bars Bottom Slab-Tot. No.	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10
"e" Bars Size Bar #	4	4	5	4	4	5	4	4	6	4	5	6	7	4	6	6	7
"e" Bars Spacing	18	10	10	18	6	6½	14	6	8	11	8½	6	6	7½	7	5½	5
Spacers Number	48			48			51			54			64	68			
Quan. Concrete C.Y. per lin ft.	1.40	2.05	2.46	1.45	2.07	2.48	1.51	2.18	2.64	1.68	2.27	2.74	3.04	1.92	2.51	3.05	3.41
Quan. Reinf. Lbs per lin ft.	236	254	310	236	274	324	243	230	339	252	278	355	430	279	327	400	476
Hydraulics Area A	100			120			140			160				200			
Hydraulic Radius R	1.67			1.88			2.06			2.22				2.50			
Neutral Slope %	0.49			0.51			0.52			0.54				0.58			
Head Factor k	0.238			0.205			0.183			0.165				0.143			
Entrance Capacity Q_{10}	690			906			1142			1396				1952			
Design Discharge Q_{100}	1136			1494			1882			2300				3220			

SPAN	12'																				
HEIGHT	6'			7'			8'			9'				10'				12'			
STRENGTH CLASSIFICATION	A	B	C	A	B	C	A	B	C	A	B	C	D	A	B	C	D	A	B	C	D
MAX. FILL OVER TOP	2	14	26	2	14	25	2	14	26	2	14	26	36	2	14	26	36	2	14	26	36
Conc. Top Slab T_1	10	14	17½	10	14¼	17½	10¼	14¼	17¾	10¼	14½	17¾	20½	10¼	14½	17¾	20½	10¼	14½	18¼	21¼
Conc. Bottom Slab T_2	9¼	14¾	18	9¼	15	18¼	9¾	15	18½	10	15¼	18¾	21¼	10¼	15¼	18¾	21½	10½	15¼	19¼	22
Conc. Sidewalls T_3	6	6	6½	7	7	7	8	8	8½	9	9	9	10	9	9	9½	11	9	10	11	12
Reinforcing Steel "a" Size Bar #	6	4	4	6	4	4	6	4	4	6	4	4	4	6	4	4	4	6	4	4	4
"a" Spacing	9	11½	9	9	11½	9	9	11	8½	9	11	8½	9	9	11	8½	9	9	11	8½	9
"a" Length	26-4	26-2	26-4	26-7	26-5	26-5	25-10	26-8	26-10	27-1	26-11	26-11	27-1	27-1	26-11	27-3	27-5	27-1	27-2	27-5	27-6
"b" or "b_1" Size Bar #	6	8	8	6	8	8	6	8	8	6	8	8	9	6	8	8	9	6	8	8	9
"b" or "b_1" Spacing	9	11½	9	9	11½	9	9	11	8½	9	11	8½	9	9	11	8½	9	9	11	8½	9
Length "b"	25-8	25-10	26-3	25-11	26-1	26-4	25-2	26-4	26-9	25-5	25-8	26-10	27-4	25-5	26-8	27-2	27-6	26-5	26-11	27-5	27-10
Length "b_1"	25-6	25-10	26-3	25-9	26-2	26-4	25-1	26-5	26-9	26-4	26-8	26-11	27-4	26-4	26-8	27-2	27-7	26-4	26-11	27-5	27-11
"c" Size Bar #	5	8	8	5	8	8	5	8	8	5	8	8	9	5	8	8	9	5	8	8	9
"c" Spacing	9	11½	9	9	11½	9	9	11	8½	9	11	6½	9	9	11	8½	9	9	11	8½	9
"c" Length	12-6	12-6	12-7	12-7	12-7	12-7	12-8	12-8	12-9	12-9	12-9	12-9	12-10	12-9	12-9	12-10	12-11	12-9	12-10	12-11	13-0
"d" Dist Bars Top Slab-Tot. No.	24	10	10	24	10	10	24	10	10	24	10	10	10	24	10	10	10	24	10	10	10
"d" Dist Bars Bottom Slab-Tot. No.	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10
"e" Bars Size Bar #	4	4	5	4	4	5	4	4	5	4	5	7	8	4	7	8	8	6	7	8	9
"e" Bars Spacing	18	8	8	15	6	6½	12	5½	6	9	7½	8½	8	8½	11	8½	9	12	8	7	7
Spacers Number	52			55			68			68				72				76			
Quan. Concrete C.Y. per lin ft.	1.84	2.59	3.16	1.97	2.77	3.28	2.19	2.93	3.59	2.38	3.15	3.69	4.25	2.46	3.23	3.85	4.49	2.67	3.53	4.30	4.92
Quan. Reinf. Lbs per lin ft.	309	317	401	316	330	415	336	363	460	345	374	485	578	351	394	519	582	371	427	567	673
Hydraulics Area A	144			168			192			216				240				288			
Hydraulic Radius R	2.00			2.21			2.40			2.57				2.73				3.00			
Neutral Slope %	0.46			0.48			0.49			0.51				0.52				0.56			
Head Factor k	0.189			0.167			0.151			0.138				0.128				0.114			
Entrance Capacity Q_{10}	1086			1372			1676			2000				2340				3080			
Design Discharge Q_{100}	1792			2260			2760			3300				3860				5080			



TYPICAL SECTION

(Showing reinforcement for interior walls 8" and over.)

DUPLICATED FROM STATE STANDARD DRAWING ST D-81
RECOMMENDED BY: [signature]
[signature]

SAN DIEGO COUNTY SURVEYOR – ROAD DEPARTMENT
STANDARD DRAWING

STANDARD DOUBLE BOX CULVERTS

APPROVED BY: D. K. Speer — COUNTY SURVEYOR R.C.E. 5091
DATE: 4/10/64
DRAWING No 141-1

141-1

SPAN	4'								
HEIGHT	2'			3'			4'		
STRENGTH CLASSIFICATION	A	B	C	A	B	C	A	B	C
MAX. FILL OVER TOP	10	24	38	10	24	38	10	24	38
Conc. Top Slab T_1	6¼	6¼	7¼	6¼	6¼	7¼	6¼	6¼	7¼
Conc. Bottom Slab T_2	6	7	8¼	6	7	8¼	6	7	8¼
Conc. Sidewalls T_3	6	6	6	6	6	6	6	6	6
"a" Size Bar #	5	4	5	5	4	5	5	4	5
"a" Spacing	11	11½	13	11	11½	13	11	11½	13
"a" Length	14-9	14-8	14-9	14-9	14-8	14-9	14-9	14-8	14-9
"b" or "b1" Size Bar #	5	5	6	5	5	6	5	5	6
Spacing	11	11½	13	11	11½	13	11	11½	13
Length "b"	14-2	14-2	14-3	14-2	14-2	14-3	14-2	14-2	14-3
Length "b1"	14-0	14-2	14-3	14-0	14-2	14-3	14-0	14-2	14-3
"c" Size Bar #	4	5	6	4	5	6	4	5	6
"c" Spacing	11	11½	13	11	11½	13	11	11½	13
"c" Length	9-0	9-0	9-0	9-0	9-0	9-0	9-0	9-0	9-0
"d" Dist. Bars Top Slab-Tot. No.	15	9	9	15	9	9	15	9	9
"d" Dist. Bars Bottom Slab-Tot. No.	9	9	9	9	9	9	9	9	9
"e" Bars Size Bar #	4	4	4	4	4	4	4	4	5
"e" Bars Spacing	18	18	18	18	18	13	18	11½	13
Spacers Number	34			38			42		
Quan. Concrete: C.Y. per lin. ft.	0.67	0.71	0.81	0.75	0.79	0.89	0.82	0.85	0.96
Quan. Reinf.: Lbs per lin. ft.	122	110	133	127	115	138	131	122	147
Hydraulics Area A	24			36			48		
Hydraulic Radius R	.67			.86			1.00		
Neutral Slope %	.64			.70			.77		
Head Factor k	.75			.55			.45		
Entrance Capacity Q_{10}	105			192			297		
Design Discharge Q_{100}	174			321			489		

SPAN	5'													
HEIGHT	2'			3'			4'				5'			
STRENGTH CLASSIFICATION	A	B	C	A	B	C	A	B	C	D	A	B	C	D
MAX. FILL OVER TOP	8	17	25	8	17	25	8	17	26	35	8	17	26	35
Conc. Top Slab T_1	6¾	6¾	7½	6¾	6¾	7½	6¾	6¾	7½	8¼	6¾	6¾	7½	8¼
Conc. Bottom Slab T_2	6¼	7¼	8½	5¾	7¼	8½	6¼	7¼	8½	9½	6¼	7½	8½	9½
Conc. Sidewalls T_3	6	6	6	6	6	6	6	6	6	6	6	6	6	6
"a" Size Bar #	5	4	5	5	4	5	5	4	5	5	5	4	5	5
"a" Spacing	10	11½	13	10	11½	13	10	11	13	11½	10	11	13	11½
"a" Length	17-9	17-8	17-9	17-9	17-8	17-9	17-9	17-8	17-9	17-9	17-9	17-8	17-9	17-9
"b" or "b1" Size Bar #	5	5	6	5	5	6	5	5	6	6	5	5	6	6
Spacing	10	11½	13	10	11½	13	10	11	13	11½	10	11	13	11½
Length "b"	17-3	17-3	17-3	17-3	17-3	17-3	17-3	17-3	17-3	17-5	17-3	17-3	17-3	17-5
Length "b1"	17-0	17-2	17-4	17-0	17-2	17-4	17-0	17-2	17-4	17-5	17-0	17-2	17-4	17-5
"c" Size Bar #	4	5	6	4	5	6	4	5	6	6	4	5	6	6
"c" Spacing	10	11½	13	10	11½	13	10	11	13	11½	10	11	13	11½
"c" Length	11-0	11-0	11-0	11-0	11-0	11-0	11-0	11-0	11-0	11-0	11-0	11-0	11-0	11-0
"d" Dist. Bars Top Slab-Tot. No.	18	9	9	18	9	9	18	9	9	9	18	9	9	9
"d" Dist. Bars Bottom Slab-Tot. No.	9	9	9	9	9	9	9	9	9	9	9	9	9	9
"e" Bars Size Bar #	4	4	4	4	4	4	4	4	4	5	4	4	4	6
"e" Bars Spacing	18	18	18	18	18	18	18	17	11½	11½	18	11	7	11½
Spacers Number	34			38			38				42			
Quan. Concrete: C.Y. per lin. ft.	0.82	0.87	0.98	0.90	0.95	1.05	0.97	1.02	1.13	1.23	1.04	1.11	1.20	1.31
Quan. Reinf.: Lbs per lin. ft.	150	126	153	155	130	157	157	136	161	181	161	145	171	192
Hydraulics Area A	30			45			60				75			
Hydraulic Radius R	.71			.94			1.11				1.25			
Neutral Slope %	.59			.62			.67				.73			
Head Factor k	.69			.49			.39				.34			
Entrance Capacity Q_{10}	129			240			369				516			
Design Discharge Q_{100}	213			396			609				852			

SPAN	6'													
HEIGHT	3'			4'			5'				6'			
STRENGTH CLASSIFICATION	A	B	C	A	B	C	A	B	C	D	A	B	C	D
MAX. FILL OVER TOP	3	13	23	3	13	23	3	13	23	30	3	13	23	30
Conc. Top Slab T_1	7½	7½	8¼	7½	7½	8¼	7½	7½	8¼	9¼	7½	7½	8¼	9¼
Conc. Bottom Slab T_2	6	7¼	9¼	6	7¾	9¼	6	8	9¼	10	6	8	9¼	10¼
Conc. Sidewalls T_3	6	6	6	6	6	6	6	6	6	6	6	6	6	6
"a" Size Bar #	6	5	5	6	5	5	6	5	5	5	6	5	5	5
"a" Spacing	13	14	11½	13	14	11½	13	14	11½	10	13	14	11½	10
"a" Length	20-10	20-9	20-9	20-10	20-9	20-9	20-10	20-9	20-9	20-9	20-10	20-5	20-5	20-5
"b" or "b1" Size Bar #	6	5	6	6	6	6	6	6	6	6	6	6	6	6
Spacing	13	14	11½	13	14	11½	13	14	11½	10	13	14	11½	10
Length "b"	20-3	20-3	20-5	20-3	20-3	20-5	20-3	20-3	20-5	20-6	20-3	20-3	20-5	20-6
Length "b1"	20-0	20-2	20-5	20-0	20-2	20-5	20-0	20-3	20-5	20-6	20-0	20-0	20-5	20-7
"c" Size Bar #	4	6	6	4	6	6	4	6	6	6	4	6	6	6
"c" Spacing	13	14	11½	13	14	11½	13	14	11½	10	13	14	11½	10
"c" Length	13-0	13-0	13-0	13-0	13-0	13-0	13-0	13-0	13-0	13-0	13-0	13-0	13-0	13-0
"d" Dist. Bars Top Slab-Tot. No.	18	9	9	18	9	9	18	9	9	9	18	9	9	9
"d" Dist. Bars Bottom Slab-Tot. No.	9	9	9	9	9	9	9	9	9	9	9	9	9	9
"e" Bars Size Bar #	4	4	4	4	4	4	4	4	5	5	4	4	6	6
"e" Bars Spacing	18	18	18	18	18	11½	18	11½	12	10	18	8	12	10
Spacers Number	40			40			44				48			
Quan. Concrete: C.Y. per lin. ft.	1.05	1.15	1.29	1.12	1.23	1.37	1.19	1.32	1.44	1.55	1.27	1.39	1.52	1.64
Quan. Reinf.: Lbs per lin. ft.	181	168	195	183	170	200	187	177	209	235	192	187	221	249
Hydraulics Area A	54			72			90				108			
Hydraulic Radius R	1.00			1.20			1.36				1.50			
Neutral Slope %	.56			.59			.62				.66			
Head Factor k	.450			.358			.305				.271			
Entrance Capacity Q_{10}	288			444			621				816			
Design Discharge Q_{100}	477			732			1023				1344			

SPAN	8'																
HEIGHT	4'			5'			6'			7'				8'			
STRENGTH CLASSIFICATION	A	B	C	A	B	C	A	B	C	A	B	C	D	A	B	C	D
MAX. FILL OVER TOP	2	11	20	2	11	20	2	11	20	2	11	20	28	2	11	20	28
Conc. Top Slab T_1	8¼	8¼	10¼	8¼	8¼	10¼	8¼	8¼	10¼	8¼	8¼	10¼	11½	8¼	8¼	10¼	11½
Conc. Bottom Slab T_2	6½	9	11	6½	9¼	11	6½	9¼	11	6¾	9¼	11	12¼	6¾	9¼	11	12¼
Conc. Sidewalls T_3	6	6	6	6	6	6	6	6	6	6	6	6½	6½	7	7	7½	8¼
"a" Size Bar #	6	5	5	6	5	5	6	5	5	6	5	5	6	6	5	5	6
"a" Spacing	11½	12	12	11½	12	12	11½	12	12	11½	12	12	10½	11½	11½	12	10½
"a" Length	25-10	25-9	26-9	25-10	26-9	26-9	25-10	26-9	26-7	26-10	26-9	26-11	27-4	27-2	27-1	27-3	27-8
"b" or "b1" Size Bar #	6	6	7	6	6	7	6	6	7	6	6	7	7	6	6	7	7
Spacing	11½	12	12	11½	12	12	11½	12	12	11½	12	12	10½	11½	11½	12	10½
Length "b"	26-5	26-5	25-7	25-5	26-5	25-7	25-5	26-5	26-7	26-5	26-5	26-9	27-3	26-9	26-9	27-1	27-7
Length "b1"	26-0	26-4	26-7	25-0	26-5	25-7	25-0	26-5	26-7	26-1	26-5	26-9	27-3	26-5	26-9	27-1	27-7
"c" Size Bar #	4	6	7	4	6	7	4	6	7	4	6	7	7	4	6	7	7
"c" Spacing	11½	12	12	11½	12	12	11½	12	12	11½	12	12	10½	11½	11½	12	10½
"c" Length	17-0	17-0	17-0	17-0	17-0	17-0	17-0	17-0	17-0	17-0	17-0	17-1	17-3	17-2	17-2	17-3	17-5
"d" Dist. Bars Top Slab-Tot. No.	24	12	12	24	12	12	24	12	12	24	12	12	12	24	12	12	12
"d" Dist. Bars Bottom Slab-Tot. No.	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12
"e" Bars Size Bar #	4	4	4	4	4	5	4	5	6	4	6	7	7	4	6	7	7
"e" Bars Spacing	18	18	12	18	12	12	18	12	12	11½	12	12	10½	11½	11½	12	10½
Spacers Number	58			62			62			66				70			88
Quan. Concrete: C.Y. per lin. ft.	1.47	1.67	1.99	1.54	1.76	2.06	1.62	1.84	2.14	1.71	1.91	2.25	2.57	1.90	2.10	2.46	2.79
Quan. Reinf.: Lbs per lin. ft.	261	250	301	266	257	310	267	264	320	276	277	336	409	285	295	347	441
Hydraulics Area A	96			120			144			168				192			
Hydraulic Radius R	1.33			1.54			1.71			1.87				2.00			
Neutral Slope %	.52			.54			.56			.59				.62			
Head Factor k	.314			.262			.229			.206				.189			
Entrance Capacity Q_{10}	591			828			1086			1371				1674			
Design Discharge Q_{100}	978			1365			1791			2259				2763			

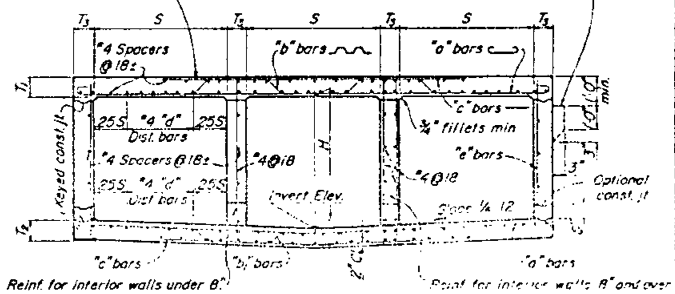
Note:
For boxes of height less than that shown in table, use next greater table height slabs, wall dimensions and reinforcing steel, and make necessary changes in bar lengths, number of spacers and quantities.

SPAN	10'																
HEIGHT	5'			6'			7'			8'				10'			
STRENGTH CLASSIFICATION	A	B	C	A	B	C	A	B	C	A	B	C	D	A	B	C	D
MAX. FILL OVER TOP	2	11	20	2	11	20	2	11	20	2	11	20	28	2	11	20	28
Conc. Top Slab T_1	9	10	12	9	10	12	9	10	12	9	10	12	14¼	9	10½	12½	14¼
Conc. Bottom Slab T_2	7½	10¾	13	7½	10¾	13	7½	10¾	13	7¾	11	13	15	8	11	13½	15
Conc. Sidewalls T_3	6	6	6	6	6	6	6	6	6½	7	7	7½	8½	8	8¼	9	10
"a" Size Bar #	6	6	6	5	6	6	6	6	6	6	6	6	6	6	6	6	6
"a" Spacing	10½	13	10	10½	13	10	10½	13	10	10½	13	10	11	10½	13	10	11
"a" Length	32-10	32-10	32-10	32-10	32-10	32-10	32-10	32-10	33-0	33-2	33-2	33-4	33-6	33-6	33-8	33-10	34-2
"b" or "b1" Size Bar #	6	7	7	6	7	7	6	7	7	6	7	7	8	6	7	7	8
Spacing	10½	13	10	10½	13	10	10½	13	10	10½	13	10	11	10½	13	10	11
Length "b"	32-6	32-7	32-10	32-6	32-7	32-10	32-6	32-7	33-0	32-10	32-11	33-4	33-11	33-2	33-5	33-11	34-5
Length "b1"	32-2	32-7	32-11	32-2	32-7	32-11	32-2	32-7	33-1	32-6	32-11	33-5	33-11	32-11	33-5	33-11	34-5
"c" Size Bar #	5	7	7	5	7	7	5	7	7	5	7	7	8	5	7	7	8
"c" Spacing	10½	13	10	10½	13	10	10½	13	10	10½	13	10	11	10½	13	10	11
"c" Length	21-0	21-0	21-0	21-0	21-0	21-0	21-0	21-0	21-1	21-2	21-2	21-3	21-5	21-4	21-5	21-6	21-6
"d" Dist. Bars Top Slab-Tot. No.	27	15	15	27	15	15	27	15	15	27	15	15	15	27	15	15	15
"d" Dist. Bars Bottom Slab-Tot. No.	15	15	15	15	15	15	15	15	15	15	15	15	15	15	15	15	15
"e" Bars Size Bar #	4	4	5	4	5	6	4	6	7	4	6	7	8	5	6	8	8
"e" Bars Spacing	18	13	10	18	13	10	13	13	10	10½	12	10	11	10½	9	10	9
Spacers Number	68			68			72			76			94	102			
Quan. Concrete: C.Y. per lin. ft.	1.98	2.40	2.82	2.06	2.48	2.90	2.13	2.55	3.03	2.34	2.77	3.23	3.70	2.68	3.18	3.73	4.22
Quan. Reinf.: Lbs per lin. ft.	358	[illegible]	470	359	379	482	367	391	502	377	402	514	550	421	455	577	632
Hydraulics Area A	130			180			210			240				300			
Hydraulic Radius R	1.67			1.88			2.06			2.22				2.50			
Neutral Slope %	.49			.51			.52			.54				.58			
Head Factor k	.238			.205			.183			.165				.143			
Entrance Capacity Q_{10}	1035			1359			1713			2094				2928			
Design Discharge Q_{100}	1704			2241			2823			3450				4830			

SPAN	12'																				
HEIGHT	6'			7'			8'			9'				10'				12'			
STRENGTH CLASSIFICATION	A	B	C	A	B	C	A	B	C	A	B	C	D	A	B	C	D	A	B	C	D
MAX. FILL OVER TOP	2	10	18	2	10	18	2	10	18	2	11	20	30	2	11	20	30	2	11	20	30
Conc. Top Slab T_1	10¼	11½	14	10¼	11½	14	10¼	11½	14	10¼	12	14¾	17¾	10¼	12	14¾	17¾	10¼	12	14¾	17¾
Conc. Bottom Slab T_2	8¼	12	14½	8½	12	14¾	8½	12	14¾	8¾	12½	15½	18¼	8¾	12½	15½	18¼	9	12¾	15¾	18¾
Conc. Sidewalls T_3	6	6	6½	6	6	7	7	7	7½	8	8	9	10	8	8	9	10½	9	9	10½	12
"a" Size Bar #	7	6	7	7	6	7	7	6	7	7	6	7	8	7	6	7	8	7	6	7	8
"a" Spacing	12	11	11½	12	11	11½	12	11	11½	12	10½	11	11½	12	10½	11	11½	12	10½	11	11½
"a" Length	39-1	38-10	39-3	39-1	38-10	39-5	39-5	39-5	39-7	39-9	39-6	40-1	40-10	39-9	39-6	40-1	41-0	40-7	39-10	40-7	41-6
"b" or "b1" Size Bar #	7	7	8	7	7	8	7	7	8	7	7	8	9	7	7	8	9	7	7	8	9
Spacing	12	11	11½	12	11	11½	12	11	11½	12	10½	11	11½	12	10½	11	11½	12	10½	11	11½
Length "b"	38-7	38-9	39-3	38-7	38-9	39-5	38-11	39-1	39-7	39-3	39-6	40-2	40-10	39-5	39-6	40-2	41-0	39-7	39-10	40-8	41-6
Length "b1"	38-3	38-7	39-2	38-3	38-9	39-5	38-7	39-1	39-7	39-0	39-6	40-2	40-10	39-0	39-6	40-2	41-0	39-4	39-10	40-9	41-6
"c" Size Bar #	6	7	8	6	7	8	6	7	8	6	7	8	9	6	7	8	9	6	7	8	9
"c" Spacing	12	11	11½	12	11	11½	12	11	11½	12	10½	11	11½	12	10½	11	11½	12	10½	11	11½
"c" Length	25-0	25-0	25-1	25-0	25-0	25-1	25-2	25-2	25-3	25-4	25-4	25-6	25-8	25-4	25-4	25-6	25-9	25-6	25-6	25-9	26-0
"d" Dist. Bars Top Slab-Tot. No.	36	15	15	36	15	15	36	15	15	36	15	15	15	36	15	15	15	36	15	15	15
"d" Dist. Bars Bottom Slab-Tot. No.	15	15	15	15	15	15	15	15	15	15	15	15	15	15	15	15	15	15	15	15	15
"e" Bars Size Bar #	4	4	6	4	4	6	4	4	6	4	6	7	8	5	7	8	9	6	7	9	9
"e" Bars Spacing	18	7	11½	12	5¾	11½	12	5½	9	10	10½	11	11½	12	10½	11	10½	12	9	11	9
Spacers Number	76			80			84			104				110				116			
Quan. Concrete: C.Y. per lin. ft.	2.60	3.18	3.82	2.70	3.26	3.98	2.88	3.45	4.13	3.13	3.79	4.61	5.45	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
Quan. Reinf.: Lbs per lin. ft.	499	505	628	497	516	637	505	527	654	536	562	719	872	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	636	[illegible]	963
Hydraulics Area A	216			252			288			324				360				432			
Hydraulic Radius R	2.00			2.21			2.40			2.57				2.73				3.00			
Neutral Slope %	.46			.48			.49			.51				.52				.56			
Head Factor k	.199			.167			.151			.138				.128				.114			
Entrance Capacity Q_{10}	1629			2058			2514			3000				3310				4620			
Design Discharge Q_{100}	2688			3390			4140			4950				5790				7620			

For culverts at grade, extend "c" bars full length, provide additional spacers @ 18± and adjust quantities.

Provide paving notch for culverts at grade where P.C.C. approach paving is used.



Reinf. for interior walls under 8".

TYPICAL SECTION

DUPLICATED FROM STATE STANDARD DRAWING No. D 83

RECOMMENDED BY:

SAN DIEGO COUNTY SURVEYOR — ROAD DEPARTMENT
STANDARD DRAWING

STANDARD TRIPLE BOX CULVERTS

APPROVED BY: COUNTY SURVEYOR & ROAD COMM.

DATE

DRAWING No. 142-1

142-1

DUPLICATED FROM STATE STANDARD DRAWING NO. D 83

RECOMMENDED BY: [illegible] 4/13/64

[illegible] 4/13/64

DESIGN NOTES

SPECIFICATIONS:

DESIGN: A.A.S.H.O. DATED 1957 WITH REVISIONS AND AS SUPPLEMENTED BY BRIDGE PLANNING AND DESIGN MANUAL.

SECTIONS DESIGNED FOR CULVERT IN A TRENCH ON HARD FOUNDATION, OR CULVERT UNTRENCHED ON YIELDING FOUNDATION. FOR CULVERTS ON PILES OR ROCK FOUNDATIONS SPECIAL DESIGN WILL BE REQUIRED.

LOADING:

LIVE LOAD = H20-S16-44 OR ALTERNATIVE WITH 30% IMPACT FOR ALL COVER DEPTHS. NEGLECT LIVE LOAD WHEN ON SINGLE SPANS, COVER IS MORE THAN 8' AND EXCEEDS SPAN, AND ON MULTIPLE SPANS WHEN COVER EXCEEDS DISTANCE BETWEEN EXTERIOR WALLS.

CULVERTS AT GRADE TREATED AS A BRIDGE, WITH THE WHEEL LOAD ON THE OVERT SLAB DISTRIBUTED OVER 7.5' TRANSVERSLY AND THE BREADTH OF THE CULVERT LONGITUDINALLY.

WHEEL LOADS DISTRIBUTED UNIFORMLY OVER A SQUARE, THE SIDES OF WHICH ARE 1.75 TIMES THE DEPTH OF FILL, BUT NOT LESS TRANSVERSLY THAN THE DIMENSION FOR GRADE TOP ON THE TOP SLAB, AND NOT LESS THAN 7.5' ON THE INVERT SLAB. WHEN SUCH AREAS FROM SEVERAL CONCENTRATIONS OVERLAP, THE TOTAL LOAD SHALL BE CONSIDERED AS UNIFORMLY DISTRIBUTED OVER THE AREA DEFINED BY THE OUTSIDE LIMITS OF THE INDIVIDUAL AREAS, BUT THE TOTAL WIDTH SHALL NOT EXCEED THE TOTAL WIDTH OF THE SUPPORTING SLAB.

DEAD LOAD: EARTH LOAD OF 120 LBS PER CU FT. AND AN EQUIVALENT FLUID PRESSURE OF 38 LBS PER SQ. FT. (BOTH REDUCED 30% FOR BALANCED DESIGN)

DISTRIBUTION OF WHEEL AT GRADE, $E = .175S + 3.2$

UNIT STRESSES: F_s = 20,000 P.S.I., $N = 10$

F_c = 1,200 P.S.I.

REINFORCEMENT EMBEDMENT IS 1 1/2 DIA. CLEAR, MIN 1", EXCEPT AS NOTED.

DISTRIBUTION "d" BARS EXPRESSED AS A % OF MAIN REINFORCEMENT:

CLASSIFICATION "A" TOP SLAB = $\frac{100}{\sqrt{SPAN}}$, MAX. 50%

CLASSIFICATION "A" BOTTOM SLAB = MIN #4 @ 18

CLASSIFICATION "B", OR ABOVE, TOP AND BOTTOM SLABS MIN. #4 @ 18

CONSTRUCTION NOTES

SPECIFICATIONS: STANDARD SPECIFICATIONS, COUNTY OF SAN DIEGO, CURRENT EDITION AND SPECIAL PROVISIONS ACCOMPANYING PLANS.

EXPANSION JOINTS: NONE IN INVERT SLAB. UNDER COVER LESS THAN SPAN LENGTH, PLACE 1/2" EXPANSION JOINT FILLER IN TOP SLAB AND SIDE WALLS IN DIVIDING STRIP OR OUTSIDE SHOULDER. UNDER COVER MORE THAN SPAN LENGTH, PLACE EXPANSION JOINTS IN TOP SLAB AND SIDE WALLS ONLY AT 30' ± CENTERS, AND ADDITIONAL JOINTS AS DIRECTED BY THE ENGINEER AT LOCATIONS OF CHANGE OF FOUNDATION CHARACTER.

CONSTRUCTION LOADS: CONSTRUCTION LOADS HEAVIER THAN LEGAL LOADS NOT PERMITTED UNTIL CONCRETE HAS REACHED A STRENGTH OF 3,000 P.S.I. AND STRUCTURE STRUTTED AND CUSHIONED AS DIRECTED BY THE ENGINEER.

LOCATION NOTES

HYDRAULICS: IF SLOPE OF NATURAL CHANNEL EXCEEDS "NEUTRAL SLOPE" OF CULVERT ENTRANCE, CAPACITY FOR 10 YEAR FLOOD (Q10) WILL USUALLY DETEMINE SIZE. OTHERWISE COMPUTE TOTAL HEAD = $\left(\frac{Q100}{8A}\right)^2 \left(\frac{1.05+KL}{100}\right)$. WHERE "K" IS HEAD FACTOR "A" IS AREA, "L" IS LENGTH OF CULVERT AND Q100 THE 100 YEAR FLOOD, AND COMPARE WITH ALLOWABLE HEAD. TABULATED ELEMENTS ARE FOR FULL NOMINAL SECTION.

DESIGNATION: SHOW ON PLANS AS SPAN X HEIGHT STRENGTH CLASSIFICATION X LENGTH: THUS 4 x 4 -A x 60', FOLLOWED BY ALTERNATIVES.

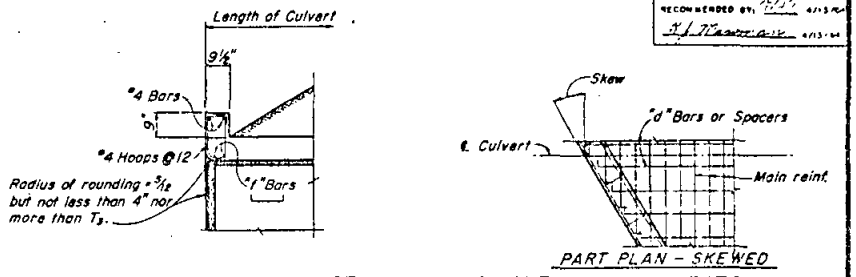
ALTERNATIVES: INVERT WILL BE SLOPED UNLESS "TRAPEZOIDAL INVERT", "FLAT INVERT" OR "V INVERT" IS INCLUDED IN DESIGNATION. ENDS OF CULVERT WILL BE ROUNDED UNLESS "SQUARE ENDS" ARE DESIGNATED. PARAPET ON CULVERTS WITH OVER 2' COVER WILL BE 0'-8" UNLESS "___FT PARAPET" IS DESIGNATED. SUCH DESIGNATIONS MAY BE DIFFERENT FOR INLET AND OUTLET ENDS.

QUANTITIES: QUANTITIES ARE FOR ESTIMATING ONLY. THEY ARE FOR THE SLOPED INVERT SLAB AND DO NOT INCLUDE SPLICES IN LONGITUDINAL BARS NOR CONCRETE AND REINFORCEMENT FOR SPECIAL COVERAGE, NOR TEMPERATURE REINFORCEMENT FOR GRADE TOP CULVERT.

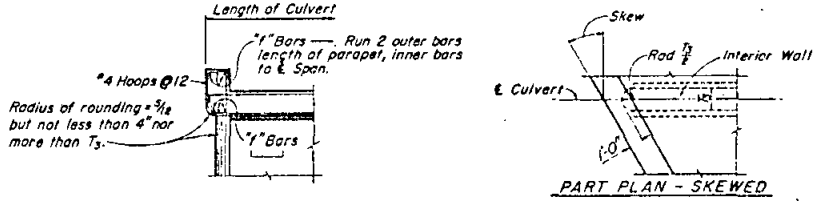
SPECIAL COVERAGE: WHERE CULVERTS ARE EXPOSED TO ACTION OF SALT WATER THICKNESS OF CONCRETE SHALL BE INCREASED TO PROVIDE 4" COVERAGE BETWEEN STEEL AND EXPOSED SURFACES. WHERE SCOUR IS ANTICIPATED, THICKNESS OF BOTTOM SLAB SHALL BE INCREASED TO PROVIDE 2" MINIMUM COVERAGE BETWEEN STEEL AND EXPOSED SURFACE.

USE OF STANDARD PLAN

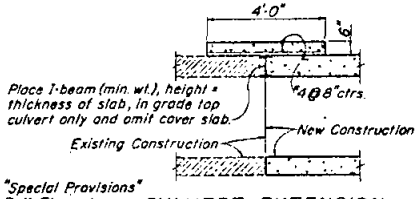
"STRENGTH CLASSIFICATION", SYMBOLIZED BY THE LETTERS "A", "B", "C" ETC., AT THE TOP OF THE DATA TABLE IS MERELY A CONVENIENT DESIGNATION FOR A PARTICULAR STRUCTURAL SECTION FOR A CULVERT OF ANY GIVEN OPENING. IT IS DICTATED BY THE COVER OR DEPTH OF FILL OVER THE TOP SLAB.



PARAPET DETAILS FOR SINGLE SPAN CULVERTS

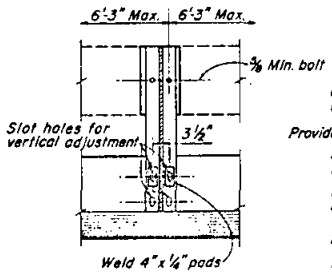


PARAPET DETAILS FOR MULTIPLE SPAN CULVERTS

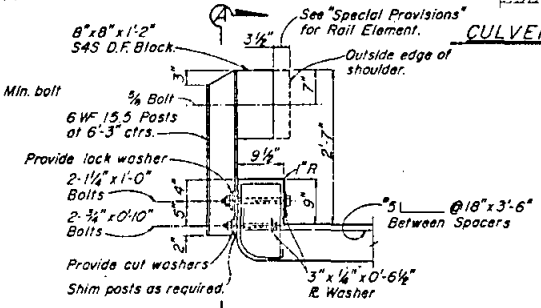


CULVERT EXTENSION

SKEWED PARAPETS								
Skew Angle	Span	3	4	5	6	8	10	12
0°-15°	Bar No.	4	4	5	6	6	7	8
	No of bars	2	2	2	2	3	3	3
16°-30°	Bar No.	4	4	5	6	7	9	8
	No of bars	2	3	3	3	3	3	3
31°-45°	Bar No.	4	4	6	6	7	9	8
	No of bars	3	3	3	3	3	3	3
0°-45°	#4 Hoops	12" ctrs.						



SECTION A-A
Scale: 1" = 1'-0"



RAILING DETAILS
Scale: 1" = 1'-0"

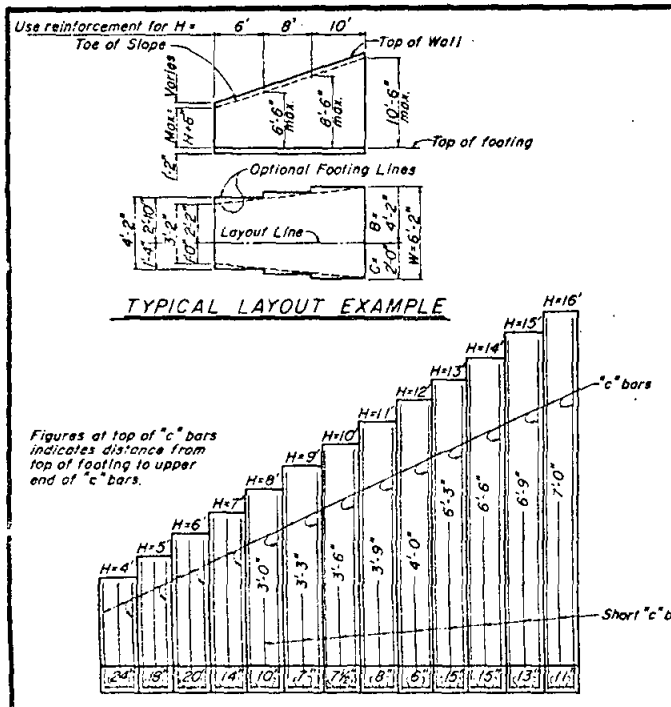
SAN DIEGO COUNTY SURVEYOR — ROAD DEPARTMENT
STANDARD DRAWING

STANDARD BOX CULVERT
MISCELLANEOUS DETAILS

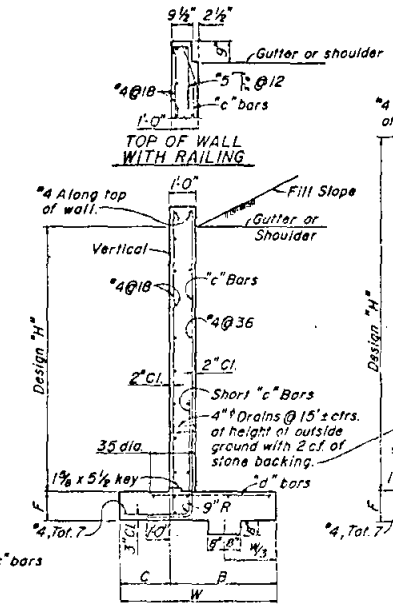
APPROVED BY: [illegible] COUNTY SURVEYOR (R.E. BOX)
DATE: [illegible]

DRAWING Nº 143-1

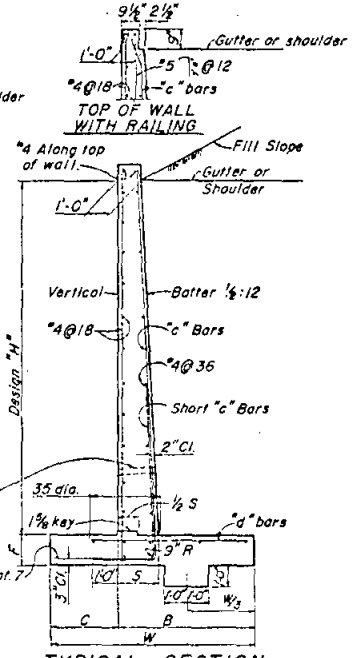
143-1



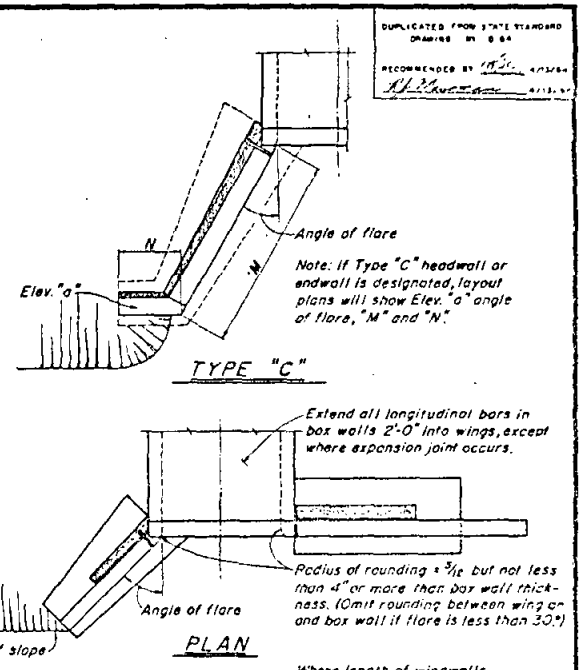
TYPICAL LAYOUT EXAMPLE



TYPICAL SECTION
H=4' THRU 12'



TYPICAL SECTION
H=13' THRU 16'



REINFORCED CONCRETE WING HEADWALLS & ENDWALLS

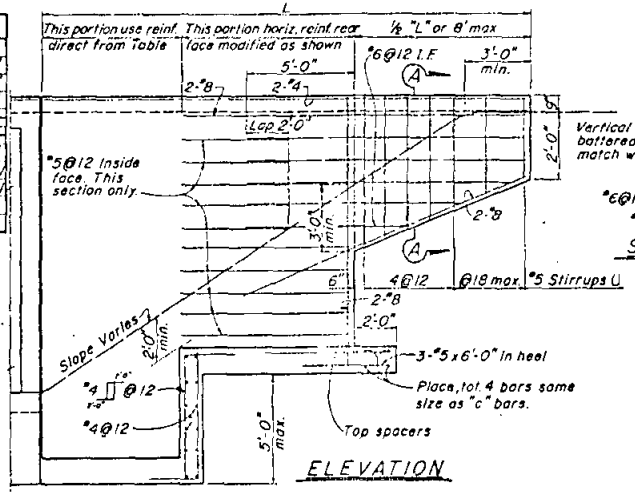
H	4'	5'	6'	7'	8'	9'	10'	11'	12'	13'	14'	15'	16'
W	3'-2"	3'-8"	4'-2"	4'-8"	5'-2"	5'-8"	6'-2"	6'-8"	7'-2"	7'-8"	8'-2"	8'-8"	9'-2"
C	1'-0"	1'-2"	1'-4"	1'-6"	1'-8"	1'-10"	2'-0"	2'-2"	2'-4"	2'-6"	2'-8"	2'-10"	3'-0"
B	2'-2"	2'-6"	2'-10"	3'-2"	3'-6"	3'-10"	4'-2"	4'-6"	4'-10"	5'-2"	5'-6"	5'-10"	6'-2"
F	1'-2"												
Batter	None											½ : 12	
S	1'-0"	1'-0"	1'-0"	1'-0"	1'-0"	1'-0"	1'-0"	1'-0"	1'-0"	1'-6½"	1'-7"	1'-7½"	1'-8"
"c" Bars	#4@24	#4@18	#5@20	#5@14	#5@10	#5@7	#6@7½	#7@8	#7@6	#9@15	#10@15	#10@13	#10@11
"d" Bars	#4@24	#4@18	#5@20	#5@14	#5@10	#5@14	#7@15	#8@16	#7@12	#8@15	#9@15	#9@13	#9@11
Conc. C.Y./L.F.	0.32	0.38	0.44	0.49	0.55	0.61	0.67	0.73	0.79	1.02	1.10	1.18	1.26
Reinf. Lb./L.F.	13	16	19	25	30	37	49	62	76	70	89	104	125

Design Notes:

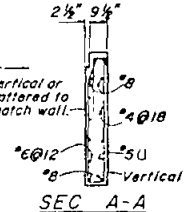
Unit Stresses: f_s = 20,000 p.s.i., f_c = 1200 p.s.i., n = 10

Maximum Toe Pressure = 1½ Tons/sq. ft.

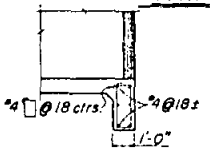
Elevations, length and angle of flare of wings may be varied by the Engineer to suit conditions encountered in the field. Walls designed for 2' liveload surcharge, 1½:1 sloping surcharge not to exceed 5' in elevation plus 2' liveload surcharge, or unlimited 2:1 surcharge.



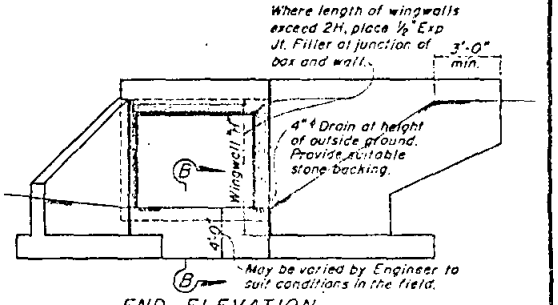
ELEVATION



SEC A-A



SEC B-B



TYPE "A" TYPE "B"

STRAIGHT WING HEADWALLS & ENDWALLS

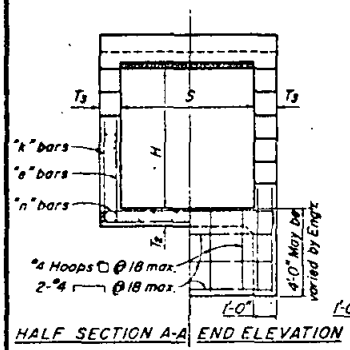
SAN DIEGO COUNTY SURVEYOR ~ ROAD DEPARTMENT
STANDARD DRAWING

STANDARD CULVERT HEADWALLS AND ENDWALLS TYPES "A", "B" & "C"

APPROVED BY COUNTY SURVEYOR & ENGINEER
DATE
DRAWING No. 144-1

144-1

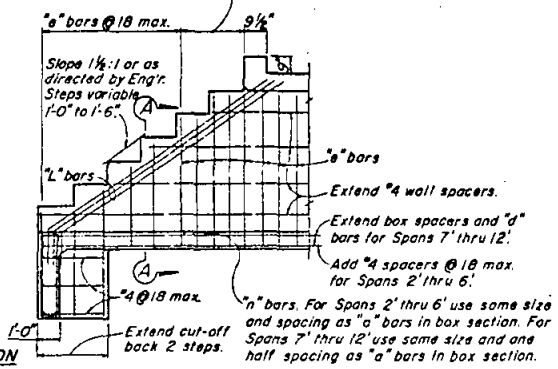
Note: Dimensions S, H, T_2 and T_3 to be same as adjacent box.



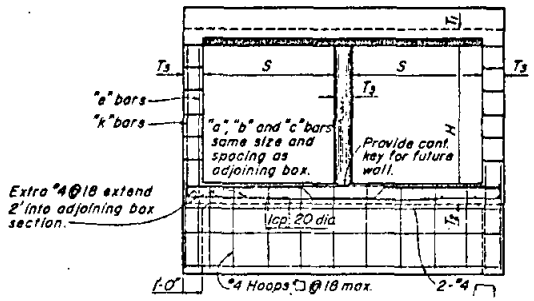
HALF SECTION A-A END ELEVATION

SINGLE BOX

In first two steps "e" bars cont'd. from box at same spacing.



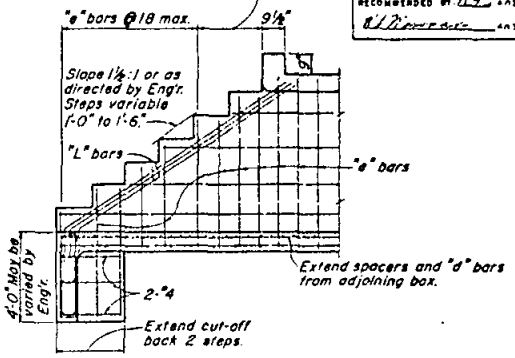
LONGITUDINAL SECTION
(Showing reinforcement in inside face)



END ELEVATION

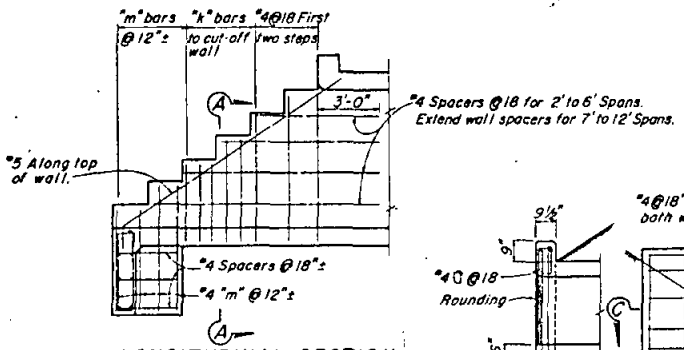
MULTIPLE BOXES

In first two steps "e" bars cont'd. from box at same spacing.



LONGITUDINAL SECTION
(Showing reinforcement in inside face)

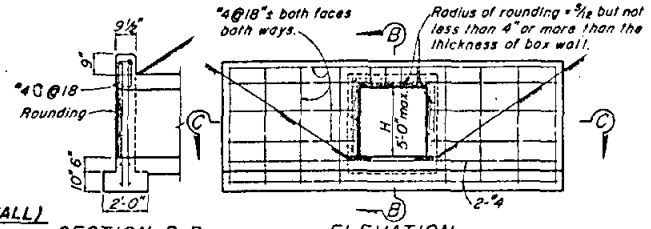
DUPLICATED FROM STATE STANDARD DRAWING BY
RECOMMENDED BY



LONGITUDINAL SECTION
(Showing reinforcement in outside face)

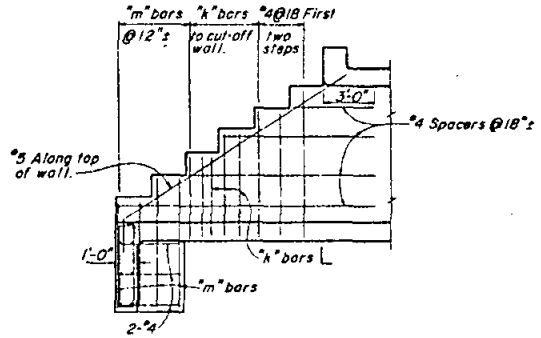
TYPE "E" (STEPPED HEADWALL OR ENDWALL)

Table of Reinforcement for Type "E" Walls									
H		3'	4'	5'	6'	7'	8'	10'	12'
"k" Bars	Bar No.	4	4	5	5	5	5	5	5
	Spacing	12	12	12	10	9	8	7	6
"L" Bars	Bar No.	5	5	6	6	7	7	7	7
	Number ea. wall	2	2	3	3	3	3	3	3



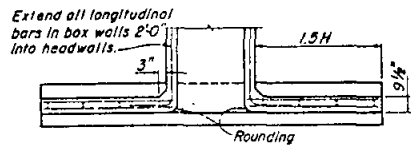
SECTION B-B

ELEVATION



LONGITUDINAL SECTION
(Showing reinforcement in outside face)

TYPE "E" (STEPPED HEADWALL OR ENDWALL)



SECTION C-C
TYPE "D"

STRAIGHT HEADWALL AND ENDWALLS

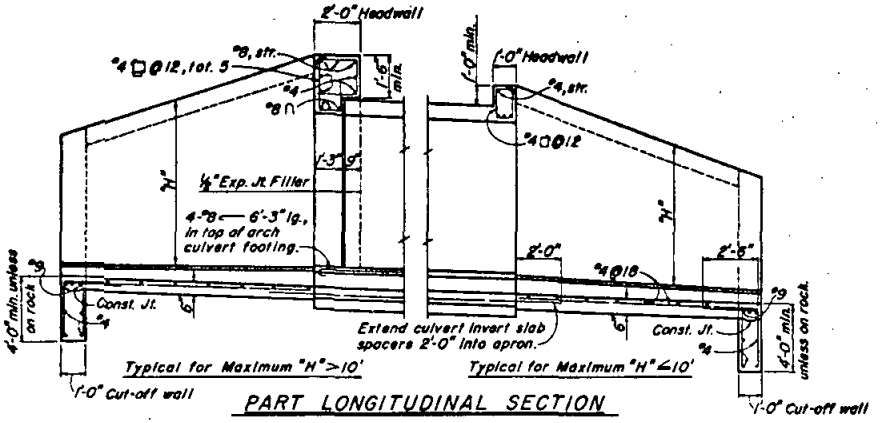
Details similar for multiple span boxes.

SAN DIEGO COUNTY SURVEYOR — ROAD DEPARTMENT
STANDARD DRAWING

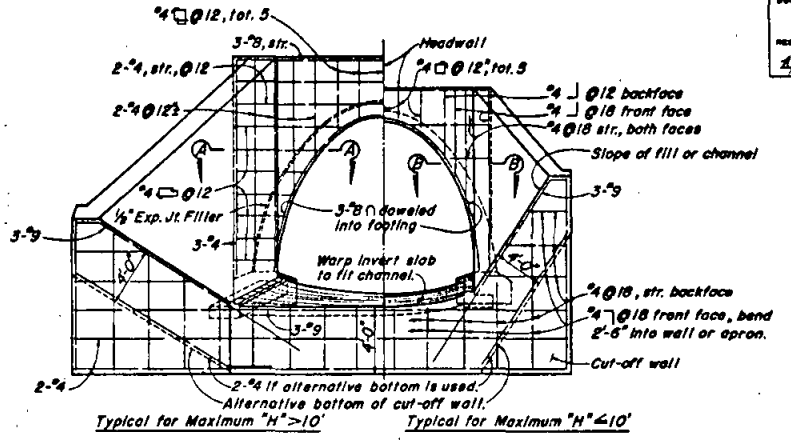
STANDARD CULVERT HEADWALLS AND ENDWALLS TYPES "D" AND "E"

APPROVED BY: COUNTY SURVEYOR & CE ROAD
DATE:
DRAWING Nº 145-1

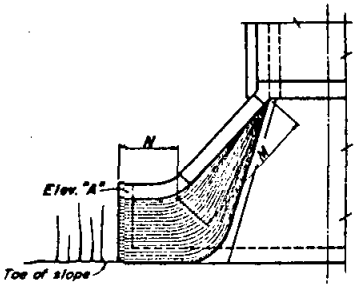
145-1



PART LONGITUDINAL SECTION

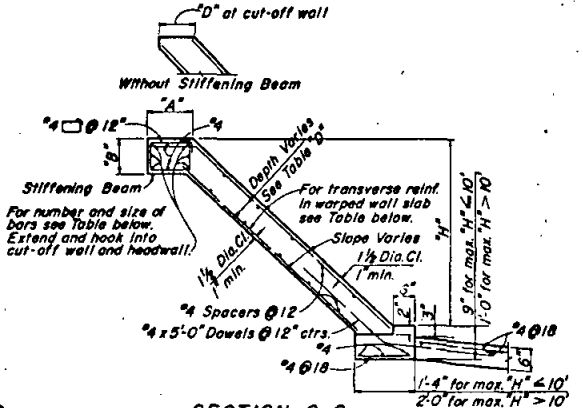


END ELEVATION

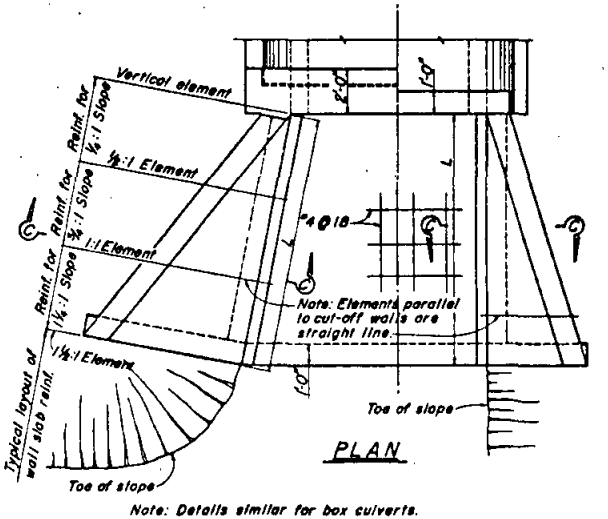


ALTERNATIVE WARPED WING

(Use where additional protection to toe of embankment is required.)

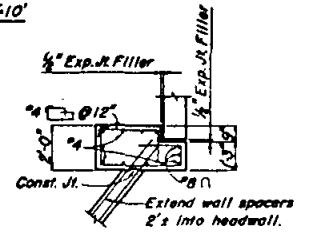


SECTION C-C

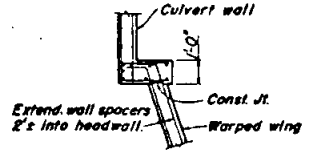


PLAN

Note: Details similar for box culverts.



SECTION A-A



SECTION B-B

WARPED WINGWALLS

WALL SLAB DIMENSIONS AND REINFORCING									STIFFENING BEAM DIMENSIONS & REINFORCING									
Element Slope	H	8' or less	10'	12'	14'	16'	18'	20'	H max.	L	12'	14'	16'	18'	20'	25'	30'	35'	40' or more
1/2:1	Front face reinf.	#4 @12	#4 @7	#5 @7	#5 @5	#6 @6	#7 @7	#7 @6	6'	No beam. Place 2-#6 in each face along top of wall									
	Rear face reinf.	#4 @12	#4 @12	#4 @12	#4 @12	#4 @12	#4 @12	#4 @12	8'										
3/4:1	Front face reinf.	#4 @12	#4 @12	#4 @12	#4 @12	#4 @10	#4 @8	#4 @6	10'		A=1'-0" B=9" Tot. 6-#5								
	Rear face reinf.	#4 @12	#4 @12	#4 @12	#4 @10	#4 @7	#4 @6	#5 @8	12'						A=1'-6" B=1'-0" Tot. 6-#7				
1 1/4:1	Front face reinf.	#4 @12	#4 @12	#4 @12	#4 @12	#4 @12	#4 @12	#4 @12	14'								A=1'-10" B=1'-0" Tot. 8-#9		
	Rear face reinf.	#4 @8	#4 @8	#4 @5	#5 @6	#6 @7	#6 @6	#7 @6	16'									A=2'-0" B=1'-6"	
Slab at Cut-off Wall "D"		6"	6"	6"	7 1/2"	8"	9 1/2"	11"	18'							A=1'-8" B=1'-6" Tot. 8-#9			
Slab at Headwall "D"		6"	6"	6"	8"	9 1/2"	11"	1'-1"	20'										

Note: Walls designed for 2' surcharge; earth load = 120 #/cu. ft.; equivalent fluid pressure = 36 #/cu. ft.
Vary depth of warped slab uniformly from depth at cut-off wall to that at headwall.

DUPLICATED FROM STATE STANDARD DRAWING No. D-66
RECOMMENDED BY: 4/15/64
4/15/64

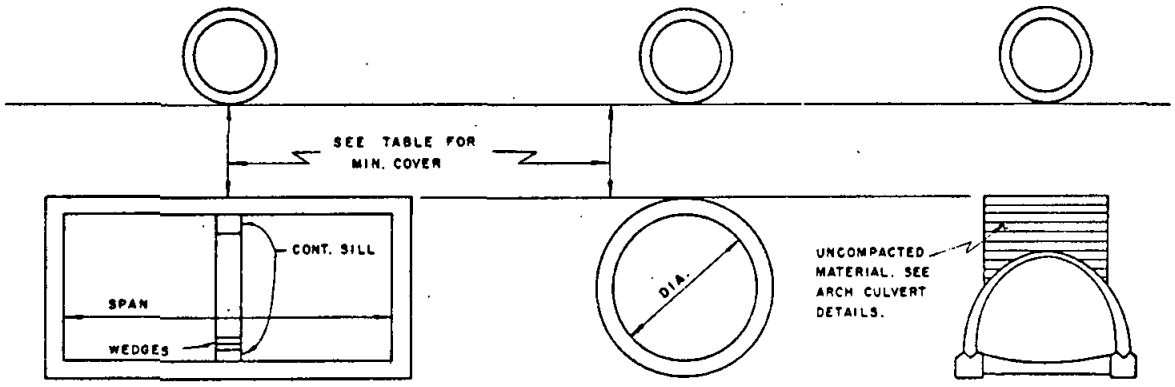
SAN DIEGO COUNTY SURVEYOR — ROAD DEPARTMENT
STANDARD DRAWING

STANDARD REINFORCED CONCRETE WARPED WINGHEADWALLS & ENDWALLS

APPROVED BY: COUNTY SURVEYOR R.C.E. 8091
DATE: 4/15/64
DRAWING No. 146-1

146-1

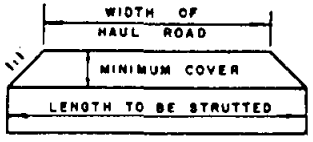
DUPLICATED FROM STATE STANDARD
DRAWING Nº D 88
RECOMMENDED BY A.S.H.B.M.&O.
R. J. Mussman 8-25-64



BOX CULVERTS

R.C. PIPES & METAL CULVERTS

R.C. ARCH CULVERTS



MINIMUM LENGTH OF STRUTTING

	CLASSIFICATION	18—50K AXLE					50—75K AXLE					75—110K AXLE					110—150K AXLE				
		SPAN	TYPE	MIN. COVER	STRUTS REQ'D.	STRUT SIZE & SPACING	SPAN	TYPE	MIN. COVER	STRUTS REQ'D.	STRUT SIZE & SPACING	SPAN	TYPE	MIN. COVER	STRUTS REQ'D.	STRUT SIZE & SPACING	SPAN	TYPE	MIN. COVER	STRUTS REQ'D	STRUT SIZE & SPACING
BOX CULVERTS	A	2' TO 5'	SINGLE	4'	—	—	2' TO 5'	SINGLE	5'	—	—	2' TO 4'	SINGLE	3'	—	—	2' TO 4'	SINGLE	4'	—	—
	A	6'	SINGLE	5'	—	—	6	SINGLE	5'	1/2 PT.	POSTS 4x6@3 SILLS 4x6, CONT.	5' TO 6	SINGLE	5'	1/3 PTS.	POSTS 4x6@ 3' SILLS 4x6, CONT.	5' TO 6'	SINGLE	5'	1/3 PTS.	POSTS 4x6@ 3 SILLS 4x6, CONT.
	A	7' TO 8'	SINGLE	5'	—	—	7' TO 8'	SINGLE	5'	—	—	7' TO 8	SINGLE	5'	—	—	7' TO 8'	SINGLE	5'	1/4 PTS.	POSTS 4x6@ 3' SILLS 4x6, CONT.
	A	10' TO 12'	SINGLE	5'	—	—	10' TO 12	SINGLE	5'	—	—	10' TO 12	SINGLE	5'	1/5 PTS.	POSTS 6x6@3'-6" SILLS 6x6, CONT.	10' TO 12'	SINGLE	5'	1/5 PTS.	POSTS 6x6@ 3' SILLS 6x6 CONT.
	A	14'	SINGLE	3'	—	—	14'	SINGLE	3'	1/5 PTS.	POSTS 6x6@3'-6" SILLS 6x8 CONT.	14'	SINGLE	3'	1/5 PTS.	POSTS 6x8@3'-6 SILLS 6x8, CONT.	14'	SINGLE	4'	1/5 PTS.	POSTS 6x8@3'-6" SILLS 6x8 CONT.
	A	4' TO 12'	MULTIPLE	5'	—	—	4' TO 12	MULTIPLE	5'	—	—	4' TO 12'	MULTIPLE	5'	—	—	4' TO 12'	MULTIPLE	5'	—	—
	B, C, D, E.	ALL	ALL	SPAN/1.75 OR 5' MIN.	—	—	ALL	ALL	SPAN/1.75 OR 5' MIN.	—	—	ALL	ALL	SPAN/1.75 OR 5' MIN	—	—	ALL	ALL	SPAN/1.75 OR 5' MIN.	—	—
R.C. PIPES	12" TO 39"	MIN. COVER = 2'					MIN. COVER = 3'					MIN. COVER = 4'					MIN. COVER = 4'				
	42" TO 108"	DIA./1.75 OR 4' MIN.					DIA./1.75 OR 4' MIN.					DIA./1.75 OR 4' MIN.					DIA./1.75 OR 4' MIN.				
METAL CULVERTS	PIPES	TO 120"	MIN. COVER = 2'				MIN. COVER = 2'					DIA./3 OR 2' MIN.					DIA./3 OR 3' MIN.				
		OVER 120"	DIA./5 OR 2' MIN.				DIA./5 OR 2' MIN.					DIA./3 OR 4' MIN.					DIA./3 OR 4' MIN.				
	ARCHES, PIPE-ARCHES.	ALL SPAN	SPAN/7 OR 2' MIN.				SPAN/7 OR 2' MIN.					SPAN/3 OR 2' MIN.					SPAN/3 OR 3' MIN.				
R.C. ARCH CULVERTS	SPANS TO 14'	SPAN/2.5 OR 4' MIN.					SPAN/2.5 OR 4' MIN.					SPAN/2.5 OR 4' MIN.					SPAN/2.5 OR 4' MIN.				
	SPANS TO 22'	SPAN/3.5 OR 5' MIN.					SPAN/3.5 OR 5' MIN.					SPAN/3.5 OR 5' MIN.					SPAN/3.5 OR 5' MIN.				

NOTES: 1. LIMITS OF STRUTTING TO BE DETERMINED BY ENGINEER, BUT SHALL NOT BE LESS THAN AS SHOWN IN SKETCH. REFERENCE— STATE OF CALIFORNIA STD. BOX CULVERTS DATED OCT. 4, 1960.

ASSUMED TIRE PATTERNS _____:

50 K AXLE 2.0' x 1.5'
75 K AXLE 3.0' x 2.0'
110 K AXLE 3.0' x 2.5'
150 K AXLE 3.0' x 3.0'

2. IMPACT = 50%
TIMBER POSTS & SILLS TO BE D.F., 1450 F.
SILLS TO BE GLUED-LAMINATED OR SOLID TIMBERS.

3. ALL STRUTTING AND REMOVAL TO BE AT EXPENSE OF THE CONTRACTOR.

SAN DIEGO COUNTY SURVEYOR — ROAD DEPARTMENT
STANDARD DRAWING

STANDARD CONSTRUCTION LOADS ON CULVERTS

APPROVED BY: [signature] COUNTY SURVEYOR
DATE: Aug. 27, 1964
DRAWING Nº 147-1

147-1

MAX. SAFE HEIGHTS OF OVERFILLS AND GAGE FOR FACTORY-RIVETED CORRUGATED METAL PIPE

Diameter inches (round pipe)	Heights of Overfills in feet: less than 15	15 to 20	20 to 25	25 to 30	30 to 35	35 to 40	40 to 45	45 to 50	50 to 60	60 to 70	70 to 80	80 to 100	Span & rise inches (arch pipe)
	Min. required gage												
18	16	16	16	16	16	16	14	14	14	12	12	12	18 x 11
21	16	16	16	16	16	14	14	14	12	12	12	10	
24	14	14	14	14	14	14	14	12	12	12	10	10	22 x 13
30	14	14	14	14	12	12	12	10	10	10	8	8	29 x 18
36	12	12	12	12	10	10	10	8	8	8	8	8	36 x 22
42	12	12	12	10	10	8	8	8	8	8	8	8	
48	12	12	12	10	10	8	8	8	8	8	8	8	43 x 27
54	12	12	10	10	10	8	8	8	8	8	8		50 x 31
60	10	10	10	8	8	8							58 x 36
66	10	10	8	8									65 x 40
72	10	8	8	8									72 x 44
78	8	8	8										
84	8	8											
90	8												
96	8												

Use field assembled plate culverts

STRENGTH & USES OF REINFORCED CONCRETE PIPE

Class	Diameters inches	Cracking D-Load	Principal Highway Uses
I	60 - 108	800D	Not adequate for highway uses.
II	12 - 108	1000D	Use outside the roadbed. Under moderately low depths of cover. This class is required for pipe shaft manholes & drop inlets.
III	12 - 108	1350D	Intended for normal culvert & stormdrain uses.
IV	12 - 84	2000D	Same as Class III but will sustain higher overfills.
V	12 72	3000D	High strength pipe for severe loading conditions.

MAX. SAFE HEIGHTS OF OVERFILL IN FEET FOR R.C.P.

Inside diameter inclusive inches	Class II 1000 D	Class III 1350 D	Class IV 2000 D	Class V 3000 D
	Method A Backfill			
12-18	18	23	32	47
21-27	19	24	33	47
30-39	19	25	34	49
42-48	19	25	35	50
51-63	20	25	35	51
66-72	20	25	36	52
75-84	20	25	36	not listed
87-108	20	26	not listed	not listed

MINIMUM THICKNESS OF COVER

Surface type	Pipes: R.C.P.	Pipes: C.M.P.	Arches
Flexible pavement or unpaved	diameter/5, 24" min.	diameter/5, 12" min.	span/15, 12" min.
Rigid pavement	diameter/5, 18" min.	diameter/7, 6" min. below slab	span/20, 6" min. below slab

Notes
1. All pipe shall conform to current A.S.T.M. designation C-76.
2. For box culverts see standard drawings pertaining thereto.
3. Source of information for tables: A.A.S.H.O. standard spec.

Standard Specifications	SAN DIEGO COUNTY SURVEYOR — ROAD DEPARTMENT	
Section 19	STANDARD DRAWING	Revision / By / Approved / Date
Drawn by Drake / Checked by R.E.B.		Scale None / Approved 4-5-63
Recommended by:	SAFE OVERFILLS FOR R.C.P. OR C.M.P.	Drawing No. 180-1
Approved by County Surveyor		
D. K. Spear R.C.E. 8091		

MAX SAFE HEIGHTS OF OVERFILLS FOR FIELD ASSEMBLED PLATE PIPES

STRUTTED CONDITION

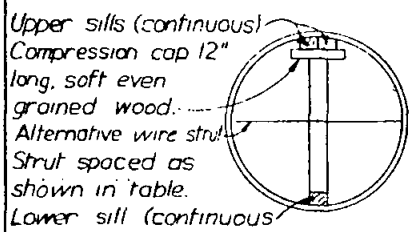
STANDARD 6" × 2" CORRUGATIONS

Diameter inches	HEIGHT OF COVER (FEET) 1-5	6-10	11-15	16-20	21-25	26-30	31-35	36-40	41-45	46-50	51-55	56-60	61-70	71-80	81-90	91-100	GAGE
60	12	12	12	12	12	12	12	12	12	12	10	10	8	7	5	5	
66	12	12	12	12	12	12	12	12	10	10	8	8	7	5	3	3	
72	12	12	12	12	12	12	12	12	10	10	8	8	7	5	3	1	
78	12	12	12	12	12	12	12	10	10	8	8	7	5	3	1		
84	12	12	12	12	12	12	12	10	10	8	8	7	5	3	1		
90	12	12	12	12	12	10	10	10	8	7	7	5	3	1			
96	12	12	12	12	12	10	10	10	8	7	7	5	3	1			
102	12	12	12	10	10	10	10	8	7	5	5	3	1				
108	12	12	12	10	10	10	10	8	7	5	5	3	1				
114	10	12	10	10	10	10	8	7	5	5	3	1					
120	10	12	10	10	10	10	8	7	5	5	3	1					
126	10	10	10	10	10	8	8	7	5	3	1	1					
132	10	10	10	10	10	8	8	7	5	3	1	1					
138	10	10	10	10	8	8	7	5	3	1	1						
144	10	10	10	10	8	8	7	5	3	1	1						
150	10	10	10	8	8	8	5	3	1	1							
156	10	10	10	8	8	8	5	3	1	1							
162	10	10	10	8	8	7	5	3	1								
168	10	10	10	8	8	7	5	3	1								
174	8	10	8	8	8	5	3	1									
180	8	10	8	8	8	5	3	1									

From AASHO Standard Specifications for Highway Bridges, 1953 (Arts. 3.10.3 & 3.11.4) H-15 & H-20 Loading.

Notes

1. Table gives minimum gage of side and top plates with not less than 4 bolts per foot of longitudinal seam. Live load not to exceed H-20 to H-20-S-16
2. Invert plates shall be at least one step thicker gage than the rest of the barrel.
3. The pipe diameter is measured from the inside crests.
4. Limiting height of cover may be increased 50% when 16 bolts per foot of longitudinal seam are provided and No. 1 gage metal is used.



Compression caps & sills to be same diamension timber as struts. Timber for struts & sills shall be Douglas Fir common.

STRUT DETAILS

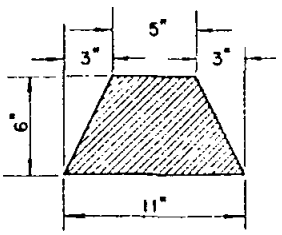
SPACING IN FEET OF TIMBER STRUTS FOR CORR. METAL & FIELD ASSEBLED PLATE PIPE

Pipe Dia.	Strut size	Height of fill in feet 0-20	30	40	50	60	70	80	100
48"	4×4		5.0	3.5					
	4×6		6.0	5.0	4.0	3.5	3.0		
	6×6				6.0	5.0	4.5	4.0	3.5
	6×8							6.0	5.0
60"	4×4	6.0	4.0	3.0					
	4×6		6.0	4.5	3.5	3.0			
	6×6				5.5	4.5	4.0	3.5	3.0
	6×8						5.5	4.5	4.0
72"	4×4	5.0	3.0						
	4×6	6.0	5.0	3.5	3.0				
	6×6			6.0	4.5	4.0	3.5	3.0	3.0
	6×8					5.0	4.5	4.0	3.5
84"	6×6	6.0	6.0	5.0	4.0	3.5	3.0		
	6×8				5.0	4.5	4.0	3.5	3.0
	8×8							4.5	3.5
96"	6×6	6.0	5.5	4.5	3.5	3.0			
	6×8			5.5	4.5	4.0	3.5	3.0	
	8×8						4.5	4.0	3.0

Pipe Dia	Strut size	Height of fill in feet 0-20	30	40	50	60	70	80	100
108"	6×6	6.0	4.0	3.5	3.0				
	6×8		6.0	5.0	4.0	3.5	3.0		
	8×8					4.5	4.0	3.5	
120"	6×6	6.0	4.0	3.0					
	6×8	6.0	5.5	4.0	3.5	3.0			
	8×8				5.0	4.0	3.5	3.0	
132"	6×6	5.0	3.5						
	6×8	6.0	4.5	3.5	3.0				
	8×8			5.5	4.0	4.0	3.5	3.0	
144"	6×6	4.5	3.0						
	6×8	5.5	4.0	3.0					
	8×8			5.0	4.0	3.5	3.0		
156"	6×8	4.5	3.0						
	8×8		6.0	4.5	3.5	3.0			
168"	6×8	3.5							
	8×8	6.0	5.0	4.0	3.0				
180"	6×8	3.0							
	8×8	6.0	4.5	3.5					

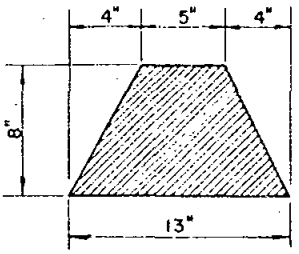
Standard Specifications	SAN DIEGO COUNTY SURVEYOR – ROAD DEPARTMENT		
Section 19	STANDARD DRAWING	Revision / By / Approved / Date	
Drawn by: Drake Checked by: PEB		Scale None	Approved 4-5-63
Recommended by:	SAFE OVERFILLS FOR FIELD ASSEMBLED PLATE PIPE	Drawing No.	
Appoved by County Surveyor		181-1	
D. K. Speer R.C.E. 8091			

TYPE A DIKE



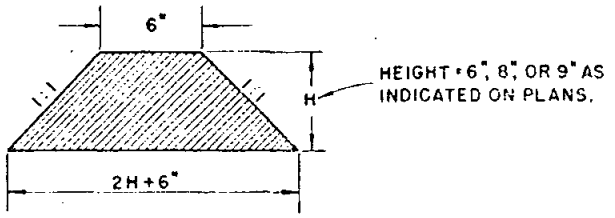
SECTION

TYPE B DIKE

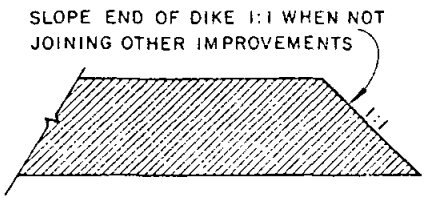


SECTION

TYPE C DIKE

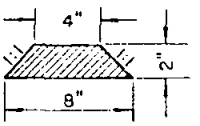


SECTION



SIDE VIEW

TYPE D DIKE



SECTION

NOTE:

A.C. DIKES MAY BE SHAPED AND COMPACTED WITH AN EXTRUSION MACHINE OR OTHER EQUIPMENT CAPABLE OF SHAPING AND COMPACTING THE MATERIAL TO THE REQUIRED CROSS SECTION.

APPROX. DIKE QUANTITIES	
TYPE	TONS/LIN. FT.
A	0.02500
B	0.03740
C-6"	0.03750
C-8"	0.05833
C-9"	0.07031
D	0.00586

REDUCED SCALE
USE SCALE BELOW

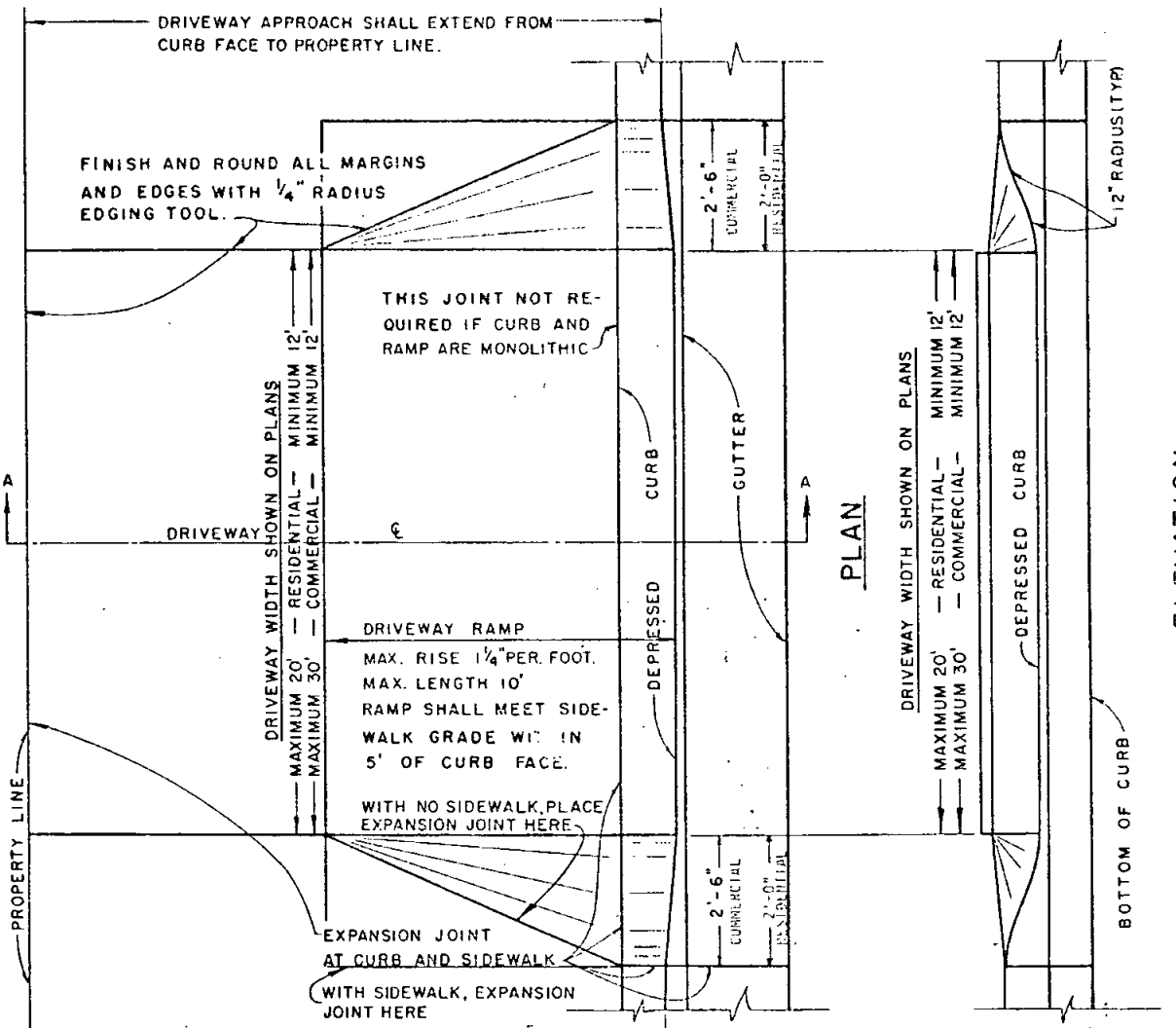
0 1 2 3

3 INCHES ON ORIGINAL PLAN

LEGEND ON PLAN

LABEL TYPE OF DIKE

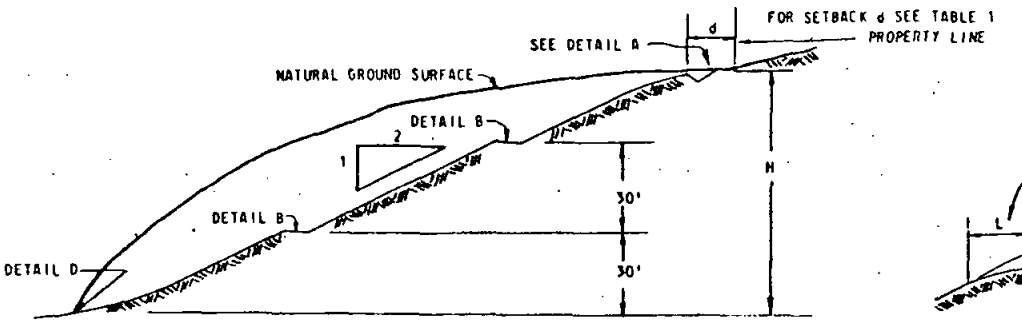
STD. SPEC. SEC: 39	SAN DIEGO COUNTY ENGINEER DEPARTMENT STANDARD DRAWING				
DRAWN BY	CHECKED BY				
RECOMMENDED BY		REVISION	BY	APPROVED	DATE
APPROVED BY COUNTY ENGINEER	ASPHALT CONCRETE DIKES	SCALE: NONE			
H.M. Taylor RCE 11458		DRAWING NUMBER 201-2			
DATE: Sept. 28, 1971					



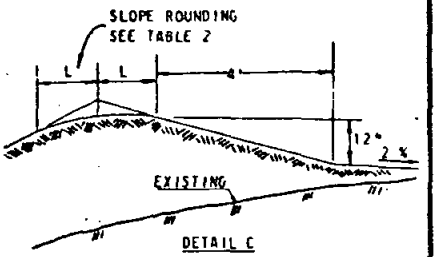
NOTE:

1. THICKER CONCRETE, CLASS "A" CONCRETE AND REINFORCEMENT ARE PERMISSIBLE. 6" CLASS III AGGREGATE BASE RECOMMENDED FOR HEAVY SERVICE.
2. WEAKENED-PLANE JOINT REQUIRED ON DRIVEWAY ℄ FOR DRIVEWAYS 13'-20' WIDE.
3. ALTERNATE WEAKENED-PLANE JOINT MAY BE POWER DRIVEN SAW CUT, 1 1/2" MINIMUM DEPTH, 1/4" MAXIMUM WIDTH.
4. SEE STANDARD DRAWINGS 305, 306 FOR LOCATION & WIDTH REQUIREMENTS.

STD. SPEC. SEC: 51, 73, 90	SAN DIEGO COUNTY ENGINEER DEPARTMENT STANDARD DRAWING	
DRAWN BY R.S.G. CHECKED BY E.M.		
RECOMMENDED BY [signature]	CONCRETE DRIVEWAYS	REVISION / BY / APPROVED / DATE
APPROVED BY COUNTY ENGINEER		SCALE: NONE
H.M. Taylor R.C.E. 11458		DRAWING NUMBER 207-4 T
DATE: 1-8-74		

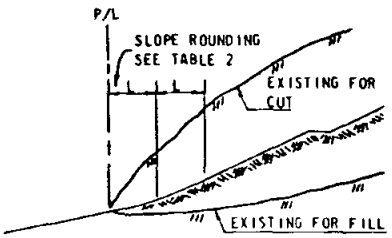


TYPICAL CUT SLOPE

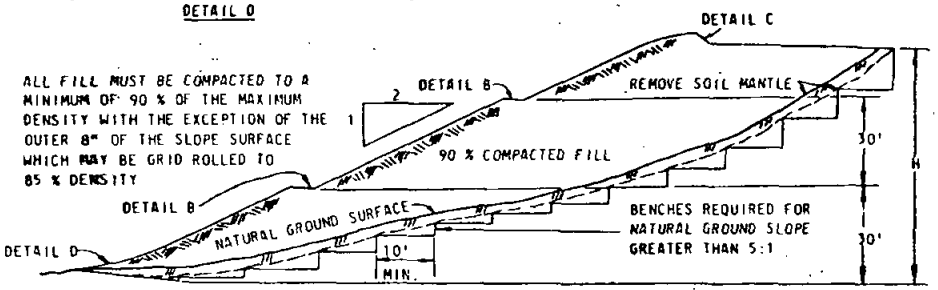


DETAIL C

TYPICAL BERM AT TOP OF ALL FILL SLOPES



DETAIL D



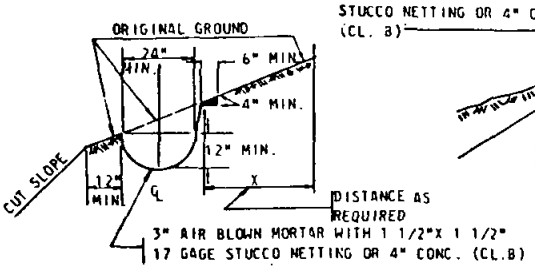
TYPICAL FILL SLOPE

TABLE 1
REQUIRED SETBACK

H FEET	d
0 - 15'	3'
OVER 15'	5'

TABLE 2
SLOPE ROUNDING

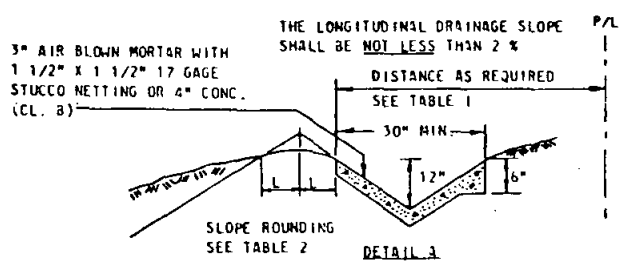
H FEET	L FEET
0' - 5'	-
5' - 20'	2.5'
20' - 40'	5'
OVER 40'	10'



TYPICAL SECTION OF BROW DITCH

ALT. DETAIL A

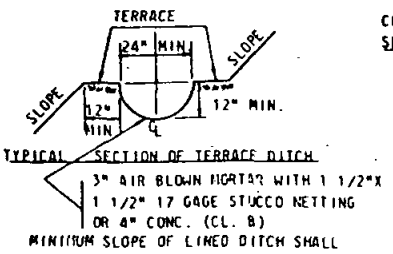
TYPICAL PAVED BROW DITCH



DETAIL A

TYPICAL PAVED BROW DITCH

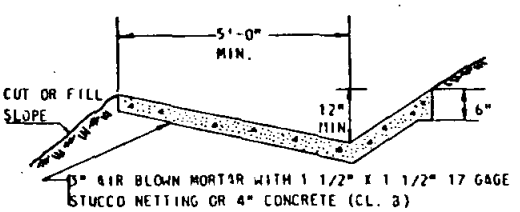
L.V.C. = LENGTH OF VERTICAL CURVE



TYPICAL SECTION OF TERRACE DITCH

ALT. DETAIL B

TYPICAL TERRACE DRAIN

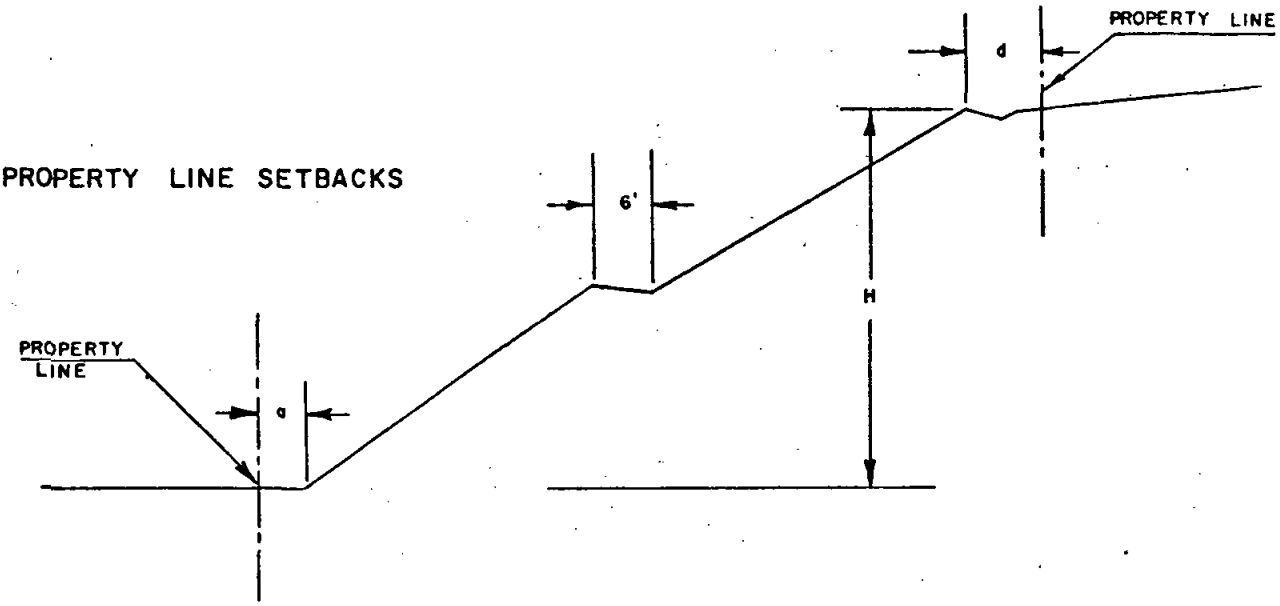


DETAIL B

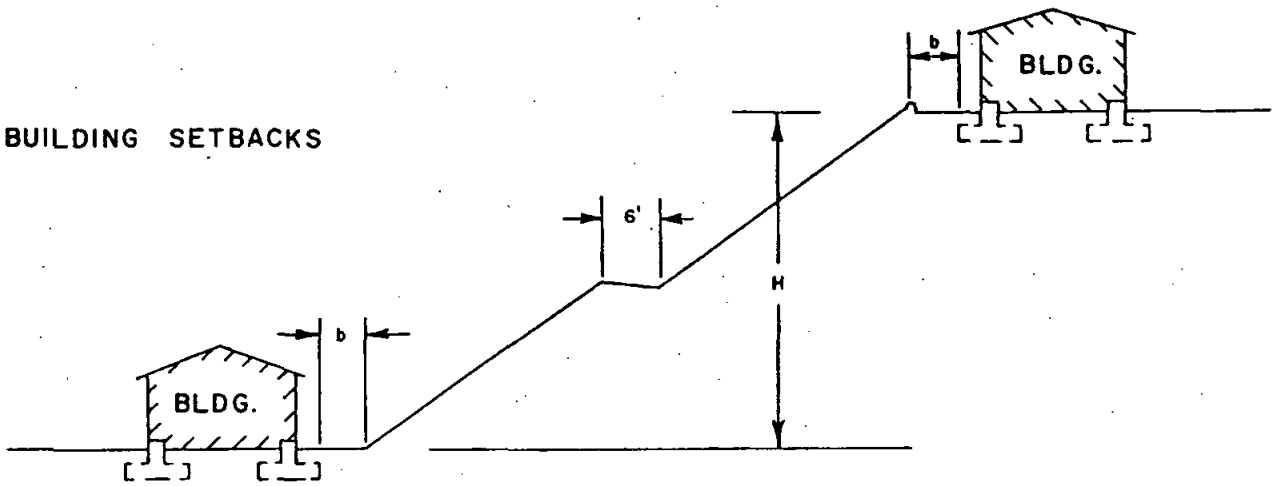
TYPICAL TERRACE DRAIN

STD. SPEC. SEC: 19, 52, 53, 90	SAN DIEGO COUNTY ENGINEER DEPARTMENT STANDARD DRAWING				
DRAWN BY D.W.D. CHECKED BY [illegible]					
RECOMMENDED BY [illegible]	GRADING OF SLOPES	REVISION	BY	APPROVED	DATE
APPROVED BY COUNTY ENGINEER		SCALE: NONE			
H.M. Taylor R.C.E. 11458		DRAWING NUMBER 208-1 T			
DATE: 1-8-74					

PROPERTY LINE SETBACKS



BUILDING SETBACKS



REQUIRED SETBACKS			
H FEET	a	b	d
0 - 15	1' - 6"	5'	3'
15 - 30	3'	5'	5'
OVER 30	5'	5'	5'

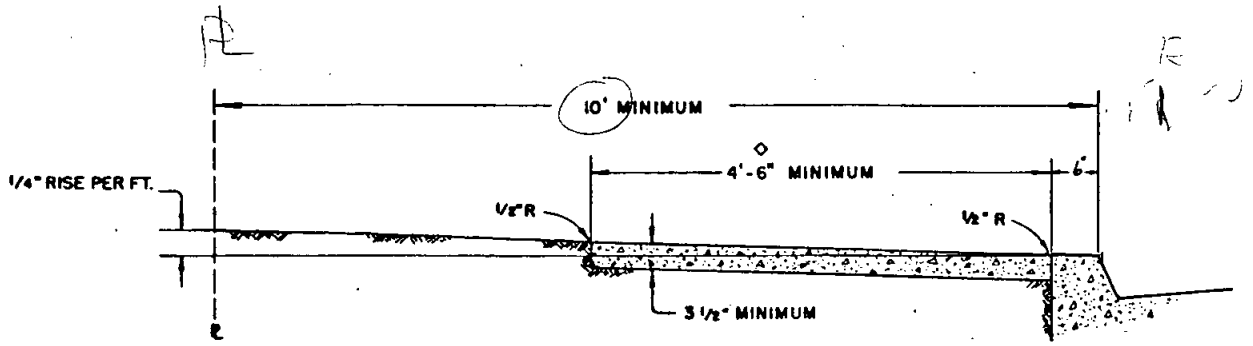
a. DISTANCE FROM TOE OF SLOPE TO PROPERTY LINE

b. DISTANCE FROM EDGE OF FOUNDATION TO TOE OR TOP OF SLOPE.

d. DISTANCE FROM TOP OF SLOPE TO PROPERTY LINE.

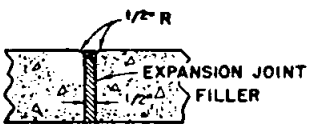
H. TOTAL SLOPE HEIGHT MEASURED VERTICALLY.

STD. SPEC. SEC.					
DRAWN BY RCL CHECKED BY HC					
RECOMMENDED BY J. Mulgrew	SAN DIEGO COUNTY SURVEYOR-ROAD DEPARTMENT	REVISION	BY	APPROVED	DATE
APPROVED BY COUNTY SURVEYOR	STANDARD DRAWING	SCALE: NONE			
D. K. Spear R.C.E. 8091	REQUIRED SETBACKS	DRAWING NUMBER 209			
DATE: Sept. 17, 1965					

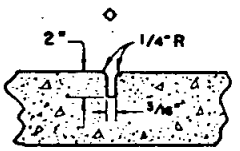


TYPICAL SECTION

LOCATE TRANSVERSLY AT 60 FT. INTERVALS AND AT RETURNS.



EXPANSION JOINT



LOCATE TRANSVERSLY AT 15 FT. INTERVALS BETWEEN EXPANSION JOINTS.

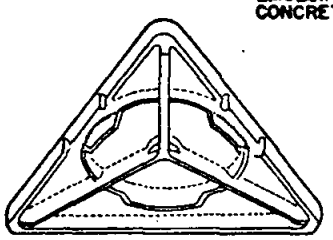
WEAKENED-PLANE JOINT

NOTES:

1. ALL CONCRETE SHALL BE CLASS "B".
2. WHERE TRAVERSED BY DRIVEWAYS, SIDEWALKS SHALL CONFORM TO DRIVEWAY REQUIREMENTS.
3. MONOLITHIC CURB, GUTTER AND SIDEWALK MAY BE USED WITH SPECIFIC APPROVAL OF THE COUNTY ENGINEER.
4. SPECIFIED INTERVALS BETWEEN TRANSVERSE JOINTS SHALL BE VARIED TO MATCH ADJACENT EXISTING IMPROVEMENTS.
5. SIDEWALK SHALL BE MARKED TRANSVERSLY AT 5 FT. INTERVALS BETWEEN EXPANSION AND WEAKENED-PLANE JOINTS WITH A SCORING TOOL THAT WILL LEAVE THE EDGES ROUNDED.
6. SIDEWALK LOCATION MAY BE VARIED, SUBJECT TO APPROVAL BY THE COUNTY ENGINEER, TO MATCH EXISTING ADJACENT IMPROVEMENTS.
7. ◇ SIDEWALK LOCATION AND WIDTH MAY BE VARIED TO ALLOW FOR ENCROACHING UTILITIES, SUBJECT TO APPROVAL BY THE COUNTY ENGINEER.
8. ◇ WHERE EXPANSIVE SOILS ARE ENCOUNTERED A MINIMUM OF 4" CLASS 3 AGGREGATE BASE WILL BE REQUIRED AS DIRECTED BY THE COUNTY ENGINEER.
9. ◇ EXPANSION JOINT TO BE INSTALLED AT BEGINNING AND ENDING OF SIDEWALK RETURNS.

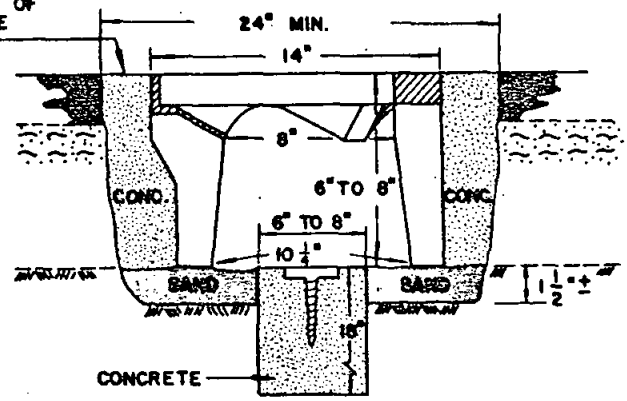
STD. SPEC. SEC: 51, 73, 90	SAN DIEGO COUNTY ENGINEER DEPARTMENT STANDARD DRAWING	CHG. NOTE 3	RLB	H.M. Taylor	8/18/70
DRAWN BY RLB CHECKED BY MCB		◇	MCB		1-4-71
RECOMMENDED BY	CONCRETE SIDEWALK	REVISION	BY	APPROVED	DATE
APPROVED BY COUNTY ENGINEER		SCALE: NONE			
H.M. Taylor R.C.E. 11456		DRAWING NUMBER 212-3 T			
DATE: 1-8-74					

BLACKEN SURFACE OF CONCRETE COLLAR WITH BLACK COAT OF EMULSIFIED ASPHALT WHILE CONCRETE IS FRESH



CI COVER (BOTTOM VIEW)

COVER TO BE BROOKS NO. 4TT OR EQUAL AND TO HAVE WORD "MONUMENT" CAST IN LID. BOX TO BE BROOKS 6" 4TT OR EQUAL.



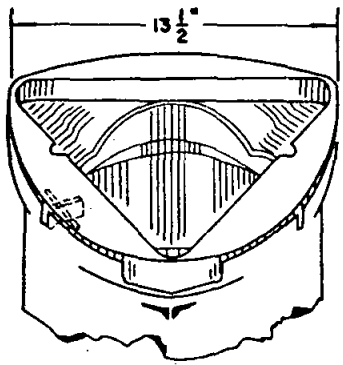
MONUMENT MARKER

SOLID BRASS, 2" DIA. TOP, 3/4" x 2 1/2" SHANK, LIETZ 526 OR APPROVED EQUAL TO BE SET IN FRESH P.C.C. TOP OF MONUMENT TO BE APPROX. 6" BELOW STREET SURFACE.

SURVEYOR'S NOTE

EXACT POINT TO BE DETERMINED BY ACCURATE SURVEY AND CLEARLY PUNCHED IN TOP OF BRASS MARKER TOGETHER WITH R.E. OR L.S. NUMBER IN 1/8" NUMERALS.

△ ON ALL SUBDIVISIONS WITH DEFERRED MONUMENTATION, WE WILL REQUIRE THE ENGINEER TO ADD THE FOLLOWING NOTE TO THE LEGEND: "IN THE EVENT THE ABOVE TYPE(S) OF MONUMENT(S) CANNOT BE SET, DUE TO UNFORSEEN CIRCUMSTANCES, THEN I WILL AFFIX A TAG OR DISC STAMPED L.S. ____ OR R.E ____ IN EXISTING, CONCRETE, WOOD OR METAL STRUCTURE, OR IN EXISTING NATURAL STONE OUTCROPPING AT THE TRUE POSITION CALLED FOR BY THIS LEGEND SYMBOL."



MONUMENT NOTE:

MONUMENT MAY BE FORMED BY METAL SLEEVE, WAXED CARDBOARD OR BY DRILLING THRU HOLE MADE FOR MONUMENT. IF THERE IS AN OVERCUT, THEN OVERCUT SHOULD BE FILLED WITH CONCRETE TO SAND LEVEL.

NOTE:

ALL REQUIRED SURVEY MONUMENTS OR MARKINGS MUST BE COMPLETE AND IN PLACE WITHIN 30 DAYS AFTER COMPLETION OF SUBDIVISION IMPROVEMENTS. (SEE STANDARD DRAWING NO. 219-1)

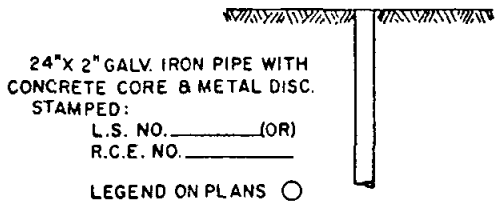
OTHER REQUIRED SURVEY MARKERS

△ EVERY MAP OF SUBDIVISION SHALL SHOW THE FOLLOWING MONUMENTS WHICH SHALL BE SET BY A LICENSED SURVEYOR OR ENGINEER:

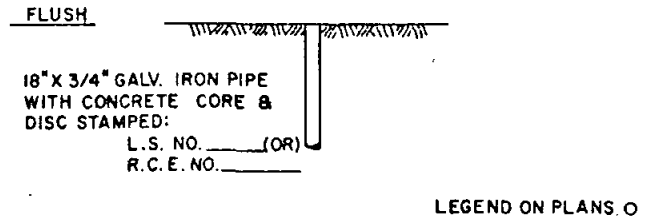
BOUNDARY MONUMENTS: THE EXTERIOR BOUNDARY OF THE SUBDIVISION SHALL BE MONUMENTED WITH PERMANENT MONUMENTS NOT SMALLER THAN TWO INCH (2") IRON PIPES AT LEAST TWENTYFOUR INCHES (24") LONG SET AT EACH CORNER, AT INTERMEDIATE POINTS ALONG THE BOUNDARY NOT MORE THAN ONE THOUSAND FEET (1000') APART AND AT THE BEGINNING AND END POINTS OF ALL CURVES; PROVIDED, IF ANY EXISTING RECORD AND IDENTIFIED MONUMENT MEETING THE FOREGOING REQUIREMENTS IS FOUND AT ANY SUCH CORNER OR POINT, SUCH MONUMENT MAY BE USED IN LIEU OF A NEW MONUMENT.

LOT CORNER MONUMENTS: ALL LOT CORNERS, EXCEPT WHEN COINCIDENT WITH EXTERIOR BOUNDARY CORNER, SHALL BE MONUMENTED WITH PERMANENT MONUMENTS OF ONE OF THE FOLLOWING TYPES: (1) THREE-FOURTH INCH (3/4") DIAMETER IRON PIPE AT LEAST EIGHTEEN INCHES (18") LONG. (2) ONE-HALF INCH (1/2") DIAMETER STEEL ROD AT LEAST TWELVE INCHES (12") LONG. (3) LEAD PLUG AND COPPER IDENTIFICATION DISKS SET IN CONCRETE SIDEWALKS OR CURBS.

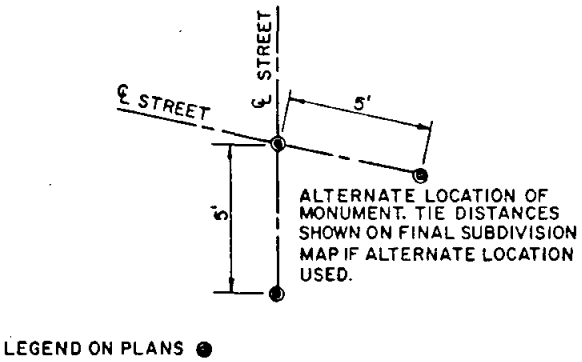
STD. SPEC. SEC:	SAN DIEGO COUNTY ENGINEER DEPARTMENT STANDARD DRAWING				
DRAWN BY FRH / CHECKED BY MEG		△	MEG		
RECOMMENDED BY [signature]		REVISION	BY	APPROVED	DATE
APPROVED BY COUNTY ENGINEER	STREET SURVEY MONUMENT	SCALE: NONE			
H. M. Taylor R.C.E. 11458		DRAWING NUMBER 218-1			
DATE: Aug. 14, 1978					



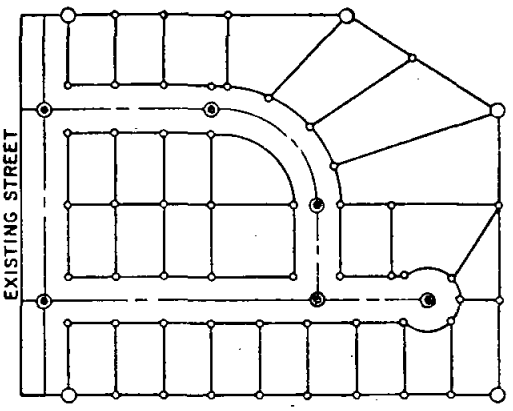
SUBDIVISION BOUNDARY MONUMENT



PROPERTY CORNER MONUMENT



LOCATION OF STREET SURVEY MONUMENT
(STD. DRAWING NO. 218-1)

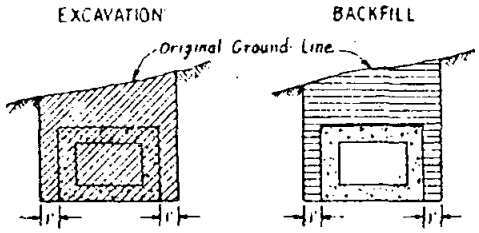


TYPICAL INSTALLATION

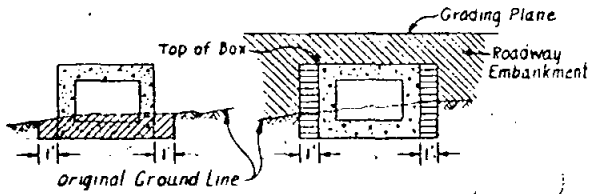
NOTES

1. STREET SURVEY MONUMENT:
   FOR DETAILS OF PLACEMENT AND CONSTRUCTION, SEE STANDARD DRAWING NO. 218-1
   (a) SET ON ALL CENTERLINE INTERSECTIONS UNLESS ACTUAL LOCATION IS MODIFIED BY THE COUNTY SUBDIVISION ENGINEER AND SHOWN IN MODIFIED LOCATION ON MAP. WHEN CENTER LINE INTERSECTION IS IMPRACTICAL, OFFSET 5 FEET ON CENTER LINE OF MAJOR STREET. (SEE DETAIL ABOVE). IF NEITHER CENTER LINE CAN BE OCCUPIED, TWO MONUMENTS WILL BE SET IN LINE AROUND THE POINT ON THE PERIMETER OF A 10-FOOT DIAMETER CIRCLE, WHOSE CENTER IS THE POINT.
   (b) SET ON CENTER LINE AT INTERVALS NOT EXCEEDING 1000 FEET ON STRAIGHT RUNS.
   (c) SET ON CENTER LINE AT POINTS OF CURVATURE.
   (d) SET ON CENTER AT CENTER POINTS OF CUL-DE-SACS.
   ◇ (e) SET ON CENTER LINE WHEN CENTER POINT OF CUL-DE-SAC IS OFFSET FROM CENTER LINE.
   (f) THESE STANDARDS MAY BE MODIFIED AT THE DISCRETION OF THE COUNTY ENGINEER IN CASES WHERE STRICT COMPLIANCE THEREWITH RESULTS IN MORE MONUMENTS THAN HE CONSIDERS NECESSARY. THE FOLLOWING TECHNIQUE FOR REDUCING THE NUMBER OF MONUMENTS WILL BE ROUTINE.
   ◇ (g) SUBSTITUTION OF ONE MONUMENT ON THE "POINT OF INTERSECTION" FOR MONUMENTS AT THE "BEGINNING OF CURVE" AND THE "ENDING OF CURVE" WHEN THE "POINT OF INTERSECTION" FALLS WITHIN THE PAVEMENT AREA.
   ◇ (h) DELETION OF ANY MONUMENT OTHERWISE REQUIRED BY THESE STANDARDS WHEN ITS POSITION CAN BE DETERMINED BY TURNING ONE ANGLE FROM A POINT ON A STRAIGHT LINE BETWEEN TWO OTHER MONUMENTS, PROVIDING SUCH POINT IS NOT MORE THAN 300 FEET FROM THE POINT ON WHICH THE DELETED MONUMENT WOULD HAVE BEEN PLACED.
2. PRESERVATION OF MONUMENTS:
   WHERE PLANS ARE SUBMITTED, IT SHALL BE THE RESPONSIBILITY OF THE ENGINEER OF WORK TO SHOW ALL MONUMENTS OF RECORD WHICH IT MAY BE NECESSARY TO MOVE. THE PERMITTEE SHALL NOT DISTURB ANY MONUMENTS OF RECORD FOUND ON THE LINE OF IMPROVEMENT WITHOUT PERMISSION FROM THE COUNTY ENGINEER, AND THE PERMITTEE SHALL BEAR THE EXPENSE OF RESETTING ANY MONUMENT OR STAKES WHICH MAY BE DISTURBED.
3. COMPLETION TIME:
   ALL REQUIRED SURVEY MONUMENTS OR MARKINGS MUST BE COMPLETE AND IN PLACE WITHIN 30 DAYS AFTER COMPLETION OF SUBDIVISION IMPROVEMENTS.
4. CALIFORNIA COORDINATE SYSTEM:
   ALTHOUGH THE USE OF THE CALIFORNIA COORDINATE SYSTEM IS OPTIONAL, SAN DIEGO COUNTY WOULD PREFER ITS USE. IF THE ENGINEER OR SURVEYOR WILL USE COORDINATE PROCEDURE, THE COUNTY WILL PROVIDE THE NEEDED TIES AND COORDINATES.

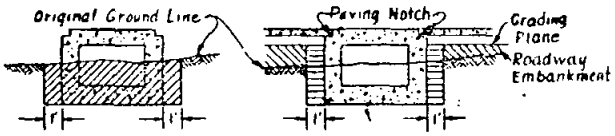
STD. SPEC. SEC:	SAN DIEGO COUNTY ENGINEER DEPARTMENT STANDARD DRAWING	◇	MEZ		
DRAWN BY RLH CHECKED BY MEZ					
RECOMMENDED BY [signature]	SURVEY MONUMENT LOCATIONS	REVISION	BY	APPROVED	DATE
APPROVED BY COUNTY ENGINEER		SCALE: NONE			
H.M. Taylor R.C.E. 11458		DRAWING NUMBER 219-1			
DATE: Aug. 14, 1973					



CULVERT IN TRENCH

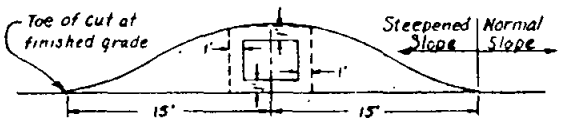


CULVERT IN EMBANKMENT



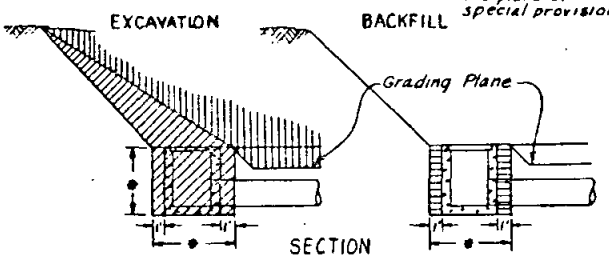
GRADE TOP OF CULVERT

BOX CULVERTS



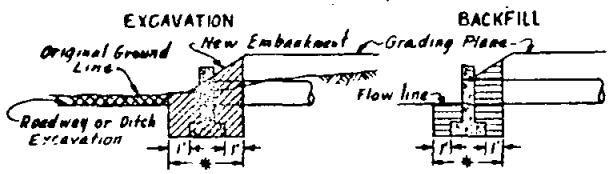
PLAN

NOTE: Slopes & dimensions may vary as shown on the plans or in the special provisions



SECTION

RECESSES AT CULVERT INLETS

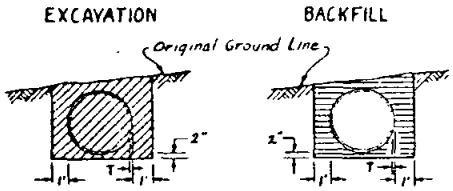


PIPE HEADWALLS

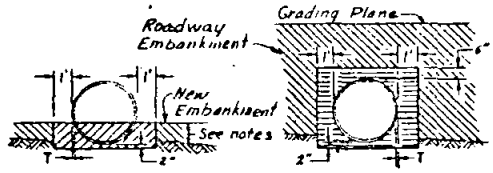
* Note: When concrete is being paid for as class A concrete (Minor Structures), the cost of excavation and backfill is included in the price paid for class A concrete (Minor Structures)

LEGEND

- Structure Excavation
- Structure Backfill
- Ditch Excavation
- Roadway Excavation
- Roadway Embankment
- Original Ground



PIPE CULVERT IN TRENCH

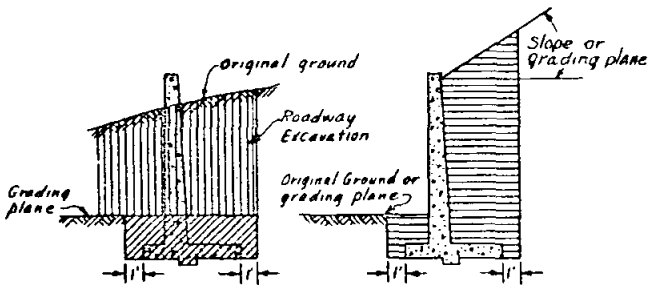


PIPE CULVERT IN NEW EMBANKMENT

Height of top of embankment before excavating for pipe shall be as follows:

For pipe 24" dia. or less: 6" above top of pipe or 30" max.
For C.M.P. over 24" to 90" dia: 30" above bottom of pipe.
For C.M.P. over 90" dia. 1/3 point of dia. above bottom pipe.
For R.C.P. over 24" dia: 30" above bottom of pipe.
For field assembled plate culvert: 1/3 point of dia. above bottom of pipe. Structure backfill 6" above top of pipe.
For payment quantities excavation & backfill concrete pipe T = min. wall thickness as shown in A.A.S.H.O. M170 for class III pipe, wall A. For C.M.P. T = 0.00

PIPE CULVERTS, RODS & DEADMEN
except underdrains & overside drains

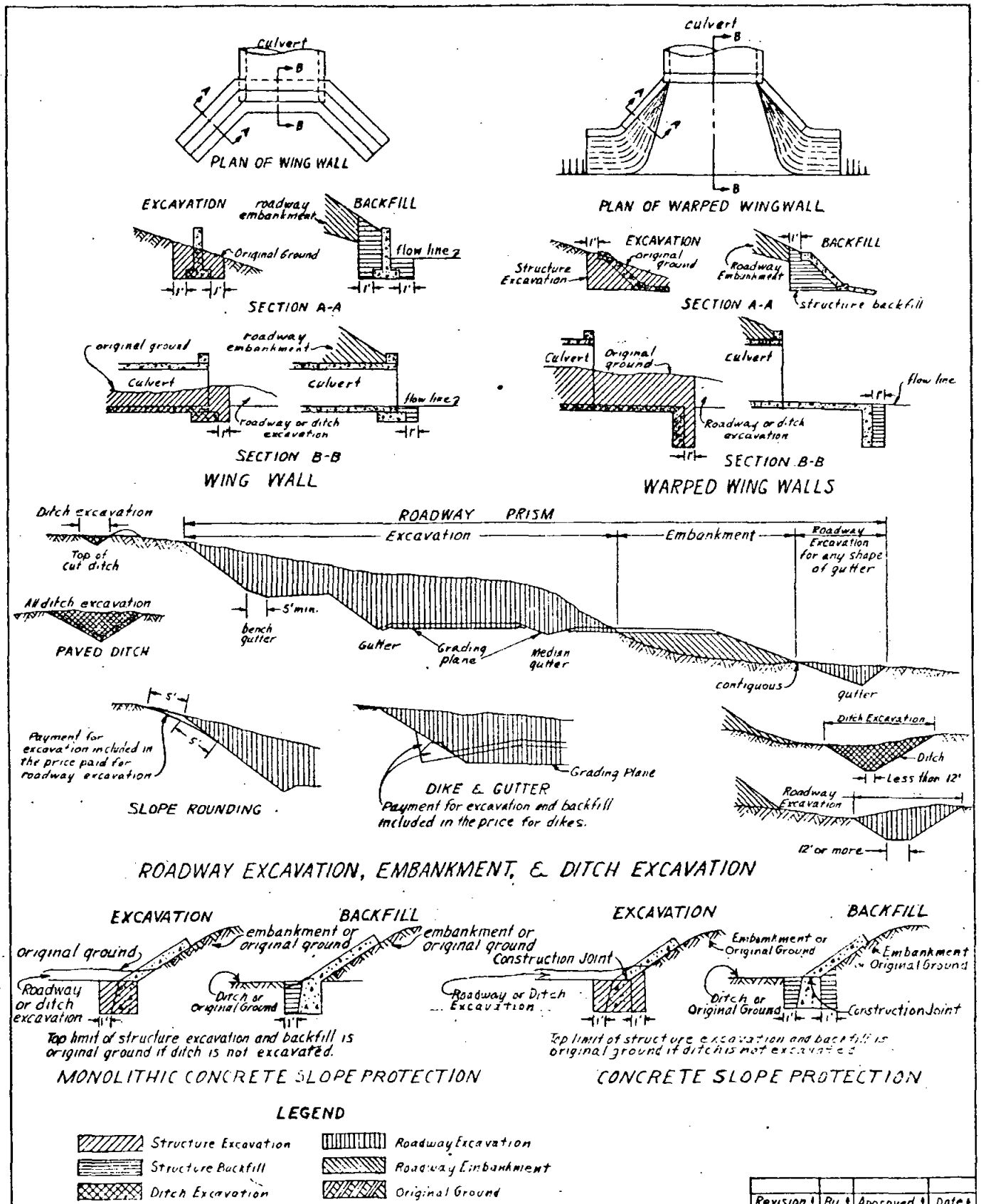


RETAINING WALLS

Note: If no roadway excavation is involved at the wall Structure excavation will be measured from the original ground.

Revision	By	Approved	Date

Standard Specifications	SAN DIEGO COUNTY SURVEYOR – ROAD DEPARTMENT STANDARD DRAWING	Scale: None
Sections: 19		Date Approved: 1-14-63
Drawn by: Drake Checked by: REG		Drawing Nº
Recommended by: [illegible]	EXCAVATION AND BACKFILL CULVERTS, RETAINING WALLS & HEADWALLS	220-1
Approved by County Surveyor: D. K. Spear R.C.E. 8091		



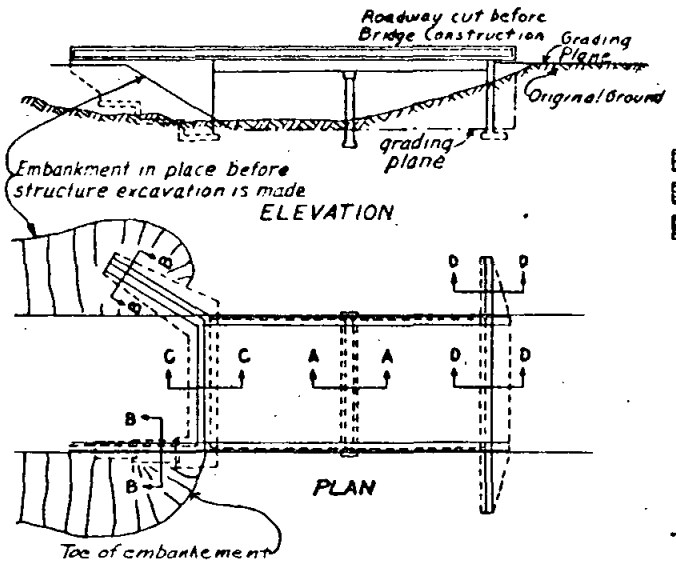
Revision	By	Approved	Date

Standard Specifications
Sections: 19
Drawn by: Drake Checked by: REE
Recommended by: [signature]
Approved by County Surveyor:
D. K. Spear R.C.E. 8091

SAN DIEGO COUNTY SURVEYOR – ROAD DEPARTMENT
STANDARD DRAWING

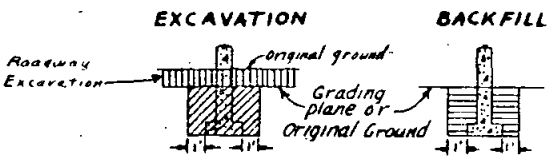
EXCAVATION AND BACKFILL
ROADWAY, WING WALLS & SLOPE PROTECTION

Scale: None
Date Approved: 1-14-63
Drawing No
221-1

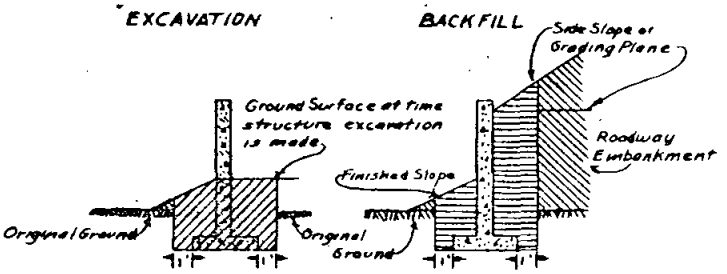


LEGEND

- Structure Excavation
- Structure Backfill
- Ditch Excavation
- Roadway Excavation
- Roadway Embankment
- Original Ground

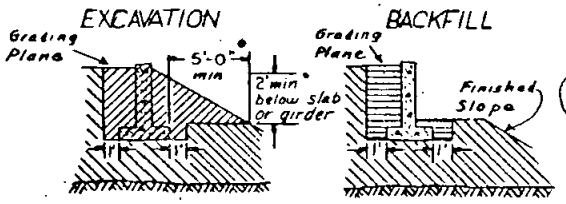


SECTION A-A



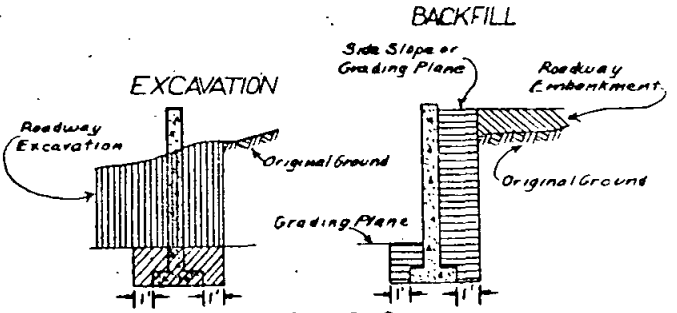
SECTION B-B

When bridge piers are in water course quality and compaction requirements for backfill will be waived and full compensation for backfilling the excavation will be considered as included in the price paid for structure excavation.



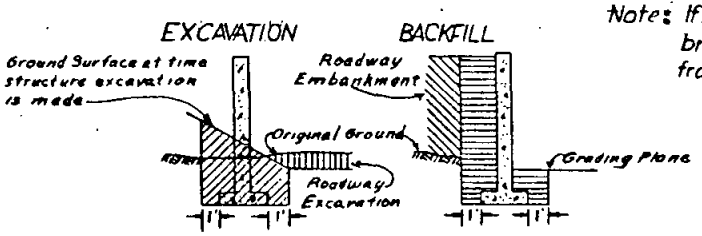
SECTION C-C
ABUTMENT IN EMBANKMENT

* Or as shown on plans



SECTION D-D

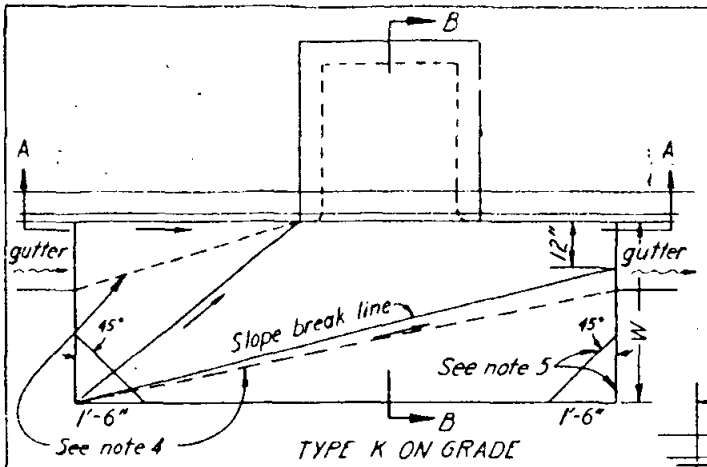
Note: If no roadway excavation is involved at bridge, structure excavation will be measured from the original ground.



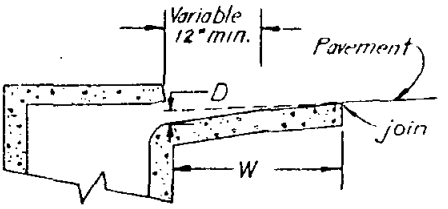
SECTION C-C
ABUTMENT IN ORIGINAL GROUND

Revision	By	Approved	Date

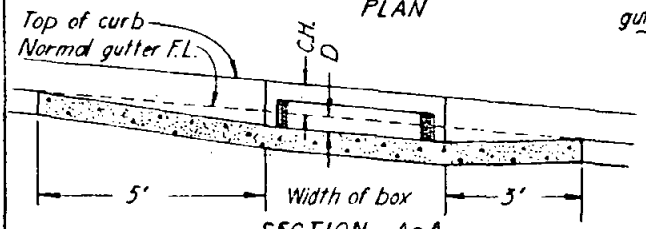
Standard Specifications	SAN DIEGO COUNTY SURVEYOR — ROAD DEPARTMENT STANDARD DRAWING	Scale: None
Sections: 19		Date Approved: 1-14-63
Drawn by: Drake Checked by: RES		Drawing No
Recommended by: [illegible]	EXCAVATION AND BACKFILL BRIDGE PIERS, ABUTMENTS & ADJOINING WING WALLS	222-1
Approved by County Surveyor: D. K. Spear R.C.E. 8031		



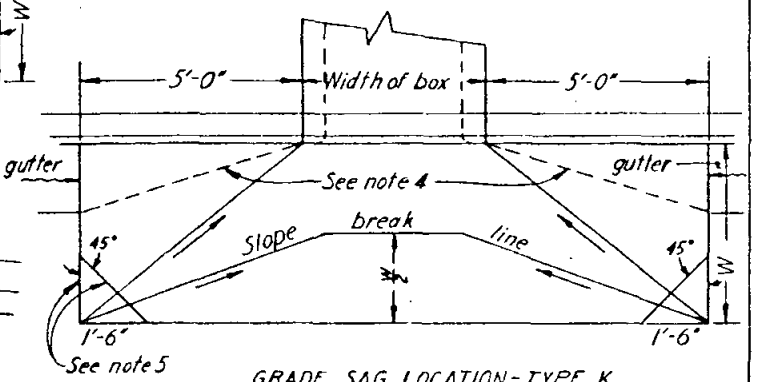
TYPE K ON GRADE
PLAN



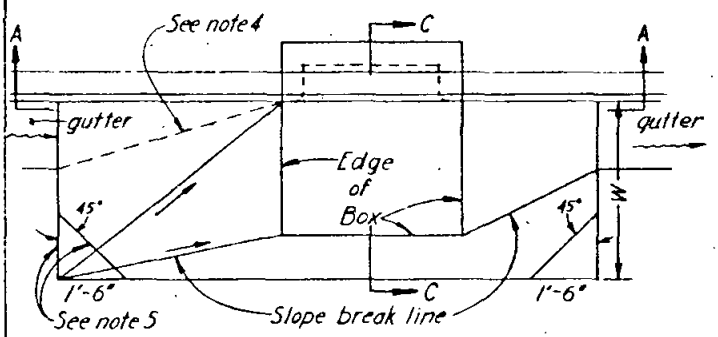
SECTION B-B



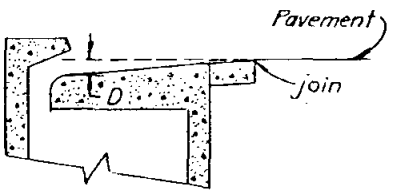
SECTION A-A



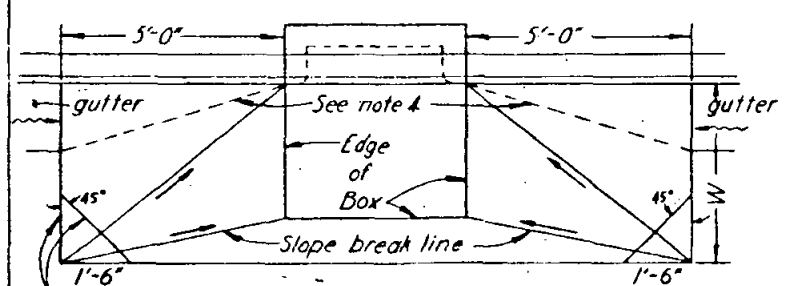
GRADE SAG LOCATION-TYPE K
PLAN



TYPE K-1 ON GRADE
PLAN



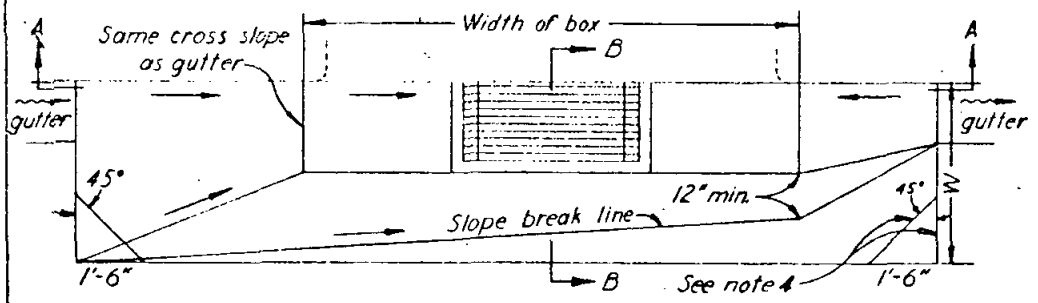
SECTION C-C



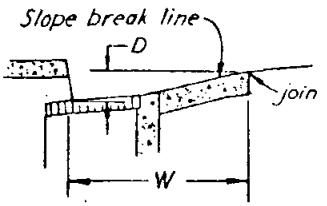
GRADE SAG LOCATION
TYPE K-1
PLAN

Notes:

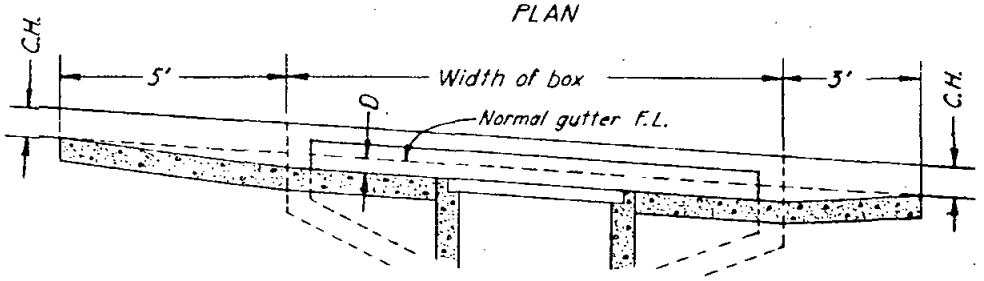
1. W = width of depressed aprons, variable 3' to 6' (use 4' unless noted otherwise).
   D = gutter depression. It shall be 4" unless noted otherwise.
   C.H. = curb height.
   ——→ = straight grade, downward slope.
   ~~~→ = gutter direction of flow.
2. Gutter depression to be class "A" P.C.C. 6" thick.
3. Refer to standard drawing 104-1 type K curb inlet or 105-1 type K-1 curb inlet for curb opening.
4. Where cross slope of gutter is not the same as cross slope of adjacent pavement, dashed slope break lines also apply.
5. When adjacent pavement is P.C.C., corners shall be 90°. For A.C. pavement corners shall be formed at 45° as shown.

Standard Specifications	SAN DIEGO COUNTY SURVEYOR — ROAD DEPARTMENT	Revision / By / Approved / Date
Sections: 51, 90.	STANDARD DRAWING	Scale: None
Drawn by: [illegible] Checked by: REB		Date Approved: 12/2/63
Recommended by: [illegible]	STANDARD GUTTER DEPRESSIONS	Drawing No.
Approved by County Surveyor:	FOR TYPE K AND K-1 CURB INLETS	223-1
D. K. [illegible] R.C.E. 8091		
   ~~~



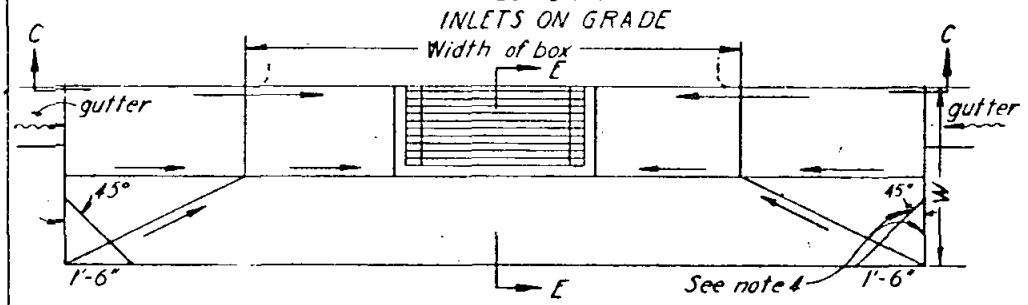
PLAN



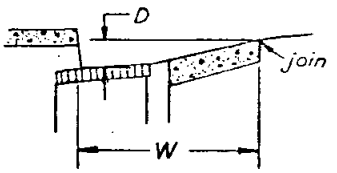
SECTION B-B



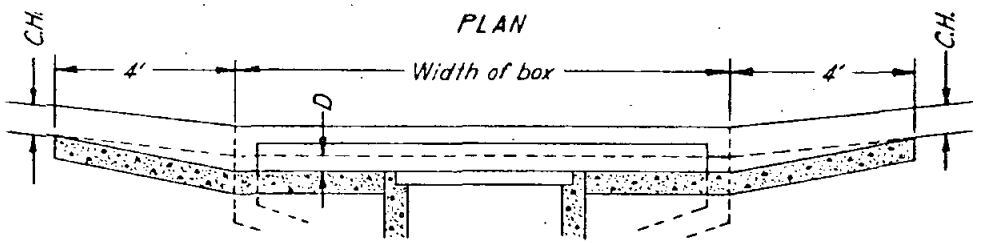
SECTION A-A
INLETS ON GRADE



PLAN



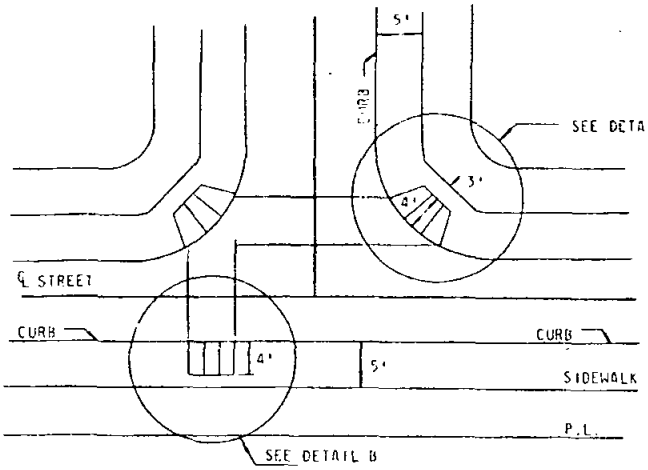
SECTION E-E



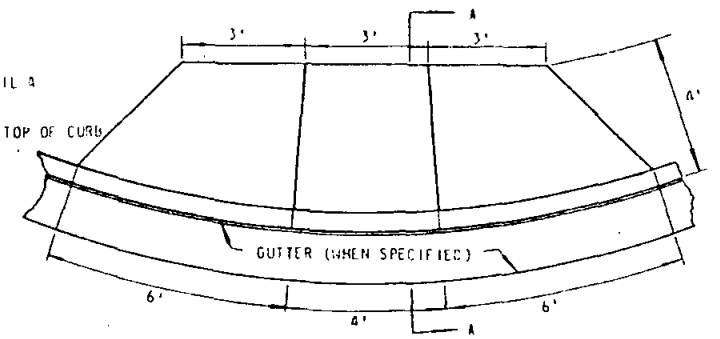
SECTION C-C
GRADE SAG LOCATION

Notes:

1. W = width of depressed aprons, variable 3' to 6' (use 4' unless noted otherwise).
   D = gutter depression. It shall be 4" unless noted otherwise.
   C.H. = curb height.
   ——▸ = straight grade, downward slope.
   ~~~▸ = gutter direction of flow.
2. Gutter depression to be class "A" P.C.C., 6" thick.
3. This standard drawing shall apply to all standard curb inlets with grate.
4. When adjacent pavement is P.C.C., corners shall be formed at 90°. For A.C. pavement, corners shall be formed at 45° as shown.

Standard Specifications	SAN DIEGO COUNTY SURVEYOR – ROAD DEPARTMENT	Revision | By | Approved | Date
Sections: 51, 90.		Scale: None
Drawn by: Drake | Checked by: [illegible]	STANDARD DRAWING	Date Approved: 12/2/63
Recommended by: [illegible]	STANDARD GUTTER DEPRESSIONS FOR CURB INLETS WITH GRATE	Drawing No.
Approved by County Surveyor:		224-1
D. K. Spear R.C.E. 8091		
   ~~~

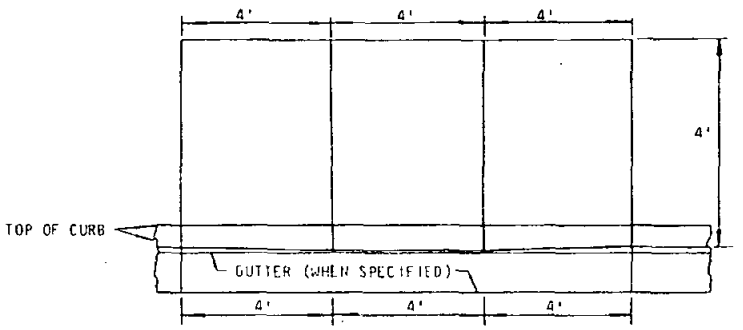


DETAIL A



PLAN

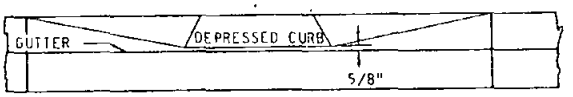
DETAIL B



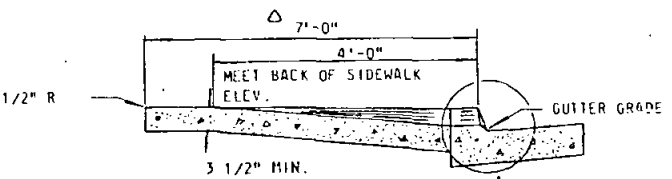
PLAN

NOTES:

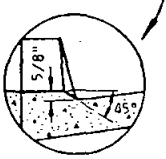
1. IF OBSTRUCTIONS SUCH AS INLETS, UTILITY POLES, FIRE HYDRANTS, ETC. ARE ENCOUNTERED THE LOCATION AND DIMENSIONS MAY BE ADJUSTED UPON THE APPROVAL OF THE COUNTY ENGINEER
2. TEXTURE TO BE HEAVY BROOM FINISH TRANSVERSE TO AXIS OF RAMP.
3. THE RAMP SHOWN IN DETAIL B SHALL BE CENTERED IN THE CROSSWALK.



ELEVATION

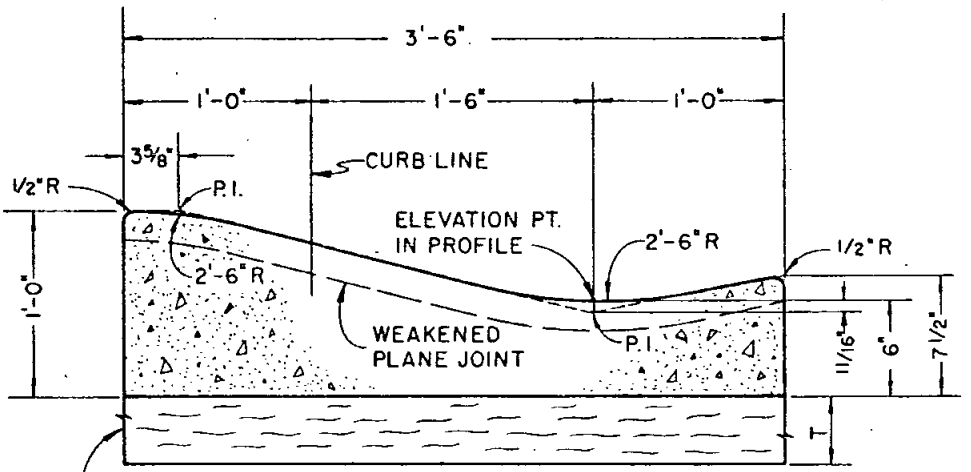


SECTION A-A



5/8" LIP ON DEPRESSED CURB SECTION WILL BE SLOPED AT 45°

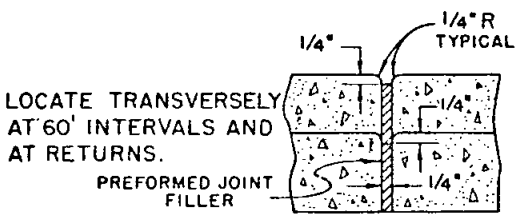
STD. SPEC. SEC: 51, 73, 90	SAN DIEGO COUNTY ENGINEER DEPARTMENT STANDARD DRAWING	Δ	J.B.	J. Kadwell	2-1-84
DRAWN BY Bull / CHECKED BY					
RECOMMENDED BY	RAMP FOR CURB, GUTTER AND SIDEWALK	REVISION	BY	APPROVED	DATE
APPROVED BY COUNTY ENGINEER		SCALE: NONE			
By Bert Elkins R.C.E. 11458		DRAWING NUMBER 225			
DATE: 6-15-73					



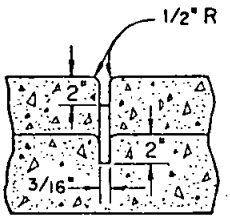
SECTION

BASE MATERIAL TO MATCH STRUCTURAL SECTION OF STREET. THICKNESS (T) = 6" OR THE THICKNESS DETERMINED BY EXTEND-ING THE ROADBED GRADING PLANE UNDER THE CURB, WHICH-EVER THICKNESS IS GREATER.

BASE ONLY FOR COMMERCIAL OR INDUSTRIAL USE.



EXPANSION JOINT



LOCATE TRANSVERSELY AT 20' INTERVALS BETWEEN EXPANSION JOINTS.

WEAKENED PLANE JOINT

THE SPECIAL MOUNTABLE CURB MAY BE USED ONLY WHERE THE FOLLOWING CONDITIONS ARE PRESENT:

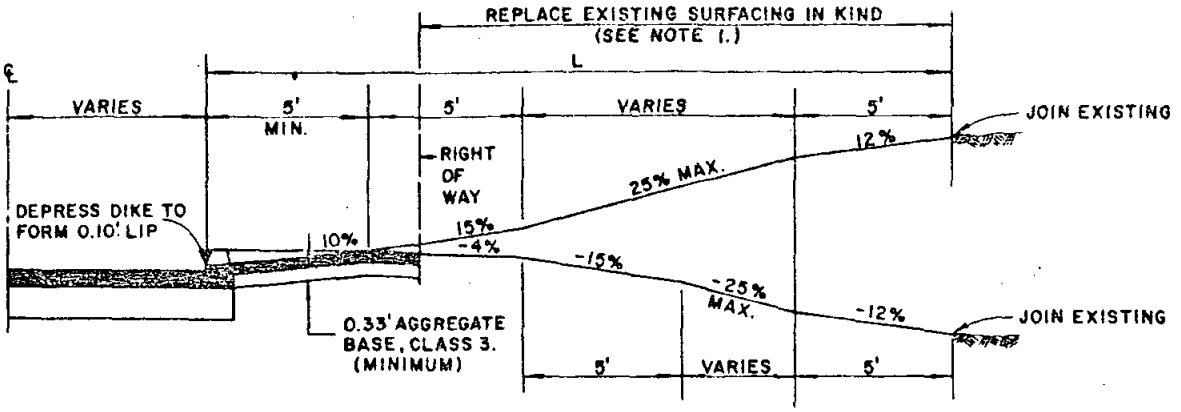
1. FOR COMMERCIAL AND INDUSTRIAL ACCESS ALONG INDUSTRIAL, INDUSTRIAL CUL-DE-SAC AND INDUSTRIAL COLLECTOR STREETS WHERE CURB PARKING IS PROHIBITED.
2. FOR RESIDENTIAL ACCESS WHEN:
   a.) LOT WIDTH IS LESS THAN 40'.
   b.) THE STREET IS CLASSIFIED RESIDENTIAL ONLY.
   c.) THE STREET GRADE DOES NOT EXCEED 5% AND ADEQUATE DRAINAGE IS PROVIDED FOR.

NOTES:

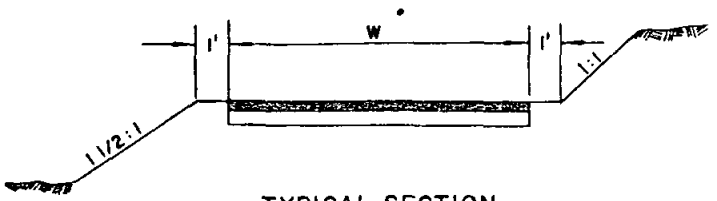
ALL CONCRETE TO BE CLASS "B".
SIDEWALK WILL BE INSTALLED AT PROPERTY LINE.
ALL CURB RETURN RADII TO BE TYPE E CURB & GUTTER WITH MINIMUM 10' TRANSITION TO ROLL CURB PROVIDED FROM END OF RETURN.

LEGEND ON PLANS

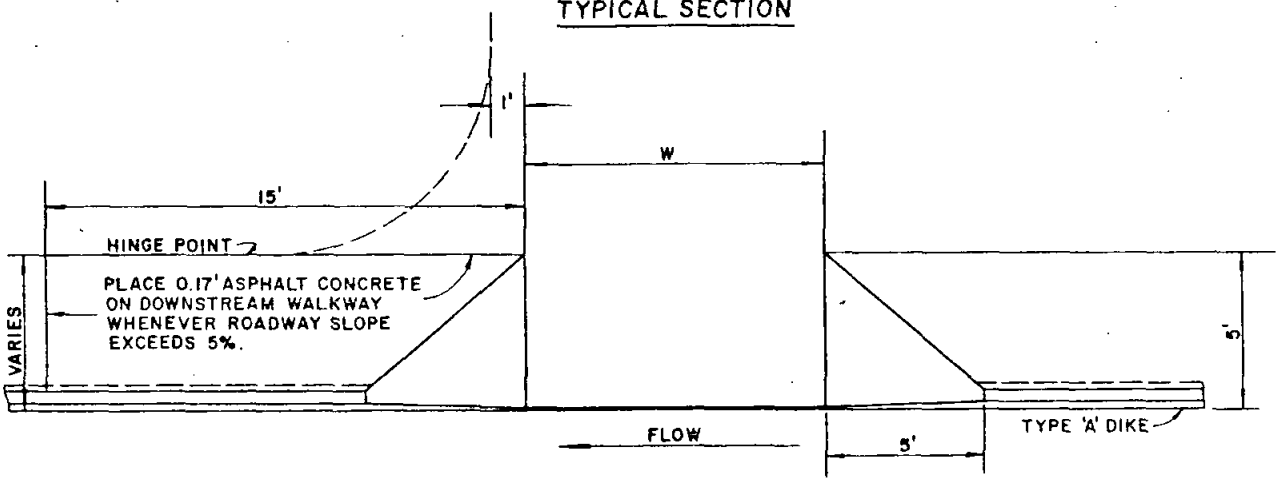
STD. SPEC. SEC:	SAN DIEGO COUNTY ENGINEER DEPARTMENT STANDARD DRAWING				
DRAWN BY RSY CHECKED BY					
RECOMMENDED BY	SPECIAL MOUNTABLE CURB	REVISION	BY	APPROVED	DATE
APPROVED BY COUNTY ENGINEER		SCALE: NONE			
H. M. Taylor R.C.E. 11458		DRAWING NUMBER 226			
DATE: Jan. 12, 1970					



PROFILE



TYPICAL SECTION



PLAN

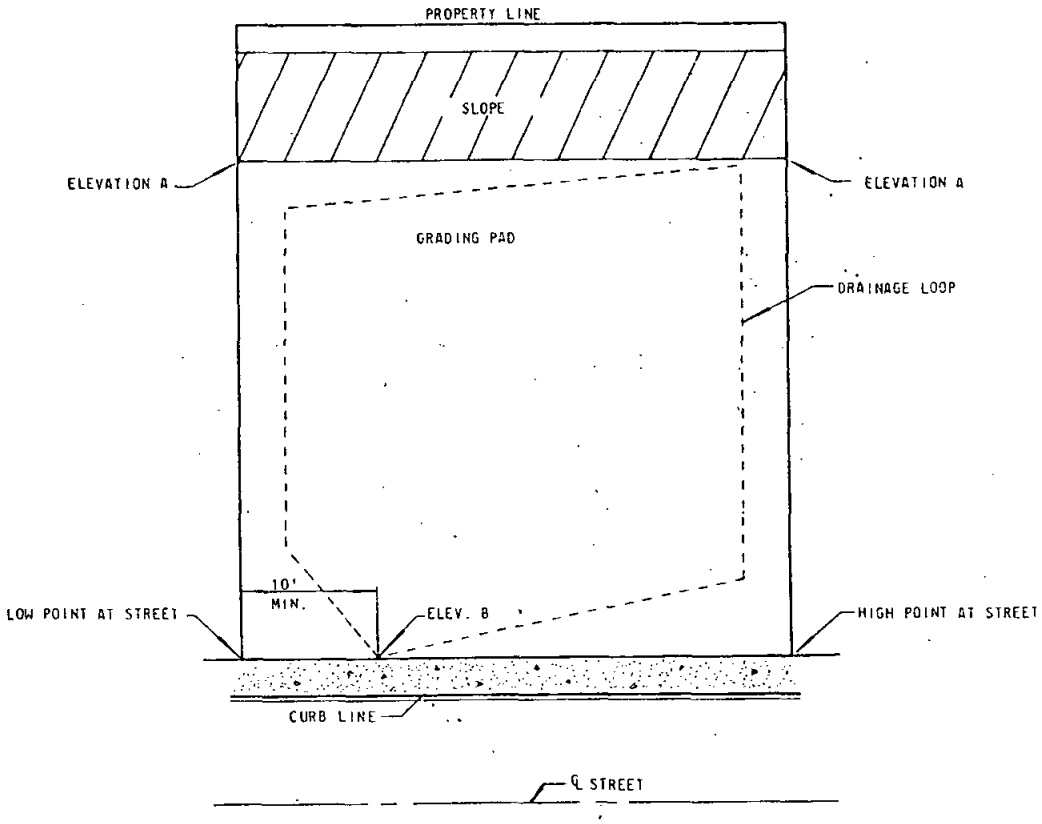
NOTES:

1. DRIVEWAYS WITH GRADES GREATER THAN 15% SHALL BE SURFACED WITH ASPHALT CONCRETE OR PORTLAND CEMENT CONCRETE.
2. MAXIMUM GRADE BREAK 14%.
3. SEE STANDARD DRAWING 207 & 211 FOR CONCRETE DRIVEWAYS.
4. SEE STANDARD DRAWING 305 & 306 FOR LOCATION & WIDTH REQUIREMENTS.

DRIVEWAY
PAVING SCHEDULE

DEPTH OF A.C.	GRADE
0.17'	0-15%
0.25'	15-20%
0.33'	20-25%

STD. SPEC. SEC:		SAN DIEGO COUNTY ENGINEER DEPARTMENT STANDARD DRAWING			
DRAWN BY RSG	CHECKED BY EM				
RECOMMENDED BY		ASPHALT CONCRETE DRIVEWAY	REVISION	BY	APPROVED	DATE
APPROVED BY COUNTY ENGINEER			SCALE: NONE			
H. M. Taylor R.C.E. 11458			DRAWING NUMBER 227			
DATE: Dec 28, 1970						

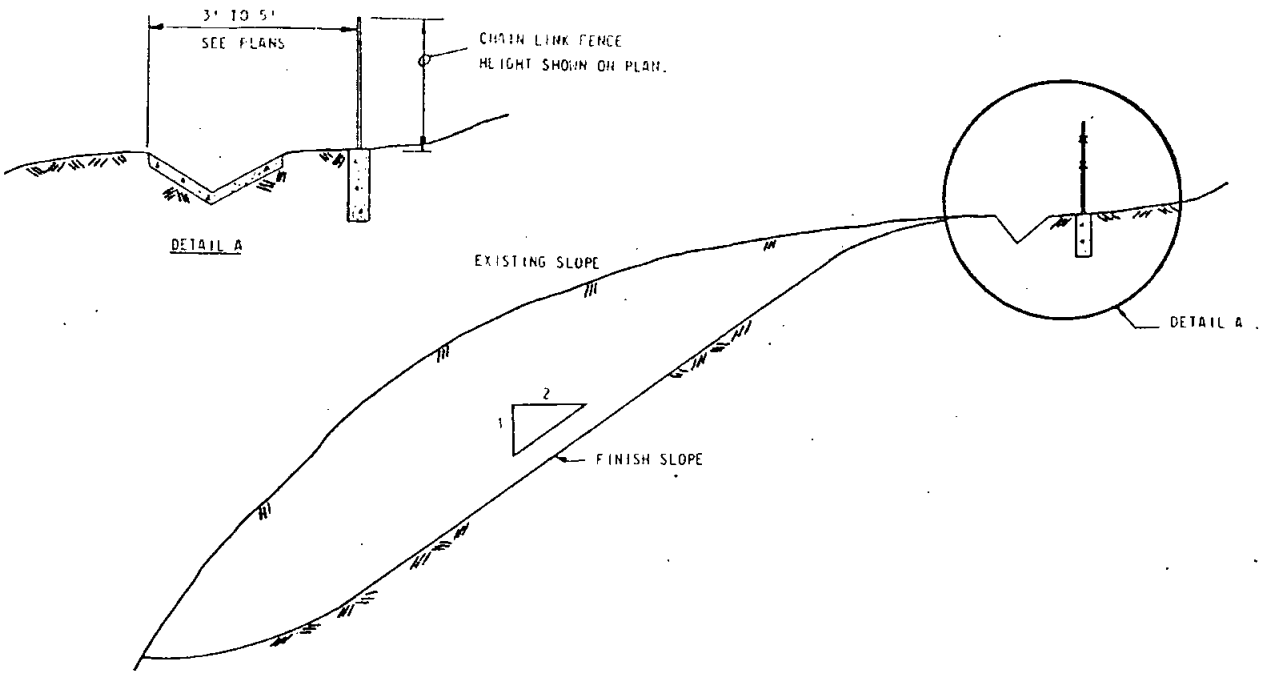


TYPICAL FINISHED GRADING

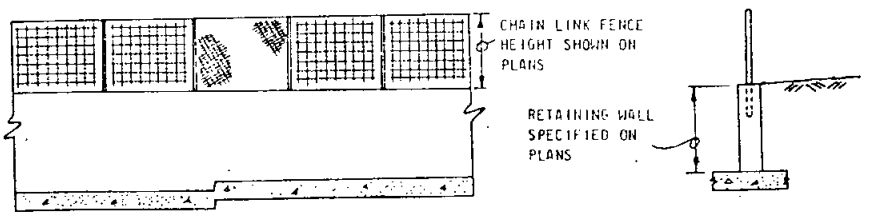
NOTES:

1. ELEV. A IS TO BE DETERMINED FOR THE MOST-REMOTE CORNER OF THE LOT FROM THE DRAIN POINT. ELEV. A = ELEV. B PLUS 1% TIMES ONE-HALF THE PERIMETER OF THE LOT.
2. MIN. 1% SWALE TO STREET OR OTHER DISCHARGE POINT.
3. ALL SLOPE SURFACES TO BE PROTECTED BY APPROVED EROSION CONTROL.

STD. SPEC. SEC: 19, 20, 90	SAN DIEGO COUNTY ENGINEER DEPARTMENT STANDARD DRAWING				
DRAWN BY PWH / CHECKED BY MCA					
RECOMMENDED BY		REVISION	BY	APPROVED	DATE
APPROVED BY COUNTY ENGINEER	LOT GRADING	SCALE: NONE			
H.M. Taylor R.C.E. 11458		DRAWING NUMBER 231 T			
DATE: 1-8-74					



FENCING CUT BANKS



RETAINING WALL & CHAIN LINK FENCE
FOR WALL HEIGHTS GREATER THAN 4 FT.

NOTES:

1. CHAIN LINK FENCE OR ALTERNATE ACCEPTABLE TO THE COUNTY ENGINEER SHALL BE INSTALLED ALONG THE TOP OF SLOPES EXCEEDING 15 FEET VERTICAL HEIGHT AND 3 TO 1 SLOPE RATIO, AND ALONG THE TOP OF WALLS EXCEEDING 4' VERTICAL HEIGHT.
2. RETAINING WALLS AND CHAIN LINK FENCE OR ALTERNATE SHALL BE CONSTRUCTED IN ACCORDANCE WITH COUNTY OF SAN DIEGO STANDARD SPECIFICATIONS.

STD. SPEC. SEC: 19, 51, 52, 80	SAN DIEGO COUNTY ENGINEER DEPARTMENT STANDARD DRAWING				
DRAWN BY D.W.A. CHECKED BY					
RECOMMENDED BY	FENCING CUT BANKS	REVISION	BY	APPROVED	DATE
APPROVED BY COUNTY ENGINEER		SCALE: NONE			
H.M. Tayler R.C.E. 11458		DRAWING NUMBER 232 T			
DATE: 1-8-74					

BENCH MARK

Description: _____

Location : _____

Record From: _____

Elev : _____ Datum : _____

PRIVATE CONTRACT

SHEET	COUNTY OF SAN DIEGO SURVEYOR DEPARTMENT	SHEETS

PLANS FOR IMPROVEMENTS IN
AND ADJOINING (SUBDIVISION NAME)

Recommended for Approval Subdivision Engineer	Approved County Surveyor
Engineer of Work R.C.E.	Checked by Approval Date T.M.

FILE NO.

COUNTY APPROVED CHANGES

No.	Description	Approved By	Date

Scale as shown

Drawing Number 300

STANDARD DRAWING

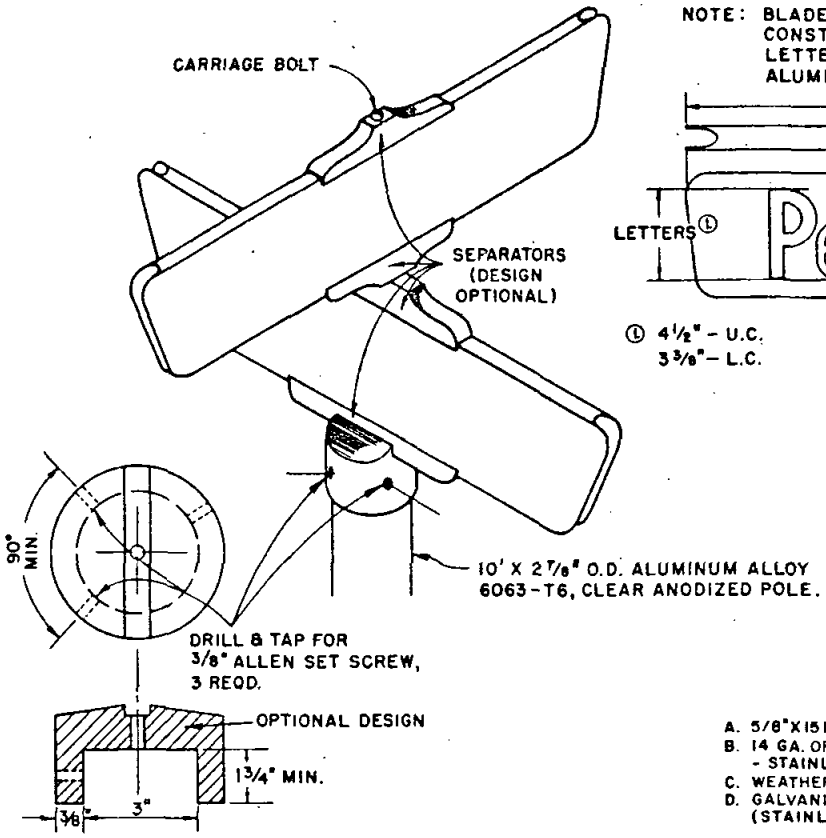
SAN DIEGO COUNTY

NEW SUBDIVISION
IMPROVEMENT PLAN
TITLE BLOCK

Specification Reference

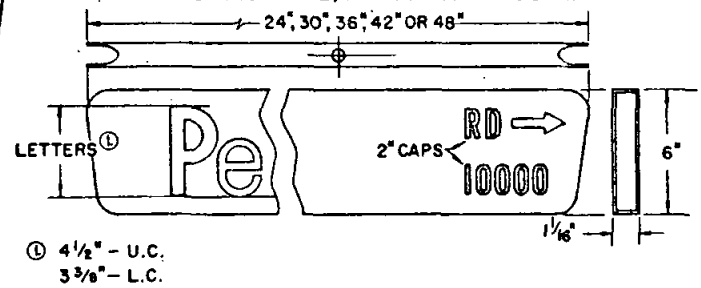
County Surveyor

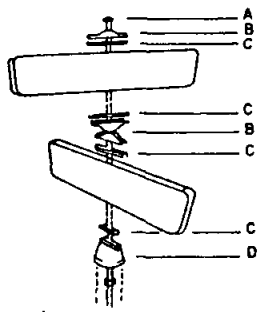
D.K. SPEER R.C.E. 8091



POST CAP DETAIL

NOTE: BLADE TO BE 0.063 ALUMINUM PLATE BOX CONSTRUCTION WITH BLUE PORCELAIN FINISH. LETTERS TO BE REFLECTIVE WHITE 0.004 THICK ALUMINUM FOIL, MIN. 50 C.P. PER SQ. FT.

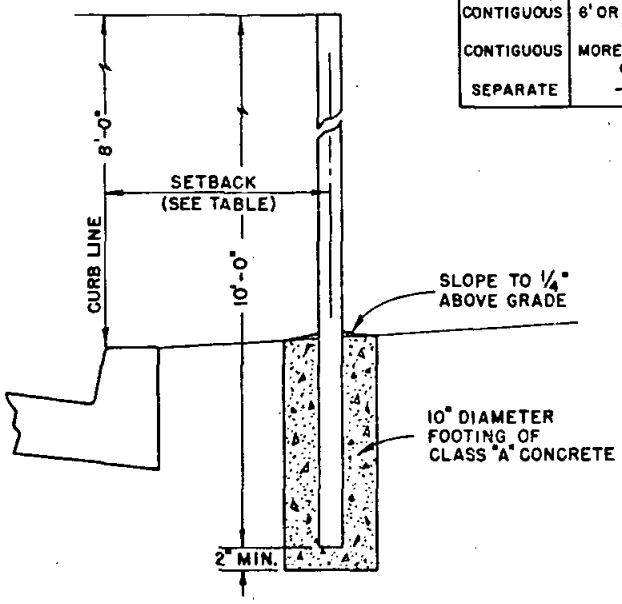


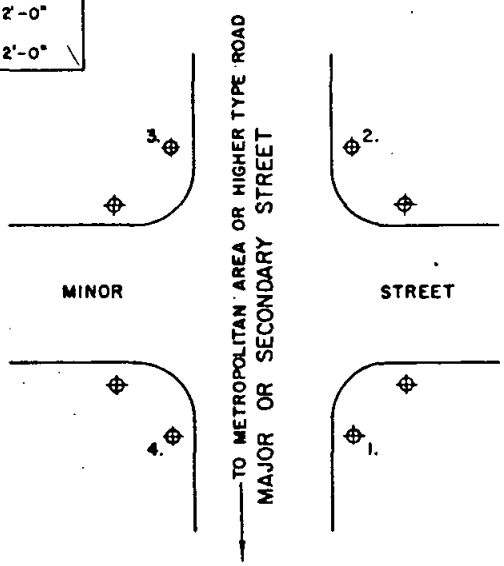


A. 5/8"X151/2" CARRIAGE BOLT.
B. 14 GA. ORNAMENTAL TOP AND CENTER CROSS SADDLE - STAINLESS STEEL.
C. WEATHERPROOF COMPOSITION GASKET.
D. GALVANIZED POSTCAP, WITH 3-5/8" ALLEN SET SCREWS. (STAINLESS STEEL, CONE POINT)

CURB & SIDEWALK	SIDEWALK WIDTH	SETBACK
CONTIGUOUS	6' OR LESS	SIDEWALK WIDTH
CONTIGUOUS	MORE THAN 6'	2'-0"
SEPARATE	—	2'-0"

Δ NOTE: ATTACH CAP TO POST USING SUFFICIENT FORCE ON SCREWS TO DIMPLE POST

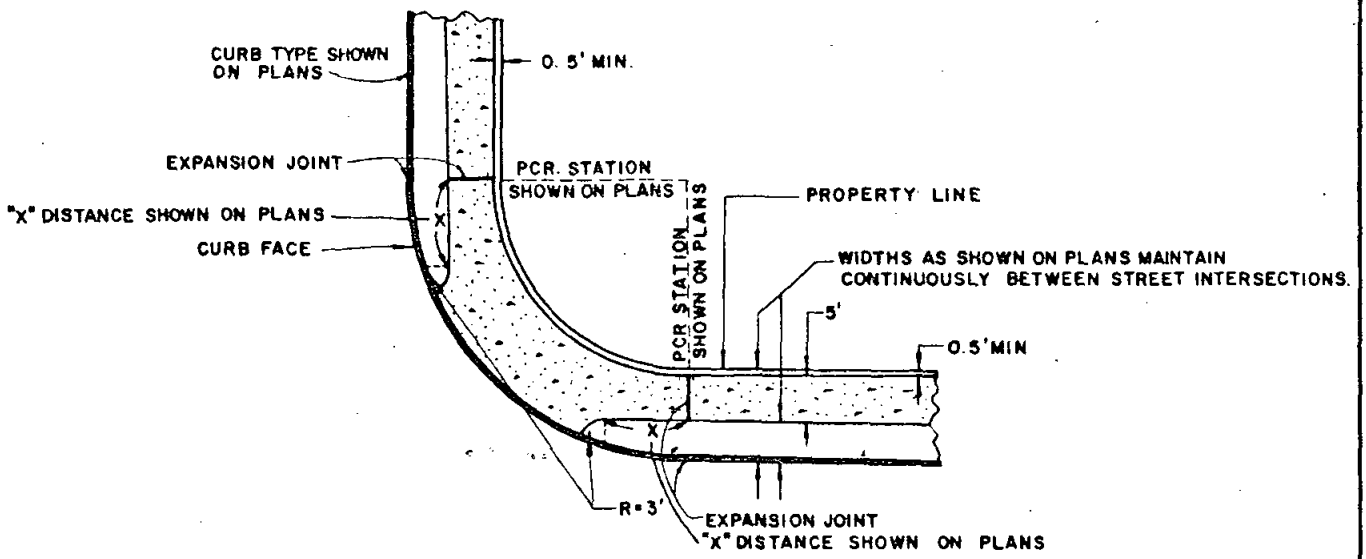




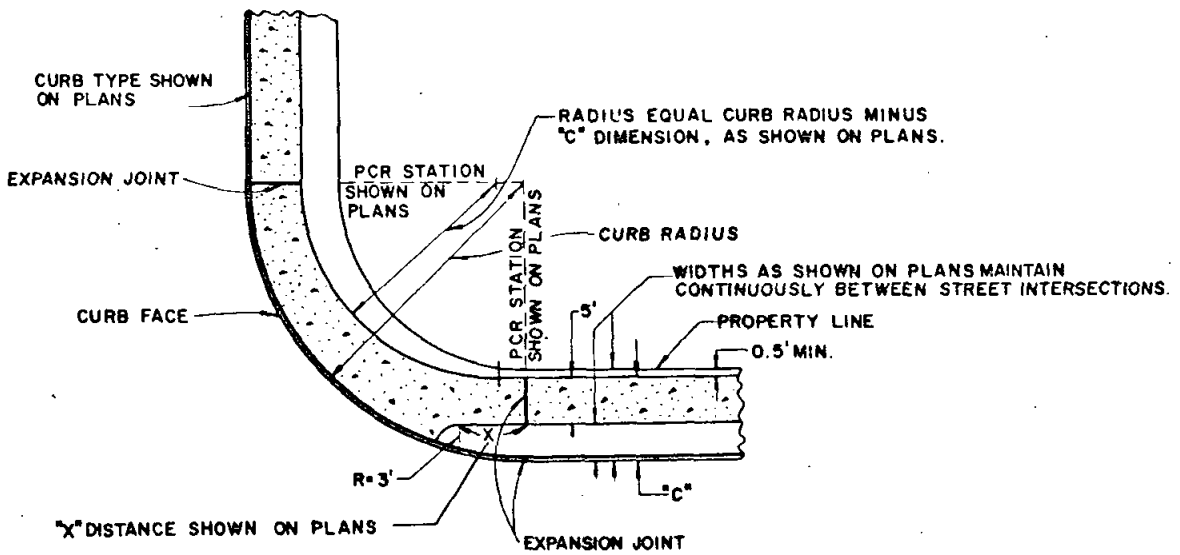
STREET NAME SIGN LOCATION

(NUMBERS INDICATE PRIORITY OF LOCATION SELECTION)

STD. SPEC. SEC: SEC. 56	SAN DIEGO COUNTY ENGINEER DEPARTMENT STANDARD DRAWING	Δ	J.E.B.	A. Kuchera	2/1/74
DRAWN BY R.M.G. CHECKED BY E.C.L.					
RECOMMENDED BY [signature]	STANDARD STREET SIGN	REVISION	BY	APPROVED	DATE
APPROVED BY COUNTY ENGINEER		SCALE:			
H. M. Taylor R.C.E. 11458		DRAWING NUMBER 301-2			
DATE: 5-19-71					



SIDEWALK INTERSECTION DETAIL
NON-CONTIGUOUS

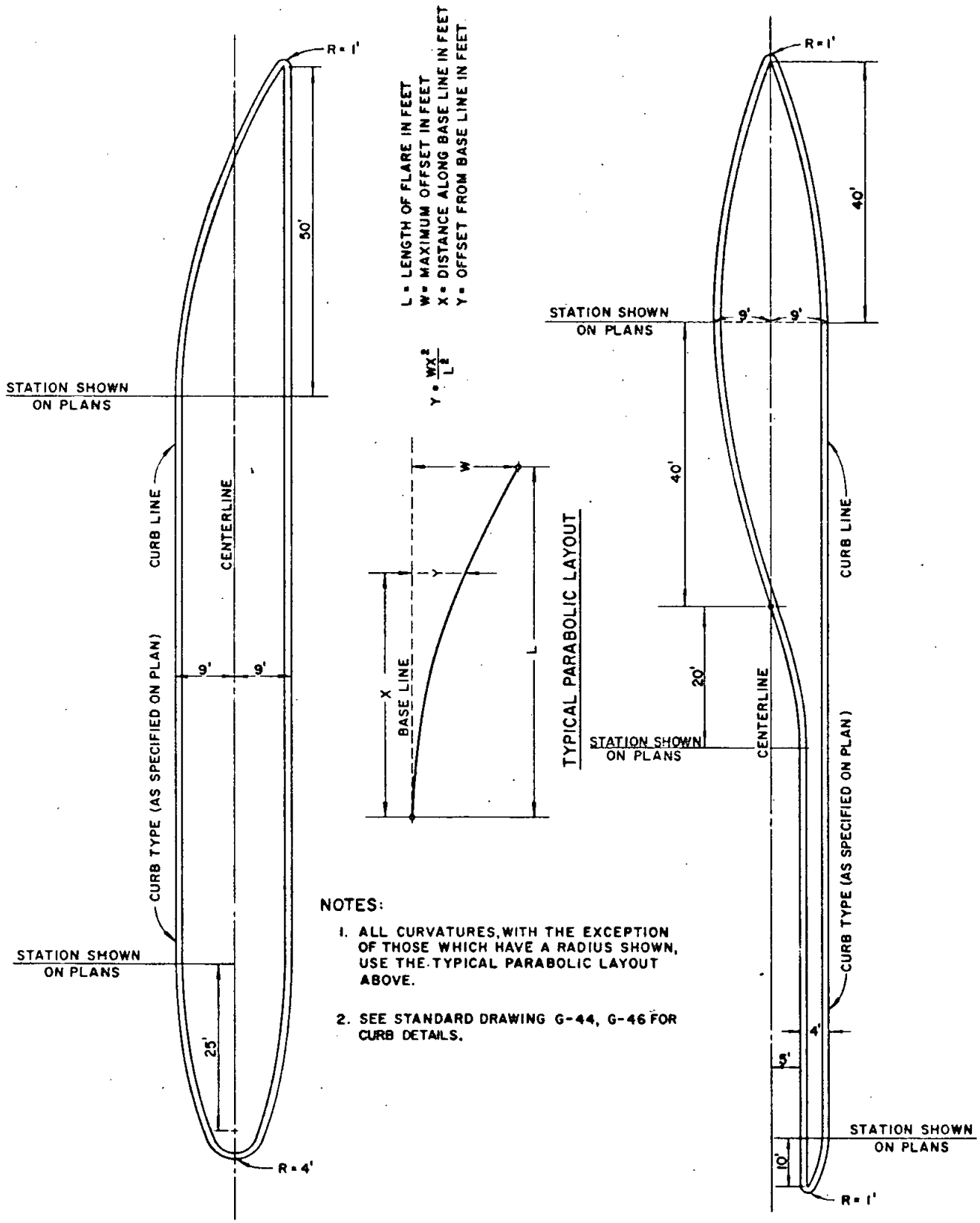


SIDEWALK INTERSECTION DETAIL
TRANSITION-CONTIGUOUS TO NON-CONTIGUOUS

NOTE:

1. SEE STANDARD DRAWING 212 FOR CONSTRUCTION DETAILS.

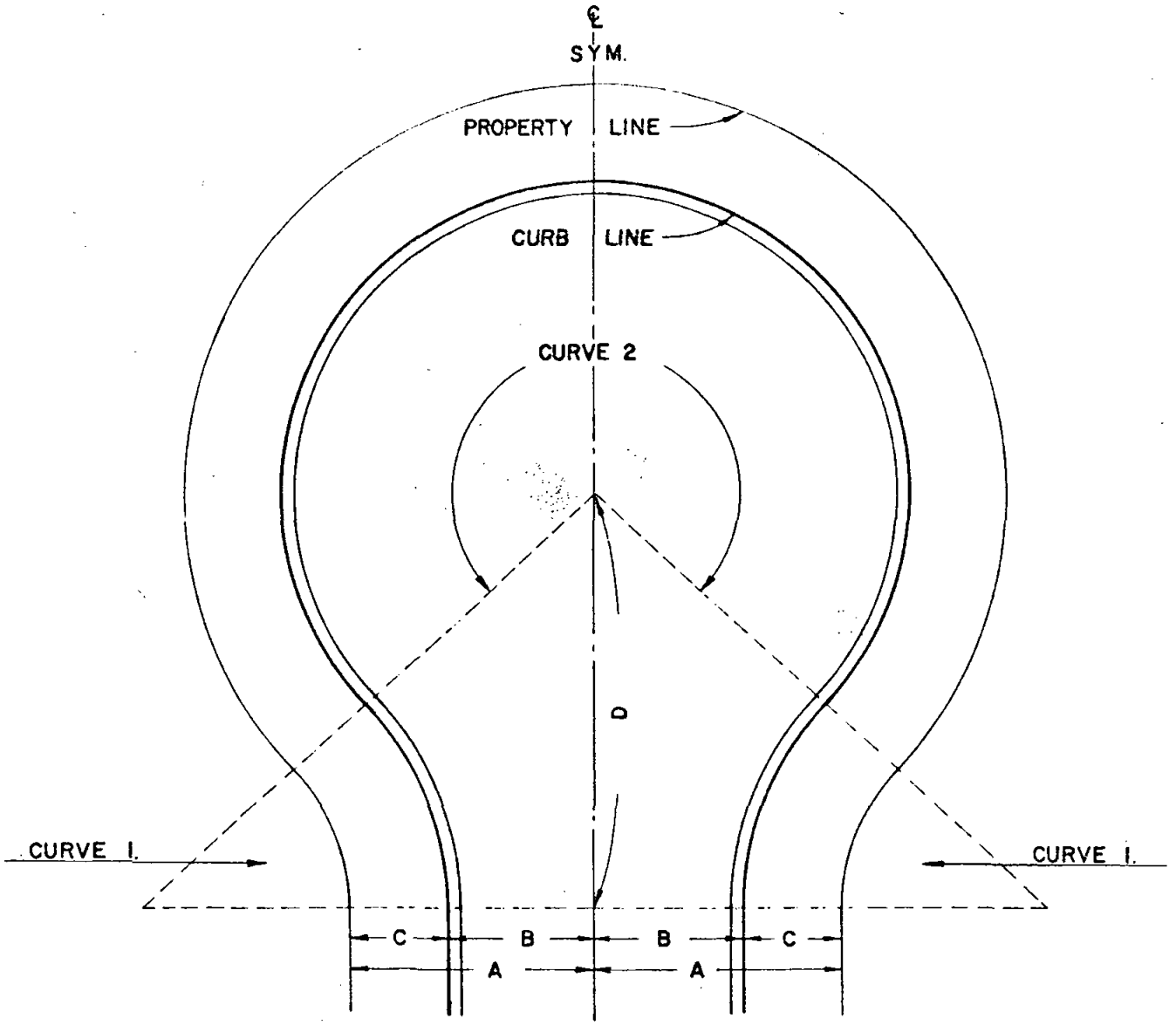
STD. SPEC. SEC: 51,73,90.	SAN DIEGO COUNTY ENGINEER DEPARTMENT STANDARD DRAWING				
DRAWN BY E.S.G. CHECKED BY E.M.					
RECOMMENDED BY	SIDEWALK RETURNS	REVISION	BY	APPROVED	DATE
APPROVED BY COUNTY ENGINEER		SCALE:			
H. M. Taylor R.C.E. 11458		DRAWING NUMBER 302-1			
DATE: Dec 28, 1970					



NOTES:

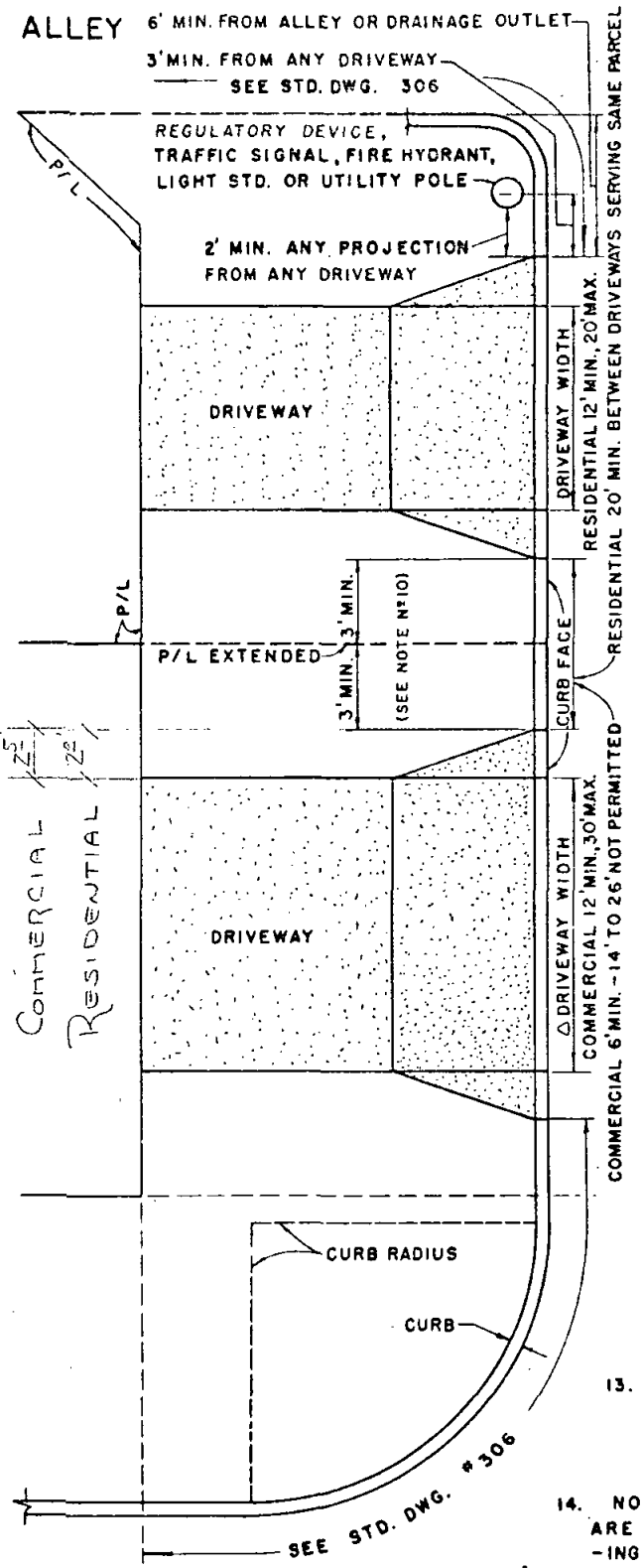
1. ALL CURVATURES, WITH THE EXCEPTION OF THOSE WHICH HAVE A RADIUS SHOWN, USE THE TYPICAL PARABOLIC LAYOUT ABOVE.
2. SEE STANDARD DRAWING G-44, G-46 FOR CURB DETAILS.

STD. SPEC. SEC: 73, 90	SAN DIEGO COUNTY ENGINEER DEPARTMENT STANDARD DRAWING				
DRAWN BY RLG CHECKED BY MEG					
RECOMMENDED BY [signature]	STANDARD RAISED MEDIAN ISLAND	REVISION	BY	APPROVED	DATE
APPROVED BY COUNTY ENGINEER		SCALE: NONE			
R.J. Meeman for R.C.E. 11458		DRAWING NUMBER 303-1			
DATE: July 2, 1973					



DIMENSIONS					CURVE 1.								CURVE 2				
R/W	A	B	C	D	△	CURB			PROP.			△	CURB		PROP.	
						R	L	T	R	L	T		R	L	R	L
52'	26'	16'	10'	50.95'	46°42' 30"	32'	26.09'	13.82'	22'	17.93'	9.50'	273°25' 00"	38'	181.34'	48'	229.06'
56'	28'	18'	10'	50.99'	42°50' 00"	37'	27.66'	14.52'	27'	20.18'	10.59'	265°40' 00"	38'	176.20'	48'	222.56'
60'	30'	20'	10'	68.15'	29°35' 31"	100'	51.65'	26.41'	90'	46.48'	23.77'	239° 11' 02"	38'	158.63'	48'	200.38'
72'	36'	26'	10'	81.39'	32°51' 36"	100'	57.35'	29.49'	90'	51.62'	26.54'	245°43' 12"	50'	214.43'	60'	257.32'

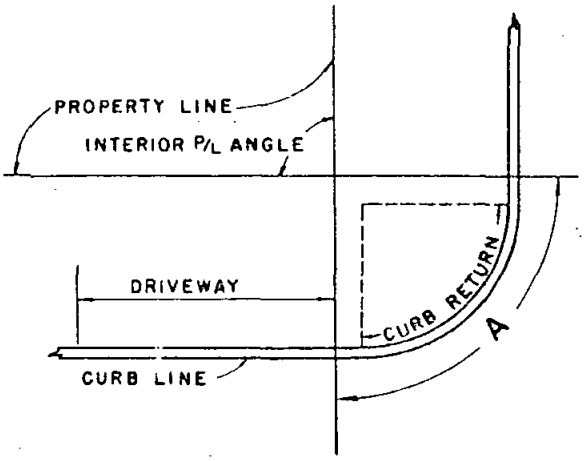
STD. SPEC. SEC:	SAN DIEGO COUNTY ENGINEER DEPARTMENT STANDARD DRAWING				
DRAWN BY [illegible] CHECKED BY CRJ					
RECOMMENDED BY	TURNAROUND AND CALCULATIONS	REVISION	BY	APPROVED	DATE
APPROVED BY COUNTY ENGINEER		SCALE: NONE			
H. M. Taylor R.C.E. 11458		DRAWING NUMBER 304-3			
DATE: Dec 28, 1979					



GENERAL DRIVEWAY REQUIREMENTS

1. DRIVEWAYS SHALL BE CONSTRUCTED IN ACCORDANCE WITH STANDARD SPECIFICATIONS AND DRAWINGS OF THE COUNTY OF SAN DIEGO.
2. A RESIDENTIAL DRIVEWAY IS ONE THAT SERVES THREE (3) DWELLING UNITS OR LESS, OR FARMS OR RANCHES NOT USED AS RETAIL OUTLETS. ALL OTHER DRIVEWAYS ARE CLASSIFIED AS COMMERCIAL DRIVEWAYS.
3. △ STANDARD DRIVEWAY WIDTH SHALL BE TOTAL WIDTH OF CURB OPENING EXCLUDING CURB TRANSITIONS.
4. THE MAXIMUM WIDTH OF RESIDENTIAL DRIVEWAYS SHALL BE 20 FEET, MINIMUM 12 FEET.
5. △ THE MAXIMUM WIDTH OF COMMERCIAL DRIVEWAYS SHALL BE 30 FEET, MINIMUM 12 FEET. (RECOMMENDED 17 FEET MINIMUM.)
6. PORTLAND CEMENT CONCRETE DRIVEWAY APPROACHES SHALL EXTEND TO PROPERTY SIDE OF SIDEWALK OR, IF THERE IS NO SIDEWALK, TO WITHIN SIX INCHES OF THE PROPERTY LINE.
7. WHERE PORTLAND CEMENT CONCRETE CURBS ARE NOT INSTALLED, DRIVEWAY APPROACHES SHALL NOT BE CONSTRUCTED OF PORTLAND CEMENT CONCRETE.
8. LOCATION AND EXTENT OF ALL COMMERCIAL DRIVEWAYS SHALL BE SUBJECT TO APPROVAL OF THE COUNTY ENGINEER.
9. NO PORTION OF ANY DRIVEWAY SHALL BE ALLOWED ACROSS A LINE EXTENDING NORMAL TO THE ROADWAY FROM THE FRONT CORNER OF THE PROPERTY, EXCEPT THAT JOINT-USE DRIVEWAYS MAY BE PERMITTED IN SPECIAL INSTANCES WHERE WRITTEN APPROVAL OF BOTH PROPERTY OWNERS IS FILED WITH THE COUNTY ENGINEER.
10. DRIVEWAYS, EXCEPT JOINT-USE DRIVEWAYS AND DRIVEWAYS ON LOTS HAVING 21 FOOT FRONTAGE OR LESS, SHALL BE LOCATED AT LEAST 3 FEET FROM THE SIDE PROPERTY LINE EXTENDED.
11. NOT MORE THAN 60% OF THE PROPERTY FRONTAGE MAY BE ALLOCATED FOR DRIVEWAYS ON ANY ONE LOT, EXCEPT THAT LOTS HAVING FRONTAGE OF 25 FEET OR LESS ARE ENTITLED TO ONE 15 FOOT DRIVEWAY.
12. DRIVEWAY LOCATIONS AND GRADES SHALL NOT INTERFERE WITH PLANNED ULTIMATE GRADING WITHIN THE RIGHT OF WAY.
13. PORTLAND CEMENT CONCRETE CURB OPENINGS (DEPRESSED CURBS) WILL BE PERMITTED ONLY IN THOSE LOCATIONS WHERE COMPLETE STANDARD PORTLAND CEMENT CONCRETE DRIVEWAYS ARE TO BE CONSTRUCTED CONCURRENTLY.
14. NO CONCRETE SHALL BE PLACED UNTIL FORMS AND SUBGRADE ARE INSPECTED BY THE COUNTY ENGINEER DEPARTMENT OR BUILDING INSPECTION DEPARTMENT.
15. △ WHEN A DRIVEWAY THROUGH A PORTLAND CEMENT CONCRETE CURB IS ABANDONED, OR IS MOVED TO ANOTHER LOCATION SERVING THE SAME PROPERTY, THE OWNER SHALL INSTALL FULL HEIGHT CURB ACROSS THE SUPERFLUOUS OPENING AND SHALL FILL THE DEPRESSION BEHIND THE CURB.

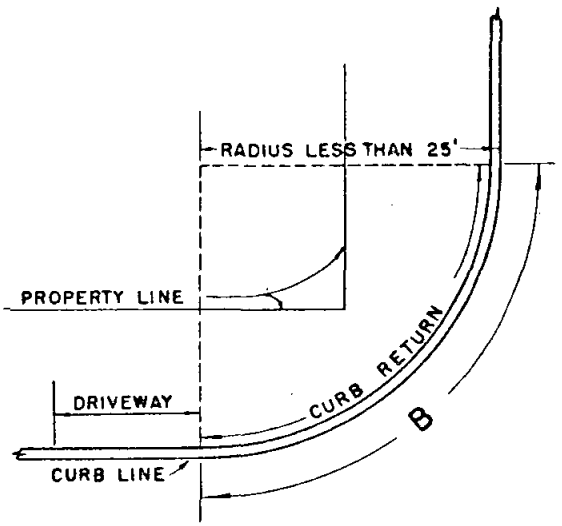
STD. SPEC. SEC:		SAN DIEGO COUNTY ENGINEER DEPARTMENT STANDARD DRAWING	△			
DRAWN BY R.S.G.	CHECKED BY E.M.					
RECOMMENDED BY			REVISION	BY	APPROVED	DATE
APPROVED BY COUNTY ENGINEER		DRIVEWAY LOCATION AND WIDTH REQUIREMENTS	SCALE: NONE			
H. M. Taylor	R.C.E. 11458		DRAWING NUMBER	305-3T		
DATE: Dec. 28, 1970						



REQUIREMENT 1

NO PORTION OF ANY DRIVEWAY SHALL BE PERMITTED WITHIN THE INTERSECTION OF THE PROLONGED PROPERTY LINES AND THE CURB AS SHOWN BY ARC "A".

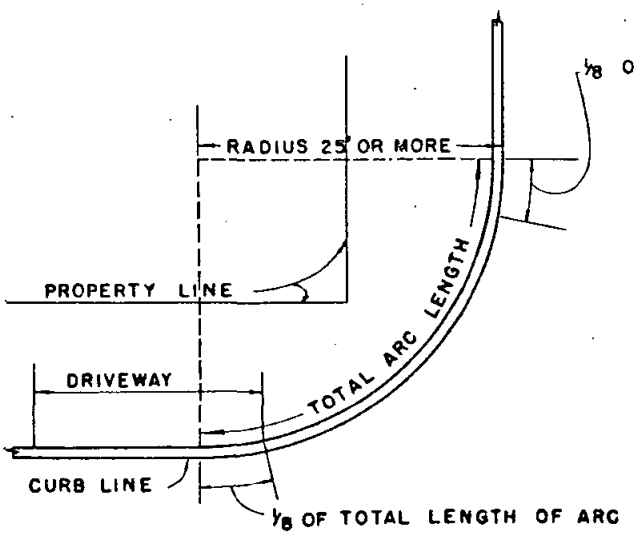
WHEN THE INTERIOR PROPERTY LINE ANGLE BETWEEN TWO STREETS IS LESS THAN 70°, NO DRIVEWAY ENCROACHMENT INTO THE CURB RETURN WILL BE MADE WITHOUT APPROVAL OF THE COUNTY SURVEYOR-ROAD COMISSIONER.



REQUIREMENT 2

NO PORTION OF ANY DRIVEWAY SHALL BE PERMITTED IN THE CURB RETURN WHERE THE RADIUS OF THE CURB IS LESS THAN 25 FEET, AS SHOWN BY ARC "B".

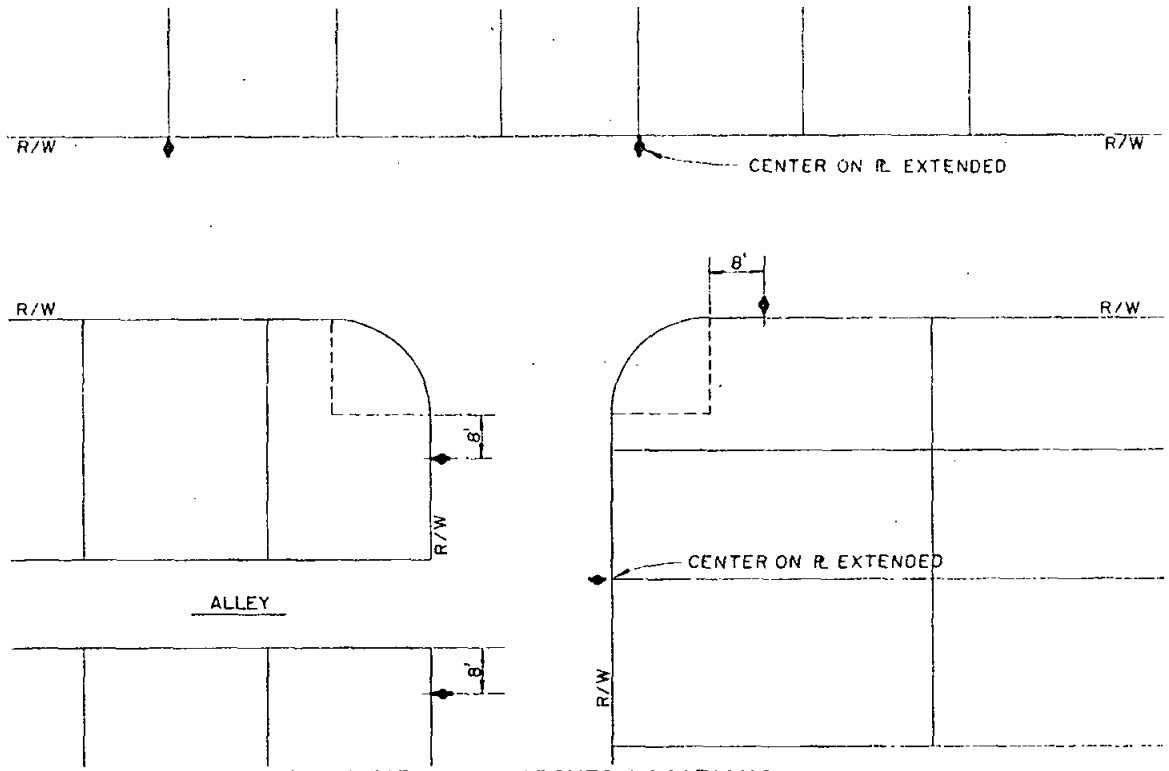
REQUIREMENT 3



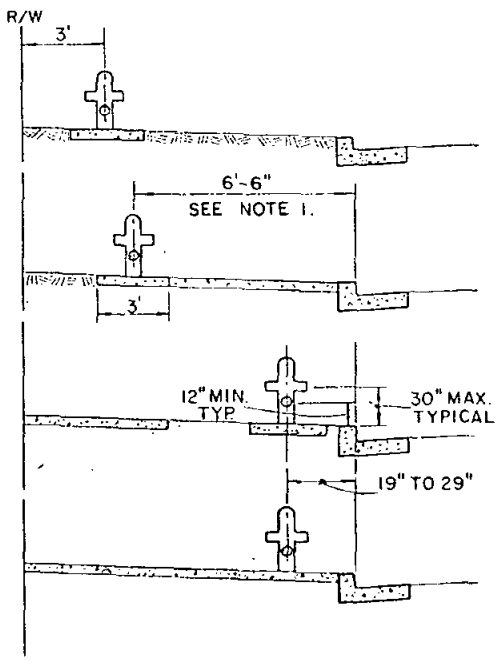
ON ALL CURB RETURNS WHERE THE RADIUS IS 25 FEET OR MORE, DRIVEWAYS MAY ENCROACH UPON EACH END OF THE RETURN A DISTANCE EQUAL TO 12½% OR 1/8 OF THE TOTAL LENGTH OF THE ARC ON THE CURB RETURN, THUS LEAVING AT LEAST 75% OF THE LENGTH OF ARC ON THE RETURN FACE FREE FROM DRIVEWAY ENCROACHMENT, PROVIDED REQUIREMENT 1 IS MET, AND PROVIDED THE CURB ENCROACHMENT IS APPROVED BY THE SURVEYOR-ROAD COMMISSIONER.

NO DRIVEWAY SHALL BE PERMITTED WITHIN A CURB RETURN WITHIN THREE FEET OF A REGULATORY DEVICE.

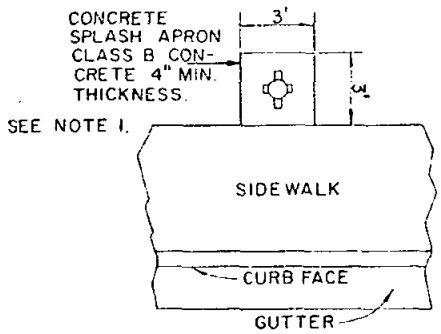
STD. SPEC. SEC.					
DRAWN BY D.R. CHECKED BY A.S.N.					
RECOMMENDED BY R. J. Masman	SAN DIEGO COUNTY SURVEYOR — ROAD DEPARTMENT	REVISION	BY	APPROVED	DATE
APPROVED BY COUNTY SURVEYOR	STANDARD DRAWING	SCALE NONE			
D. K. Spear R.C.E. 8091	DRIVEWAY LOCATION ADJACENT TO CURB RETURNS	DRAWING NUMBER 306-1			
DATE: July 14, 1964					



PLAN VIEW OF APPROVED LOCATIONS



PROFILE OF APPROVED LOCATIONS



SPLASH APRON PLAN

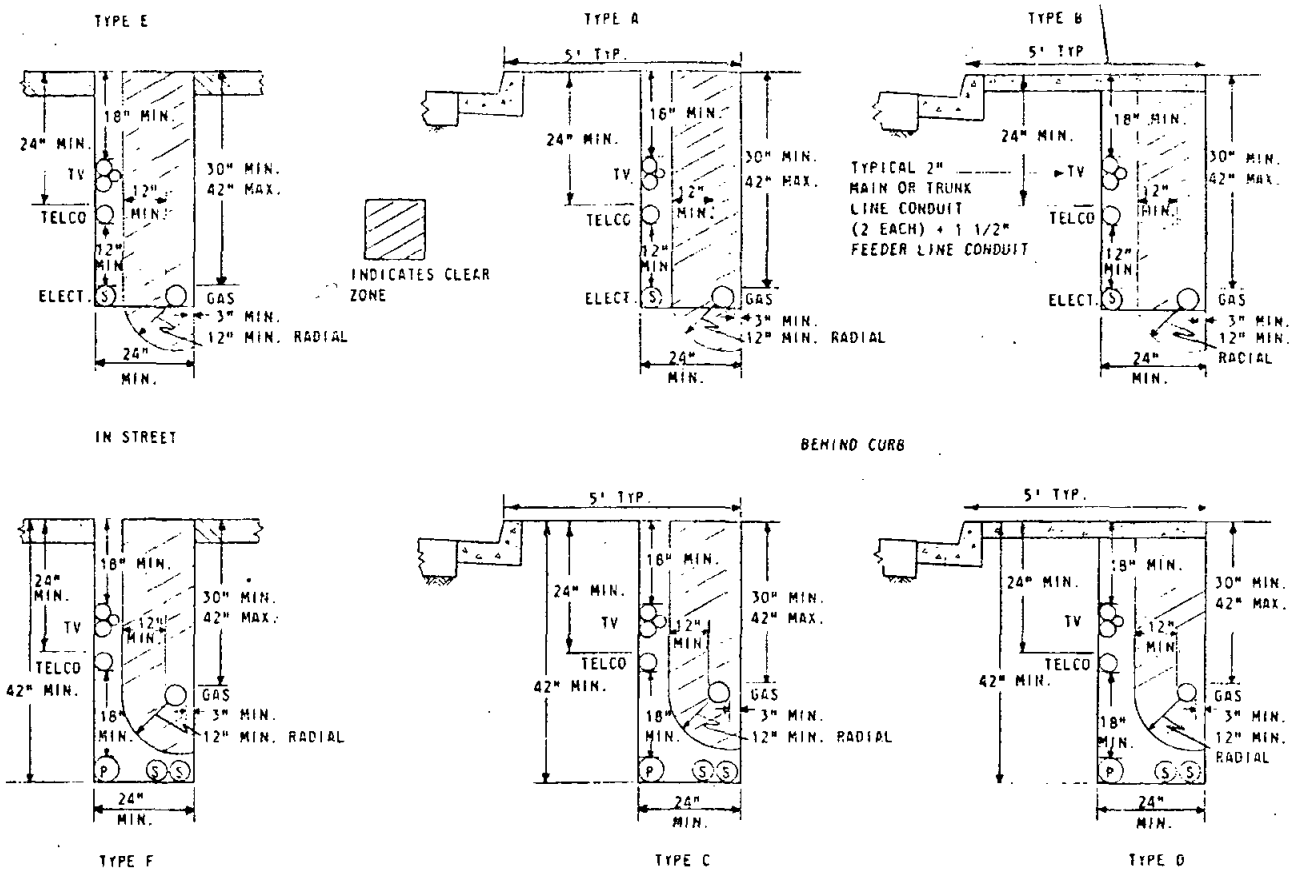
NOTES

1. FOR CONTIGUOUS SIDEWALK WHERE DISTANCE FROM BACK OF SIDEWALK TO PROPERTY LINE IS 3'-6" MIN., INSTALL AS SHOWN. WHEN DISTANCE FROM HYDRANT TO TOP OR TOE OF SLOPE IS LESS THAN 2'-0", SPECIAL HYDRANT PROTECTION WILL BE REQUIRED.
2. HARDWARE DETAILS WILL BE THOSE OF THE APPLICABLE DISTRICT INVOLVED.
3. A 3'-0" x 3'-0" SPLASH APRON AROUND ALL INSTALLATIONS WHERE NOT PART OF SIDEWALK.

REDUCED SCALE
USE SCALE BELOW

0 1 2 3
3 INCHES ON ORIGINAL PLAN

STD. SPEC. SEC: 19.90	SAN DIEGO COUNTY ENGINEER DEPARTMENT STANDARD DRAWING				
DRAWN BY CHECKED BY					
RECOMMENDED BY	FIRE HYDRANT LOCATION	REVISION	BY	APPROVED	DATE
APPROVED BY COUNTY ENGINEER		SCALE: NONE			
H. M. Taylor R.C.E. 11458		DRAWING NUMBER 307			
DATE: Sept. 28, 1971.					



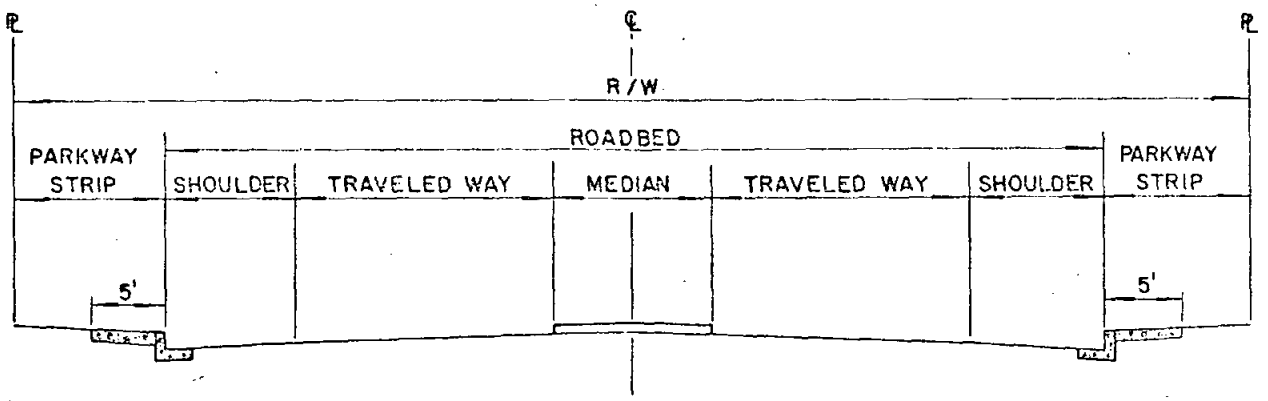
GENERAL NOTES:

1. GENERALLY UTILITIES ARE TO BE INSTALLED UNDER THE APPLICABLE SPECIFICATIONS FOR THE PARTICULAR UTILITY AND THE SPECIFICATIONS OF THE OWNER AGENCY.
2. WHERE MULTIPLE DUCTS (OTHER THAN SHOWN) ARE TO BE PLACED A SPECIAL JOINT TRENCH DETAIL SHALL BE DESIGNED AND APPROVAL OF PARTICIPATING UTILITIES OBTAINED.
3. GAS MAIN TO BE PLACED ON PROPERTY SIDE OF TRENCH. ELECTRIC PRIMARY SHOULD BE DIAGONALLY OPPOSITE GAS MAIN WHERE POSSIBLE (TYPES C, D & F).
4. INSTALLATION OF SEWER AND/OR WATER UTILITIES ARE NOT PERMITED IN THE JOINT TRENCH SHOWN ABOVE.
5. MINIMUM DEPTH TO TOP OF GAS PIPE MAY, SUBJECT TO GAS COMPANY INSPECTORS APPROVAL, BE REDUCED TO 24" WHERE NECESSARY TO CLEAR FOREIGN STRUCTURE CROSSINGS.
6. DEPTH AND WIDTH OF TRENCH VARIES.
7. WHEN APPROVED BY ALL UTILITIES CONCERNED SECONDARY ELECTRIC, TELEPHONE AND CATV MAY BE CONCURRENTLY INSTALLED WITH RANDOM SEPARATION.
8. CATV MAIN OR TRUNK LINE CONDUIT REQUIRED ALONG ALL STREETS EXCEPT CUL-DE-SAC STREETS LESS THAN 2500' IN LENGTH MAY BE SERVED BY FEEDER LINES ONLY.
9. CATV 1 1/2" FEEDER CONDUIT SHALL RUN ACROSS STREETS WITH EACH POWER SERVICE LINE AND CAPPED AT EDGE OF SIDEWALK.
10. ALL CATV TERMINALS AND CONDUITS SHALL BE TERMINATED AT GENERALLY ACCEPTED LOCATIONS AND MARKED. A MAP SHALL BE FILED WITH THE APPROPRIATE AGENCY SHOWING THE LOCATION OF THE CATV SYSTEM.
11. IN NO CASE SHALL CATV CONDUITS BE PLACED WITHIN 12" OF ELECTRIC OR GAS LINES. ALSO CONDUITS ARE NOT TO BE PLACED DIRECTLY OVER GAS LINES.
12. CATV CONDUIT MAY BE PLACED WITH THE TELCO CONDUIT PROVIDED THE TELCO MIN. DEPTH IS HELD.
13. THE LOCATION OF UTILITIES AS SHOWN BY THE STANDARD DRAWING SHALL IN NO WAY VIOLATE EXISTING CODES OR REGULATIONS APPLICABLE TO INDIVIDUAL UTILITIES.
14. TYPES A, B & E APPLY WHEN AN ELECTRIC SECONDARY CONDUIT ONLY IS USED. TYPES C, D, AND F APPLY WHEN AN ELECTRIC PRIMARY (& SECONDARY) CONDUIT IS USED.

STD. SPEC. SEC:	SAN DIEGO COUNTY ENGINEER DEPARTMENT STANDARD DRAWING				
DRAWN BY J.L.B. CHECKED BY					
RECOMMENDED BY	JOINT TRENCH UTILITIES LOCATION	REVISION	BY	APPROVED	DATE
APPROVED BY COUNTY ENGINEER		SCALE: NONE			
R.C.E. 11458		DRAWING NUMBER 309T			
DATE: 1-14-74					

TYPICAL ROADWAY SECTION

SYMMETRICAL ABOUT CENTERLINE



TYPE OF ROAD OR STREET	R/W	ROADBED	TRAVELED WAY	SHOULDER	MEDIAN	PARKWAY STRIP
PRIME ARTERIAL TRAFFIC VOLUME OF 16,000 V.P.D. OR MORE	126'	106'	36'	8'	18'	10'
MAJOR ROAD TRAFFIC VOLUME 10,000 TO 16,000 V.P.D.	102'	82'	24'	8'	18'	10'
COLLECTOR ROAD TRAFFIC VOLUME 5,000 TO 10,000 V.P.D.	84'	64'	24'	8'	0'	10'
RESIDENTIAL COLLECTOR STREET TRAFFIC VOLUME FROM 150 TO 700 DWELLING UNITS	60'	40'	12'	8'	0'	10'
RESIDENTIAL STREET TRAFFIC VOLUME FROM 150 DWELLING UNITS OR LESS	56'	36'	12'	6'	0'	10'
RESIDENTIAL CUL-DE-SAC STREET TRAFFIC VOLUME FROM 20 UNITS OR LESS. 600' MAX. LENGTH	52'	32'	12'	4'	0'	10'
RESIDENTIAL LOOP STREET TRAFFIC VOLUME FROM 20 UNITS OR LESS. 600' MAX. LENGTH	52'	32'	12'	4'	0'	10'
*COMM. & IND. COLLECTOR STREET TRAFFIC VOLUME FROM COMMERCIAL OR INDUSTRIAL ST'S.	88'	68'	24'	10'	0'	10'
*COMM. & IND. STREET TRAFFIC VOLUME FROM ABUTTING COMMERCIAL LOTS	72'	52'	16'	10'	0'	10'
*COMM. & IND. CUL-DE-SAC STREET TRAFFIC VOLUME FROM ABUTTING COMMERCIAL LOTS	72'	52'	16'	10'	0'	10'
FRONTAGE ROAD ADJACENT TO FREEWAY RIGHT OF WAY		SEE	NOTE	Nº 4		

*COMM. & IND. = COMMERCIAL & INDUSTRIAL

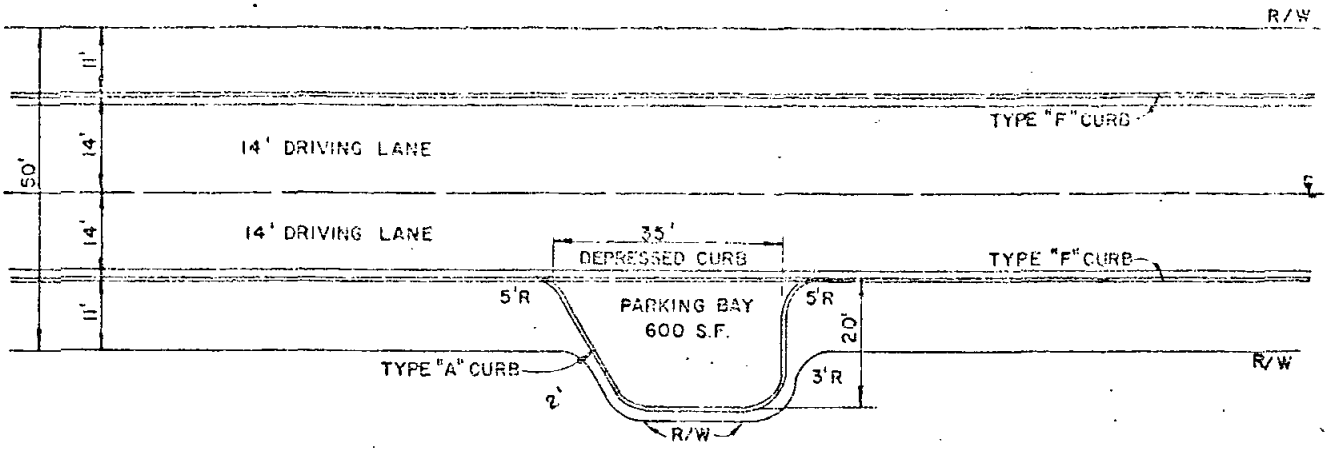
NOTE: 1. STREET CLASSIFICATIONS (EXCEPT PRIME ARTERIAL) AND TYPICAL ROADWAY SECTIONS FROM SAN DIEGO COUNTY TECHNICAL ROAD POLICY (JAN. 6, 1964).

2. PRIME ARTERIAL SECTION BASED UPON MINIMUM STANDARDS "NATIONAL COMMITTEE ON URBAN TRANSPORTATION".

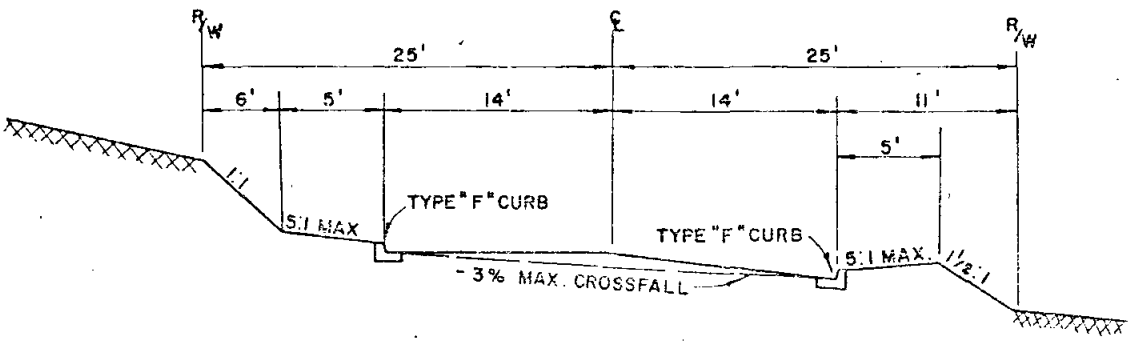
3. SEE SAN DIEGO COUNTY STANDARD DRAWINGS AND SAN DIEGO COUNTY TECHNICAL ROAD POLICY FOR SIDEWALK, CURB, AND ROADWAY REQUIREMENTS.

4. FRONTAGE ROAD ADJACENT TO FREEWAY R/W. TRAVELED WAY AND MEDIAN STANDARD FOR ROAD CLASSIFICATION AND/OR TRAFFIC VOLUME. SHOULDER ADJACENT TO FREEWAY 2'. PARKWAY STRIP ADJACENT TO FREEWAY VARIES FROM 4' TO 10' SHOULDER AND PARKWAY STRIP AWAY FROM FREEWAY STANDARD FOR TRAFFIC VOLUME AND/OR ROAD CLASSIFICATION.

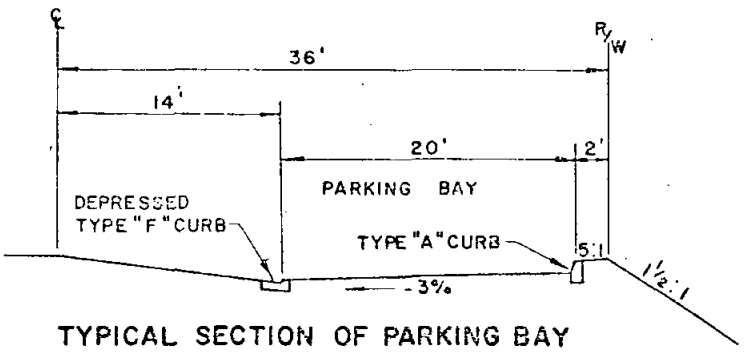
STD. SPEC. SEC. 39, 71, 73, 90					
DRAWN BY CGB CHECKED BY BFB					
RECOMMENDED BY [signature]	SAN DIEGO COUNTY ENGINEER DEPARTMENT	REVISION	BY	APPROVED	DATE
APPROVED BY COUNTY ENGINEER	STANDARD DRAWING	SCALE: NONE			
H. M. Taylor for R.C.E. 11458	TYPICAL ROADWAY SECTIONS	DRAWING NUMBER 310-3			
DATE: 12-30-71					



PLAN



TYPICAL ROADWAY SECTION

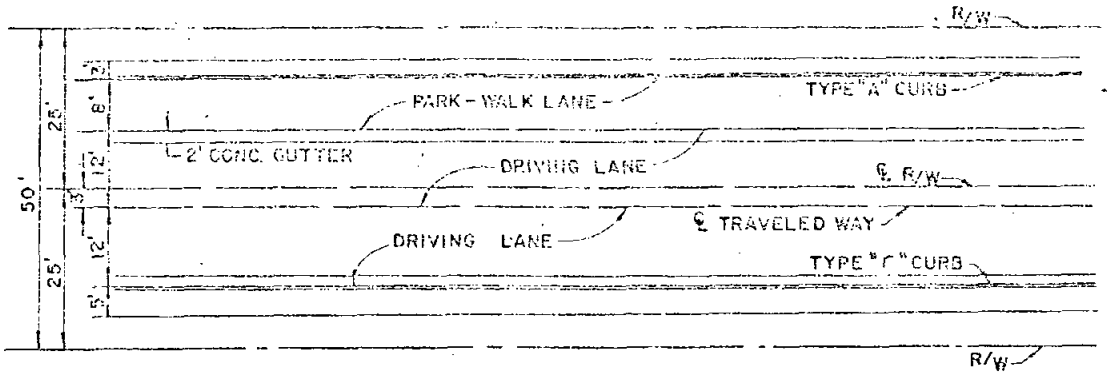


TYPICAL SECTION OF PARKING BAY

NOTES:

1. SEE SAN DIEGO COUNTY STANDARD DRAWINGS AND SAN DIEGO COUNTY TECHNICAL ROAD POLICY FOR CURB, SIDEWALK & ROADWAY REQUIREMENTS.
2. NATURAL SLOPE EXCEEDS 20% AS DEFINED IN SAN DIEGO COUNTY TECHNICAL ROAD POLICY SECT. 4.22
3. REQUIRED: ONE 600 SQUARE FOOT PERPENDICULAR PARKING BAY PER LOT. THE SURVEYOR-ROAD COMMISSIONER MAY ALSO ESTABLISH ALTERNATE STANDARD TYPICAL SECTIONS WHICH WILL PROVIDE A MINIMUM OF TWO PARKING STALLS PER LOT.
4. USE OF THIS STREET SECTION LIMITED TO AREAS IN WHICH AT LEAST 80% OF THE LOTS HAVE A NET AREA NOT LESS THAN 20,000 SQUARE FEET.

STD. SPEC. SEC. 73, 90, 92.					
DRAWN BY JMCY CHECKED BY JEP					
RECOMMENDED BY [illegible]	SAN DIEGO COUNTY SURVEYOR-ROAD DEPARTMENT	REVISION	BY	APPROVED	DATE
APPROVED BY COUNTY SURVEYOR	STANDARD DRAWING	SCALE: NONE			
[illegible] R.C.E. 6091	HILLSIDE RESIDENTIAL STREET	DRAWING NUMBER	311-1		
DATE: 12/30/64	ALTERNATE No. 1				



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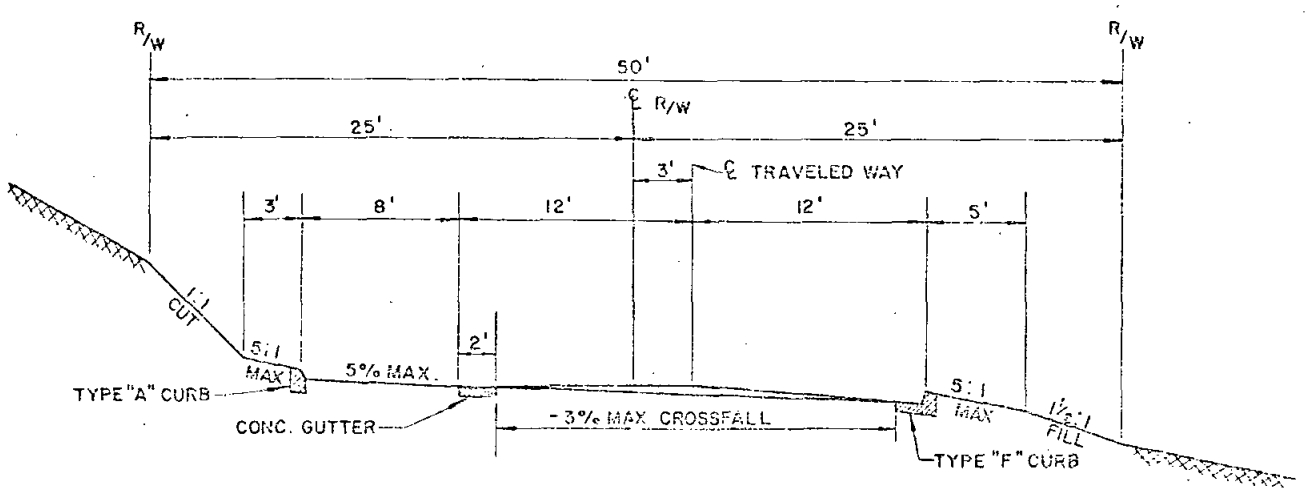
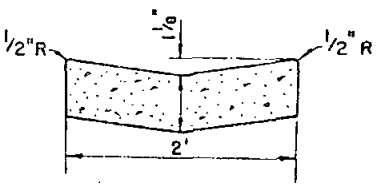


TYPICAL ROADWAY SECTION

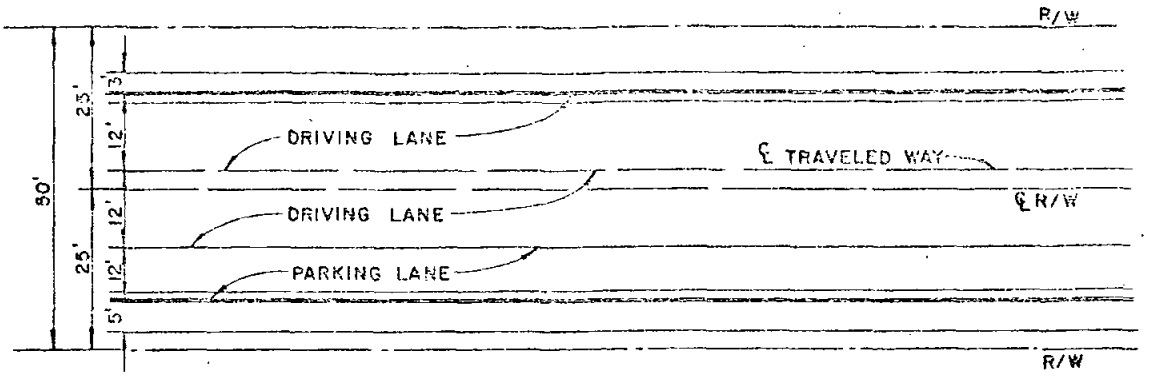


CONCRETE GUTTER DETAIL

NOTES:

1. SEE SAN DIEGO COUNTY STANDARD DRAWINGS AND SAN DIEGO COUNTY TECHNICAL ROAD POLICY FOR CURB, SIDEWALK & ROADWAY REQUIREMENTS.
2. NATURAL SLOPE EXCEEDS 20% AS DEFINED IN SAN DIEGO COUNTY TECHNICAL ROAD POLICY SECT. 4.22
3. USE OF THIS STREET SECTION LIMITED TO AREAS IN WHICH AT LEAST 80% OF THE LOTS HAVE A NET AREA OF NOT LESS THAN 20,000 SQUARE FEET.
4. USE OF HILLSIDE RESIDENTIAL STREE STANDARDS ARE APPLICABLE ONLY TO STREETS CLASSIFIED AS, RESIDENTIAL, RESIDENTIAL CUL-DE-SAC, OR RESIDENTIAL LOOP STREETS AND ARE NOT APPLICABLE TO STREETS IN AREAS ZONED FOR COMMERCIAL, INDUSTRIAL OR MULTIPLE RESIDENTIAL USE.

STD. SPEC. SEC. 73, 90, 92					
DRAWN BY JMCY CHECKED BY JEP					
RECOMMENDED BY	SAN DIEGO COUNTY SURVEYOR-ROAD DEPARTMENT	REVISION	BY	APPROVED	DATE
APPROVED BY COUNTY SURVEYOR	STANDARD DRAWING	SCALE: NONE			
R.C.E. 8091	HILLSIDE RESIDENTIAL STREET	DRAWING NUMBER	312-1		
DATE:	ALTERNATE No. 2				



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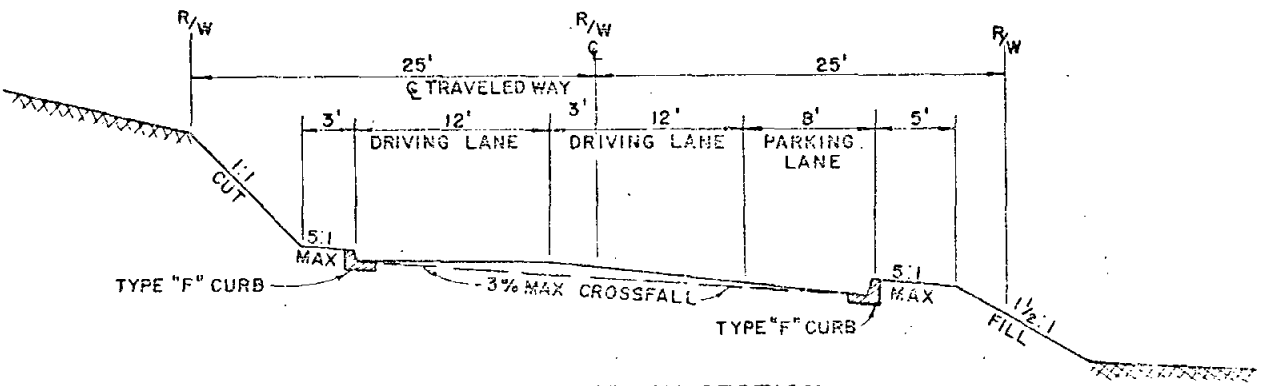
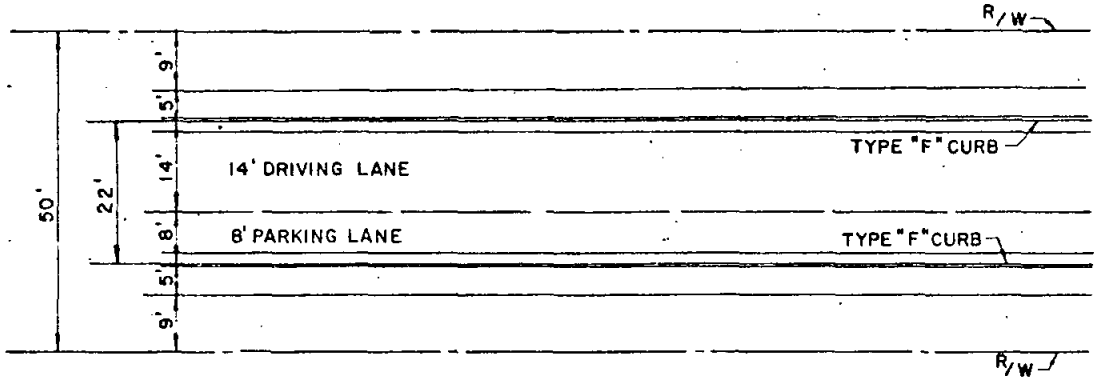


TYPICAL ROADWAY SECTION

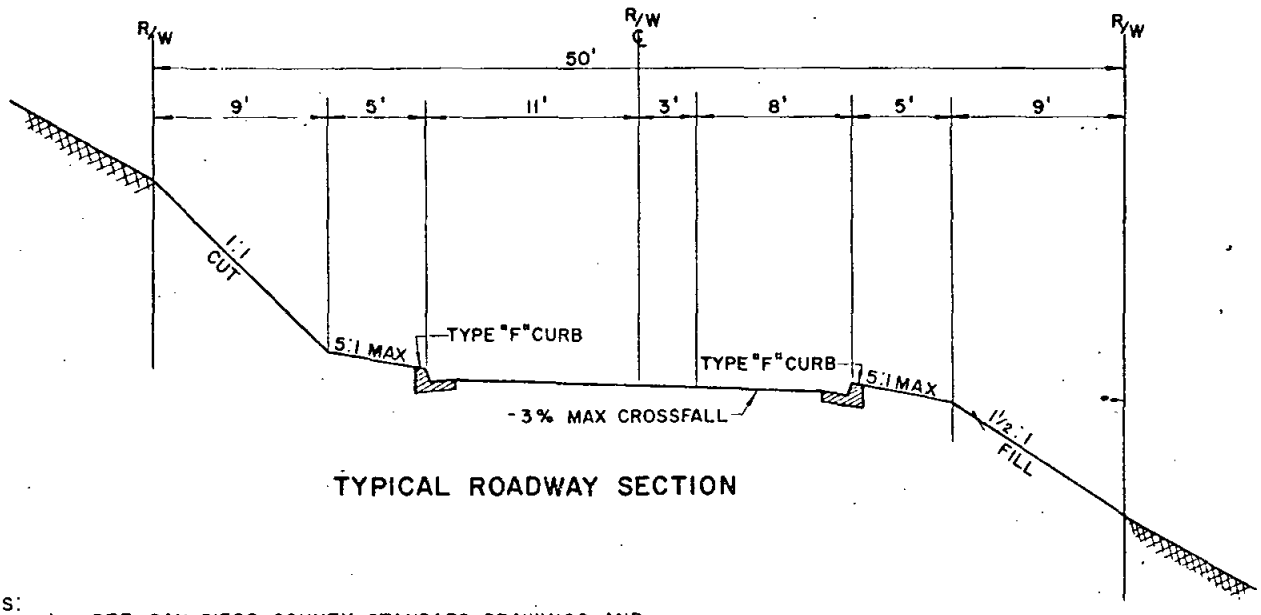
NOTES:

1. SEE SAN DIEGO COUNTY STANDARD DRAWINGS AND SAN DIEGO COUNTY TECHNICAL ROAD POLICY FOR CURB, SIDEWALK & ROAD REQUIREMENTS.
2. NATURAL SLOPE EXCEEDS 20% AS DEFINED IN SAN DIEGO COUNTY TECHNICAL ROAD POLICY SECT. 4.22
3. USE OF THIS STREET SECTION LIMITED TO AREAS IN WHICH AT LEAST 80% OF THE LOTS HAVE A NET AREA OF NOT LESS THAN 20,000 SQUARE FEET.
4. USE OF HILLSIDE RESIDENTIAL STREET STANDARDS ARE APPLICABLE ONLY TO STREETS CLASSIFIED AS RESIDENTIAL, RESIDENTIAL CUL-DE-SAC, OR RESIDENTIAL LOOP STREETS AND ARE NOT APPLICABLE TO STREETS IN AREAS ZONED FOR COMMERCIAL, INDUSTRIAL OR MULTIPLE RESIDENTIAL USE.

STD. SPEC. SEC. 73, 90, 92					
DRAWN BY JM'CY CHECKED BY JSP					
RECOMMENDED BY [signature]	SAN DIEGO COUNTY SURVEYOR - ROAD DEPARTMENT	REVISION	BY	APPROVED	DATE
APPROVED BY COUNTY SURVEYOR	STANDARD DRAWING	SCALE: NONE			
[signature] R.C.E. [illegible]	HILLSIDE RESIDENTIAL STREET	DRAWING NUMBER	313-1		
DATE: 12/30/64	ALTERNATE No. 3				



PLAN



TYPICAL ROADWAY SECTION

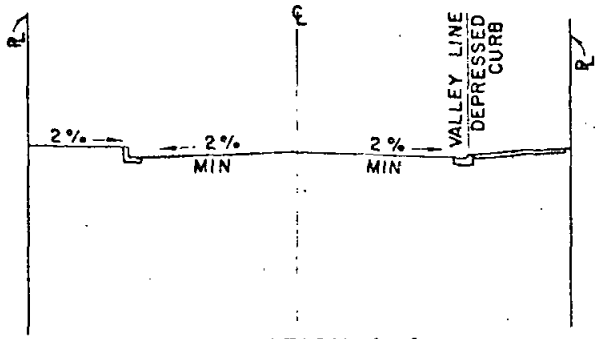
NOTES:

1. SEE SAN DIEGO COUNTY STANDARD DRAWINGS AND SAN DIEGO COUNTY TECHNICAL ROAD POLICY FOR CURB, SIDEWALK & ROADWAY REQUIREMENTS.
2. NATURAL SLOPE EXCEEDS 20% AS DEFINED IN SAN DIEGO COUNTY TECHNICAL ROAD POLICY SECT. 4.22
3. MAXIMUM LENGTH BETWEEN CONNECTIONS TO CROSSING TWO-WAY STREETS SHALL BE 1200 FT.
4. USE OF THIS STREET SECTION LIMITED TO:

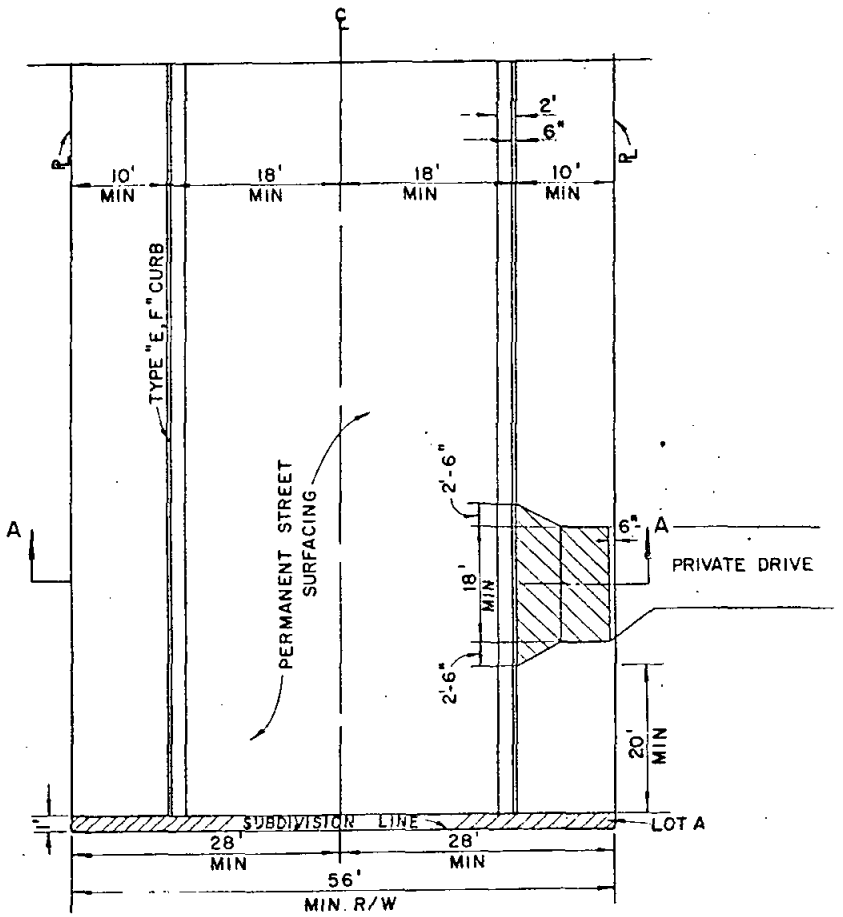
   A. AREAS IN WHICH AT LEAST 80% OF THE LOTS HAVE A NET AREA OF NOT LESS THAN 20,000 SQUARE FEET.

   B. STREET PATTERN ALLOWS RETURN TO POINT OF ORIGIN IN ONE MILE OR LESS.
5. USE OF HILLSIDE RESIDENTIAL STREET STANDARDS ARE APPLICABLE ONLY TO STREETS CLASSIFIED AS RESIDENTIAL, RESIDENTIAL CUL-DE-SAC, OR RESIDENTIAL LOOP STREETS, AND ARE NOT APPLICABLE TO STREETS IN AREAS ZONED FOR COMMERCIAL, INDUSTRIAL OR MULTIPLE RESIDENTIAL USE.

STD. SPEC. SEC. 73, 90, 92					
DRAWN BY JN'CY / CHECKED BY JEP					
RECOMMENDED BY [signature]	SAN DIEGO COUNTY SURVEYOR-ROAD DEPARTMENT	REVISION	BY	APPROVED	DATE
APPROVED BY COUNTY SURVEYOR	STANDARD DRAWING	SCALE: NONE			
D. K. Spear R.C.E. 8091	HILLSIDE RESIDENTIAL ONE-WAY STREET	DRAWING NUMBER	314-1		
DATE: 12/30/64	ALTERNATE No 4				



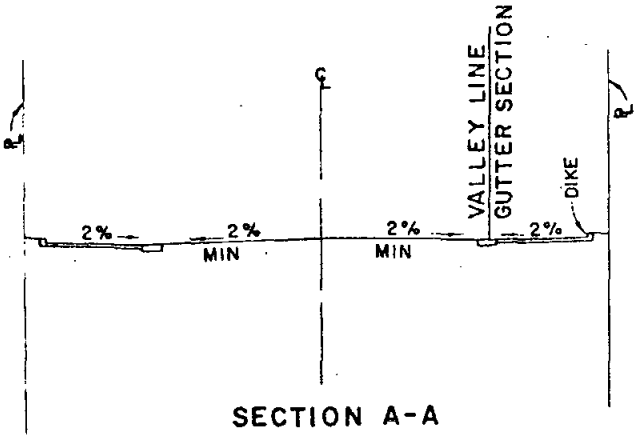
SECTION A-A



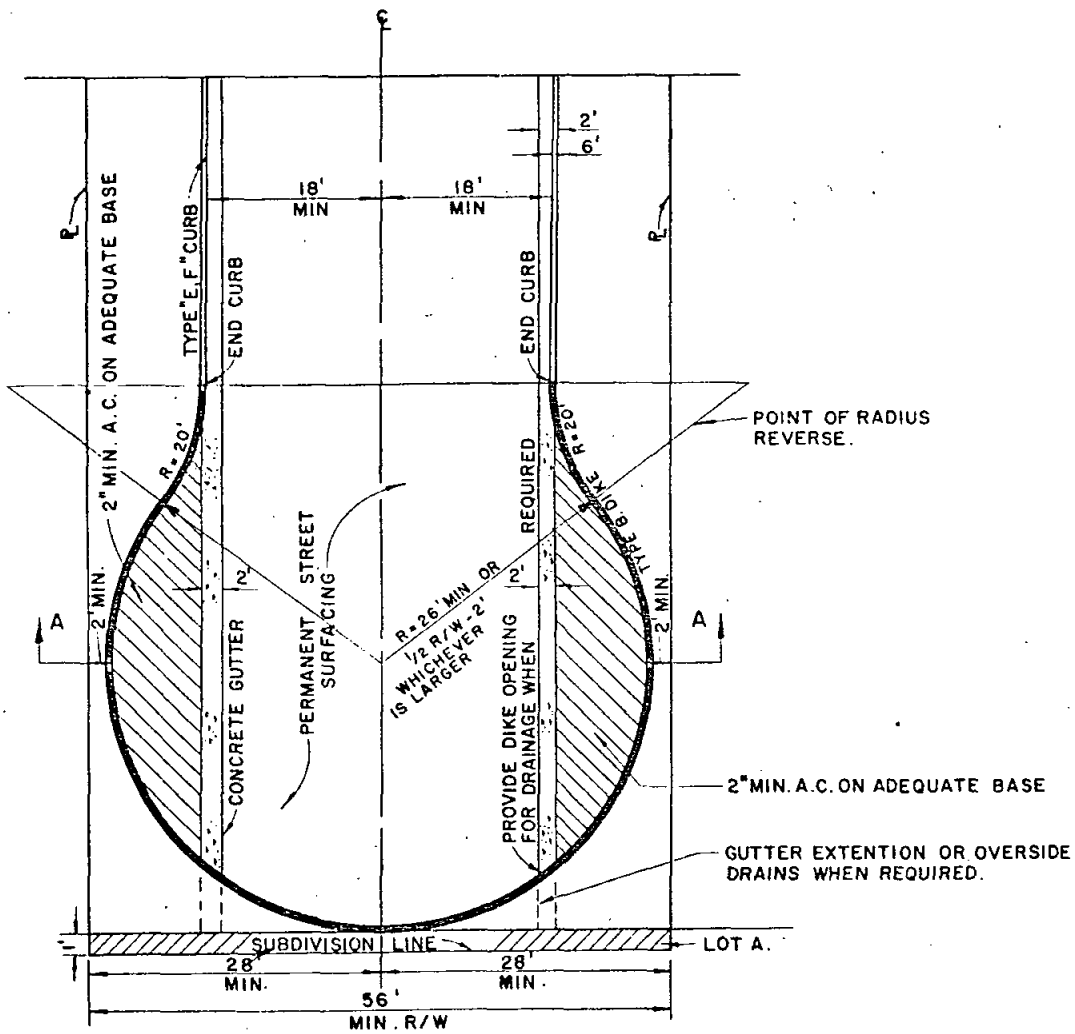
NOTE:

1. TEMPORARY HAMMERHEAD TURN-AROUND TO BE CONSTRUCTED IN COMPLIANCE WITH REQUIREMENTS FOR CONCRETE RESIDENTIAL DRIVEWAYS, CURRENT SAN DIEGO COUNTY STANDARD DRAWINGS. LOCATION TO BE GOVERNED BY DRIVEWAY LOCATION REQUIREMENTS CURRENT SAN DIEGO COUNTY STANDARD DRAWINGS AND THIS STANDARD DRAWING.
2. FOR USE ON EITHER 36' OR 40' WIDTH STREETS.

STD. SPEC. SEC.					
DRAWN BY JM'CY CHECKED BY LEP					
RECOMMENDED BY R. Mussman	SAN DIEGO COUNTY SURVEYOR-ROAD DEPARTMENT	REVISION	BY	APPROVED	DATE
APPROVED BY COUNTY SURVEYOR	STANDARD DRAWING	SCALE: NONE			
D. K. Sefton R.C.E. 8091	TEMPORARY HAMMERHEAD TURN-AROUND AT DEAD-END STREET	DRAWING NUMBER 315-1			
DATE: 12/30/64					



SECTION A-A



NOTE:

1. FOR USE ON EITHER 36' OR 40' WIDTH STREETS.

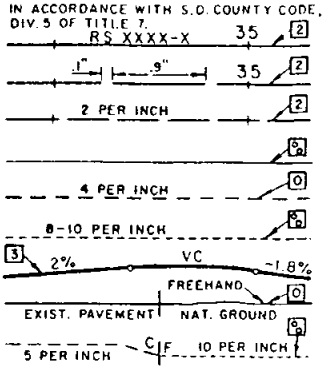
STD. SPEC. SEC.					
DRAWN BY JM'GT CHECKED BY JEP					
RECOMMENDED BY G. Mussman	SAN DIEGO COUNTY SURVEYOR-ROAD DEPARTMENT STANDARD DRAWING	REVISION	BY	APPROVED	DATE
APPROVED BY COUNTY SURVEYOR		SCALE: NONE			
D. K. Spear R.C.E. 8091	TEMPORARY TURN-AROUND AT DEAD-END STREET.	DRAWING NUMBER 316-1			
DATE 12/30/64					

PROPOSED CONSTRUCTION

LINES

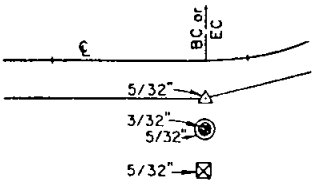
* INDICATES CENTER LINE ESTABLISHED IN ACCORDANCE WITH S.D. COUNTY CODE, DIV. 5 OF TITLE 7.

ULTIMATE CENTERLINE (℄)*
STAGE CONSTRUCTION LINE
INTERSECTING ROADS & STREETS
RIGHT OF WAY LINE
EQUATION OR RADIUS LINE
OFFSET TIE
GRADE LINES ON PROFILES
GROUND LINES ON PROFILES
SLOPE LIMIT LINES



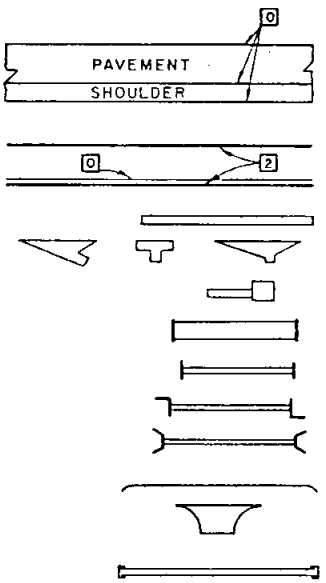
POINTS

BC & EC
PI OR ANGLE PT.
℄ MONUMENT
BENCH MARK

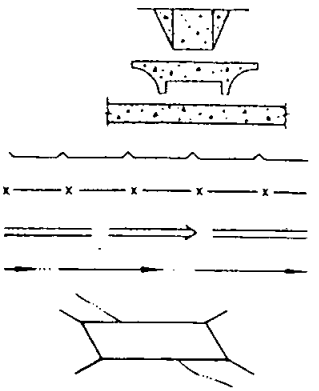


CONSTRUCTION

PAVEMENT EDGE & SHOULDERS
A C DIKE (LABEL TYPE)
CURB & GUTTER (LABEL TYPE)
CULVERT
DOWNDRAIN, A C SPILLWAY
DROP INLET
BOX CULVERT
HEADWALL, STANDARD
HEADWALL "L" TYPE
HEADWALL & WINGWALL
GUARD RAIL
DRIVEWAY APRONS A C
UTILITY DUCT (LABEL)



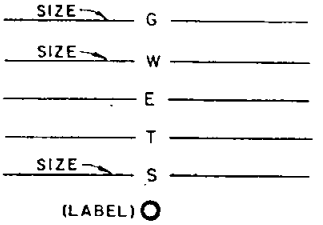
DRIVEWAY APRONS P C C
CONCRETE CROSS GUTTER
SIDEWALK
RETAINING WALL
FENCE (LABEL TYPE)
DITCH, LINED
DITCH, UNLINED
BRIDGE



UTILITIES

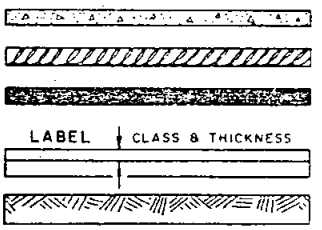
GAS LINE
WATER LINE
ELECTRIC CABLE
TELEPHONE CABLE
SEWER LINE
UTILITY MANHOLE

UNDERGROUND ONLY



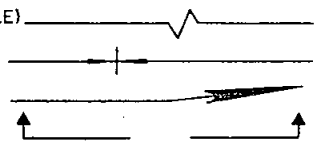
STRUCTURAL SYMBOLS

PORTLAND CEMENT CONCRETE
ASPHALT CONCRETE (EXISTING)
ROAD OIL MIX OR ASPHALT CONCRETE SURFACING
BASE MATERIAL
ORIGINAL GROUND



MISCELLANEOUS SYMBOLS

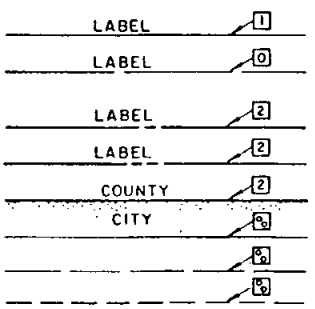
CONTRACTED LINE (NOT TO SCALE)
LIMIT ARROWS
PROJECT, WORK LIMIT
CUTTING PLANE

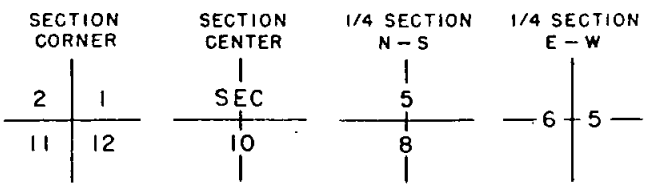


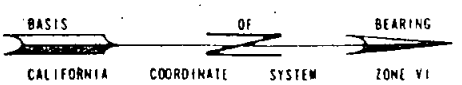
CADASTRAL SYMBOLS

LAND LINES

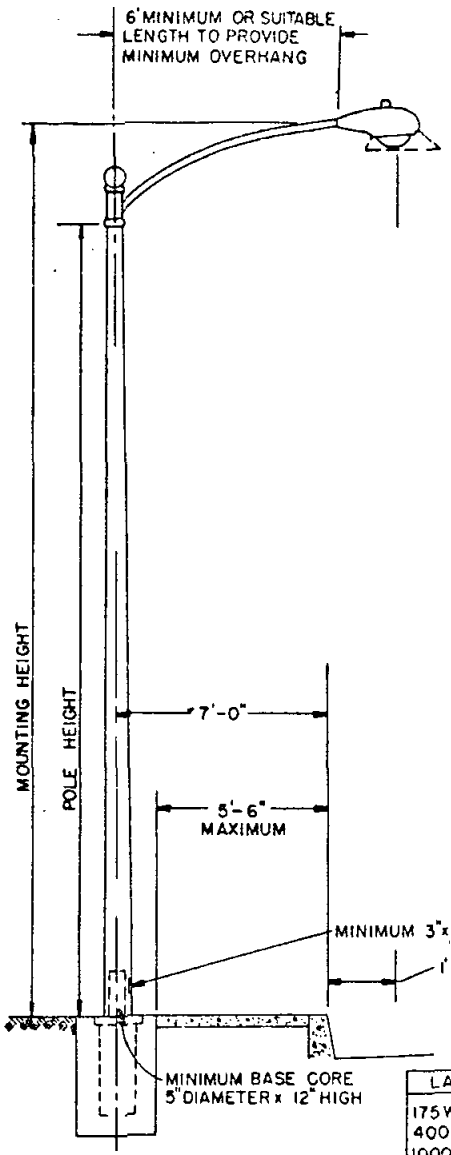
TOWNSHIP LINES
SECTION LINES
GRANT LINE (RHO BOUNDARY OR INDIAN RESERVATION)
SUBDIVISION BOUNDARY LINE
CITY / COUNTY BOUNDARY LINE
PROPERTY LINE
LOT LINE
EASEMENT LINE





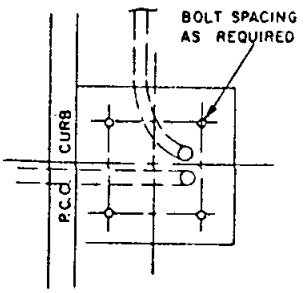


STD. SPEC. SEC: NONE	SAN DIEGO COUNTY ENGINEER DEPARTMENT STANDARD DRAWING				
DRAWN BY CL / CHECKED BY BER					
RECOMMENDED BY	CONSTRUCTION PLAN SYMBOLS	REVISION	BY	APPROVED	DATE
APPROVED BY COUNTY ENGINEER		SCALE: NONE			
H. M. Taylor R.C.E. 11458		DRAWING NUMBER 318			
DATE: 2-18-70					

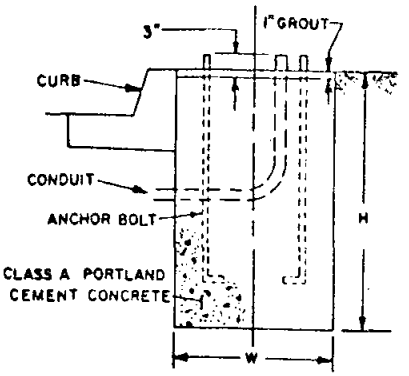


INSTALLATION BEHIND CONTIGUOUS SIDEWALK

FOUNDATION



PLAN



ELEVATION

FOUNDATION DATA

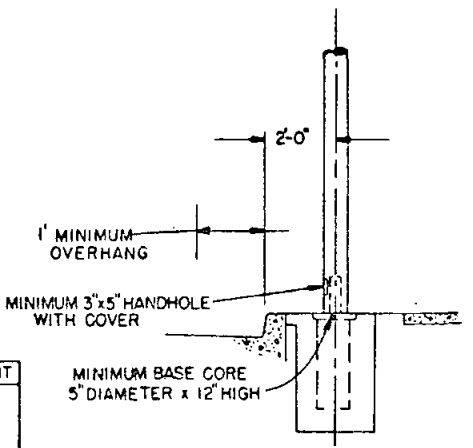
POLE HEIGHT	DIMENSION H	DIMENSION W	ANCHOR BOLTS (1) NO.-DIA. x LGTH x HOOK
THRU 25' (2)	4'-0"	2'-6" SQUARE	4- 1" x 36" x 4"
26' THRU 30' (3)	4'-0"	3'-0" SQUARE	4- 1" x 36" x 4"
UP TO 35' (3)	5'-0"	3'-0" SQUARE	4- 1" x 36" x 4"

NOTES: (1) ANCHOR BOLTS & NUTS SHALL BE GALVANIZED
(2) LUMINAIRE 6' MAX. CANTILEVER.
(3) LUMINAIRE 12' MAX. CANTILEVER.

TABLE OF MOUNTING HEIGHT

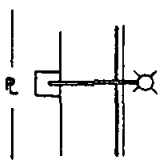
LAMP SIZE *	POLE HEIGHT	MOUNTING HEIGHT
175 WATT (7000 Lumen)	25' ± 2'	27' ± 1'
400 WATT (20,000 ")	28' ± 2'	31' ± 1'
1000 WATT (55,000 ")	35' ± 2'	38' ± 1'

*ALL LAMPS SHALL BE IMPROVED-COLOR PHOSPHOR-COATED MERCURY VAPOR TYPES.

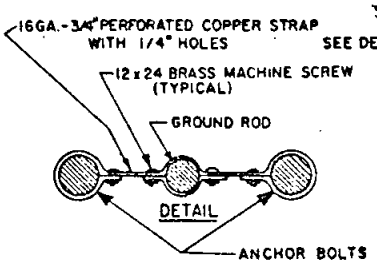


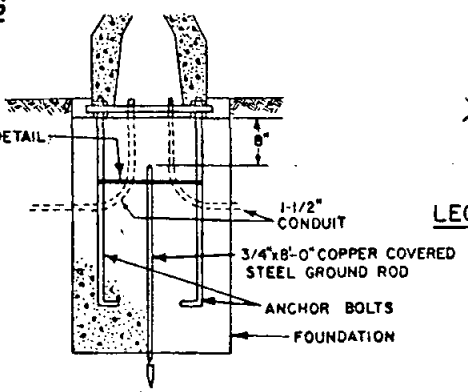
INSTALLATION BEHIND CURB

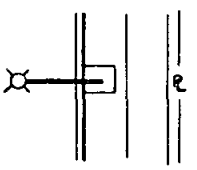
GROUNDING



LEGEND ON PLANS







LEGEND ON PLANS

STD. SPEC. SEC:	SAN DIEGO COUNTY ENGINEER DEPARTMENT STANDARD DRAWING		
DRAWN BY [illegible] CHECKED BY [illegible]		REVISION	BY	APPROVED	DATE
RECOMMENDED BY [illegible]	ORNAMENTAL STREET LIGHTS	SCALE: NONE			
APPROVED BY COUNTY ENGINEER		DRAWING NUMBER	410-T PAGE 1		
H.M. Taylor R.C.E. 11458					
DATE: 12-21-71					

NOTES

LAMPS

175 WATT (7000 LUMEN) PHOSPHOR-COATED MERCURY VAPOR ANSI LAMP DESIGNATION H39-22KC/DX

or

400 WATT (20,000 LUMEN) PHOSPHOR-COATED MERCURY VAPOR ANSI LAMP DESIGNATION H33-1GL/DX

or

1000 WATT (55,000 LUMEN) PHOSPHOR-COATED MERCURY VAPOR ANSI LAMP DESIGNATION H36-15GW/DX AS SPECIFIED.

LUMINAIRES

HORIZONTAL BURNING TYPE WITH INTEGRAL CONSTANT WATTAGE BALLAST, PHOTOELECTRIC CONTROL, AND GLASS REFRACTOR.

ANSI SHORT DISTRIBUTION, SEMI-CUTOFF CLASSIFICATION, TYPE II DISTRIBUTION FOR 7000 LUMEN UNITS.

ANSI SHORT DISTRIBUTION, SEMI-CUTOFF CLASSIFICATION, TYPE III DISTRIBUTION FOR OTHER SIZES.

MAST ARMS

TWO-INCH DIAMETER, STANDARD GALVANIZED STEEL OR ALUMINUM, SELF-SUPPORTING, WITHOUT BRACES, SCROLLS, OR RODS.

DAVIT-STYLE UNITS ARE NOT PERMITTED.

ARMS PERPENDICULAR TO STREET CENTERLINE UNLESS INDICATED OTHERWISE ON THE PLANS.

POLE TOPS

GALVANIZED STEEL OR CAST ALUMINUM ALLOY, SECURED BY A MINIMUM OF TWO SCREWS.

MISCELLANEOUS HARDWARE

CADMIUM-COATED, HOT DIPPED GALVANIZED, OR STAINLESS STEEL.

POLES

ROUND PRESTRESSED CONCRETE WITH EXPOSED BLACK AND WHITE MARBLE AGGREGATE FINISH.

HANDHOLE TO FACE STREET.

WIRING

MINIMUM NO. 10 GA. TW STRANDED COPPER TO BALLAST.

NEUTRAL LEG OF LIGHTING CONDUCTORS GROUNDED TO BASE OF STANDARD.

HOT LEG OF LIGHTING CONDUCTORS FUSED WITH 10 AMP. SLO-BLO MIDGET FERRULE-TYPE FUSE (BUSS FMN 10 OR EQUIVALENT) IN PLUG CONNECTOR (FUSETRON HEB OR EQUIVALENT) IN BASE OF STANDARD.

SPLICES

PERMITTED IN PULL BOXES AND LIGHTING STANDARD BASES ONLY.

SHALL BE MADE USING AN APPROVED CONNECTOR SIMILAR TO SCOTCHLOCK OR CRIMP-TYPE COMPRESSION TAP SIMILAR TO TXB CAT. NO. 54710, INSERTING THE CONNECTION IN AN EPOXY RESIN MIXTURE MIXED IN A PLASTIC CONTAINER, ALL SUPPLIED AS A KIT. KIT SHALL BE SIMILAR AND EQUAL TO 3M 60. SCOTCHLOCK NO. 3578 CONNECTOR SEALING PACK.

CONDUIT & CONDUCTORS

ALL ABS PLASTIC CONDUIT SHALL BE 1-1/2" HEAVY WALL, EQUAL TO BALDWIN EXTRUDED PRODUCTS, INC., BALDWIN ABSOLUTE ABS ELECTRICAL CONDUIT, AND SHALL CONFORM TO THE WESTERN UNDERGROUND COMMITTEE SPECIFICATION NO. 3.1

CABLE—IN—DUCT SHALL CONSIST OF 2 CONDUCTORS PREASSEMBLED WITHIN A PLIABLE 3/4" HIGH DENSITY POLYETHYLENE DUCT. MINIMUM CONDUCTORS SHALL BE A.W.G. SIZE NO. 10, 7-STRAND COPPER WITH U.S.E. INSULATION OR A.W.G. SIZE NO. 8, 7 STRAND ALUMINUM WITH U.S.E. INSULATION, WITH ONE BLACK AND ONE YELLOW LEAD UNLESS SHOWN OTHERWISE ON THE PLANS.

STD. SPEC. SEC:	SAN DIEGO COUNTY ENGINEER DEPARTMENT STANDARD DRAWING				
DRAWN BY EMM CHECKED BY					
RECOMMENDED BY	ORNAMENTAL STREET LIGHTS	REVISION	BY	APPROVED	DATE
APPROVED BY COUNTY ENGINEER		SCALE: NONE			
H.M. Taylor R.C.E. 11458		DRAWING NUMBER 410-T PAGE 2			
DATE: 12-21-79					

CONDUIT AND CONDUCTORS

POLYETHYLENE DUCT SHALL BE HIGH DENSITY, TYPE III POLYETHYLENE RESISTANT TO ABRASION MOISTURE, ALKALIS, SALTS, DETERGENTS, AND OTHER CHEMICALS. DUCT SHALL NOT ROT, RUST OR CORRODE AND SHALL BE IMPERVIOUS TO ELECTROLYTIC ENVIRONMENT.

CABLE-IN-DUCT SHALL BE LIGHT, EASY TO HANDLE, FLEXIBLE AND SHALL BE SUITABLE FOR INSTALLATION DIRECTLY IN THE GROUND WITHOUT ADDITIONAL PROTECTIVE COATINGS OR WRAPS BEING REQUIRED.

SERVICE LINES SHALL BE LOCATED UNDER SIDEWALKS WHEREVER PRACTICAL.

SERVICE ENTRANCE

CONDUIT SHALL BE 1-1/2" HEAVY WALL ABS PLASTIC.

FOR CABLE-IN-DUCT SERVICE, THE CABLE-IN-DUCT SHALL BE INSTALLED IN THE SERVICE ENTRANCE CONDUIT TO PROVIDE COMPLETE CABLE-IN-DUCT SERVICE TO THE HANDHOLE.

FOUNDATION

SEE DET. L DRAWING.

GROUNDING

SEE DETAIL DRAWING

MISCELLANEOUS REQUIREMENTS

PRIOR TO INSTALLATION OF ANY PART OF THE STREET LIGHTING SYSTEM, THE CONTRACTOR SHALL FURNISH THE COUNTY ENGINEER, FOR APPROVAL, A COMPLETE CATALOG LISTING OF ALL PROPOSED EQUIPMENT.

UPON COMPLETION OF THE STREET LIGHTING SYSTEM INSTALLATION, THE CONTRACTOR SHALL FURNISH, AT HIS OWN EXPENSE, THE NECESSARY PERSONNEL AND EQUIPMENT TO DEMONSTRATE SATISFACTORY OPERATION OF THE LIGHTING SYSTEM TO THE ENGINEER.

STD. SPEC. SEC:	SAN DIEGO COUNTY ENGINEER DEPARTMENT STANDARD DRAWING				
DRAWN BY: Emm CHECKED BY: AP					
RECOMMENDED BY: [illegible]	ORNAMENTAL STREET LIGHTS	REVISION	BY	APPROVED	DATE
APPROVED BY COUNTY ENGINEER		SCALE: NONE			
H.M. Taylor R.C.E. 11458		DRAWING NUMBER 410-T PAGE 3			
DATE: 12-21-73					

COUNTY OF SAN DIEGO

COUNTY ENGINEER & ROAD DEPARTMENT

CONFERENCE NOTES

Date April 17, 1974 Time started 2:00 P.M. Time completed 3:00 P.M.
Requested by: John R. Cousino
Location: Conference Room, Building 5, County Operations Center

Subject: To discuss suitable alternate materials and clarifications of present County Standards for ornamental street lights.

Conferees:

Name	Title	Organization
John R. Cousino	Associate C.E.	County Engineer Dept.
Donald L. Weiss	Associate C.E.	County Engineer Dept.
Gil Scott	Traffic Signal Tech. III	Dept. of Gen'l. Services
Irvin J. Klein	Assistant C.E.	County Engineer Dept.
R. A. McBride	Southern Contracting Co., Inc.	

The meeting was held to discuss suitable alternate materials and clarifications of present County Standards for ornamental street lights. The following items were agreed on to submit for acceptance as standards.

1. Conduit - Three alternates are recommended:

   a. Rigid Metal Pipe - 1" minimum diameter.
   b. PVC Pipe - 1" minimum diameter - Schedule 40 (Type II).
   c. ABS Pipe - 1 1/2" minimum diameter - heavy wall (strength comparable to Schedule 40 PVC).

2. Wiring -

   a. Use Minimum No. 10 G T.W. standard copper, one black and one white to be used as the neutral leg.
   b. It was generally agreed that aluminum wire was not desirable for use. If it can be determined that copper wire is in short supply, Minimum No. 8, 7 strand aluminum wire should be considered as acceptable.

3. It was generally agreed that 1/2" cable-in-duct was not acceptable for use.

Form ER 500 (6/66-OSI)

4. If 3/4" cable-in-duct meets all the requirements described on dwg. 410.T it can be used. If the yellow wire is not available, white marking tape can be used to designate the neutral leg.

5. Where possible - all references to brand name products should be eliminated. The possibility of referencing to the National Electric Code was discussed.

6. The use of pull boxes was discussed as a requirement. It was suggested that pull boxes should be required at a maximum of 350 foot intervals adjacent to the street light bases.

Actions Remaining

1. Mr. McBride will have a recommended standard prepared which will reflect the thinking of the National Electrical Contractors Association.

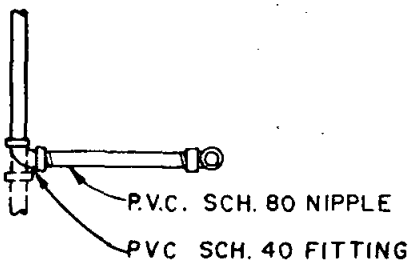
2. Mr. McBride will supply the County with a copy of the National Electrical Code to be studied for possible reference in our standards.

3. Mr. Klein will determine the proper designation for ABS conduit (equal strength of Schedule 40 PVC).

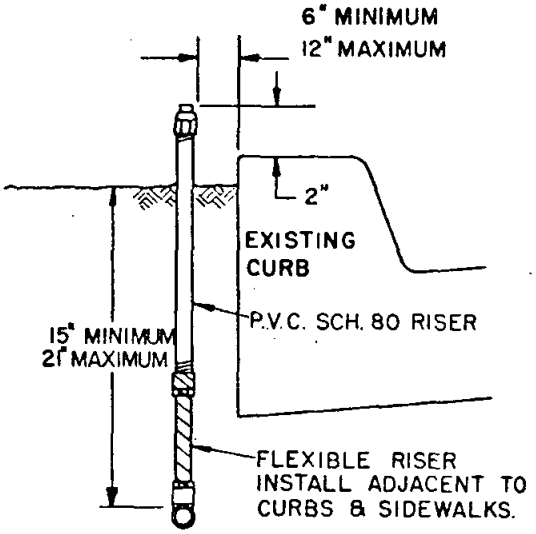
4. Mr. Klein will investigate what changes are necessary in our standard dwgs (including the requirement for pull boxes) and submit the recommended changes to the County Engineer for approval.

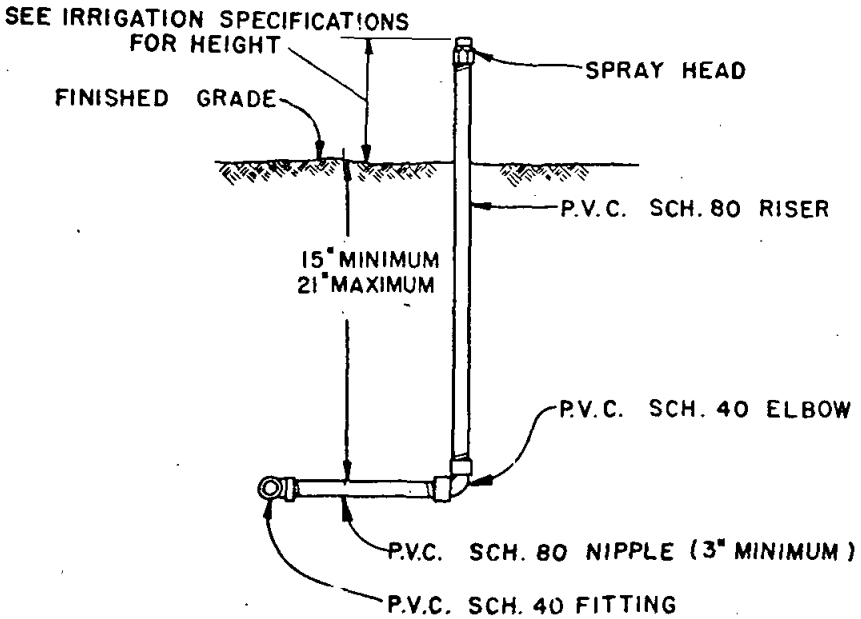
Notes prepared by J. R. Cousino

cc J. R. Cousino; D. L. Weiss; G. Scott; I. J. Klein; R. A. McBride



PLAN VIEW



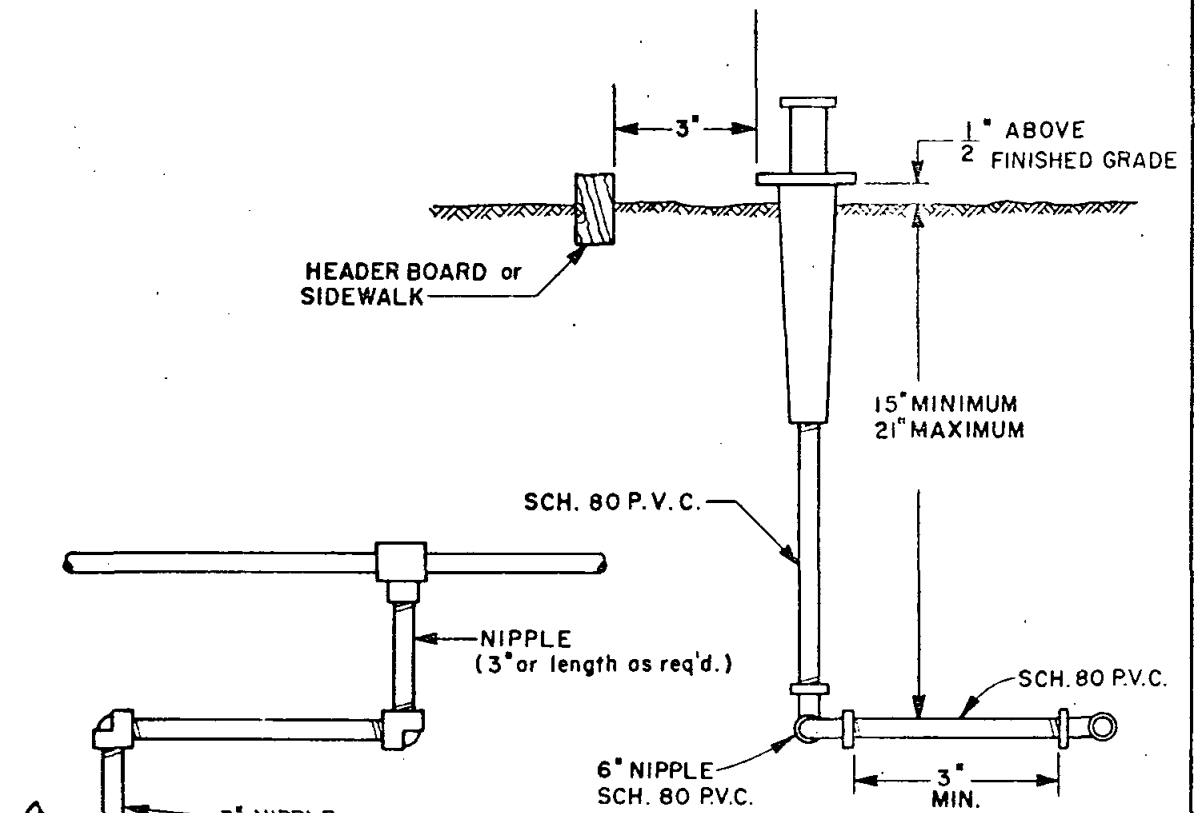


ELEVATION

SYMBOLS:

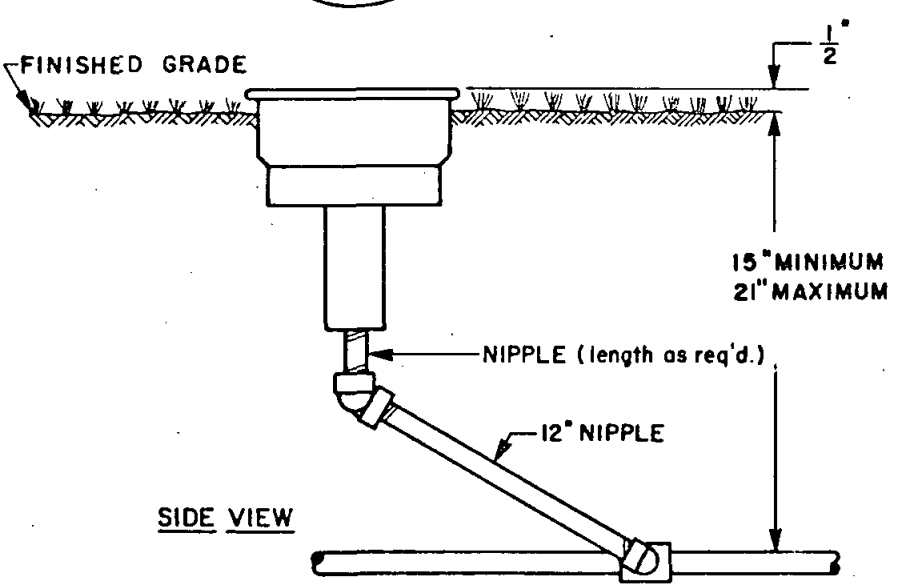
SHRUBBERY SPRAY
STREAM SPRAY
RECTANGULAR SPRAY

STD. SPEC. SEC.:	SAN DIEGO COUNTY ENGINEER DEPARTMENT STANDARD DRAWING	Added Flex. Riser			12/13/78
DRAWN BY J.M.M. CHECKED BY					
RECOMMENDED BY		REVISION	BY	APPROVED	DATE
APPROVED BY COUNTY ENGINEER	SHRUBBERY SPRINKLER HEADS FIXED SPRAY TYPE	SCALE: NONE			
R.C.E. 11458		DRAWING NUMBER	700-T-2		
DATE 7-25-72					



POP-UP LAWN SPRAY
mounted on swing-joint riser

TOP VIEW



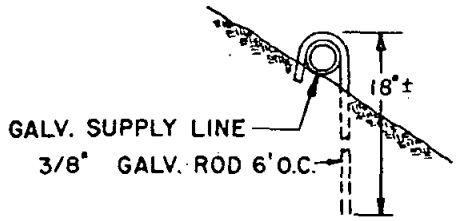
SIDE VIEW

NOTES:
1. ALL NIPPLES AND FITTINGS FOR ROTARY POP-UP SPRINKLER TO BE THREADED SCH. 80 P.V.C. PIPE.
2. ALL SPRAY HEADS SHALL CLEAR EDGE OF SIDEWALKS OR OTHER IMPROVEMENTS BY 3".

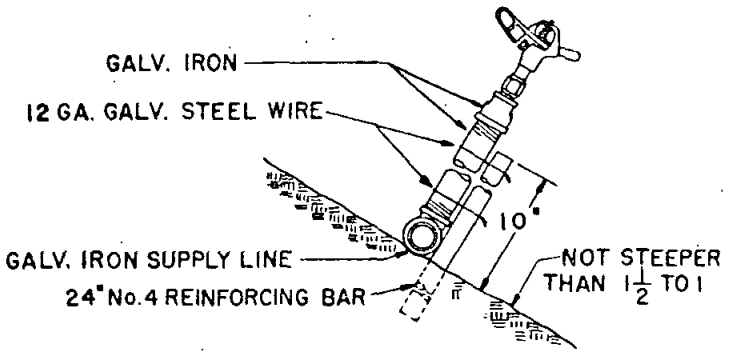
SYMBOL: ARY POP-UP
UP

ROTARY POP-UP SPRINKLER
mounted on swing-joint riser

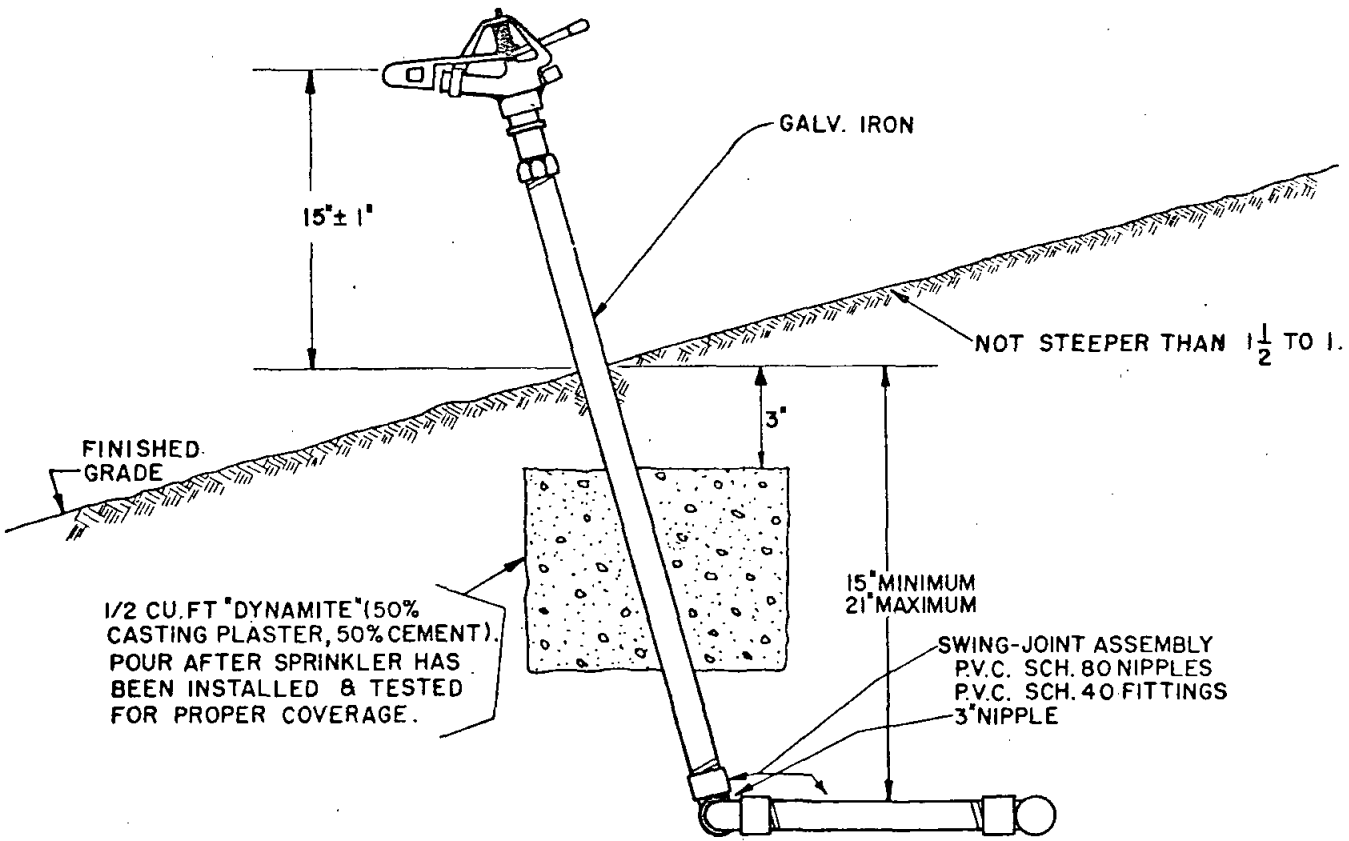
STD. SPEC. SEC.:	SAN DIEGO COUNTY ENGINEER DEPARTMENT STANDARD DRAWING	Changed Nipple Lengths			13/3/73
DRAWN BY EMM CHECKED BY					
RECOMMENDED BY W P Seeor		REVISION	BY	APPROVED	DATE
APPROVED BY COUNTY ENGINEER	LAWN SPRINKLER HEADS POP-UP ROTARY & POP-UP SPRAY TYPES	SCALE: NONE			
H. M. Taylor R.C.E. 11458		DRAWING NUMBER 701-T-1			
DATE: 2-25-72					



SPECIAL ABOVE-GROUND INSTALLATION
SUPPLY LINE ANCHOR DETAIL



SPECIAL ABOVE-GROUND INSTALLATION
SPRINKLER STAKING DETAIL

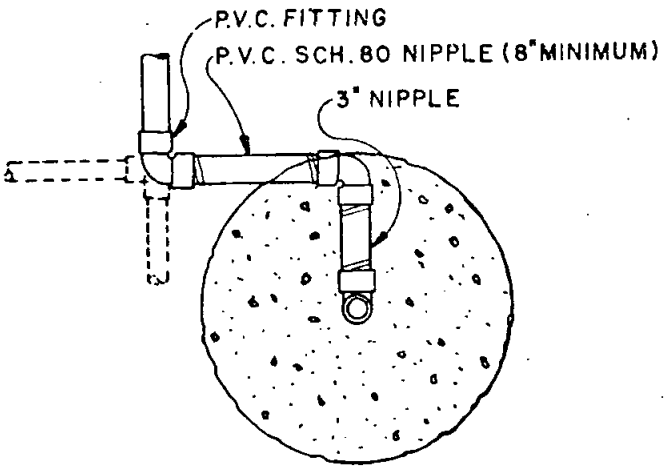


NORMAL INSTALLATION

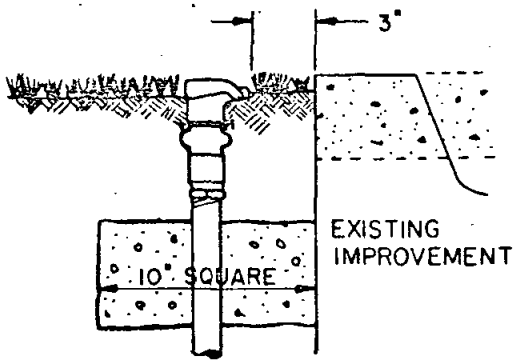
NOTE:
USE OF SPECIAL ABOVE-GROUND SPRINKLER INSTALLATION MUST HAVE THOROUGH JUSTIFICATION. INSTALLATION SHALL NOT COMMENCE UNTIL AUTHORIZED IN WRITING BY THE COUNTY ENGINEER

SYMBOLS:

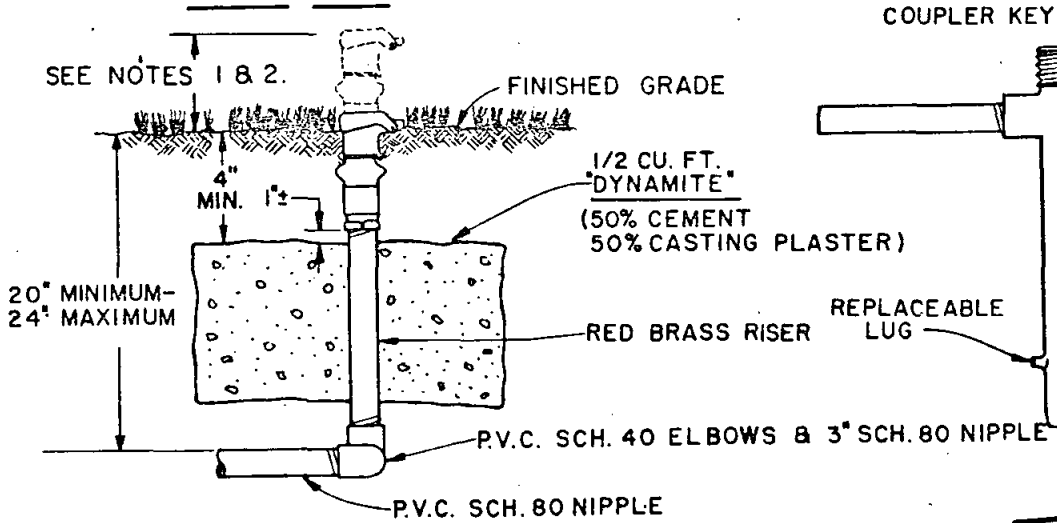
STD. SPEC. SEC:	SAN DIEGO COUNTY ENGINEER DEPARTMENT STANDARD DRAWING	Change iron nipple			12/3/73
DRAWN BY BMM CHECKED BY					
RECOMMENDED BY		REVISION	BY	APPROVED	DATE
APPROVED BY COUNTY ENGINEER	IMPACT SPRINKLER HEAD	SCALE: NONE			
R.C.E. 11458		DRAWING NUMBER 702-T-2			
DATE: 7-25-72					



PLAN VIEW

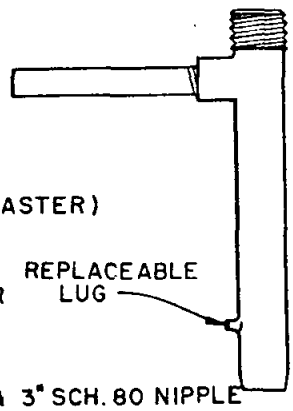


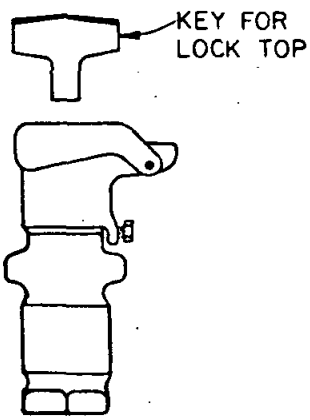
LOCATION OF QUICK COUPLING VALVES ADJACENT TO EXISTING IMPROVEMENTS.



ELEVATION

COUPLER KEY — SINGLE LUG





TWO PIECE LOCK TOP QUICK-COUPLING VALVE

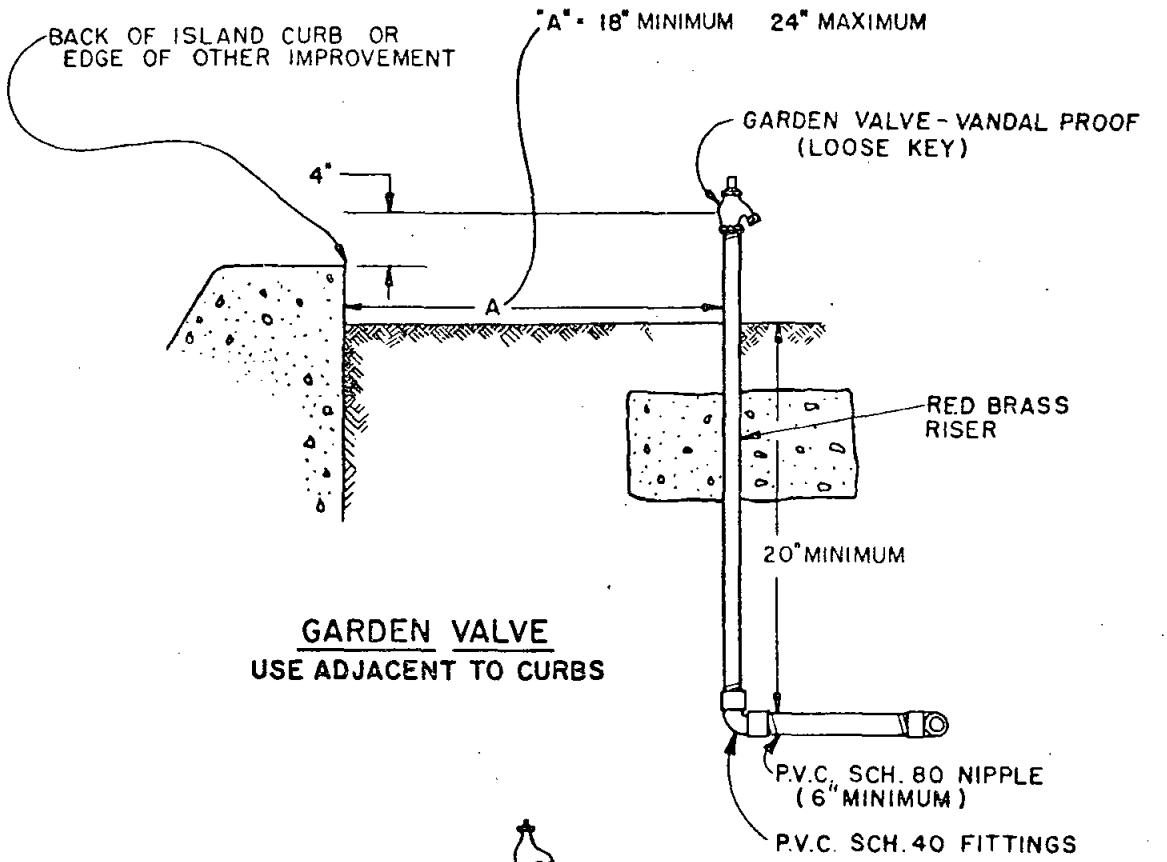
NOTES:

1. ALL QUICK COUPLING VALVES INSTALLED IN NEW LAWN AREAS SHALL BE INSTALLED ONE-HALF (1/2) INCH ABOVE THE PROPOSED FINISHED GRADE.

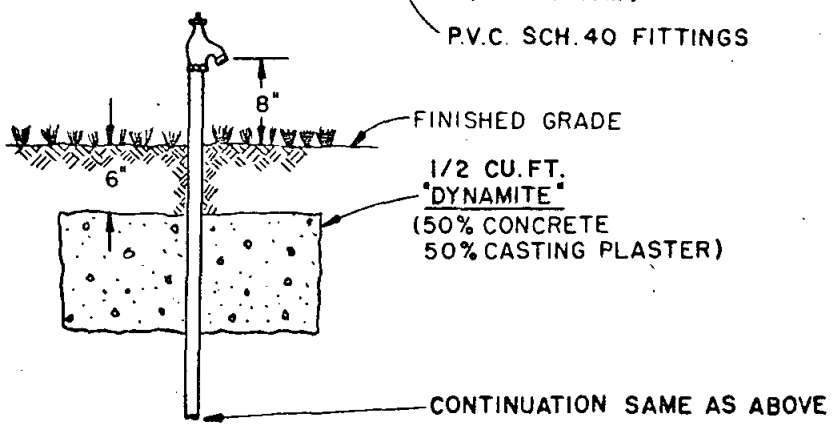
2. ALL QUICK COUPLING VALVES INSTALLED IN SHRUB BEDS SHALL BE INSTALLED FOUR (4) INCHES ABOVE FINISHED GRADE.

SYMBOL: ⊗ Q.C.V.

STD. SPEC. SEC:	SAN DIEGO COUNTY ENGINEER DEPARTMENT STANDARD DRAWING				
DRAWN BY F.M.M. CHECKED BY					
RECOMMENDED BY	QUICK COUPLING VALVES	REVISION	BY	APPROVED	DATE
APPROVED BY COUNTY ENGINEER		SCALE: NONE			
R.C.E. 11458		DRAWING NUMBER	703-T		
DATE: 7-25-72					



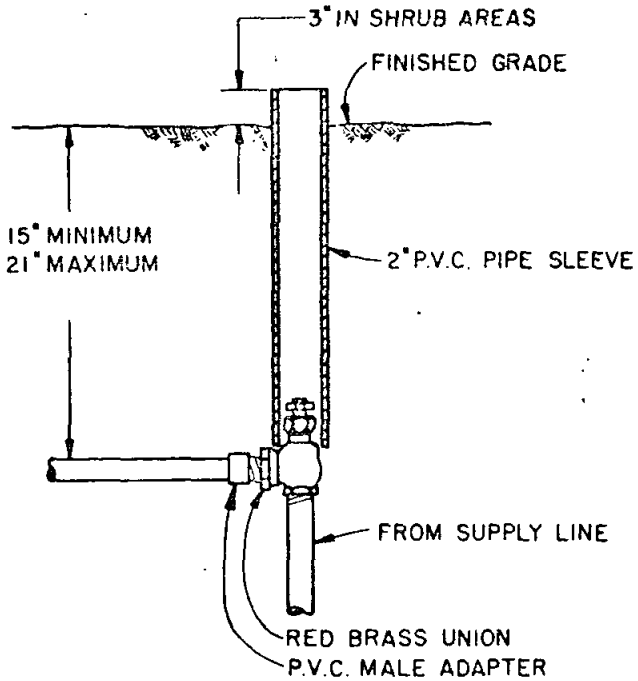
GARDEN VALVE
USE ADJACENT TO CURBS



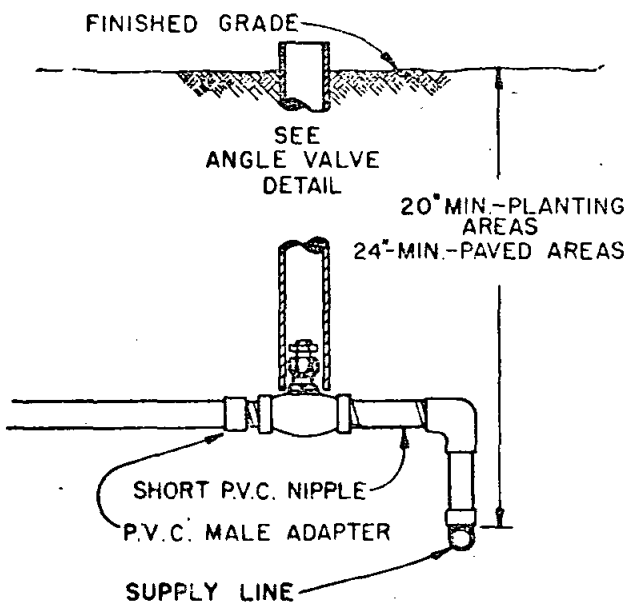
GARDEN VALVE
USE IN OPEN AREAS

SYMBOL: ♂

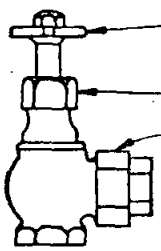
STD. SPEC. SEC:	SAN DIEGO COUNTY ENGINEER DEPARTMENT STANDARD DRAWING				
DRAWN BY: JMM CHECKED BY: AG					
RECOMMENDED BY: W.P. Deere	GARDEN VALVES	REVISION	BY	APPROVED	DATE
APPROVED BY COUNTY ENGINEER		SCALE: NONE			
H. M. Taylor R.C.E. 11450		DRAWING NUMBER	704-T		
DATE: 7-26-72					



ANGLE VALVE



GLOBE VALVE



ALL MANUAL VALVES SHALL BE FURNISHED WITH A STANDARD MANUAL CONTROL VALVE CROSS

REMOVABLE BONNET AND PACKING GLAND NUT.

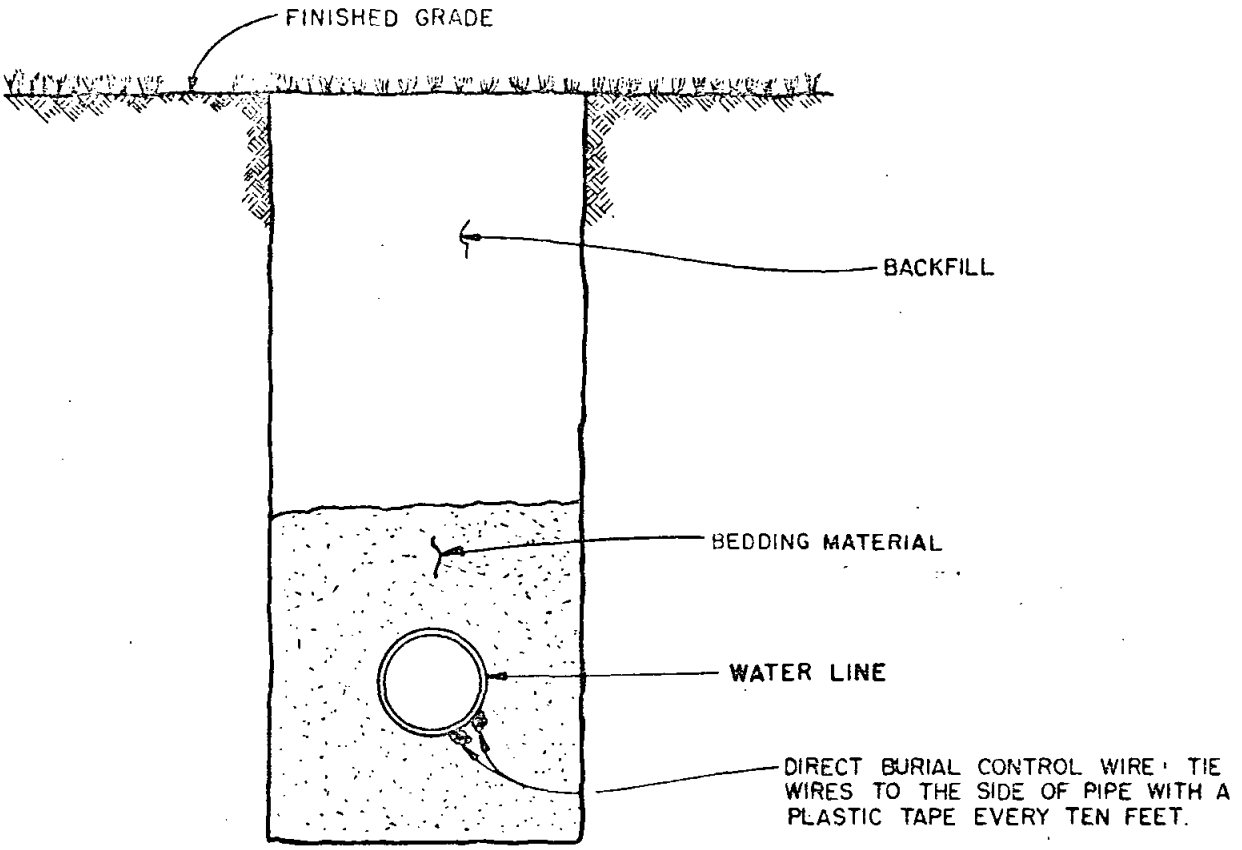
ALL MANUAL ANGLE VALVES SHALL BE INSTALLED WITH A UNION ON THE DOWNSTREAM SIDE OF THE VALVE. THE UNION MAY BE PART OF THE VALVE OR FURNISHED SEPARATELY-UNIONS SHALL BE GROUND JOINT, RED BRASS.

ORISEAL VALVES, MANUAL CONTROL VALVES, AND OTHER MANUAL VALVES SHALL BE INSTALLED ACCORDING TO THIS STANDARD WITH VALVE SIZES AS SHOWN ON THE PLANS.

UNLESS SHOWN OTHERWISE ON THE PLANS, ALL VALVES SHALL BE INSTALLED WITHIN TWELVE (12) INCHES OF THE WATER MAIN

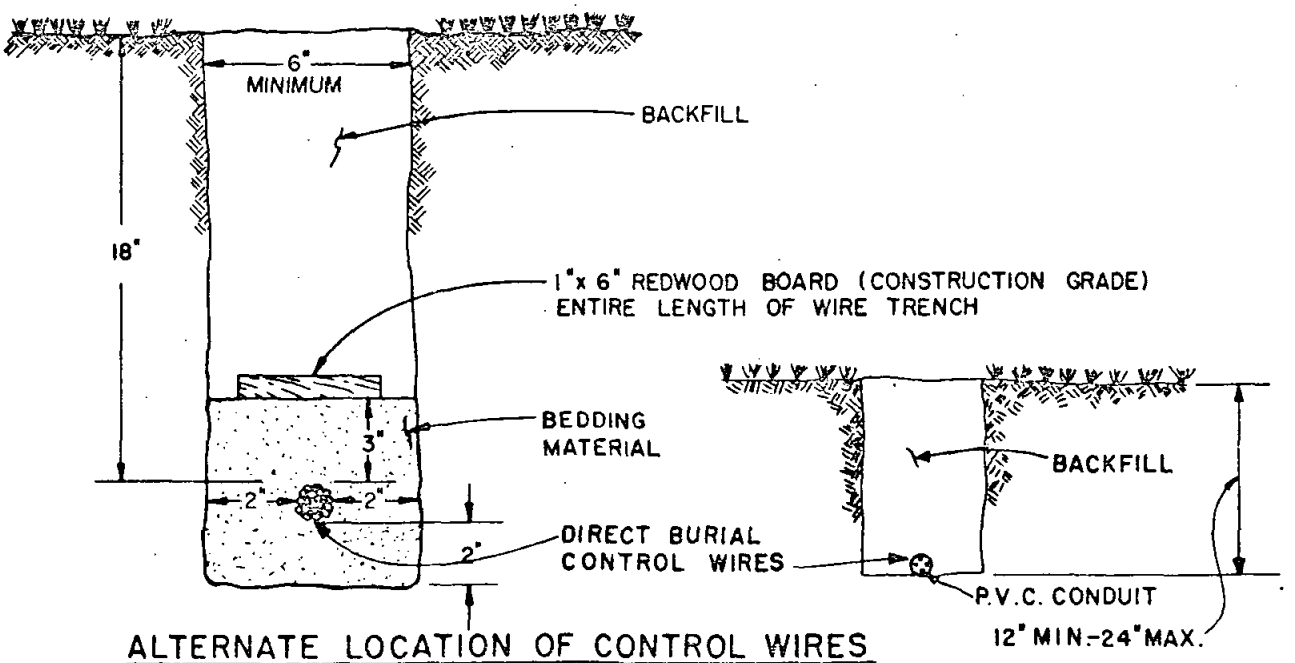
SYMBOLS:
MANUAL CONTROL ANGLE VALVE ⊗MCV
MANUAL CONTROL GLOBE VALVE ⊗MCV
ORISEAL VALVE ⊗OV
GATE VALVE ⊗GV

STD. SPEC. SEC. :	SAN DIEGO COUNTY ENGINEER DEPARTMENT STANDARD DRAWING				
DRAWN BY MM CHECKED BY					
RECOMMENDED BY	MANUAL VALVES	REVISION	BY	APPROVED	DATE
APPROVED BY COUNTY ENGINEER		SCALE: NONE			
R.C.E. 11458		DRAWING NUMBER	705-T		
DATE: 7-25-72					



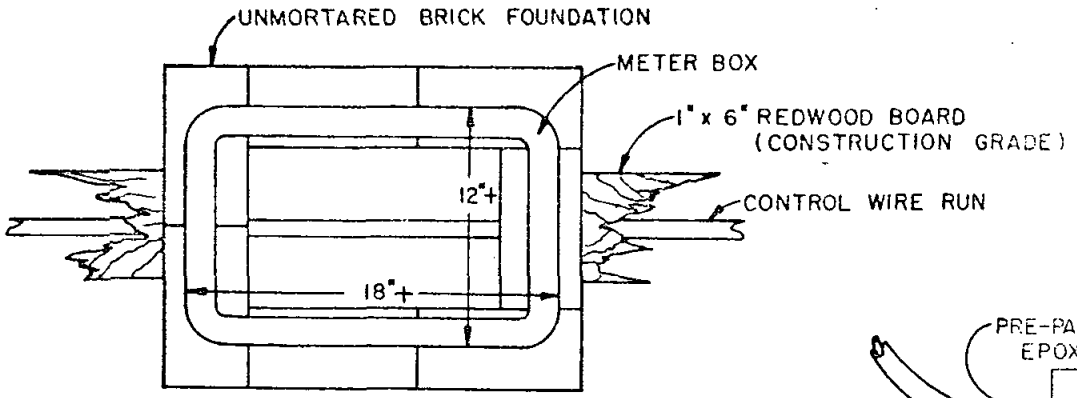
NORMAL LOCATION OF CONTROL WIRES

SEE IRRIGATION SPECIFICATIONS FOR ADDITIONAL INFORMATION ON TRENCH SIZE, BACKFILL AND DIRECT BURIAL WIRE INSTALLATION.

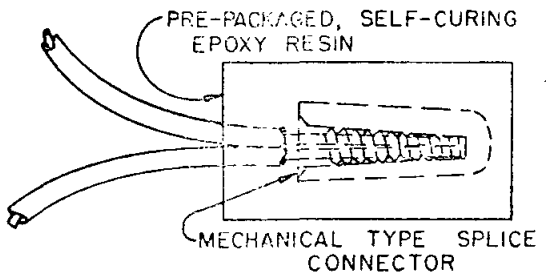


ALTERNATE LOCATION OF CONTROL WIRES

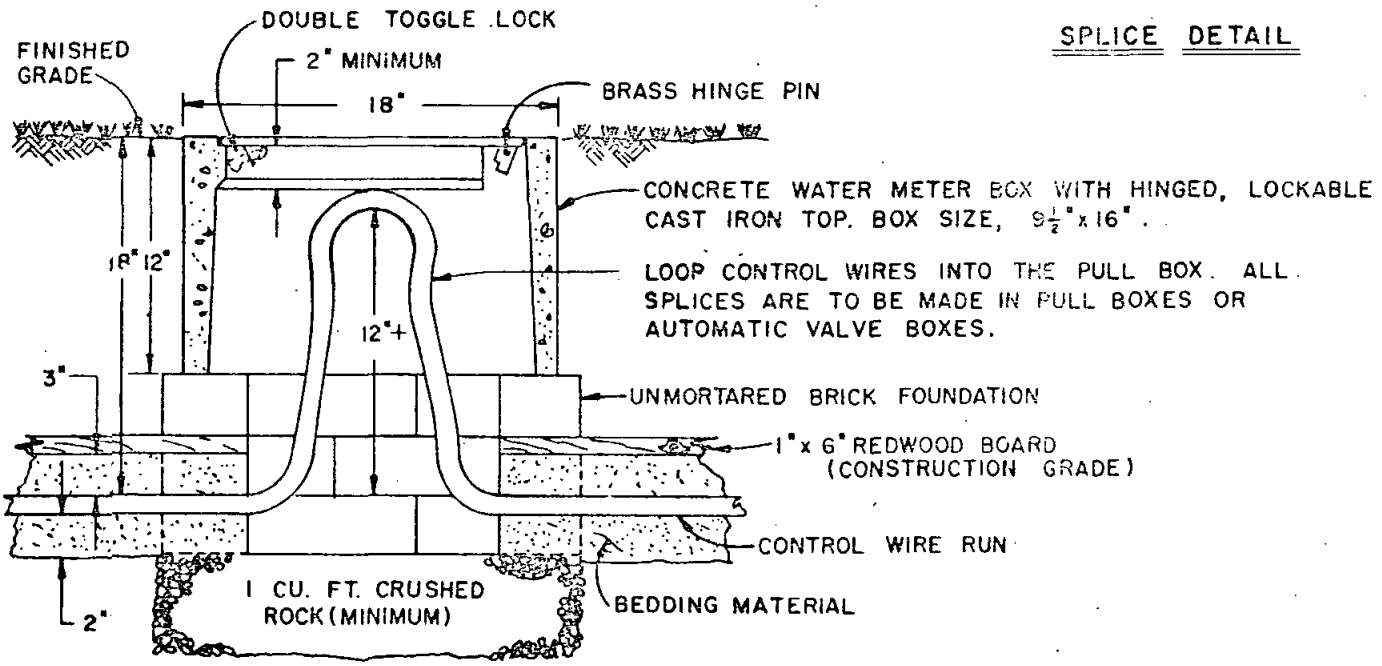
STD. SPEC. SEC.	SAN DIEGO COUNTY ENGINEER DEPARTMENT STANDARD DRAWING	BEDDING MATERIAL	[illegible]	A. Kerchevel	2/8/74
DRAWN BY M.M. CHECKED BY [illegible]					
RECOMMENDED BY W.P. Secor	DIRECT BURIAL CONTROL WIRE & TRENCH DETAIL	REVISION	BY	APPROVED	DATE
APPROVED BY COUNTY ENGINEER		SCALE: NONE			
H. M. Taylor R.C.E. 11458		DRAWING NUMBER 706-1T			
DATE: 2-25-72					



PLAN VIEW



SPLICE DETAIL



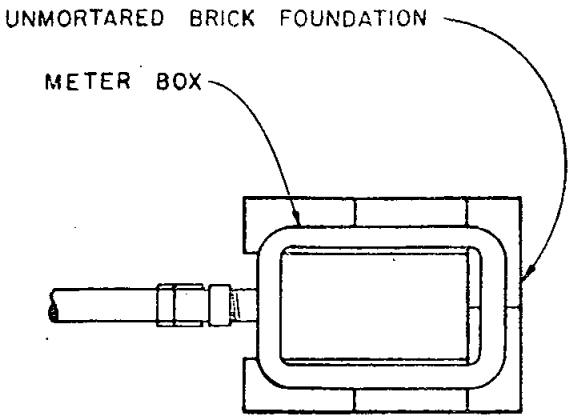
ELEVATION

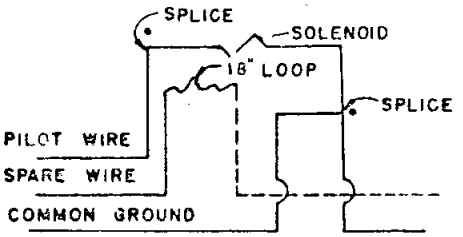
NOTES:

1. INSTALL PULL BOXES AS SHOWN ON THE PLANS.
2. AT JUNCTIONS WHERE RUNS COMBINE, SPLICE COMMON GROUND IN PULL BOX.
3. PULL BOX COVER SHALL BE PERMANENTLY MARKED "ELECTRIC".
4. CONDUCTORS FOR EACH CONTROLLER CLOCK SHALL BE HARNESSED SEPARATELY AND AT SUFFICIENT INTERVALS TO MAINTAIN A DEFINITE BUNDLE.

SYMBOL: P.B.

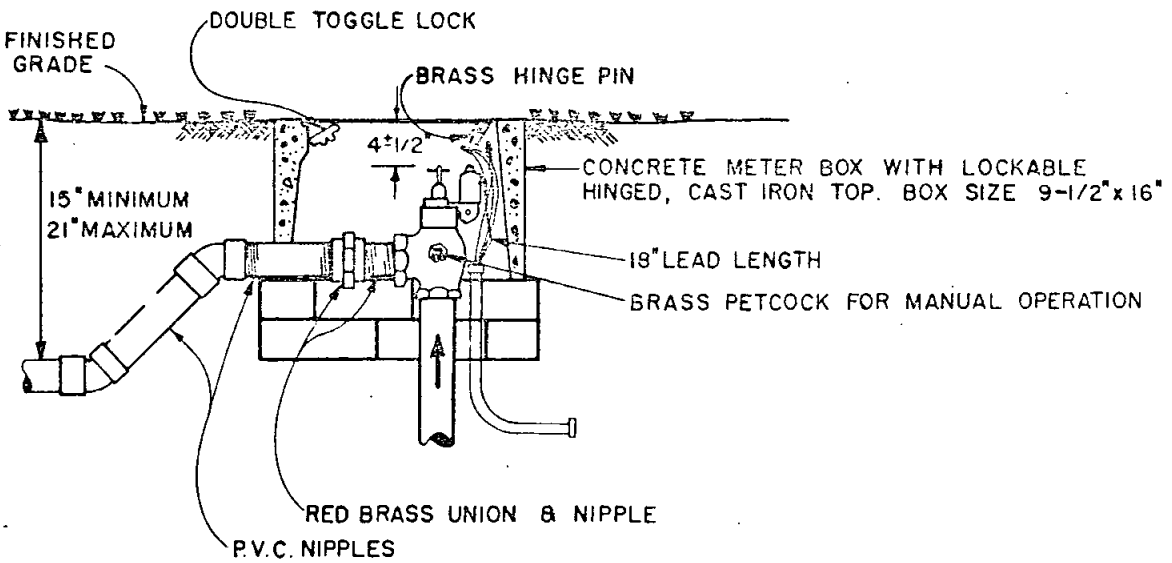
STD. SPEC. SEC:	SAN DIEGO COUNTY ENGINEER DEPARTMENT STANDARD DRAWING	Class "A" Backfill			
DRAWN BY: CHECKED BY:		BEDDING MATERIAL			
RECOMMENDED BY	ELECTRICAL PULL BOX FOR DIRECT BURIAL CONTROL WIRES & SPLICE DETAIL	REVISION	BY	APPROVED	DATE
APPROVED BY COUNTY ENGINEER		SCALE: NONE			
R.C.E. 11488		DRAWING NUMBER	707-2T		
DATE: 7-25-75					





TYPICAL ELEMENTARY DIAGRAM FOR WIRING ELECTRIC AUTOMATIC CONTROL VALVE

PLAN VIEW

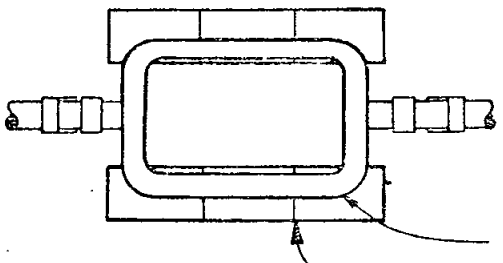


ELEVATION

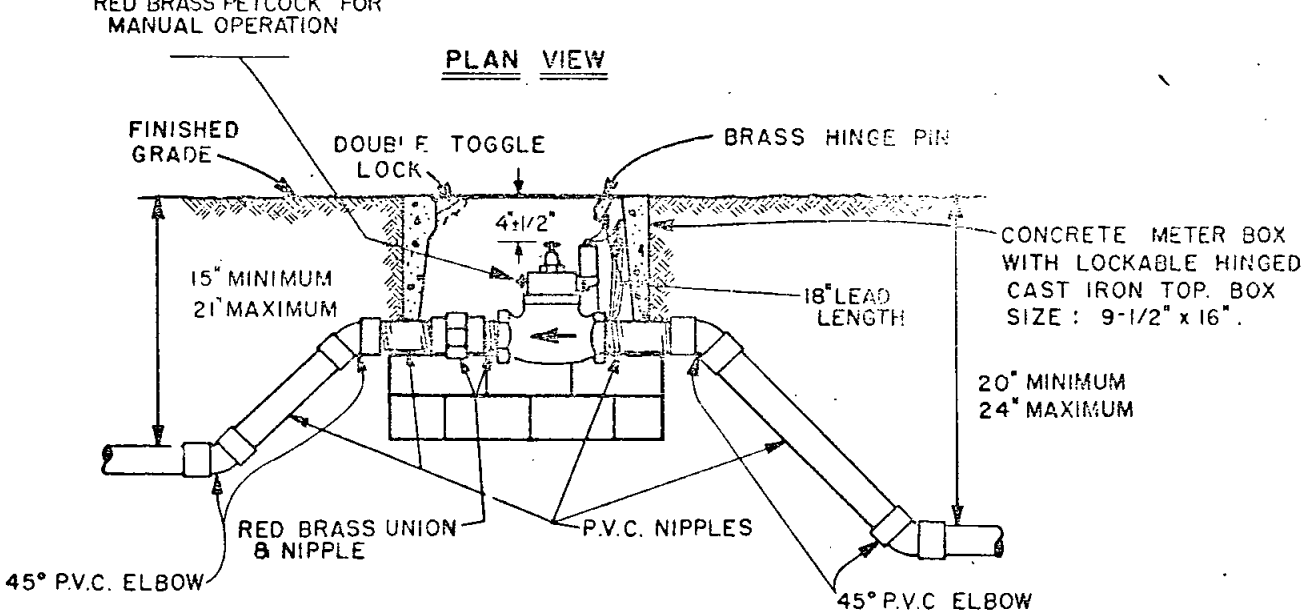
NOTE: NO SPLICING SHALL BE MADE OUTSIDE OF THE VALVE BOX EXCEPT THAT MADE IN A PULL-BOX (SEE STD. DWG. 707).

SYMBOL: ▼ A.V. No.____

STD. SPEC. SEC.:	SAN DIEGO COUNTY ENGINEER DEPARTMENT STANDARD DRAWING	Position of Valve			
DRAWN BY ____ CHECKED BY ____					
RECOMMENDED BY ____	AUTOMATIC CONTROL VALVE — — ELECTRIC (ANGLE VALVE)	REVISION	BY	APPROVED	DATE
APPROVED BY COUNTY ENGINEER		SCALE: NONE			
____ R.C.E. 11458		DRAWING NUMBER 708-T-1			
DATE: 7-25-72					



PLAN VIEW

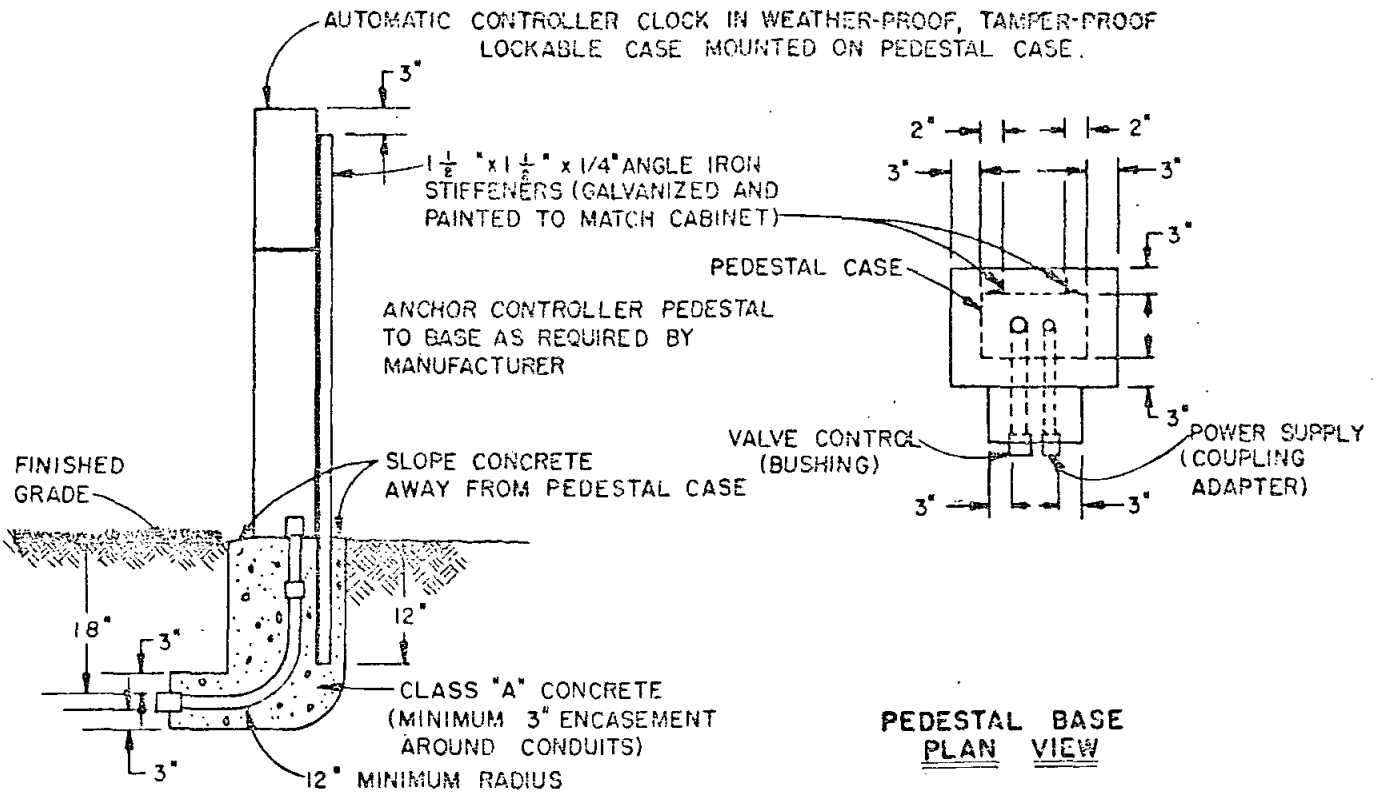


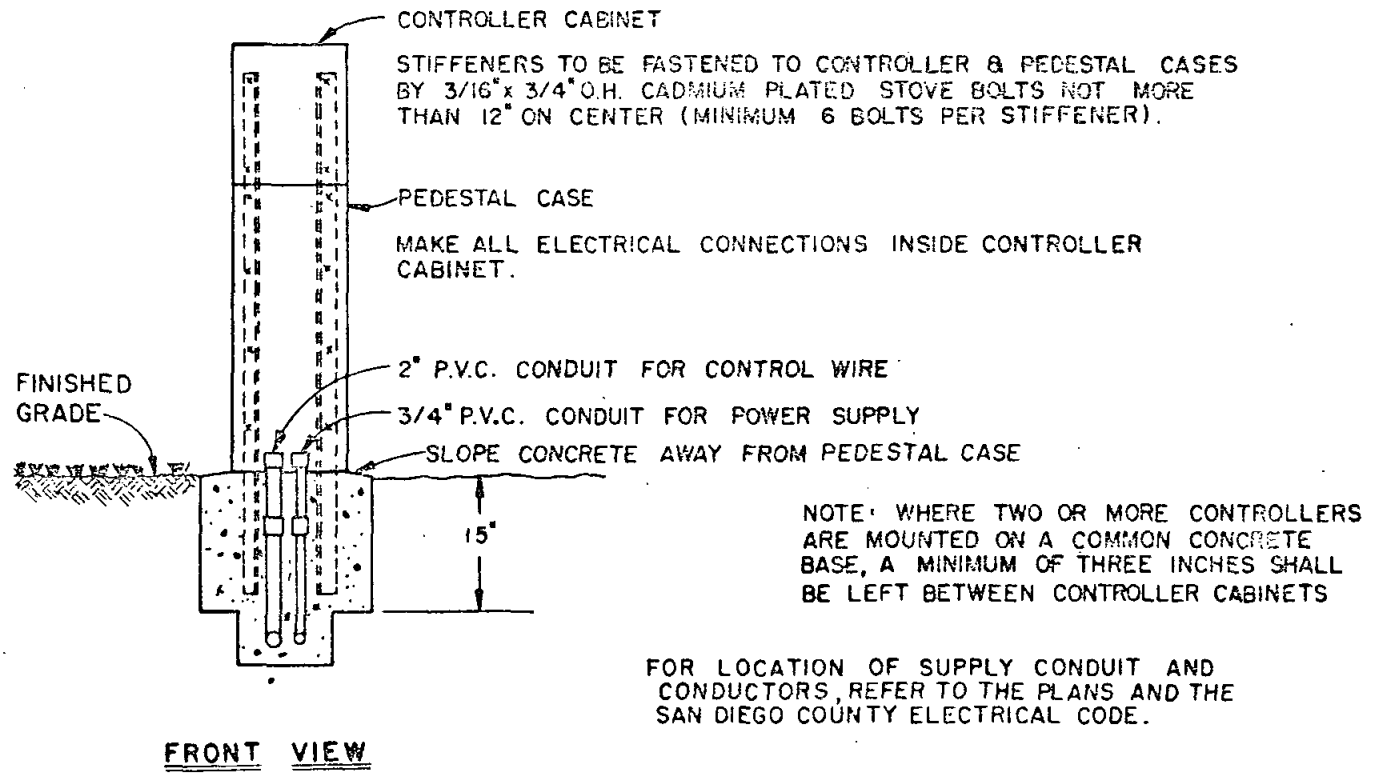
ELEVATION

NOTE: SEE STD. DWG. NO. 708 FOR ELEMENTARY WIRING DIAGRAM & ADDITIONAL NOTES

SYMBOL: ▼ A.V. Nº —

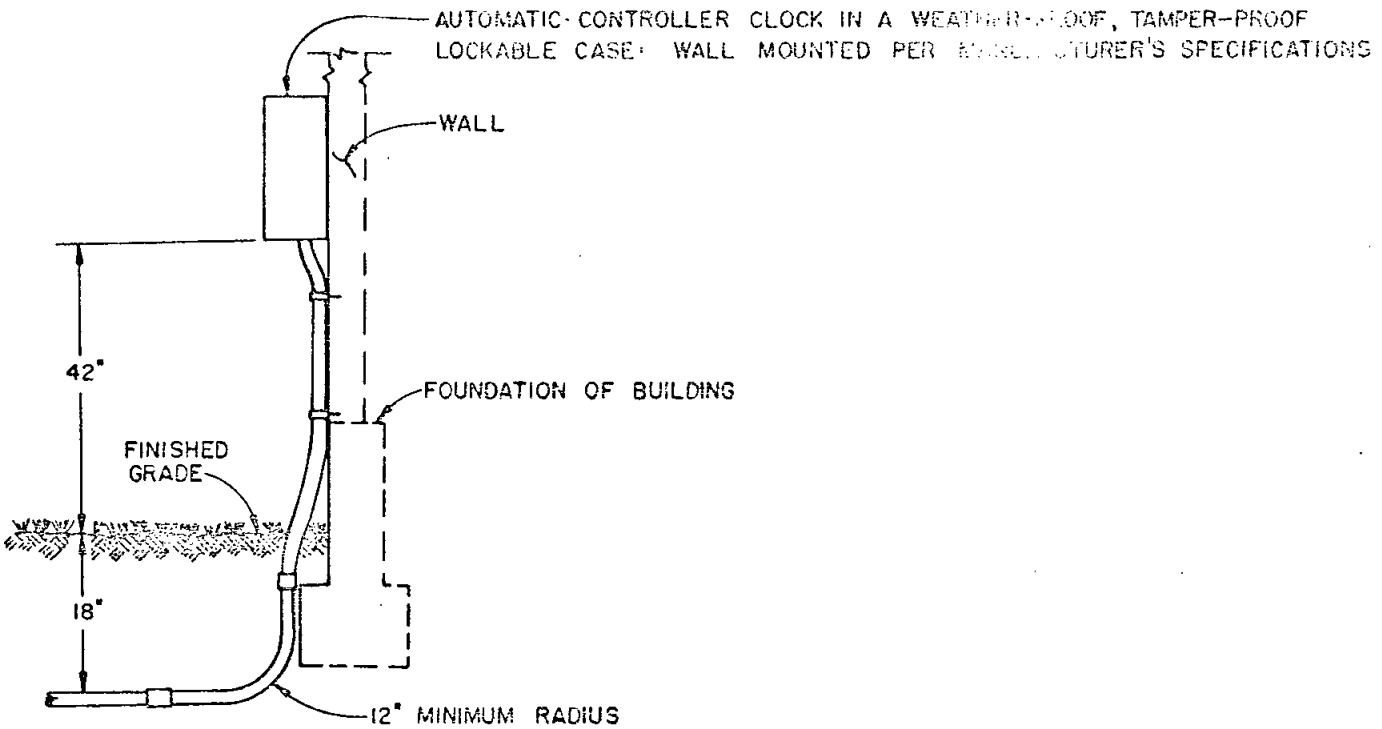
STD. SPEC. SEC.	SAN DIEGO COUNTY ENGINEER DEPARTMENT STANDARD DRAWING				
DRAWN BY	CHECKED BY				
RECOMMENDED BY	AUTOMATIC CONTROL VALVE — ELECTRIC (GLOBE VALVE)	REVISION	BY	APPROVED	DATE
APPROVED BY COUNTY ENGINEER		SCALE: NONE			
R.C.E. 11429		DRAWING NUMBER 709-T-1			
DATE 7-26-72					



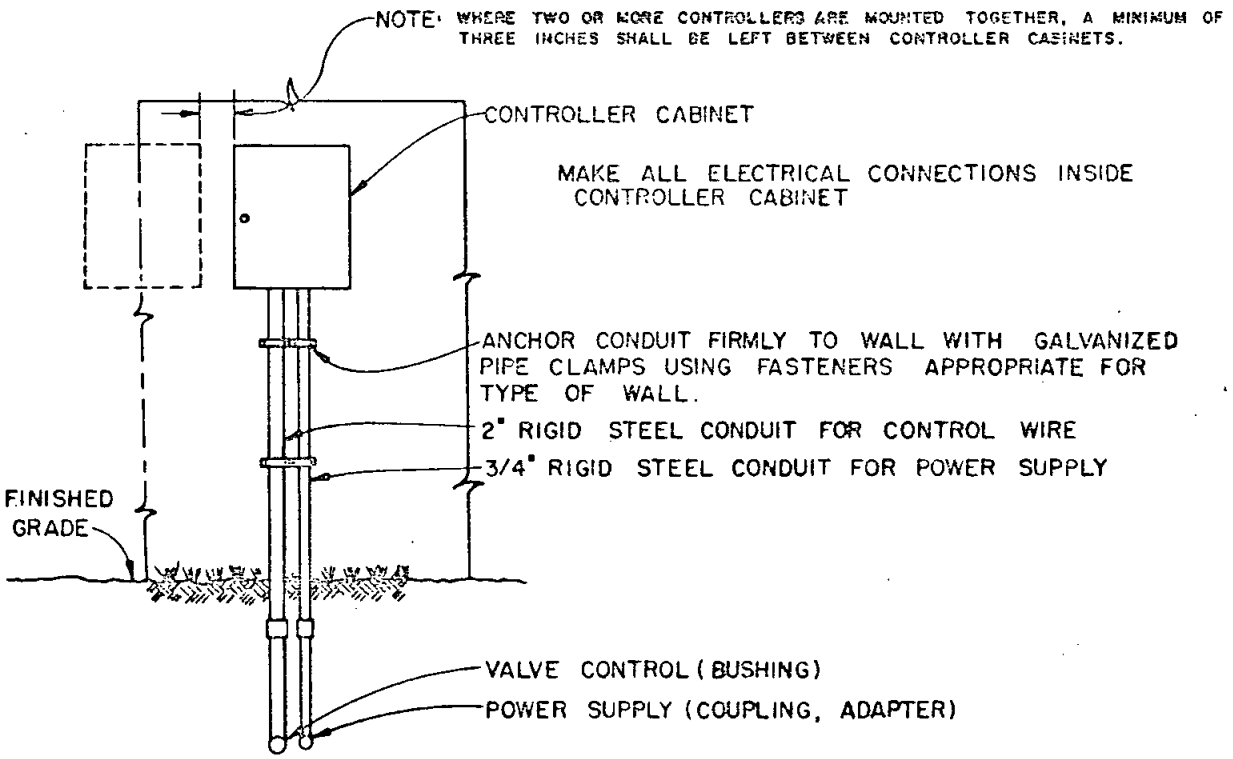


SYMBOL: ⊠P

STD. SPEC. SEC:	SAN DIEGO COUNTY ENGINEER DEPARTMENT STANDARD DRAWING				
DRAWN BY CHECKED BY					
RECOMMENDED BY	ELECTRIC CONTROLLER CLOCK PEDESTAL MOUNTING	REVISION	BY	APPROVED	DATE
APPROVED BY COUNTY ENGINEER		SCALE: NONE			
R.C.E. 11458		DRAWING NUMBER	710-T		
DATE: 7-2-78					



SIDE VIEW

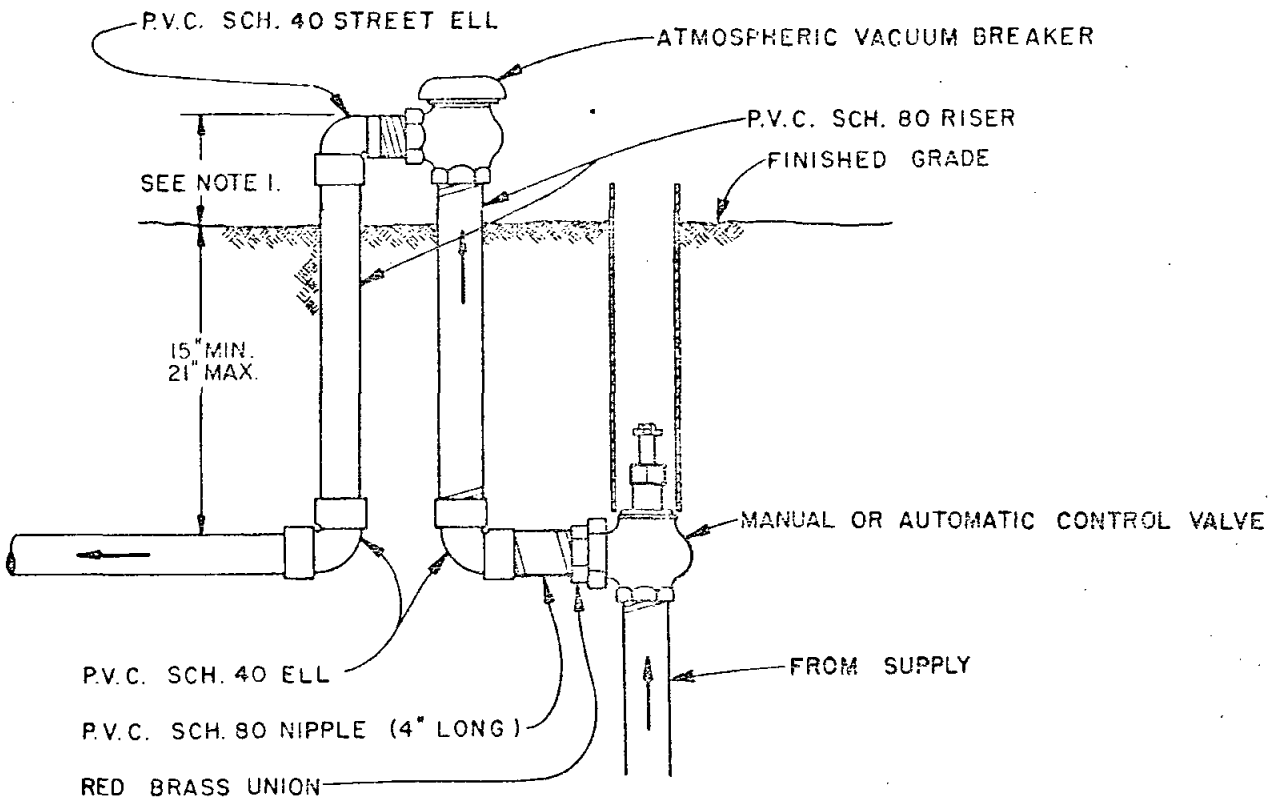


FRONT VIEW

FOR LOCATION OF SUPPLY CONDUIT & CONDUCTOR, REFER TO THE PLANS & THE SAN DIEGO COUNTY ELECTRICAL CODE

SYMBOL: ⊠ W

STD. SPEC. SEC:	SAN DIEGO COUNTY ENGINEER DEPARTMENT STANDARD DRAWING				
DRAWN BY [illegible] CHECKED BY [illegible]					
RECOMMENDED BY [illegible]	ELECTRIC CONTROLLER CLOCK WALL MOUNTING	REVISION	BY	APPROVED	DATE
APPROVED BY COUNTY ENGINEER		SCALE: NONE			
[illegible] R.C.E. 11458		DRAWING NUMBER 711-T			
DATE: [illegible]					



NOTE:

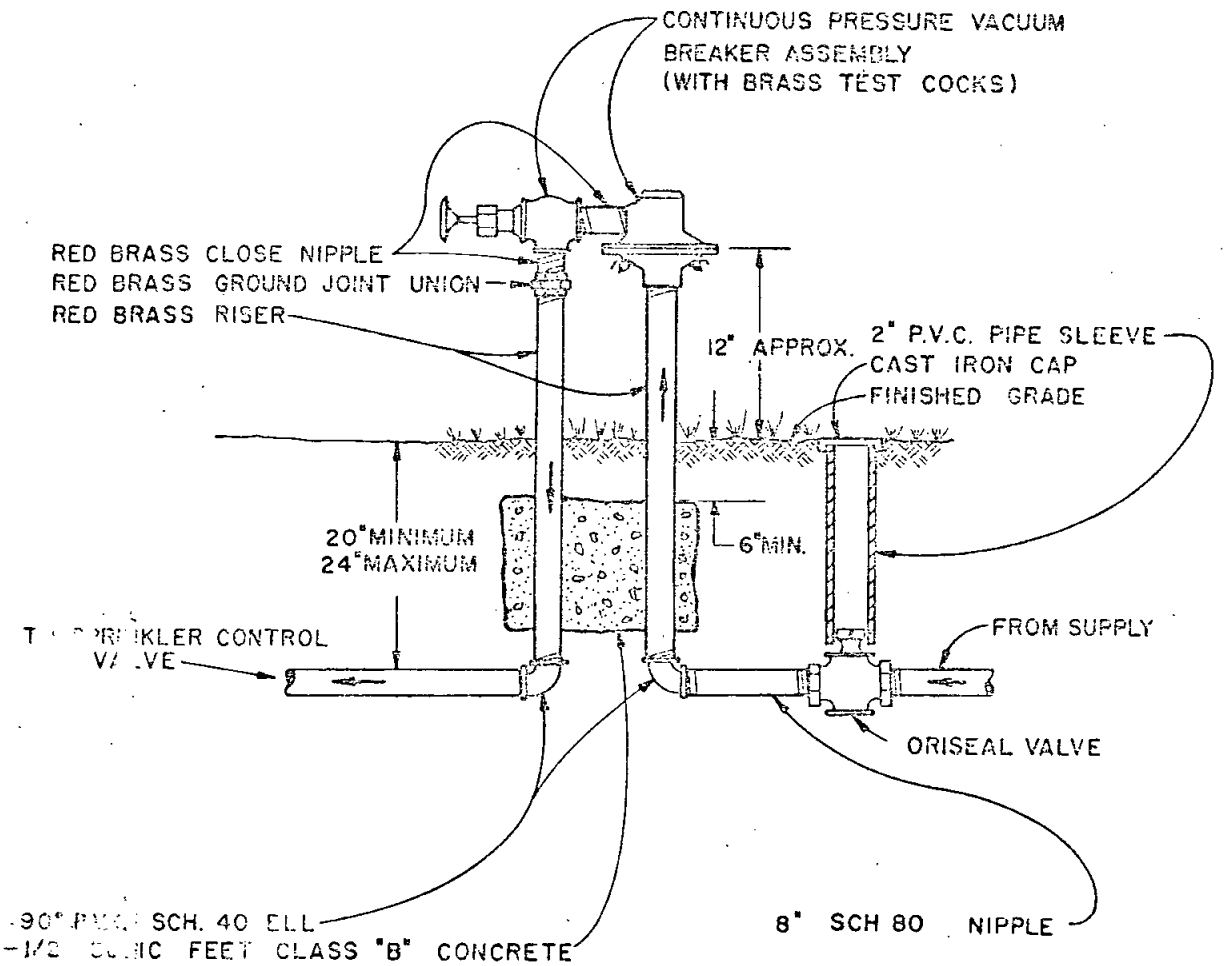
1. ATMOSPHERIC VACUUM BREAKERS SHALL BE INSTALLED APPROX. 6" ABOVE THE FINISHED GRADE AND ABOVE A SUFFICIENT NUMBER OF SPRINKLER HEADS CLOSEST TO VACUUM BREAKER SO AT NO TIME WILL IT BE SUBJECTED TO BACK PRESSURE OR DRAINAGE.

2. ALL FITTINGS INCLUDING THE ATMOSPHERIC VACUUM BREAKER SHALL NOT BE OF SMALLER SIZE THAN THE VALVE.

3. FOR USE ON LINES 2 INCHES AND SMALLER.

SYMBOL: (A) A.V.B.

STD. SPEC. SEC.	SAN DIEGO COUNTY ENGINEER DEPARTMENT STANDARD DRAWING				
DRAWN BY CHECKED BY					
RECOMMENDED BY	ATMOSPHERIC VACUUM BREAKER (TYPE I BACKFLOW PROTECTION)	REVISION	BY	APPROVED	DATE
APPROVED BY COUNTY ENGINEER		SCALE: NONE			
R.C.E. 11458		DRAWING NUMBER	712-T		
DATE:					

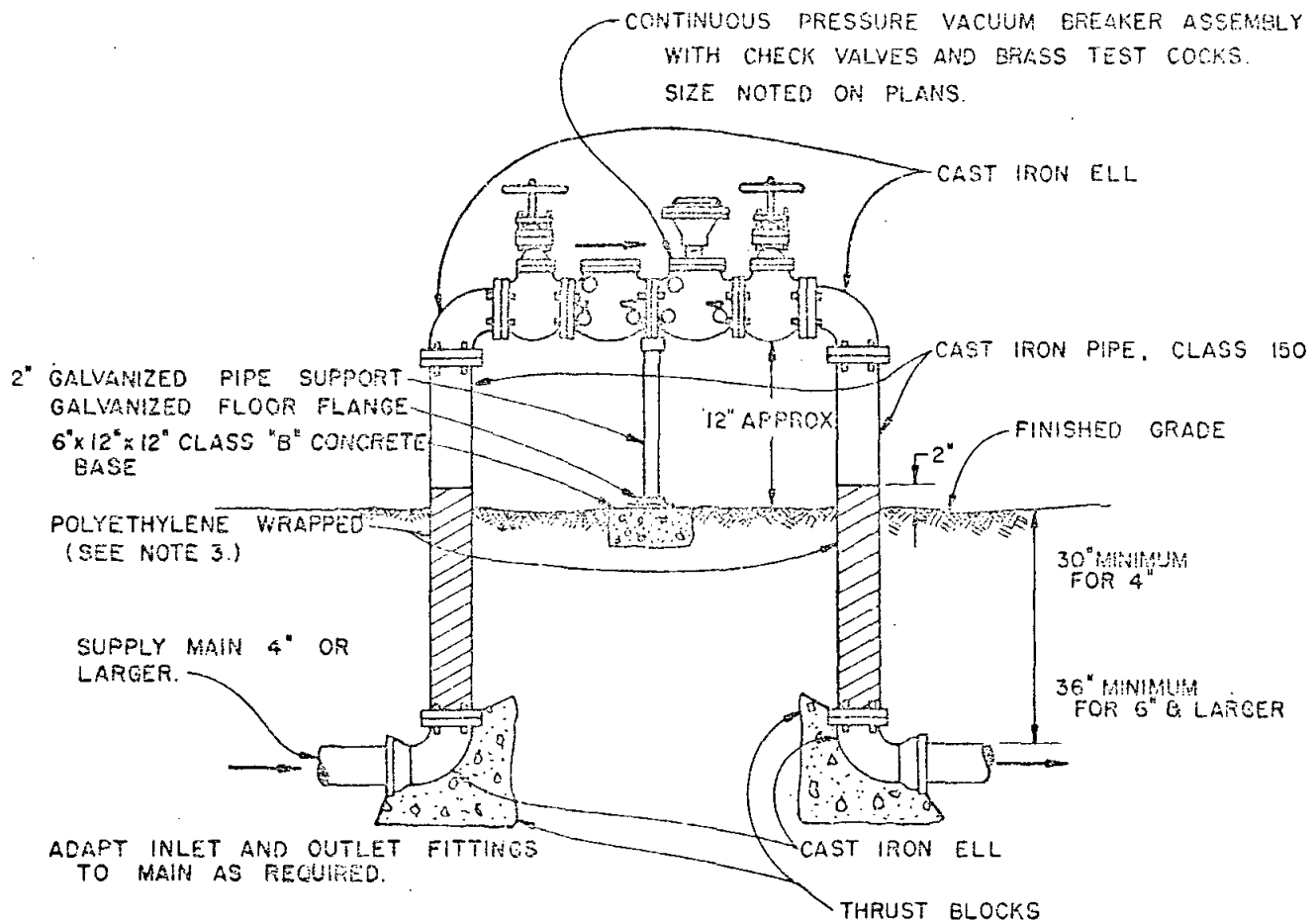


PRESSURE VACUUM BREAKERS SHALL BE INSTALLED ABOVE A SUFFICIENT NUMBER OF SPRINKLER HEADS TO VACUUM BREAKER SO AT NO TIME WILL IT BE SUBJECTED TO BACK PRESSURE OR DRAINAGE.

FOR USE ON LINES TWO INCHES AND SMALLER.

SYMBOL: (V) P.V.B.

STD. SPEC. SEC:	SAN DIEGO COUNTY ENGINEER DEPARTMENT				
DRAWN BY	STANDARD DRAWING				
RECOMMENDED BY	CONTINUOUS PRESSURE VACUUM BREAKER ASSEMBLY	REVISION	BY	APPROVED	DATE
APPROVED BY COUNTY ENGINEER	(TYPE II BACKFLOW PROTECTION)	SCALE: NONE			
DATE:		DRAWING NUMBER	713-T		

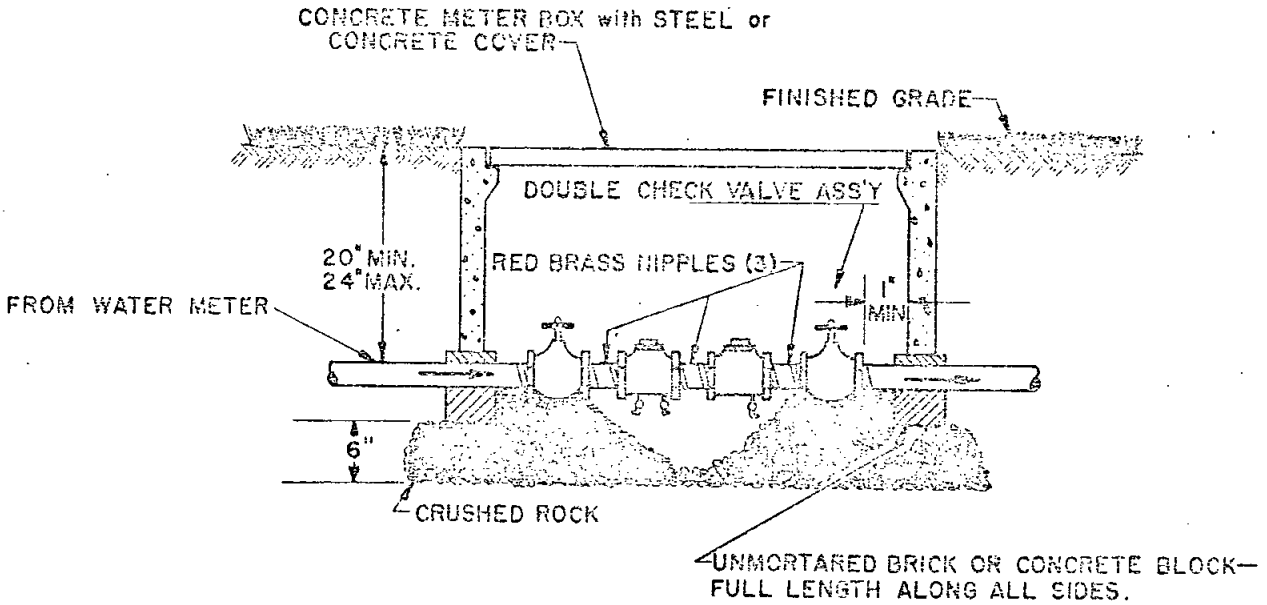


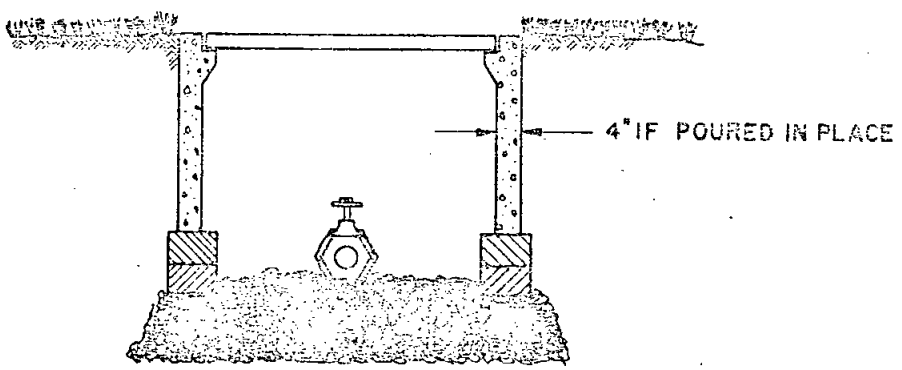
NOTES:

1. ALL FITTINGS ON ASSEMBLY SHALL BE FLANGED.
2. CAST IRON PIPE SHALL BE POLYETHYLENE WRAPPED.
3. CAST IRON PIPE AND FITTINGS SHALL BE CEMENT LINED.
4. PRESSURE VACUUM BREAKER ASSEMBLY SHALL BE INSTALLED ABOVE A SUFFICIENT NUMBER OF SPRINKLER HEADS CLOSEST TO VACUUM BREAKER SO AT NO TIME WILL IT BE SUBJECTED TO BACK PRESSURE OR DRAINAGE.
5. FOR USE ON LINES FOUR INCHES AND LARGER.

SYMBOL: ⊗⊘⊘⊗

STD. SPEC. SEC.:	SAN DIEGO COUNTY ENGINEER DEPARTMENT STANDARD DR. ING				
DRAWN BY: M.M. CHECKED BY:					
RECOMMENDED BY:	CONTINUOUS PRESSURE VACUUM BREAKER ASSEMBLY WITH CHECK VALVES (TYPE III BACKFLOW PROTECTION)	REVISION	BY	APPROVED	DATE
APPROVED BY COUNTY ENGINEER		SCALE: NONE			
R.C.E. 11458		DRAWING NUMBER	714-T-1		
DATE:					



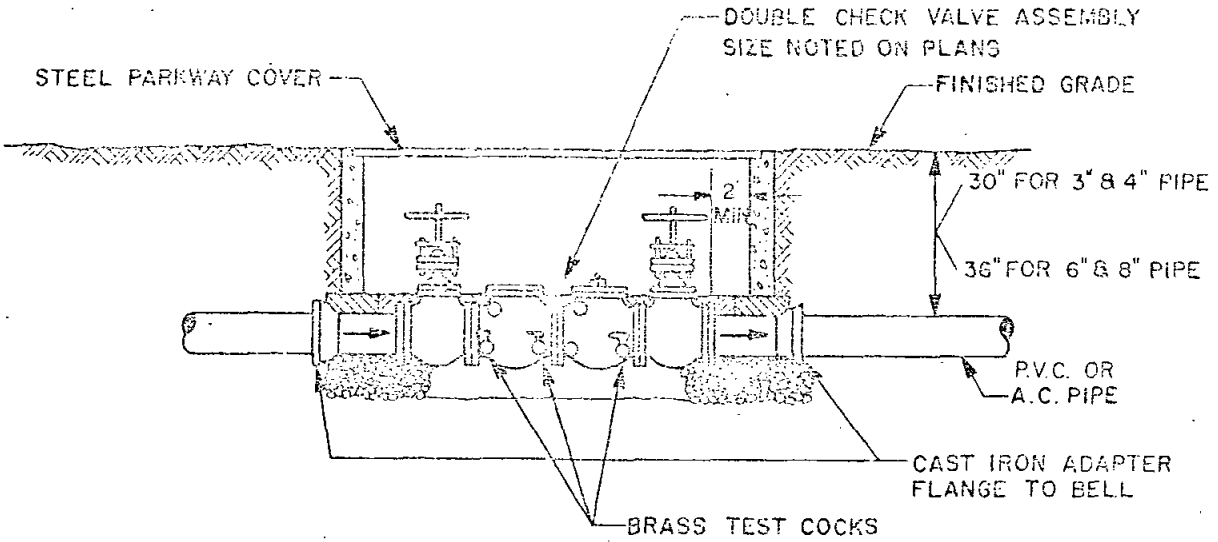


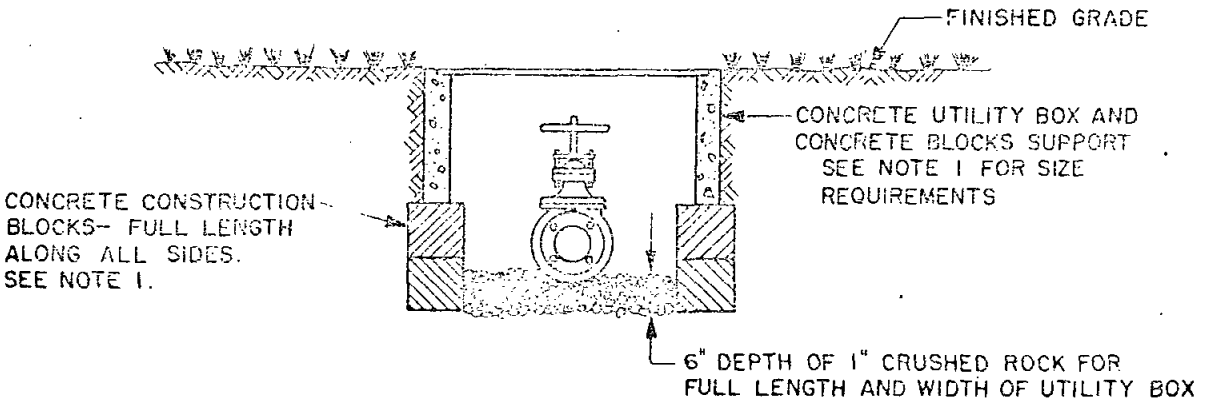
NOTES:

1. NOT FOR USE IN TRAFFIC AREAS.
2. FOR USE ON WATER MAINS OF ALL SIZES.

SYMBOL:

STD. SPEC. SEC:	SAN DIEGO COUNTY ENGINEER DEPARTMENT STANDARD DRAWING		
DRAWN BY / CHECKED BY			
RECOMMENDED BY	DOUBLE CHECK VALVE ASSEMBLY (TYPE IV BACKFLOW PROTECTION)	REVISION / BY / APPROVED / DATE	
APPROVED BY COUNTY ENGINEER		SCALE: NONE	
R.C.E. 11458		DRAWING NUMBER	715-T
DATE:			



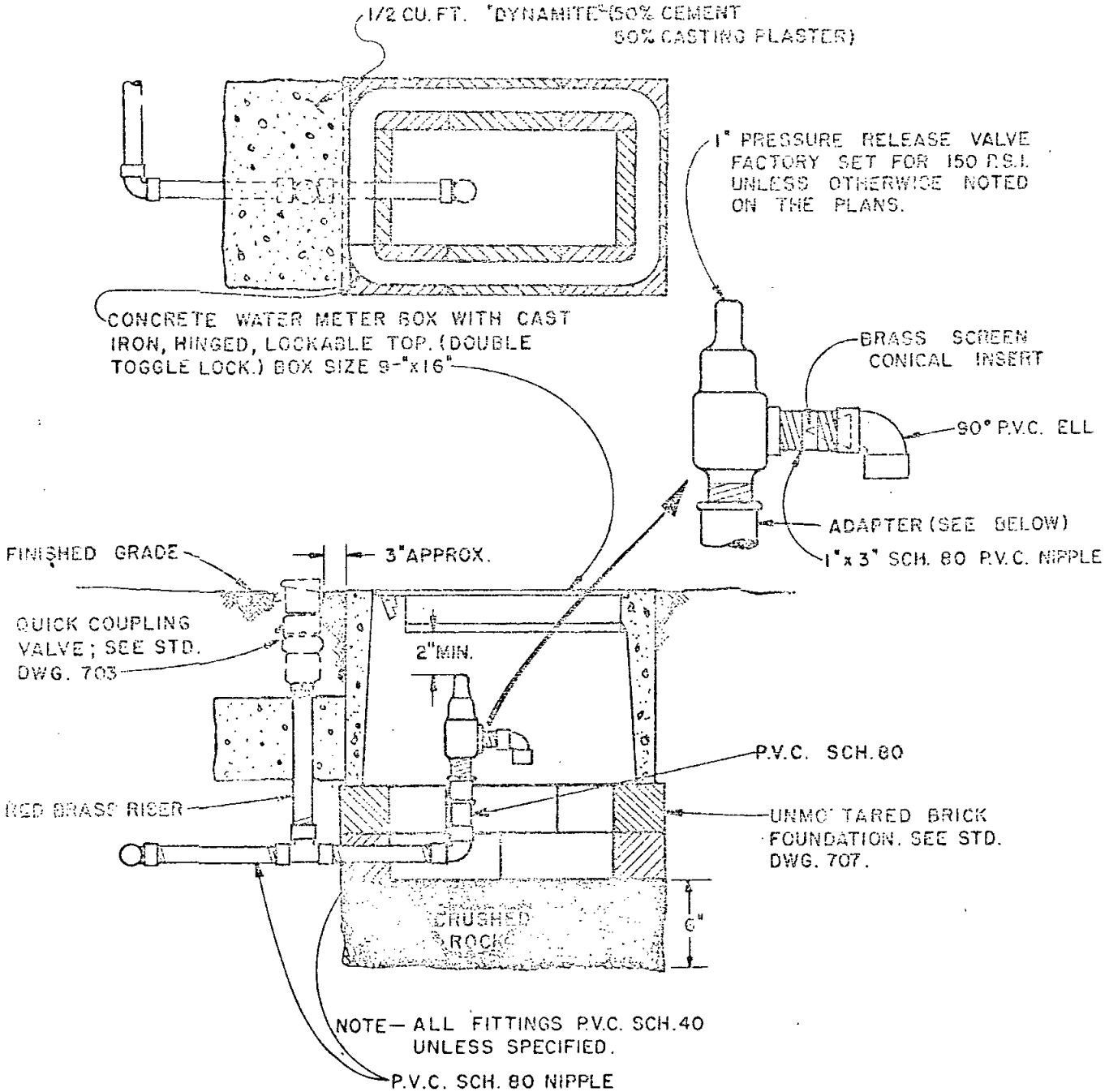


NOTES:

1. 3" & 4" PIPE: 2'-6" x 4'-0" UTILITY BOX WITH 4" WALLS.
   6" & 8" PIPE: 3'-2" x 6'-0" UTILITY BOX WITH 4" WALLS.
2. NOT FOR USE IN TRAFFIC AREAS.
3. FOR USE ON WATER MAINS 3" OR LARGER.

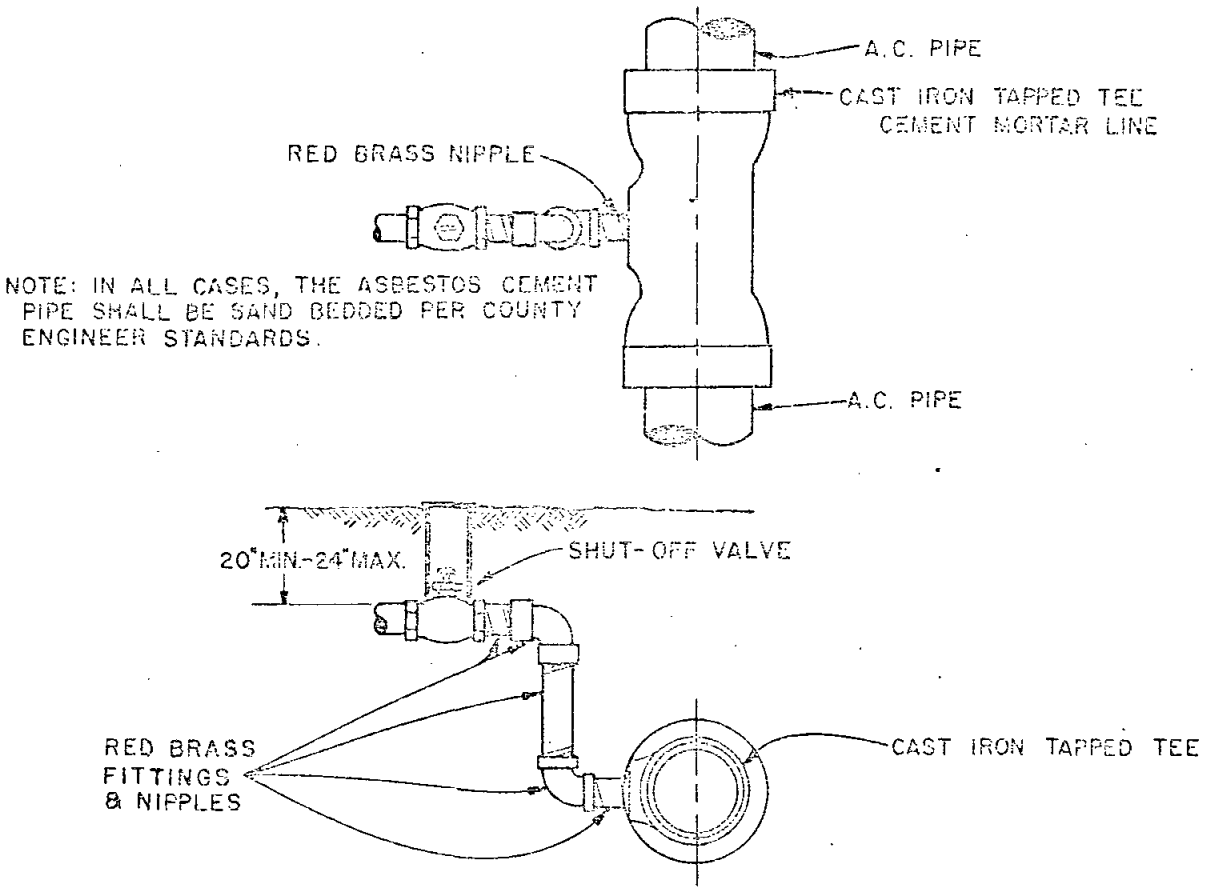
SYMBOL:

STD. SPEC. SEC:	SAN DIEGO COUNTY ENGINEER DEPARTMENT STANDARD DRAWING				
DRAWN BY / CHECKED BY					
RECOMMENDED BY	DOUBLE CHECK VALVE ASSEMBLY P.V.C. or A.C. PIPE SERVICE (TYPE IV BACKFLOW PROTECTION)	REVISION	BY	APPROVED	DATE
APPROVED BY COUNTY ENGINEER		SCALE: NONE			
R.C.E. 11458		DRAWING NUMBER	716-T-1		
DATE:					



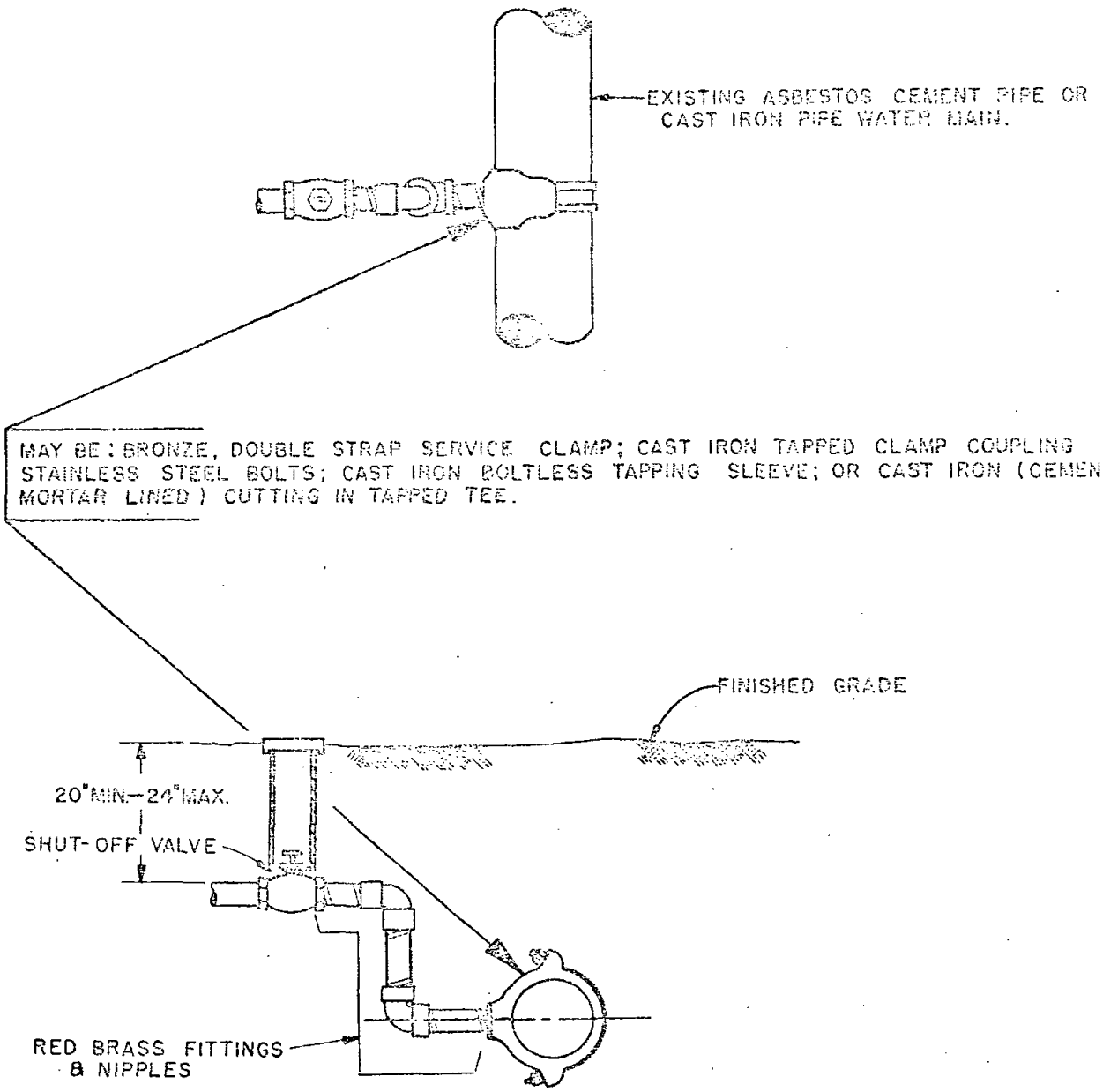
SYMBOL: Ⓥ P.R.V.

STD. SPEC. SEC.:	SAN DIEGO COUNTY ENGINEER DEPARTMENT STANDARD DRAWING.				
DRAWN BY: CHECKED BY:					
RECOMMENDED BY:	PRESSURE RELIEF VALVE installed with QUICK COUPLING VALVE	REVISION	BY	APPROVED	DATE
APPROVED BY: COUNTY ENGINEER		SCALE: NONE			
R.C.E. 11458		DRAWING NUMBER 717-T			



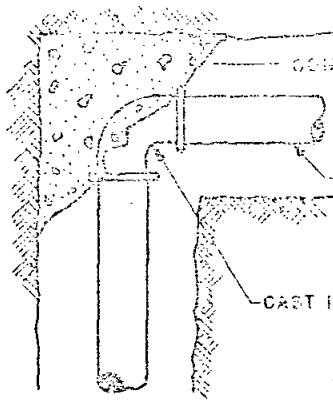
SYMBOL:

STD. SPEC. SEC.:	SAN DIEGO COUNTY ENGINEER DEPARTMENT STANDARD DRAWING				
DRAWN BY: S.M.M. CHECKED BY:					
RECOMMENDED BY:	CONNECTION DETAIL FOR NEW ASBESTOS CEMENT WATER MAINS	REVISION	BY	APPROVED	
APPROVED BY COUNTY ENGINEER		SCALE: NONE			
R.C.E. 11650		DRAWING NUMBER	718-T		
DATE:					

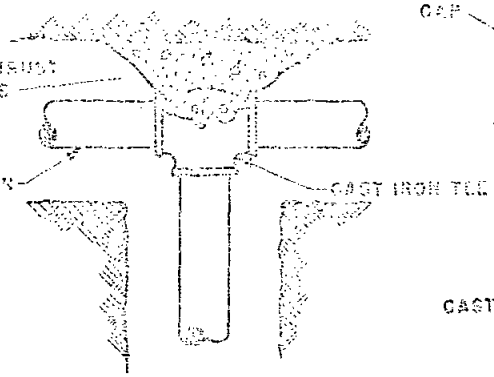


SYMBOL:

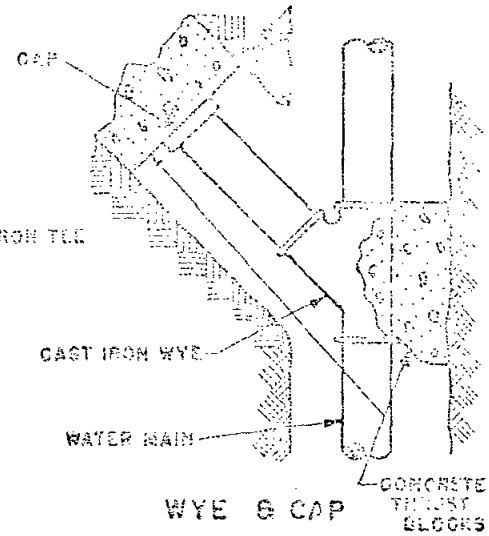
STD. SPEC. SEC.:	SAN DIEGO COUNTY ENGINEER DEPARTMENT STANDARD DRAWING				
DRAWN BY: CHECKED BY:					
RECOMMENDED BY:		REVISION	BY	APPROVED	DATE
APPROVED BY COUNTY ENGINEER	CONNECTION DETAIL FOR EXISTING WATER MAINS	SCALE NONE			
R.C.E. 8459		DRAWING NUMBER 719T			
DATE					



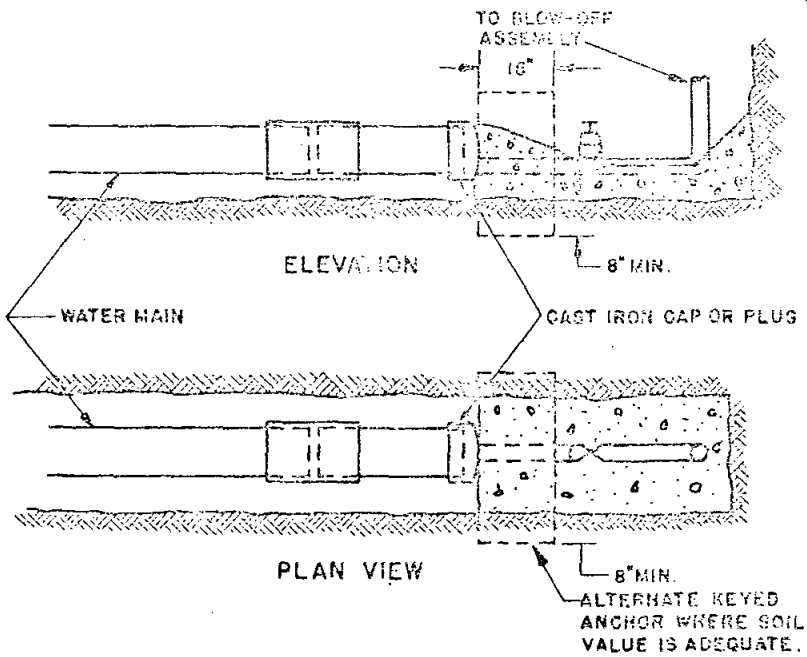
BEND



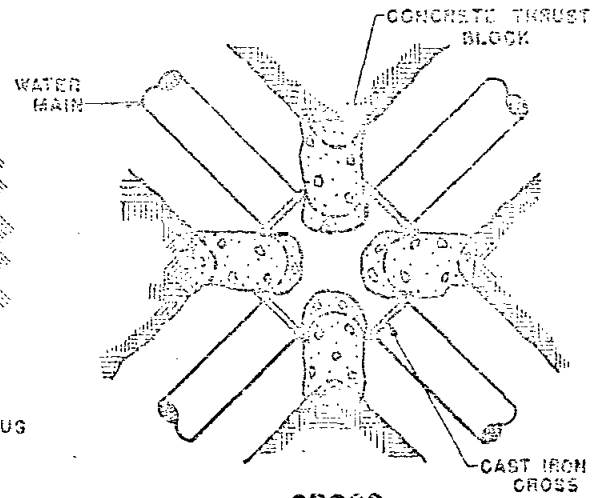
TEE



WYE & CAP



BLOW-OFF



CROSS

NOTES:

1. BEARING AREAS FOR THRUST BLOCKS SHALL DEPEND ON PRESSURE & PIPE SIZE. FOR BEARING AREAS SEE STD. DWG. 721 .
2. ALL CONCRETE FOR THRUST BLOCKS SHALL BE CLASS "B".
3. CONCRETE ANCHORS ARE TO BE KEPT CLEAR OF ALL PIPE & VALVE JOINTS.
4. THRUST BLOCKS ARE TO BE USED WHERE PIPE SIZES DIFFER IN CROSS AND WHEN ONE OR MORE OPENINGS ARE PLUGGED.

STD. SPEC. SEC.:	SAN DIEGO COUNTY ENGINEER DEPARTMENT STANDARD DRAWING				
DRAWN BY CHECKED BY					
RECOMMENDED BY	CONCRETE THRUST BLOCKS for CAST IRON FITTINGS	REVISION	BY	APPROVED	DATE
APPROVED BY COUNTY ENGINEER		SCALE: NONE			
R.C.E. 11456		DRAWING NUMBER	720-T		
DATE					

NOTES:

1. BASED ON 225 PSI TEST PRESSURE AND BEARING VALUES OF DRY SOILS.

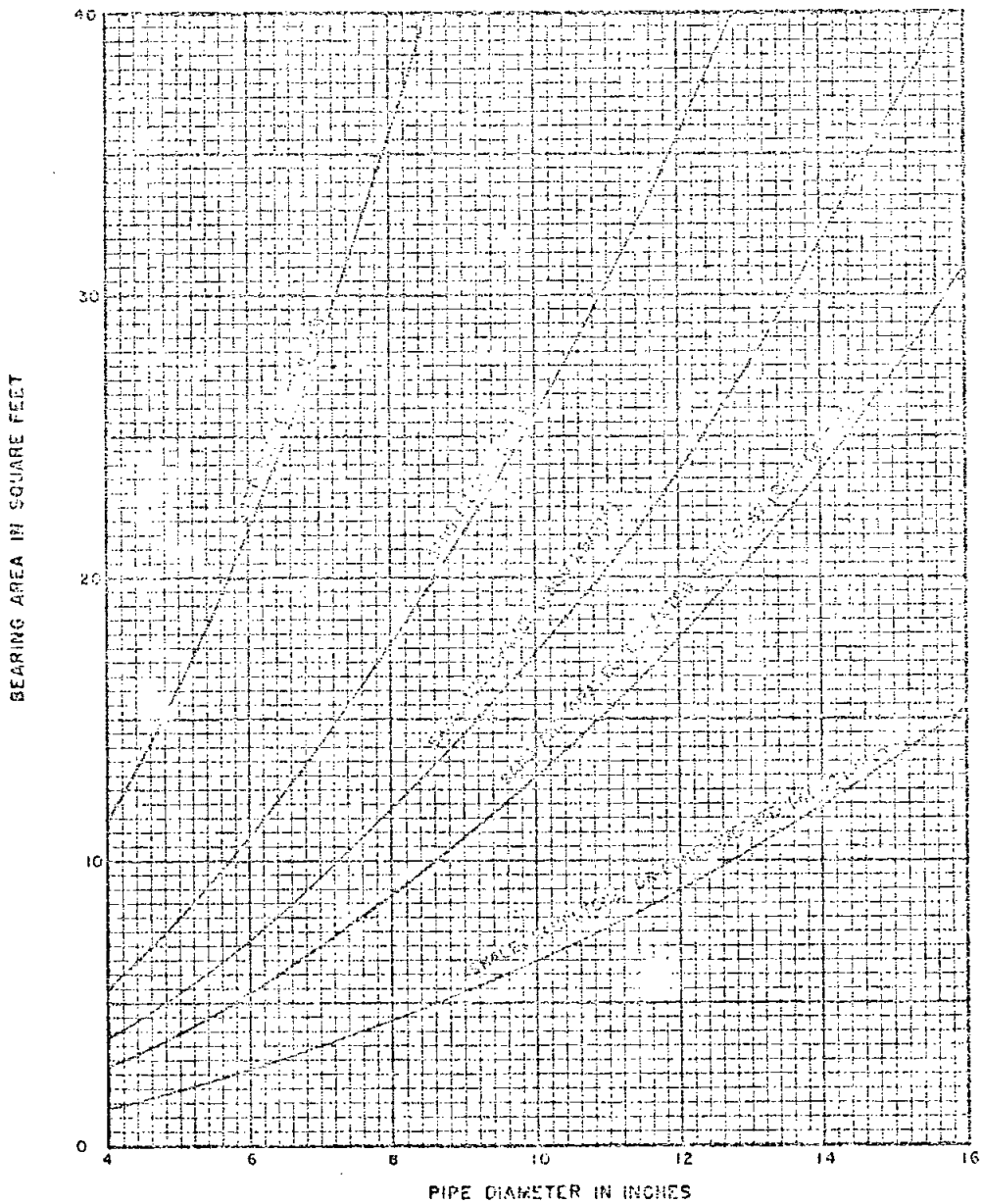
2. VALUES FROM CURVES ARE FOR TEES & DEAD ENDS, i.e. STRAIGHT-LINE THRUST. FOR 90° BENDS USE VALUE FROM CURVE.

45°	0.8
22½°	0.4

3. FOR CONDITIONS NOT COVERED BY CURVES, SPECIAL THRUST BLOCKS MUST BE COMPUTED & APPROVED BY THE COUNTY ENGINEER DEPARTMENT

4. THRUST BLOCKS DIMENSIONED ON PLANS ARE BASED ON 2000 LB/SQ.FT. BEARING VALUES, OR AS OTHERWISE NOTED.

5. FOR LOCATION OF THRUST BLOCKS SEE STD. DWG. 720.



STD. SPEC. SEC.	SAN DIEGO COUNTY ENGINEER DEPARTMENT STANDARD DRAWING		
DRAWN BY CHECKED BY			
RECOMMENDED BY	CONCRETE THRUST BLOCKS BEARING AREAS	REVISION / DATE / APPROVED / DATE	
APPROVED BY COUNTY ENGINEER		SCALE: NONE	
R.C.E.		DRAWING NUMBER	721-T
DATE:			

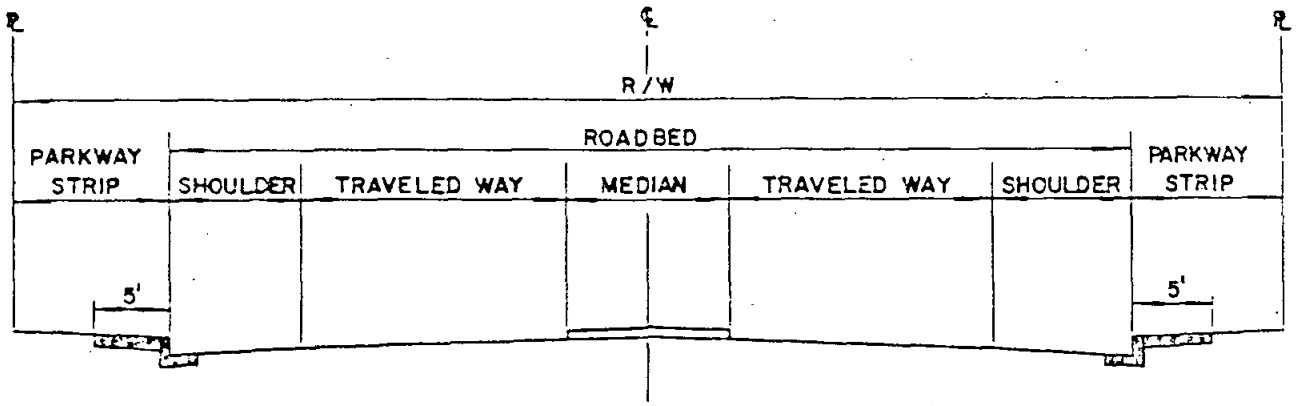
COUNTY OF SAN DIEGO

INDEX OF DESIGN STANDARDS

Number	Title
DS-1	Typical Roadway Sections
DS-2	Hillside Residential Street, Alt. No. 1
DS-3	Hillside Residential Street, Alt. No. 2
DS-4	Hillside Residential Street, Alt. No. 3
DS-5	Temporary Turn-Around at Dead-End Street
DS-6	Turn-Around and Calculations
DS-7	Asphalt Concrete Driveway
DS-8	Lot Grading
DS-9	Fencing, Cut Banks
DS-10	Grading of Slopes
DS-11	Required Setbacks
DS-12	Construction Plan Symbols
DS-13	Standard Street Sign

TYPICAL ROADWAY SECTION

SYMMETRICAL ABOUT CENTERLINE



TYPE OF ROAD OR STREET	R/W	ROADBED	TRAVELED WAY	SHOULDER	MEDIAN	PARKWAY STRIP
PRIME ARTERIAL TRAFFIC VOLUME OF 16,000 V.P.D. OR MORE	126'	106'	36'	8'	18'	10'
MAJOR ROAD TRAFFIC VOLUME 10,000 TO 16,000 V.P.D.	102'	82'	24'	8'	18'	10'
COLLECTOR ROAD TRAFFIC VOLUME 5,000 TO 10,000 V.P.D.	84'	64'	24'	8'	0'	10'
RESIDENTIAL COLLECTOR STREET TRAFFIC VOLUME FROM 150 TO 700 DWELLING UNITS	60'	40'	12'	8'	0'	10'
RESIDENTIAL STREET TRAFFIC VOLUME FROM 150 DWELLING UNITS OR LESS	56'	36'	12'	6'	0'	10'
RESIDENTIAL CUL-DE-SAC STREET TRAFFIC VOLUME FROM 20 UNITS OR LESS. 600' MAX. LENGTH	52'	32'	12'	4'	0'	10'
RESIDENTIAL LOOP STREET TRAFFIC VOLUME FROM 20 UNITS OR LESS. 600' MAX. LENGTH	52'	32'	12'	4'	0'	10'
*COMM. & IND. COLLECTOR STREET TRAFFIC VOLUME FROM COMMERCIAL OR INDUSTRIAL ST'S.	88'	68'	24'	10'	0'	10'
*COMM. & IND. STREET TRAFFIC VOLUME FROM ABUTTING COMMERCIAL LOTS	72'	52'	16'	10'	0'	10'
*COMM. & IND. CUL-DE-SAC STREET TRAFFIC VOLUME FROM ABUTTING COMMERCIAL LOTS	72'	52'	16'	10'	0'	10'
FRONTAGE ROAD ADJACENT TO FREEWAY RIGHT OF WAY		SEE	NOTE	No. 4		

*COMM. & IND. = COMMERCIAL & INDUSTRIAL

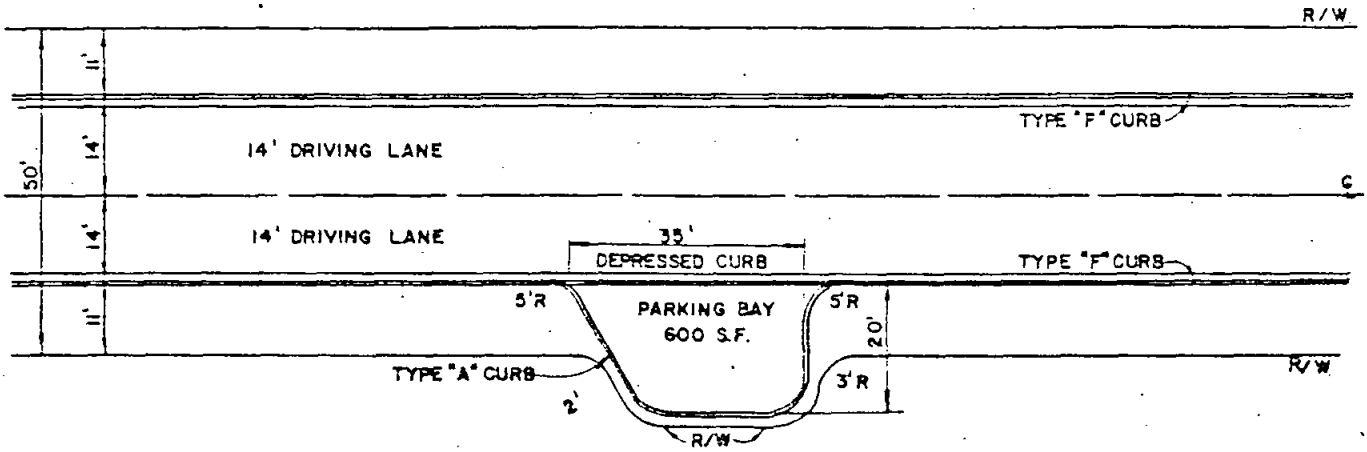
NOTE: 1. STREET CLASSIFICATIONS (EXCEPT PRIME ARTERIAL) AND TYPICAL ROADWAY SECTIONS FROM SAN DIEGO COUNTY TECHNICAL ROAD POLICY (JAN. 6, 1964).

2. PRIME ARTERIAL SECTION BASED UPON MINIMUM STANDARDS "NATIONAL COMMITTEE ON URBAN TRANSPORTATION".

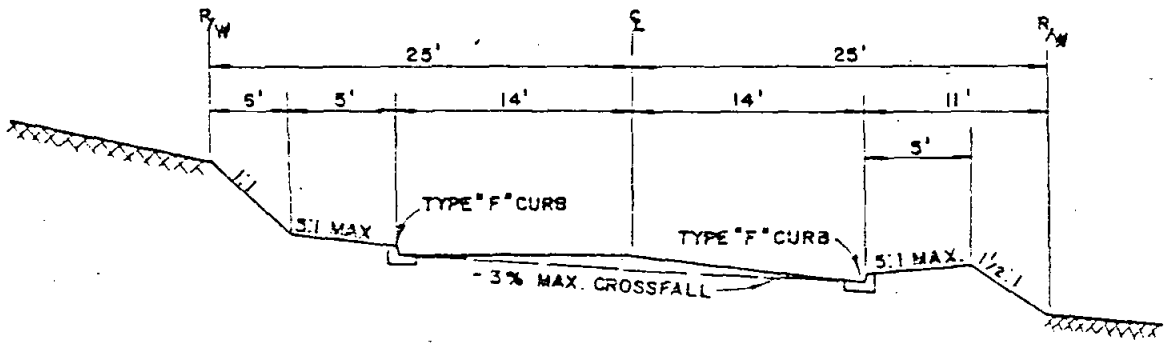
3. SEE SAN DIEGO COUNTY STANDARD DRAWINGS AND SAN DIEGO COUNTY TECHNICAL ROAD POLICY FOR SIDEWALK, CURB, AND ROADWAY REQUIREMENTS.

4. FRONTAGE ROAD ADJACENT TO FREEWAY R/W. TRAVELED WAY AND MEDIAN STANDARD FOR ROAD CLASSIFICATION AND/OR TRAFFIC VOLUME. SHOULDER ADJACENT TO FREEWAY 2'. PARKWAY STRIP ADJACENT TO FREEWAY VARIES FROM 4' TO 10'. SHOULDER AND PARKWAY STRIP AWAY FROM FREEWAY STANDARD FOR TRAFFIC VOLUME AND/OR ROAD CLASSIFICATION.

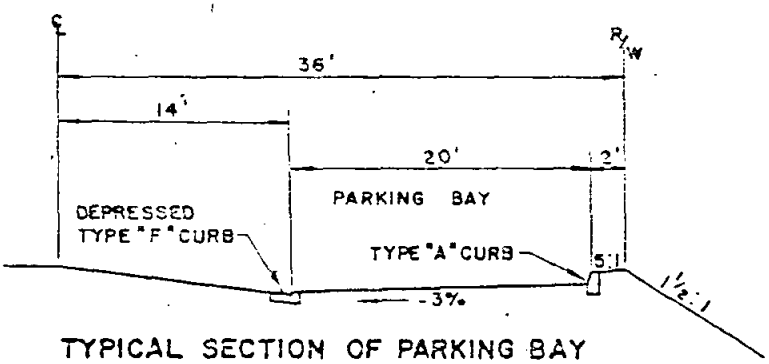
DRAWN BY ____ CHECKED BY ____	SAN DIEGO COUNTY DESIGN STANDARD	TITLE BLK
RECOMMENDED BY WPB		REVISION / BY / APPROVED / DATE
APPROVED BY COUNTY ENGINEER	TYPICAL ROADWAY SECTIONS	FORMERLY STANDARD DRAWING 310-3
R.C.E. 10358		NUMBER DS-1
DATE 7-12-73		



PLAN



TYPICAL ROADWAY SECTION

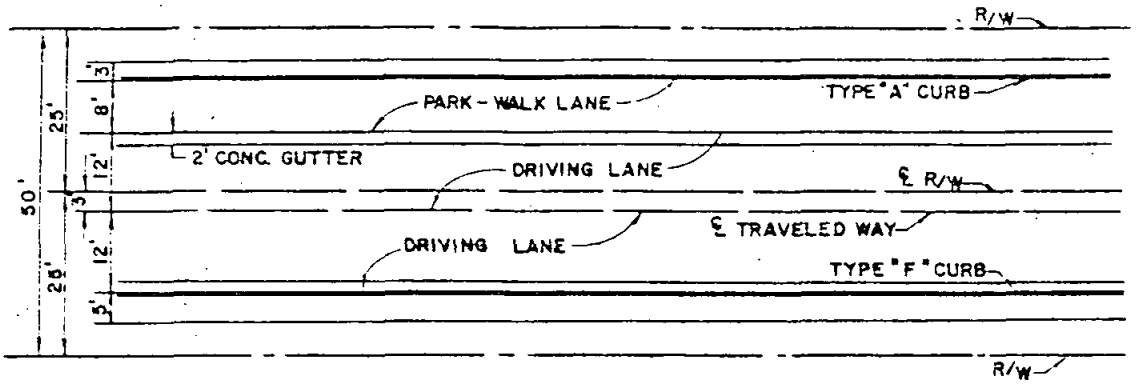


TYPICAL SECTION OF PARKING BAY

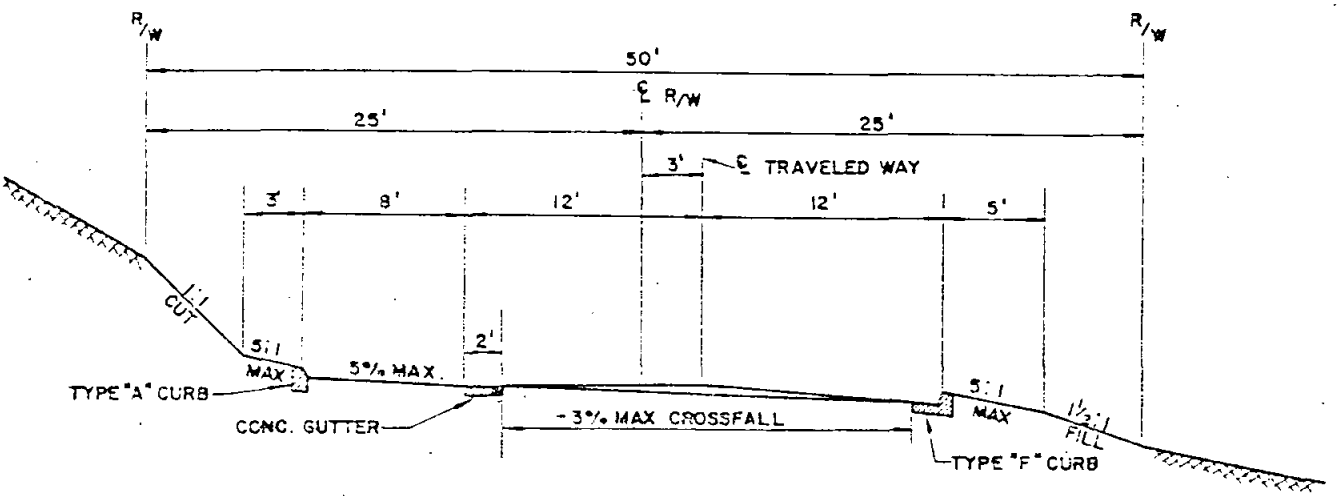
NOTES:

1. SEE SAN DIEGO COUNTY STANDARD DRAWINGS AND SAN DIEGO COUNTY TECHNICAL ROAD POLICY FOR CURB, SIDEWALK & ROADWAY REQUIREMENTS.
2. NATURAL SLOPE EXCEEDS 20% AS DEFINED IN SAN DIEGO COUNTY TECHNICAL ROAD POLICY SECT 4.22
3. REQUIRED: ONE 600 SQUARE FOOT PERPENDICULAR PARKING BAY PER LOT. THE SURVEYOR-ROAD COMMISSIONER MAY ALSO ESTABLISH ALTERNATE STANDARD TYPICAL SECTIONS WHICH WILL PROVIDE A MINIMUM OF TWO PARKING STALLS PER LOT.
4. USE OF THIS STREET SECTION LIMITED TO AREAS IN WHICH AT LEAST 80% OF THE LOTS HAVE A NET AREA NOT LESS THAN 20,000 SQUARE FEET.

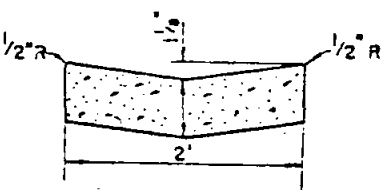
DRAWN BY ____ CHECKED BY ____	SAN DIEGO COUNTY DESIGN STANDARD	
RECOMMENDED BY		REVISION / BY / APPROVED / DATE
APPROVED BY COUNTY ENGINEER	HILLSIDE RESIDENTIAL STREET	FORMERLY STANDARD DRAWING 311-1
R.C.E. 10358	ALTERNATE No. 1	NUMBER DS-2
DATE 2/22/76		



PLAN



TYPICAL ROADWAY SECTION

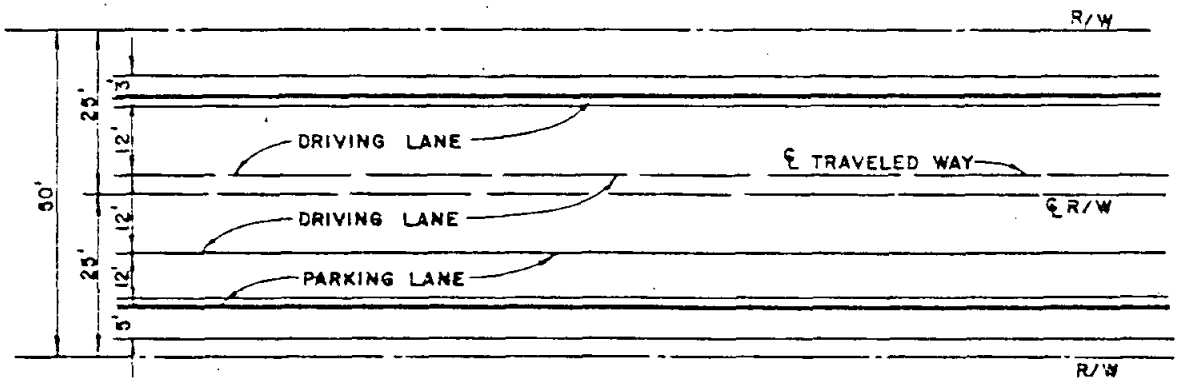


CONCRETE GUTTER DETAIL

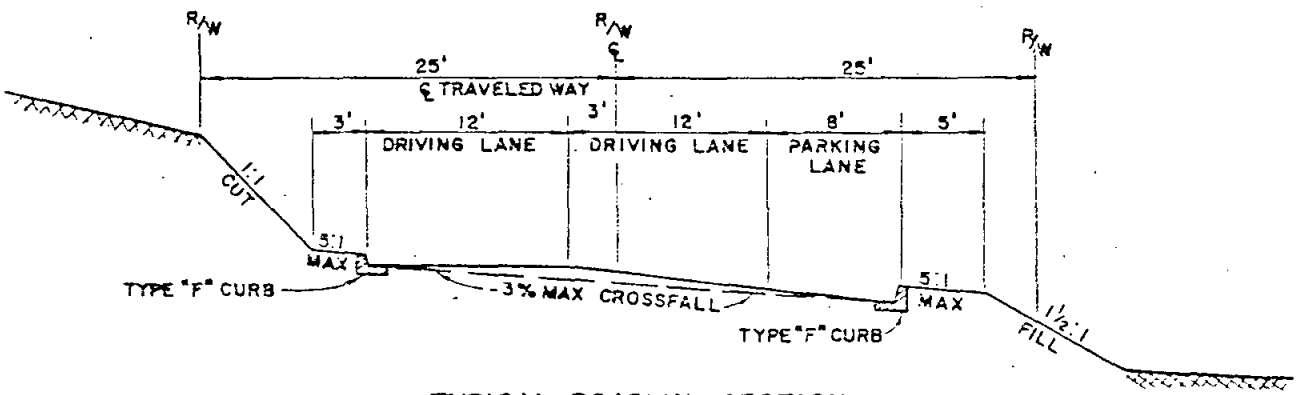
NOTES:

1. SEE SAN DIEGO COUNTY STANDARD DRAWINGS AND SAN DIEGO COUNTY TECHNICAL ROAD POLICY FOR CURB, SIDEWALK & ROADWAY REQUIREMENTS.
2. NATURAL SLOPE EXCEEDS 20% AS DEFINED IN SAN DIEGO COUNTY TECHNICAL ROAD POLICY SECT. 4.22
3. USE OF THIS STREET SECTION LIMITED TO AREAS IN WHICH AT LEAST 80% OF THE LOTS HAVE A NET AREA OF NOT LESS THAN 20,000 SQUARE FEET.
4. USE OF HILLSIDE RESIDENTIAL STREET STANDARDS ARE APPLICABLE ONLY TO STREETS CLASSIFIED AS, RESIDENTIAL, RESIDENTIAL CUL-DE-SAC, OR RESIDENTIAL LOOP STREETS AND ARE NOT APPLICABLE TO STREETS IN AREAS ZONED FOR COMMERCIAL, INDUSTRIAL OR MULTIPLE RESIDENTIAL USE.

DRAWN BY ____ CHECKED BY ____	SAN DIEGO COUNTY DESIGN STANDARD	
RECOMMENDED BY [illegible]		REVISION | BY | APPROVED | DATE
APPROVED BY COUNTY ENGINEER	HILLSIDE RESIDENTIAL STREET	FORMERLY STANDARD DRAWING 312-1
[illegible] R.C.E. 10359	ALTERNATE No. 2	NUMBER DS-3
DATE [illegible]		



PLAN

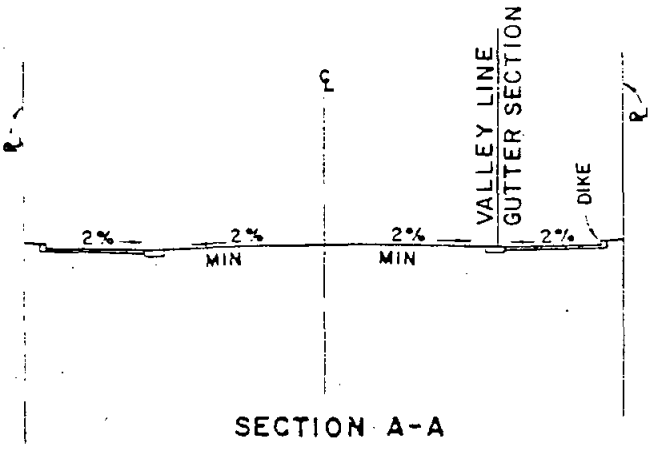


TYPICAL ROADWAY SECTION

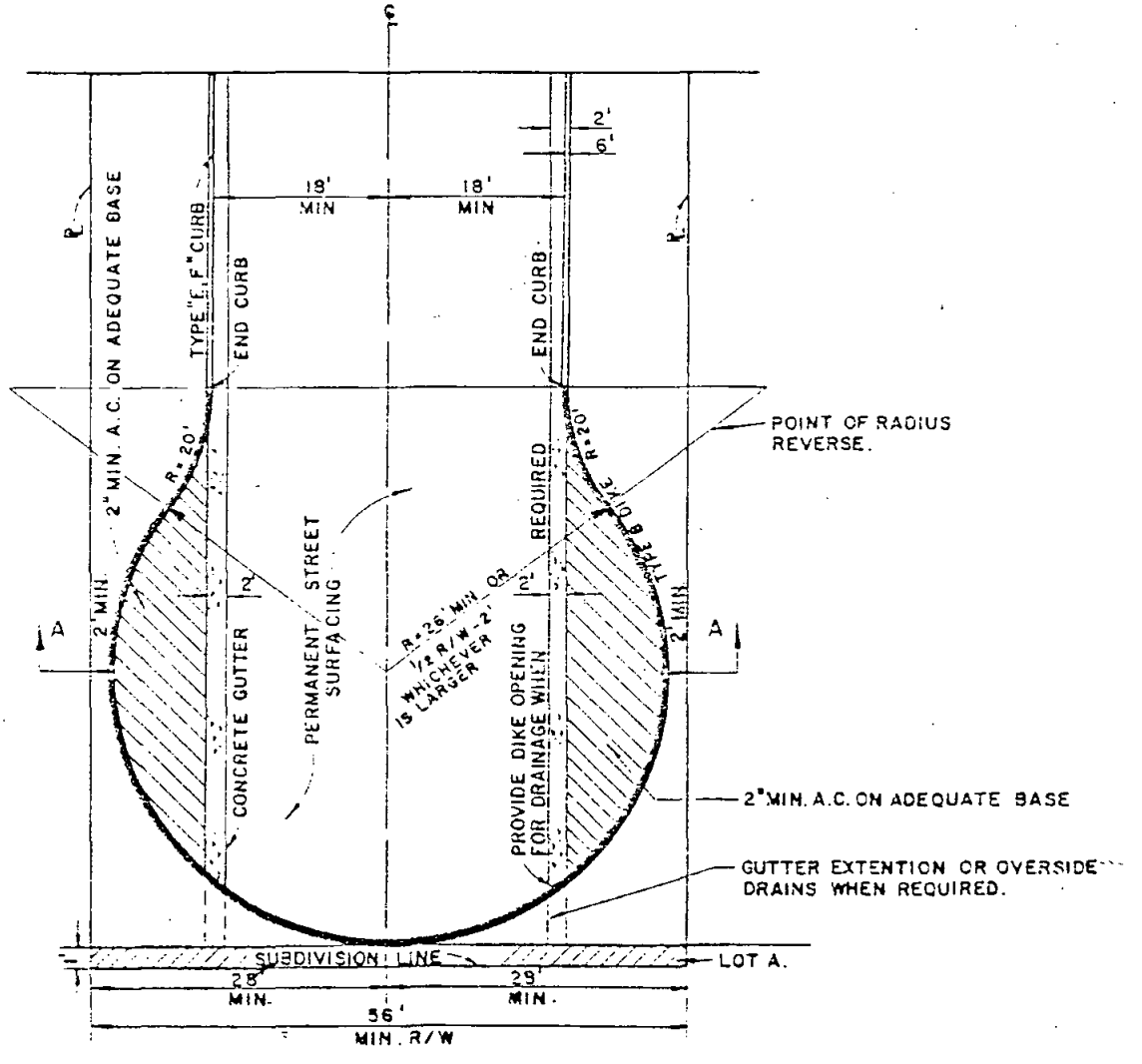
NOTES:

1. SEE SAN DIEGO COUNTY STANDARD DRAWINGS AND SAN DIEGO COUNTY TECHNICAL ROAD POLICY FOR CURB, SIDEWALK & ROAD REQUIREMENTS.
2. NATURAL SLOPE EXCEEDS 20% AS DEFINED IN SAN DIEGO COUNTY TECHNICAL ROAD POLICY SECT. 4.22.
3. USE OF THIS STREET SECTION LIMITED TO AREAS IN WHICH AT LEAST 80% OF THE LOTS HAVE A NET AREA OF NOT LESS THAN 20,000 SQUARE FEET.
4. USE OF HILLSIDE RESIDENTIAL STREET STANDARDS ARE APPLICABLE ONLY TO STREETS CLASSIFIED AS RESIDENTIAL, RESIDENTIAL CUL-DE-SAC, OR RESIDENTIAL LOOP STREETS AND ARE NOT APPLICABLE TO STREETS IN AREAS ZONED FOR COMMERCIAL, INDUSTRIAL OR MULTIPLE RESIDENTIAL USE.

DRAWN BY ____ CHECKED BY ____	SAN DIEGO COUNTY DESIGN STANDARD	
RECOMMENDED BY WTB		REVISION | BY | APPROVED | DATE
APPROVED BY COUNTY ENGINEER	HILLSIDE RESIDENTIAL STREET	FORMERLY STANDARD DRAWING 313-1
R.C.E. 10359	ALTERNATE No. 3	NUMBER DS-4
DATE 7/12/76		



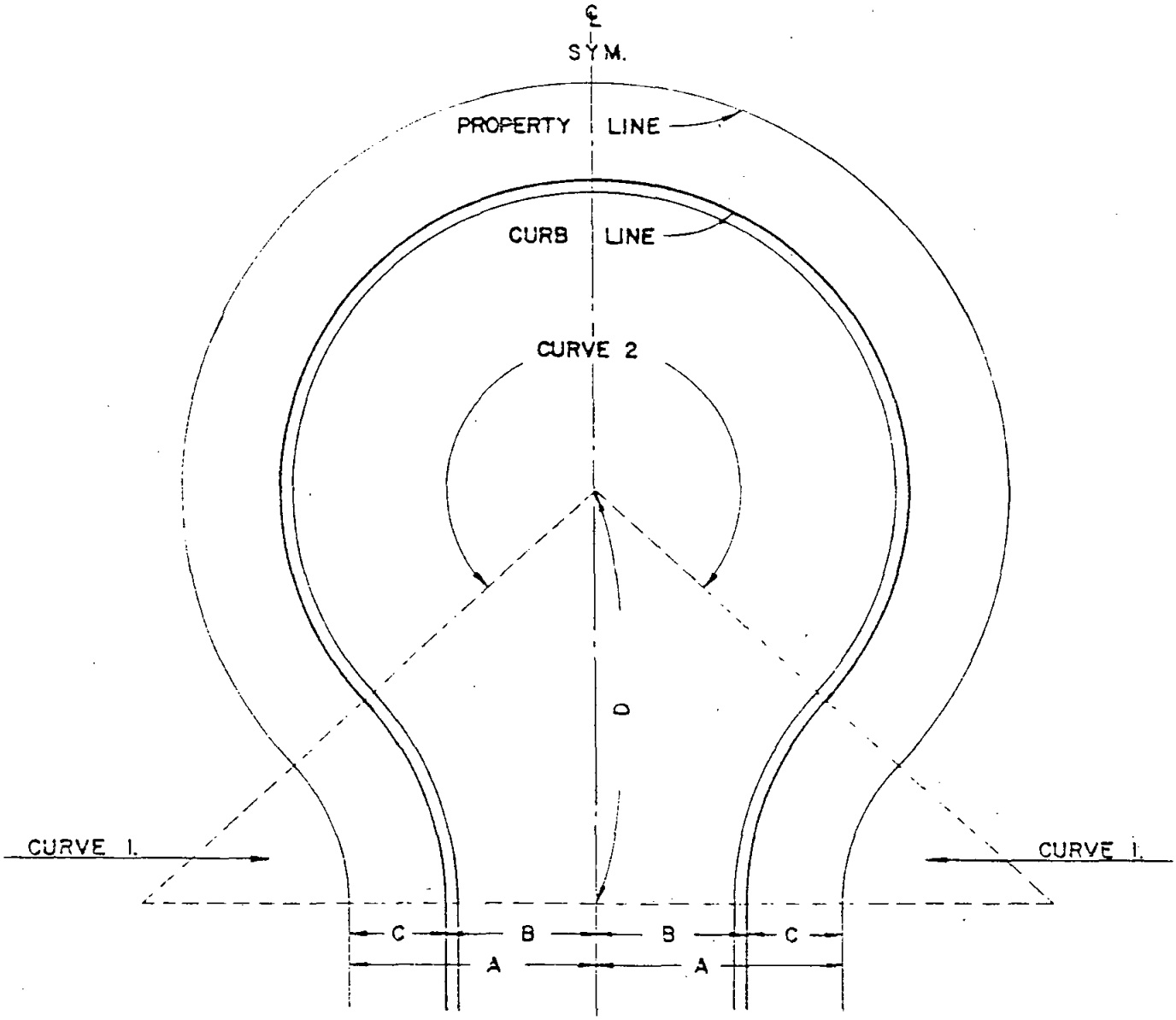
SECTION A-A



NOTE:

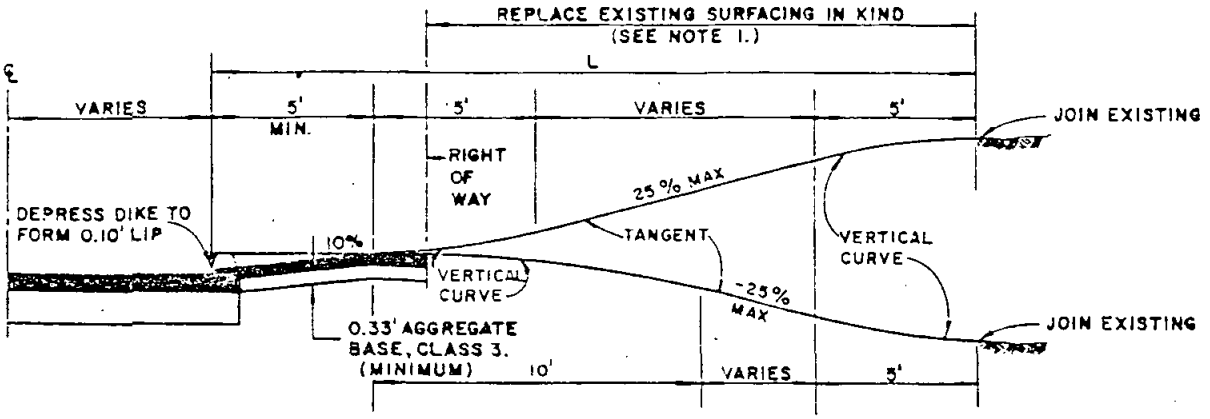
1. FOR USE ON EITHER 36' OR 40' WIDTH STREETS.

DRAWN BY ____ CHECKED BY ____	SAN DIEGO COUNTY DESIGN STANDARD	TITLE	
RECOMMENDED BY [signature]		REVISION / BY / APPROVED / DATE	
APPROVED BY COUNTY ENGINEER	TEMPORARY TURN-AROUND AT DEAD-END STREET	FORMERLY STANDARD DRAWING 314-1	
[signature] R.C.E. 10339		NUMBER DS-5	
DATE [illegible]			

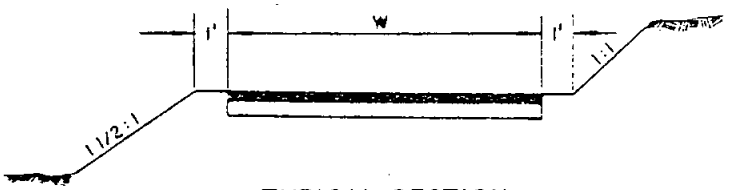


DIMENSIONS					CURVE 1.								CURVE 2				
R/W	A	B	C	D	△	CURB			PROP.				△	CURB		PROP.	
						R	L	T	R	L	T			R	L	R	L
52'	26'	16'	10'	50.95'	46°42' 30"	32'	26.09'	13.82'	22'	17.33'	9.50'		273°25' 00"	38'	181.34'	43'	229.06'
56'	28'	18'	10'	50.99'	42°50' 00"	37'	27.66'	14.52'	27'	20.18'	10.59'		255°40' 00"	38'	175.20'	48'	222.56'
60'	30'	20'	10'	68.15'	29°35' 31"	100'	51.65'	26.41'	90'	46.48'	23.77'		239°11' 02"	38'	158.63'	48'	200.33'
72'	36'	25'	10'	91.39'	32°31' 36"	100'	57.35'	29.49'	90'	51.62'	25.34'		245°43' 12"	50'	214.43'	60'	257.32'

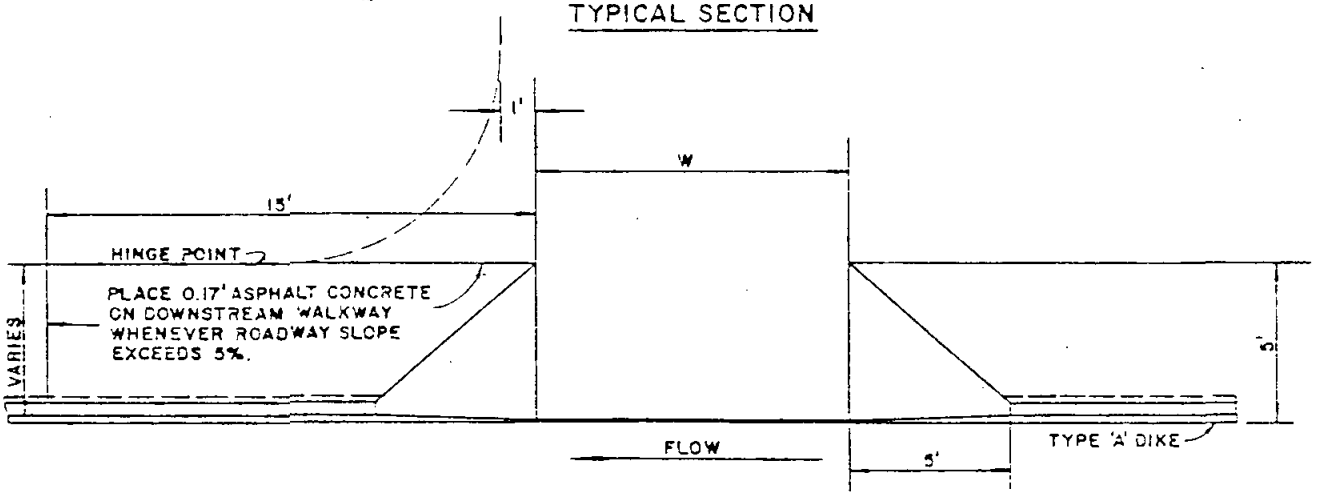
DRAWN BY ____ CHECKED BY ____	SAN DIEGO COUNTY DESIGN STANDARD	
RECOMMENDED BY [illegible]		REVISION | BY | APPROVED | DATE
APPROVED BY, COUNTY ENGINEER	TURNAROUND AND CALCULATIONS	FORMERLY STANDARD DRAWING 3C4-3
[illegible] R.C.E. 10359		NUMBER DS-6
DATE 2/26/76		



PROFILE



TYPICAL SECTION



PLAN

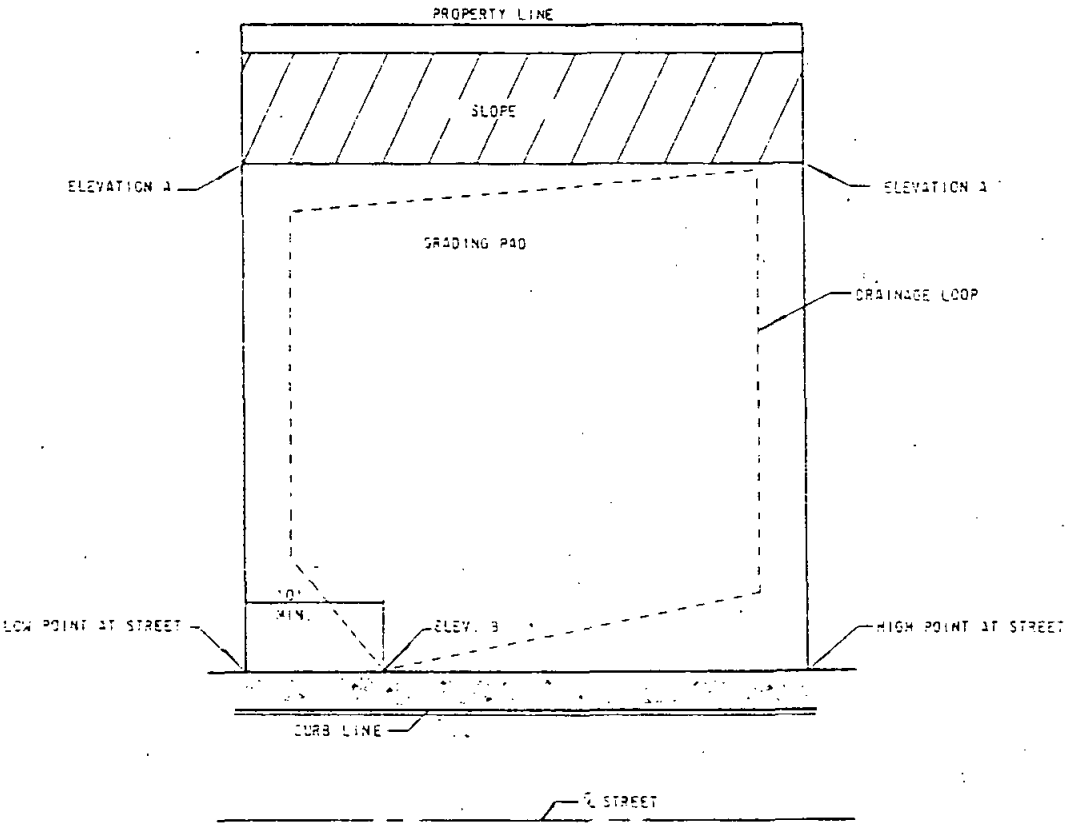
NOTES:

1. DRIVEWAYS WITH GRADES GREATER THAN 15% SHALL BE SURFACED WITH ASPHALT CONCRETE OR PORTLAND CEMENT CONCRETE.
2. MAXIMUM GRADE BREAK 14%.
3. SEE STANDARD DRAWING G - 14 FOR CONCRETE DRIVEWAYS.
4. SEE STANDARD DRAWING G-15 & G-16 FOR LOCATION & WIDTH REQUIREMENTS.

DRIVEWAY
PAVING SCHEDULE

DEPTH OF A.C.	GRADE
0.17'	0 - 15%
0.25'	15 - 20%
0.33'	20 - 25%

DRAWN BY ____ CHECKED BY ____	SAN DIEGO COUNTY DESIGN STANDARD	TITLE	
RECOMMENDED BY [signature]		% to V.C.	
APPROVED BY COUNTY ENGINEER		REVISION / BY / APPROVED / DATE	
[signature] R.C.E. 10358	ASPHALT CONCRETE DRIVEWAY	FORMERLY STANDARD DRAWING 227	
DATE 2/22/71		NUMBER DS - 7	

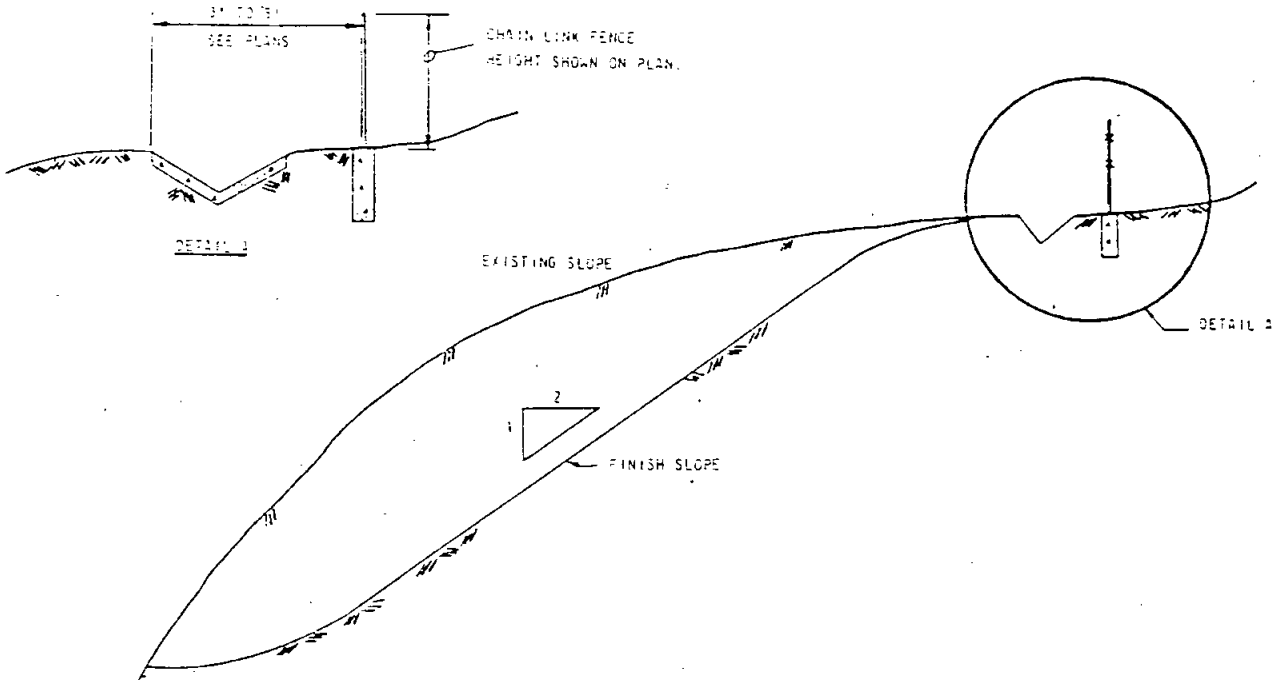


TYPICAL FINISHED GRADING

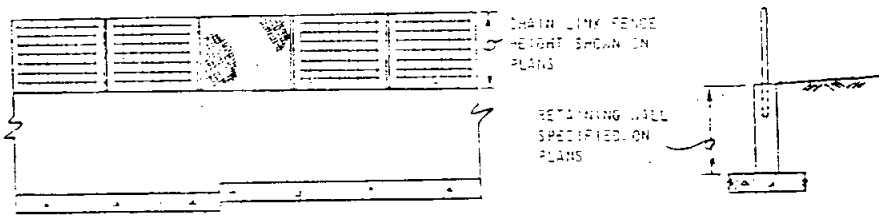
NOTES:

1. ELEV. A IS TO BE DETERMINED FOR THE MOST REMOTE CORNER OF THE LOT FROM THE DRAIN POINT. ELEV. A = ELEV. B PLUS 1% TIMES ONE-HALF THE PERIMETER OF THE LOT.
2. MIN. 1% SWALE TO STREET OR OTHER DISCHARGE POINT.
3. ALL SLOPE SURFACES TO BE PROTECTED BY APPROVED EROSION CONTROL.

DRAWN BY ____	CHECKED BY ____	SAN DIEGO COUNTY DESIGN STANDARD	
RECOMMENDED BY			REVISION | BY | APPROVED | DATE
APPROVED BY COUNTY ENGINEER		LOT GRADING	FORMERLY STANDARD DRAWING C-31
R.C.E. 10368			NUMBER DS-8
DATE			



FENCING CUT BANKS

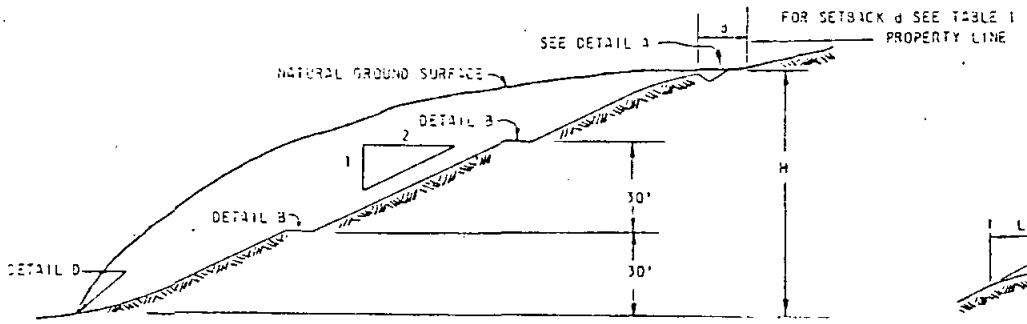


RETAINING WALL & CHAIN LINK FENCE
FOR WALL HEIGHTS GREATER THAN 4 FT.

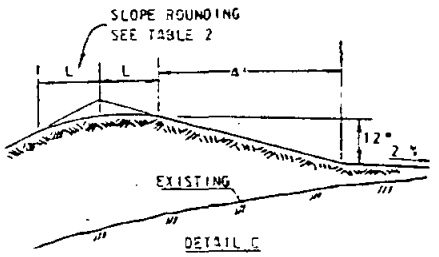
NOTES:

1. CHAIN LINK FENCE OR ALTERNATE ACCEPTABLE TO THE COUNTY ENGINEER SHALL BE INSTALLED ALONG THE TOP OF SLOPES EXCEEDING 15 FEET VERTICAL HEIGHT AND 3 TO 1 SLOPE RATIO, AND ALONG THE TOP OF WALLS EXCEEDING 4' VERTICAL HEIGHT.
2. RETAINING WALLS AND CHAIN LINK FENCE OR ALTERNATE SHALL BE CONSTRUCTED IN ACCORDANCE WITH COUNTY OF SAN DIEGO STANDARD SPECIFICATIONS.

DRAWN BY	CHECKED BY	SAN DIEGO COUNTY DESIGN STANDARD			
RECOMMENDED BY			REVISION	BY	APPROVED	DATE
APPROVED BY/COUNTY ENGINEER		FENCING CUT BANKS	FORMERLY STANDARD DRAWING 232T		
(R.C.E. 10359)			NUMBER DS-9		
DATE					

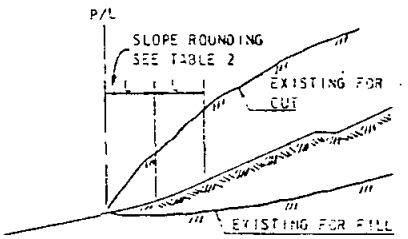


TYPICAL CUT SLOPE

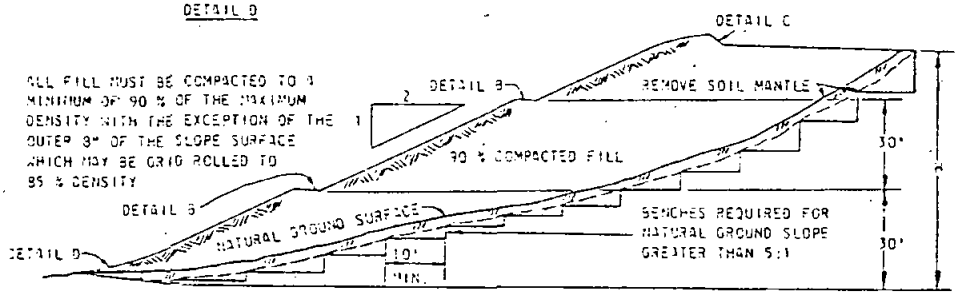


DETAIL C

TYPICAL BERM AT TOP OF ALL FILL SLOPES



DETAIL D



TYPICAL FILL SLOPE

TABLE 1
REQUIRED SETBACK

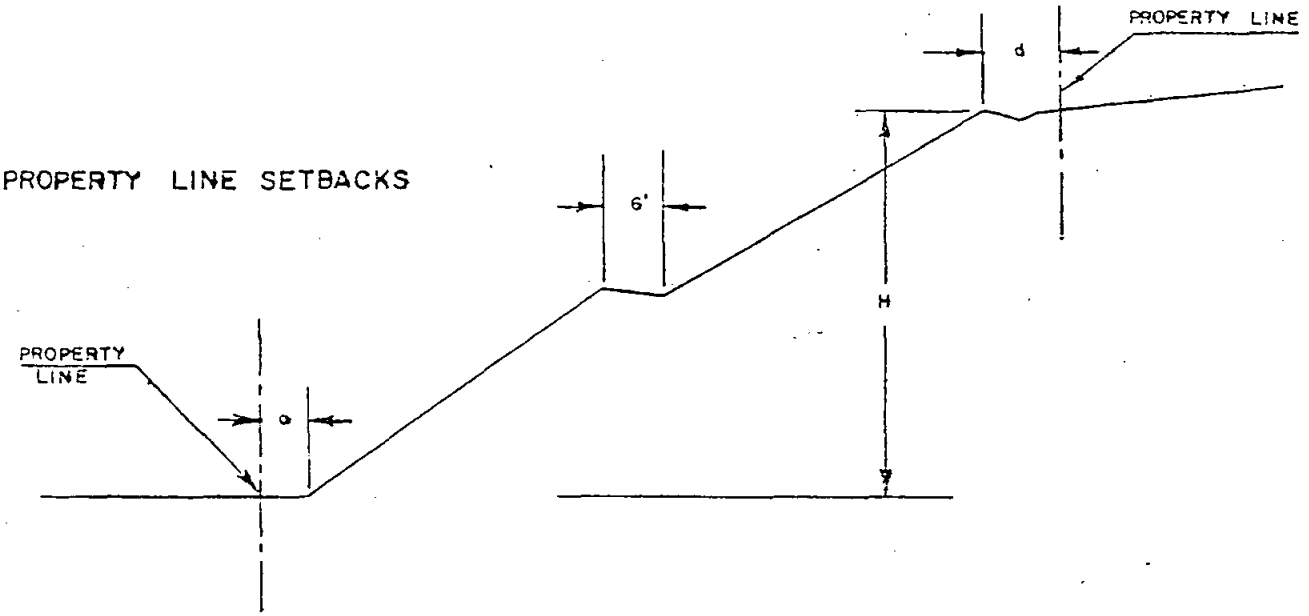
H FEET	d
0 - 15'	3'
OVER 15'	5'

TABLE 2
SLOPE ROUNDING

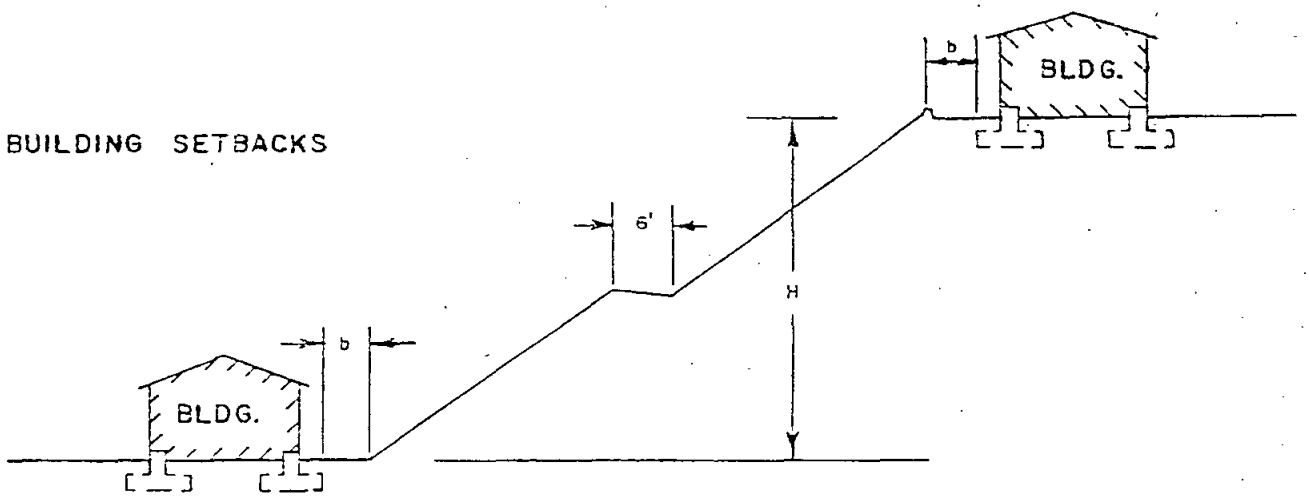
H FEET	L FEET
0' - 5'	-
5' - 20'	2.5'
20' - 40'	5'
OVER 40'	10'

DRAWN BY ____	CHECKED BY ____	SAN DIEGO COUNTY DESIGN STANDARD	TITLE BLK
RECOMMENDED BY WEB			
APPROVED BY COUNTY ENGINEER		GRADING OF SLOPES	REVISION / BY / APPROVED / DATE
[signature] R.C.E. 10358			FORMERLY STANDARD DRAWING 208-1T
DATE 2/24/76			NUMBER DS - 10

PROPERTY LINE SETBACKS



BUILDING SETBACKS



REQUIRED SETBACKS			
H FEET	a	b	d
0 - 15	1' - 6"	5'	3'
15 - 30	3'	5'	5'
OVER 30	5'	5'	5'

a. DISTANCE FROM TOE OF SLOPE TO PROPERTY LINE

b. DISTANCE FROM EDGE OF FOUNDATION TO TOE OR TOP OF SLOPE.

d. DISTANCE FROM TOP OF SLOPE TO PROPERTY LINE.

H. TOTAL SLOPE HEIGHT MEASURED VERTICALLY.

DRAWN BY ____ CHECKED BY ____	SAN DIEGO COUNTY DESIGN STANDARD		
RECOMMENDED BY		REVISION	BY	APPROVED	DATE
APPROVED BY COUNTY ENGINEER	REQUIRED SETBACKS	FORMERLY STANDARD DRAWING 209	
R.C.E. 10358		NUMBER	DS - 11
DATE			

PROPOSED CONSTRUCTION

LINES

* INDICATES CENTER LINE ESTABLISHED IN ACCORDANCE WITH S.D. COUNTY CODE, DIV. 3 OF TITLE 7.

- ULTIMATE CENTERLINE (℄)* — RS XXXX-X 35
- STAGE CONSTRUCTION LINE — 1" .5" 35
- INTERSECTING ROADS & STREETS — 2 PER INCH
- RIGHT OF WAY LINE
- EQUATION OR RADIUS LINE — 4 PER INCH
- OFFSET TIE — 8-10 PER INCH
- GRADE LINES ON PROFILES — 2% VC -1.8%
- GROUND LINES ON PROFILES — FREEHAND; EXIST. PAVEMENT; NAT. GROUND
- SLOPE LIMIT LINES — 5 PER INCH; C/F; 10 PER INCH

POINTS

- B C & E C — BC or EC
- P I OR ANGLE PT. — 5/32"
- ℄ MONUMENT — 3/32" 5/32"
- BENCH MARK — 5/32"

CONSTRUCTION

- PAVEMENT EDGE & SHOULDERS — PAVEMENT; SHOULDER
- A C DIKE (LABEL TYPE)
- CURB & GUTTER (LABEL TYPE)
- CULVERT
- DOWNDRAIN, A C SPILLWAY
- DROP INLET
- BOX CULVERT
- HEADWALL, STANDARD
- HEADWALL "L" TYPE
- HEADWALL & WINGWALL
- GUARD RAIL
- DRIVEWAY APRONS A C
- UTILITY DUCT (LABEL)
- DRIVEWAY APRONS P C C
- CONCRETE CROSS GUTTER
- SIDEWALK
- RETAINING WALL
- FENCE (LABEL TYPE)
- DITCH, LINED
- DITCH, UNLINED
- BRIDGE

UTILITIES

- GAS LINE — SIZE G
- WATER LINE — SIZE W
- ELECTRIC CABLE — E
- TELEPHONE CABLE — T
- SEWER LINE — SIZE S
- UTILITY MANHOLE — (LABEL)

UNDERGROUND ONLY

STRUCTURAL SYMBOLS

- PORTLAND CEMENT CONCRETE
- ASPHALT CONCRETE (EXISTING)
- ROAD OIL MIX OR ASPHALT CONCRETE SURFACING
- BASE MATERIAL — LABEL; CLASS 5 THICKNESS
- ORIGINAL GROUND

MISCELLANEOUS SYMBOLS

- CONTRACTED LINE (NOT TO SCALE)
- LIMIT ARROWS
- PROJECT, WORK LIMIT
- CUTTING PLANE

CADASTRAL SYMBOLS

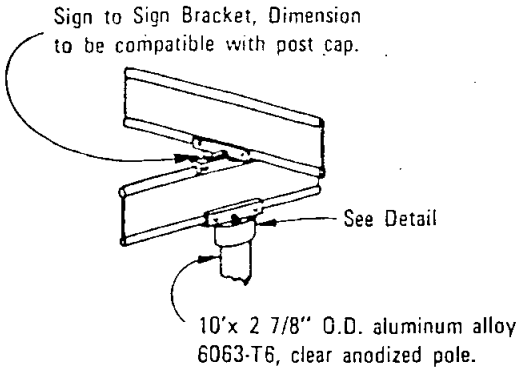
LAND LINES

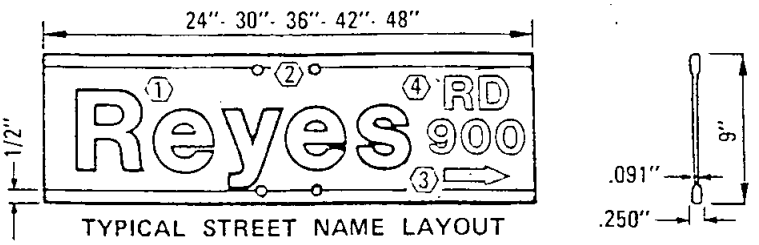
- TOWNSHIP LINES — LABEL
- SECTION LINES — LABEL
- GRANT LINE (RHO BOUNDARY OR INDIAN RESERVATION) — LABEL
- SUBDIVISION BOUNDARY LINE — LABEL
- CITY / COUNTY BOUNDARY LINE — COUNTY; CITY
- PROPERTY LINE
- LOT LINE
- EASEMENT LINE

SECTION CORNER	SECTION CENTER	1/4 SECTION N – S	1/4 SECTION E – W
2 | 1	SEC	5	6 – 5
11 | 12	10	8	

BASIS OF BEARING — CALIFORNIA COORDINATE SYSTEM ZONE VI

DRAWN BY ____	CHECKED BY ____	SAN DIEGO COUNTY DESIGN STANDARD	TITLE
RECOMMENDED BY WEB			REVISION | BY | APPROVED | DATE
APPROVED BY COUNTY ENGINEER		CONSTRUCTION PLAN SYMBOLS	FORMERLY STANDARD DRAWING
R.C.E. 10358			NUMBER DS-12
DATE 12-6-72			

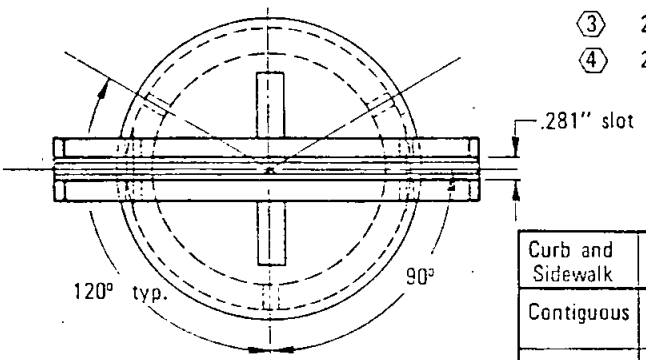




TYPICAL STREET NAME LAYOUT

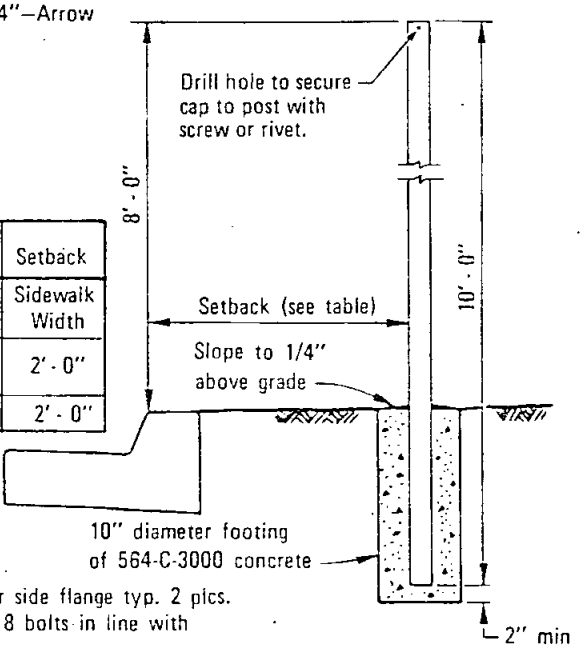
Typical layout of legend and border on variable length sign blade of extruded aluminum with reverse screened reflective sheeting engineering grade. White letters and border on green background.

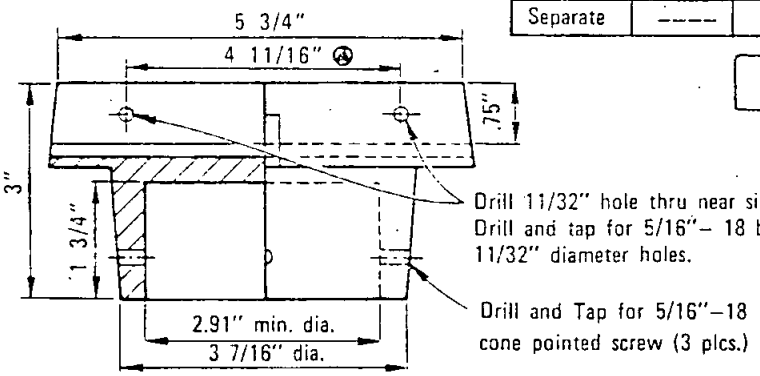
1. 5"–U.C., 3 3/4"–L.C.
2. 4 11/16" spacing of two 11/32" holes centered on both top and bottom edge of blade to match holes in sign bracket assemblies.
3. 2" x 2 3/4"–Arrow
4. 2"–U.C.



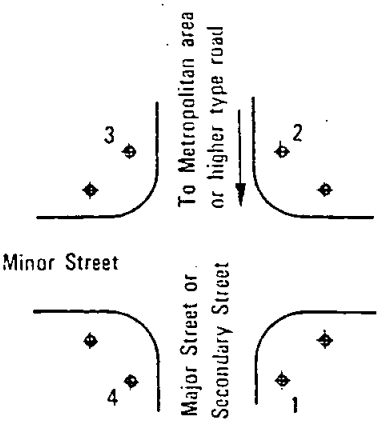
POST CAP DETAIL

Curb and Sidewalk	Sidewalk Width	Setback
Contiguous	6' or less	Sidewalk Width
Contiguous	more than 6'	2'-0"
Separate	----	2'-0"





HALF–SECTION DETAIL



STREET NAME–SIGN LOCATION
(numbers indicate priority of location selection)

NOTES

1. ✪ denotes 4 11/16" spacing shall match the holes in the extruded blades.
2. Bracket to be die cast aluminum.
3. All attaching screws shall be vandal proof type.

DRAWN BY CR.	CHECKED BY	SAN DIEGO COUNTY DESIGN STANDARD
RECOMMENDED BY RF Walsh		
APPROVED BY COUNTY ENGINEER		STANDARD STREET SIGN
R.C.E. 10358		
DATE 10/6/76		

CAP DIM.	C.J.	D. S.	12/2/76
REVISION	BY	APPROVED	DATE
FORMERLY STANDARD DRAWING 301-2			
NUMBER	DS–13		

STATE COORDINATE FACTORS FOR CONVERTING GROUND DISTANCES TO GRID DISTANCES

ELEVATION FACTOR

FORMULA IN SPECIAL PUBLICATION Nº 235, PAGE 18.

$F = 1 - \frac{H}{R}$

H = ELEVATION (AVG. FOR SHORT JOBS)
R = 20,906,000' (RADIUS OF EARTH)

$\frac{H}{R} = \frac{\quad}{20,906,000} = \frac{1.00000000}{\boxed{\quad}}$ *

SCALE FACTOR

Y COORDINATE AT POINT = , , .

Y Coord.

a	° ' =	,	.
b	° ' =	,	.
c	Diff. =	,	.

↗	Y COORD. =	,	.
b	° ' =	,	.
d	Diff. =	,	.

$\frac{d}{c} = \frac{\quad , \quad .}{\quad , \quad .} = \boxed{e \; .}$

SCALE

b	° ' =	.	
a	° ' =	.	
f	Diff. =	.	

SF = (b) − [(f)(e)]

f =	.
e =	.
(f)(e) =	.

b =	.
(f)(e) =	.
SF =	.

*

COMBINED FACTOR

$\boxed{\quad . \quad \times \quad . \quad} = \boxed{\quad . \quad}$

DRAWN BY	SAN DIEGO COUNTY ENGINEER DEPARTMENT DESIGN STANDARDS	REVISION	BY	APPROVED	DATE
CHECKED BY					
RECOMMENDED BY					
APPROVED BY	GRID DISTANCES	DRAWING NUMBER			
PRINCIPAL CIVIL ENG. OFF.					
DATE					

TABLE of OFFSETS from TANGENT for CIRCULAR CURVES

RADIUS	DISTANCE FROM EC OR BC (ALONG TANGENTS)												
	50'	100'	150'	200'	250'	300'	400'	500'	600'	700'	800'	900'	1000'
20,000	0.05	0.25	0.56	1.00	1.56	2.25	4.00	6.25	9.00	12.25	16.01	20.26	25.02
15,000	0.08	0.33	0.75	1.33	2.08	3.00	5.33	8.34	12.01	16.34	21.35	27.02	33.37
10,000	0.13	0.50	1.13	2.00	3.13	4.50	8.00	12.51	18.02	24.53	32.05	40.58	50.13
9,000	0.14	0.56	1.25	2.22	3.47	5.00	8.89	13.90	20.02	27.26	35.62	45.11	55.73
8,000	0.16	0.63	1.41	2.50	3.91	5.63	10.01	15.64	22.53	30.69	40.10	50.79	62.75
7,000	0.18	0.71	1.61	2.86	4.47	6.43	11.44	17.88	25.76	35.09	45.87	58.10	71.80
6,000	0.21	0.83	1.88	3.33	5.21	7.51	13.35	20.87	30.08	40.97	53.57	67.88	83.92
5,000	0.25	1.00	2.25	4.00	6.25	9.01	16.03	25.06	36.13	49.24	64.42	81.67	101.02
4,500	0.28	1.11	2.50	4.45	6.95	10.01	17.81	27.86	40.18	54.76	71.69	90.92	112.52
4,000	0.31	1.25	2.81	5.00	7.82	11.27	20.05	31.37	45.26	61.73	80.82	102.57	127.02
3,500	0.36	1.43	3.22	5.72	8.94	12.88	22.93	35.90	51.81	70.71	92.66	117.69	145.90
3,000	0.42	1.67	3.75	6.67	10.44	15.04	26.79	41.95	60.61	82.81	108.63	138.13	171.57
2,500	0.50	2.00	4.50	8.01	12.53	18.07	32.20	50.51	73.07	100.00	131.46	167.62	208.71
2,000	0.63	2.50	5.63	10.03	15.69	22.63	40.41	63.51	92.12	126.50	166.97	213.94	267.95
1,800	0.70	2.78	6.26	11.15	17.45	25.18	45.01	70.84	102.94	141.69	187.55	241.15	303.34
1,700	0.74	2.94	6.63	11.81	18.48	26.68	47.73	75.19	109.40	150.81	200.00	257.79	325.23
1,600	0.78	3.12	7.05	12.55	19.65	28.38	50.81	80.13	116.76	161.25	214.36	277.12	351.00
1,500	0.83	3.34	7.52	13.39	20.98	30.31	54.32	85.79	125.23	173.35	231.14	300.00	
1,400	0.89	3.58	8.06	14.35	22.50	32.52	58.36	92.33	135.09	187.55	251.09	327.61	
1,300	0.96	3.85	8.68	15.46	24.27	35.09	63.07	100.00	146.74	204.56	275.31		
1,250	1.00	4.01	9.03	16.10	25.26	36.53	65.73	104.36	153.41	214.39	289.53		
1,200	1.04	4.17	9.41	16.78	26.33	38.11	68.63	109.13	160.77	225.32	305.57		
1,100	1.14	4.56	10.28	18.34	28.79	41.70	75.31	120.20	178.05	251.47			
1,000	1.25	5.01	11.31	20.20	31.75	45.06	83.49	133.98	200.00	285.86			
900	1.39	5.57	12.59	22.50	35.42	51.47	93.77						
800	1.56	6.28	14.19	25.40	40.07	58.38	107.18						
750	1.67	6.70	15.15	27.16	42.89	62.61							
700	1.79	7.18	16.26	29.18	46.17	67.54							
650	1.93	7.74	17.54	31.53	50.00	73.37							
600	2.09	8.39	19.05	34.32	54.56	80.39							
550	2.28	9.17	20.85	37.65	60.10								
500	2.51	10.10	23.03	41.74	66.99								
450	2.79	11.25	25.74	46.89									
400	3.14	12.70	29.19	53.59									
300	4.20	17.16	40.19										
200	6.35	25.60	67.71										
100	13.40												

DERIVATION of TABLE

GIVEN: R & X
SOUGHT: OFFSET Y

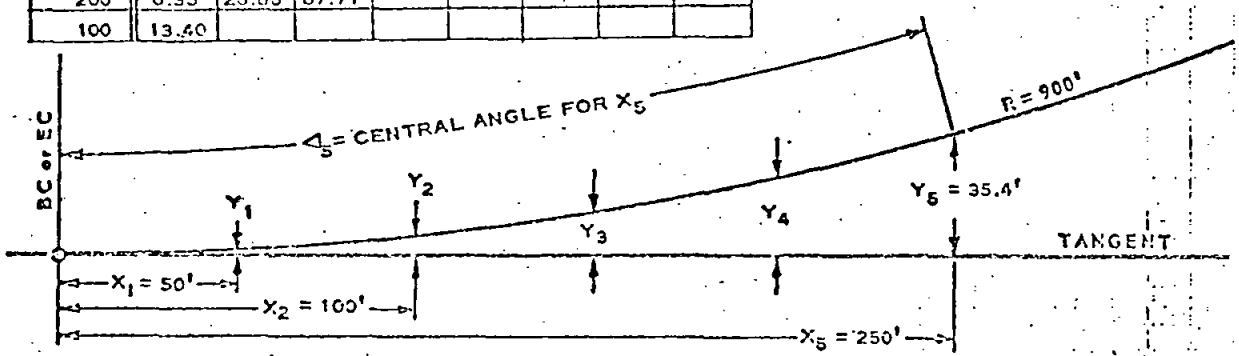
(1) $\sin \Delta = \frac{X}{R}$

(2) $Y = R \text{ VERS } \Delta = R\,(1 - \cos \Delta)$

GIVEN: Y & X
SOUGHT: R

(1) $\tan \frac{\Delta}{2} = \frac{Y}{X}$

(2) $R = \frac{X}{\sin \Delta}$



NOTE: — For approx. results the simpler formula ($Y = \frac{X^2}{2R}$) may be used. (The error is 1% when X = 0.2 R)

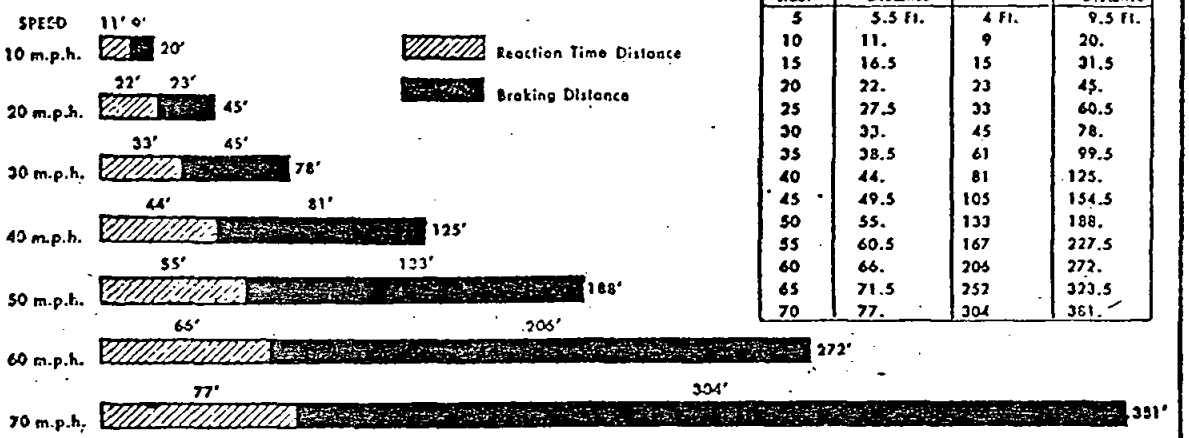
This table may be used for other Radii by moving decimal equally in R, X, & Y.

DRAWN BY	SAN DIEGO COUNTY ENGINEER DEPARTMENT DESIGN STANDARDS	REVISION	BY	APPROVED
CHECKED BY				
RECOMMENDED BY				
APPROVED BY PRINCIPAL CIVIL ENG. OFF. DATE	CURVE TANGENT OFFSETS	DRAWING NUMBER		

SPEED AND DISTANCE CHART

MINIMUM STOPPING DISTANCES AT DIFFERENT SPEEDS

(To nearest half foot) Reaction Time 0.75 second



Miles Per Hour	Reaction-Time Distance	Braking Distance	Total Stopping Distance
5	5.5 Ft.	4 Ft.	9.5 Ft.
10	11.	9	20.
15	16.5	15	31.5
20	22.	23	45.
25	27.5	33	60.5
30	33.	45	78.
35	38.5	61	99.5
40	44.	81	125.
45	49.5	105	154.5
50	55.	133	188.
55	60.5	167	227.5
60	66.	206	272.
65	71.5	252	323.5
70	77.	304	381.

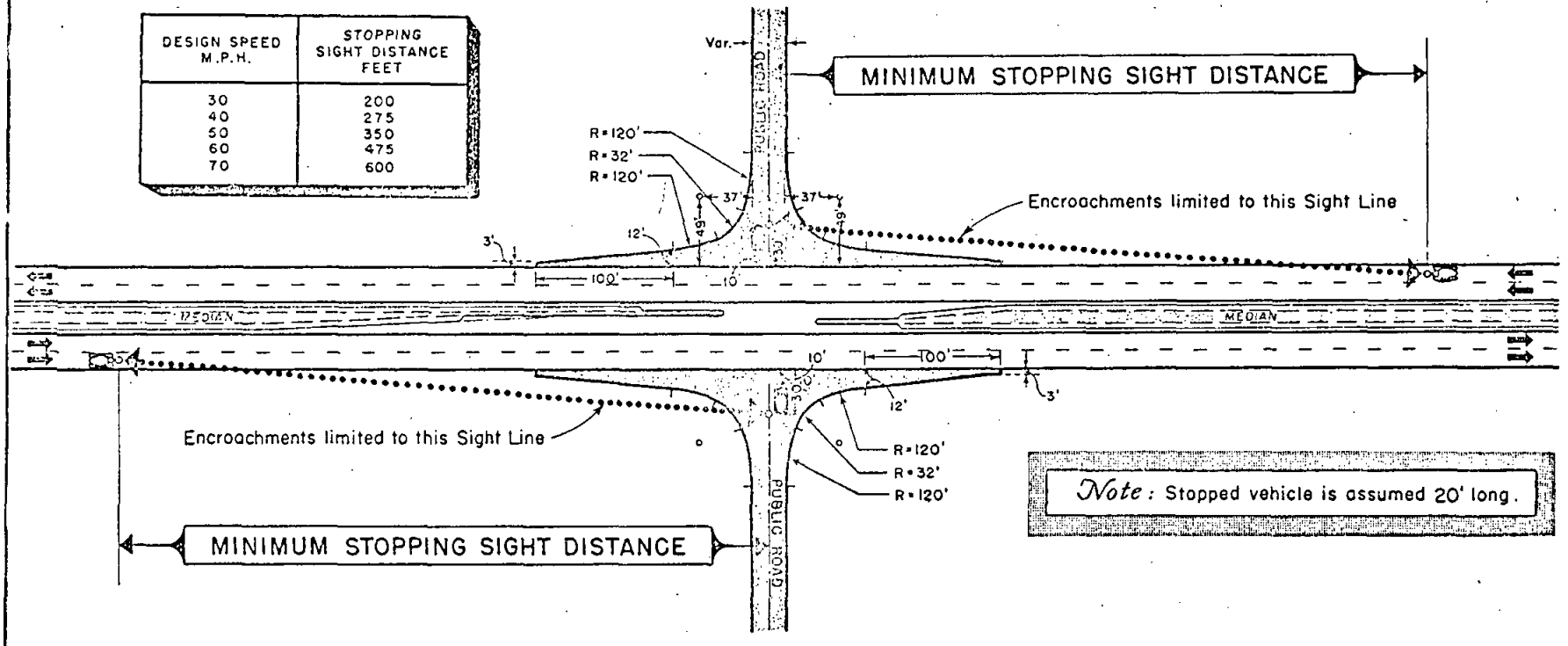
Minimum Stopping Distance in Feet

Source: Sportsmanlike Driving, 3rd Ed. American Automobile Association

Prepared by Public Safety Department
AUTOMOBILE CLUB OF SOUTHERN CALIFORNIA

DRAWN BY	SAN DIEGO COUNTY ENGINEER DEPARTMENT DESIGN STANDARDS	REVISION	BY	APPROVED	DATE
CHECKED BY					
RECOMMENDED BY					
APPROVED BY PRINCIPAL CIVIL ENG. OFF.	SPEED AND DISTANCE CHART	DRAWING NUMBER			
DATE					

DESIGN SPEED M.P.H.	STOPPING SIGHT DISTANCE FEET
30	200
40	275
50	350
60	475
70	600



Note: Stopped vehicle is assumed 20' long.

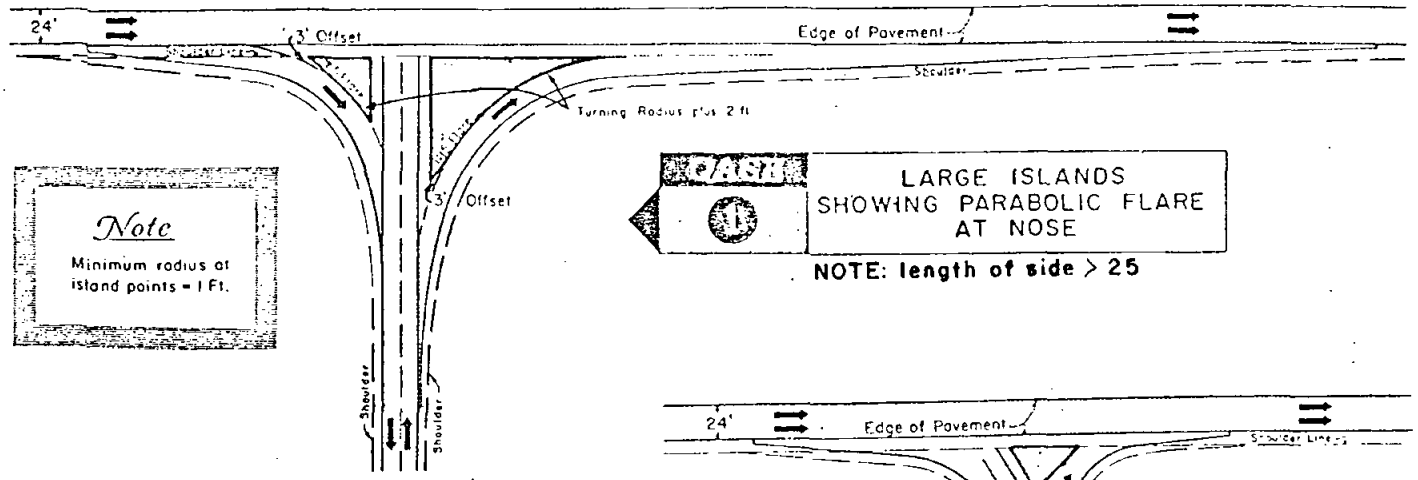
REVISION	BY	APPROVED	TE

DRAWING NUMBER

SAN DIEGO COUNTY ENGINEER DEPARTMENT
DESIGN STANDARDS

INTERSECTION SIGHT DISTANCE

DRAWN BY
CHECKED BY
RECOMMENDED BY
APPROVED BY
PRINCIPAL CIVIL ENG. OFF.
DATE



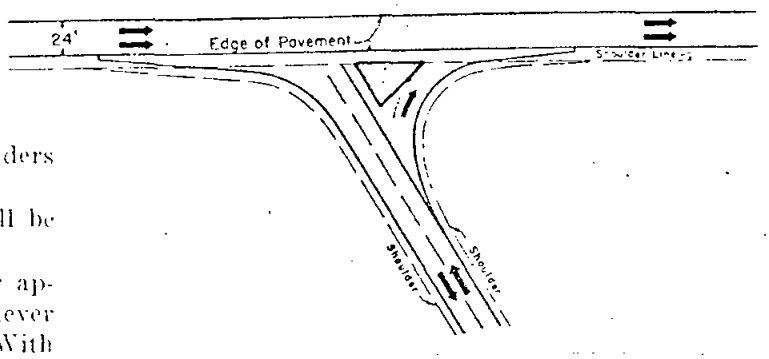
Note

Minimum radius at island points = 1 Ft.

CASE 1

LARGE ISLANDS SHOWING PARABOLIC FLARE AT NOSE

NOTE: length of side > 25



NOTE: length of side < 25

CASE 2

ISLAND TOO SHORT FOR PARABOLIC FLARE

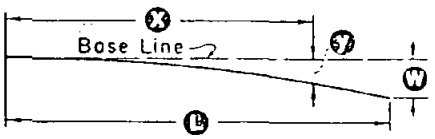
Traffic Islands

Traffic islands shall not encroach on the shoulders of the through facility.

In general, curbs outlining traffic islands shall be a mountable type.

At separate turning lanes, island noses facing approaching traffic shall be offset and flared whenever the curbs are offset less than the shoulder width. With reference to the normal curb line, noses on the left of traffic shall be offset 3 feet and noses on the right shall be offset 5 feet. Table gives standard parabolic flares to be used in island design. On curved alignment, parabolic flares may be omitted for small triangular traffic islands whose sides are less than 25 feet long. (See Case 2)

Parabolic Curb Flares Commonly Used



$$y = \frac{WX^2}{L^2}$$

L = Length of flare in feet
W = Maximum offset in feet
X = Distance along base line in feet
Y = Offset from base line in feet

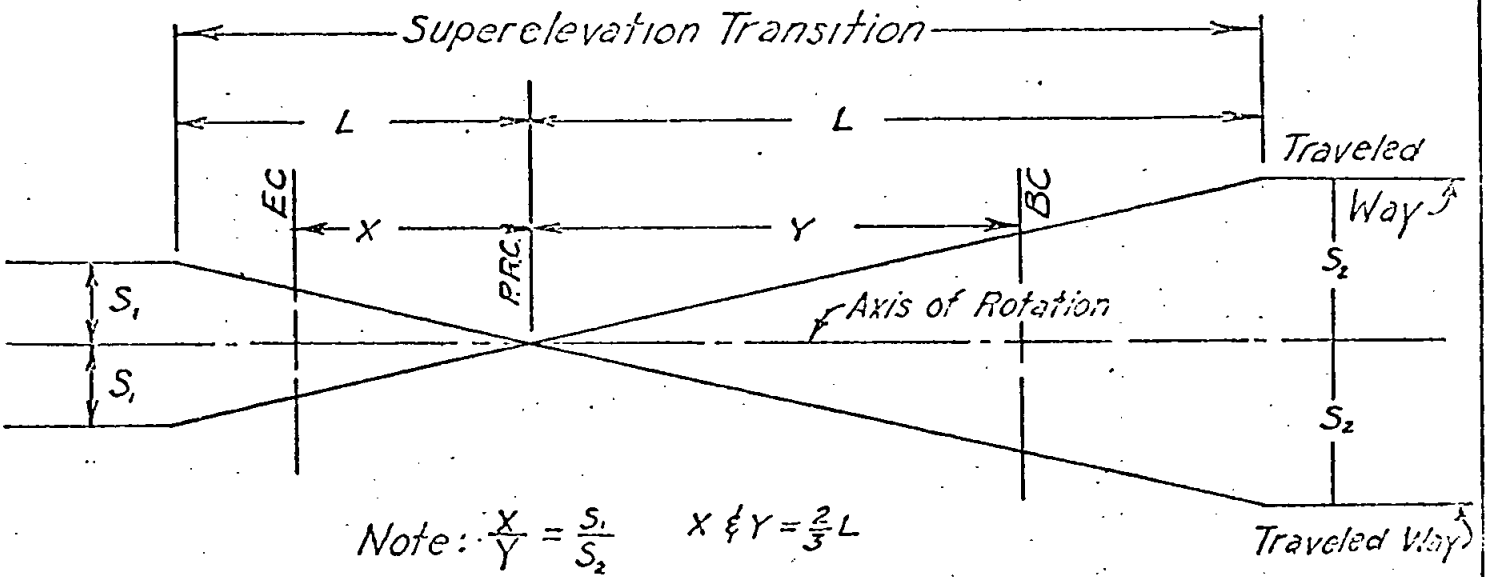
W is shown in table thus 5.00

OFFSET IN FEET FOR GIVEN 'x' DISTANCE

Length of flare (L) \ Distance (X)	10	15	20	25	30	40	45	50	60	70	75	80	90	100	110	120
1.5 FLARES																
25	0.80	1.80	3.20	5.00												
50	0.40		1.60		3.60	6.40		10.00								
1.0 FLARES																
50	0.20		0.80		1.80	3.20		5.00								
100	0.10		0.40		0.90	1.60		2.50	3.60	4.90		6.40	8.10	10.00		
0.75 FLARES																
45	0.15		0.59		1.33	2.37	3.00		-							
75	0.09		0.36		0.80	1.42		2.22	3.20	4.36	5.00					
90	0.07		0.30		0.67	1.19		1.85	2.67	3.63		4.74	6.00			
120	0.06		0.22		0.50	0.89		1.39	2.00	2.72		3.56	4.50	5.56	6.72	8.00

DRAWN BY	SAN DIEGO COUNTY ENGINEER DEPARTMENT DESIGN STANDARDS	REVISION	BY	APPROVED	DATE
CHECKED BY					
RECOMMENDED BY					
APPROVED BY	TYPICAL ISLAND DESIGNS	DRAWING NUMBER			
PRINCIPAL CIVIL ENG. OFF.					
DATE					

SUPERELEVATION TRANSITION



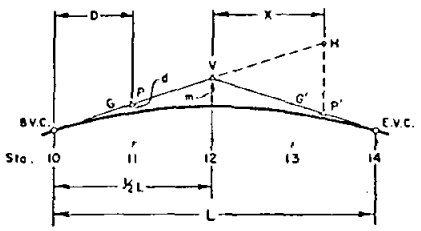
Note: $\frac{X}{Y} = \frac{S_1}{S_2}$ X & $Y = \frac{2}{3}L$

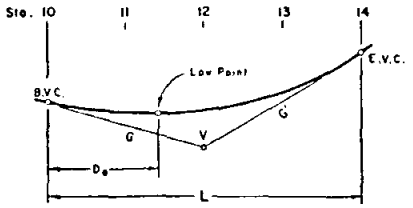
Superelevation	Minimum X or Y	L (Ft.)
8%	133'	200
7%	117'	175
6%	100'	150
5%	83'	125
4%	67'	100
2%	33'	50

Example:

For reversing curves with a 2% superelevation, the minimum distance from the EC to the BC is $2 \times 33 = 66$ ft.

DRAWN BY CHECKED BY RECOMMENDED BY	SAN DIEGO COUNTY ENGINEER DEPARTMENT DESIGN STANDARDS	REVISION / BY / APPROVED
APPROVED BY PRINCIPAL CIVIL ENG. OFF. DATE	REVERSING CURVES	DRAWING NUMBER





VERTICAL CURVE

1. $m = \frac{(G'-G)L}{8}$

2. $m = \frac{1}{2}\left(\frac{\text{Elev. B.V.C.} + \text{Elev. E.V.C.}}{2} - \text{Elev V}\right)$

3. $d = m\left(\frac{D}{L/2}\right)^2 = \frac{4m}{L^2}D^2$

4. $d = \frac{D^2(G'-G)}{2L}$

5. $X = \frac{100(H-P')}{(G-G')}$

6. $S = G - D\left(\frac{G-G'}{L}\right)$

7. $D_o = \frac{LG}{G-G'}$

WHERE

L = Length of curve — 100 ft. units or stations.

G and G' = Grade rates — percent.

m = Middle ordinate — ft.

d = Correction from grade line to curve — ft.

D = Distance from B.V.C. or E.V.C. to any point on curve — stations.

S = Slope of the tangent to the curve at any point — percent.

X = Distance, from P' to V — ft.

H = Elevation of grade G produced to station of P'

P and P' = Elevation on respective grades.

D_o = *Distance to low or high point from extremity of curve — stations.*

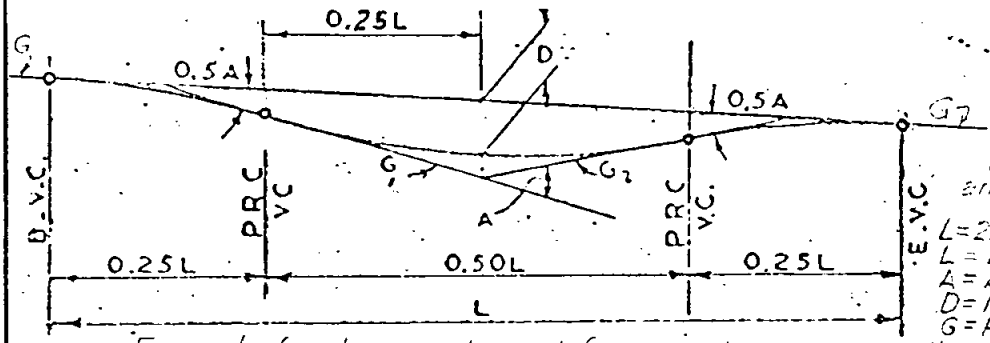
NOTES

A rising grade carries a plus sign while a falling grade carries a minus sign.

Thus in a crest vertical curve as above, G carries a plus sign and G' a minus sign when progressing in the direction of the stationing. When progressing in the opposite direction, G becomes a minus grade and G' a plus grade.

DRAWN BY	SAN DIEGO COUNTY ENGINEER DEPARTMENT DESIGN STANDARDS	REVISION	BY	APPROVED	DATE
CHECKED BY					
RECOMMENDED BY					
APPROVED BY PRINCIPAL CIVIL ENG. OFF.	VERTICAL CURVES	DRAWING NUMBER			
DATE					

THREE REVERSING VERTICAL CURVES CROSSING A DIP OR SUMMIT.
ALL CURVES WITH EQUAL RATES OF GRADE CHANGE.

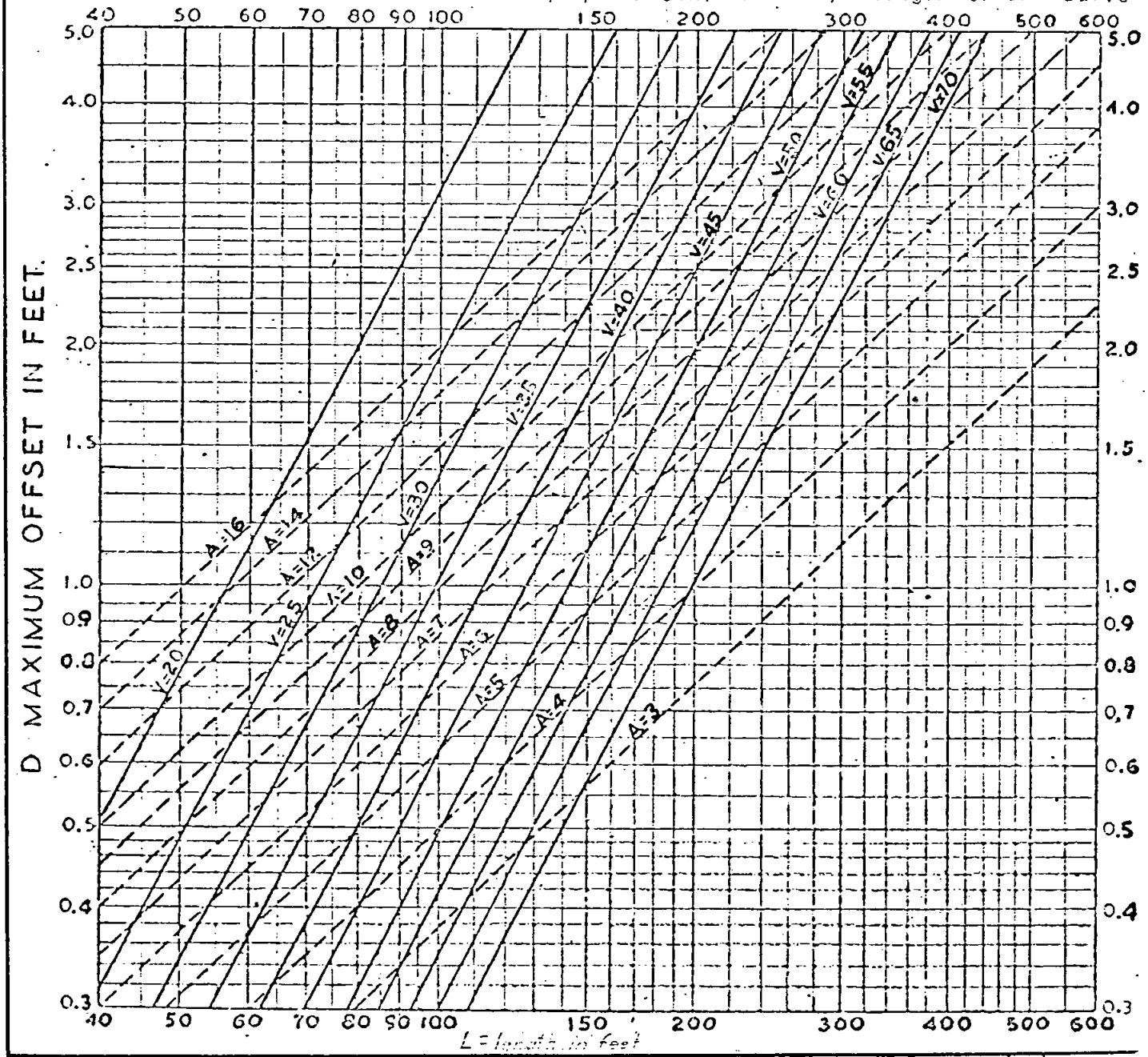


Example

Given: D=2 ft. V=50 MPH. G=1
On horizontal line D=2 ft; find intersection with V=50 and read L=200 and A=8. Then G_1=5% and and G_2=3% and curves can be plotted.

$L=2.83V\sqrt{D}$; $G_1=0.5A+G$; $G_2=0.5A-G$
L = Length-ft. Velocity-MPH-V
A = Algebraic difference in grades-%
D = Maximum offset-ft.
G = Ruling grade-%

Formula for L was derived from eq. $L_1=0.005AV$. Where L_1 is length of one curve.



DRAWN BY CHECKED BY RECOMMENDED BY	SAN DIEGO COUNTY ENGINEER DEPARTMENT DESIGN STANDARDS	REVISION	BY	APPROVED
APPROVED BY PRINCIPAL CIVIL ENG. OFF. DATE	COMFORTABLE SPEED ON VERTICAL CURVES	DRAWING NUMBER		

SUPERELEVATION TRANSITION

FORMULAE		EXPLANATION OF TERMS
2 LANE ROADS	*L_t = 2500 S	(L) = Length of superelevation runoff – ft.
MULTILANE ROADS	*L_t = 3600 S	(S) = Superelevation rate – ft./ft.
RAMPS	L_t = 2500 S if possible	
Minimum L_t = 150 ft		

* Adjust computed length to nearest 10 ft. length divisible by 3

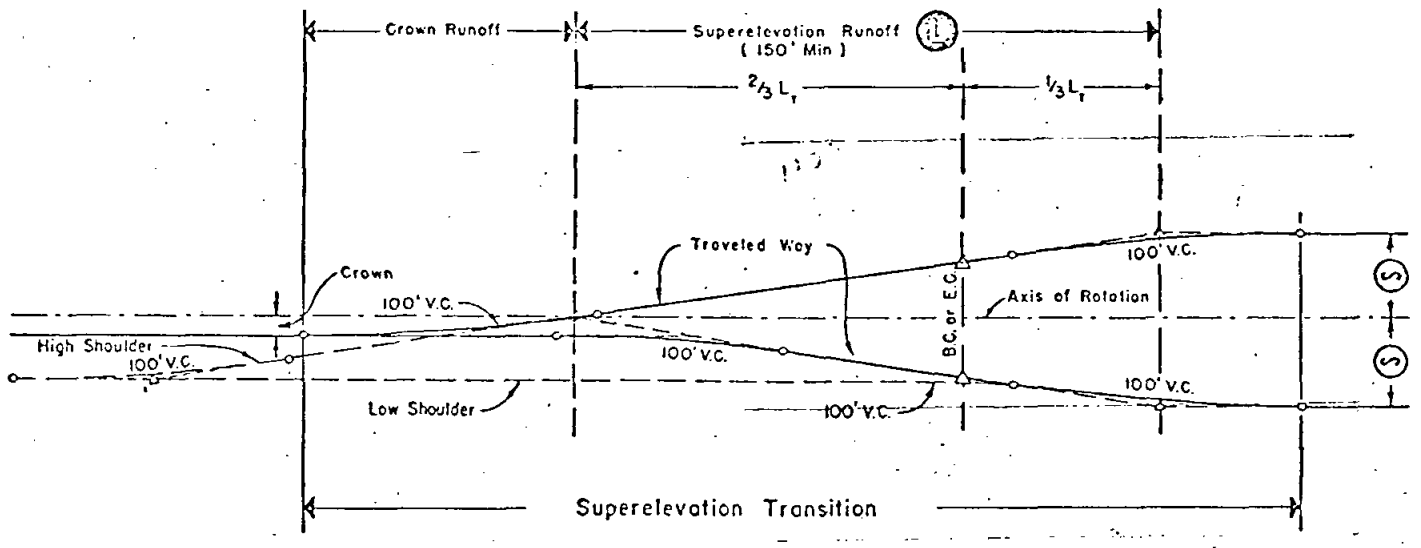


TABLE OF "L" LENGTHS

2-Lane highways and ramps		Multilane highways	
S—foot/foot	L—feet	S—foot/foot	L—feet
0.02 to 0.06	150	0.02 to 0.04	150
0.07	180	0.05	180
0.08	210	0.06	210
0.09	240	0.07	270
0.10	240	0.08	300
0.11	270	0.09	330
0.12	300	0.10	360
		0.11	390
		0.12	420

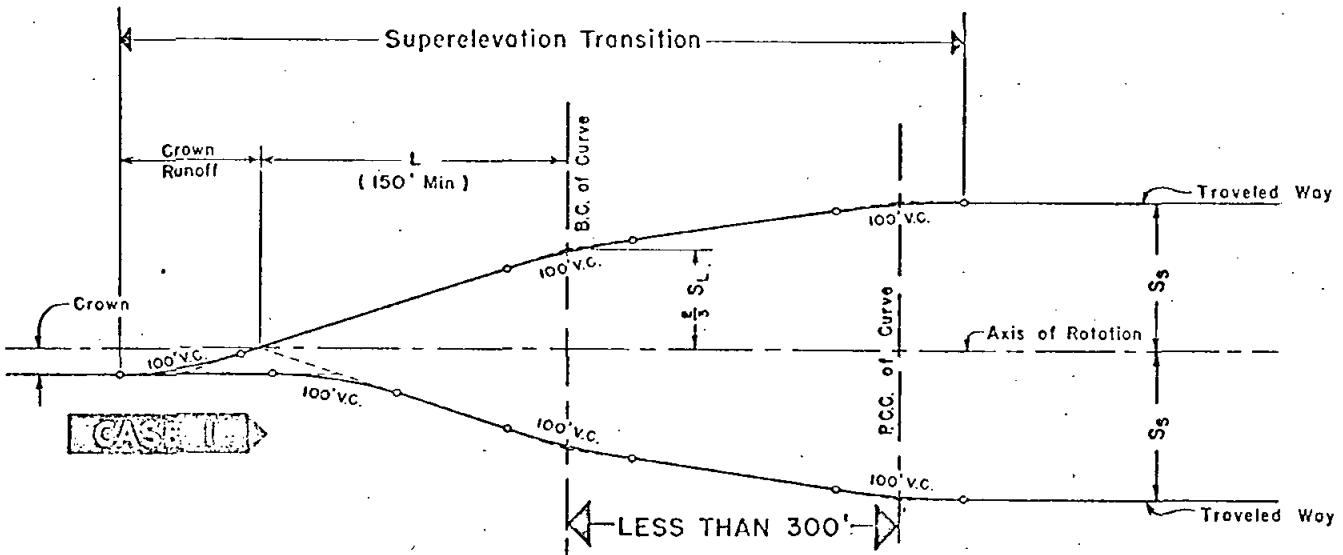
DRAWN BY	SAN DIEGO COUNTY ENGINEER DEPARTMENT DESIGN STANDARDS	REVISION	BY	APPROVED	DATE
CHECKED BY					
RECOMMENDED BY					
APPROVED BY		DRAWING NUMBER			
PRINCIPAL CIVIL ENG. OFF.					
DATE					

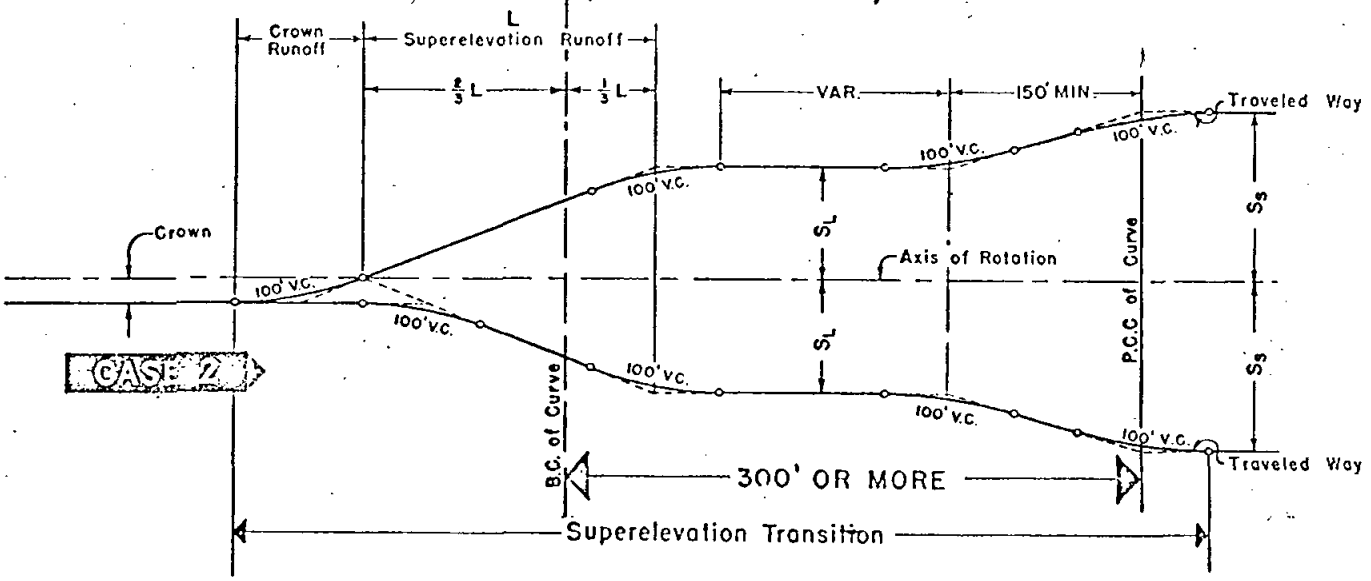
SUPERELEVATION OF COMPOUND CURVES

L = Length of superelevation runoff – ft.

S_S = Superelevation rate for smaller radius curve – ft./ft. or percent

S_L = Superelevation rate for larger radius curve – ft./ft. or percent





DRAWN BY	SAN DIEGO COUNTY ENGINEER DEPARTMENT DESIGN STANDARDS	REVISION	BY	APPROVED	DATE
CHECKED BY					
RECOMMENDED BY					
APPROVED BY		DRAWING NUMBER			
PRINCIPAL CIVIL ENG. OFF.					
DATE					

LENGTHS OF CIRCULAR ARCS RADIUS=1

Deg.	Length	Deg.	Length	Min.	Length	Sec.	Length
1	.0174533	61	1.0646508	1	.0002909	1	.0000048
2	.0349066	62	1.0821041	2	.0005818	2	.0000097
3	.0523599	63	1.0995574	3	.0008727	3	.0000145
4	.0698132	64	1.1170107	4	.0011636	4	.0000194
5	.0872665	65	1.1344640	5	.0014544	5	.0000242
6	.1047198	66	1.1519173	6	.0017453	6	.0000291
7	.1221730	67	1.1693706	7	.0020362	7	.0000339
8	.1396263	68	1.1868239	8	.0023271	8	.0000388
9	.1570796	69	1.2042772	9	.0026180	9	.0000436
10	.1745329	70	1.2217305	10	.0029089	10	.0000485
11	.1919862	71	1.2391838	11	.0031998	11	.0000533
12	.2094395	72	1.2566371	12	.0034907	12	.0000582
13	.2268928	73	1.2740904	13	.0037815	13	.0000630
14	.2443461	74	1.2915436	14	.0040724	14	.0000679
15	.2617994	75	1.3089969	15	.0043633	15	.0000727
16	.2792527	76	1.3264502	16	.0046542	16	.0000776
17	.2967060	77	1.3439035	17	.0049451	17	.0000824
18	.3141593	78	1.3613568	18	.0052360	18	.0000873
19	.3316126	79	1.3788101	19	.0055269	19	.0000921
20	.3490659	80	1.3962634	20	.0058178	20	.0000970
21	.3665191	81	1.4137167	21	.0061037	21	.0001018
22	.3839724	82	1.4311700	22	.0063995	22	.0001067
23	.4014257	83	1.4486233	23	.0066904	23	.0001115
24	.4188790	84	1.4660766	24	.0069813	24	.0001164
25	.4363323	85	1.4835299	25	.0072722	25	.0001212
26	.4537856	86	1.5009832	26	.0075631	26	.0001261
27	.4712389	87	1.5184364	27	.0078540	27	.0001309
28	.4886922	88	1.5358897	28	.0081449	28	.0001357
29	.5061455	89	1.5533430	29	.0084358	29	.0001406
30	.5235988	90	1.5707963	30	.0087266	30	.0001454
31	.5410521	91	1.5882496	31	.0090175	31	.0001503
32	.5585054	92	1.6057029	32	.0093084	32	.0001551
33	.5759587	93	1.6231562	33	.0095993	33	.0001600
34	.5934119	94	1.6406095	34	.0098902	34	.0001648
35	.6108652	95	1.6580628	35	.0101811	35	.0001697
36	.6283185	96	1.6755161	36	.0104720	36	.0001745
37	.6457718	97	1.6929694	37	.0107629	37	.0001794
38	.6632251	98	1.7104227	38	.0110538	38	.0001842
39	.6806784	99	1.7278760	39	.0113446	39	.0001891
40	.6981317	100	1.7453293	40	.0116355	40	.0001939
41	.7155850	101	1.7627825	41	.0119264	41	.0001988
42	.7330383	102	1.7802358	42	.0122173	42	.0002036
43	.7504916	103	1.7976891	43	.0125082	43	.0002085
44	.7679449	104	1.8151424	44	.0127991	44	.0002133
45	.7853982	105	1.8325957	45	.0130900	45	.0002182
46	.8028515	106	1.8500490	46	.0133809	46	.0002230
47	.8203047	107	1.8675023	47	.0136717	47	.0002279
48	.8377580	108	1.8849556	48	.0139626	48	.0002327
49	.8552113	109	1.9024089	49	.0142535	49	.0002376
50	.8726646	110	1.9198622	50	.0145444	50	.0002424
51	.8901179	111	1.9373155	51	.0148353	51	.0002473
52	.9075712	112	1.9547688	52	.0151262	52	.0002521
53	.9250245	113	1.9722221	53	.0154171	53	.0002570
54	.9424778	114	1.9896753	54	.0157080	54	.0002618
55	.9599311	115	2.0071286	55	.0159989	55	.0002666
56	.9773844	116	2.0245819	56	.0162897	56	.0002715
57	.9948377	117	2.0420352	57	.0165806	57	.0002763
58	1.0122910	118	2.0594885	58	.0168715	58	.0002812
59	1.0297443	119	2.0769418	59	.0171624	59	.0002860
60	1.0471976	120	2.0943951	60	.0174533	60	.0002909

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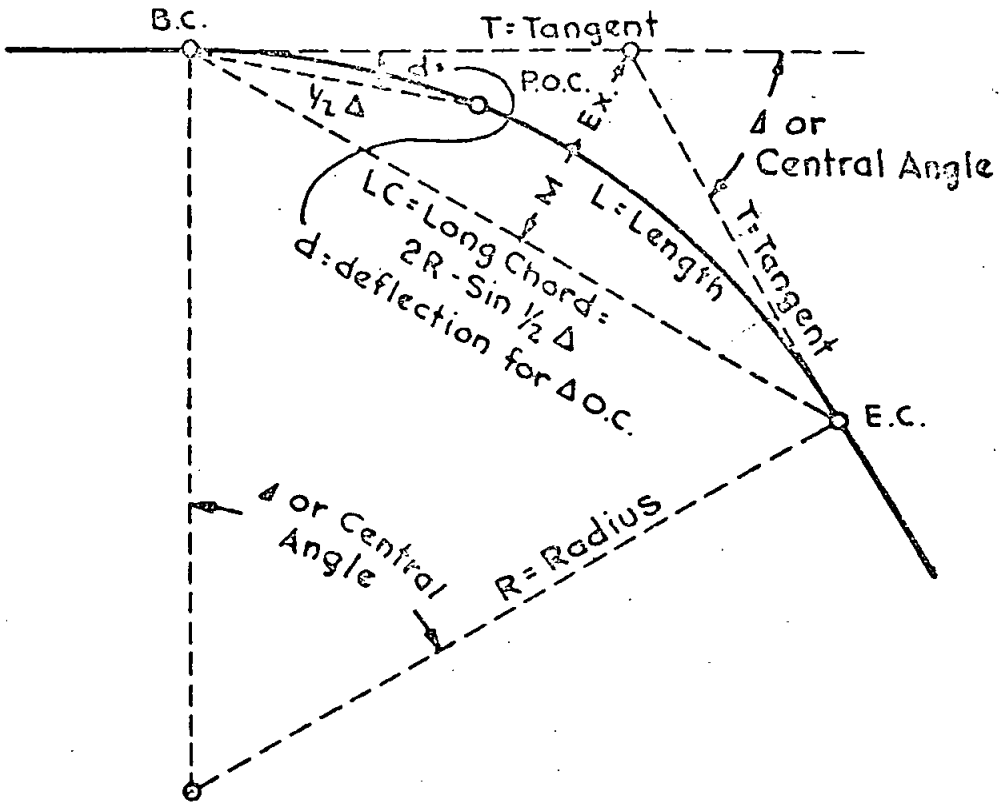
CURVE FUNCTIONS



R = Radius;
T = Tangent distance;
B.C. = Beginning of Curve;
E.C. = End of Curve; Ex. = External;
L = Length of Curve; LC = Long Chord;
P.I. = Point of Intersection; Δ = Delta or Central Angle;
d = Deflection for Point on Curve; M = Middle Ordinate.

Curve Data required are: Δ, Radius, Tangent, Length and External, Obtained as follows: –

Δ = Given; $\tan \frac{1}{2}\Delta = \frac{T}{R}$

R = Given; $R = \frac{T}{\tan \frac{1}{2}\Delta}$

$T = R \tan \frac{1}{2}\Delta$

$L = \frac{2\pi R \Delta}{360°}$ or L = R func Δ. See Table 4D.1.0-2.

Ex = R exsec ½ Δ; M = R vers ½ Δ

d (min.) = $\frac{1718.88}{R}$ arc length, See Deflection Table 4D.1.0-3.

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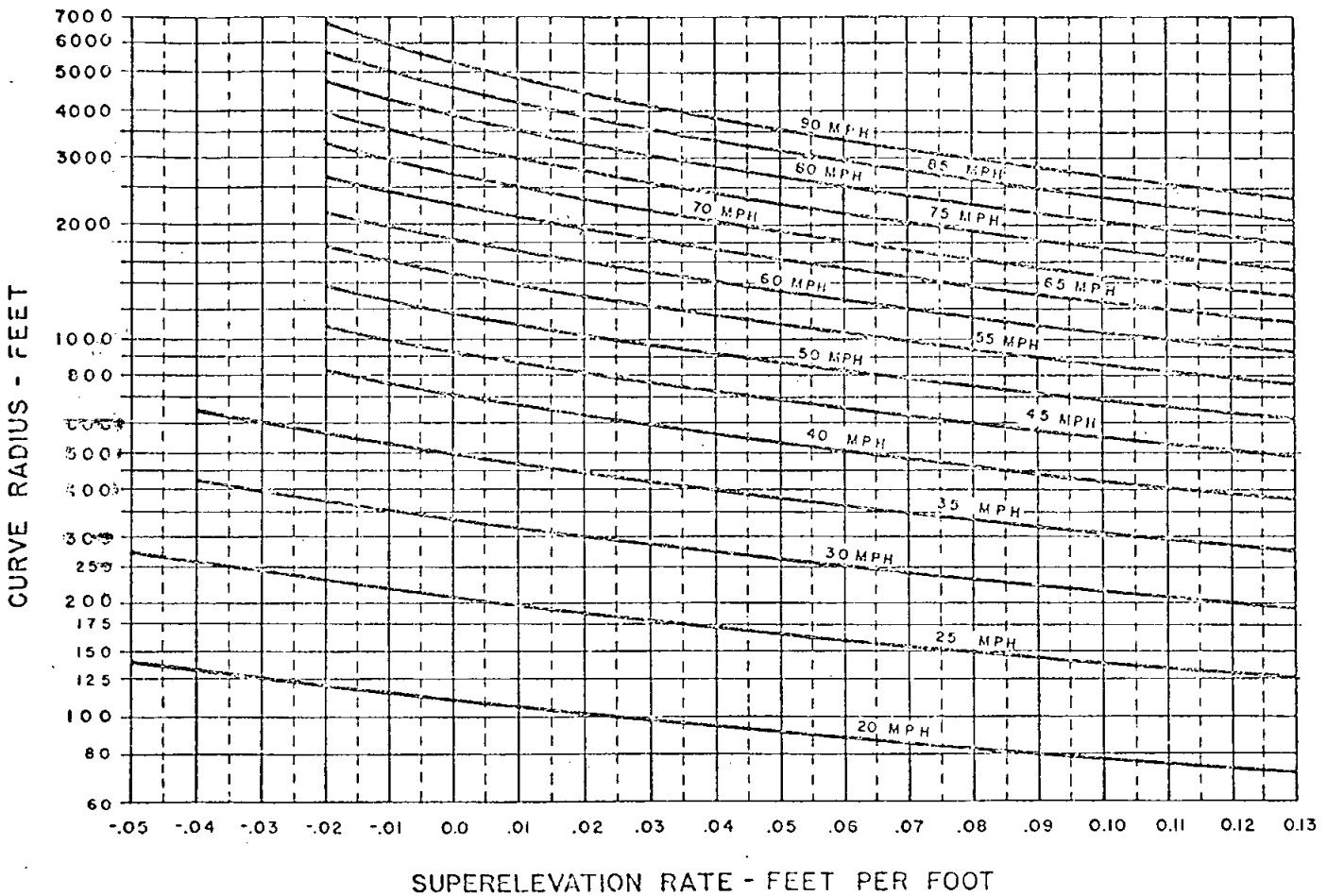
SAFE SPEED ON HORIZONTAL CURVE



SPEED	FRICTION FACTOR
20	0.24
30	0.18
40	0.15
50	0.14
60	0.13
70	0.12
80	0.11
90	0.10 (Extrapolated)

S = SUPERELEVATION
F = FRICTION FACTOR
V = SPEED IN MILES PER HOUR
R = RADIUS IN FEET

$$S+F=\frac{0.067V^2}{R}$$

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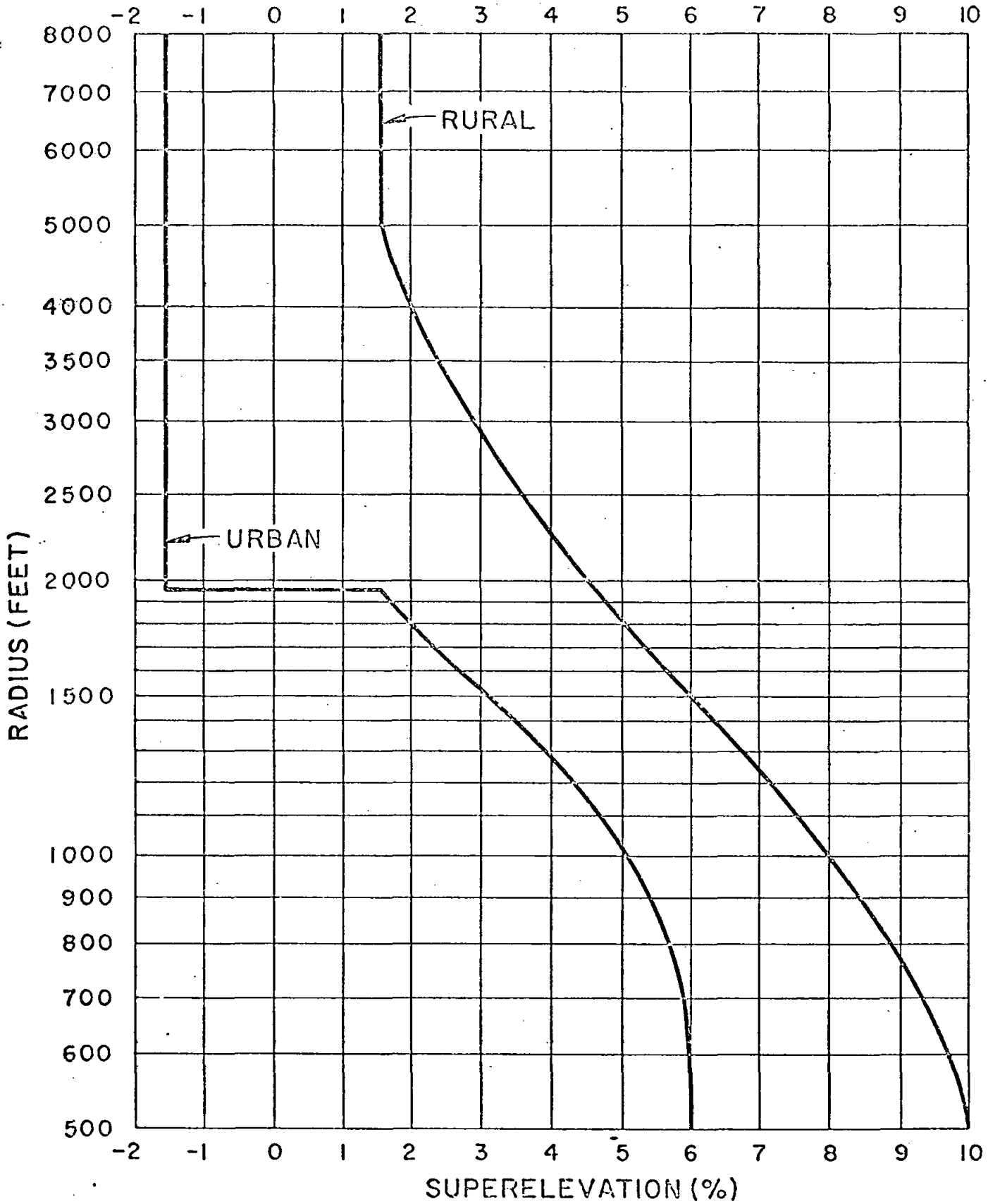

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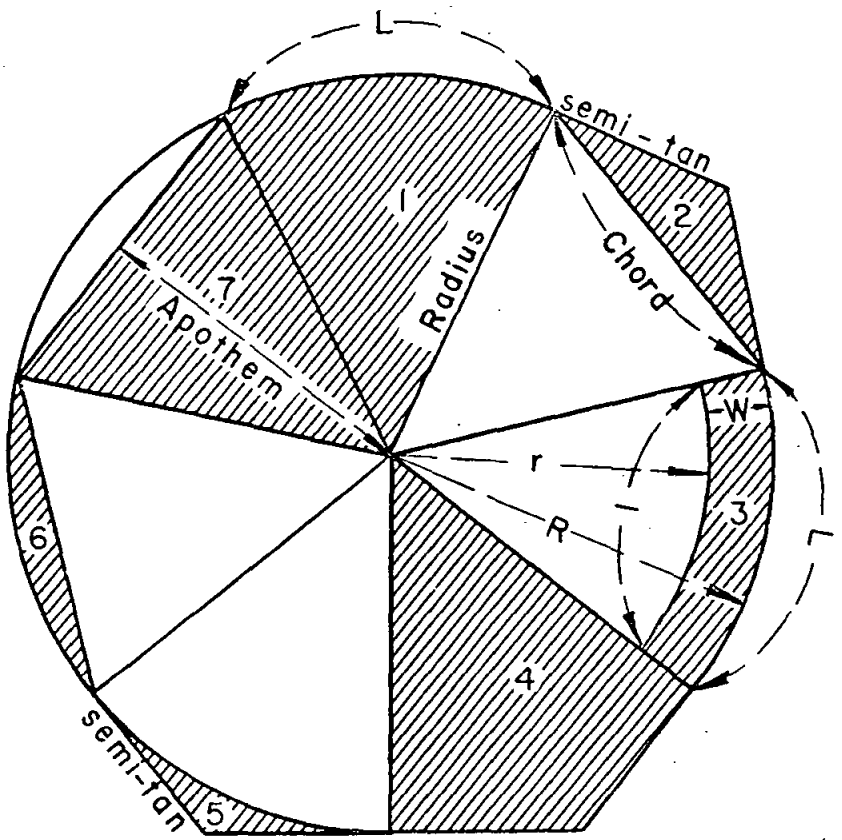
APPROVED BY PRINCIPAL CIVIL ENG. OFF. DATE	SUPERELEVATION RURAL AND URBAN STANDARDS	DRAWING NUMBER



1. $\frac{1}{2}RL$. Or, $\frac{1}{2}R^2\theta$. The sector, – a basic figure.

2. $\text{Tan}\,\frac{\Delta}{2}\,(R\cdot\sin\frac{\Delta}{2})^2$. Or, R·semi tan – ½ Apothem·Chord

3. $\frac{1}{2}\theta(R^2-r^2)$. Or, $\frac{1}{2}R\cdot L-\frac{1}{2}r\cdot l$. Or, $\frac{L+l}{2}W$, Or, $\frac{\theta}{2}\cdot(R+r)W$.

4. $R^2\cdot\tan\frac{\Delta}{2}$. Or, R · semi tan.

5. $R^2(\tan\frac{\Delta}{2}-\frac{\theta}{2})$. Or, R · semi tan – ½RL.

6. $\frac{1}{2}R^2(\theta-\sin\Delta)$. Or, ½R·L – ½ Apothem · Chord.

7. $\frac{1}{2}R^2\cdot\sin\Delta$. Or, ½Apothem · Chord.

IN THE ABOVE: Δ is the central angle in degrees,
θ is the central angle in radians.

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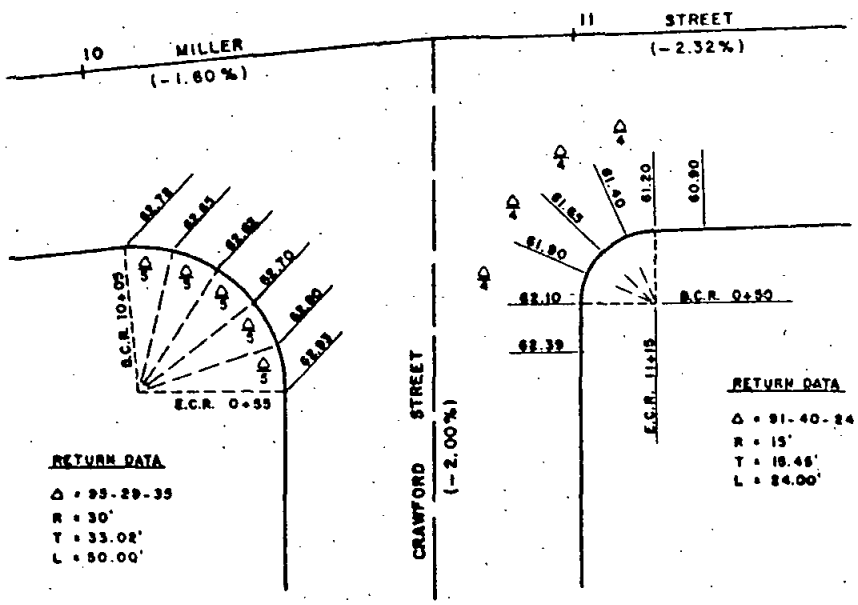
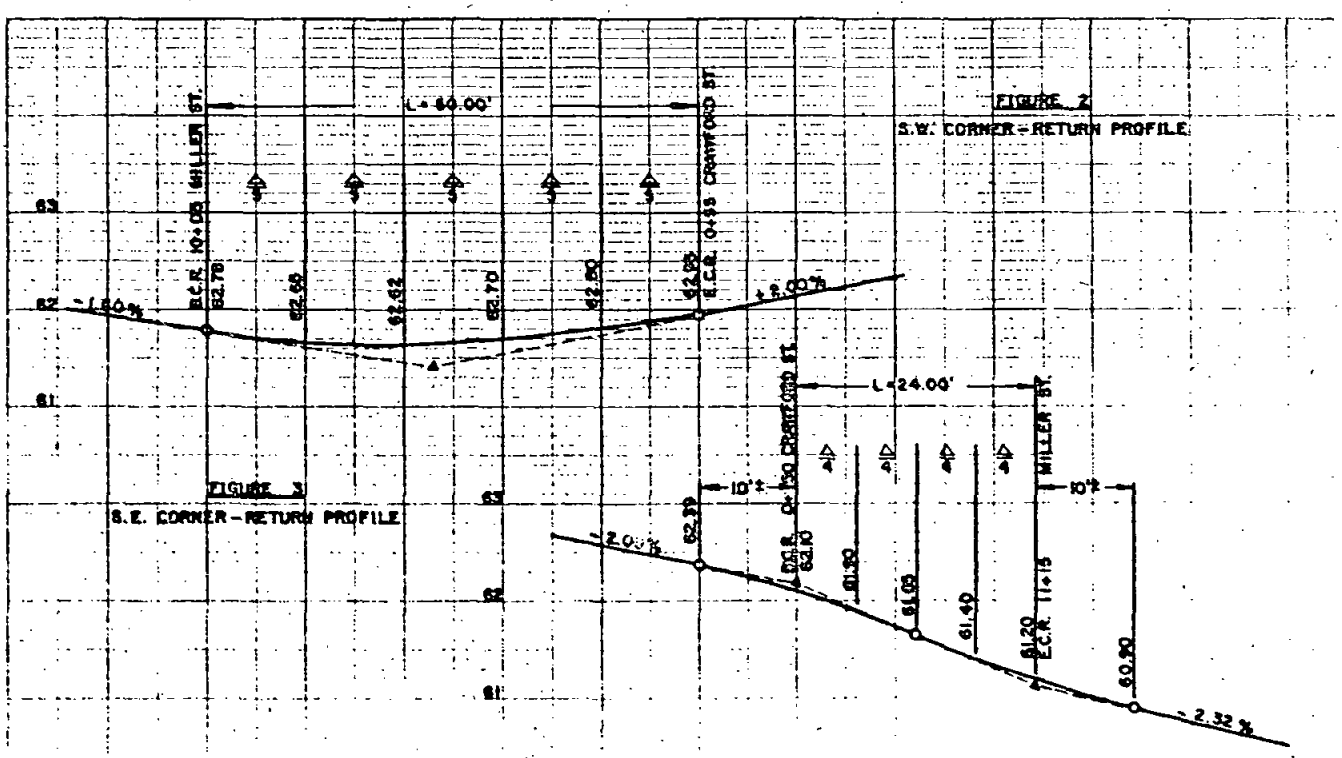
DESIGN PROCEDURE

1. CALCULATE RETURN CURVE DATA.
2. ESTABLISH ELEVATIONS OF B.C.R. AND E.C.R.
3. THE ELEVATIONS OF B.C.R. AND E.C.R. ARE PLOTTED IN PROPER RELATION ON RETURN PROFILE AND STREET GRADES ARE NOTED. STREET GRADE LINES ARE THEN EXTENDED UNTIL THEY INTERSECT EITHER SOMEWHERE BETWEEN B.C.R. AND E.C.R., AS IN FIGURE 2; OR IF ELSEWHERE, AS IN FIGURE 3. THE B.C.R. AND E.C.R. ARE CONNECTED WITH A STRAIGHT LINE.
4. THE ARC OF THE RETURN IS THEN DIVIDED INTO EQUAL SEGMENTS IN TERMS OF DELTA (e.i. Δ/2, Δ/3 ECT.) IN BOTH PLAN AND PROFILE.
5. WITH EITHER A FRENCH CURVE OR RAILWAY CURVE, DRAW AN APPROPRIATE SMOOTH CURVE BETWEEN B.C.R. AND E.C.R. (FIGURE 2) OR TO A PREDETERMINED DISTANCE FROM THESE POINTS (FIGURE 3).
6. TRANSFER ELEVATIONS OF INTERMEDIATE POINTS AS OBSERVED ON THE PROFILE TO THE PLAN.

FIGURE 1





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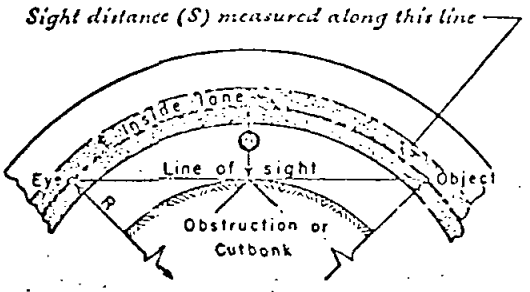
APPROVED BY ____ PRINCIPAL CIVIL ENG. OFFICE	CURB RETURNS				
DATE: ____		DRAWING NUMBER			

STOPPING SIGHT DISTANCE ON HORIZONTAL CURVES



Height of eye- 3.75 feet . . . Height of object- 0.50 feet

Line of sight is 2.0 feet above ℄ inside lane at point of obstruction

S = SIGHT DISTANCE IN FEET
R = RADIUS OF ℄ INSIDE LANE IN FEET
m = DISTANCE FROM ℄ INSIDE LANE IN FEET
V = DESIGN SPEED FOR S IN M.P.H.

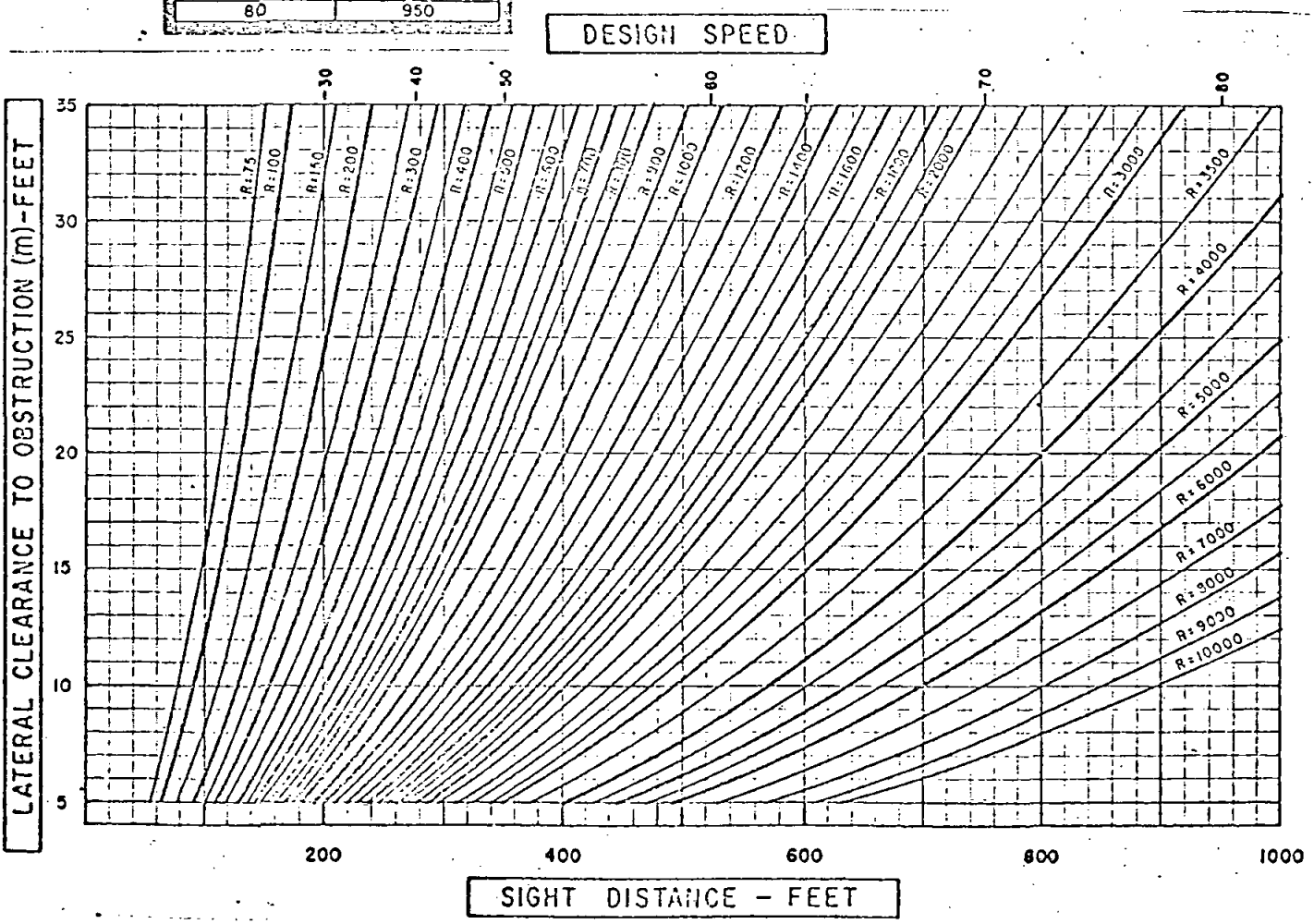
Angle is expressed in degrees.

$$m = R\left[\text{vers}\left(\frac{28.65\,S}{R}\right)\right]$$

$$S = \frac{R}{28.65}\left[\cos^{-1}\left(\frac{R-m}{R}\right)\right]$$

Formula applies only when S is equal to or less than length of curve.

DESIGN SPEED M.P.H.	SIGHT DISTANCE FEET
30	200
40	275
50	350
60	525
65	600
70	750
75	850
80	950



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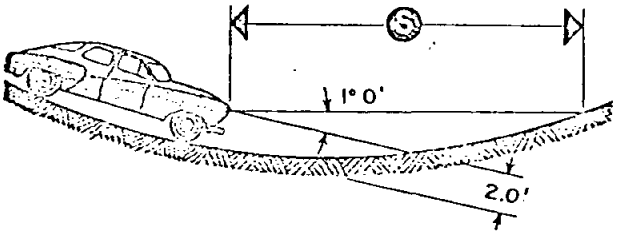
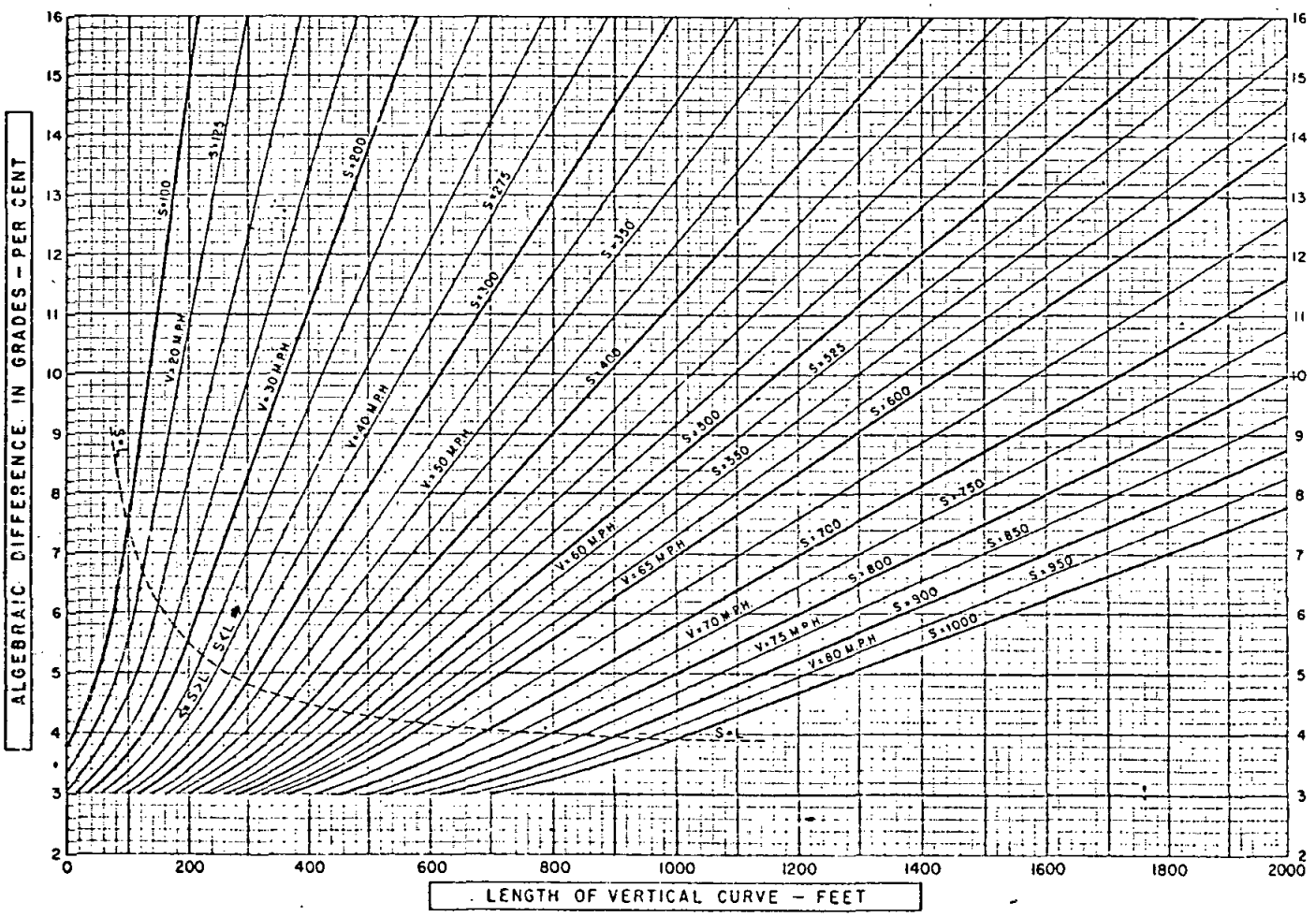
STOPPING SIGHT DISTANCE ON SAG VERTICAL CURVES



L = Curve length – Ft.
A = Algebraic grade difference – %
S = Sight distance – Ft.
V = Design speed – M.P.H. for "S"

WHEN S > L	WHEN S < L
$L = 2S - \frac{400 + 3.5S}{A}$	$L = \frac{AS^2}{400 + 3.5S}$

DESIGN SPEED M.P.H.	SIGHT DISTANCE FEET
30	200
40	275
50	350
60	525
65	600
70	750
75	850
80	950



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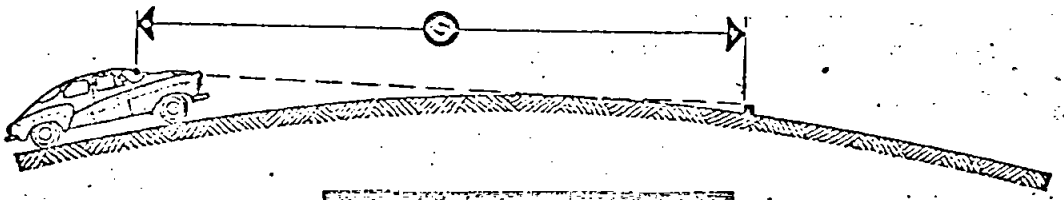
STOPPING SIGHT DISTANCE ON CREST VERTICAL CURVES

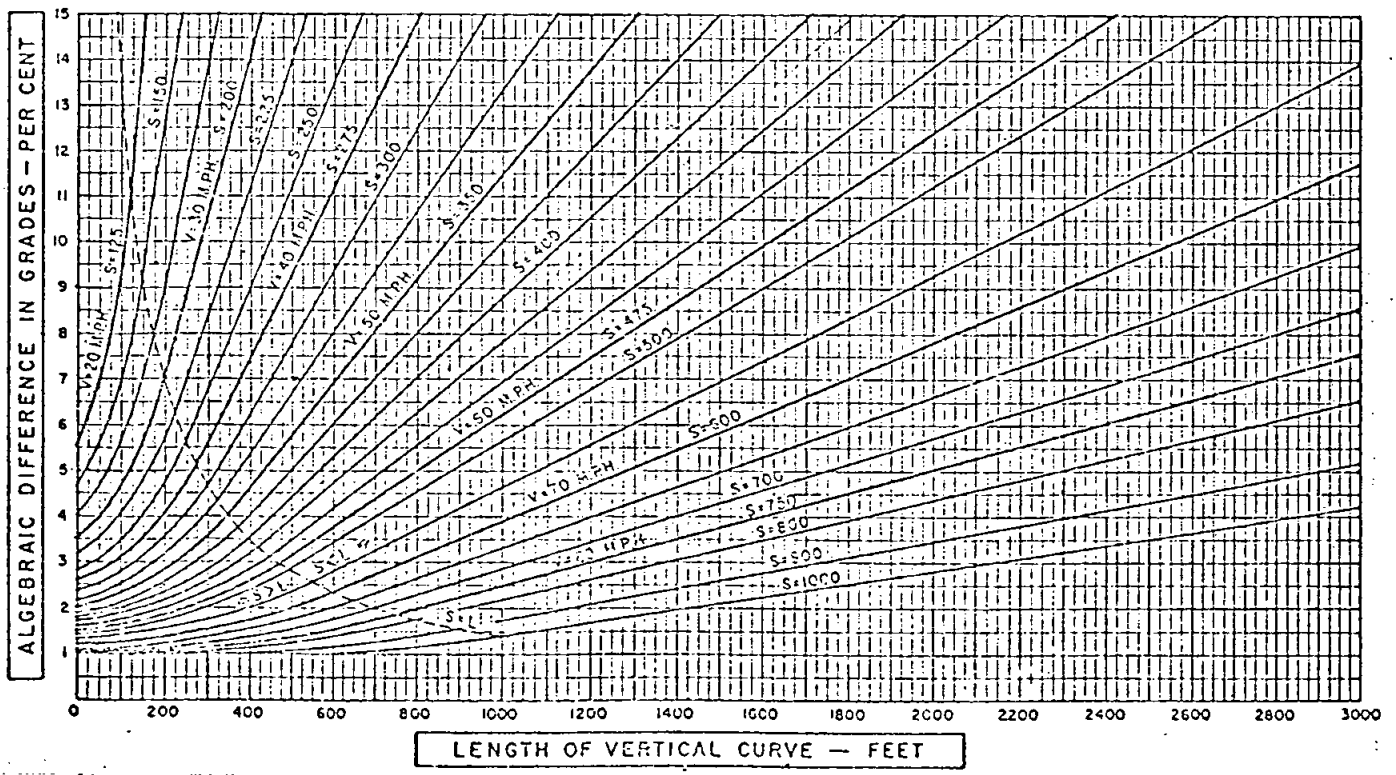
Height of eye 3.75 feet
Height of object 0.50 feet



L = Curve length - feet
A = Algebraic grade difference - %
S = Sight distance - Ft.
V = Design speed - M.P.H. for "S"

WHEN S > L	WHEN S < L
$L = 2S - \frac{398}{A}$	$L = \frac{AS^2}{398}$

DESIGN SPEED M.P.H. 2 50	SIGHT DISTANCE 160 FEET
30	200
40	275
50	350
60	475
65	550
70	600
75	675
80	750



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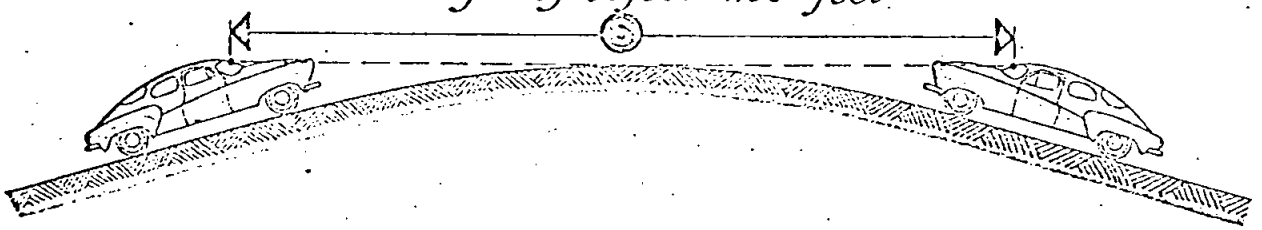
PASSING SIGHT DISTANCE ON CREST VERTICAL CURVES

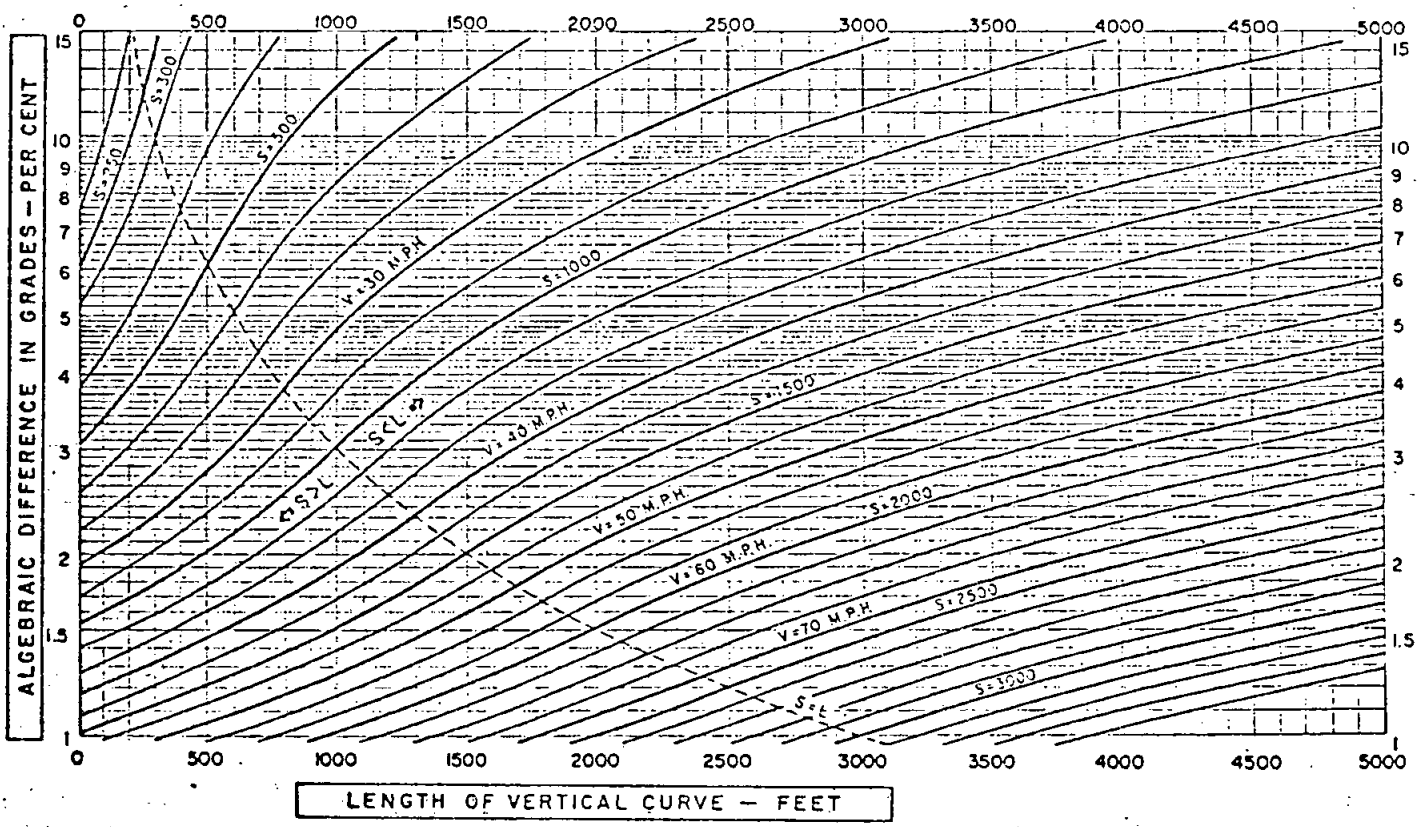
Height of eye 3.75 feet
Height of object 4.00 feet



L = LENGTH OF VERTICAL CURVE IN FEET
A = ALGEBRAIC DIFFERENCE IN GRADE RATE IN %
S = SIGHT DISTANCE IN FEET
V = DESIGN SPEED IN M.P.H. FOR S

WHEN S > L	WHEN S < L
$L = 2S - \frac{3100}{A}$	$L = \frac{AS^2}{3100}$

DESIGN SPEED M.P.H.	SIGHT DISTANCE FEET
30	800
40	1300
50	1700
60	2000
70	2400



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COMFORTABLE SPEED ON VERTICAL CURVES

L = LENGTH OF PARABOLIC VERTICAL CURVE - FT.
A = ALGEBRAIC DIFFERENCE IN GRADES - %
V = VELOCITY - MILES PER HOUR
R = RADIUS OF CIRCULAR CURVE WHICH IS IDENTICAL WITH PARABOLA - FT.
θ = ANGLE WHOSE TANGENT IS 0.005A

$L = 0.005AV^2$

$R = 0.5V^2$

$R = \frac{L}{2\sin\theta} = \frac{100L}{A}$

MAXIMUM DIFFERENCE BETWEEN PARABOLA AND CIRCLE $= \frac{L}{4\sin\theta}(\text{EXSEC}\,\theta - \text{VERSIN}\,\theta)$.

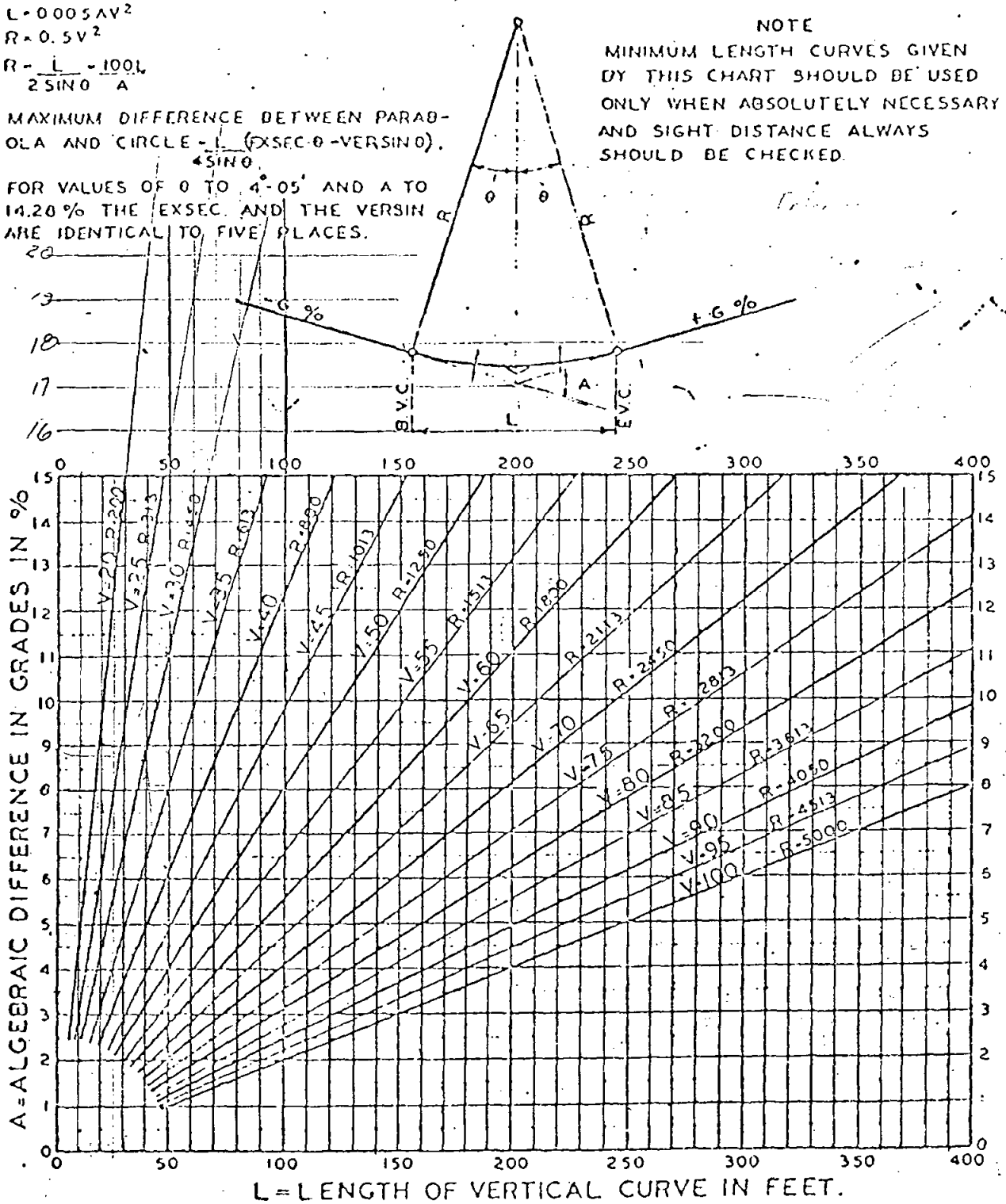
FOR VALUES OF θ TO 4°-05' AND A TO 14.20 % THE EXSEC. AND THE VERSIN ARE IDENTICAL TO FIVE PLACES.

FOR PLATTING CURVES TO ANY SCALE WITH RAILROAD CURVES

$$R\,(\text{INCHES}) = \frac{R\,(\text{FEET})(\text{VER SCALE})}{(\text{HOR SCALE})^2}$$

NOTE

MINIMUM LENGTH CURVES GIVEN BY THIS CHART SHOULD BE USED ONLY WHEN ABSOLUTELY NECESSARY AND SIGHT DISTANCE ALWAYS SHOULD BE CHECKED.



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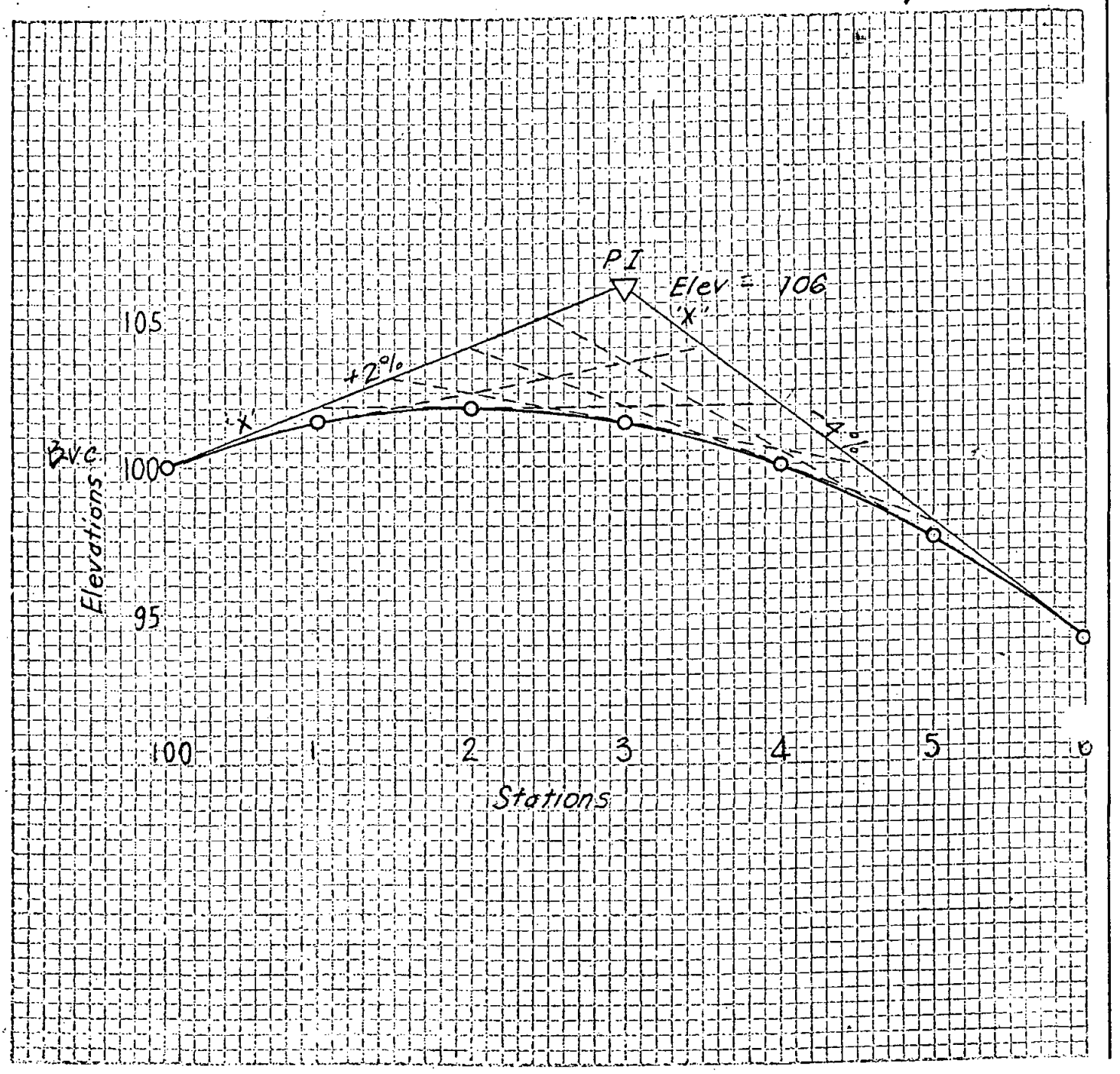

This sheet illustrates a convenient method of plotting vertical curves. To locate a point on the curve proceed as follows: Draw a straight line between a point on the back tangent "X" stations ahead of the BVC and a point on the forward tangent "X" station ahead of the P.I. A point on the curve is located at the intersection of this line and the station line "2X" stations ahead of the BVC.

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