

620.03

STATE OF ARIZONA
STATE HIGHWAY DEPARTMENT
ROADWAY STANDARDS
1959

CONSTRUCTION
"C"
STANDARDS

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HIGHWAY PLANS SERVICES

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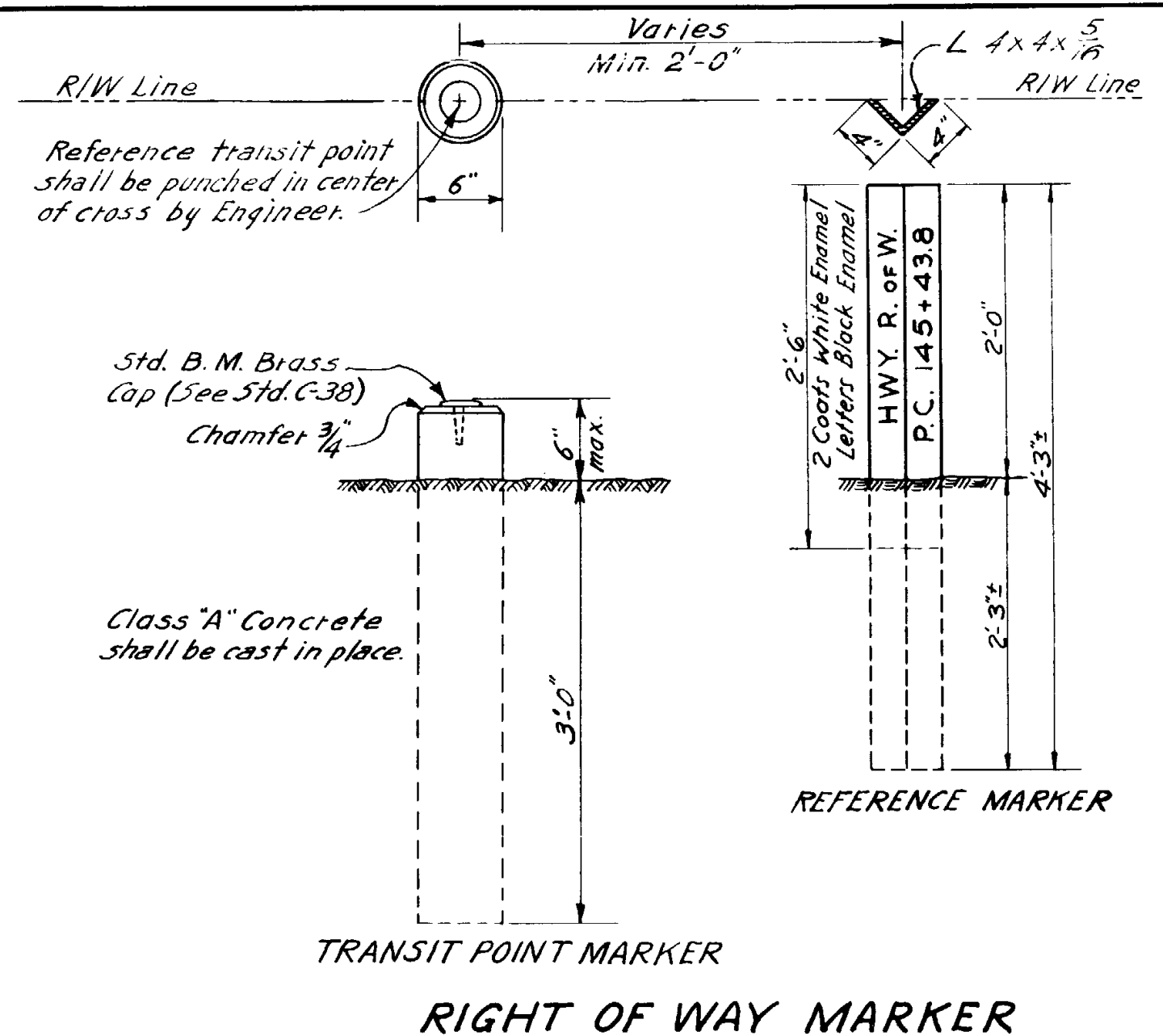
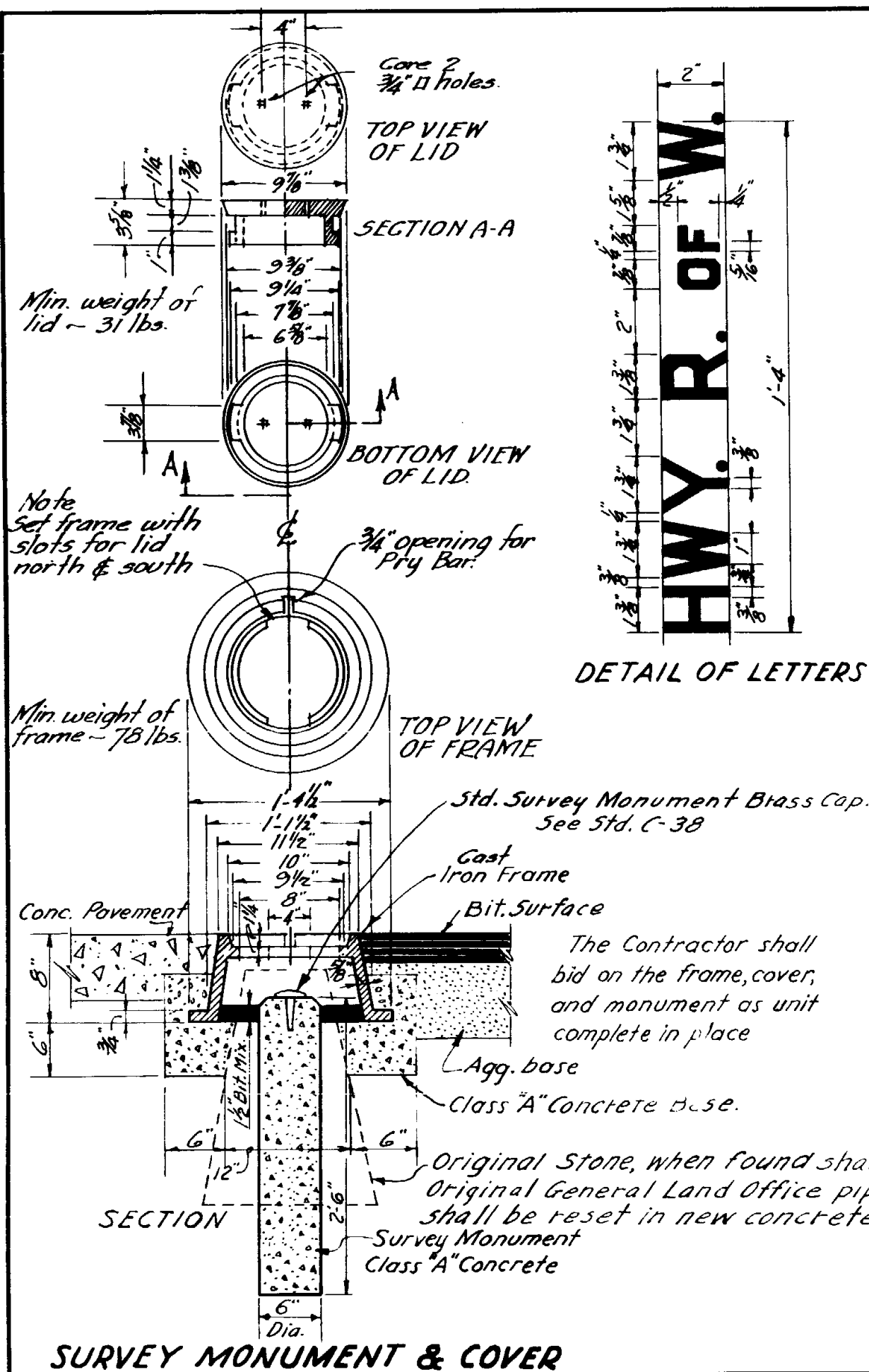
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ARIZONA STATE HIGHWAY DEPARTMENT — PLANS DIVISION

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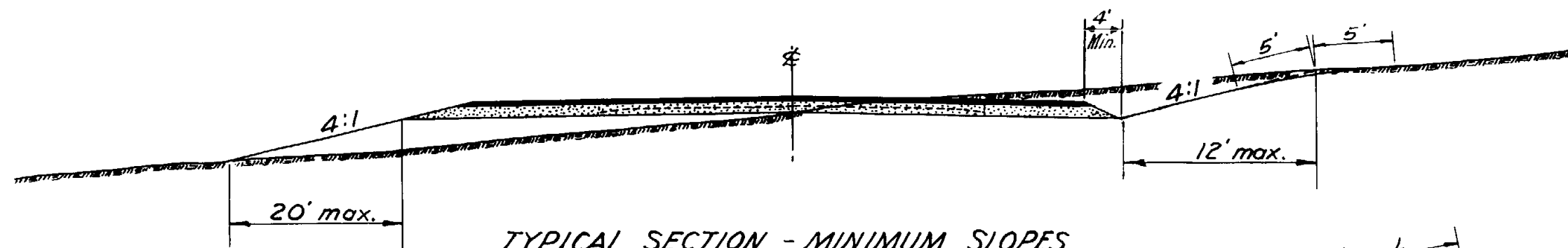


Note:

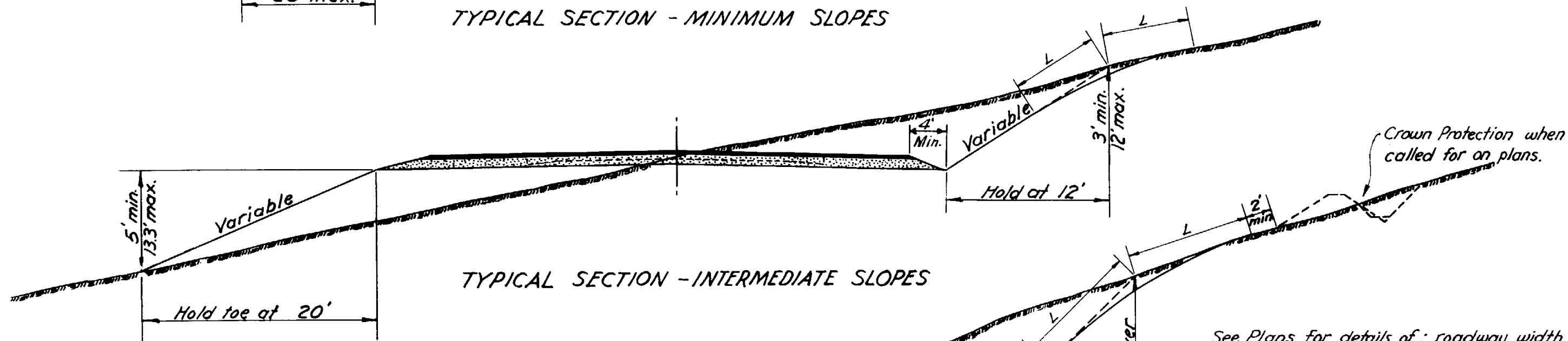
R/W markers shall be placed where shown on Plans or as directed by Engineer.

R/W marker shall consist of transit point and reference marker.

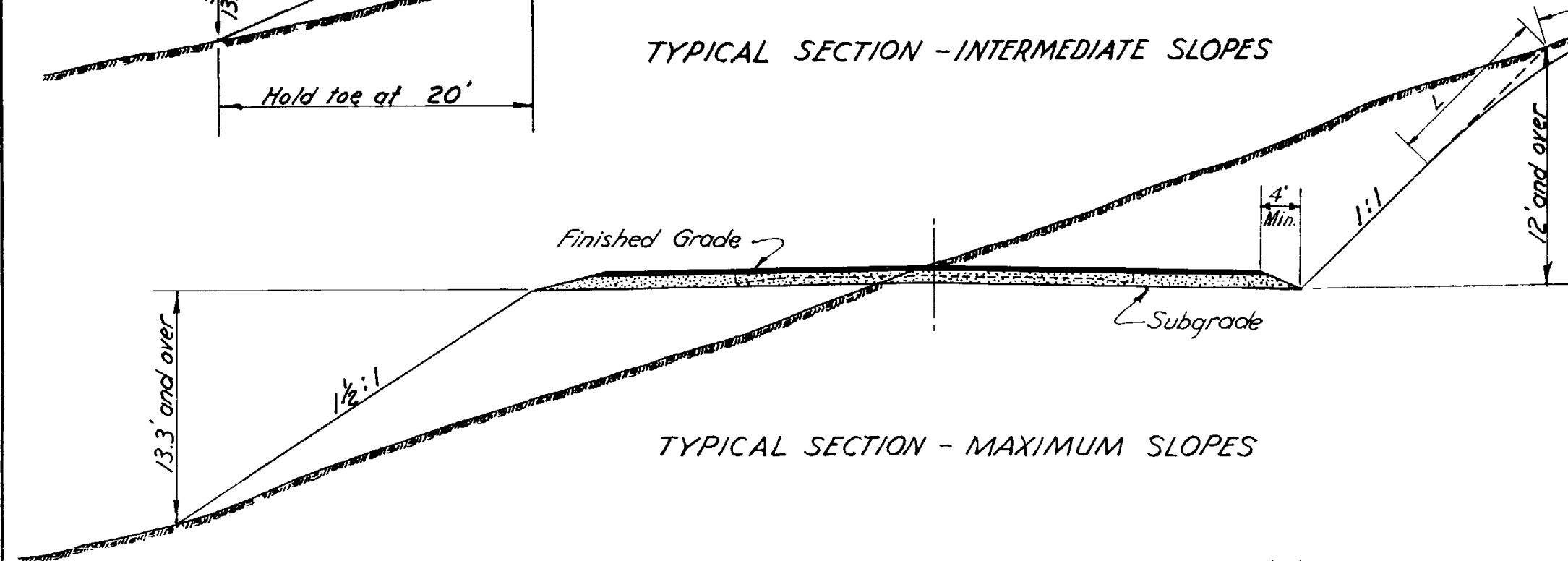
ARIZONA HIGHWAY DEPARTMENT		REV. 3/17/50 2/4/54 6/19/55 12/1/58
PLANS DIVISION		
SURVEY MONUMENT AND COVER		
RIGHT OF WAY MARKERS		
DRAWN		DRAWING NO. C-1
TRACED	GH Nov. 1945	
CHECKED	HTWessel	
APPROVED ENGR. PLANS	HTWessel	



TYPICAL SECTION - MINIMUM SLOPES



TYPICAL SECTION - INTERMEDIATE SLOPES



TYPICAL SECTION - MAXIMUM SLOPES



HALF SECTION - SIDE BORROW

HALF SECTION - MINOR CUTS

See Plans for details of; roadway width, cut ditch, type and thickness of roadway surfacing, superlevation, and curve widening.

Standard Crown Slope for P.C. Concrete 0.01' per foot; for Bit. Surf. Treat. and Bit. Mix. Surf. 0.015' per foot.

Standard Cut and embankment slopes as shown on this sheet may be superseded by special slopes where shown on plans.

For Cuts up to 6' use 5' semi-tangents (L) for slope rounding. For each additional foot of cut add 1' to semi-tangent to 11' maximum. Finish with approved drag so that the ground will not have a scarred appearance.

Do not daylight small negative slopes, but round as indicated.

ARIZONA HIGHWAY DEPARTMENT
PLANS DIVISION

SLOPES

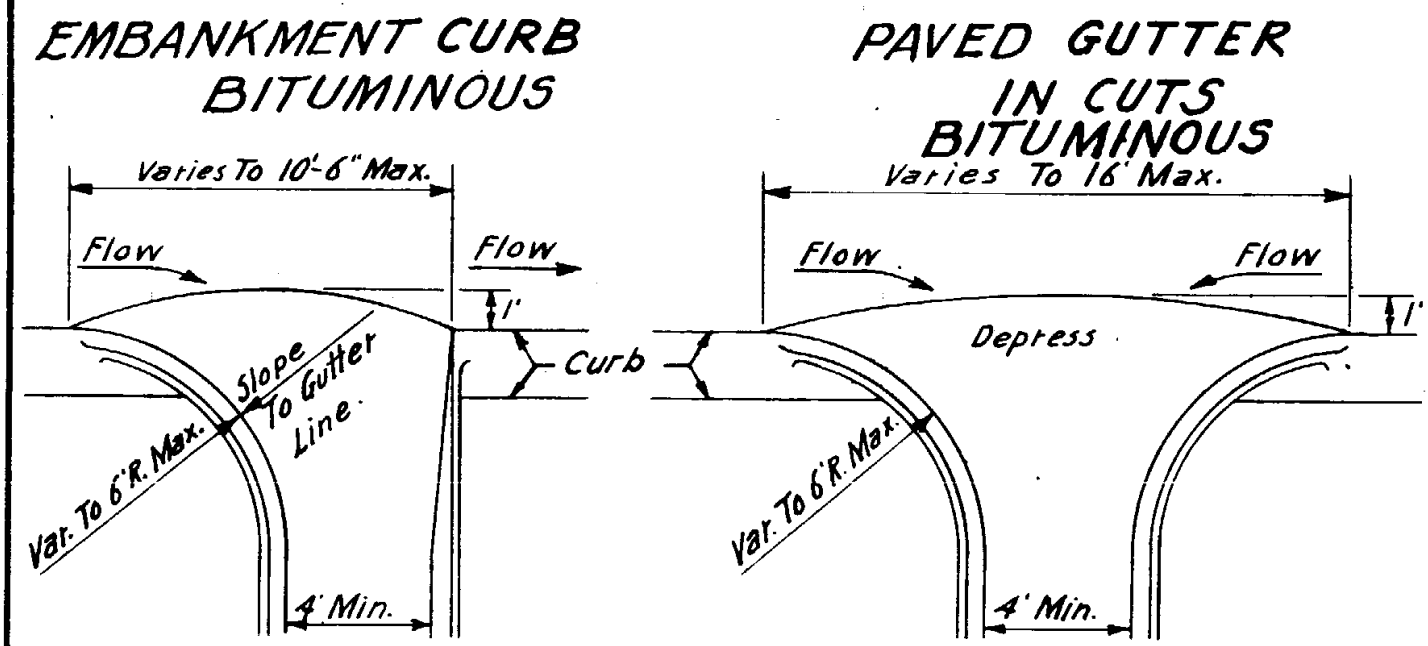
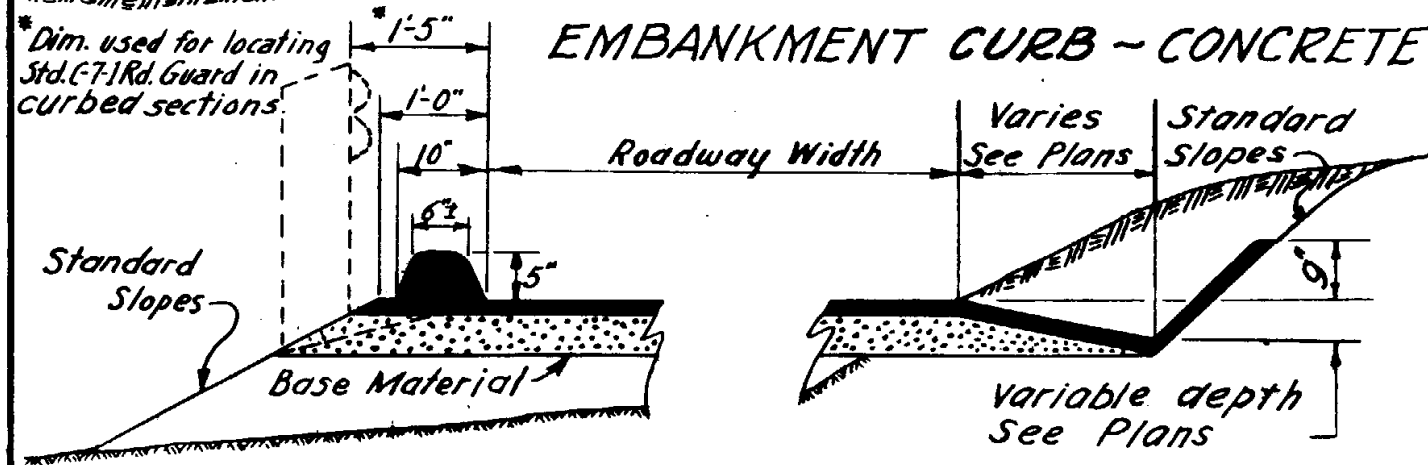
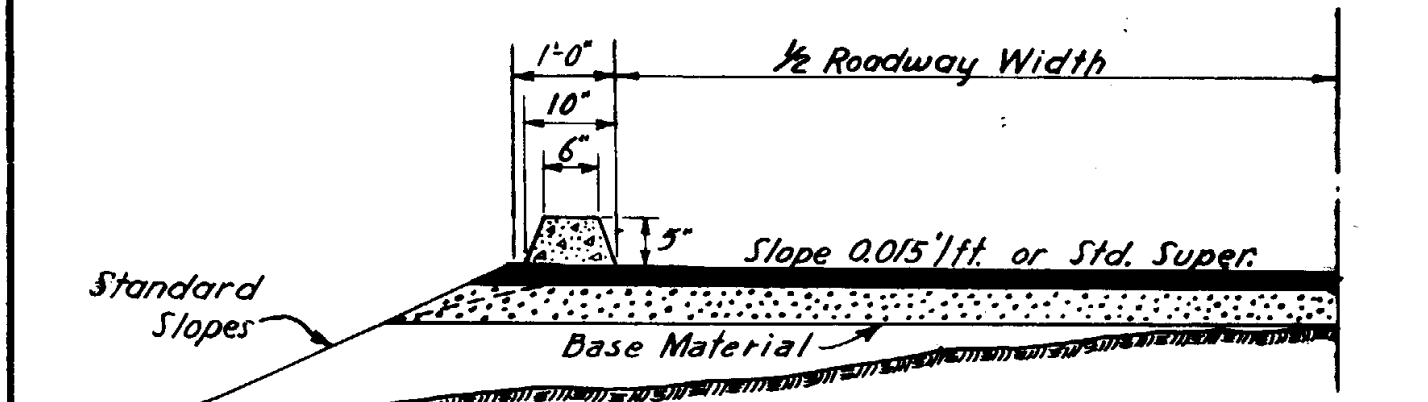
SLOPE ROUNDING

DRAWN GH Nov. 1945
TRACED GH Nov. 1945
CHECKED HTH
APPROVED HTH
PLANS ENG'R HTH

DRAWING NO.

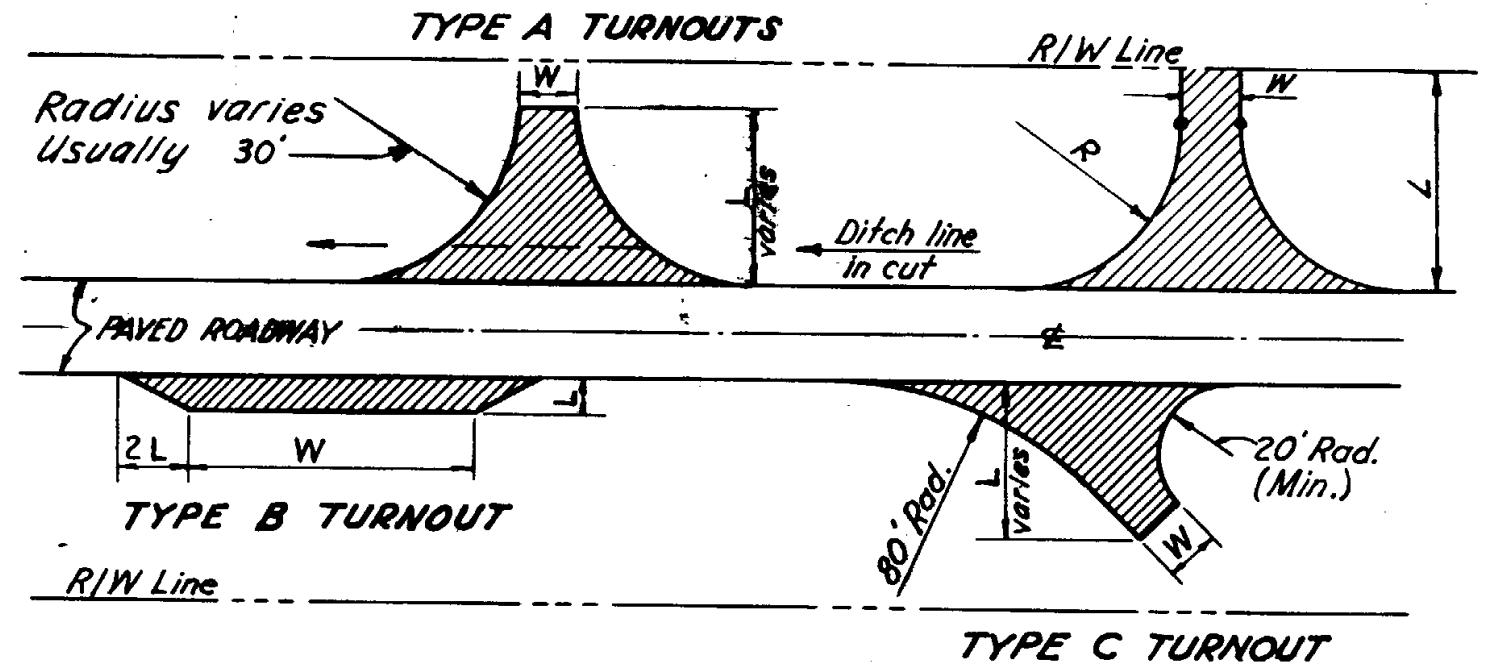
C-2

REV.
2/4/55
6/10/55
12/1/58



SPILLWAY INLETS

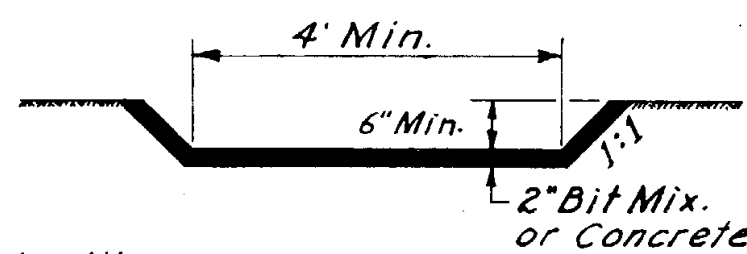
Note: Spillway inlets and spillways shall be of the same material as the curb. Maximum spacing of spillways shall not exceed 400'



PAVED TURNOUTS

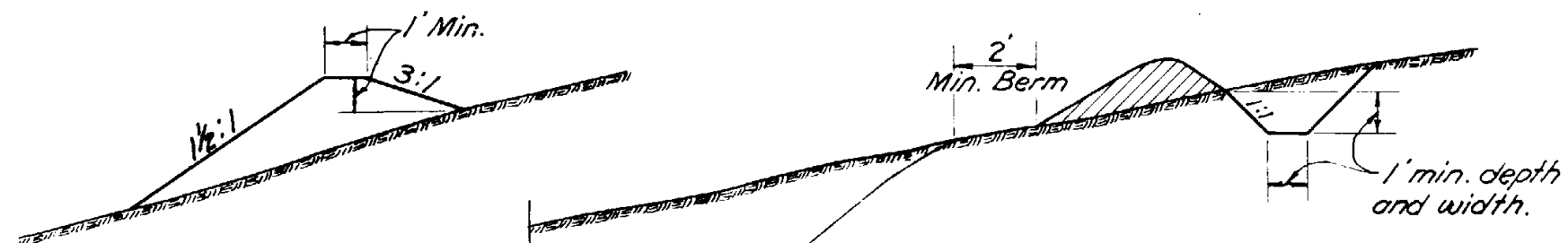
NOTES

W indicates width of paved surface of turnout.
L indicates length of paved surface of turnout.
Farm road turnout, 10' min. width. (W)
County road turnout, 20' min. width. (W)
Size and type of turnouts is noted on plans as follows: W, L, Surface, and Type (12'x30' B.M.S. Type A)
Base material thickness under turnouts is the same as shown on the roadway section, unless otherwise noted.
Any excavation or embankment for turnouts is included in the roadway quantities.
Turnouts are to be placed where shown on plans, or as directed by the Engineer.



SPILLWAY

ARIZONA HIGHWAY DEPARTMENT			REV. 3/17/50 2/4/55 4/20/55 6/19/55 12/1/58 1/4/60
PLANS DIVISION			
EMBANKMENT CURBS, SPILLWAY INLETS & SPILLWAYS PAVED TURNOUTS			
DRAWN	GH	Nov. 1945	
TRACED	GH	Nov. 1945	
CHECKED	HHW		DRAWING NO. C-3
APPROVED	HHW		
ENGR. PLANS	HHW		



CROWN DYKE

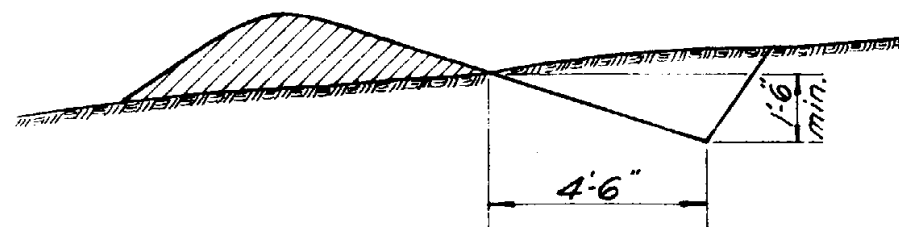
To be paid for by lineal measure.

CROWN DITCH

To be paid for by lineal measure

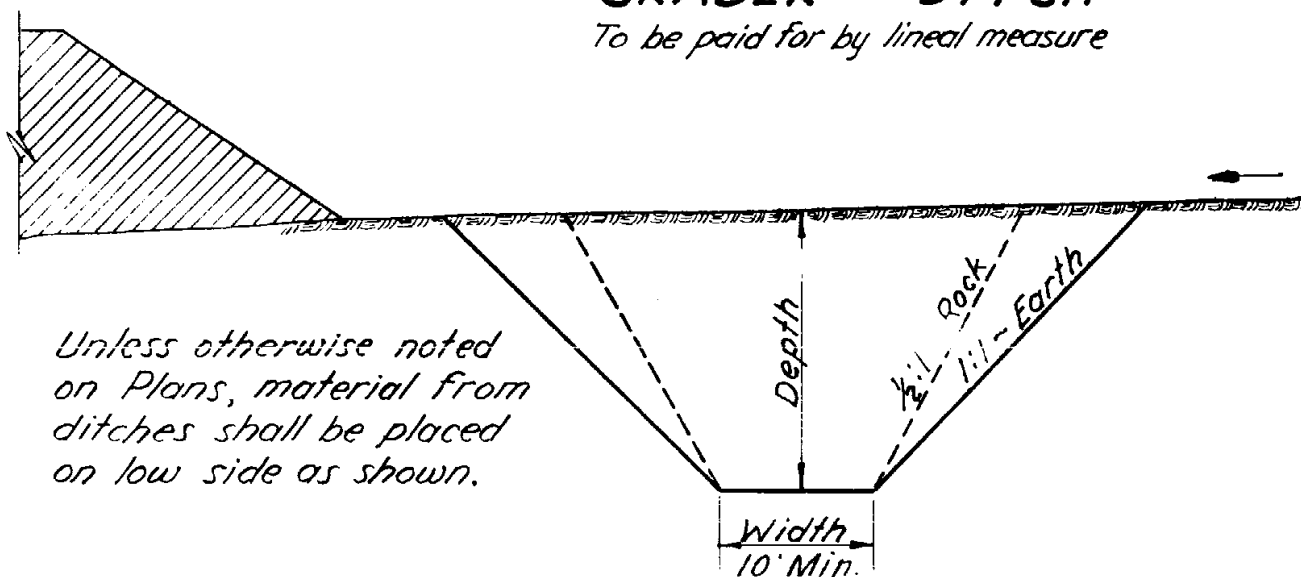
Crown protection should be constructed in such a manner that the flow of intercepted water shall not exceed 0.5%.

Grader ditch section may be used or a ditch section similar to above may be made in any manner approved by the Engineer.



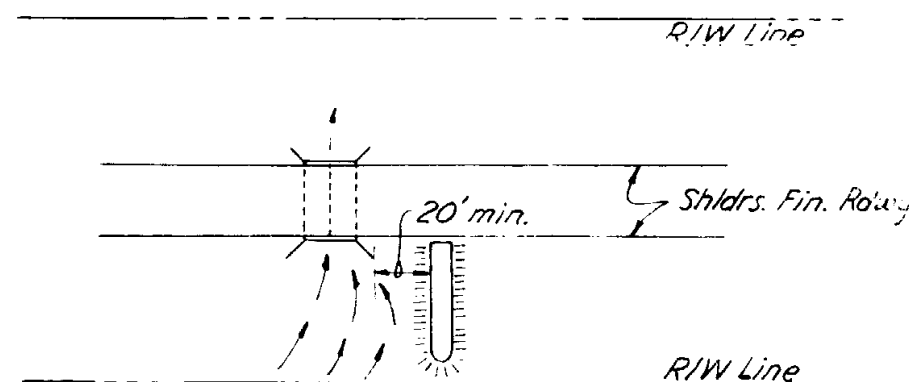
GRADER DITCH

To be paid for by lineal measure



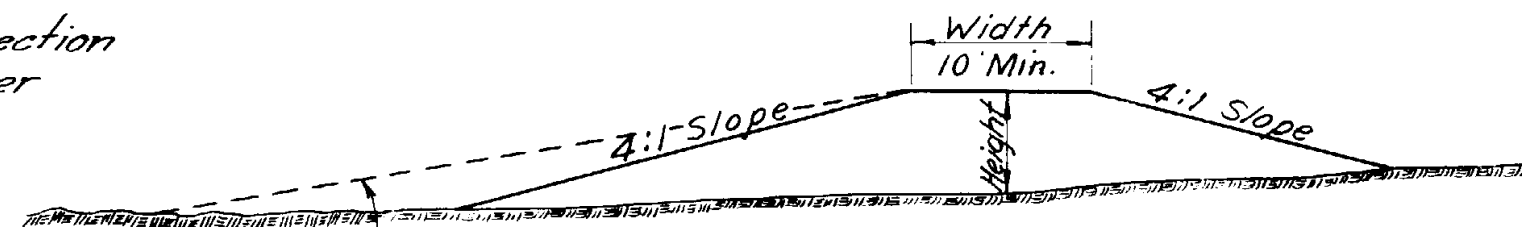
DITCH OR CHANNEL

Unless otherwise noted on Plans, material from ditches shall be placed on low side as shown.



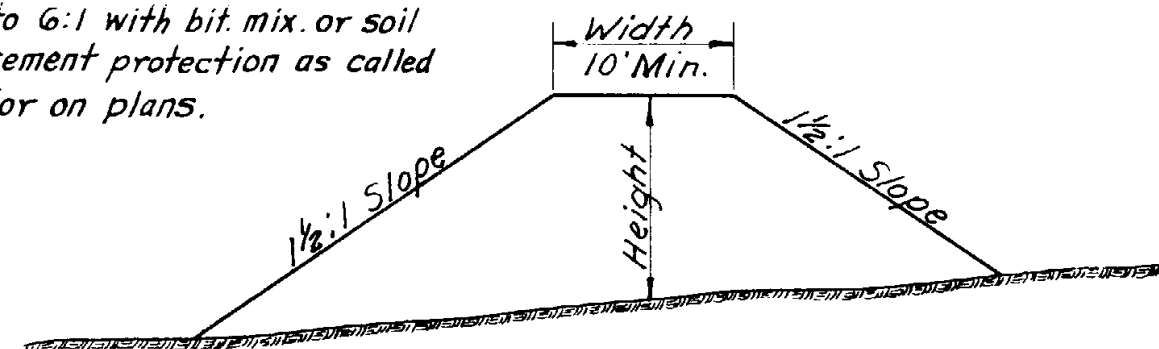
TYPICAL DYKE INSTALLATION AT STRUCTURE

Dykes at structures to be so placed that they create a water cushion.



TYPE B DYKE

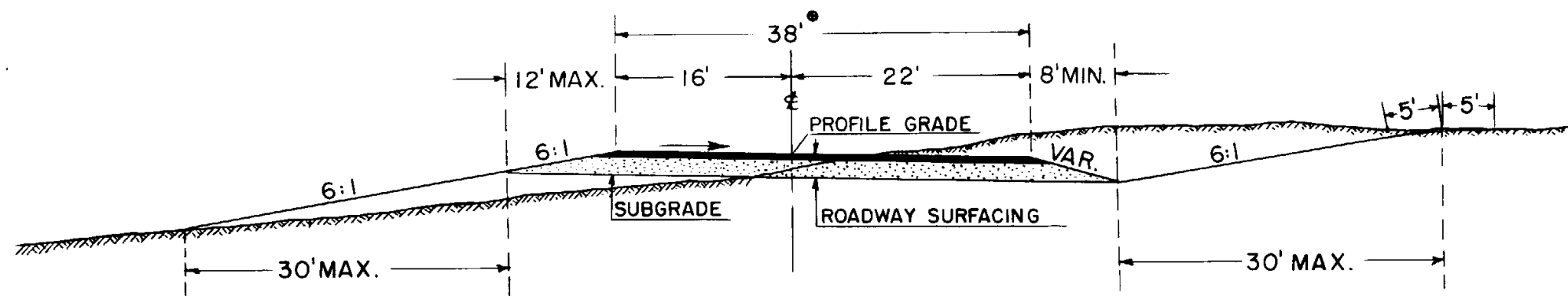
Note ~ When necessary the slope may be flattened to 6:1 with bit. mix. or soil cement protection as called for on plans.



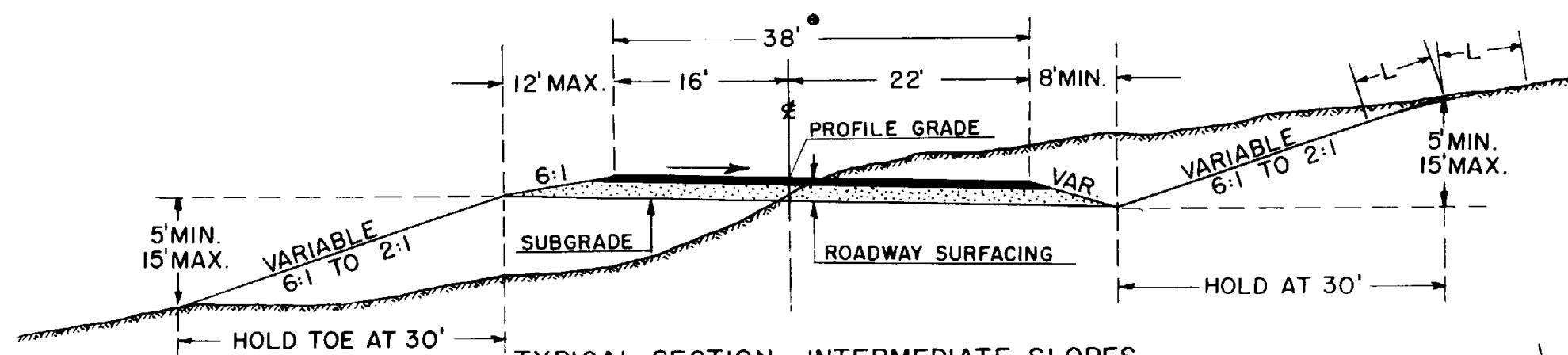
TYPE A DYKE

Dimensions of ditches and dykes as shown on plans are respectively width, depth or height, and length.

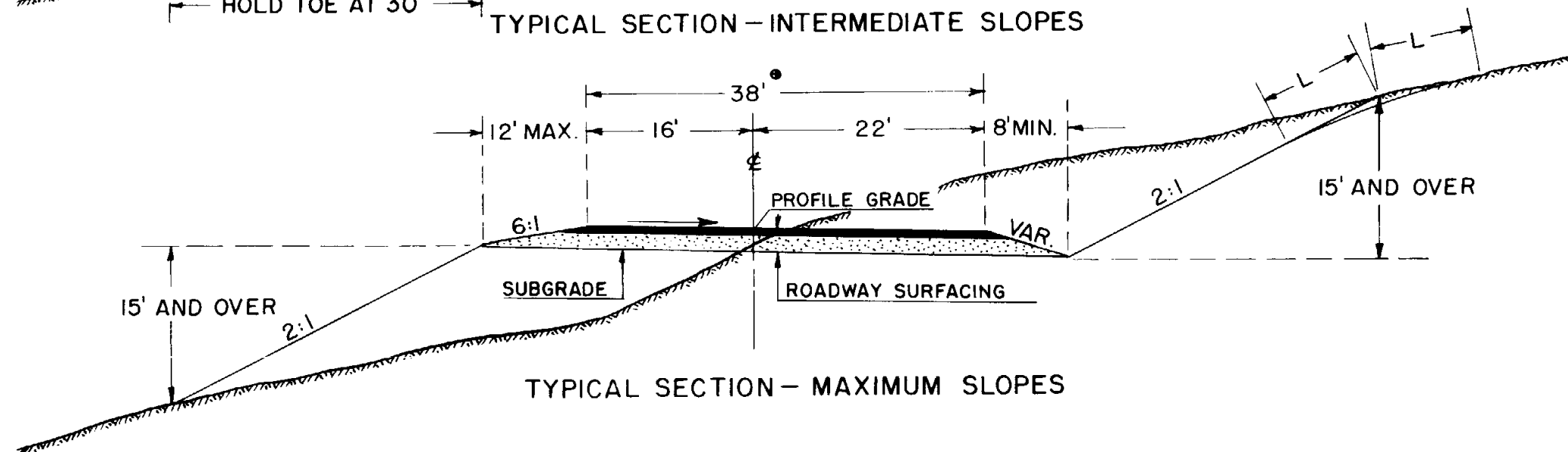
ARIZONA HIGHWAY DEPARTMENT			REV. 8/16/55 12/1/55
PLANS DIVISION			
DITCHES AND DYKES			
DRAWN	G#	Dec. 1945	DRAWING NO. C-4
TRACED	G#	Dec. 1945	
CHECKED	H#	H#	
APPROVED	H#	Wessel	
PLANS ENGR.			



TYPICAL SECTION - MINIMUM SLOPES



TYPICAL SECTION - INTERMEDIATE SLOPES



TYPICAL SECTION - MAXIMUM SLOPES

NOTE - TWO LANE ONE WAY ROADWAY SHOWN.
 38' FOR TWO LANE ONE WAY ROADWAY.
 50' FOR THREE LANE ONE WAY ROADWAY.

NOTES:

SEE PLANS FOR DETAILS OF TYPE AND THICKNESS OF ROADWAY SURFACING, WIDTH OF CUT DITCH AND WIDTH OF SHOULDER.

STANDARD CUT AND EMBANKMENT SLOPES AS SHOWN ON THIS SHEET MAY BE SUPERSEDED IN ROCK EXCAVATION OR OTHER SPECIAL CONDITIONS.

STANDARD SLOPE FOR P.C. CONCRETE 0.01' PER FOOT, FOR BIT. MIX. SURFACE 0.015' PER FOOT.

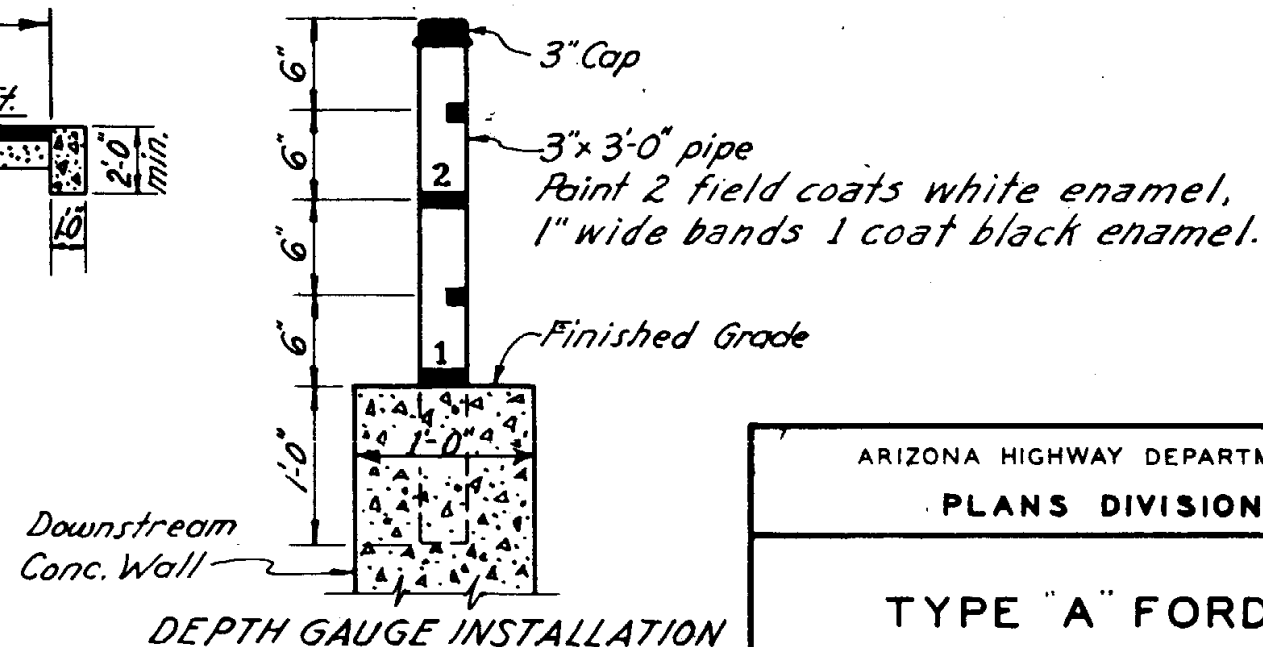
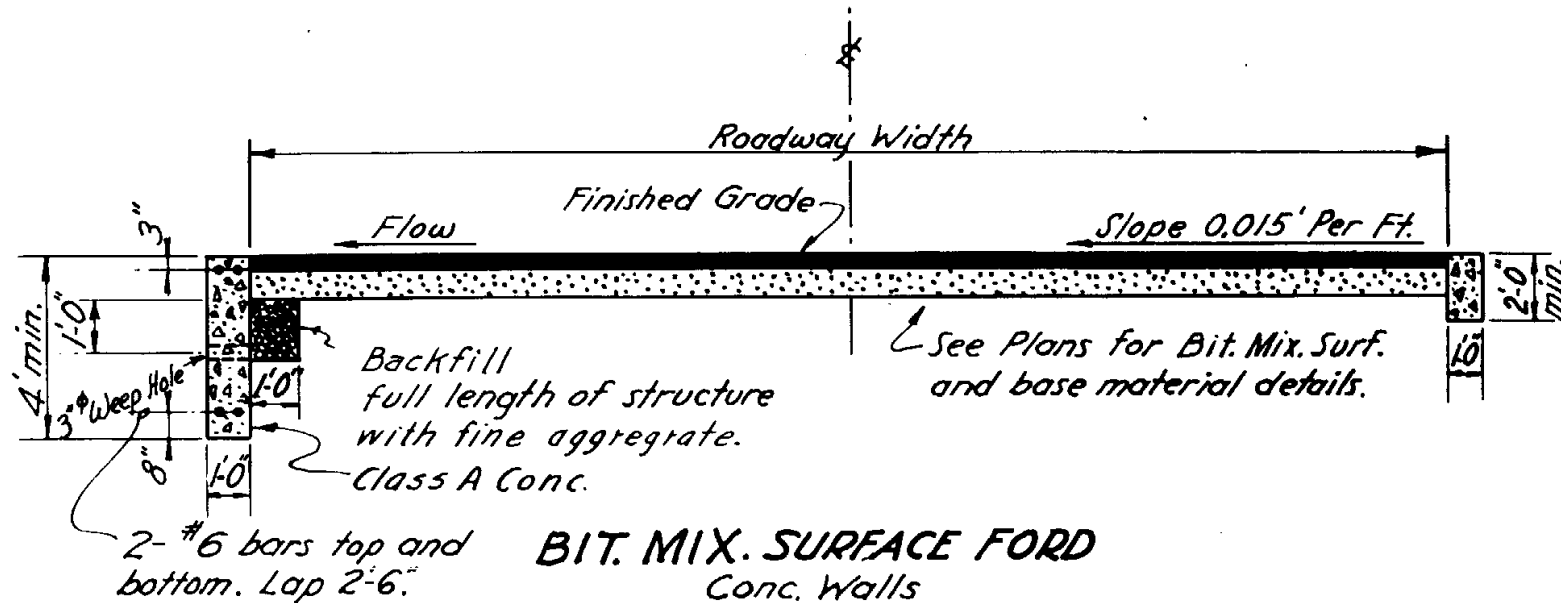
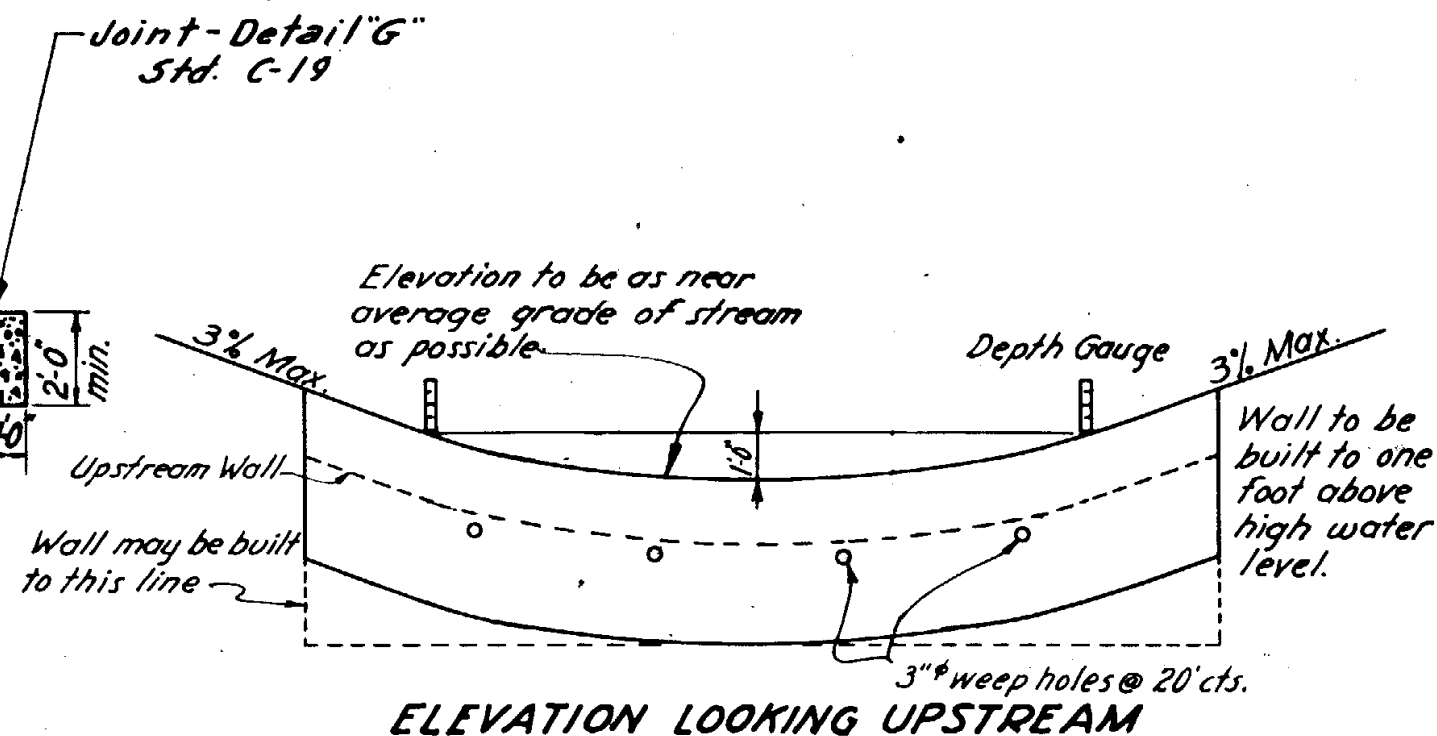
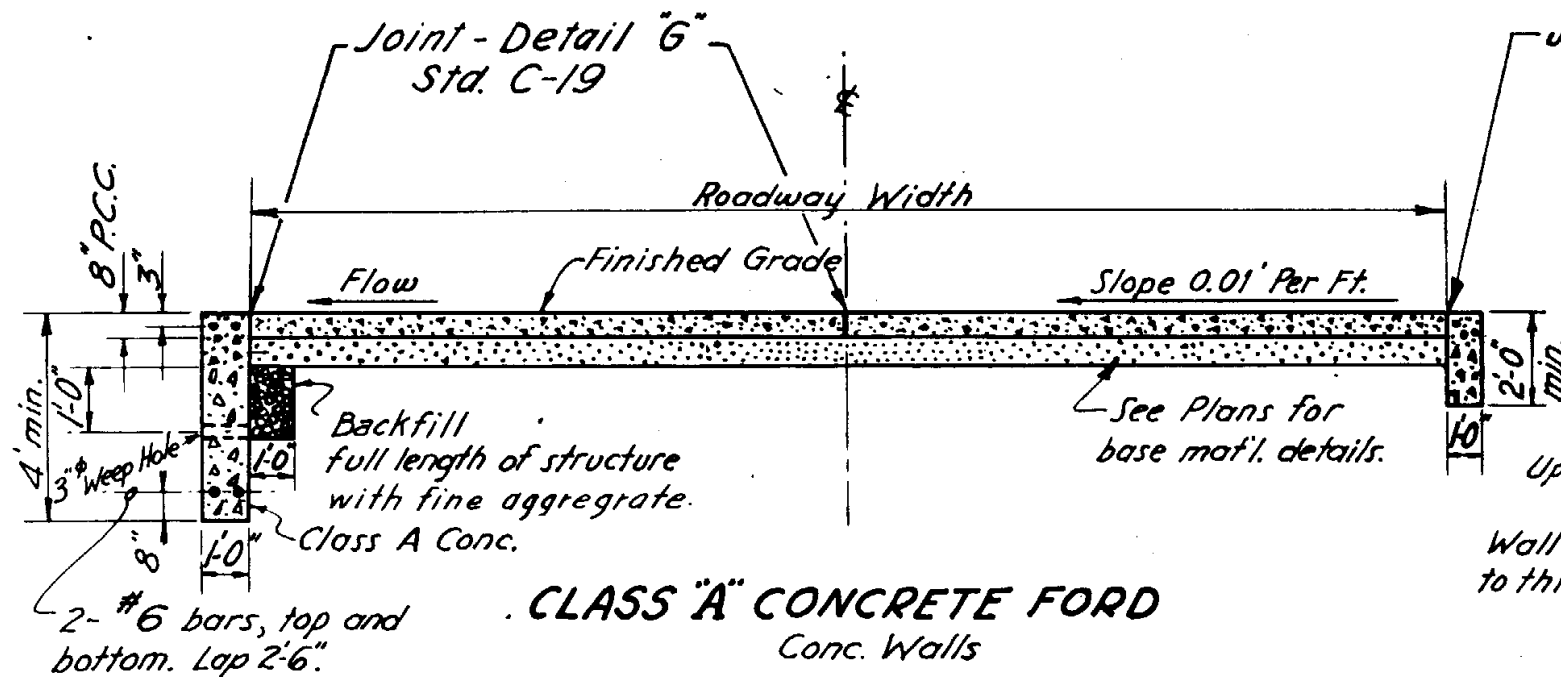
FOR CUTS UP TO 6' USE 5' SEMI-TANGENTS (L) FOR SLOPE ROUNDING. FOR EACH ADDITIONAL FOOT OF CUT ADD 1' TO SEMI-TANGENT TO 11' MAXIMUM. FINISH WITH APPROVED DRAG SO THAT THE GROUND WILL NOT HAVE A SCARRED APPEARANCE.

ARIZONA HIGHWAY DEPARTMENT
 PLANS DIVISION

INTERSTATE DESIGN
 SLOPES

DRAWN	W.E.P. Feb. 57
TRACED	L.O. Moe 8-8-57
CHECKED	CB 3-25-58
APPROVED PLANS ENG'R.	H. Weidner

DRAWING NO.
C-2-A



ARIZONA HIGHWAY DEPARTMENT

PLANS DIVISION

REV.

12/1/59

1/4/60

TYPE "A" FORD

DRAWN

C.B.B. July 1945

TRACED

GH Nov. 1945

CHECKED

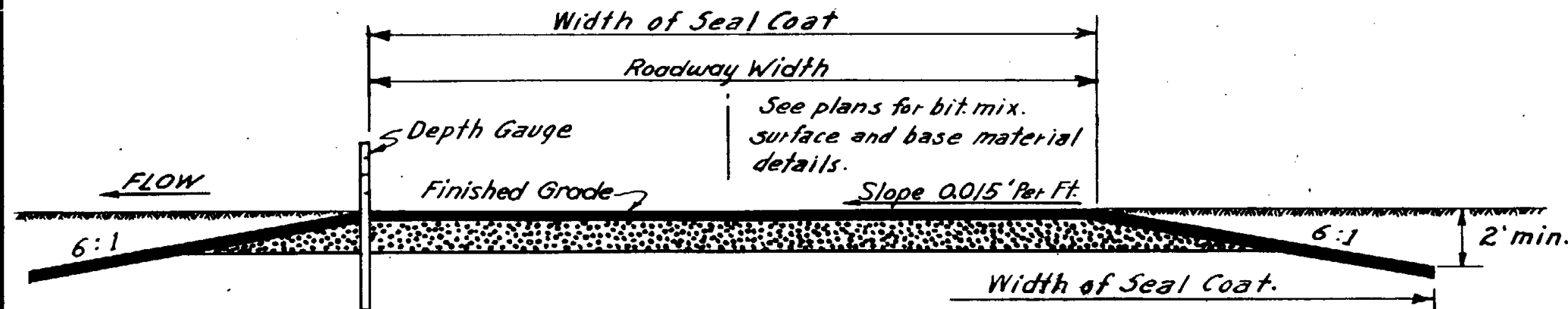
HHW

APPROVED
ENG'R. PLANS

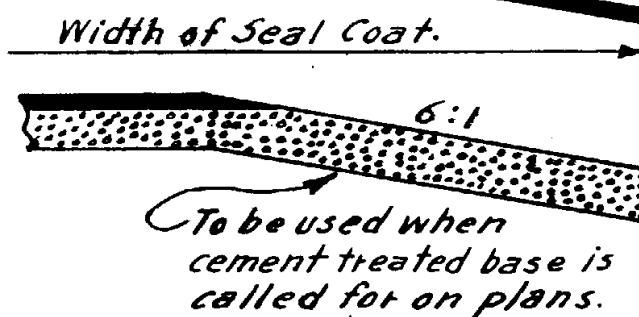
HH Wessel

DRAWING NO.

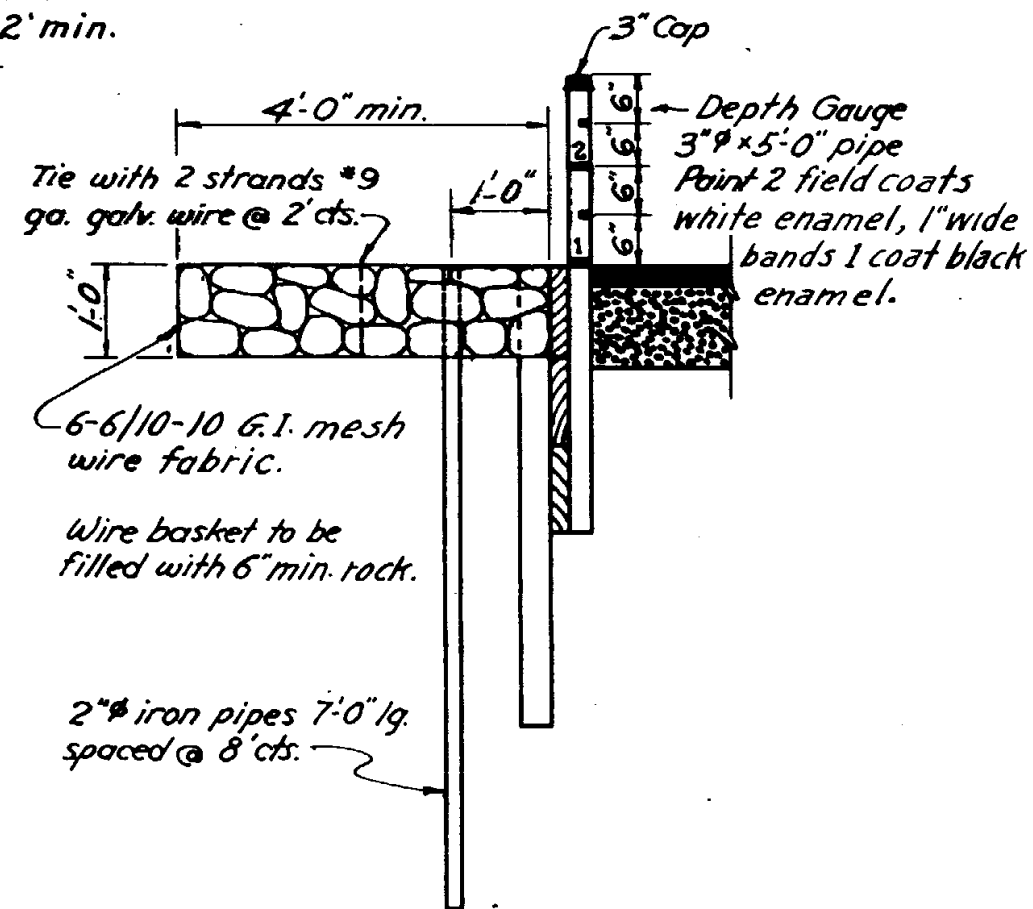
C-5



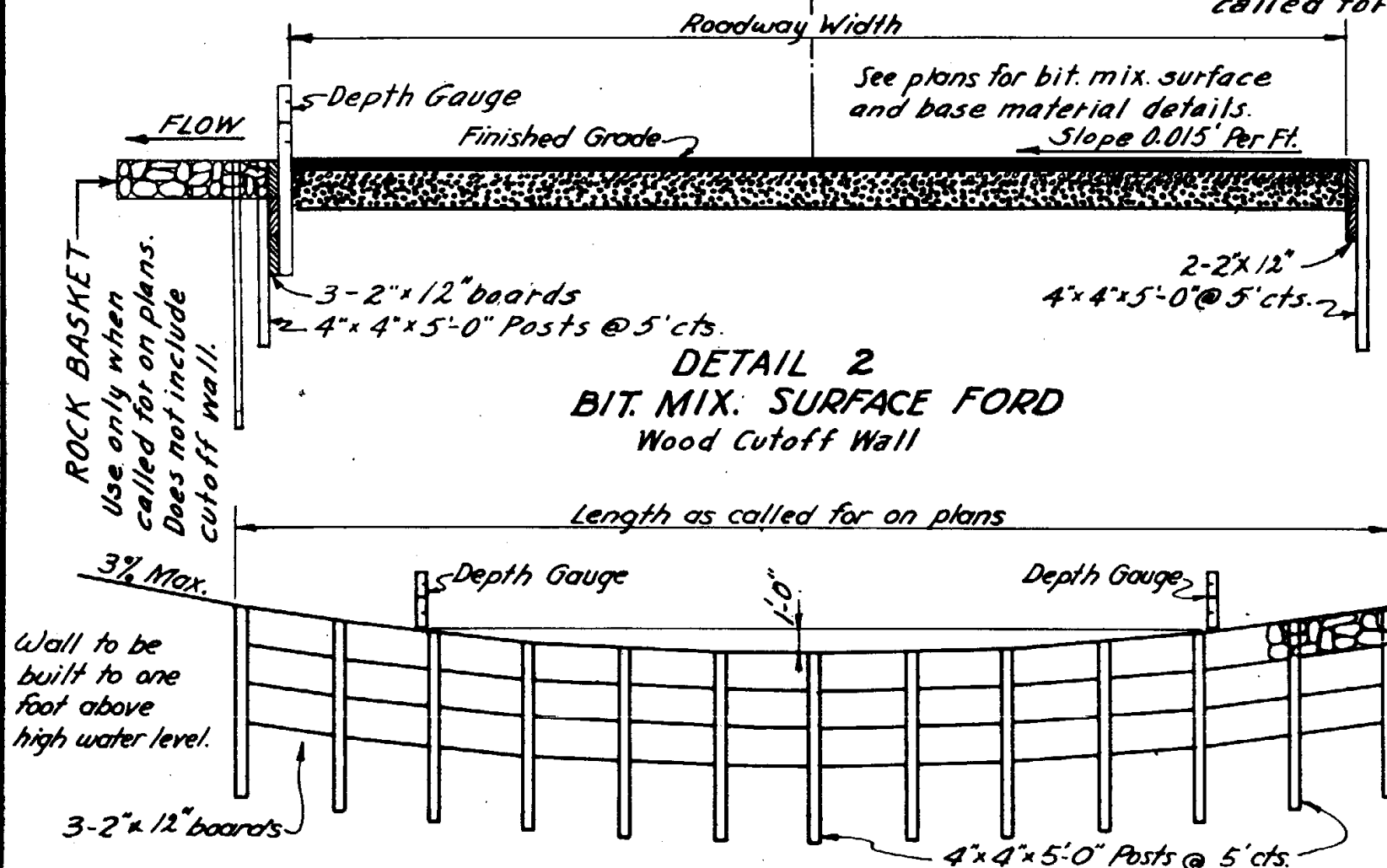
**DETAIL 1
BIT. MIX. SURFACE FORD**



Note - All timber shall be rough pressure treated and unpainted.
See Standard Specification - (1960) for allowable species and grading.

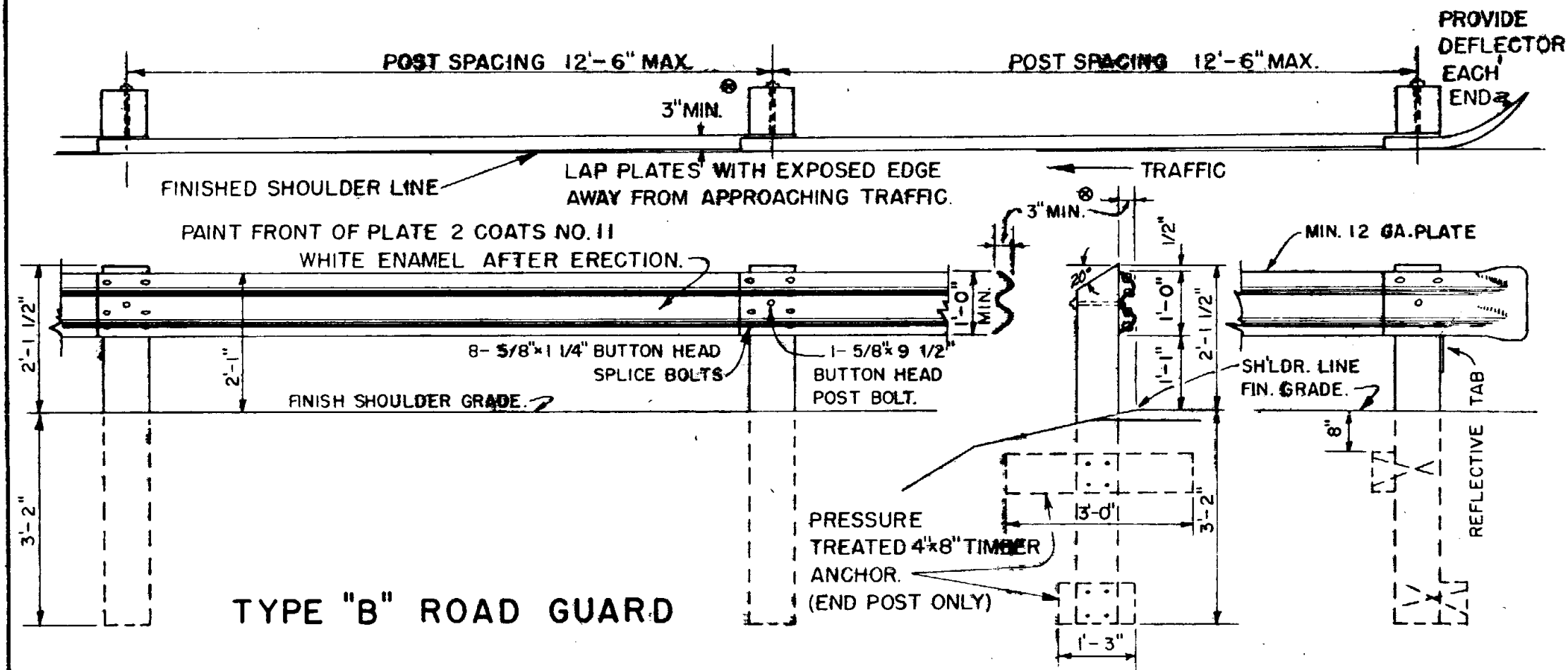
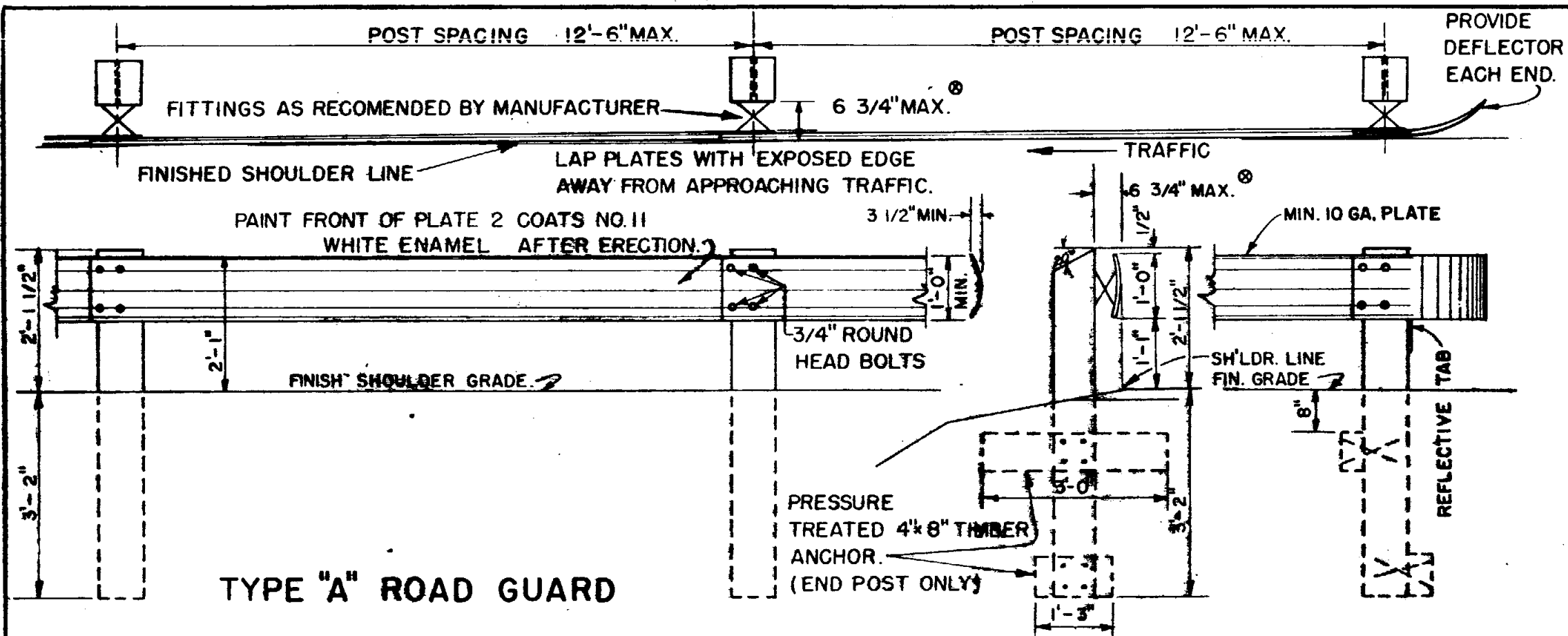


**DETAIL OF
ROCK FILLED WIRE BASKET**



ELEVATION LOOKING UPSTREAM

ARIZONA HIGHWAY DEPARTMENT		REV. 3/17/50 8/17/55 12/1/58 1/4/60
PLANS DIVISION		
TYPE "B" FORD		
DRAWN	C.B.B. July 1945	DRAWING NO. C-6
TRACED	GN Nov. 1945	
CHECKED	H.H.W.	
APPROVED ENGR. PLANS	H.H. Wessel	



GENERAL NOTES

AFTER SUBMISSION AND APPROVAL OF BRACKETS AND PLATES, MANUFACTURER'S PLANS AND SPECIFICATIONS SHALL BE USED IN CONJUNCTION WITH STANDARD ERECTION DETAILS ON THIS DRAWING. IF SPRING SUPPORT BRACKET IS USED FOR TYPE "A" ROAD GUARD THE MINIMUM TENSILE STRENGTH SHALL BE 100,000 P.S.I.

POSTS SHALL BE NOMINAL 8"x8" ROUGH, PRESSURE TREATED AND UNPAINTED. SEE STANDARD SPECIFICATIONS 1960 FOR ALLOWABLE SPECIES AND GRADING.

HOLES SHALL BE BORED AND POST TOPS TRIMMED BEFORE TREATMENT. UNLESS OTHERWISE CALLED FOR EITHER TYPE "A" OR "B" ROAD GUARD MAY BE USED.

PLACE 2"x6" FLAT TOP SILVER REFLECTIVE SHEETING TAB ON END POSTS AND EVERY THIRD INTERMEDIATE POST FACING TRAFFIC.

FOR INSTALLATION AT STRUCTURE APPROACHES SEE STANDARD C-42

SEE STANDARD C-3 FOR POST SETTING IN CURBED SECTIONS.

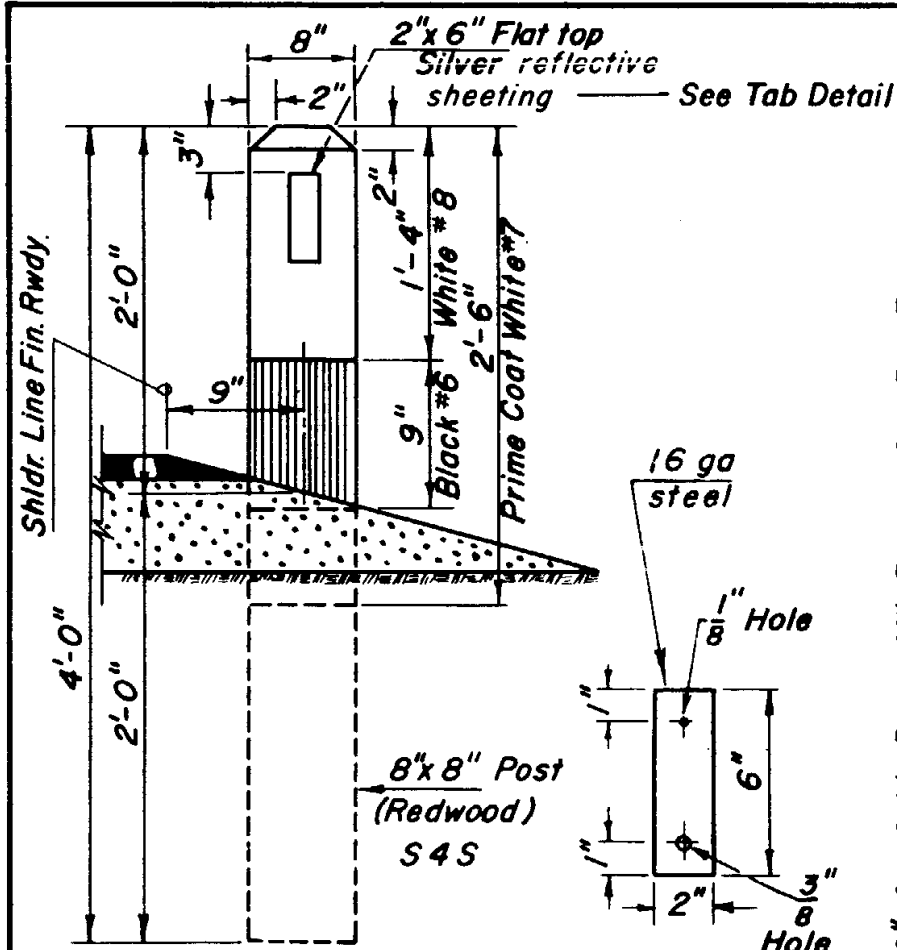
THIS DETAIL SUPERSEDES DRAWING NO. C-7

ARIZONA HIGHWAY DEPARTMENT
PLANS DIVISION

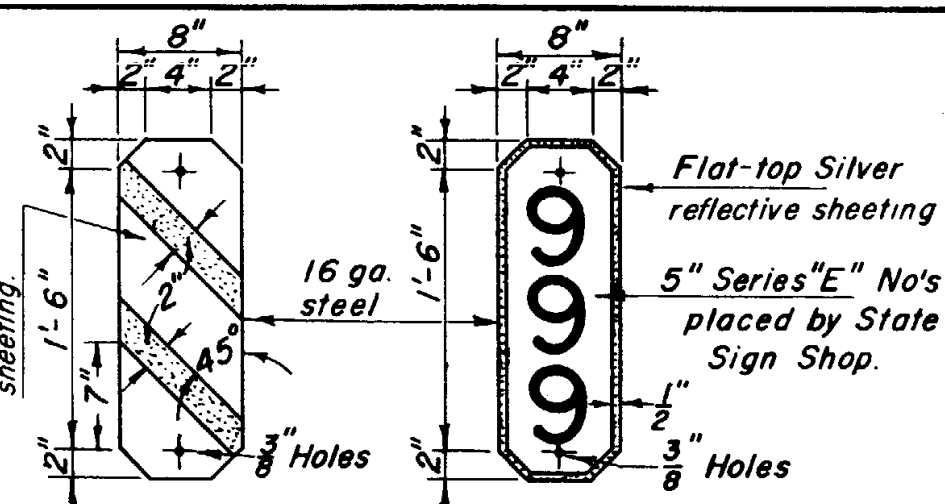
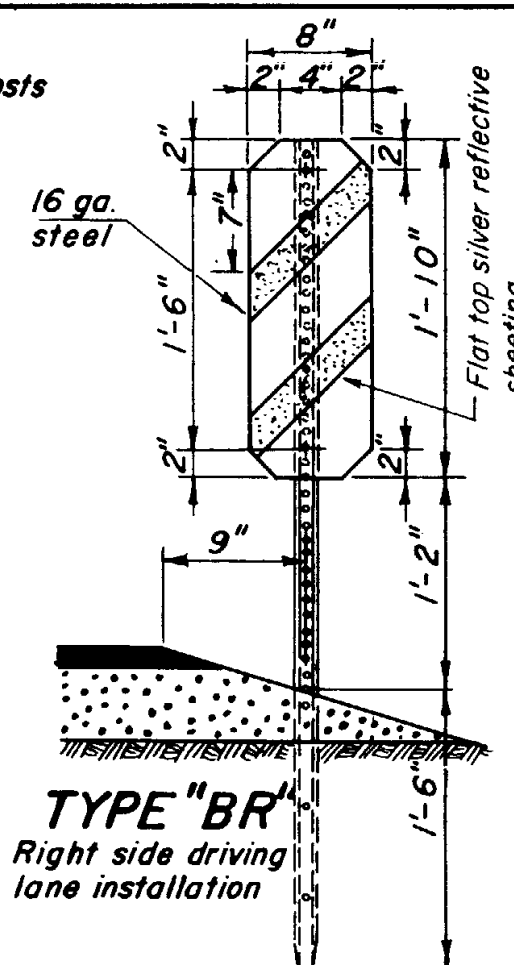
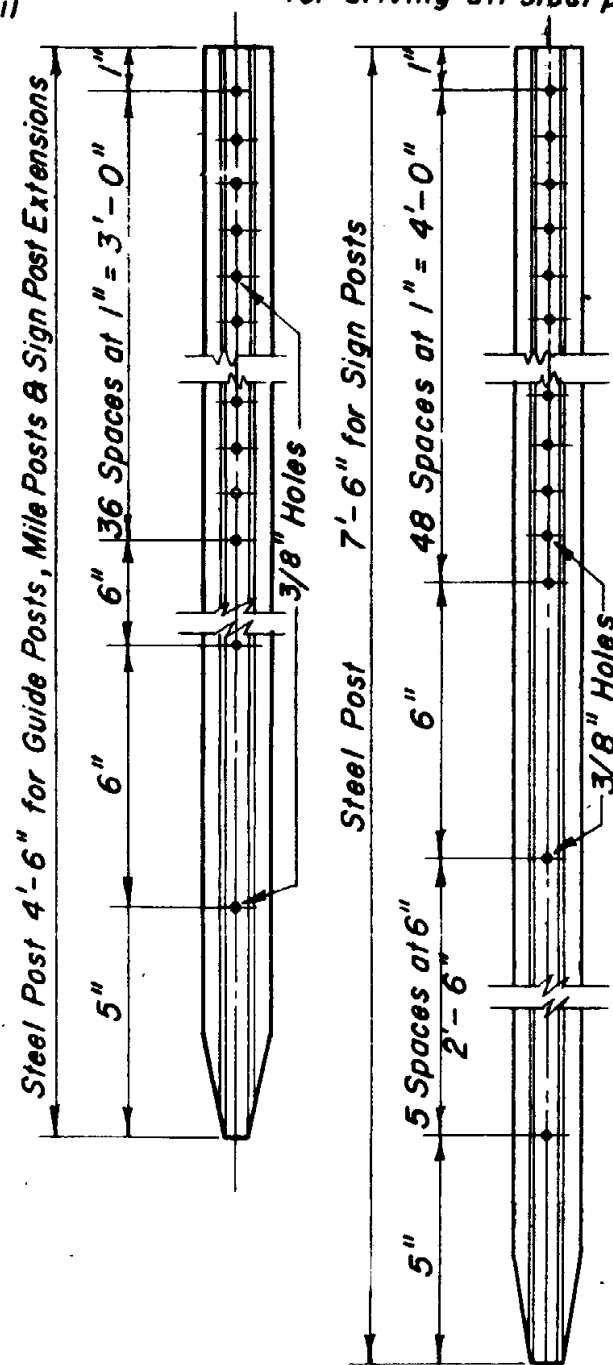
ROAD GUARD

REDRAWN	L.O. Moc 9-1-57	DRAWING NO.
TRACED	L.O. Moc 9-1-57	C-7-1
CHECKED	2/2/58	
APPROVED		
ENGR. PLANS	G. H. Decker	

REV.
1/4/60



NOTE: Use driving head
for driving all steel posts



***MILE POST
FACE PLATE***

NOTE:

Paint face plates with one coat industrial synthetic alkyd primer and one coat of industrial synthetic black enamel or equal before reflectorized material is applied.

Type "BL" and Mile Post face plate mounting details same as Type "BR"

7'-6" posts shall be painted one coat industrial synthetic primer or galvanized.

4'-6" posts shall be painted one coat industrial synthetic primer and one coat industrial synthetic enamel (Black)

Wood posts shall be Redwood 8"x8", S4S.

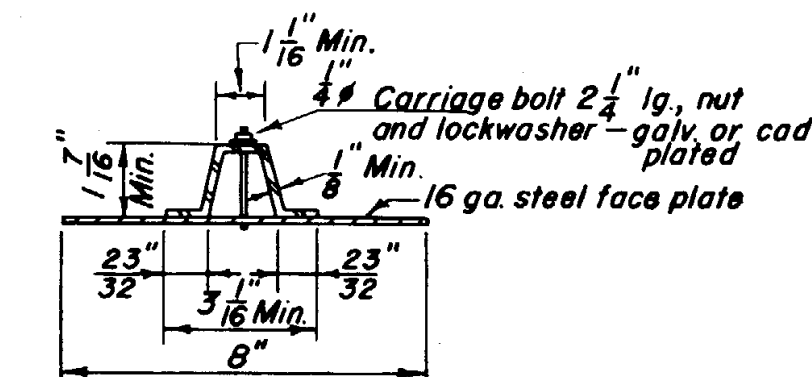
Guide post locations shown on plans are approximate and changes may be necessary to meet field conditions.

When placed in rows, guide posts shall be spaced at 200' centers unless other wise called for on plans.

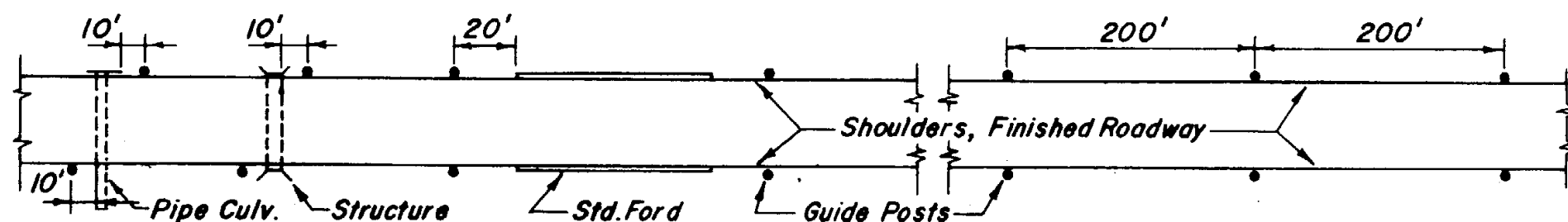
After erection and painting, install a 2"x 6" reflectorized tab, facing erection traffic, on each Type "A" post.

All guide posts along outside of curves shall have a 2"x6" reflectorized tab fastened on back of post at top.

Mile posts complete, shall be furnished by the State and installed by the Engineer.



STEEL POST DETAILS



TYPICAL GUIDE POST INSTALLATION

This detail supersedes Drawing No. C-8-1

APPROVED
TRAFFIC ENGR

DRAWN	J. Snyder	12-20-57
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TRACED	J. Snyder 12-20-57
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1	CHECKED		Jan. 1958
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APPROVED ENGR PLANS	<i>Elmer H. H.</i>
------------------------	--------------------

DRAWING NO.

C-8-2

ARIZONA HIGHWAY DEPARTMENT

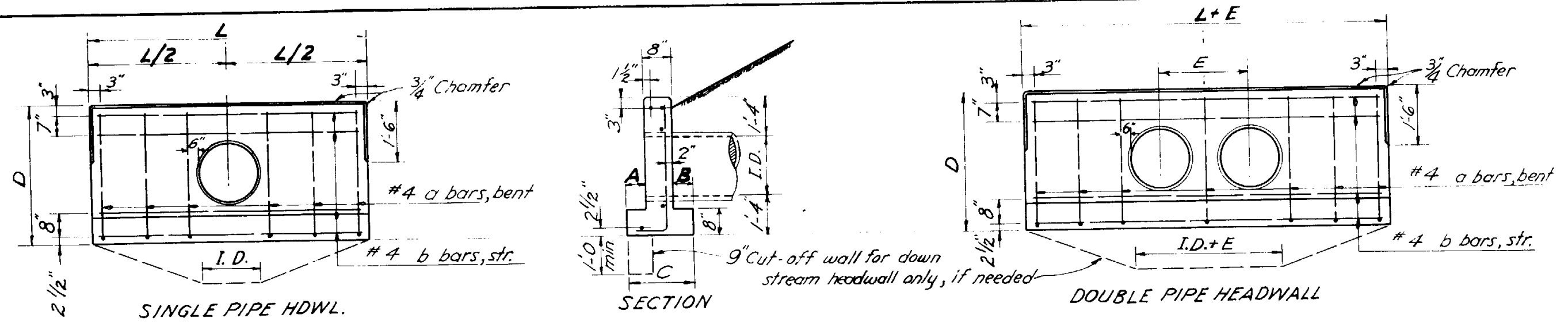
PLANS DIVISION

GUIDE POSTS

SIGN POSTS

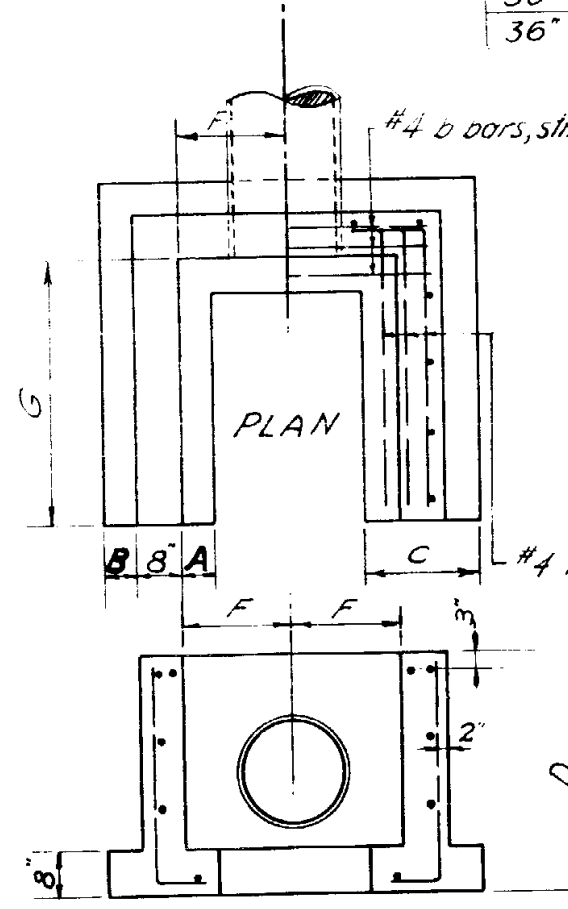
MILE POSTS

REV.
1/4/60

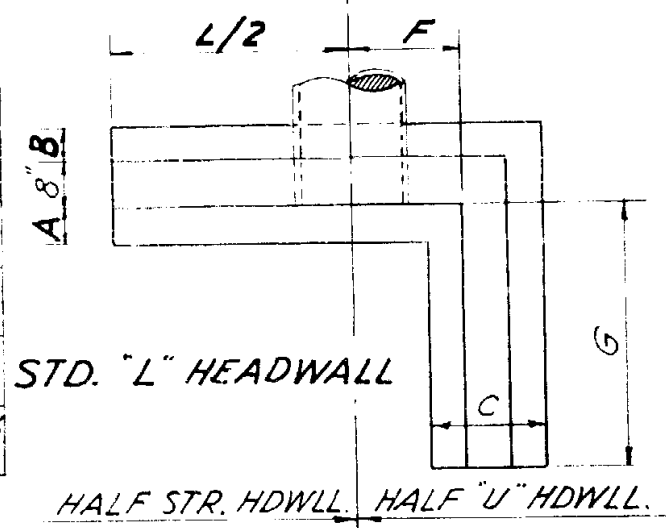


STANDARD STRAIGHT HEADWALLS

SINGLE PIPE HEADWALL										DOUBLE PIPE HEADWALL											
I.D.	DIMENSIONS							"A" Conc. C.Y.		Steel #4 bars				Reinf. Lbs.	"A" Conc. C.Y.		Steel #4 bars				Reinf. Lbs.
	A	B	C	D	E	L	L+E	FOR C.M.P.	FOR CONC. PIPE DEDUCT	a		b			FOR C.M.P.	FOR CONC. PIPE DEDUCT	a		b		
										No.	Lgth.	No.	Lgth.	No.			Lgth.	No.	Lgth.		
18"	6"	6"	1'-8"	4'-2"	2'-8"	9'-6"	12'-2"	1.17	0.03	8	4'-8"	5	9'-3"	56	1.47	0.06	9	4'-8"	5	11'-11"	68
24"	8"	8"	2'-0"	4'-8"	3'-6"	11'-6"	15'-0"	1.64	0.04	10	5'-4"	5	11'-3"	73	2.07	0.09	11	5'-4"	5	14'-9"	88
30"	8"	8"	2'-0"	5'-2"	4'-4"	13'-6"	17'-10"	2.05	0.06	10	5'-10"	5	13'-3"	83	2.62	0.13	12	5'-10"	5	17'-7"	105
36"	1'-0"	8"	2'-4"	5'-8"	5'-2"	15'-6"	20'-8"	2.63	0.09	12	6'-8"	5	15'-3"	104	3.40	0.17	14	6'-8"	5	20'-5"	131



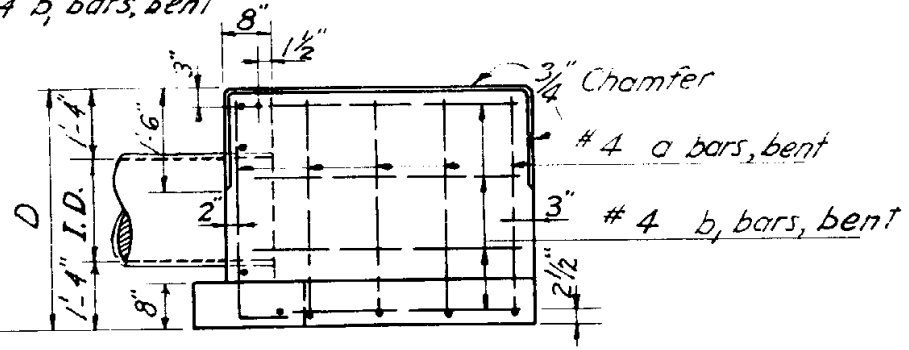
I.D.	"U" HEADWALL								SINGLE PIPES								"L" HEADWALL							
	Steel #4 bars								DIMENSIONS								Steel #4 bars							
	a	b	b ₁	A" Conc. C.Y. FOR C.M.P. DEDUCT				Reinf. Lbs.	A	B	C	D	F	G	A" Conc. C.Y. FOR C.M.P. DEDUCT	Reinf. Lbs.	a	b	b ₁	A" Conc. C.Y. FOR C.M.P. DEDUCT				Reinf. Lbs.
	No.	L	No.	L	No.	L	No.	L	No.	L	No.	L	No.	L	No.	L	No.	L	No.	L	No.	L	No.	L
18"	12	4'-8"	5	4'-3"	10	5'-8"	1.68	0.03	90	6"	6"	1'-8"	4'-2"	1'-7"	4'-6"	1.42	0.03	73	10	4'-8"	5	6'-9"	5	5'-8"
24"	14	5'-4"	5	5'-3"	12	6'-8"	2.37	0.04	121	8"	8"	2'-0"	4'-8"	2'-1"	5'-6"	2.00	0.04	97	12	5'-4"	5	8'-3"	6	6'-8"
30"	18	5'-10"	5	6'-3"	12	7'-8"	3.01	0.06	152	8"	8"	2'-0"	5'-2"	2'-7"	6'-6"	2.53	0.06	118	14	5'-10"	5	9'-9"	6	7'-8"
36"	20	6'-8"	5	7'-3"	14	8'-8"	3.90	0.09	184	1'-0"	8"	2'-4"	5'-8"	3'-1"	7'-6"	3.27	0.09	149	16	6'-8"	5	11'-3"	7	8'-8"



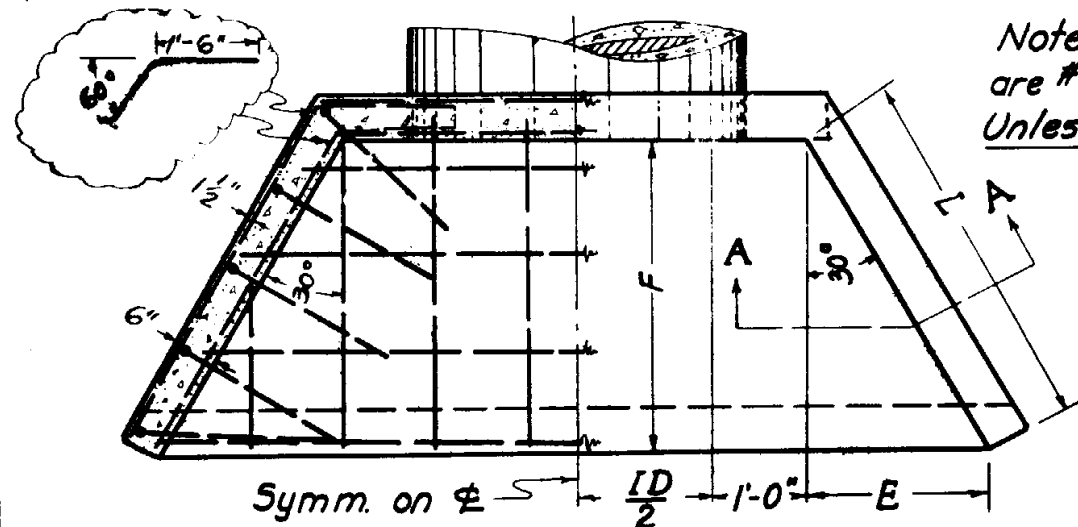
Note:
Std. "L" Hdwall. is made up of 1/2 "U" and 1/2 Str. Hdwall.

ARIZONA HIGHWAY DEPARTMENT		REV. 3-20-50
PLANS DIVISION		12/1/58
STRAIGHT, "L" AND "U" TYPE REINF. CONCRETE HEADWALLS		
DRAWN GH Nov. 1945	DRAWING NO.	
TRACED GH Nov. 1945	C-9	
CHECKED HHH		
APPROVED PLANS ENGR. [Signature]		

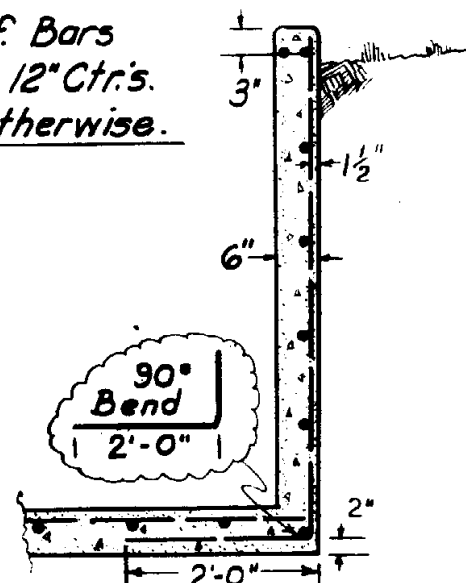
END ELEVATION
STANDARD "U" TYPE HEADWALL



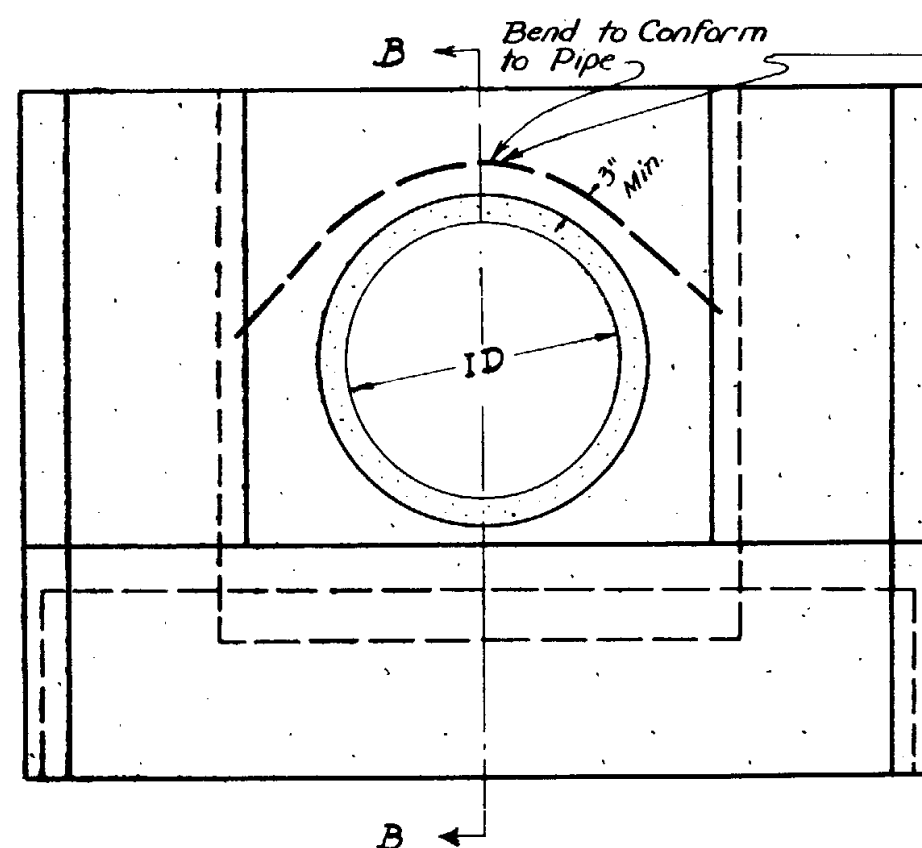
Note: All Reinf. Bars are #4 @ Approx. 12" Ctr.'s. Unless Noted Otherwise.



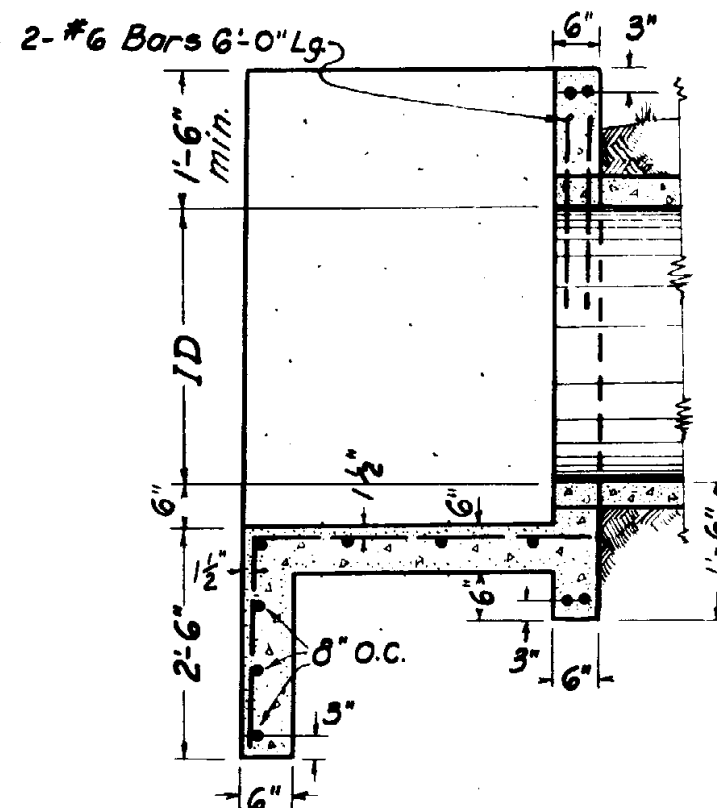
PLAN



SECTION A-A



ELEVATION



SECTION B-B

QUANTITIES FOR ONE HEADWALL

PIPE ID	DIMENSIONS			QUANTITIES	
	L	E	F	CL. 'A' CONG. C.Y. C.M.P. DEDUCT FOR R.C.P.	REINF. ST.-LB
18"	2'-0"	1'-0"	1'-9"	1.01	0.03
24"	2'-0"	1'-0"	1'-9"	1.10	0.04
30"	3'-0"	1'-6"	2'-7"	1.50	0.05
36"	4'-0"	2'-0"	3'-6"	2.11	0.06
42"	5'-0"	2'-6"	4'-4"	2.71	0.08
48"	6'-0"	3'-0"	5'-0"	3.37	0.11
54"	7'-0"	3'-6"	6'-1"	4.15	0.13
60"	8'-0"	4'-0"	6'-11"	4.97	0.16

GENERAL NOTES

1. All concrete shall be Class "A"
2. All exposed corners shall have a 3/4" chamfer.
3. Concrete pipe joints shall be constructed as per Std. C-33-1.
4. All concrete pipe under roadway shall be R.C.
5. Double riveted bituminous coated C.M.P. may be used for irrigation purposes where called for on plans.

Drawn for 36" Pipe ~ Scale: 1/2" = 1'-0"

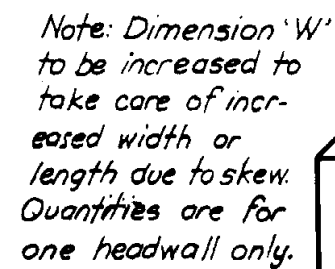
ARIZONA HIGHWAY DEPARTMENT
PLANS DIVISION

IRRIGATION HEADWALLS
18" TO 60" DIAMETER PIPES

DRAWN	R.J.J. 3-10-58	DRAWING NO.
TRACED	R.J.J. 3-11-58	
CHECKED	L.O.M. 3-20-58	
APPROVED PLANS ENGR.	<i>[Signature]</i>	

C-9-A

REV.
12-1-58
1-4-60

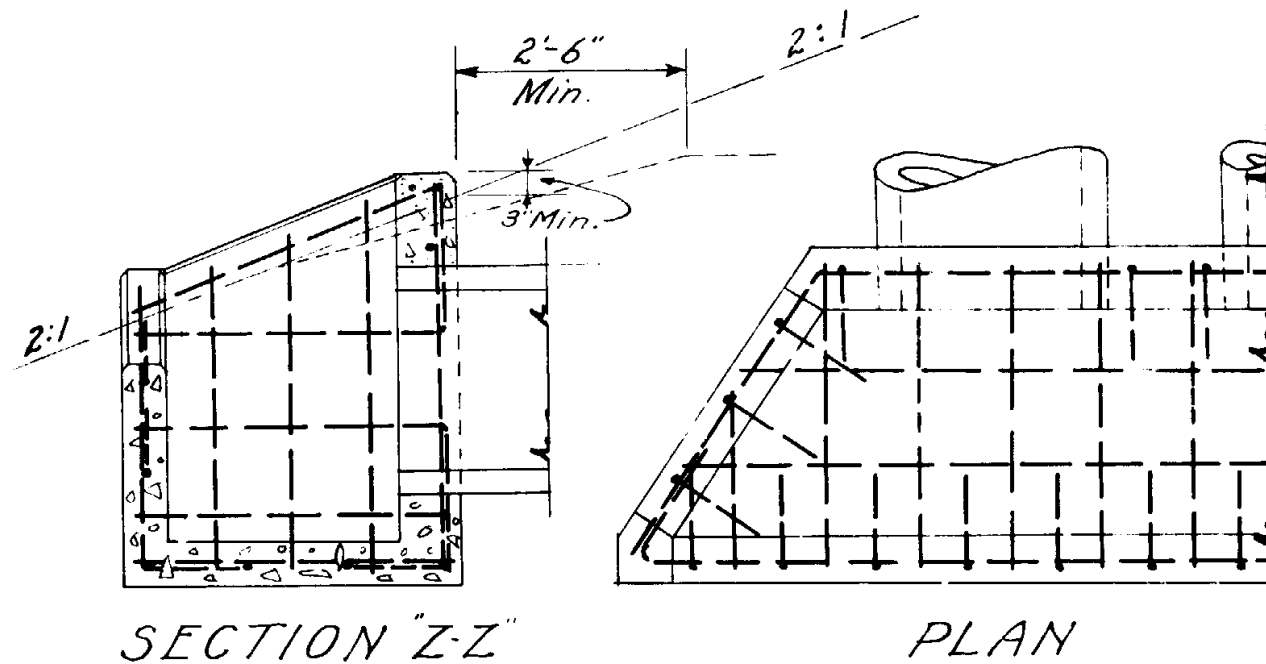


Mark	Size	Bend	No.	84"	Lath	No.	72"	Lath	No.	66"	Lath
a1	"	A	2	5-3"	2	5-0"	2	4-9"	2	2-9"	2
a2	"	"	2	5-3"	2	5-0"	2	5-3"	2	5-3"	2
a3	"	"	2	6-3"	2	6-0"	2	5-9"	2	5-9"	2
a4	"	"	2	6-3"	2	6-0"	2	6-3"	2	6-3"	2
a5	"	"	2	7-9"	2	7-0"	2	6-9"	2	6-9"	2
a6	"	"	2	8-3"	2	8-0"	2	7-9"	2	7-9"	2
a7	"	"	2	8-9"	2	8-3"	2	8-3"	2	8-3"	2
a8	"	"	2	9-3"	2	8-9"	2	8-9"	2	8-9"	2
a9	"	"	2	9-9"	2	9-3"	2	9-3"	2	9-3"	2
a10	"	"	2	10-3"	2	9-9"	2	9-9"	2	9-9"	2
b	"	5tr	10	11-9"	10	11-3"	10	10-9"	10	9-9"	10
b1	"	"	2	9-0"	2	8-9"	2	8-0"	2	7-0"	2
b2	"	"	2	7-3"	2	7-0"	2	6-3"	2	5-3"	2
b3	"	"	2	3-0"	2	3-0"	2	2-3"	2	2-3"	2
b4	"	"	2	3-0"	2	1-6"	2	1-0"	2	1-0"	2
c	"	C	10	14-6"	10	13-8"	10	12-6"	10	11-6"	10
c1	"	"	2	10-0"	2	9-6"	2	9-0"	2	8-0"	2
c2	"	"	2	8-3"	2	7-9"	2	7-3"	2	6-0"	2
c3	"	"	2	6-6"	2	6-0"	2	5-3"	2	5-0"	2
c4	"	"	2	5-0"	2	4-9"	2	4-3"	2	3-6"	2
c5	"	"	2	3-0"	2	2-9"	2	2-3"	2	2-3"	2
d	"	5tr	1	21-10"	1	20-10"	1	18-10"	1	15-4"	1
d1	"	"	1	20-10"	1	18-10"	1	17-6"	1	17-4"	1
d2	"	"	1	18-10"	1	18-10"	1	16-10"	1	16-4"	1
d3	"	"	1	18-10"	1	17-10"	1	15-10"	1	13-4"	1
d4	"	"	1	17-10"	1	16-10"	1	14-10"	1	14-4"	1
d5	"	"	1	16-10"	1	15-10"	1	13-10"	1	13-4"	1
d6	"	"	1	15-10"	1	14-10"	1	12-10"	1	12-4"	1
d7	"	"	1	14-10"	1	13-10"	1	11-10"	1	11-4"	1
d8	"	"	1	13-10"	1	12-10"	1	10-10"	1	10-4"	1
d9	"	"	1	12-10"	1	11-10"	1	9-10"	1	9-4"	1
d10	"	"	1	11-10"	1	10-10"	1	8-10"	1	8-4"	1
e	"	E	4	13-0"	4	12-6"	4	12-0"	4	11-0"	4
f	"	5tr	2	9-3"	2	8-10"	2	8-3"	2	7-10"	2
g	"	"	2	9-3"	2	8-6"	2	8-2"	2	7-8"	2
h	"	"	1	21-4"	1	20-4"	1	19-4"	1	17-10"	1

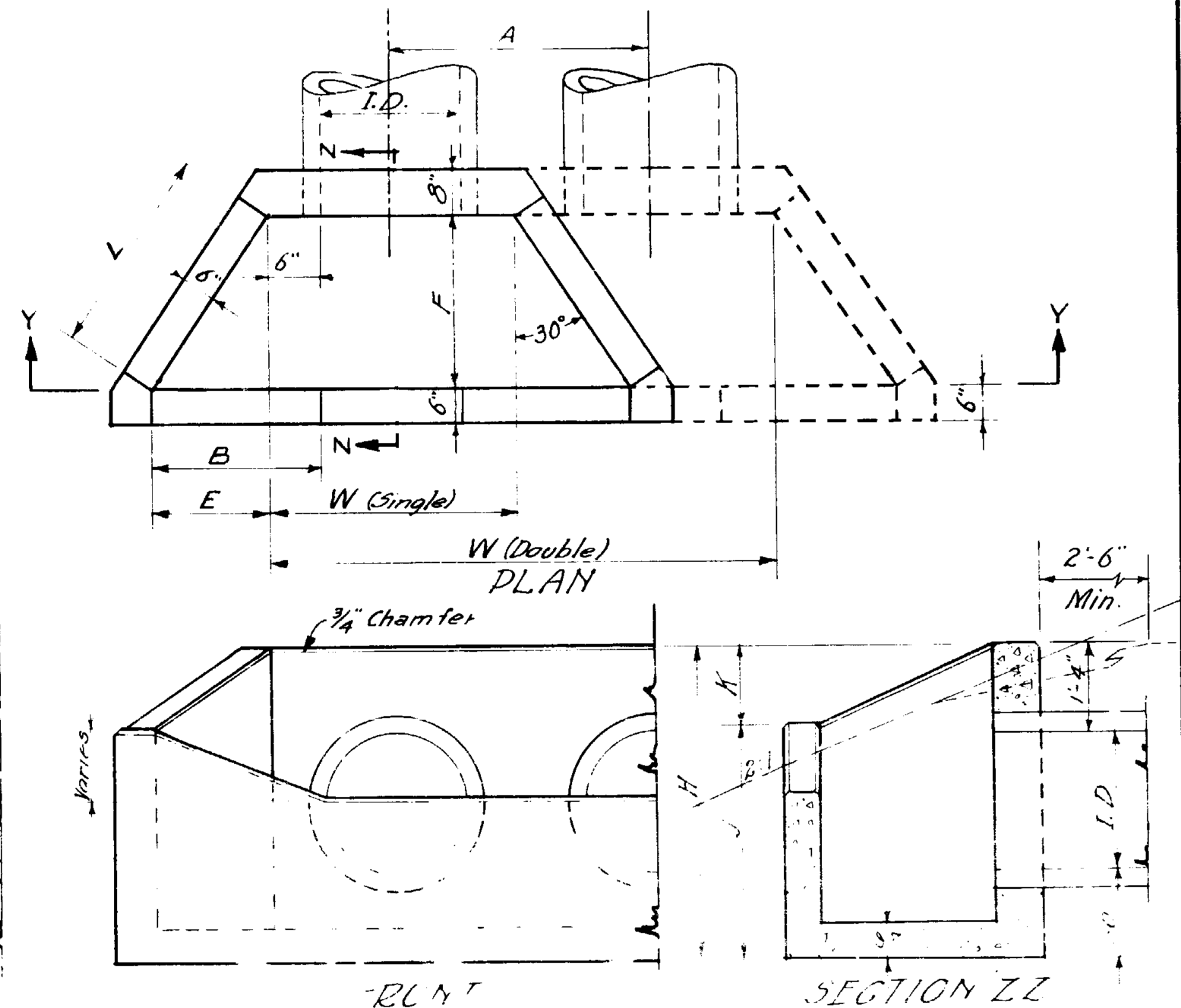
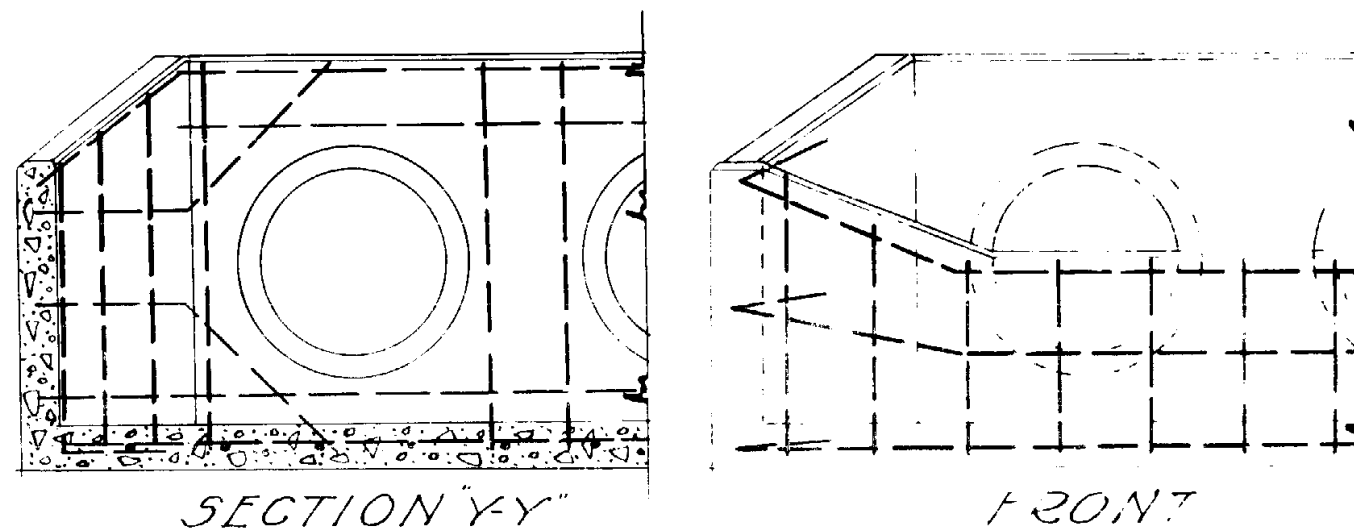
Mark	Size	Bend	60"		54"		48"		42"	
			No	Lgth	No	Lgth	No	Lgth	No	Lgth
a	#4	A	2	4'-6"	2	4'-6"	2	4'-6"	2	4'-0"
a1	"	A	2	5'-0"	2	5'-0"	2	5'-0"	2	4'-6"
a2	"	A	2	5'-6"	2	5'-6"	2	5'-6"	2	5'-0"
a3	"	A	2	6'-0"	2	6'-0"	2	6'-0"	2	5'-6"
a4	"	A	2	6'-6"	2	6'-6"	2	6'-6"	2	6'-0"
a5	"	A	2	7'-0"	2	7'-0"	2	7'-0"	2	6'-6"
a6	"	A	2	7'-6"	2	7'-6"	2	7'-3"	-	-
a7	"	A	2	8'-0"	-	-	-	-	-	-
b	"	Str	8	8'-9"	8	7'-9"	8	7'-3"	6	6'-9"
b1	"	"	2	6'-0"	2	5'-0"	2	4'-6"	2	4'-0"
b2	"	"	2	4'-3"	2	3'-3"	2	2'-9"	2	2'-0"
b3	"	"	2	1'-6"	-	-	-	-	-	-
c4	"	C	2	2'-0"	-	-	-	-	-	-
c3	"	C	2	3'-9"	2	3'-6"	2	2'-6"	2	2'-3"
c2	"	C	2	5'-6"	2	4'-9"	2	4'-3"	2	3'-3"
c1	"	C	2	7'-3"	2	6'-6"	2	6'-0"	2	6'-0"
c	"	C	8	10'-6"	7	9'-6"	7	8'-6"	6	8'-0"
d	"	Str	1	16'-10"	1	15'-4"	1	14'-3"	1	13'-4"
d1	"	"	1	15'-10"	1	14'-4"	1	13'-3"	1	12'-4"
d2	"	"	1	14'-10"	1	13'-4"	1	12'-3"	1	11'-4"
d3	"	"	1	13'-10"	1	12'-4"	1	11'-3"	1	10'-4"
d4	"	"	1	12'-10"	1	11'-4"	1	10'-3"	1	9'-4"
d5	"	"	1	11'-10"	1	10'-4"	1	9'-3"	1	8'-4"
d6	"	"	1	10'-10"	1	9'-4"	1	8'-3"	1	7'-4"
d7	"	"	1	9'-10"	1	8'-4"	-	-	-	-
e	"	E	4	10'-0"	4	9'-0"	4	8'-6"	4	8'-0"
f	"	Str	2	7'-4"	2	6'-10"	2	6'-4"	2	5'-10"
g	"	"	2	7'-2"	2	6'-8"	2	6'-2"	2	5'-8"
h	"	"	1	16'-4"	1	14'-10"	1	13'-10"	1	12'-10"

WING TYPE HEADWALL									
SINGLE PIPES									
ID	Dimensions					Water Way	Conc. C.Y.		Steel Lb.
	L	E	F	W	X		R.C.P.	C.M.B.	
42"	7'-0"	3'-6"	6'-1"	5'-10"	2'-6"	9.6'	4.27	4.38	205
48"	7'-6"	3'-9"	6'-6"	6'-4"	3'-0"	12.6'	5.01	5.15	265
54"	8'-0"	4'-0"	6'-11"	6'-10"	3'-0"	15.9'	5.04	5.21	295
60"	9'-0"	4'-6"	7'-10"	7'-4"	3'-0"	19.6'	6.87	7.09	340
66"	10'-0"	5'-0"	8'-8"	7'-10"	3'-3"	23.8'	7.29	7.54	390
72"	11'-0"	5'-6"	9'-6"	8'-4"	3'-3"	28.3'	8.29	8.59	480
78"	11'-6"	5'-9"	10'-0"	8'-10"	3'-6"	33.2'	9.12	9.47	490
84"	12'-0"	6'-0"	10'-5"	9'-4"	3'-9"	38.5'	9.96	10.35	560

ARIZONA HIGHWAY DEPARTMENT		REV. 66"-84" Added 5-12-47 6-10-55 12/1/58 1/4/60
PLANS DIVISION		
PIPE HEADWALLS- 42" TO 84"		
DRAWN BY	W.M.D. FEB., 1936	DRAWING NO. C-10
TRACED BY	K.S. JUNE, 1938	
CHECKED BY	H.M.W. JULY 1938	
APPROVED ENGR. OF PLANS	<i>[Signature]</i>	



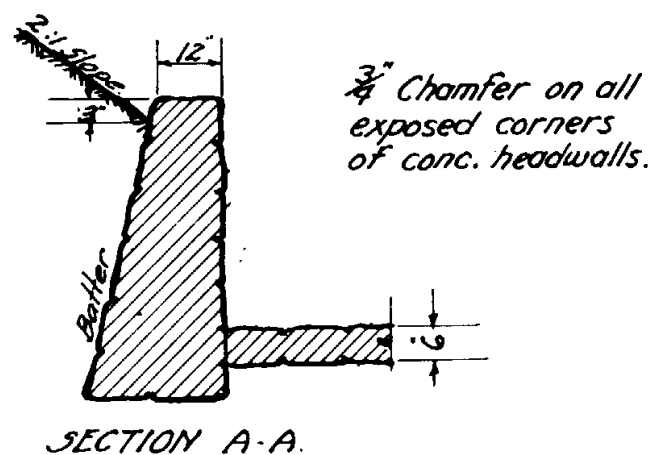
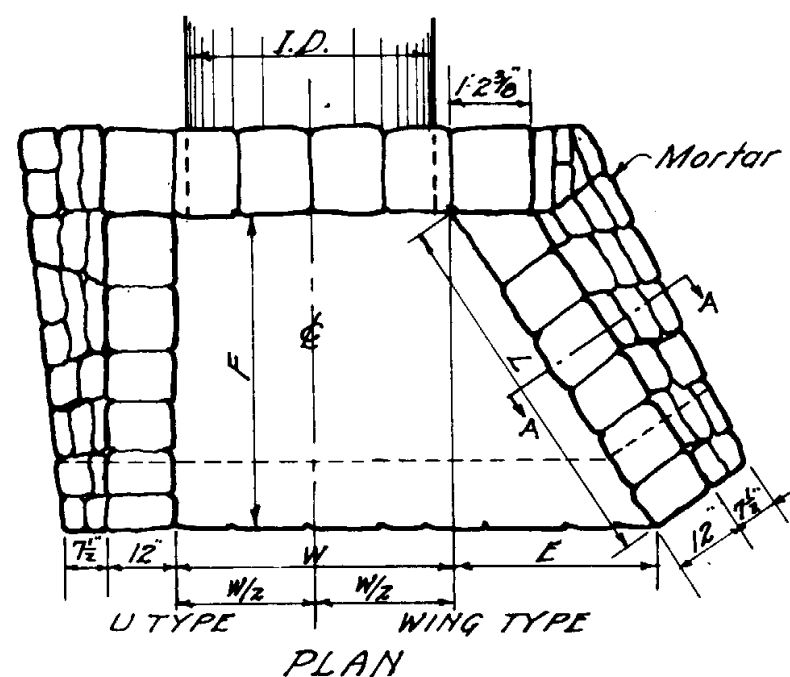
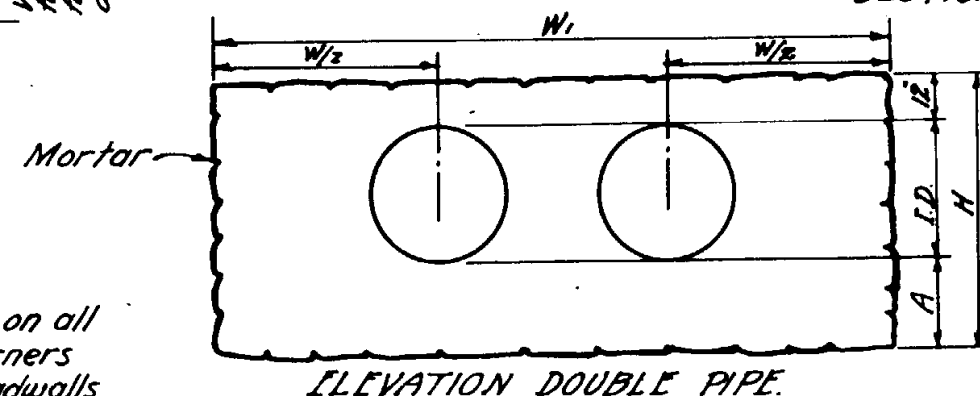
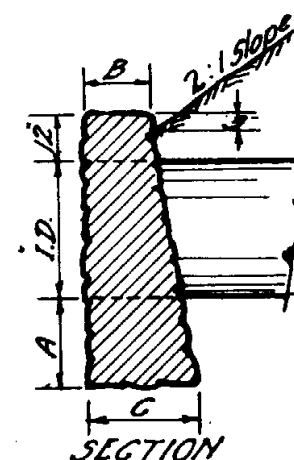
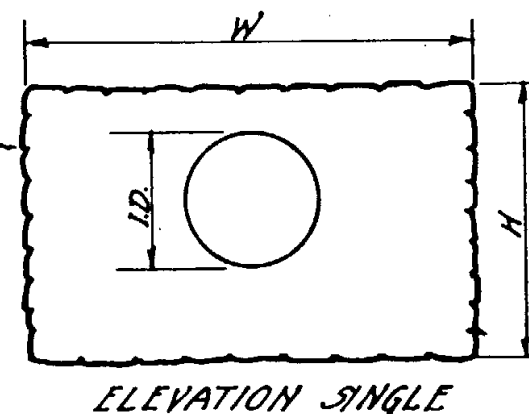
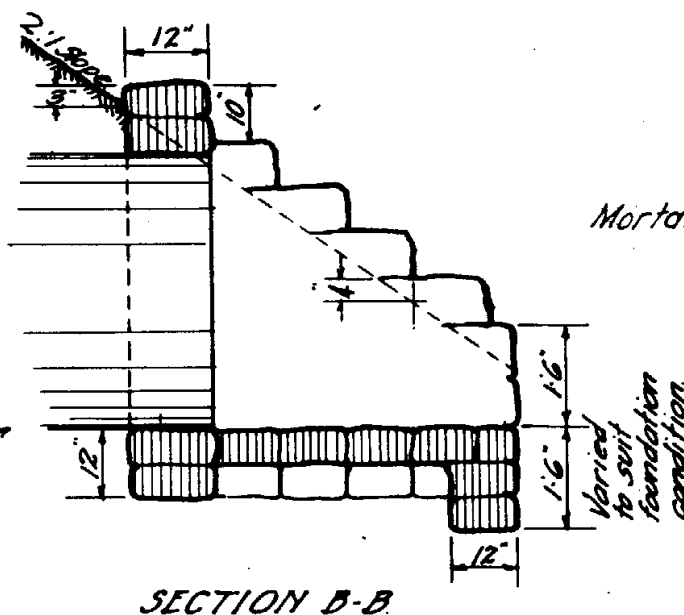
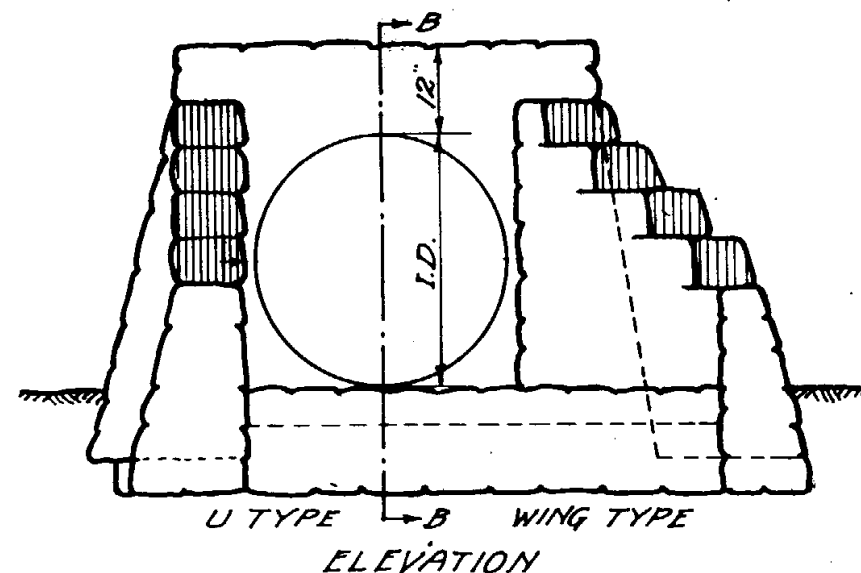
Note - All reinforcing to be
#4 bars approx. 12" o.c



PIPE		DIMENSIONS										QUANTITIES					
I. D.	W		A	B	E	F	H	J	K	L	Class "A" Conc. C.Y. Reinf. Steel						
	Single	Double									Single		Double				
											C.M.P.	For Conc. Pipe Deduct	C.M.P.	For Conc. Pipe Deduct			
18"	2'-6"	5'-2"	2'-8"	1'-3"	9"	1'-3 ⁵ / ₈ "	3'-10"	3'-1"	9"	1'-6"	0.76	0.03	1.12	0.06	75# 107#		
24"	3'-0"	6'-6"	3'-6"	1'-7 ¹ / ₂ "	1'-1 ¹ / ₂ "	1'-11 ³ / ₈ "	4'-4"	3'-5"	11"	2'-3"	1.00	0.04	1.55	0.09	92# 136#		
30"	3'-6"	7'-10"	4'-4"	2'-0"	1'-6"	2'-7 ¹ / ₄ "	4'-10"	3'-9"	1'-1"	3'-0"	1.50	0.06	2.29	0.13	112# 166#		
36"	4'-0"	9'-2"	5'-2"	2'-4 ¹ / ₂ "	1'-10 ¹ / ₂ "	3'-3"	5'-4"	4'-0"	1'-4"	3'-9"	1.96	0.09	3.01	0.17	145# 214#		
42"	4'-6"	10'-6"	6'-0"	2'-9"	2'-3"	3'-10 ³ / ₄ "	5'-10"	4'-4"	1'-6"	4'-6"	2.49	0.11	3.85	0.23	189# 279#		

Reference Std. C-13

ARIZONA HIGHWAY DEPARTMENT		REV. 12/1/58
PLANS DIVISION		
DROP INLET HEADWALLS		
DRAWN	K.S. Oct. 1939	DRAWING NO. C-11
TRACED	K.S. Oct. 1939	
CHECKED	H.H. Wells	
APPROVED PLANS ENGR.	H.H. Wells	



STRAIGHT TYPE HEADWALLS

Diam. I.D.	Dimensions				Single Pipe		Double Pipe	
	A	B	C	H	W	Cu. Yds.	W ₁	Cu. Yds.
18"	1'-0"	1'-0"	1'-4"	3'-11"	7'-0"	1.11	9'-8"	1.49
24"	1'-4"	1'-0"	1'-8"	4'-10"	8'-0"	1.15	11'-6"	2.43
30"	1'-8"	1'-0"	2'-0"	5'-9"	10'-6"	3.08	14'-7"	4.11
36"	2'-0"	1'-0"	2'-4"	6'-8"	13'-0"	5.05	17'-8"	6.58

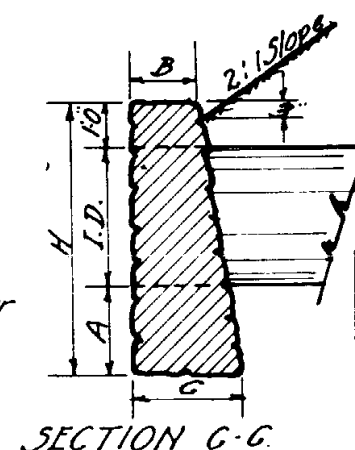
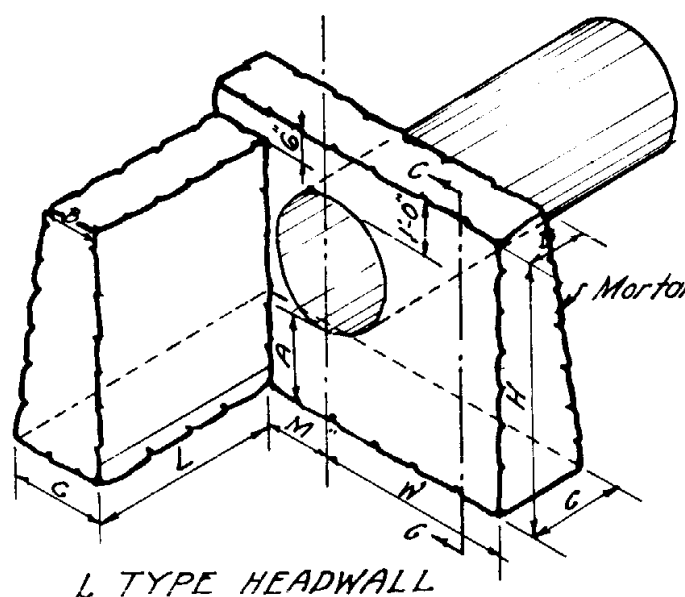
Note-- Quantities are for one headwall only.

WING AND U TYPE HEADWALLS

Dimensions				Single Pipe				Double Pipe			
Diam.	Wing Type				Waterway	U Type	Wing Type		Waterway	U Type	Wing Type
I.D.	L	F	F	W	Area S.F.	Cu. Yds.	Cu. Yds.	W	Area S.F.	Cu. Yds.	Cu. Yds.
30"	2'-8½"	1'-6"	2'-3"	3'-7"	4.91	2.52	2.57	7'-8"	9.82	3.43	3.48
36"	3'-7½"	2'-0"	3'-0"	4'-2"	7.07	3.36	3.56	8'-10"	14.14	4.51	4.71
42"	4'-6"	2'-6"	3'-9"	4'-9"	9.62	4.31	4.71	10'-0"	19.24	5.73	6.13
48"	5'-5"	3'-0"	4'-6"	5'-4"	12.56	5.40	6.03	11'-2"	25.12	7.17	7.74
54"	6'-3½"	3'-6"	5'-3"	5'-11"	15.90	6.66	7.53	12'-4"	31.80	8.20	9.57
60"	7'-2½"	4'-0"	6'-0"	6'-6"	19.63	8.05	9.21	13'-6"	39.26	10.44	11.59

Note-- Dimensions and quantities shown are calculated on a basis of using concrete pipe.

Dimension W to be increased to take care of increased width or length due to skew.



L TYPE HEADWALLS

Diam. I.D.	Dimensions				Single Pipe		Double Pipe	
	A	B	C	H	W	L	Cu. Yds.	M
18"	1'-0"	1'-0"	1'-4"	3'-11"	3'-6"	4'-6"	1.60	1'-3"
24"	1'-4"	1'-0"	1'-8"	4'-10"	4'-0"	5'-6"	2.66	1'-7"
30"	1'-8"	1'-0"	2'-0"	5'-9"	5'-3"	6'-6"	4.36	1'-10"
36"	2'-0"	1'-0"	2'-4"	6'-8"	6'-6"	7'-6"	6.69	2'-2"

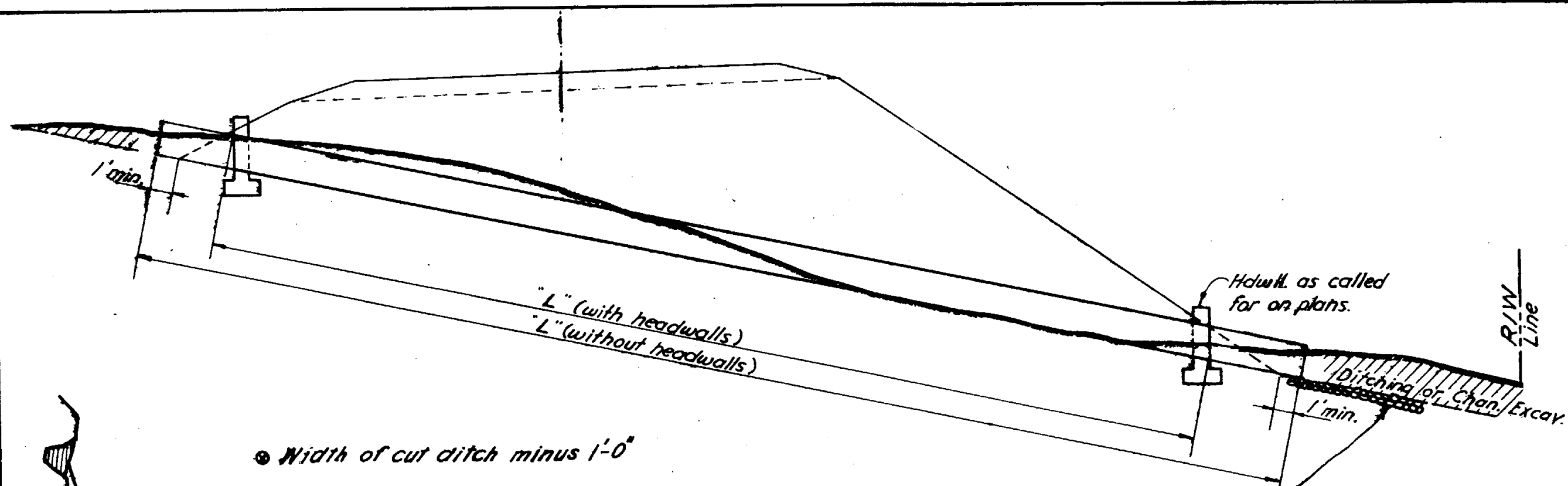
ARIZONA HIGHWAY DEPARTMENT
PLANS DIVISION

HEADWALLS
PLAIN CONCRETE OR
CEM. RUBBLE MASONRY

DRAWN BY B.P.R. DRAWING 1936
TRACED BY K.S. JUNE, 1938
CHECKED BY H.H.W. JULY, 1938
APPROVED ENGR. OF PLANS

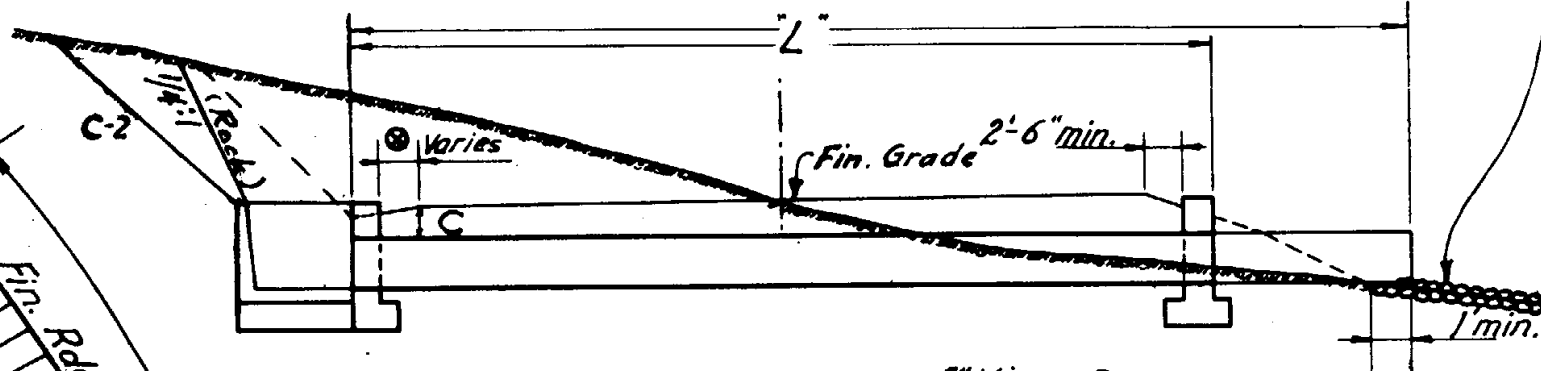
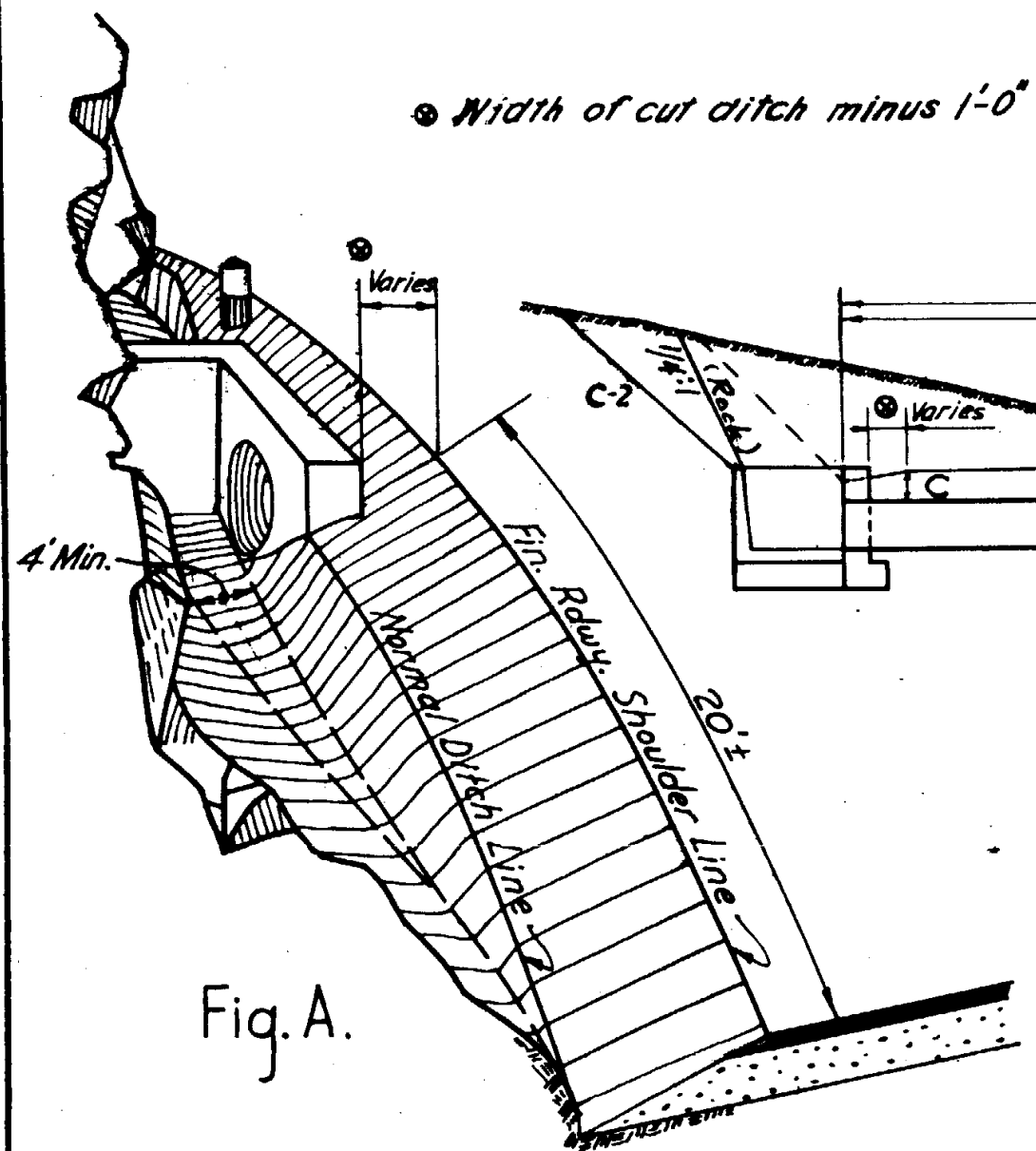
DRAWING NO.
C-12

REV.
Nov. 1945
12/1/58
1/4/60

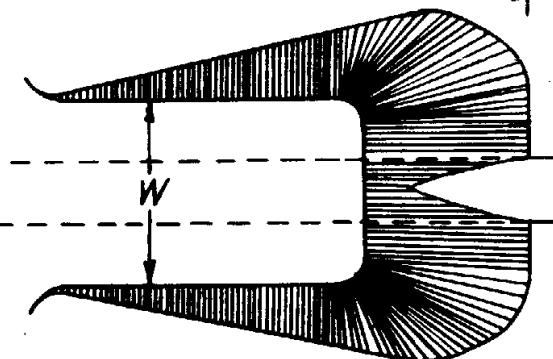
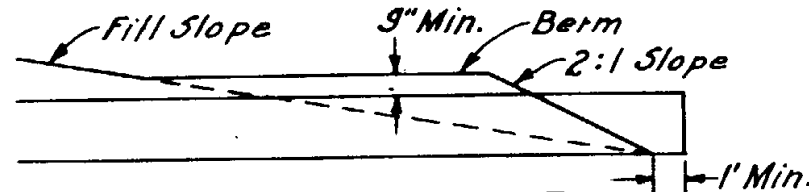


• Width of cut ditch minus 1'-0"

Length of culvert "L", shall be computed in even 2' lengths for C.M.P. and R.C. Pipes as a basis for estimates.



Pipe should be laid on a straight gradient (1% min.) and on solid base at all points.
Minimum cover "C" shall be 1'-6" for reinforced concrete pipe and 9" for corrugated metal pipe.
All concrete pipe under roadway shall be R.C.
Catch basins, in connection with angle headwalls, shall be excavated as shown in Fig. A and classed as channel excavation.
Riprap, conc. or Bituminous aprons shall be placed as shown when required for protection.
Reference Std. C-33-1



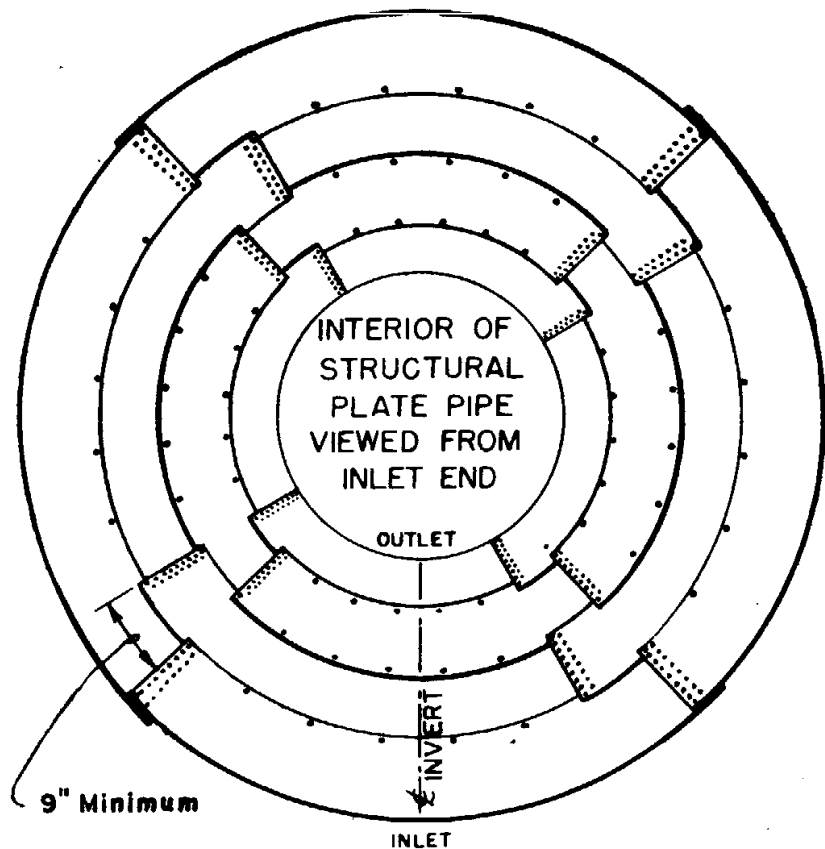
"W" For outlet end of pipe = 4' + dia. of pipe.

"W" For inlet end of pipe determined by width of channel.

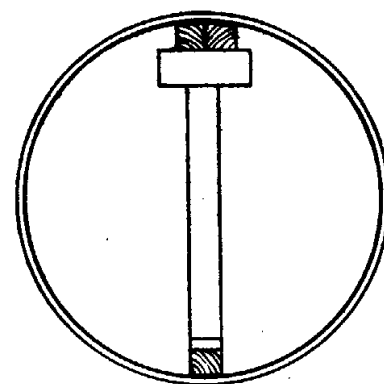
Add berm thus for fill slopes 4:1 or flatter

Fig. A.

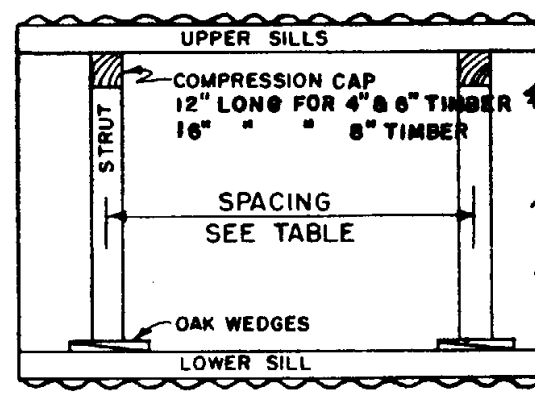
ARIZONA HIGHWAY DEPARTMENT			REV. 3-20-50 12/1/53 1/4/60
PLANS DIVISION			
PIPE CULVERT INSTALLATION			
DRAWING NO.			
DRAWN	GH	Nov. 1945	C-13
TRACED	GH	Nov. 1945	
CHECKED	H.H. Jessel		
APPROVED PLANS ENGR.	H.H. Jessel		



PLATES SHALL BE STAGGERED AS SHOWN ABOVE.
BOLT HEADS ON OUTSIDE OF PIPE AND NUTS INSIDE

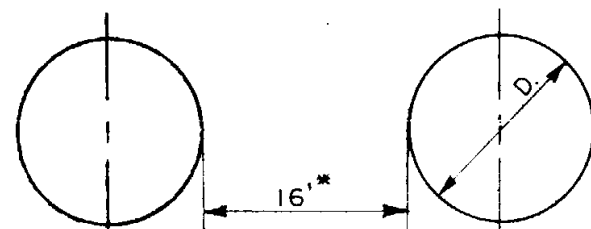


METHOD OF PLACING STRUTS



COMPRESSION CAPS AND SILLS TO BE SAME DIMENSION TIMBER AS STRUTS AND PLACED WITH LEAST DIMENSION VERTICAL.
COMPRESSION CAPS TO BE OF SOFT WOOD TO ALLOW COMPRESSION.
LENGTH OF STRUTS = (PIPE DIA. \times 1.05 FOR C.M.P. / 1.03 FOR R PIPE) - 3 \times LEAST DIM. OF STRUT AND - WEDGES.
STRUT SPACING COMPUTED FOR FULL DIMENSION (NOT NOMINAL) SOUND STRUCTURAL TIMBER.
STRUTS SHALL BE LEFT IN PLACE UNTIL FILL IS CONSOLIDATED.
C.M.P. ARCHES SHALL NOT BE STRUTTED.
STRUTS WILL NOT BE REQUIRED FOR 48" C.M.P. UNDER FILLS OF 15' OR LESS EXCEPT WHEN NOTED ON PLANS.
BOTTOM PLATES OF STRUCTURAL PLATE PIPE SHALL BE NO. 1 GAUGE.
ENDS OF C.M.P., STRUCTURAL PLATE PIPE AND PIPE ARCHES SHALL NOT BE BEVELED.

SPACING IN FEET OF TIMBER STRUTS FOR C.M.P. & STRUCTURAL PLATE PIPE											
PIPE DIA.	STRUT SIZE INCHES	HEIGHT OF COVER IN FEET									
		5	10	15	20	30	40	50	60	70	80 100
48"	4 x 4				6.0	5.0	3.5				
	4 x 6					6.0	5.0	4.0	3.5	3.0	
	6 x 6							6.0	5.0	4.5	4.0 3.5
	6 x 8										6.0 5.0
60"	4 x 4	6.0	6.0	6.0	6.0	4.5	3.5	3.0			
	4 x 6					6.0	5.0	4.0	3.5		
	6 x 6								5.5	4.5	4.0 3.0
	6 x 8									6.0	5.0 4.0
72"	4 x 4	6.0	6.0	6.0	5.5	3.5					
	4 x 6				6.0	5.5	4.0	3.5			
	6 x 6						6.0	5.0	4.0	3.5	
	6 x 8								5.5	5.0	4.0 3.5
84"	4 x 4	6.0	6.0	5.5	4.5	3.0					
	4 x 6				6.0	4.5	3.5				
	6 x 6						5.0	4.0	3.5		
	6 x 8							5.5	4.5	4.0	3.5
96"	4 x 4	6.0	6.0	4.5	3.5						
	4 x 6			6.0	5.5	4.0					
	6 x 6					6.0	4.5	3.5			
	6 x 8						6.0	5.0	4.5	3.5	3.0
108"	4 x 4	6.0	4.5	3.5							
	4 x 6		6.0	5.5	4.5	3.0					
	6 x 6				6.0	5.0	4.0	3.0			
	6 x 8						5.5	4.5	4.0	3.0	
120"	4 x 4	6.0	4.0								
	4 x 6		5.5	4.5							
	6 x 6			6.0	6.0	4.5	3.5				
	6 x 8					6.0	4.5	4.0	3.0		
132"	4 x 4	4.5	3.5								
	4 x 6		5.0	4.0	3.5						
	6 x 6			6.0	5.0	4.0	3.0				
	6 x 8					5.5	4.0	3.5	3.0		
144"	4 x 4	3.5									
	4 x 6	6.0	4.5	3.5							
	6 x 6		6.0	5.5	4.5	3.5					
	6 x 8				6.0	5.0	4.0	3.0			
156"	4 x 4						5.0	4.5	3.5	3.0	
	4 x 6	3.0									
	4 x 6	5.0	4.0	3.0							
	6 x 6		6.0	5.0	4.0						
168"	4 x 4	4.5	3.5								
	4 x 6	6.0	5.5	4.5	3.5						
	6 x 6			6.0	5.0	4.0	3.0				
	6 x 8					5.0	4.5	3.5	3.0		
180"	4 x 4	4.0									
	4 x 6	6.0	5.0	4.0							
	6 x 6		6.0	5.5	4.5	3.5	3.0				
	6 x 8				6.0	5.0	4.0	3.0			



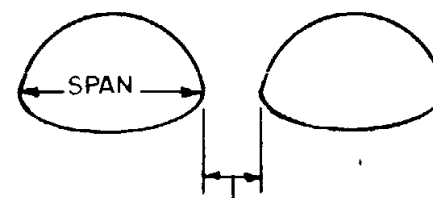
* 4' MINIMUM SPACE BETWEEN PIPES MAY BE USED ONLY IN SPECIAL CASES WHEN SHOWN ON PLANS.

DIAMETER	MINIMUM SPACE BETWEEN PIPES
12" TO 24"	1'-0"
30" TO 66"	ONE-HALF DIAMETER OF PIPE
72" TO 84"	3'-0"

* WHEN HEADWALLS ARE USED SPACE AS PER HEADWALL STANDARD.
C.M.P.

STRUCTURAL R

SPACING FOR MULTIPLE INSTALLATIONS



SPAN	MINIMUM SPACE BETWEEN PIPE ARCHES
18" TO 36"	1'-0"
43" TO 72"	ONE-THIRD SPAN OF PIPE ARCH

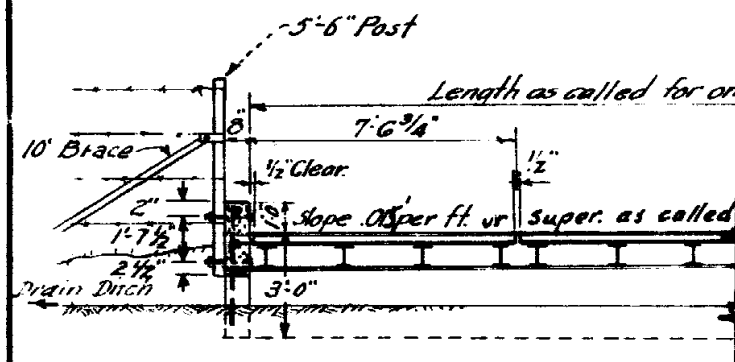
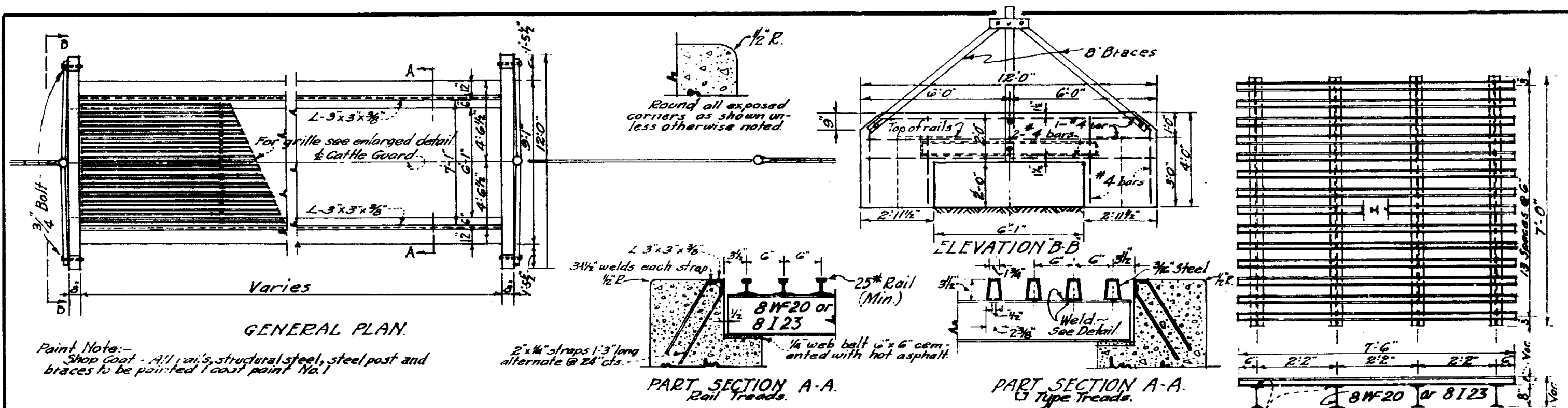
C.M.P. ARCHES

ARIZONA HIGHWAY DEPARTMENT
PLANS DIVISION

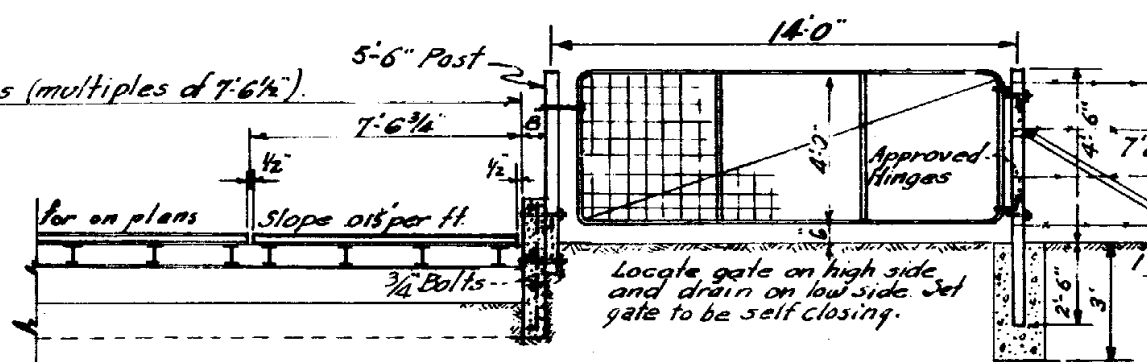
CORRUGATED METAL AND
STRUCTURAL PLATE PIPE
INSTALLATION

DRAWN	L.O. MOE 10-20-59	DRAWING NO.
TRACED	L.O. MOE 10-20-59	
CHECKED	S.M.H. 10-21-59	
APPROVED		
ENGR. PLANS	<i>W. Heidecker</i>	

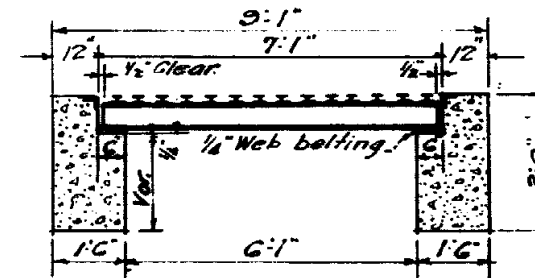
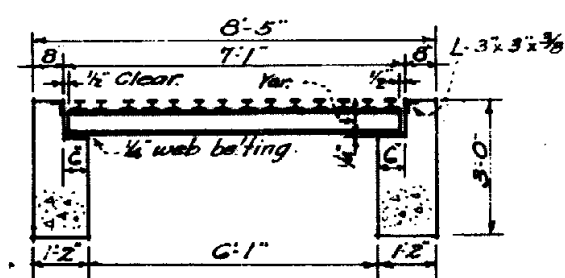
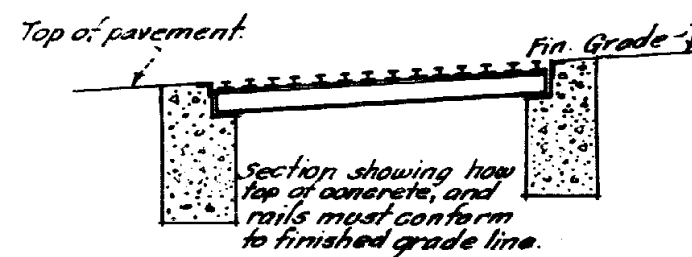
C-13-A



NOTE: Second hand rails may be used providing they are clean, free from rust scales, of uniform cross section and weighing at least 95% of original nominal weight, 25 lbs. Min.



Note: Fence posts, braces and Type #1 Gate as per Std. C-16



MATERIAL LIST				
Item	Qty.	Size	Length	Steel # Conc. C.Y.
Common to all guard lengths.				
Post, Steel	3	See Dwg.		C-16
Braces, Steel	6			C-16
Conc. for setting Post & Braces				0.36
Reinf. Bars	8	#4	11'-0"	60.70
"	3	#4	3'-0"	18.48
Gate	1	4'-0" x 14'-0"		Complete
6 Unit - 40' Roadway				
Concrete Class "A"				14.9
Fabricated L	2	3x3x3/8x45'-4"		
Web Belting	48	6"x6"x1/4"		
5 Unit - 34' Roadway				
Concrete Class "A"				12.71
Fabricated L	2	3x3x3/8x37'-9"		
Web belting	40	6"x6"x1/4"		
4 Unit - 28' Roadway				
Concrete Class "A"				10.53
Fabricated L	2	3x3x3/8x30'-3"		
Web Belting	32	6"x6"x1/4"		
2 Unit - SIDEROAD				
Concrete Class "A"				5.29
Fabricated L	2	3x3x3/8x15'-1"		
Web belting	16	6"x6"x1/4"		

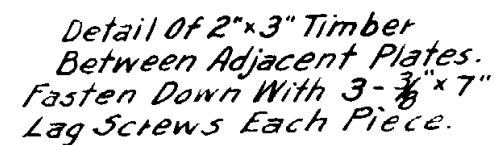
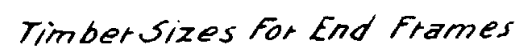
ARIZONA HIGHWAY DEPARTMENT
PLANS DIVISION

CATTLE GUARDS

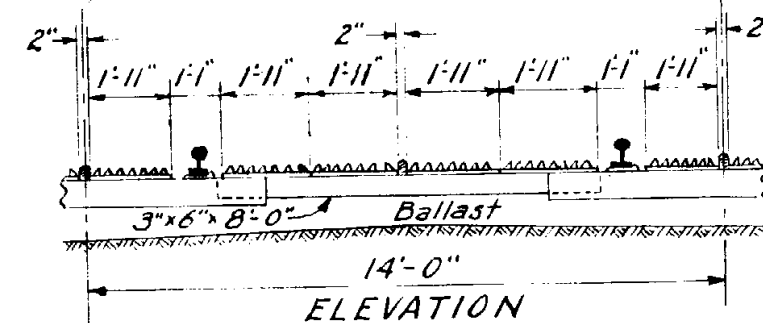
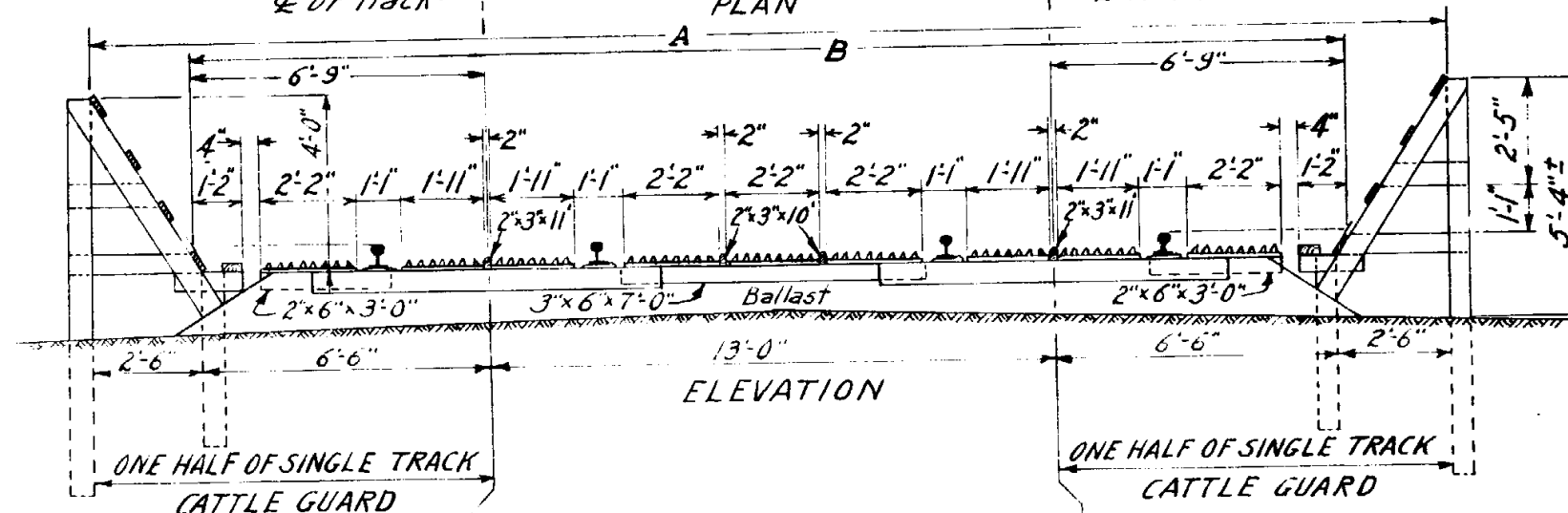
DRAWN W.M.D. MAY, 1936
TRACED H.S. JUNE, 1938
CHECKED H.H.W. JULY, 1938
APPROVED [Signature]

DRAWING NO.
C-14

REV.
3/15/44
1-Brace
6/3/47
3-20-50
17 Treads
1-Brace
5/16/52
12,1,52



Note:
The 6"x6" posts and the 2"x6" & 3"x6" timbers that are fastened to the ties shall be pressure treated in accordance with Standard Specifications and unpainted. The remaining timber shall be given one coat of #7 and one coat of #8 paint.
The metal plates shall be furnished with the manufacturers shop coat of paint or shall be given one coat of #1 paint.



DIMENSIONS	A	B
Single Track	18'-0"	13'-6"
13' Track Centers	31'-0"	26'-6"
14' Track Centers	32'-0"	27'-6"

ARIZONA HIGHWAY DEPARTMENT
PLANS DIVISION

RAILROAD CATTLE GUARD

DRAWN
TRACED
CHECKED
APPROVED
ENGR. PLANS

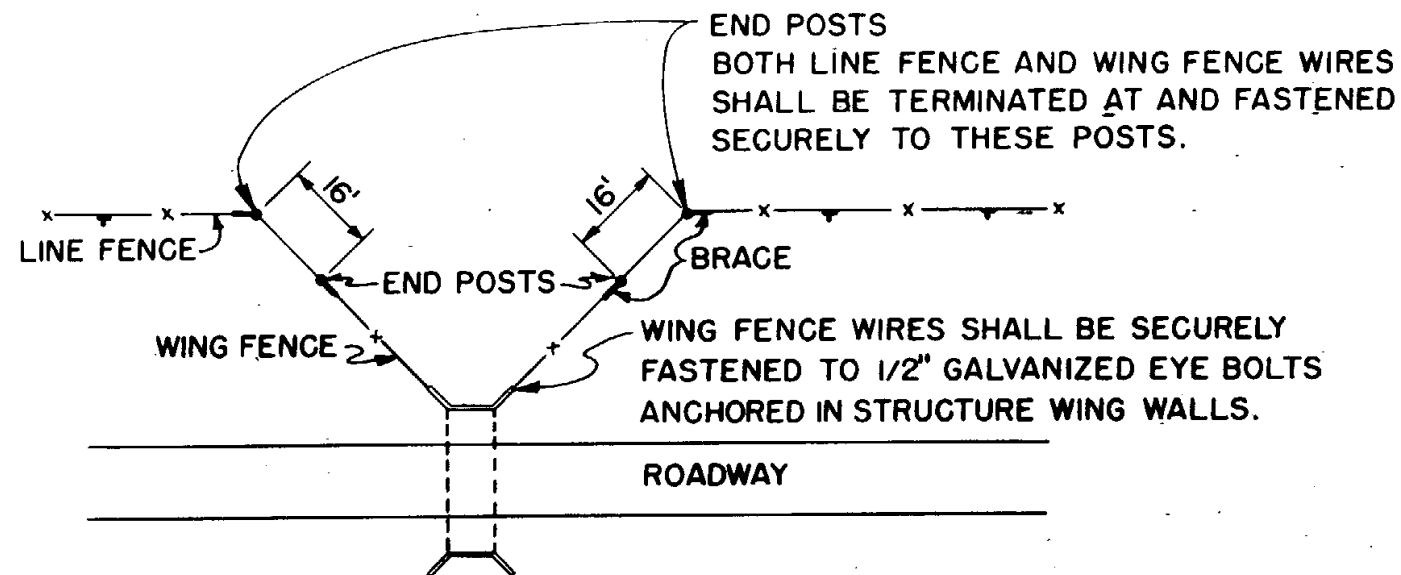
L.O. Moe 11-12-57
L.O. Moe 11-12-57
J.P.D. 1-25-58
H. H. H. H. H.

DRAWING NO.

C-14-R

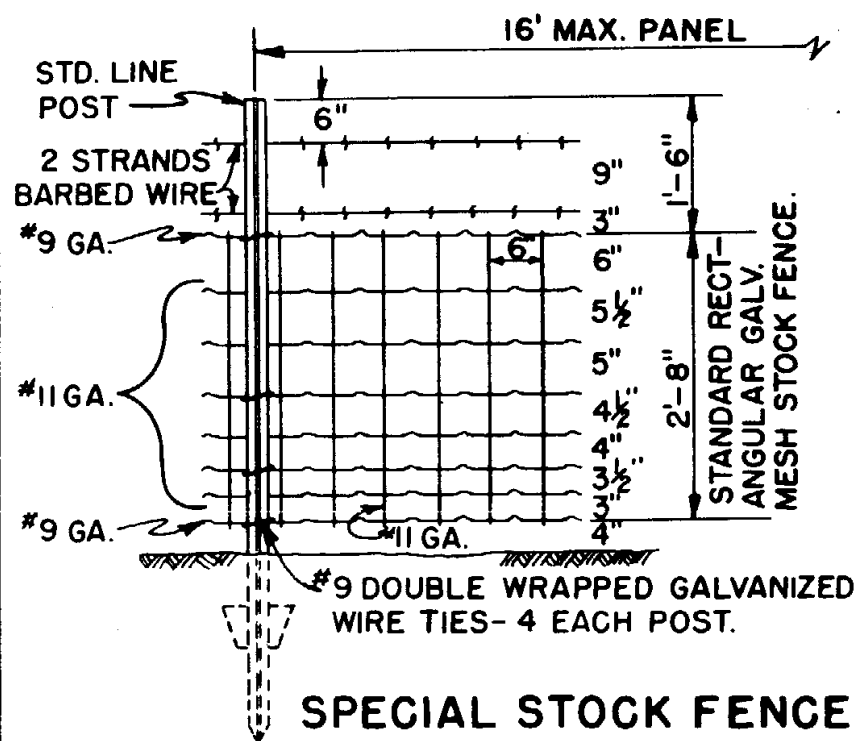
REV.
12/1/58

ARIZONA HIGHWAY DEPARTMENT PLANS DIVISION		REV. 5/24/53 5/27/53 No. 10 2/25/54 6/12/54 3-20-58 3-8-54 2/9/55 6/10/55 12/1/58 1-4-60
LINE FENCE AND GATES STEEL POSTS		
DRAWN TRACED CHECKED APPROVED ENGR. PLANS	K.S. JUNE, 1938 K.S. JUNE, 1938 H.H.W. July 1938 H.H.W. 1-2-58	DRAWING NO. C-16

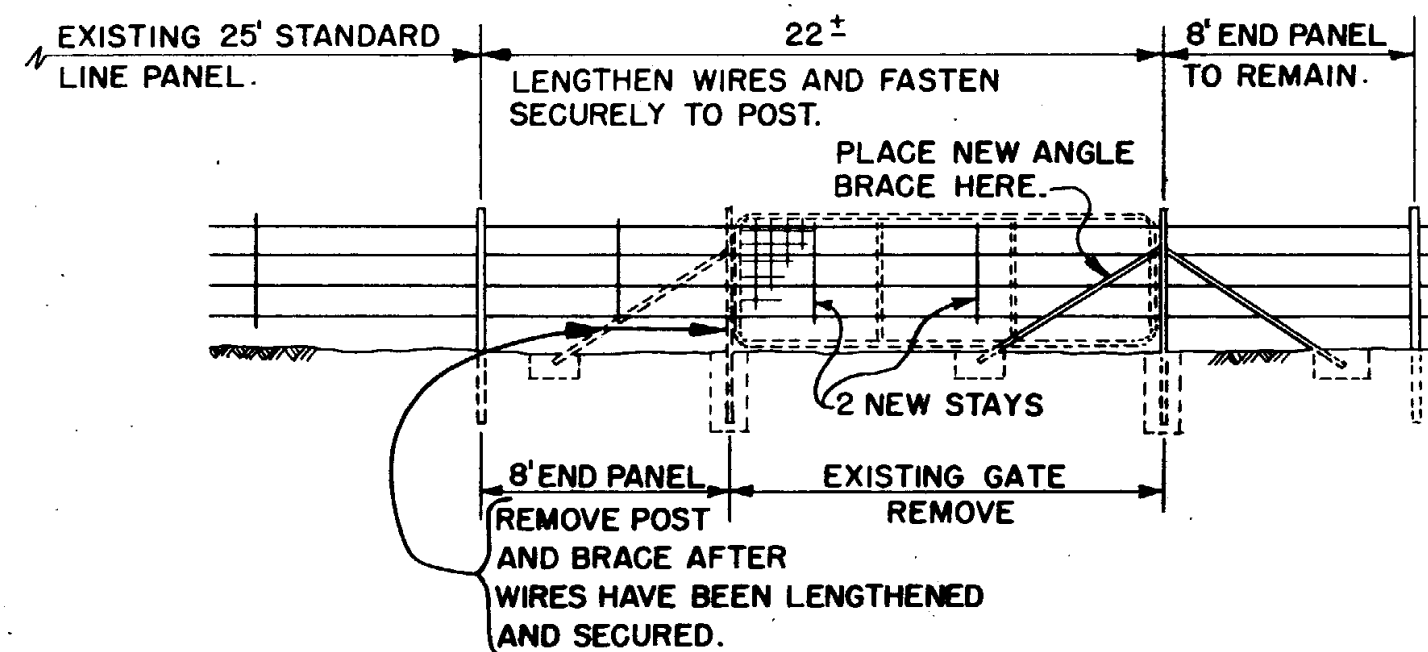


WING FENCE DETAIL

THIS DETAIL SHALL BE USED LT. AND RT. WHERE WING FENCES ARE CALLED FOR ON PLANS.



SPECIAL STOCK FENCE



DETAIL FOR ELIMINATING EXISTING LINE GATES

REFER TO STD. C-16 FOR DETAILS NOT SHOWN.

ARIZONA HIGHWAY DEPARTMENT
PLANS DIVISION

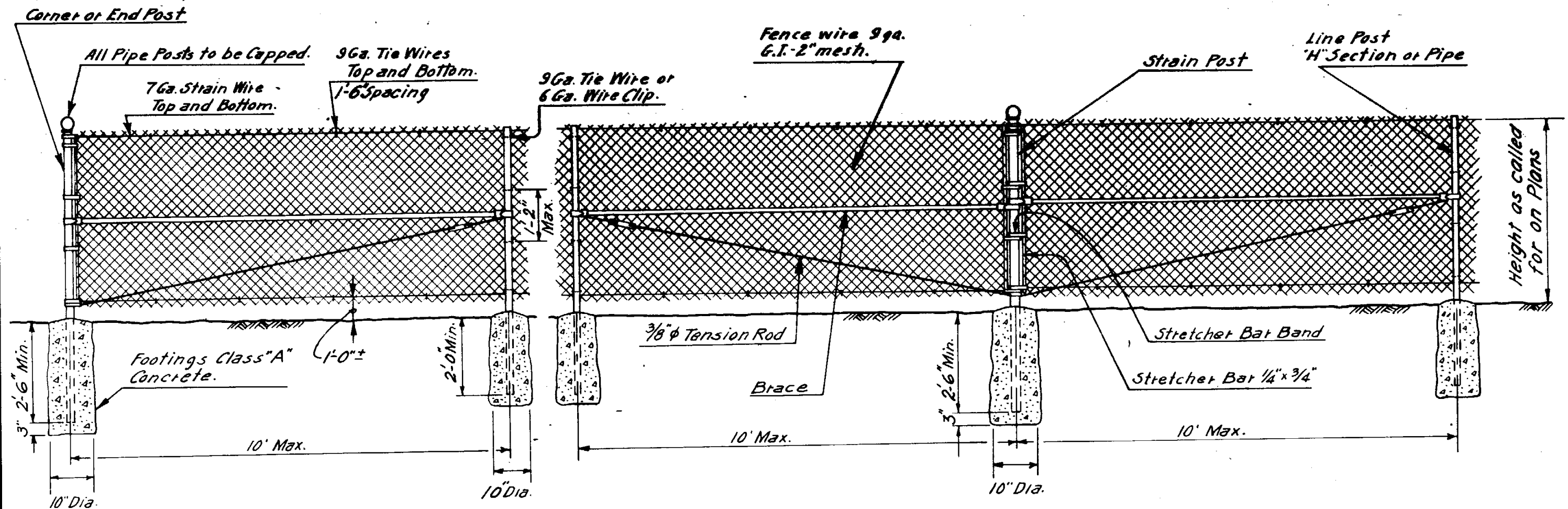
SUPPLEMENTAL FENCE DETAILS

DRAWN	L.O. MOE 4-14-60
TRACED	L.O. MOE 4-19-60
CHECKED	<i>[Signature]</i> 4-21-60
APPROVED ENGR. PLANS	<i>H. Heidecker</i>

DRAWING NO.

C-16-A

REV.



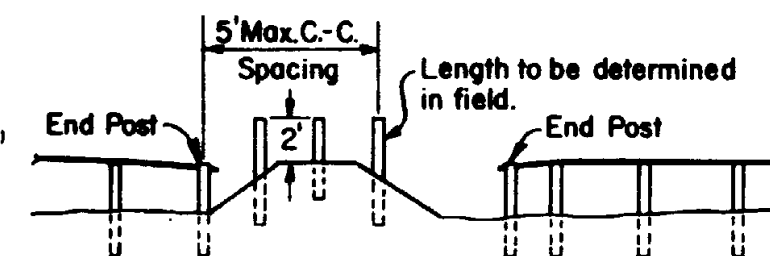
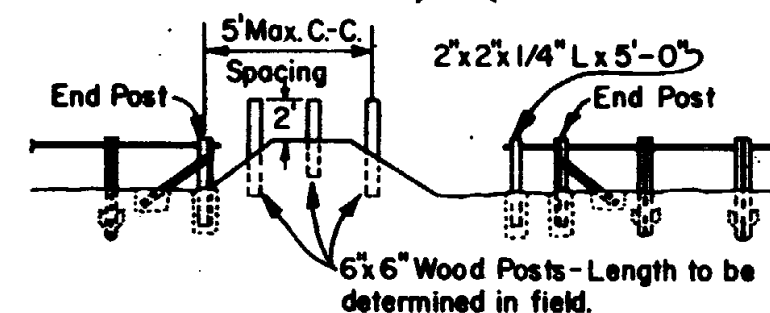
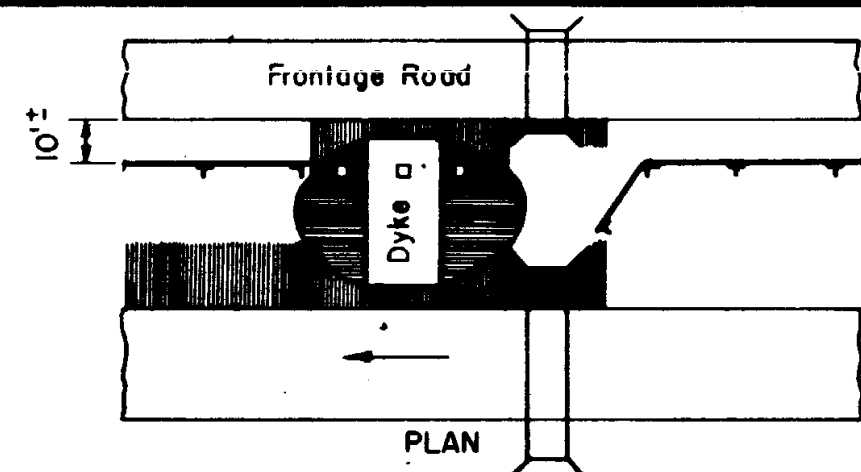
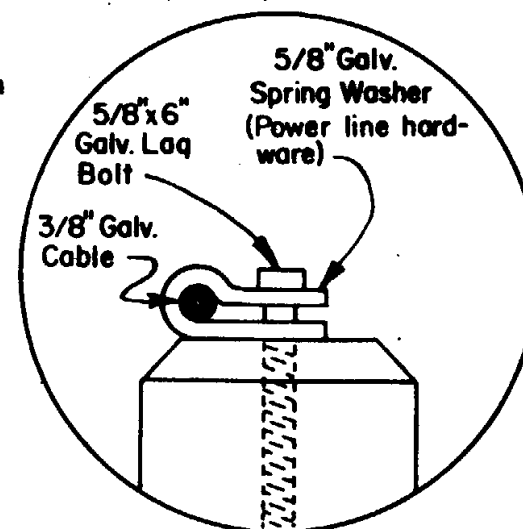
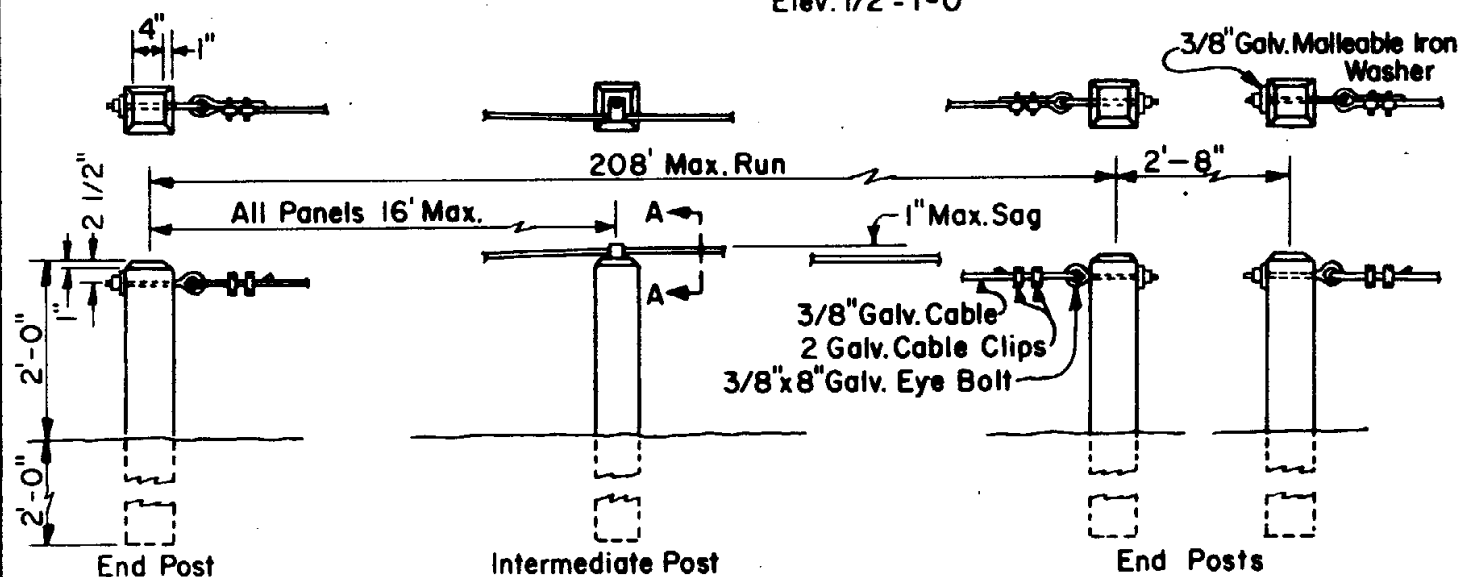
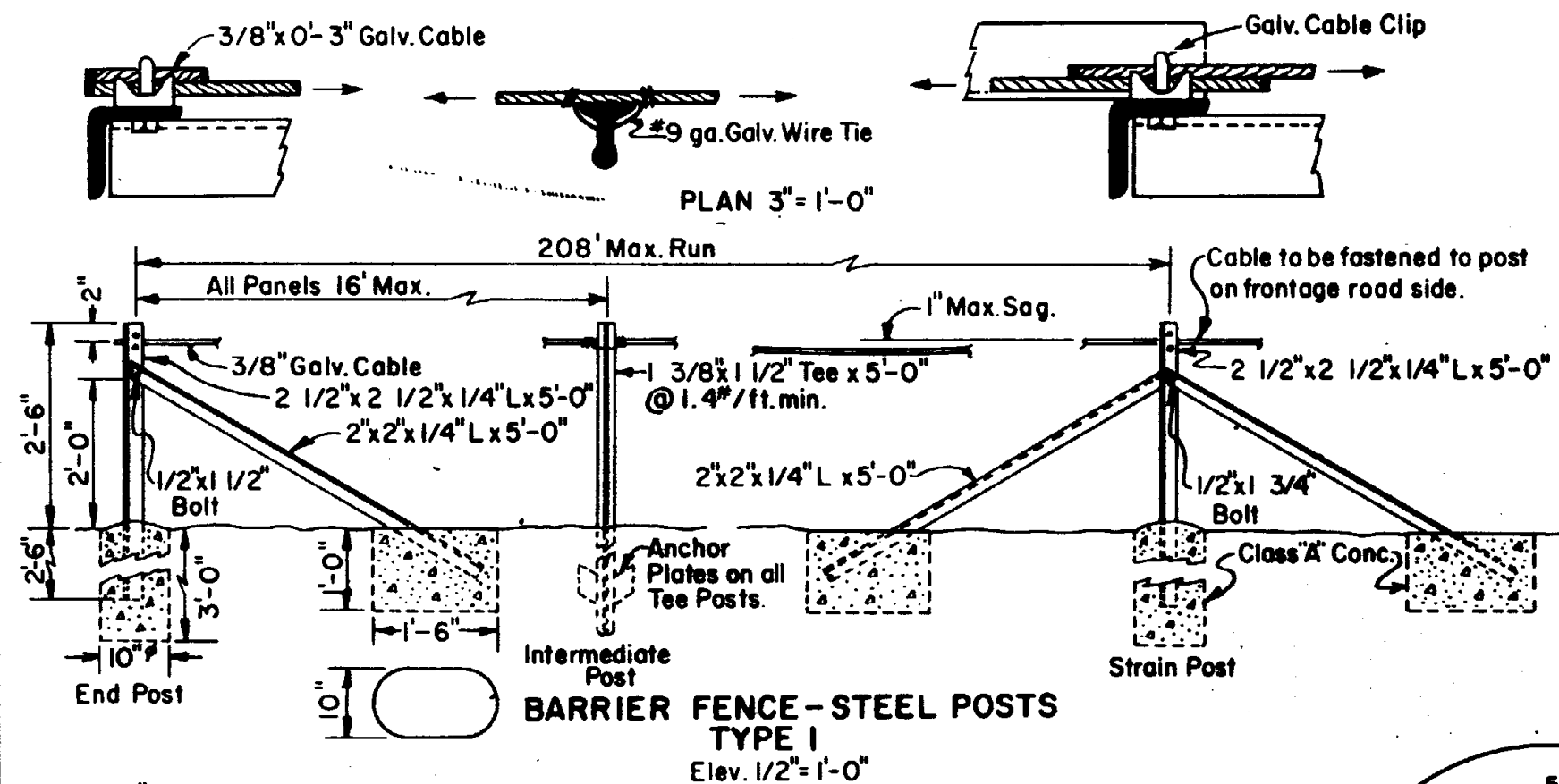
CORNER OR END PANEL

STRAIN PANELS
To be spaced at 500' intervals

Strain, End & Corner Posts	Pipe 2 1/2" O.D. - 3.65 lbs. per lin. ft. min.
Line Posts	Pipe 2" O.D. - 2.72 lbs. per lin. ft. min. "H" Sec. 1.625" x 1.875" - 2.80 lbs. per lin. ft. min.
Braces	Pipe 1 5/8" O.D. - 2.27 lbs. per lin. ft. min. "H" Sec. 1.5" x 1.31" - 2.2 lbs. per lin. ft. min.

Note:
All material and fittings shall be new and hot dip galvanized.

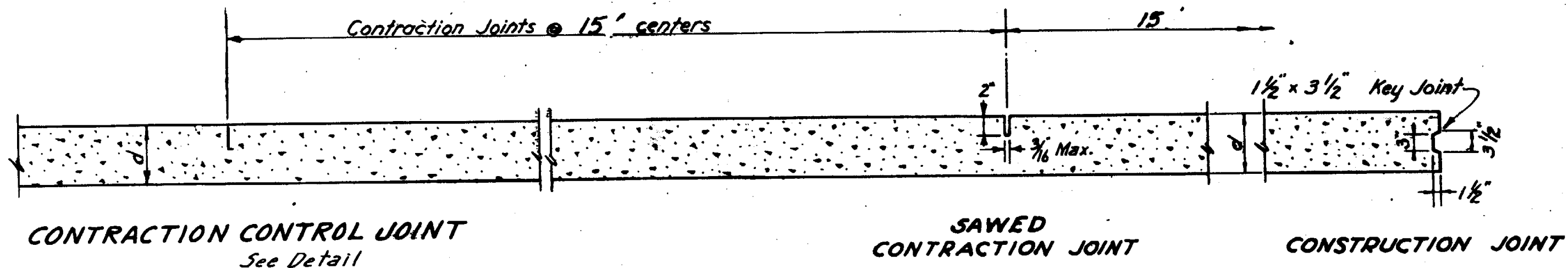
ARIZONA HIGHWAY DEPARTMENT		REV. 12/1/58 1/4/60
PLANS DIVISION		
FENCE CHAIN LINK		
DRAWN BY	L.O. Moe 2-6-58	DRAWING NO. C-17-A
TRACED BY	L.O. Moe 2-6-58	
CHECKED BY	J.P.D. 2-7-58	
APPROVED ENGR. OF PLANS	Al Heider	



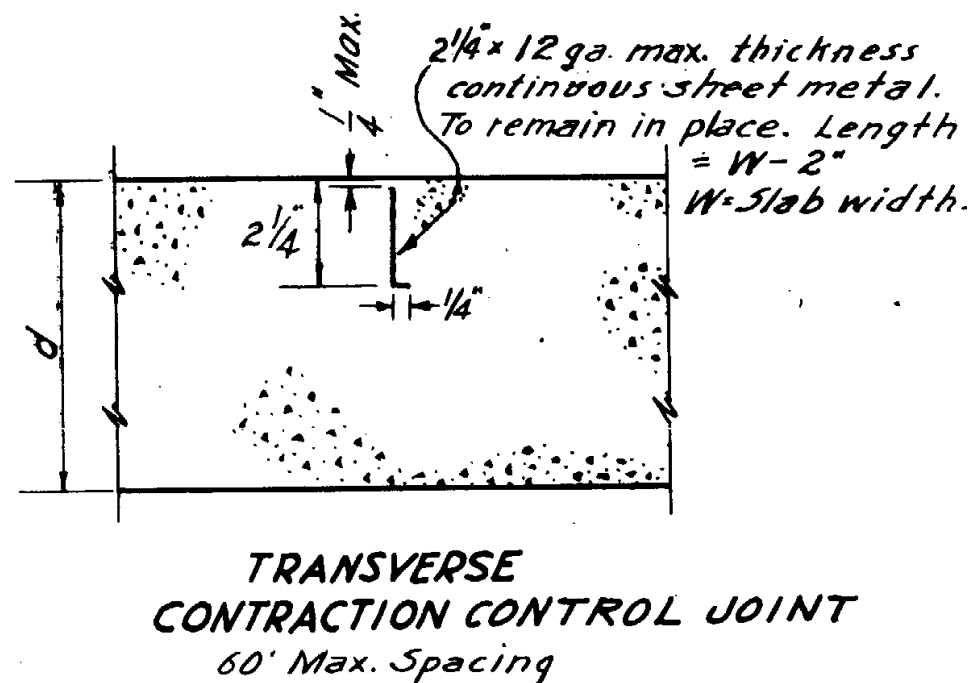
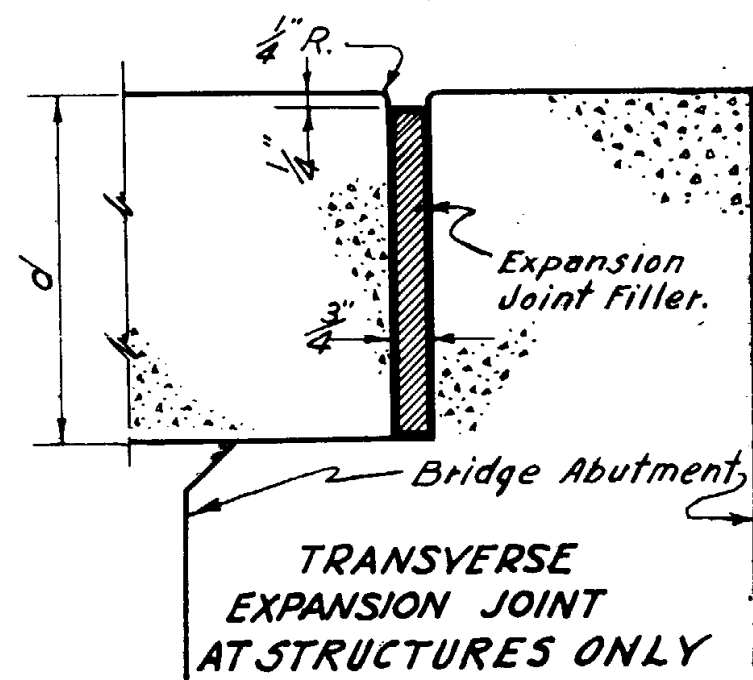
TYPICAL INSTALLATION AT DYKES

Barrier Fence shall be used only to prevent promiscuous vehicular crossings between roadways and shall not be used where accident prevention devices are necessary nor where physical barriers are present.

ARIZONA HIGHWAY DEPARTMENT		REV.
PLANS DIVISION		
BARRIER FENCE		
DRAWN	L.O. MOE 3-18-60	DRAWING NO.
TRACED	L.O. MOE 3-28-60	C-17-B
CHECKED	<i>[Signature]</i> 4-21-60	
APPROVED	<i>[Signature]</i>	
ENGR. PLANS		



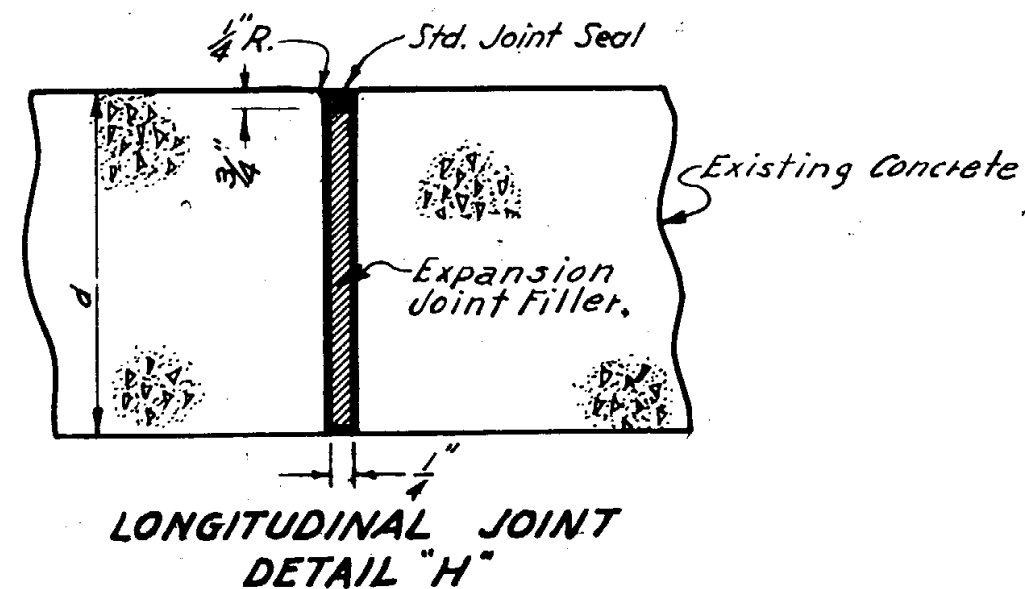
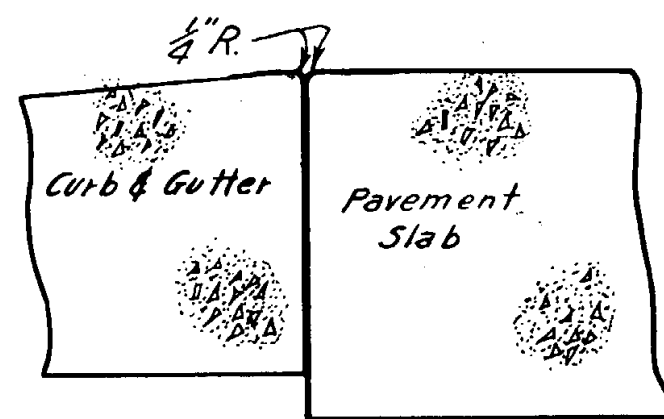
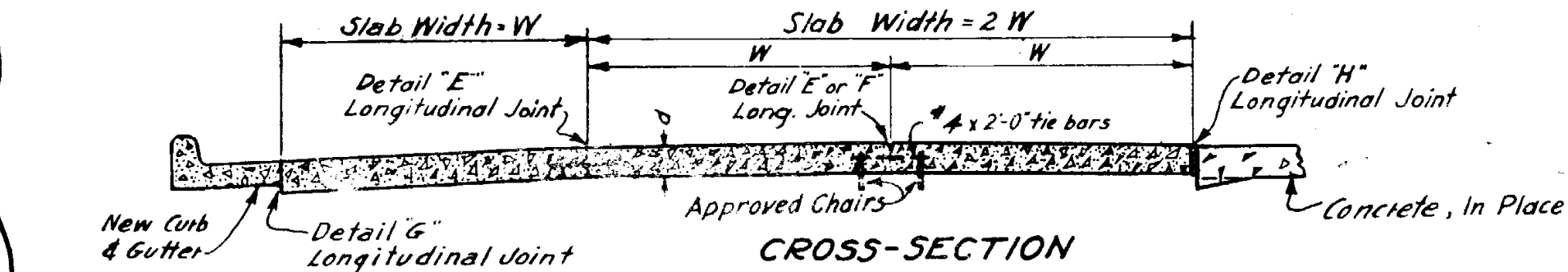
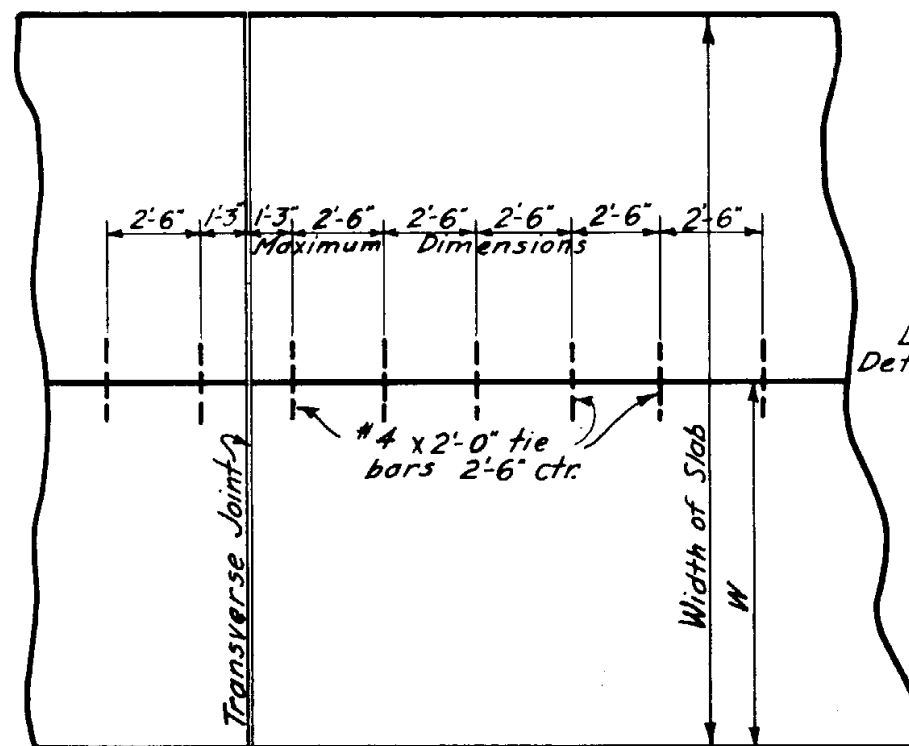
LONGITUDINAL SECTION THRU PAVEMENT



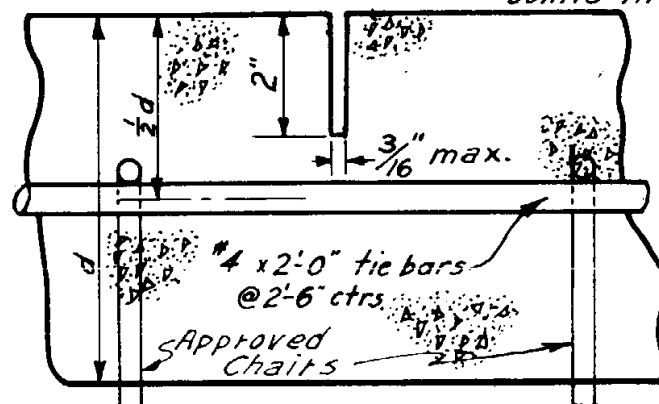
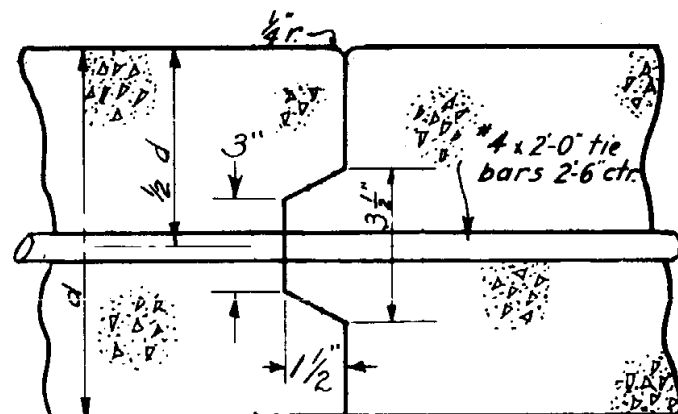
All transverse joints shall match location of joints in adjacent slabs.

All general requirements may be superseded by special notations on the plans.
At intersections of side roads or streets, joints shall be so placed as to give the intersection a symmetrical appearance and to conform to the cross section of the intersecting road or street.

ARIZONA HIGHWAY DEPARTMENT				REV.
PLANS DIVISION				3/17/50
TRANSVERSE JOINTS FOR PORTLAND CEMENT CONCRETE PAVEMENT				12/1/58
DRAWN	GH	Jan. 1946	DRAWING NO.	1/4/60
TRACED	GH	Jan. 1946		
CHECKED	HHW			
APPROVED	HHW			
ENGR. PLANS			C-18	



Concrete pavement shall be placed prior to placing of curb & gutter. Curb & gutter joints to match location of joints in concrete pavement.



GENERAL NOTES

All tie bars in center joints shall be deformed bars and shall have unbroken bond. They shall be held securely in place, parallel to the subgrade & perpendicular to the center line of the road.

*All formed longitudinal joints shall be finished with an edging tool not less than 12" wide and 18" long. Edging operation shall be followed by a burlap drag.
W = Width of traffic lane.
d = depth shown on Plans.*

All general requirements may be superseded by special notations on the plans.

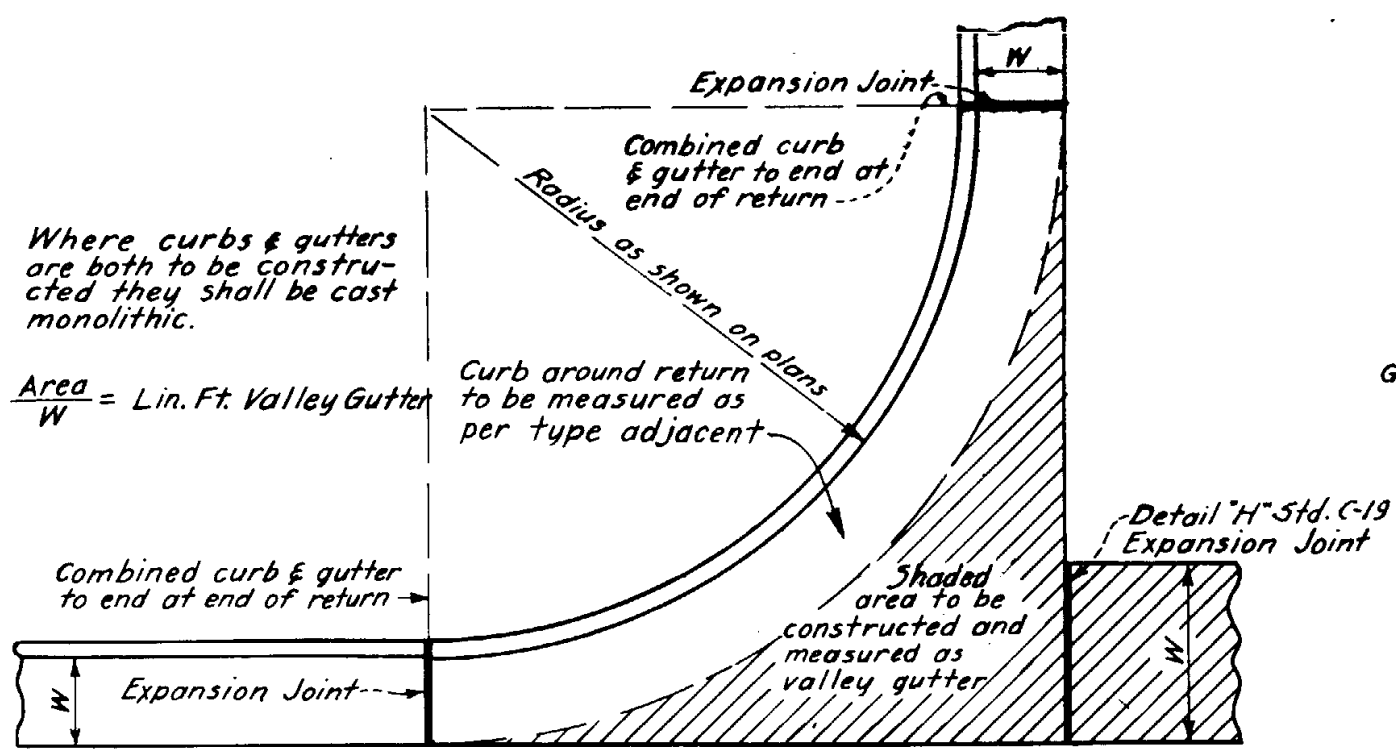
ARIZONA HIGHWAY DEPARTMENT PLANS DIVISION		REV. 6-23-35 1746 Details 6-1-41 W 8-7-41 1-17-46 12/1/55 1/4/66
LONGITUDINAL JOINTS FOR PORTLAND CEMENT CONCRETE PAVEMENT		
DRAWN TRACED CHECKED APPROVED ENGR. PLANS	O.K. MAR., 1935 H.A.K. JUNE, 1938 H.H.W. JULY 1938 <i>H.H. Wessel</i>	DRAWING NO. C-19

The diagrams illustrate three types of road curbs:

- SINGLE CURB:** Shows a cross-section of a curb with a top width of 6 inches and a height of 4 inches. The curb batter varies. The roadway width is 10 feet. The curb height is labeled as h .
- COMBINED CURB & GUTTER:** Shows a cross-section of a curb and gutter. The curb has a top width of 6 inches and a height of 4 inches. The gutter has a width of 2 feet and a depth of 4 inches. The roadway width is 10 feet. The curb height is labeled as h .
- INTEGRAL CURB:** Shows a cross-section of an integral curb. The curb has a top width of 6 inches and a height of 4 inches. The roadway width is 10 feet. The curb height is labeled as h .

Where curbs & gutters are both to be constructed they shall be cast monolithic.

$\frac{\text{Area}}{W} = \text{Lin. Ft. Valley Gutter}$



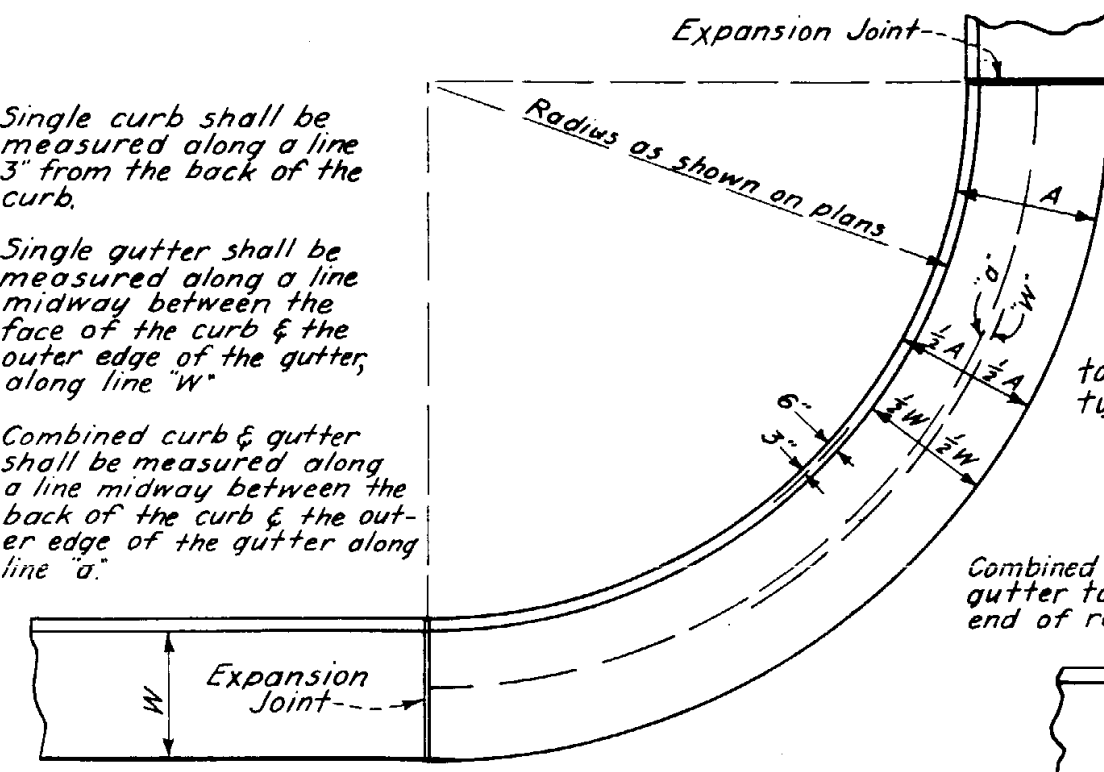
TYPICAL CONSTRUCTION OF VALLEY GUTTER AT STREET INTERSECTION OR ALLEY

W = width as shown on plans.

Single curb shall be measured along a line 3" from the back of the curb.

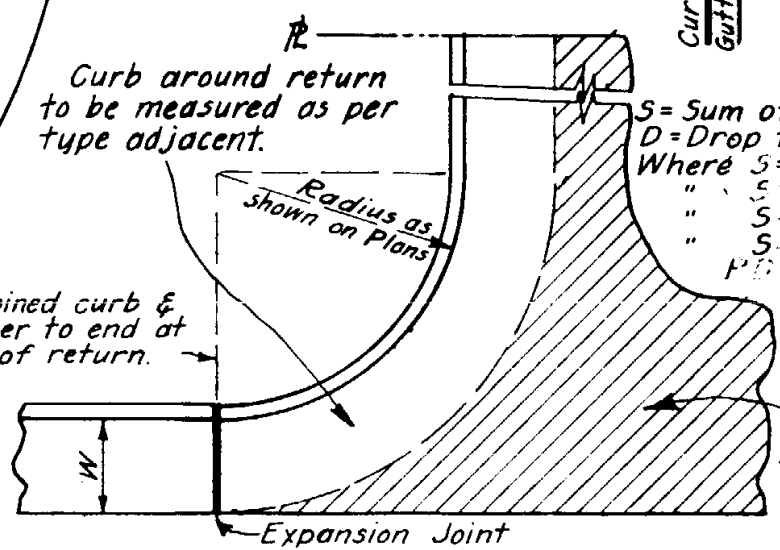
Single gutter shall be measured along a line midway between the face of the curb & the outer edge of the gutter, along line "W".

Combined curb & gutter shall be measured along a line midway between the back of the curb & the outer edge of the gutter along line "a".

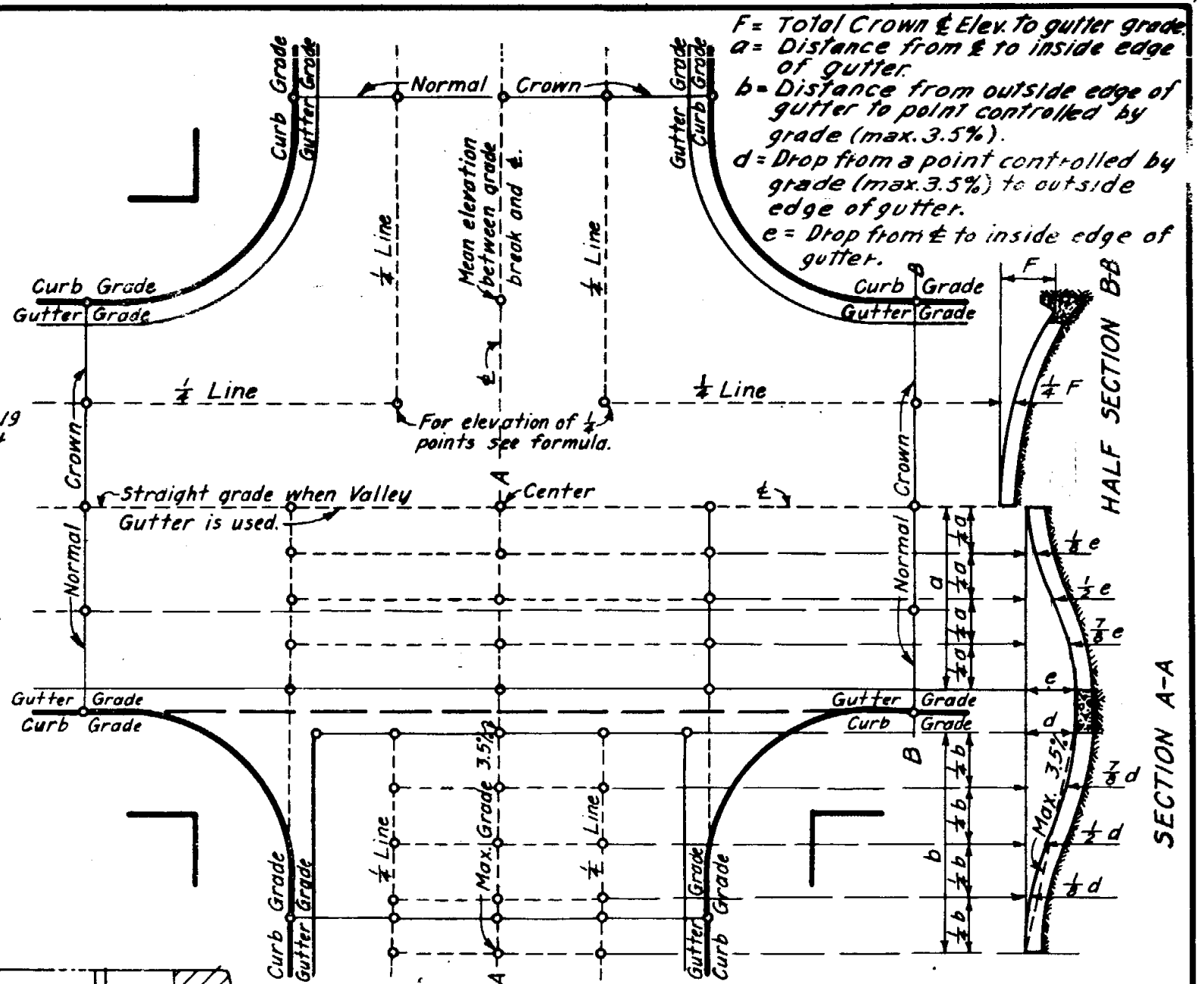


MEASUREMENT OF CURB, GUTTER OR COMBINED CURB & GUTTER ON CURVES

Curb around return to be measured as per type adjacent.



TYPICAL CONSTRUCTION OF CONCRETE ALLEYS OR DRIVEWAYS

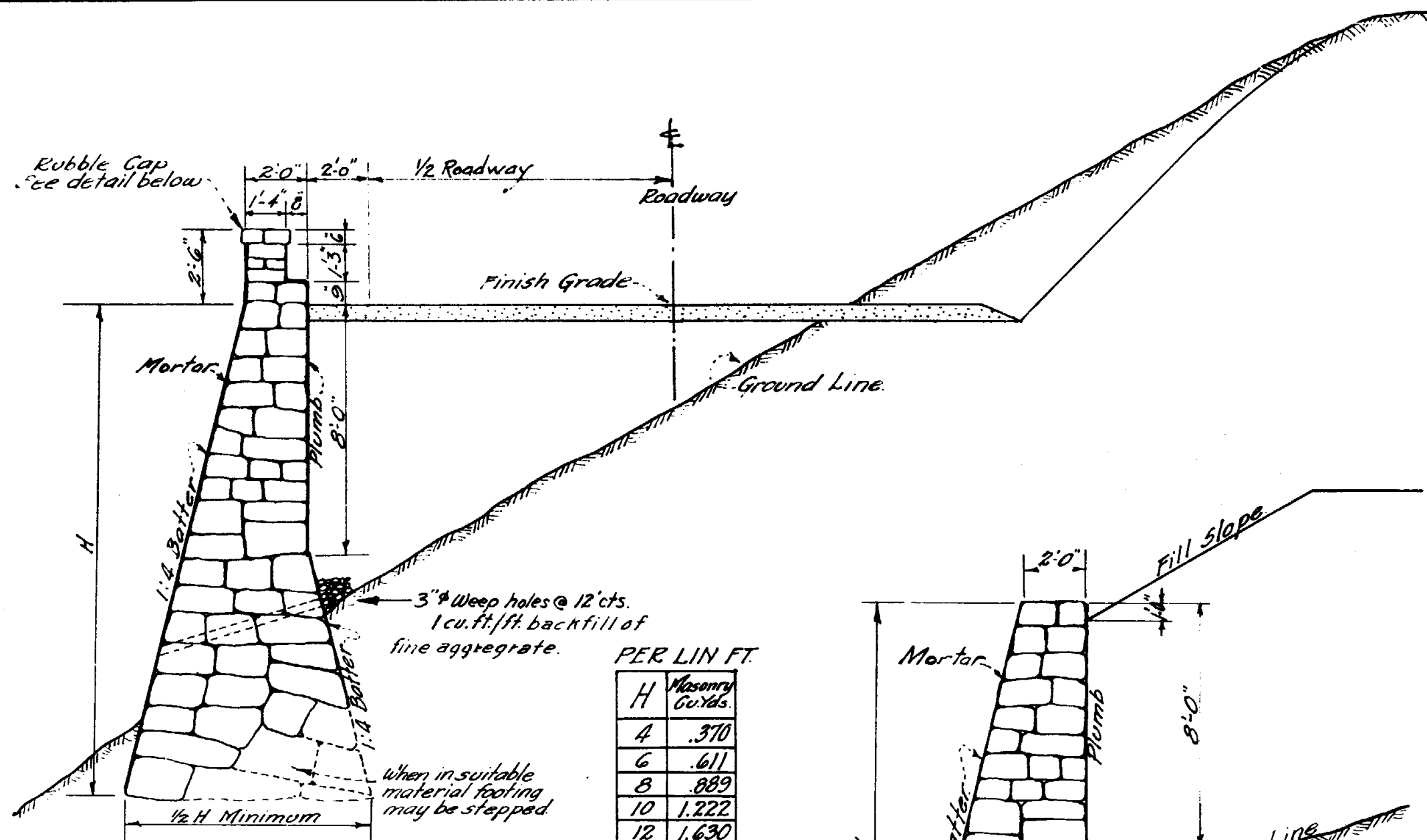


F = Total Crown & Elev. to gutter grade.
a = Distance from E to inside edge of gutter.
b = Distance from outside edge of gutter to point controlled by grade (max. 3.5%).
d = Drop from a point controlled by grade (max. 3.5%) to outside edge of gutter.
e = Drop from E to inside edge of gutter.

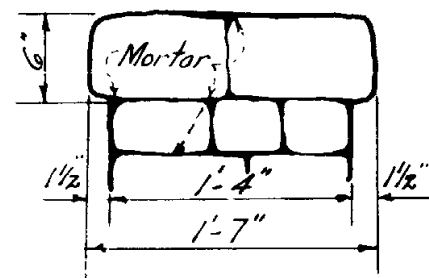
FORMULA FOR QUARTER POINTS

S = Sum of intersecting pavement widths.
D = Drop from center of intersection to center of return.
Where S = 0 to 90, P = 0.17
" S = 90 to 100, P = 0.18
" S = 100 to 110, P = 0.19
" S = 110 to 136, P = 0.20
P'D = drop from center of intersection to the quarter point.

ARIZONA HIGHWAY DEPARTMENT PLANS DIVISION			REV. 12/1/50 1/4/60
CURB & GUTTER MEASUREMENT AND STREET INTERSECTION GRADES			
DRAWN	O.K. & W.M.D. 1935-36	DRAWING NO.	
TRACED	H.A.K. JUNE, 1938	C-21	
CHECKED	H.H.W. JULY 1938		
APPROVED	ENGR. PLANS		



SECTION
TYPE A.

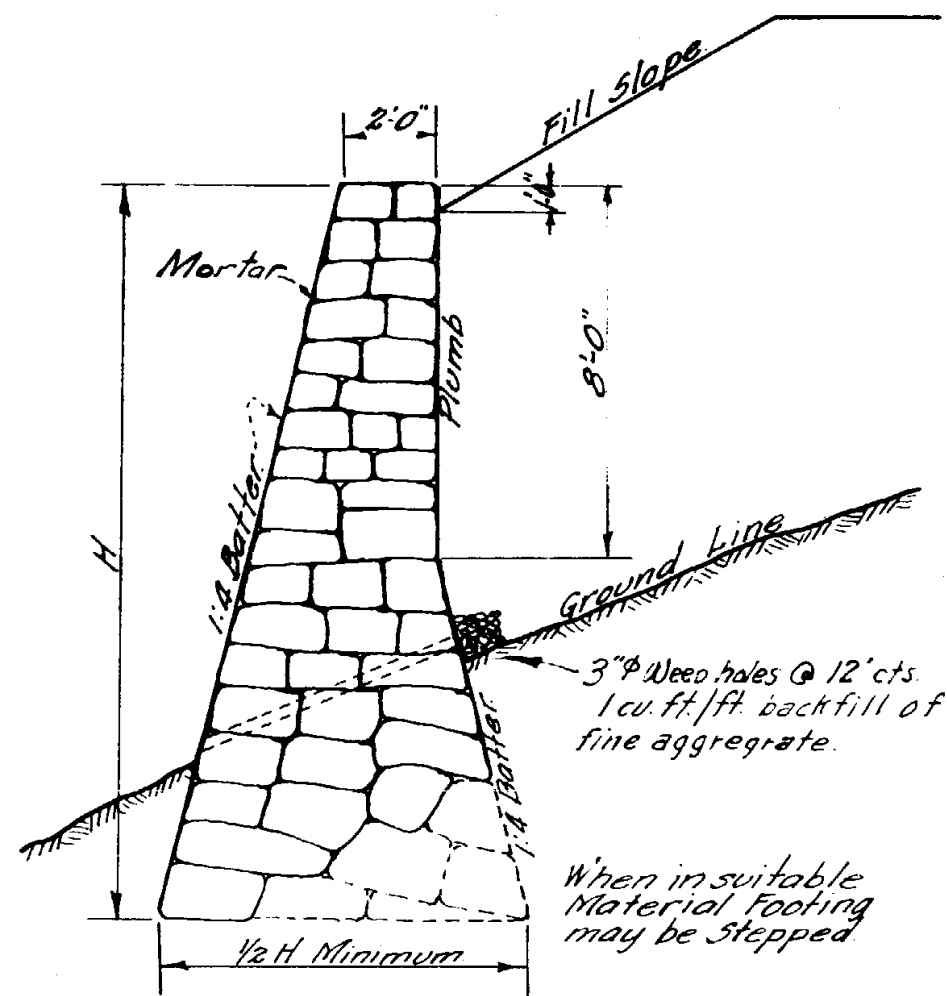


RUBBLE CAP DETAIL.

Note:-
For parapet on top of
retaining wall add per
linear ft. .145 Cu. Yds. of
masonry.

PER LIN. FT.

H	Masonry Cu. Yds.
4	.370
6	.611
8	.889
10	1.222
12	1.630
14	2.111
16	2.667



SECTION
TYPE B

Material to be used in construction of wall shall comply with requirements of
Std. Spec.

ARIZONA HIGHWAY DEPARTMENT
PLANS DIVISION

RUBBLE MASONRY

RETAINING WALLS

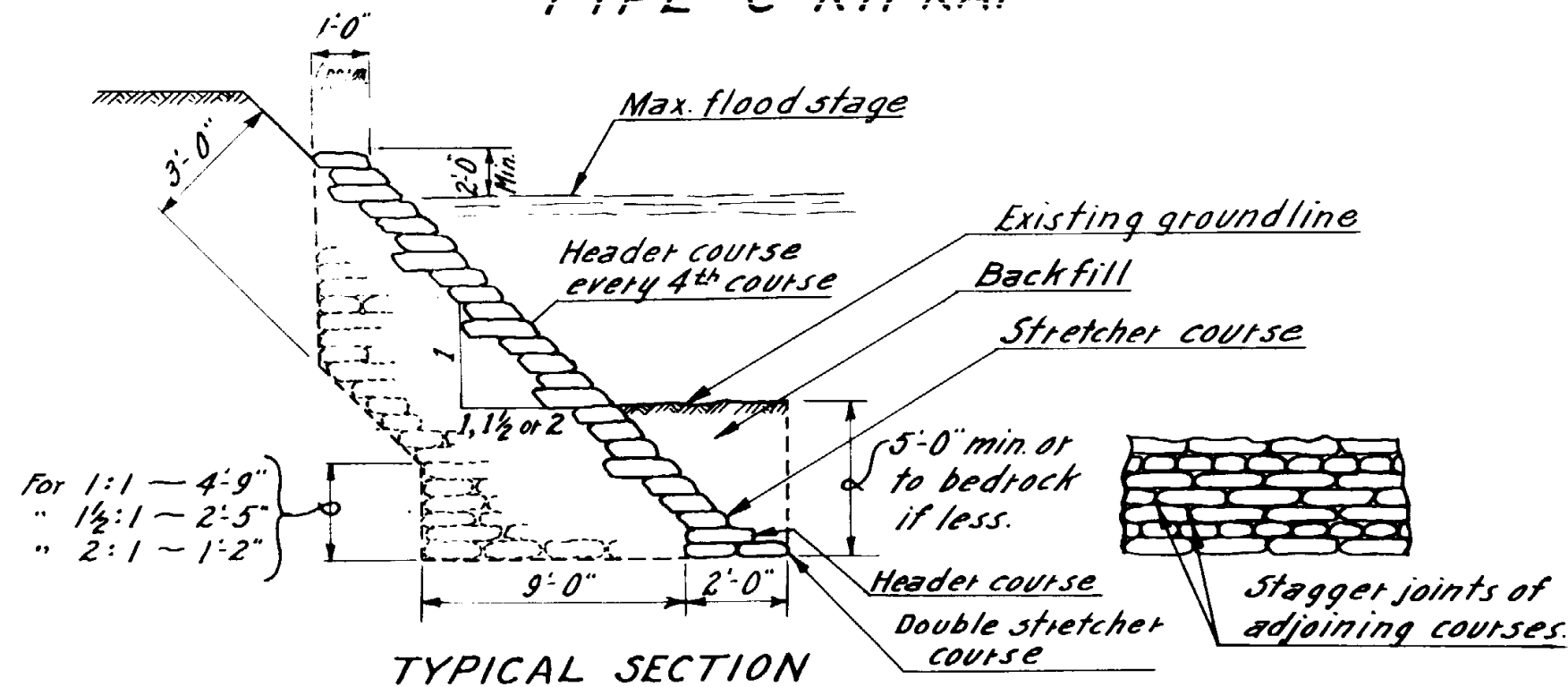
DRAWN BY W.M.D. JAN. 1936
TRACED BY K.S. JUNE, 1938
CHECKED BY H.H.W. JULY 1938
APPROVED
ENGR. OF PLANS

DRAWING NO.

C-22

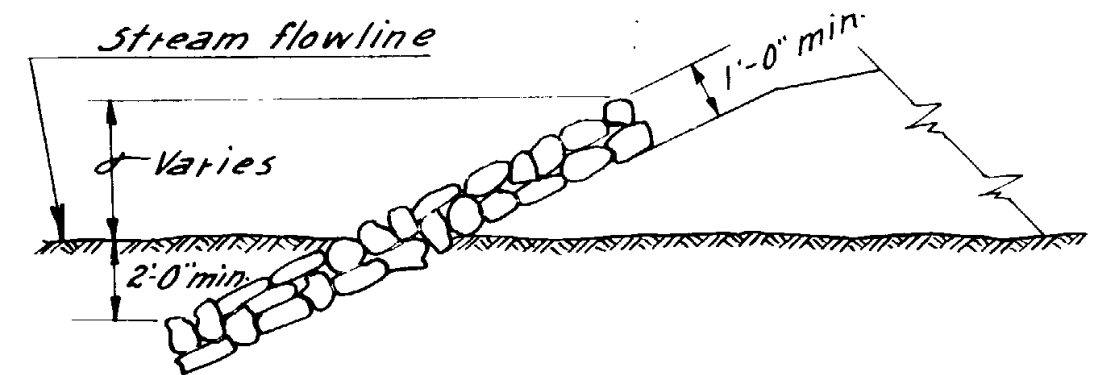
REV.
12/1/58
1/4/100

TYPE C RIPRAP

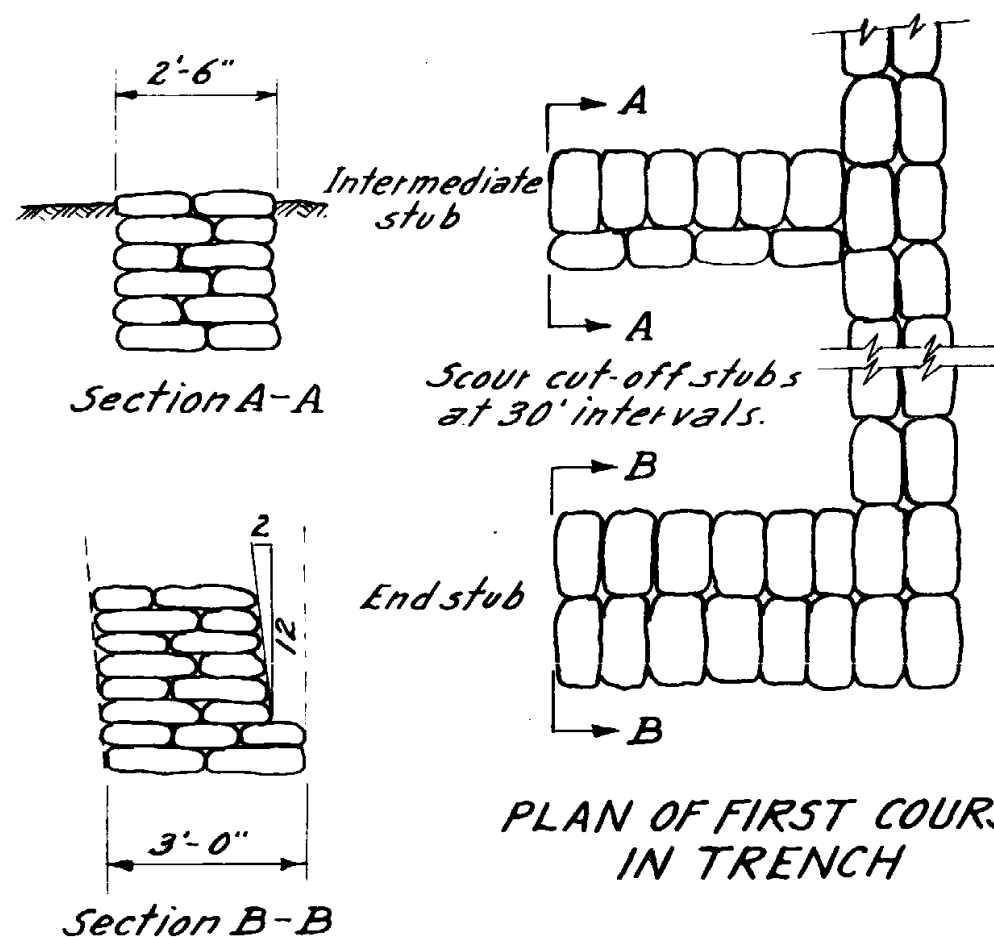


TYPICAL SECTION

TYPE A and B RIPRAP



Type A (Plain hand placed)
Type B (Grouted hand placed)
Sacked concrete may be substituted for Type A or Type B.
Size of rock shall conform to Std. Specs.

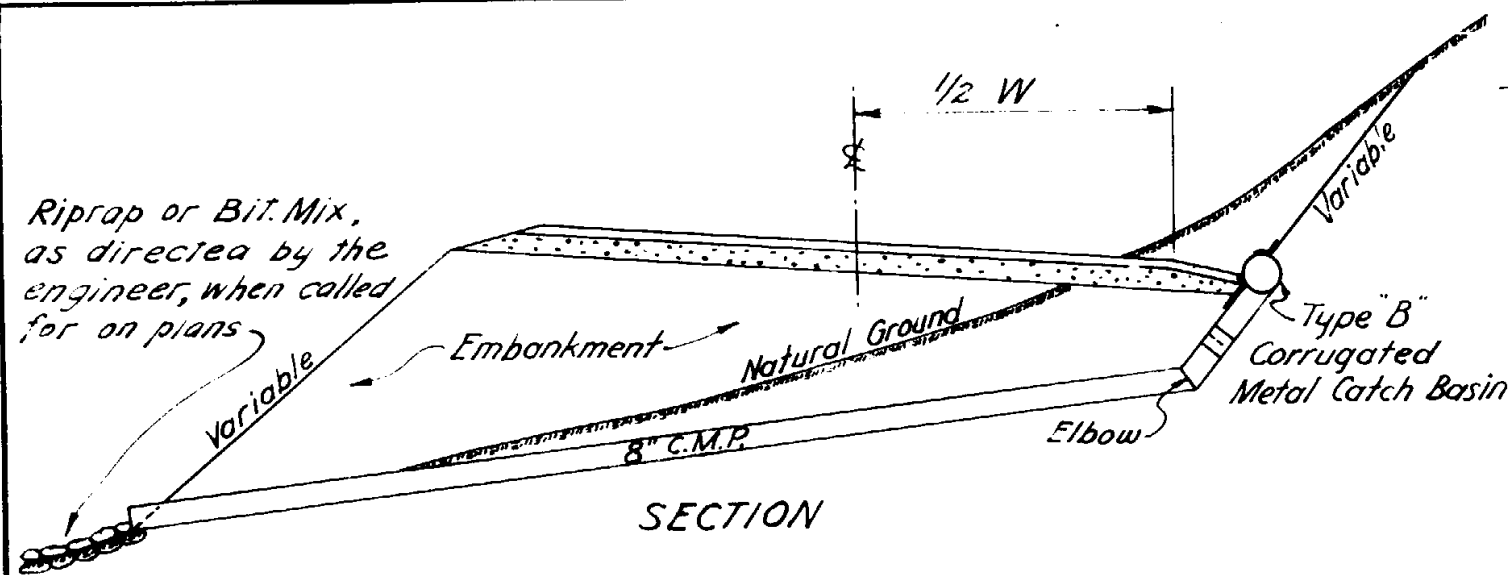


PLAN OF FIRST COURSE IN TRENCH

In case of insufficient bond or bearing, excavate trench and fill with concrete.

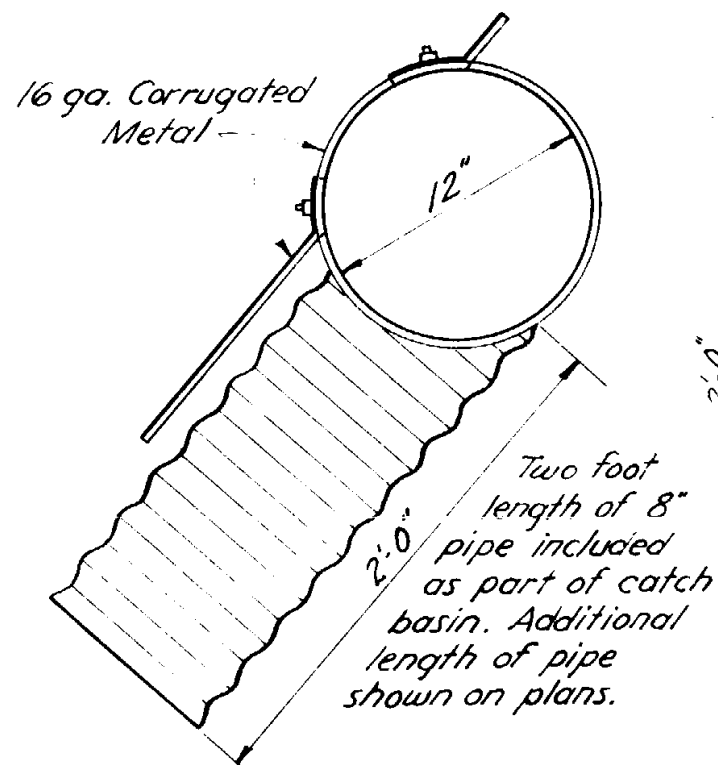
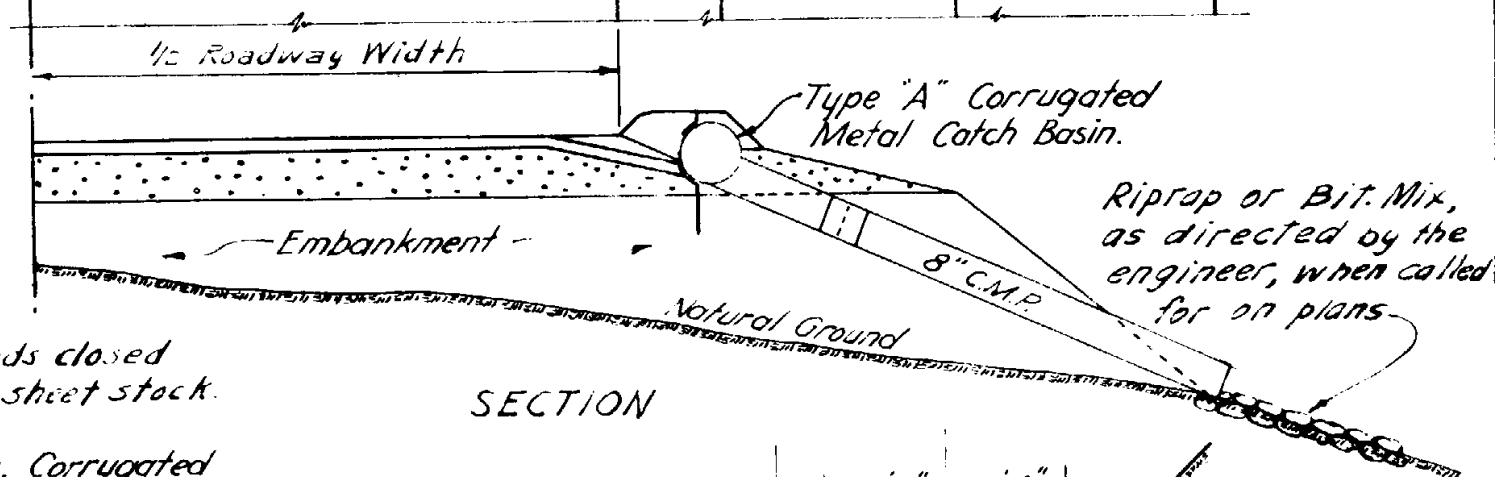
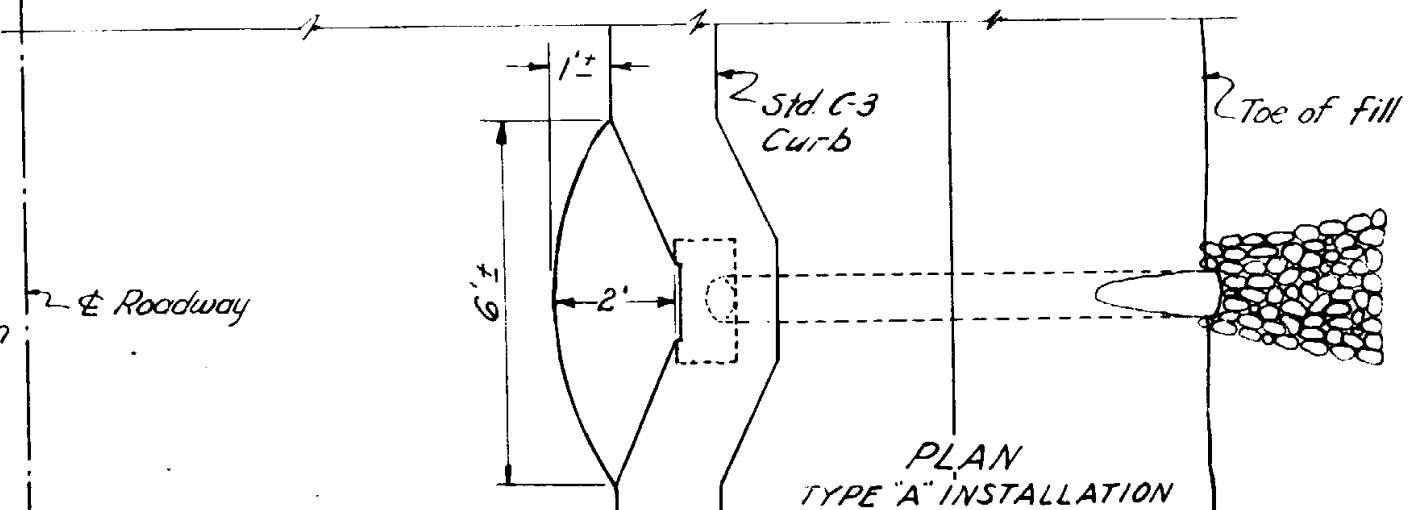
Note:
Special mix 4 sack concrete shall be used, see Std. Specs. Sacked concrete riprap shall consist of 10 oz. burlap sacks containing one cubic foot of wet concrete when placed, unless otherwise specified. Stretchers shall be placed so that folded or tied ends will not be adjacent. Headers shall be placed with folds or ties toward the earth face. Not more than four vertical courses shall be placed in any tier until initial set has taken place in the first course of such tier.

ARIZONA HIGHWAY DEPARTMENT		REV.
PLANS DIVISION		
RIPRAP		
DRAWN	Turnstra 3-1-58	DRAWING NO. C-23-A
TRACED	L.D. Moe 5-21-58	
CHECKED	<i>[Signature]</i> 12-1-58	
APPROVED	<i>[Signature]</i>	
ENGR. PLANS		

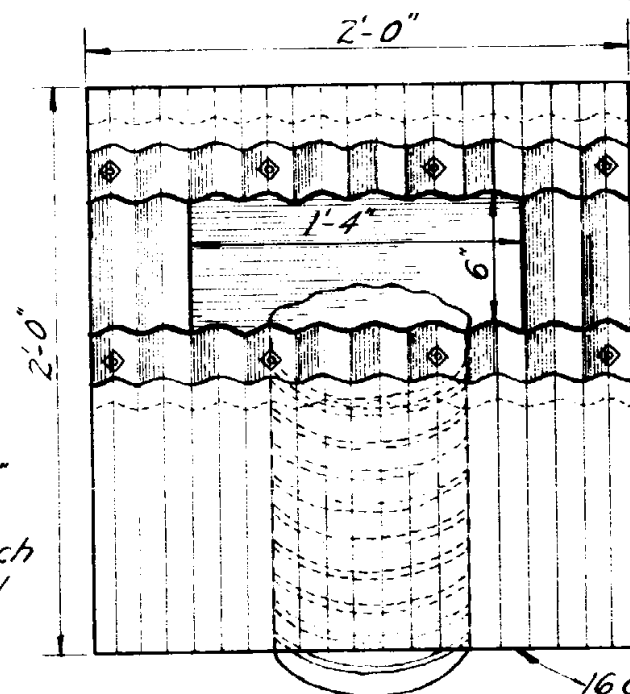


Note—

include elbow as part of total length. Call for hinged band coupling for pipe joints. Use 12" band width for pipes over 12' long, 7" band width for pipes 12' long or less. Catch basin to have bituminous coating. C.M.P. shall be plain unless otherwise specified. Catch basin shall be shifted to fit the ground so as to lessen the angle in the C.M.P. as much as possible.



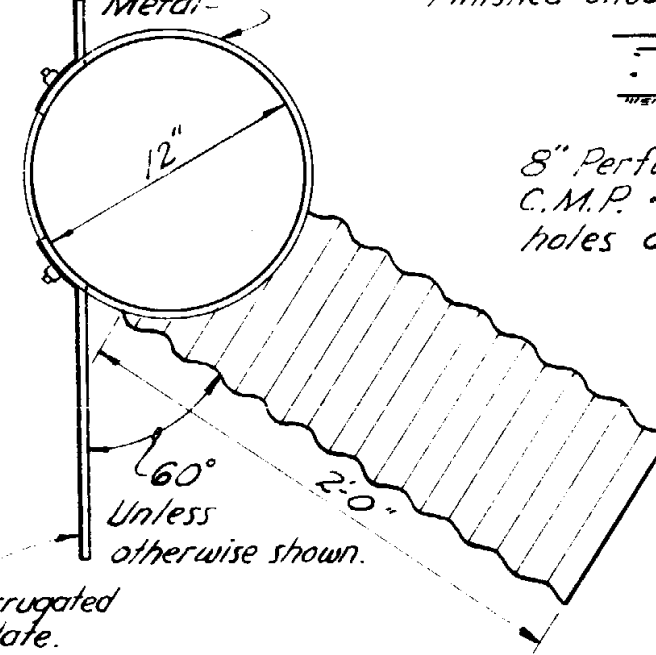
SIDE ELEVATION
TYPE "B"



FRONT ELEVATION
CATCH BASINS

Both ends closed
welded sheet stock.

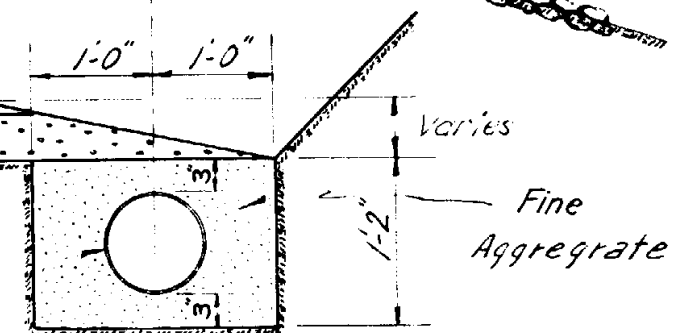
16 ga. Corrugated
Metal—



SIDE ELEVATION
TYPE "A"

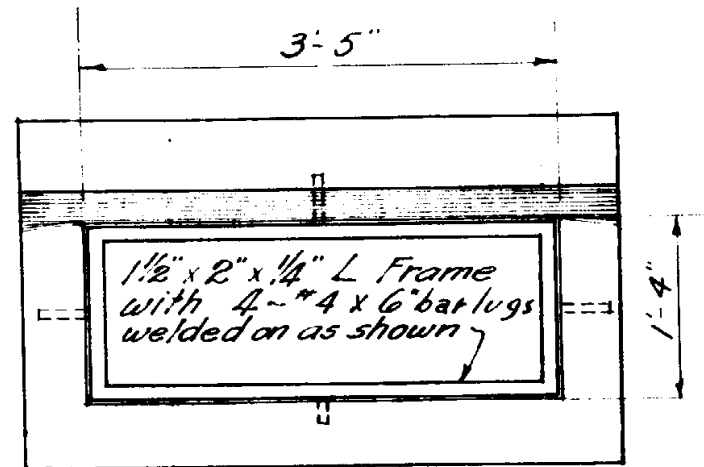
SECTION

Finished Shoulder Line
8" Perforated
C.M.P. — Place
holes down—

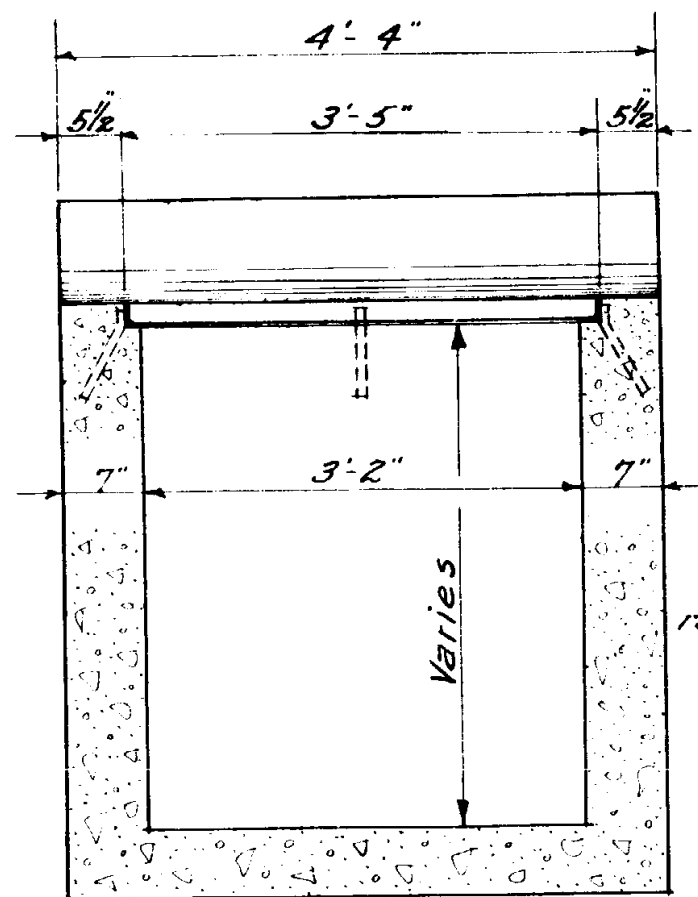


PERFORATED C.M.P. INSTALLATION

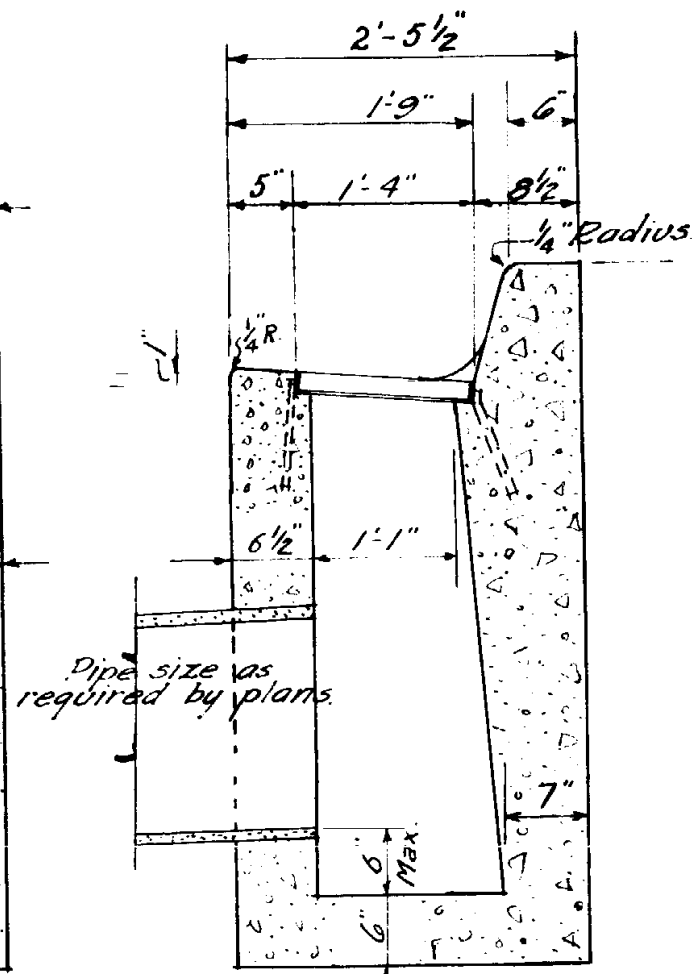
ARIZONA HIGHWAY DEPARTMENT			REV.
PLANS DIVISION			3/17/50
CORRUGATED METAL CATCH BASINS AND PERFORATED C.M.P.			8/15/52
DRAWN	C.B.B. July 1945	DRAWING NO C-24	
TRACED	GH Nov. 1945		
CHECKED	HHW		
APPROVED PLANS ENGR.			



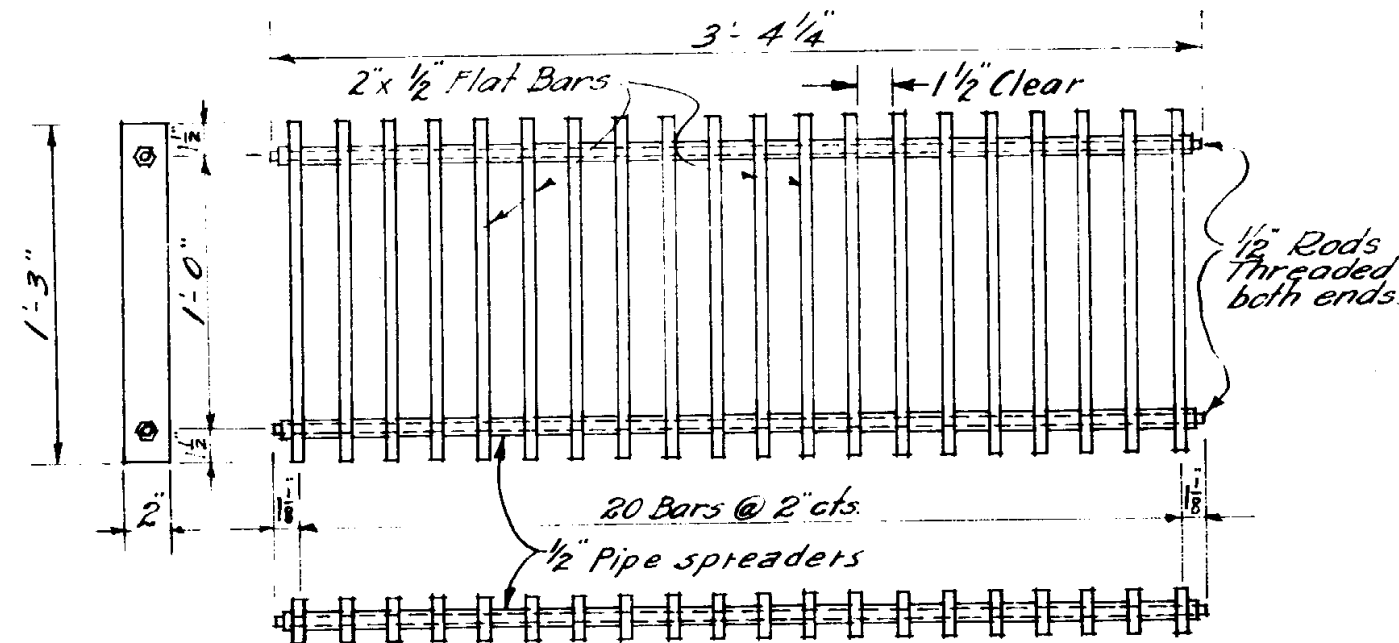
PLAN



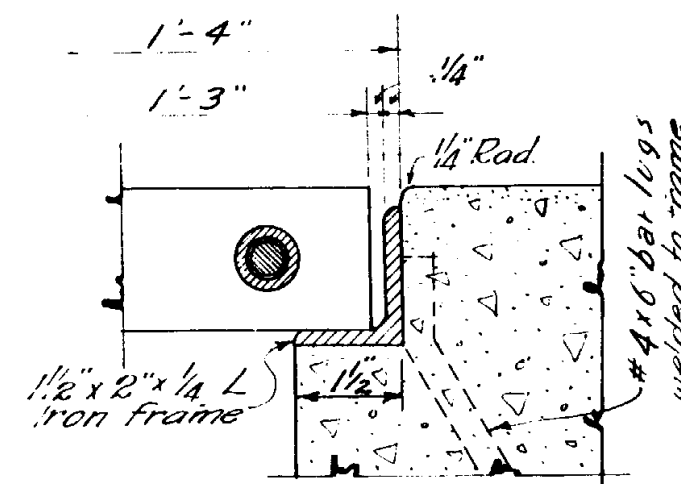
LONGITUDINAL SEC.
DETAIL OF NO. 1 CATCH BASIN.
Scale ~ 3/4" = 1'-0"



CROSS SECTION



BAR GRATE
Scale ~ 1 1/2" = 1'-0"



DETAIL OF ANGLE
FRAME GRATE SUPPORT
Scale ~ 3/8" = 1"

GENERAL NOTES

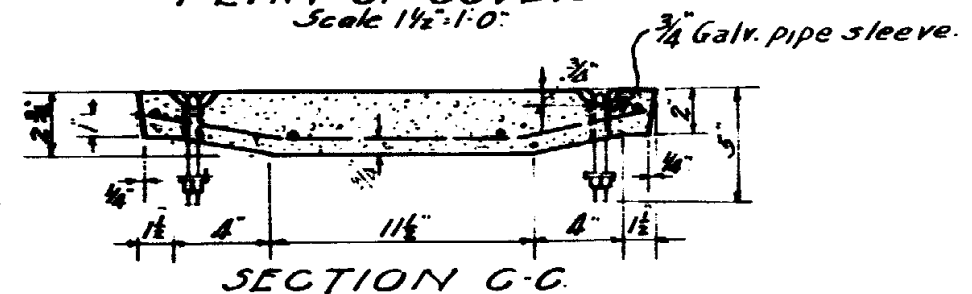
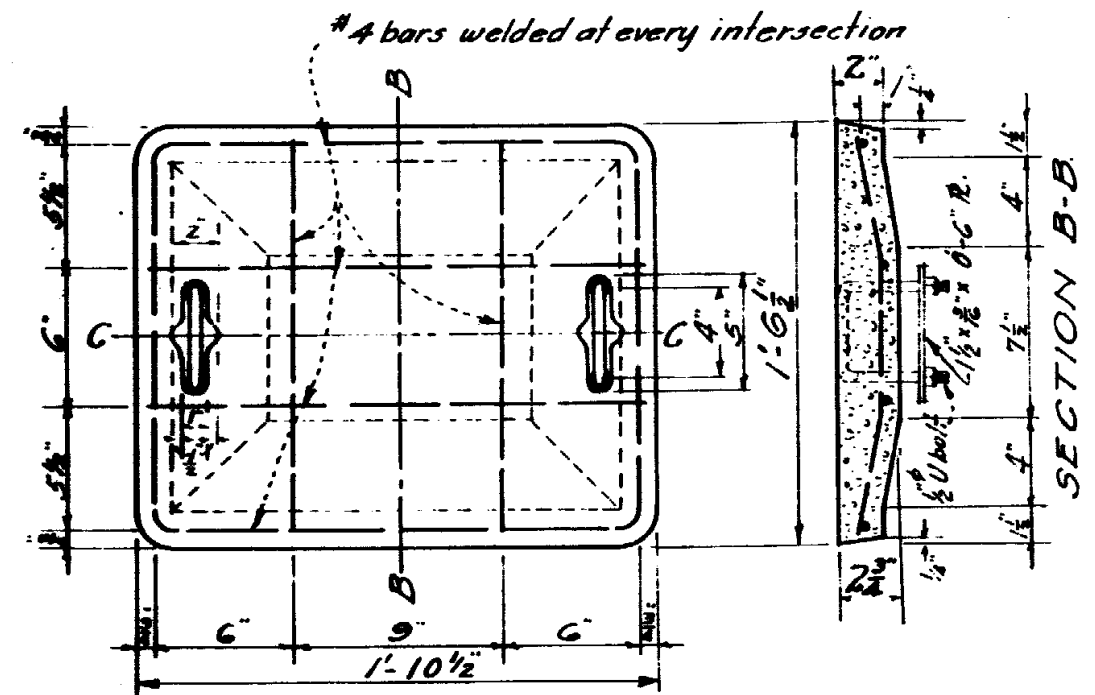
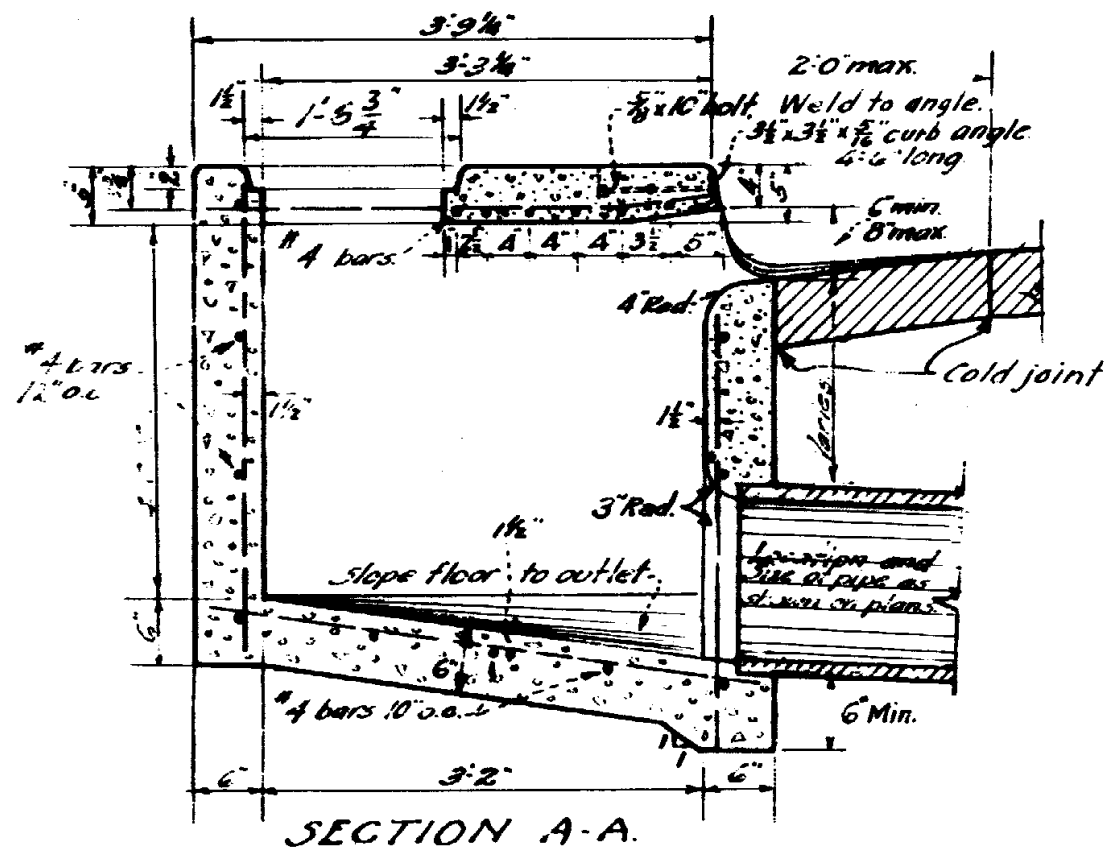
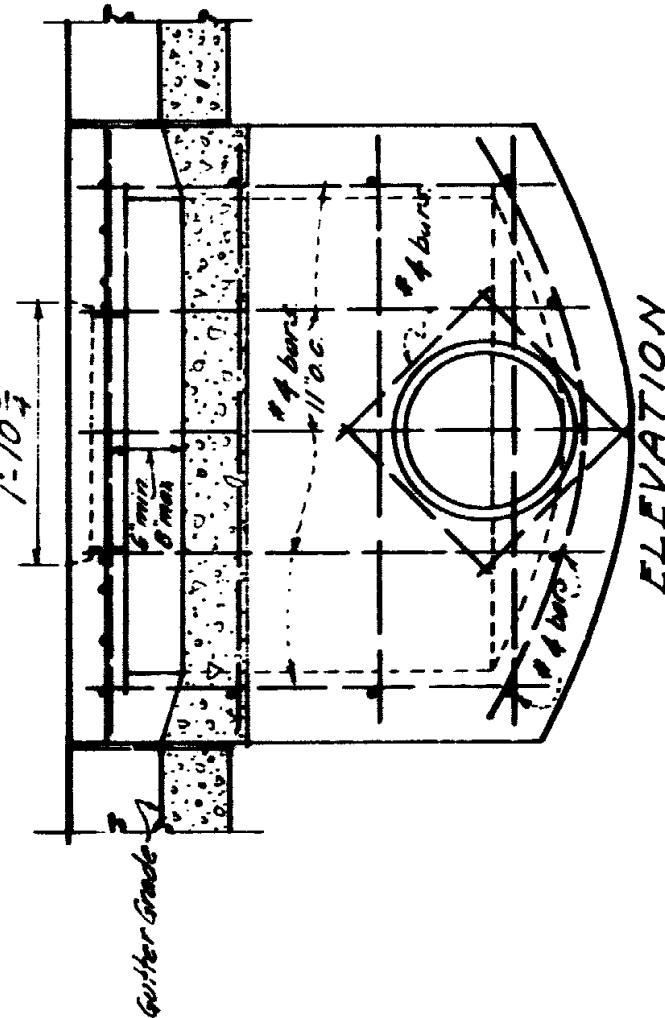
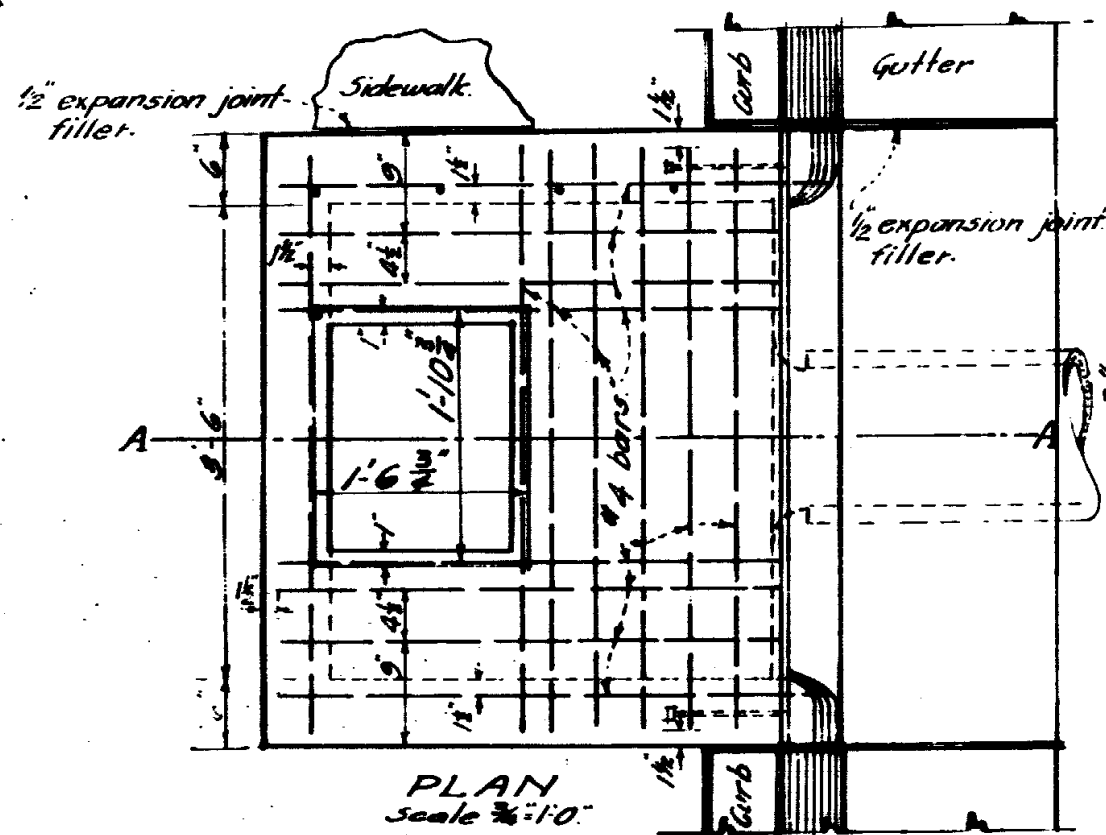
Warp face of standard curb and gutter (or curb) into catch basin in lengths of 2 feet on each side. The curb and gutter section of the catch basin shall conform in surface finish to the adjoining curb and gutter. All concrete shall be class "A".

All exposed edges shall be finished to 1/4" radius with a suitable edger. Frame and grating units shall be structural steel A.S.T.M. A-7 painted one shop coat of No. 1 paint and one field coat of No. 3 paint.

When catch basins are located in curb returns, the catch basin curb face shall conform to the radius of the return.

Area of grate opening = 3.43 sq.

ARIZONA HIGHWAY DEPARTMENT PLANS DIVISION			REV. 8-1-41 6-14-47 12-1-58
CATCH BASIN NO. 1			
DRAWN	H.H.W.	DRAWING NO.	
TRACED	K.S.		
CHECKED	H.H.W.		
APPROVED	H.H.W.		
C-25			



The finish of the top slab shall conform in marking and finish to the adjacent concrete. Where no sidewalk exists the surface shall be trowel finished, without mortar coat.

The concrete cover shall be composed of one part Portland cement and three parts clean well graded aggregate. All other concrete shall be Class "A".

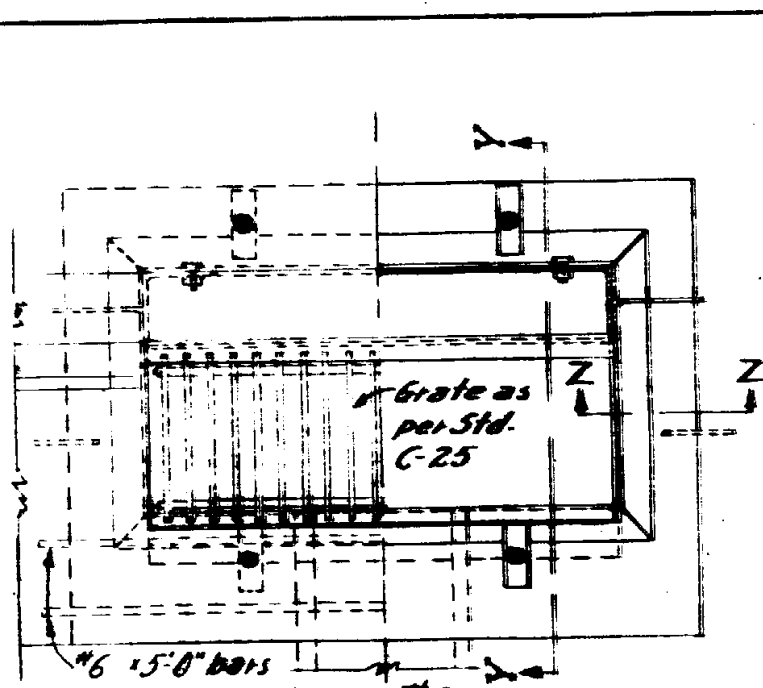
When catch basins are located in a curb return the angle iron above the inlet shall conform to the curvature of the curb.

All exposed edges shall be finished to 1/4" radius with a suitable edger.

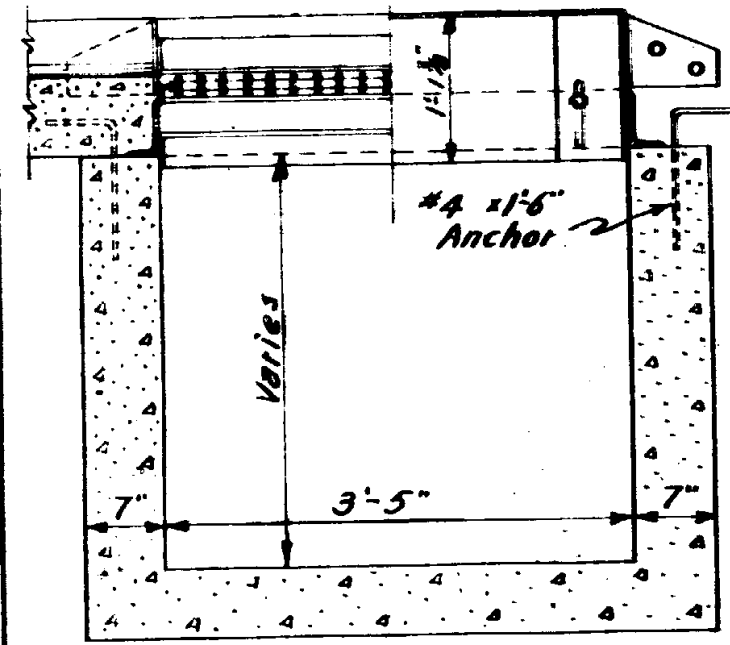
Paint curb angle one shop coat of No. 1 paint and one field coat of No. 3 paint.

Area of curb opening = 1.75^{sq} min. and 2.33^{sq} max.

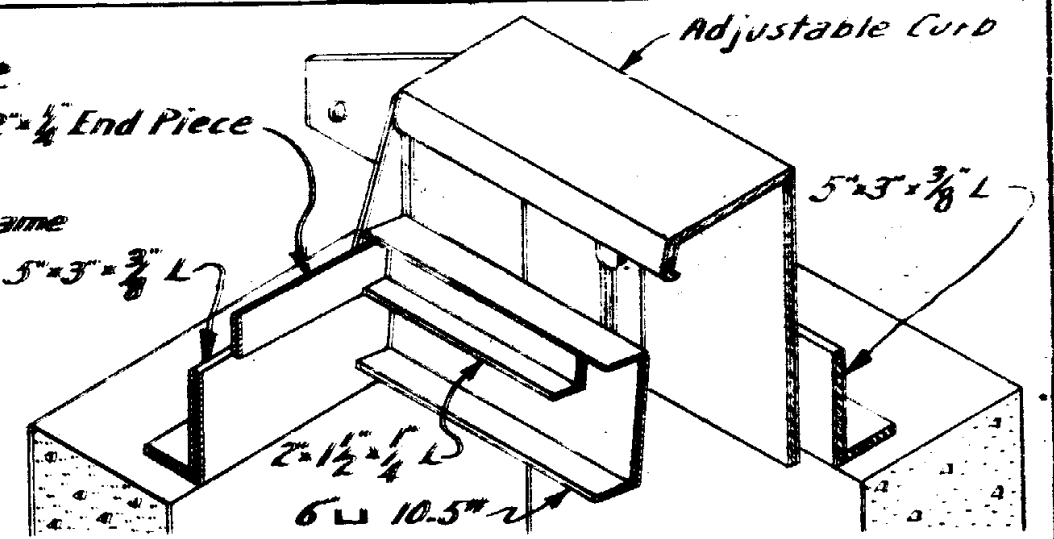
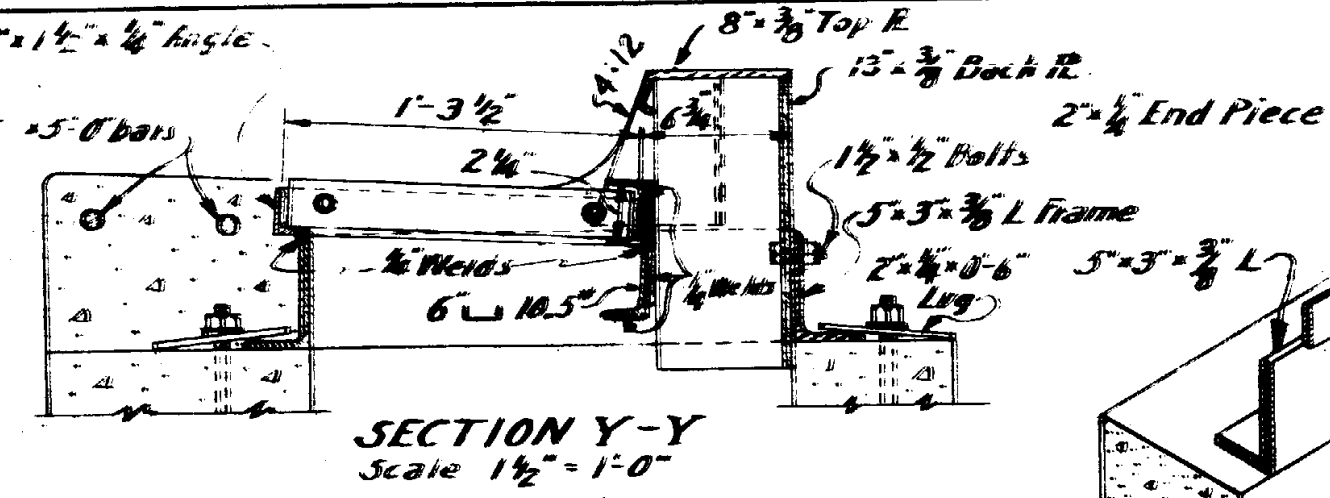
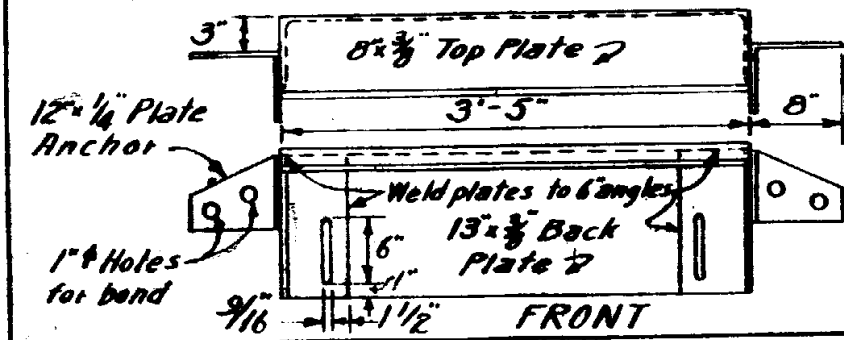
ARIZONA HIGHWAY DEPARTMENT			REV.
PLANS DIVISION			
CATCH BASIN			
NO. 2			
Drawn	C.H.	Sept. '35	DRAWING NO. C-26
Traced	H.S.	June '36	
Checked	H.H.W.	JULY 1938	
Approved			



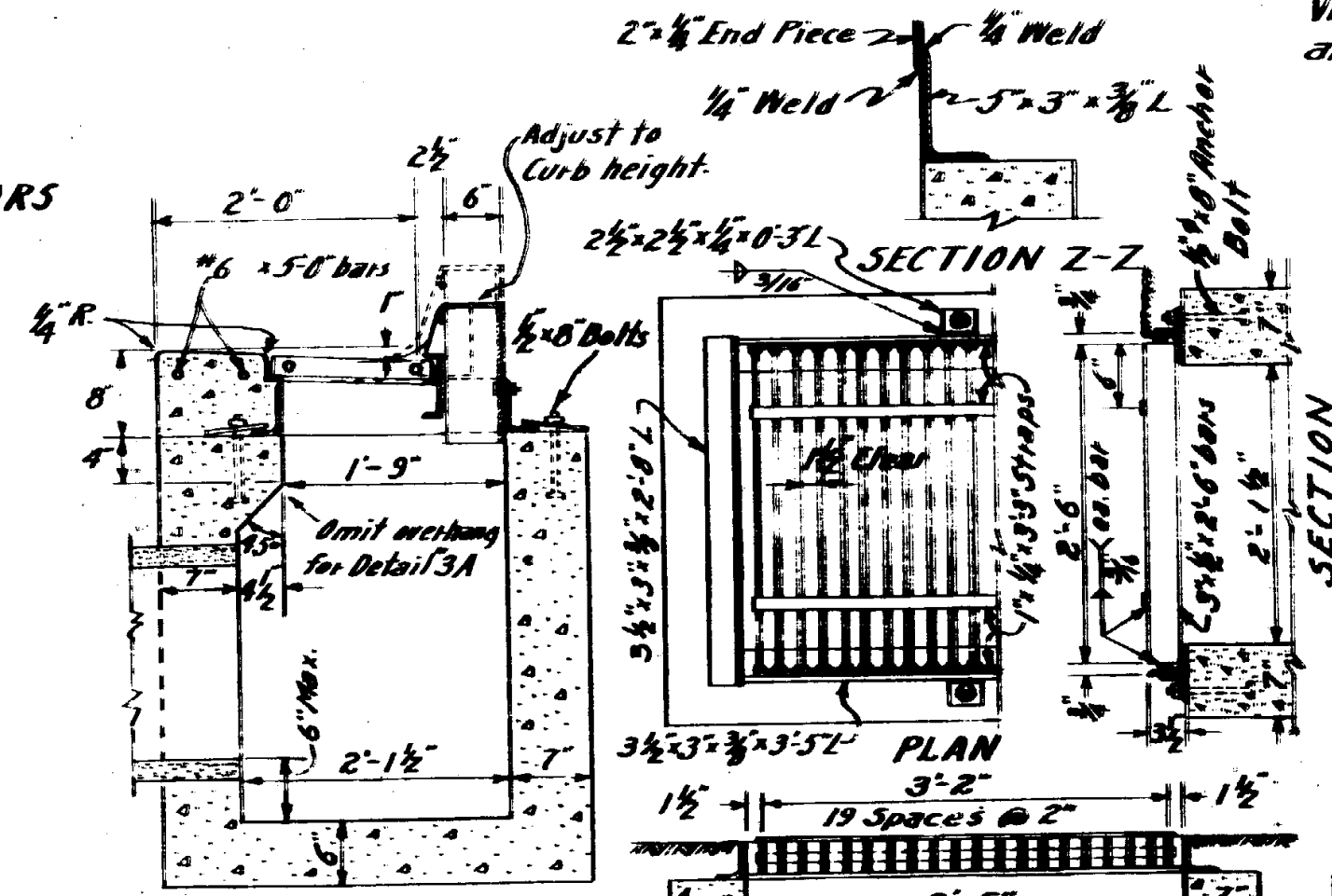
DETAIL #3
HALF PLAN GUTTER & GRATE **HALF PLAN FRAME & ANCHORS**
 Scale $\frac{3}{4}" = 1'-0"$



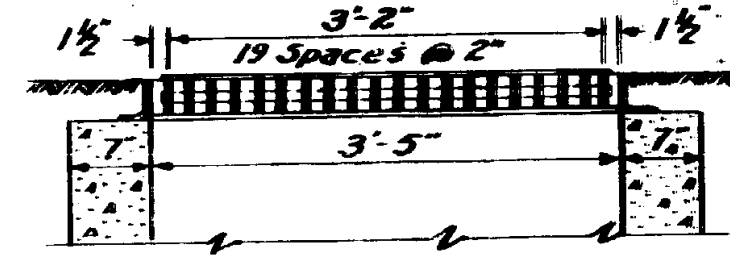
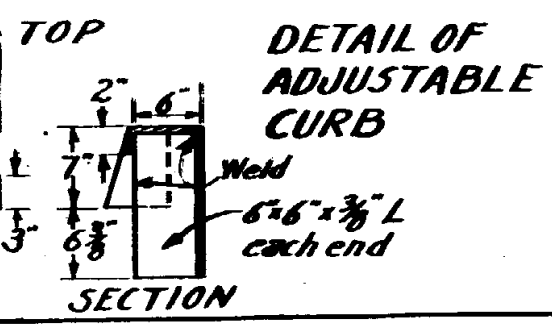
LONGITUDINAL SECTION



View showing placement of angles, channel and end piece.



CROSS SECTION

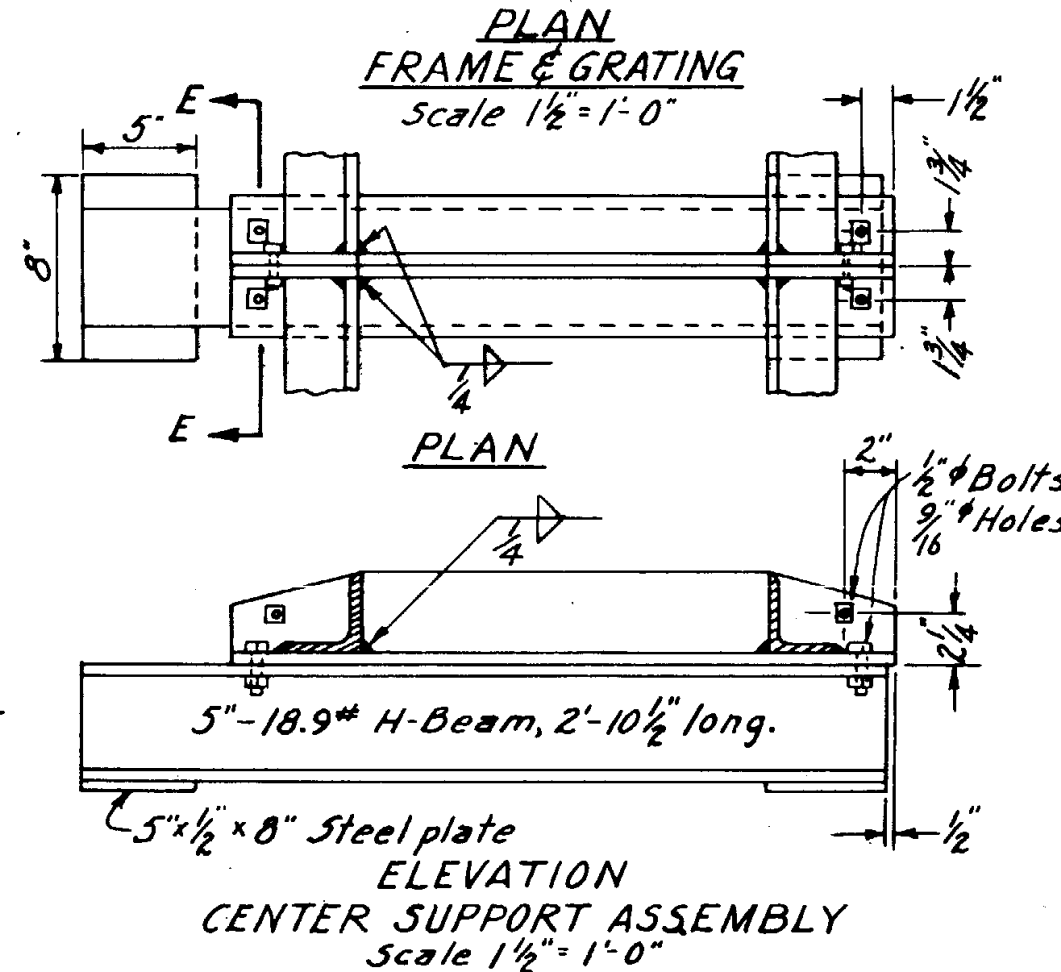
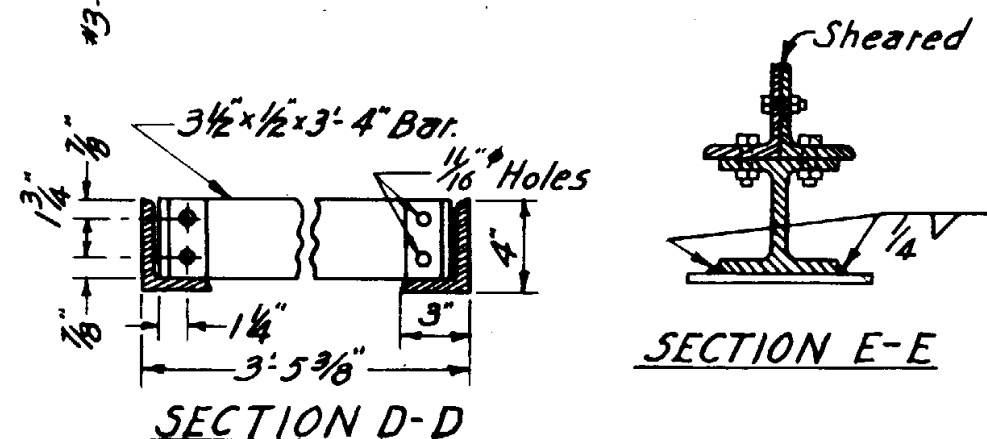
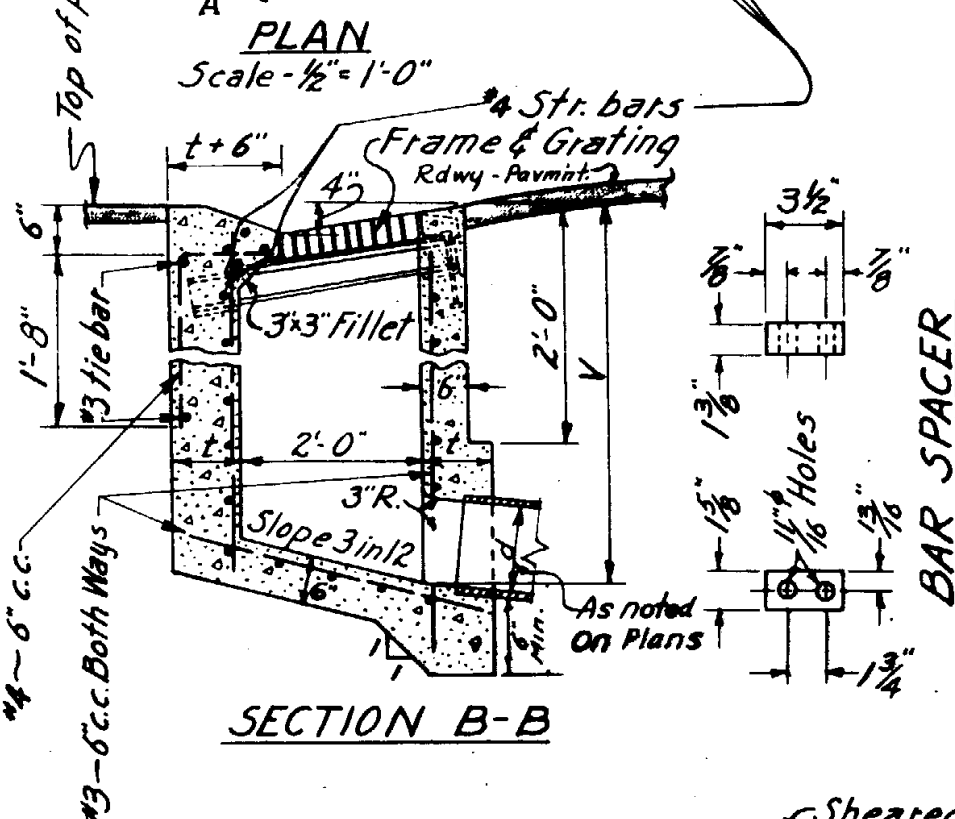
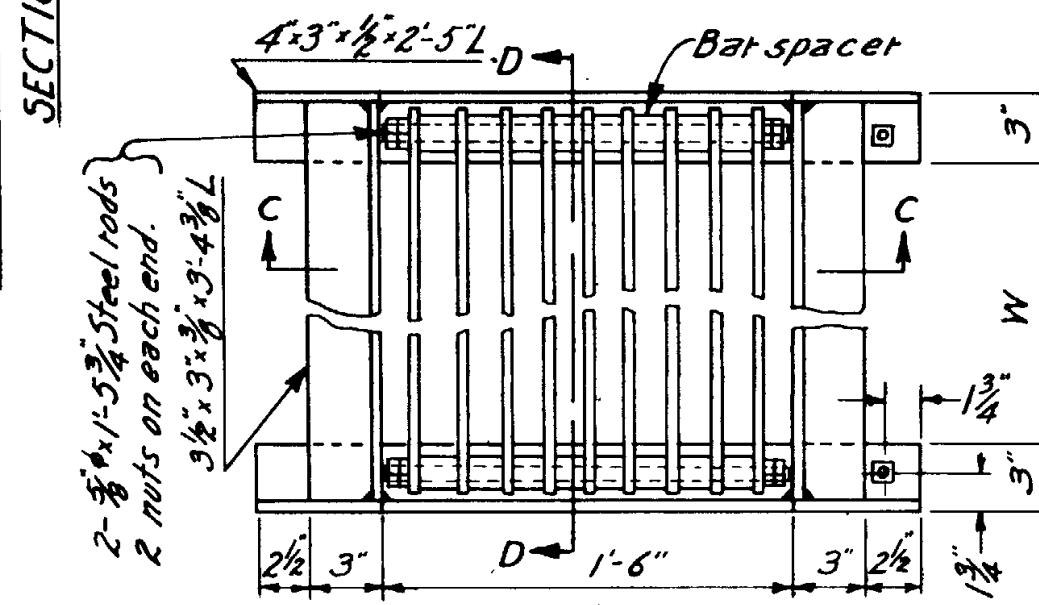
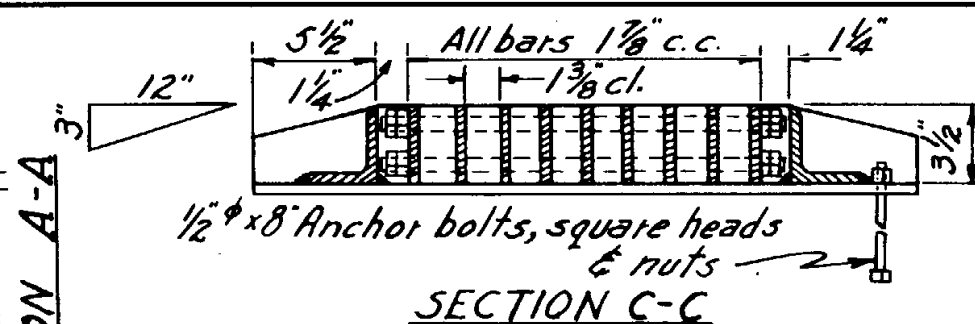


Welded frame and bar grate unit for use without curb. Concrete box is as shown for Detail #3.

Warp face of standard curb and gutter into catch basin in lengths of 2 feet on each side if necessary. Adjustable curb, frame and grating units shall be structural steel A.S.T.M. A-7 painted one shop coat of No. 1 paint and one field coat of No. 3 paint. All concrete to be class "A". Area of grate opening for Detail #3 = 3.66^{sq}, for Detail 3A = 7.26^{sq}. Area of curb opening Min = 0.70^{sq} Max = 1.85^{sq}.

THIS DETAIL SUPERSEDES DRAWING NO. C-27

ARIZONA HIGHWAY DEPARTMENT		REV.
PLANS DIVISION		
CATCH BASIN NO. 3 & 3A		
DESIGN	L.O. Mac 3-24-58	DRAWING NO. C-27-1
TRACED	L.O. Mac 3-29-58	
CHECKED	270 12-1-58	
APPROVED		
ENGR. PLANS	L.O. Mac 3-29-58	



NOTES:

Outlet pipes to be placed in position
as shown on plans.

Floor of basin shall be given a steel troweled finish. Slope of floor parallel with curb shall be 1 in 12.

$t = 6"$ if "V" is 4' or less.

$t = 8$ if " V " is between 4' and 8'

$t = 10''$ if "V" is 8' or over.

V = 3'-6" unless otherwise specified.
W = 2'-11 $\frac{3}{8}$ " for one grating. Add 3'-5 $\frac{3}{8}$ "
for each additional grating. Unless
otherwise specified the basin shall
have one grating.

Center support assembly shall be used when two or more gratings are specified.

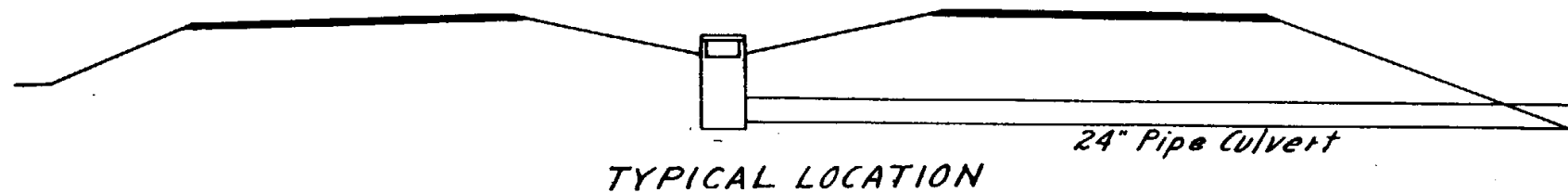
Bolts shall be used to join two or more frames together and to the "H" beam.

Frame and grating units shall be structural steel A.S.T.M. A-7 painted one shop coat of No. 1 paint and one field coat of No. 3 paint.

$$= 4.42 \text{ m}^2$$

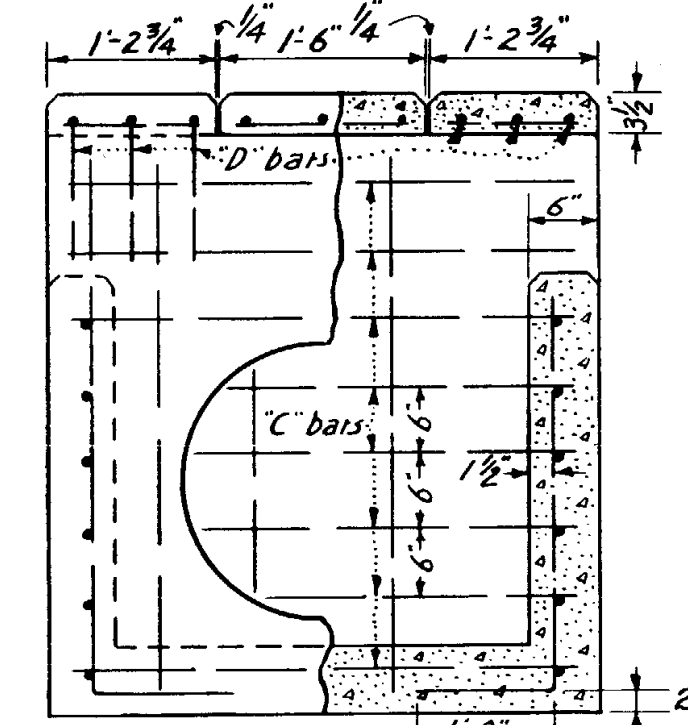
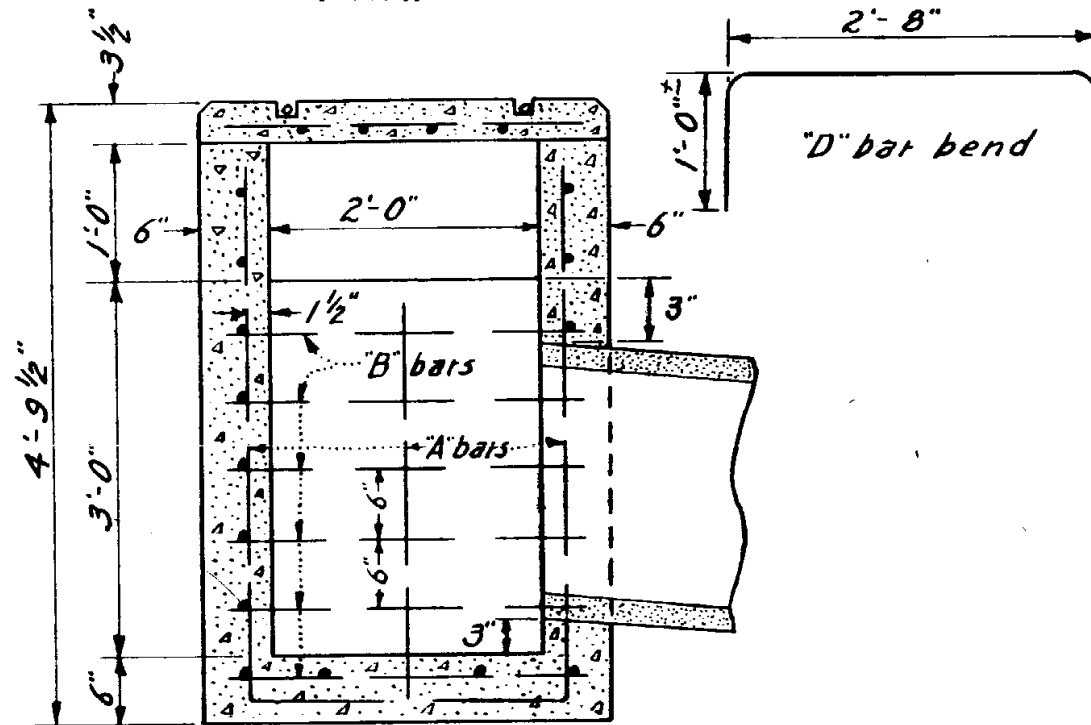
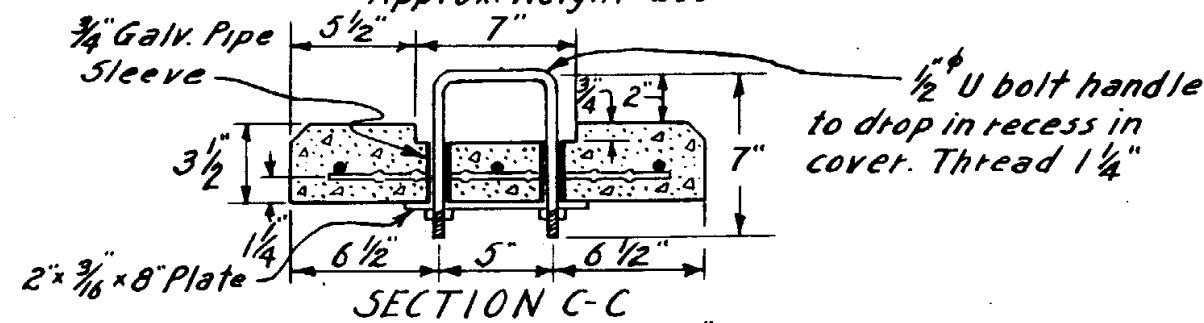
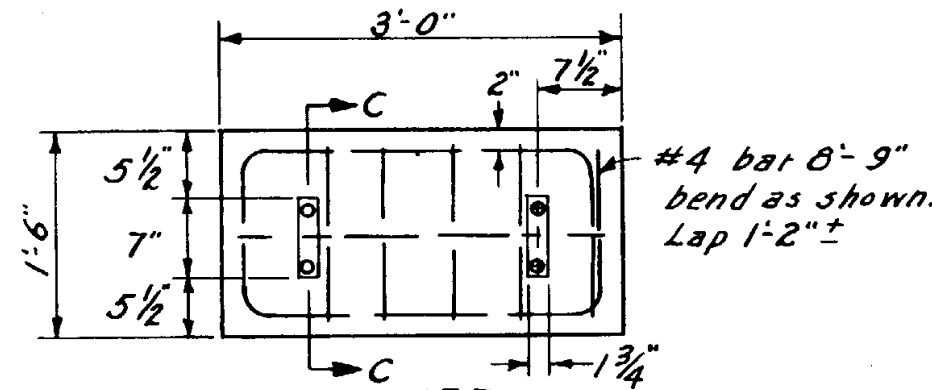
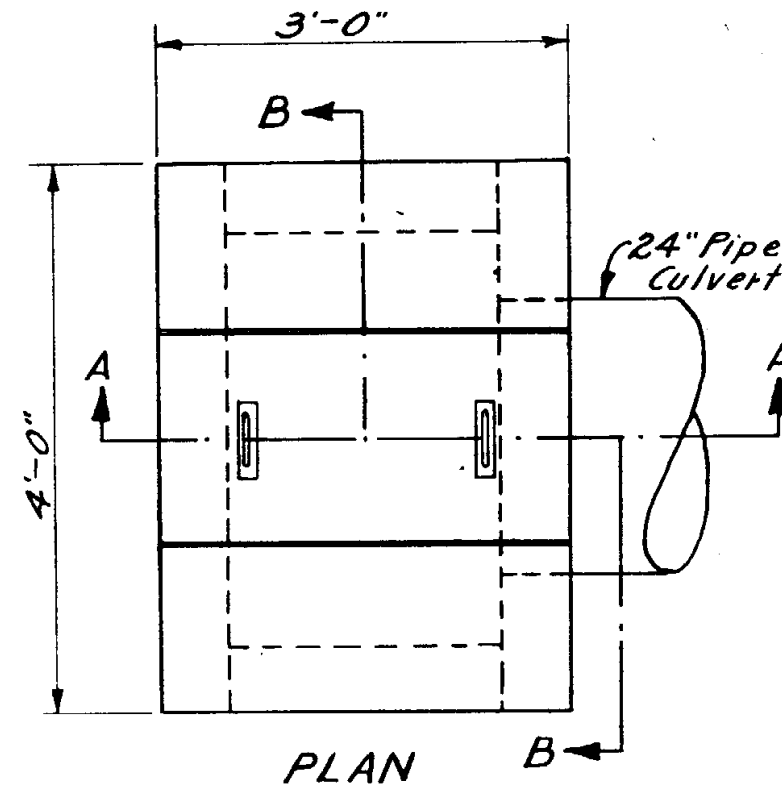
All concrete Class A
Reinforcing steel 1½" edge distance
except where noted.

ARIZONA HIGHWAY DEPARTMENT		REV. 1/4/6
PLANS DIVISION		
CATCH BASIN NO. 4		
DRAWN BY	L. J. B. 8-14-57	DRAWING NO. C-27-A
TRACED BY	L. J. B. 2-21-58	
CHECKED BY	J. P. B. 2-21-58	
APPROVED ENGR OF PLANS	J. P. B.	



NOTES:

Chamfer all exposed edges $\frac{3}{4}$ "
 This catch basin shall be used
 for median drains only when called
 for on plans.
 All concrete Class A.



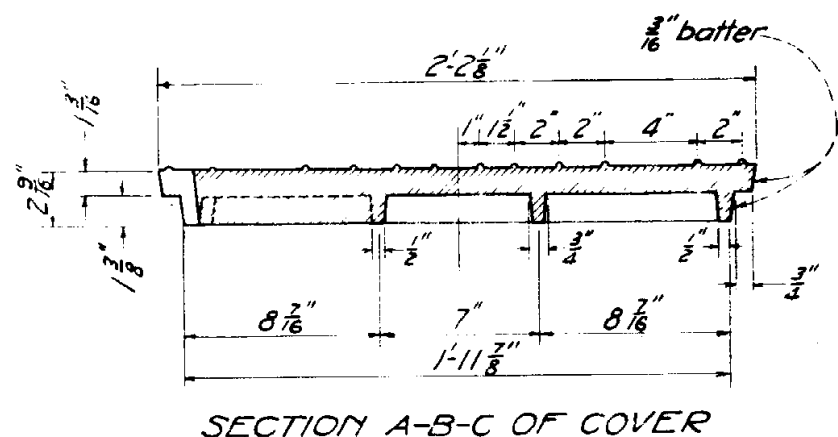
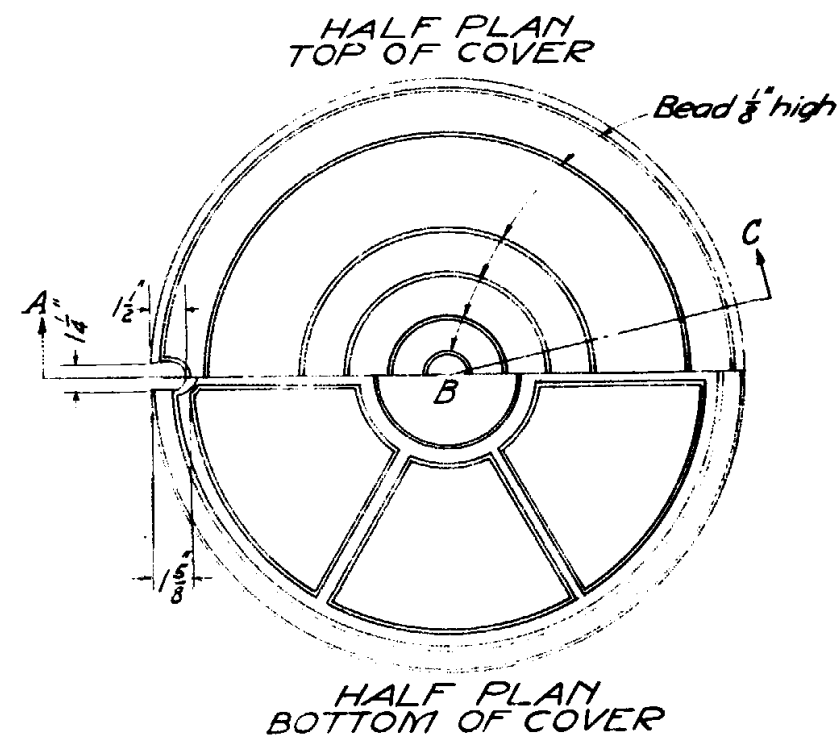
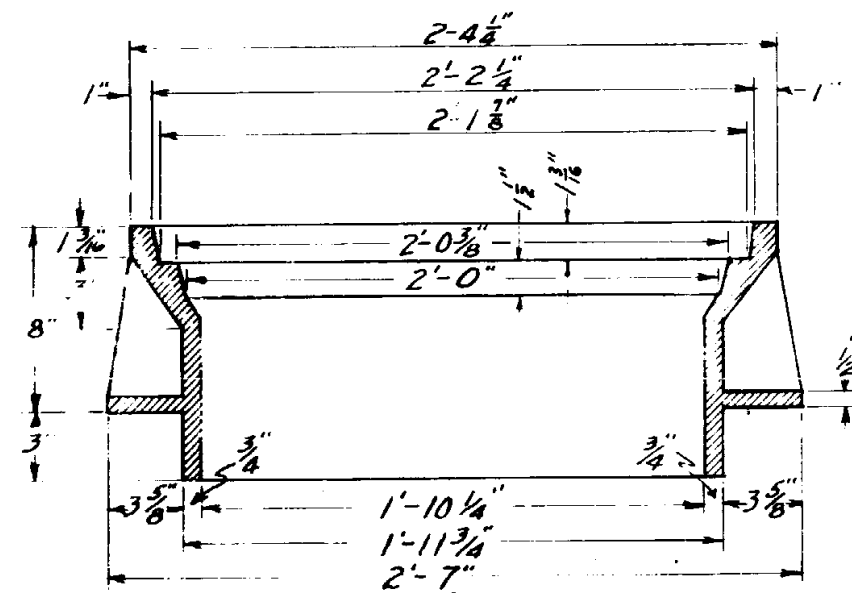
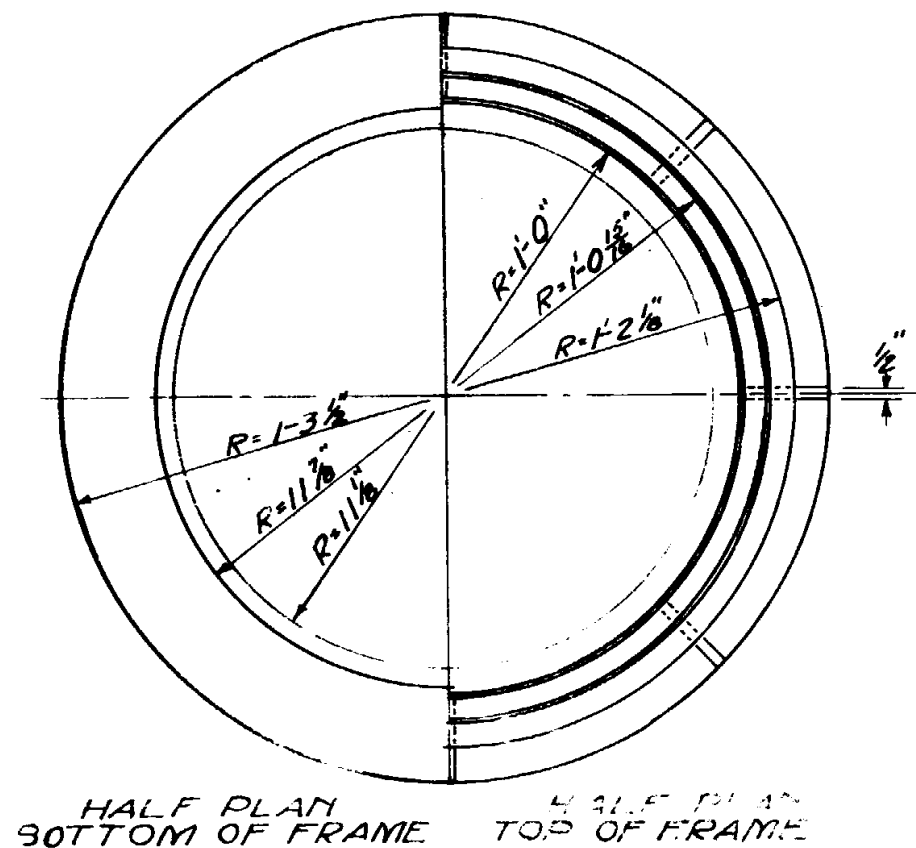
All Bars #4 - 120 lbs.						Concrete - 1.05 C.Y.			
"A" bars		"B" bars		"C" bars		"D" bars		Cover bars	
No.	Length	No.	Length	No.	Length	No.	Length	No.	Length
8	5'-3"	12	2'-9"	14	3'-9"	6	4'-6" bend	1	8'-9" bend
2	4'-3"							4	1'-3"
								1	2'-9"

ARIZONA HIGHWAY DEPARTMENT
 PLANS DIVISION

CATCH BASIN
 NO. 5

DRAWN	L.O. Moe 2-27-58	DRAWING NO.
TRACED	L.O. Moe 3-3-58	C-27-B
CHECKED	12-1-58	
APPROVED ENGR. PLANS	W. Heidecker	

REV.
 1/4/60



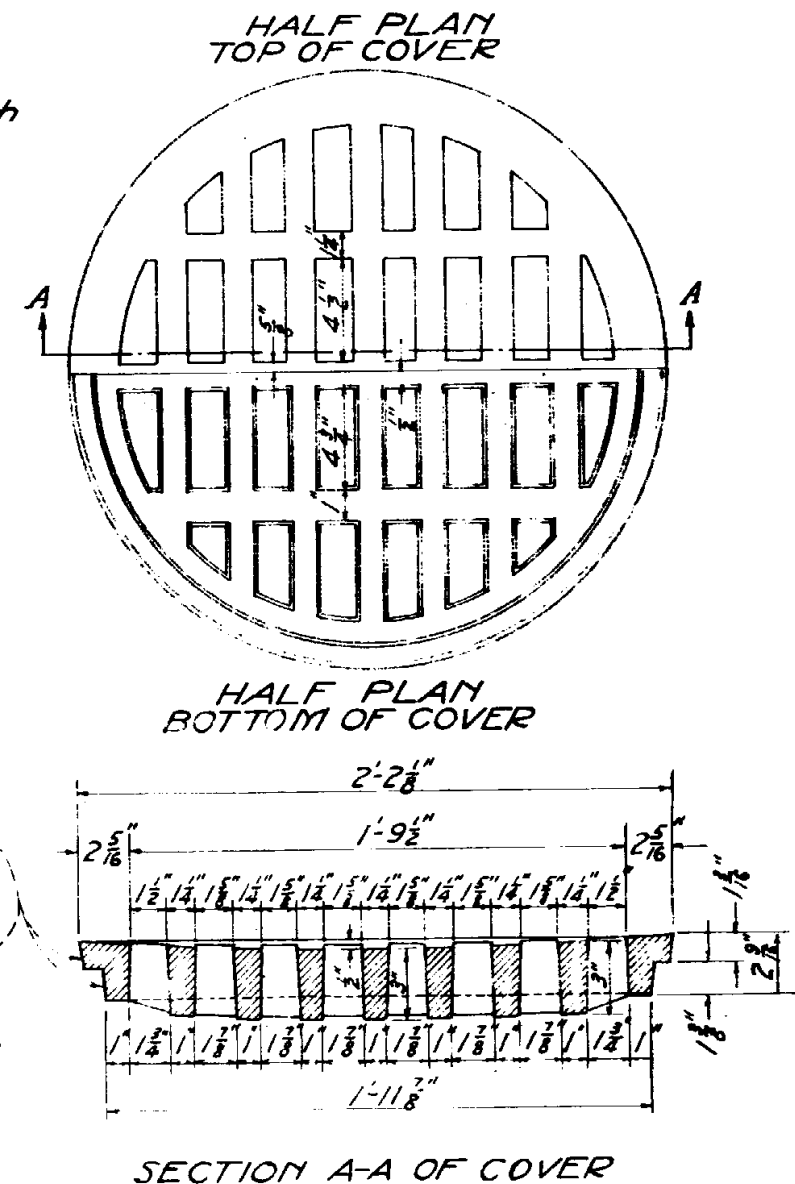
TYPE "A" COVER
Approx. weight 190 lbs.

TYPE "A-1" COVER: shall be the same as Type "A" except that the cover shall be vented with at least six one inch holes, equally spaced in a circle 8 1/2" from the center of the cover.

Type "A" cover shall be used unless otherwise specified.

Notations as shown on the plans shall be as follows: Std. M.H. Frame & Cover No. B, the letter denoting the type of cover.

The bearing faces shall be machined so that the cover will have a uniform bearing in any position in the frame.



TYPE "B" COVER
Approx. weight 280 lbs.

ARIZONA HIGHWAY DEPARTMENT
PLANS DIVISION

**CASTIRON FRAME & COVERS
FOR MANHOLES**

DRAWN	OK	OCT. 1935	DRAWING NO.
TRACED	OK	" "	
CHECKED	L.M.	" "	
APPROVED			
ENG. OF PLANS			

C-28

REV.
10/35

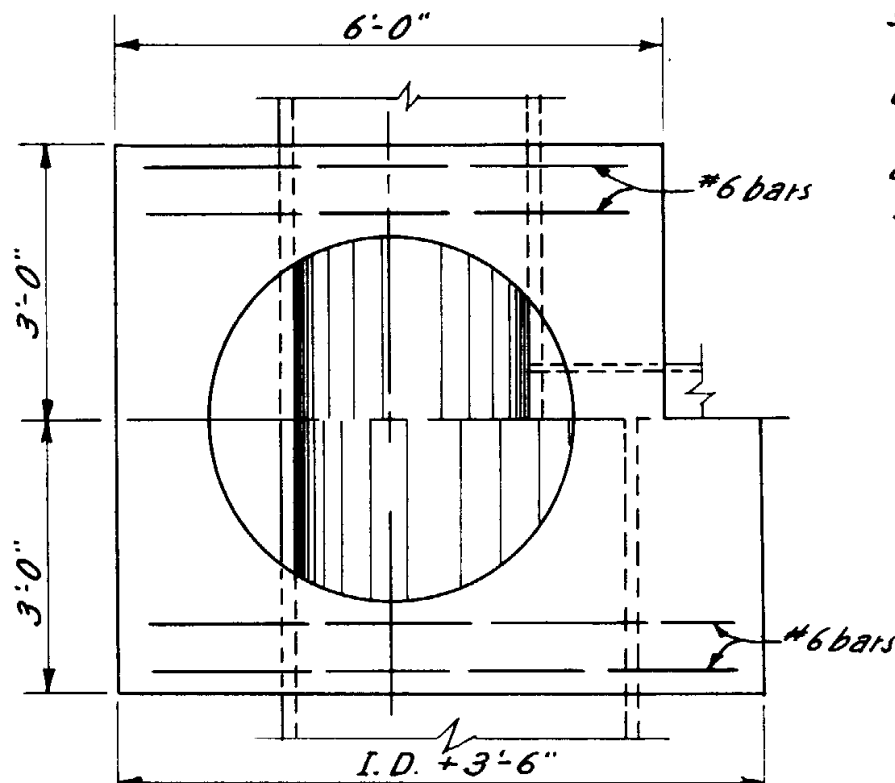
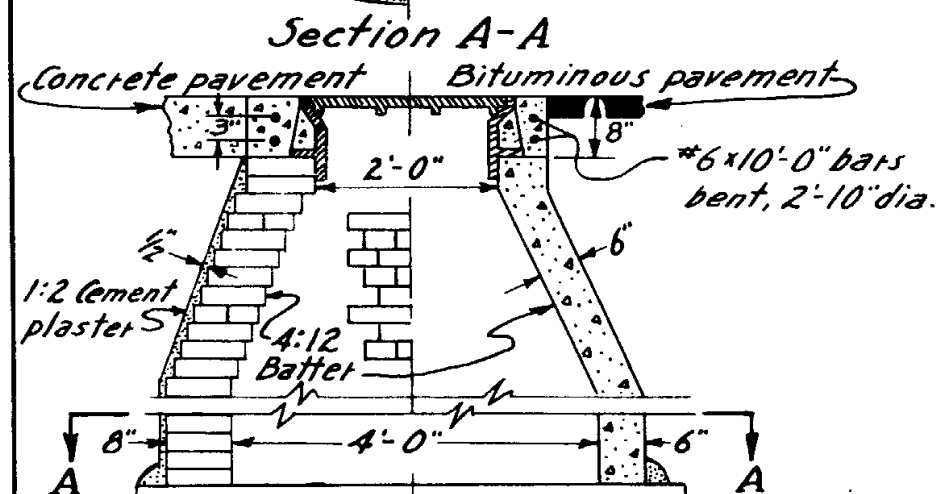
Scale 1 1/2" = 1'-0"

HALF PLAN BRICK CONCRETE

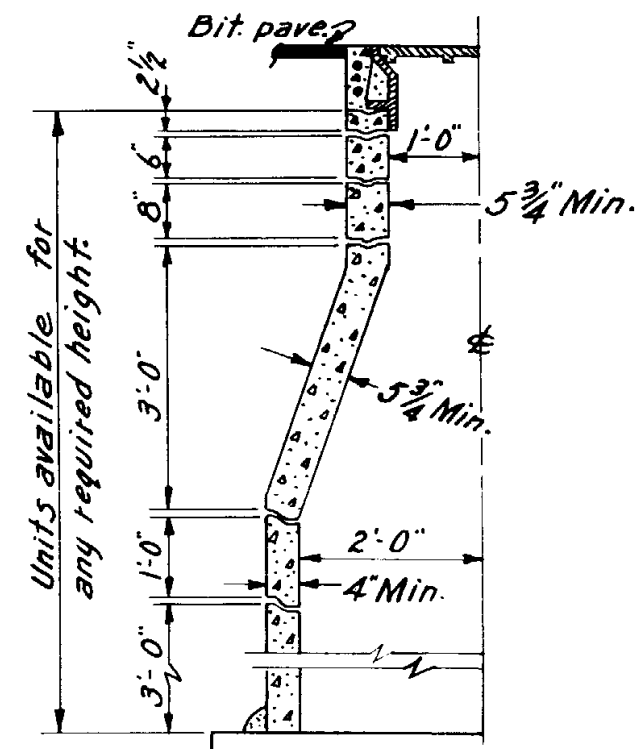
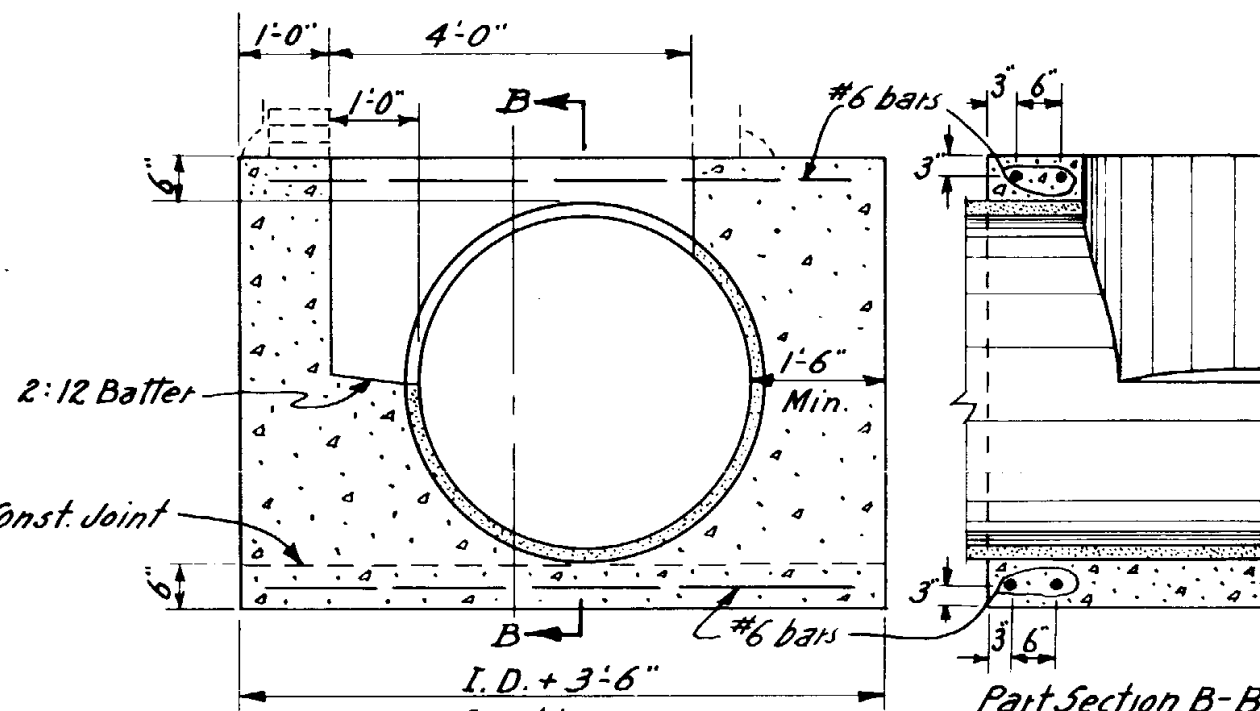
HALF PLAN PIPES 36" I.D. & SMALLER

GENERAL NOTES

Pipe for precast sections as per Standard Specs. All other concrete shall be Class "A". Every 5th course of bricks shall be laid as stretchers.
Manhole frame and cover Std. C-28 is shown. Other types may be substituted if noted on plans.
In bituminous pavement, manhole frame and concrete ring shall be placed after pavement is laid.



HALF PLAN - PIPES OVER 36" I.D.



HALF SECTION MANHOLE NO. 3 PRECAST REINFORCED CONCRETE

THIS DRAWING SUPERSEDES STD. C-30

ARIZONA HIGHWAY DEPARTMENT
PLANS DIVISION

REV.
1/4/60

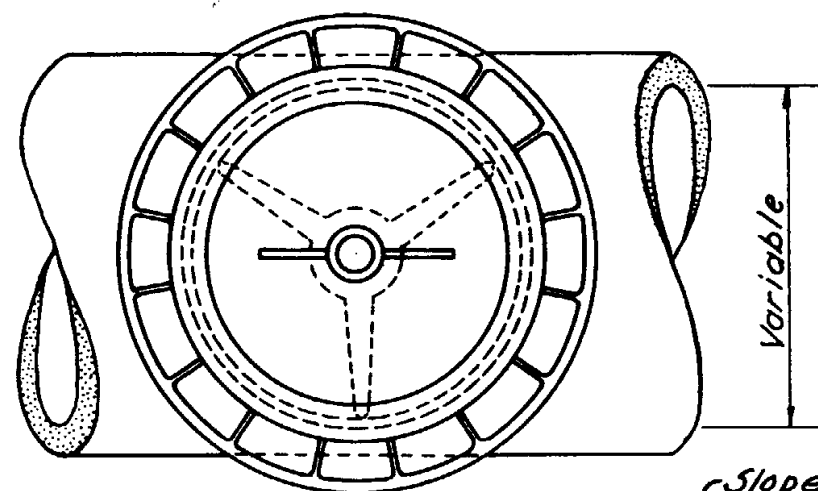
MANHOLE BASE STRUCTURE AND MANHOLES NO. 1, 2 & 3

DRAWN	R.E.W. March 1958	DRAWING NO. C-30-1
TRACED	L.D. Moe 5-26-58	
CHECKED	12-1-58	
APPROVED ENGR. PLANS	J. Heidecker	

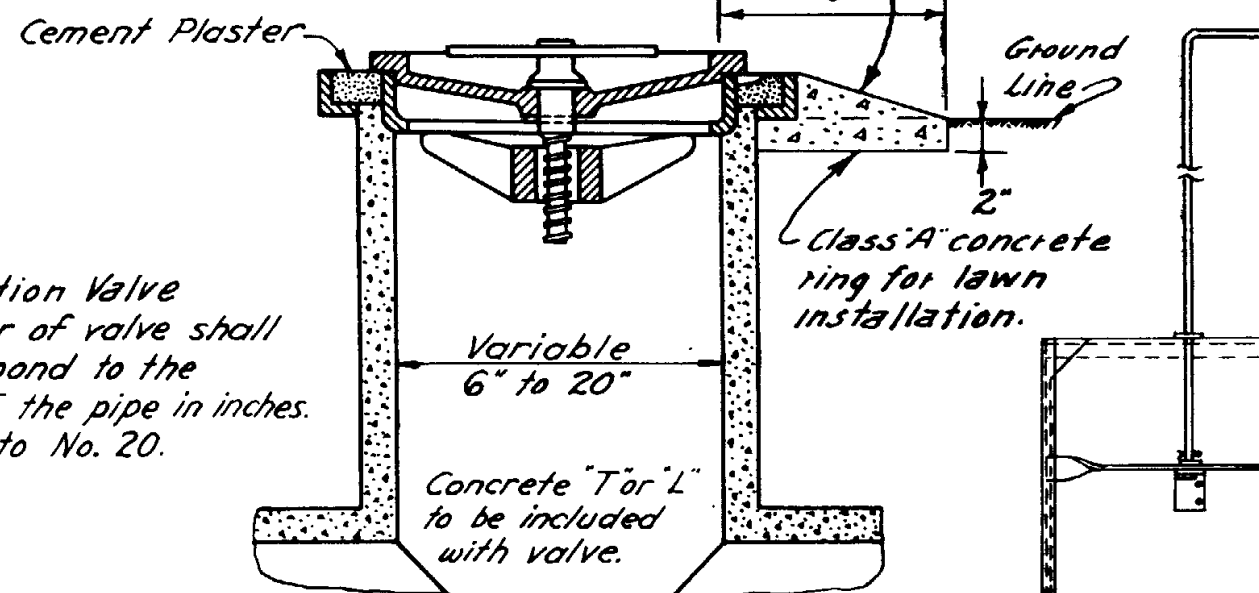
Section STANDARD BASE STRUCTURE FOR PIPES 6" TO 36" I.D.

Section STANDARD BASE STRUCTURE FOR PIPES OVER 36" I.D.

Note: Gates will be specified on plans for pipes larger than 24".



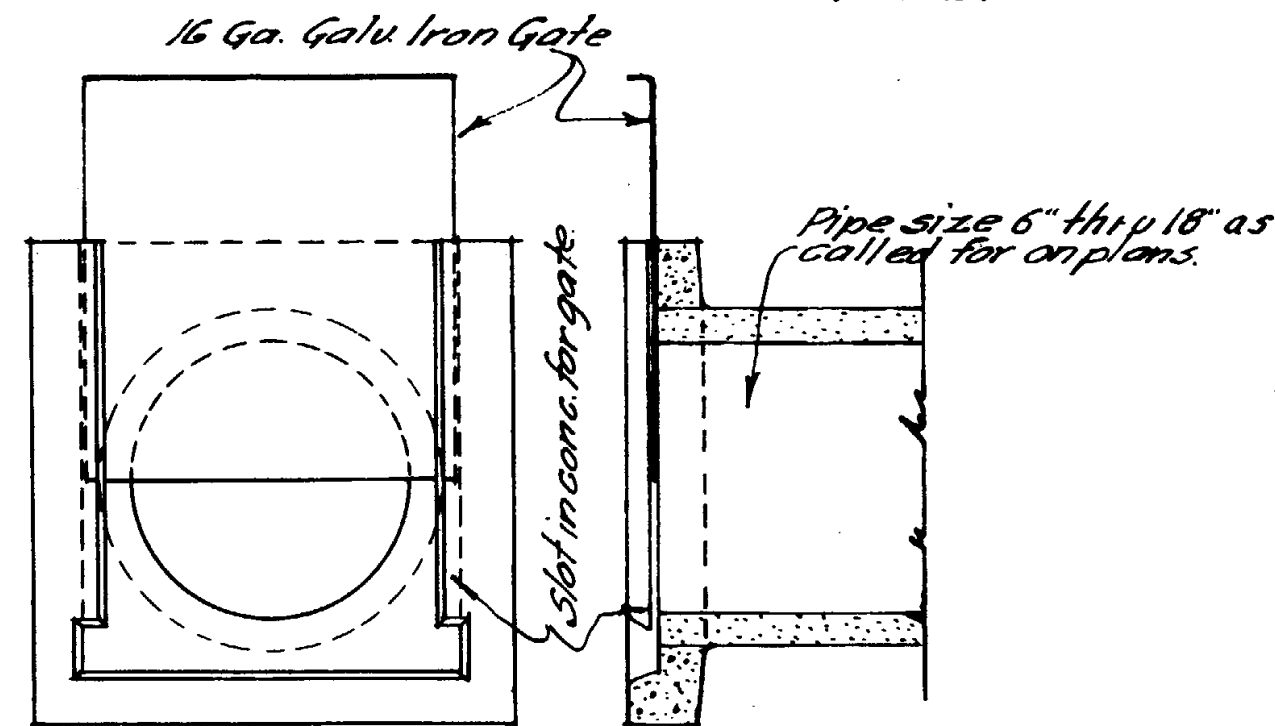
PLAN



PART SECTION

STANDARD IRRIGATION VALVE
DETAIL "C"

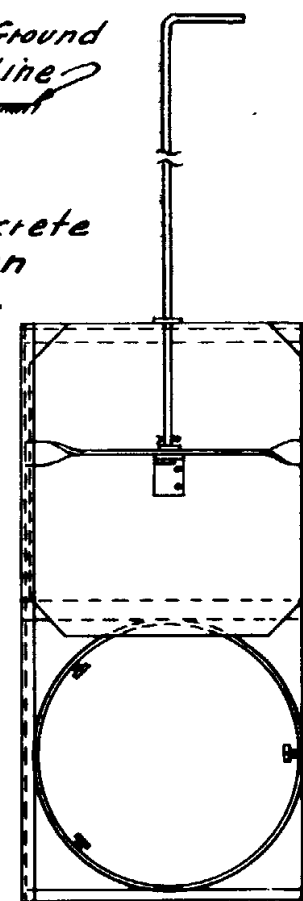
Irrigation Valve
Number of valve shall
correspond to the
size of the pipe in inches.
No. 6 to No. 20.



ELEVATION

SECTION

PRECAST IRRIGATION GATE
For open ditch installation.
DETAIL "B"



PLAN
STANDARD IRRIGATION GATE
for standpipe installation.
DETAIL "A"



Detail "A"
For pipes 6" thru 24". Gate and frame shall
be G. I. or aluminum. Type shown is for concrete
pipe. For C.M. P., external steel adjustable band
shall be used in place of internal steel ring.

ARIZONA HIGHWAY DEPARTMENT			REV. 8/17/55 12/1/58 1/4/60
PLANS DIVISION			
IRRIGATION VALVE IRRIGATION GATE			
DRAWN	O.K.	Dec. 1935	DRAWING NO. C-32
TRACED	GH	Nov. 1945	
CHECKED	HHW		
APPROVED PLANS ENGR.	HHW		

Minimum length of Shoulder Flare 50'

Widen shoulder for Pedestrian Walkway if required.

Shoulder Line.

Control Line.

Top of Curb line projected as related to ϕ of Roadway.

End of Road Guard Flare (Depends on W)

ϕ of Roadway

End of Structure

Structure

Control line

Face of Road Guard

2:1"

Reflectorized Material.

DETAIL SECTION A-A.

Basic formula for Road Guard Flare

$$Y = W \frac{X^2}{F^2}$$

W = Offset from top of Curb line (Control line) to shoulder line.

F = Length of Road Guard flare.

X = Distance from beginning post away from structure

Y = Offset to face of Road Guard at each post.

DETAIL PLAN AT END OF STRUCTURE

1'-0"

Bracket if required

Dimension varies depending on make of Road Guard.

Face of Road Guard (Control Point).

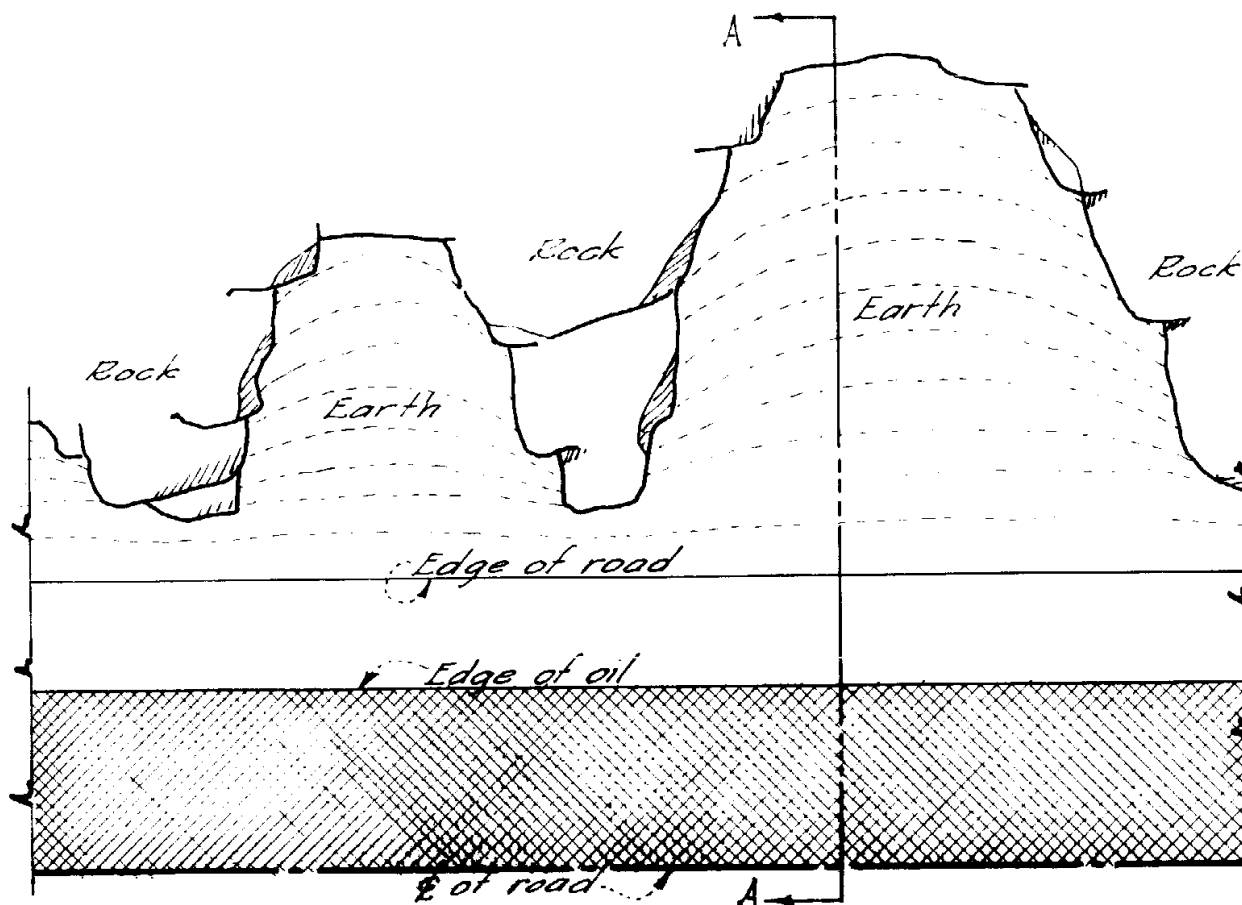
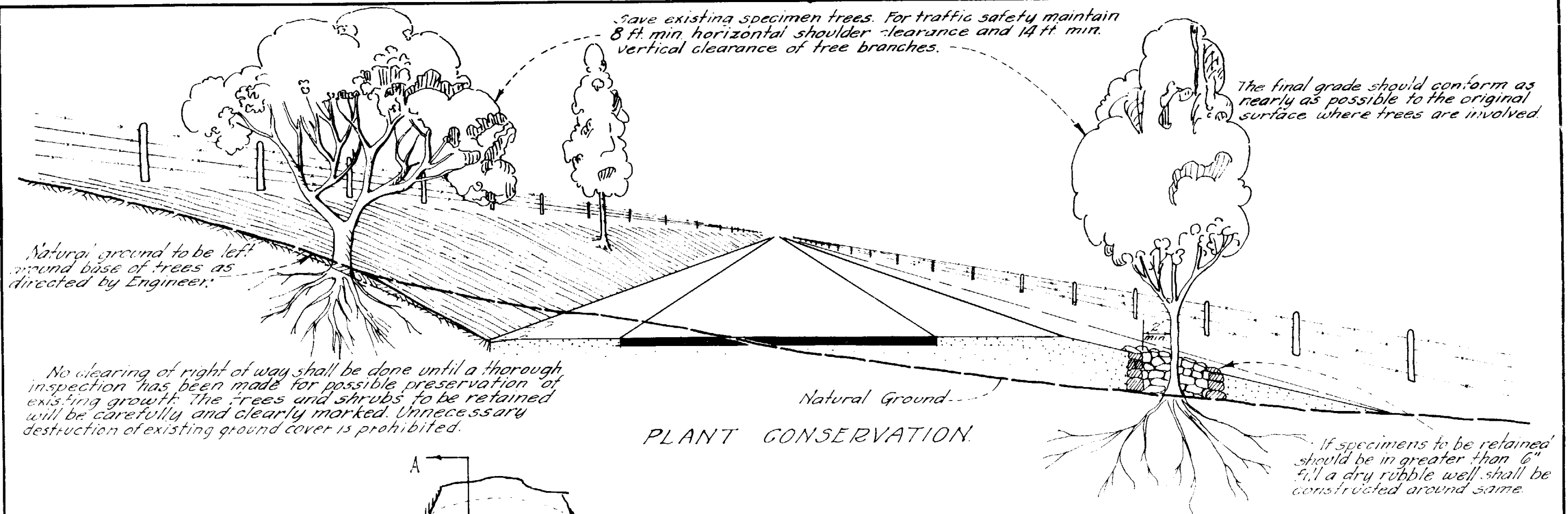
Curb line on structure at top of curb

Control line

Place Road Guard both sides of roadway.

X	Y					
	W=3	W=4	W=5	W=6	W=7	
12'-6"	0.19	0.16	0.14	0.12	0.11	
25'-0"	0.75	0.64	0.55	0.49	0.44	
37'-6"	1.69	1.44	1.25	1.10	0.98	
50'-0"	3.00	2.56	2.22	1.96	1.75	
62'-6"		4.00	3.47	3.06	2.73	
75'-0"			5.00	4.41	3.93	
87'-6"				6.00	5.36	
100'					7.00	
	F=50'	F=62'-6"	F=75'-0"	F=87'-6"	F=100'	

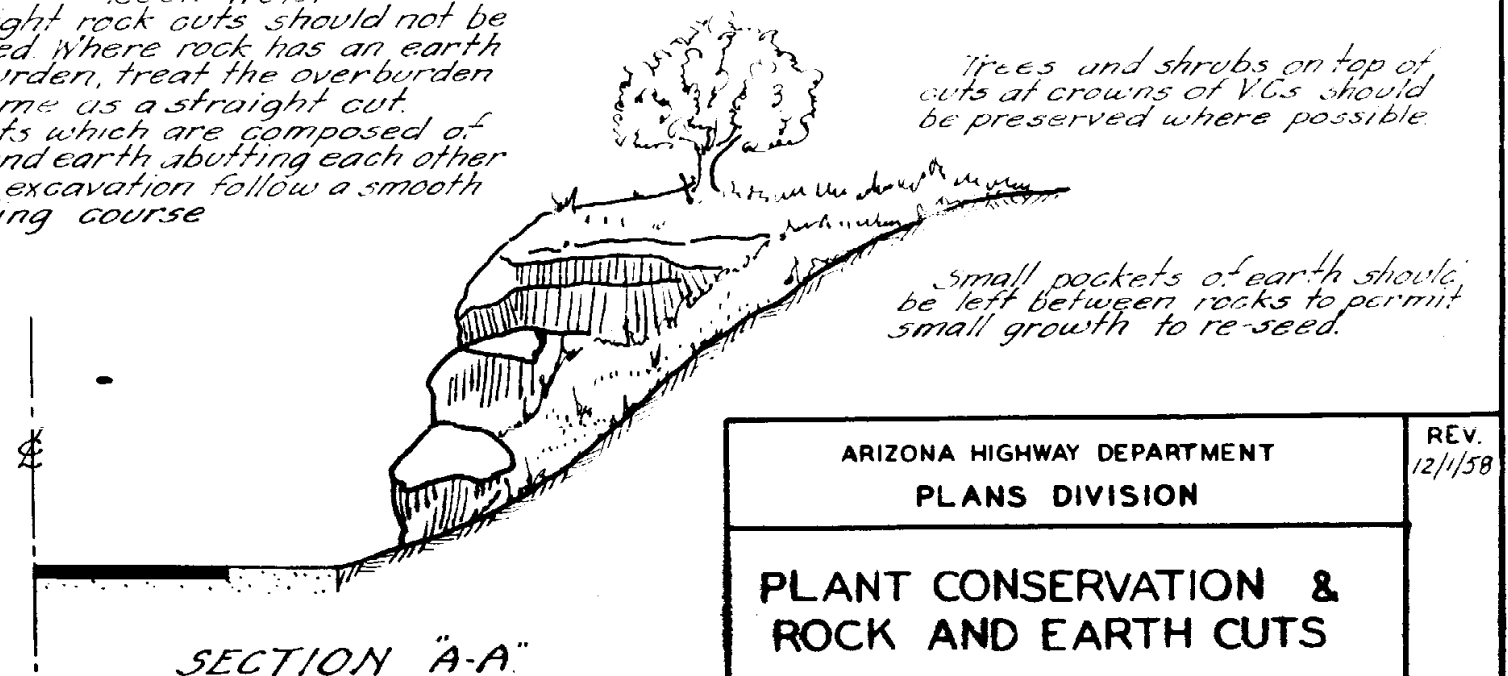
DRAWN	L. McDougall	1/10/59	DRAWING NO. C-42
TRACED	K. Stokoe	1/12/49	
CHECKED	L. McDougall	1/20/59	
APPROVED			
ENG'G PLAYS	H. H. Wesell	1/20/59	



ROCK WORK

Straight rock cuts should not be rounded where rock has an earth overburden, treat the overburden the same as a straight cut.

In cuts which are composed of rock and earth abutting each other let the excavation follow a smooth rounding course



ARIZONA HIGHWAY DEPARTMENT
PLANS DIVISION

PLANT CONSERVATION &
ROCK AND EARTH CUTS

DRAWN	W.M.D.	JAN., 1936
TRACED	K.S.	JUNE, 1938
CHECKED	H.H.W.	JULY, 1938
APPROVED		
ENGR. PLANS		

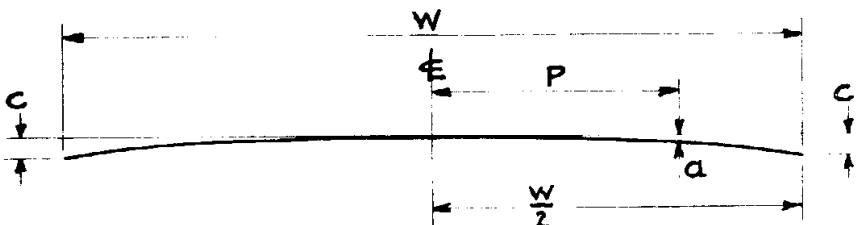
DRAWING NO.
C-41

REV.
12/1/58

CUMULATIVE PERCENT OF CROWN "C" FOR EACH FOOT RIGHT OR LEFT OF $\frac{1}{2}$

P →	1'	2'	3'	4'	5'	6'	7'	8'	9'	10'	11'	12'	13'	14'	15'	16'	17'	18'	19'	20'	21'	22'	23'	24'	25'	26'	27'	28'	29'	30'	31'	32'	33'	34'	35'	36'	37'	38'	39'	40'	41'	42'	43'	44'	45'
90	0.05	0.20	0.44	0.79	1.23	1.78	2.42	3.16	4.00	4.94	5.98	7.11	8.35	9.68	11.11	12.64	14.27	16.00	17.83	19.75	21.78	23.90	26.12	28.44	30.86	33.38	36.00	38.72	41.53	44.44	47.46	50.57	53.78	57.09	60.49	64.00	67.61	71.31	75.11	79.01	83.01	87.11	91.31	95.61	C
88	0.05	0.21	0.46	0.83	1.29	1.86	2.53	3.31	4.18	5.17	6.25	7.44	8.73	10.12	11.62	13.22	14.93	16.74	18.65	20.66	22.78	25.00	27.32	29.75	32.28	34.92	37.66	40.50	43.44	46.49	49.64	52.89	56.25	59.71	63.27	66.94	70.71	74.59	78.56	82.64	86.83	91.12	95.51	C	
86	0.05	0.22	0.49	0.87	1.35	1.95	2.65	3.46	4.38	5.41	6.54	7.79	9.14	10.60	12.17	13.85	15.63	17.52	19.52	21.63	23.85	26.18	28.61	31.15	33.80	36.56	39.43	42.40	45.48	48.67	51.97	55.38	58.90	62.52	66.25	70.09	74.02	78.10	82.26	86.53	90.91	95.40	C		
84	0.06	0.23	0.51	0.91	1.42	2.04	2.78	3.63	4.59	5.67	6.86	8.16	9.58	11.11	12.76	14.51	16.38	18.37	20.46	22.68	25.00	27.44	29.99	32.65	35.43	38.32	41.32	44.44	47.68	51.02	54.48	58.05	61.73	65.53	69.44	73.47	77.61	81.86	86.22	90.70	95.29	C			
82	0.06	0.24	0.54	0.95	1.49	2.14	2.91	3.81	4.82	5.95	7.20	8.57	10.05	11.66	13.38	15.23	17.19	19.27	21.48	23.80	26.23	28.79	31.47	34.27	37.18	40.21	43.37	46.64	50.03	53.54	57.17	60.92	64.78	68.77	72.87	77.10	81.42	85.90	90.48	95.18	C				
80	0.06	0.25	0.56	1.00	1.56	2.25	3.06	4.00	5.06	6.25	7.56	9.00	10.56	12.25	14.06	16.00	18.06	20.25	22.56	25.00	27.56	30.25	33.06	36.00	39.06	42.25	45.56	49.00	52.56	56.25	60.06	64.00	68.06	72.25	76.56	81.00	85.56	90.25	95.06	C					
78	0.07	0.26	0.59	1.05	1.64	2.37	3.22	4.20	5.33	6.57	7.96	9.47	11.11	12.89	14.79	16.83	19.00	21.30	23.73	26.30	28.99	31.82	34.78	37.87	41.09	44.44	47.93	51.54	55.29	59.17	63.18	67.32	71.60	76.00	80.54	85.21	90.01	94.94	C						
76	0.07	0.28	0.62	1.11	1.73	2.49	3.39	4.43	5.61	6.93	8.38	9.97	11.70	13.57	15.58	17.73	20.01	22.44	25.00	27.70	30.54	33.52	36.63	39.89	43.28	46.81	50.48	54.29	58.24	62.33	66.55	70.91	75.42	80.06	84.83	89.75	94.81	C							
74	0.07	0.29	0.66	1.17	1.83	2.63	3.58	4.67	5.92	7.30	8.83	10.52	12.34	14.32	16.44	18.70	21.11	23.67	26.37	29.22	32.21	35.35	38.64	42.07	45.65	49.38	53.25	57.27	61.43	65.74	70.20	74.80	79.55	84.44	89.48	94.67	C								
72	0.08	0.31	0.69	1.23	1.93	2.78	3.78	4.94	6.25	7.72	9.34	11.11	13.04	15.12	17.36	19.75	22.30	25.00	27.85	30.86	34.03	37.35	40.82	44.44	48.23	52.16	56.25	60.49	64.89	69.44	74.15	79.01	84.02	89.20	94.52	C									
70	0.08	0.33	0.73	1.31	2.04	2.94	4.00	5.22	6.61	8.16	9.88	11.76	13.80	16.00	18.37	20.90	23.59	26.45	29.47	32.65	36.00	39.51	43.18	47.02	51.02	55.18	59.51	64.00	68.65	73.47	78.45	83.59	88.90	94.37	C										
68	0.09	0.35	0.78	1.38	2.16	3.11	4.24	5.54	7.01	8.65	10.47	12.46	14.62	16.95	19.46	22.15	25.00	28.03	31.23	34.60	38.15	41.87	45.76	49.83	54.07	58.48	63.06	67.82	72.75	77.85	83.13	88.58	94.20	C											
66	0.09	0.37	0.83	1.47	2.29	3.30	4.50	5.87	7.43	9.18	11.10	13.21	15.51	17.99	20.65	23.49	26.52	29.73	33.13	36.71	40.47	44.41	48.54	52.86	57.35	62.03	66.90	71.94	77.17	82.59	88.18	93.97	C												
64	0.10	0.39	0.88	1.56	2.44	3.52	4.79	6.25	7.91	9.77	11.82	14.06	16.50	19.14	21.97	25.00	28.22	31.64	35.25	39.06	43.07	47.27	51.66	56.25	61.04	66.02	71.19	76.56	82.13	87.89	93.85	C													
62	0.10	0.42	0.94	1.66	2.60	3.75	5.10	6.66	8.43	10.41	12.59	14.98	17.59	20.40	23.41	26.64	30.07	33.71	37.56	41.62	45.89	50.36	55.05	59.94	65.04	70.34	75.86	81.58	87.51	93.65	C														
60	0.11	0.44	1.00	1.78	2.78	4.00	5.44	7.11	9.00	11.11	13.44	16.00	18.78	21.78	25.00	28.44	32.11	36.00	40.11	44.44	49.00	53.78	58.78	64.00	69.44	75.11	81.00	87.11	93.44	C															
58	0.12	0.48	1.07	1.90	2.97	4.28	5.83	7.61	9.63	11.89	14.39	17.12	20.10	23.31	26.75	30.44	34.36	38.52	42.93	47.56	52.44	57.55	62.90	68.49	74.32	80.38	86.68	93.22	C																
56	0.13	0.51	1.15	2.04	3.19	4.59	6.25	8.16	10.33	12.76	15.43	18.37	21.56	25.00	28.70	32.65	36.86	41.33	46.05	51.02	56.25	61.73	67.47	73.47	79.72	86.22	92.98	C																	
54	0.14	0.55	1.23	2.19	3.43	4.94	6.72	8.78	11.11	13.72	16.60	19.75	23.18	26.89	30.86	35.12	39.64	44.44	49.52	54.87	60.49	66.39	72.57	79.01	85.73	92.73	C																		
52	0.15	0.59	1.33	2.37	3.70	5.33	7.25	9.47	11.98	14.79	17.90	21.30	25.00	28.99	33.28	37.87	42.75	47.93	53.40	59.17	65.24	71.60	78.25	85.21	92.46	C																			
50	0.16	0.64	1.44	2.56	4.00	5.76	7.84	10.24	12.96	16.00	19.36	23.04	27.04	31.36	36.00	40.96	46.24	51.84	57.76	64.00	70.56	77.44	84.64	92.16	C																				
48	0.17	0.69	1.56	2.78	4.34	6.25	8.51	11.11	14.06	17.36	21.01	25.00	29.34	34.03	39.06	44.44	50.17	56.25	62.67	69.44	76.56	84.03	91.84	C																					
46	0.19	0.76	1.70	3.02	4.73	6.81	9.26	12.10	15.31	18.90	22.87	27.22	31.95	37.05	42.53	48.39	54.63	61.25	68.24	75.61	83.36	91.49	C																						
44	0.21	0.83	1.86	3.31	5.17	7.44	10.12	13.22	16.74	20.66	25.00	29.75	34.92	40.50	46.49	52.89	59.71	66.94	74.59	82.64	91.12	C																							
42	0.23	0.91	2.04	3.63	5.67	8.16	11.11	14.51	18.37	22.68	27.44	32.65	38.32	44.44	51.02	58.05	65.53	73.47	81.86	90.70	C																								
40	0.25	1.00	2.25	4.00	6.25	9.00	12.25	16.00	20.25	25.00	30.25	36.00	42.25	49.00	56.25	64.00	72.25	81.00	90.25	C																									
38	0.28	1.11	2.49	4.43	6.93	9.97	13.57	17.73	22.44	27.70	33.52	39.89	46.81	54.29	62.33	70.91	80.06	89.75	C																										
36	0.31	1.23	2.78	4.94	7.72	11.11	15.12	19.75	25.00	30.86	37.35	44.44	52.16	60.49	69.44	79.01	89.20	C																											
34	0.35	1.38	3.11	5.50	8.65	12.46	16.96	22.15	28.03	34.60	41.87	49.83	58.48	67.82	77.85	88.58	C																												
32	0.39	1.56	3.52	6.25	9.77	14.06	19.14	25.00	31.64	39.06	47.27	56.25	66.02	76.56	87.89	C																													
30	0.44	1.78	4.00	7.11	11.11	16.00	21.78	28.44	36.00	44.44	53.78	64.00	75.11	87.11	C																														
28	0.51	2.04	4.59	8.16	12.76	18.37	25.00	32.65	41.33	51.02	61.73	73.47	86.22	C																															
26	0.59	2.37	5.33	9.47	14.79	21.30	28.99	37.87	47.93	59.17	71.60	85.21	C																																
24	0.69	2.78																																											

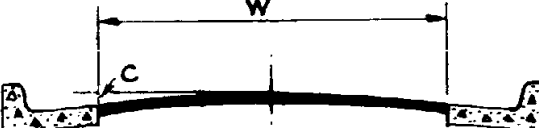
FORMULA



$$\frac{a}{C} = \frac{P^2}{\left(\frac{W}{2}\right)^2} \text{ OR } a = \frac{CP^2}{\left(\frac{W}{2}\right)^2}$$

USE OF TABLE

EXAMPLE :
ASSUME W = 40 FT. AND C = 0.45 FT.
FIND a IF P = 8 FT.
TABLE SHOWS a = 16.00% OF C , OR 0.45 x 0.16 = 0.072 FT.



INTERPRETATION OF "W" AND "C"
WHERE CURBS AND GUTTERS ARE USED

ARIZONA STATE HIGHWAY DEPARTMENT PLANS DIVISION		REV.
PARABOLIC CROWN FORMULA AND TABLE		
CALCULATED AND DRAWN JUNE 1941 BY LESLIE McDUGALL - HIGHWAY DESIGNER		
CHECKED BY		
APPROVED BY ENGINEER OF PLANS		STANDARD DRWG. NO. C-39

U
S

I
F

P-2 Lt.

74(3)

14F

Letter or number designates section of project.
P-2 Rt.

7'-6" Steel sign post as per Std C-8-2
Std. B.M. Plate See detail

Class A Conc. 0.06 C.Y. ±

10" Dia.

PROJECT MARKER

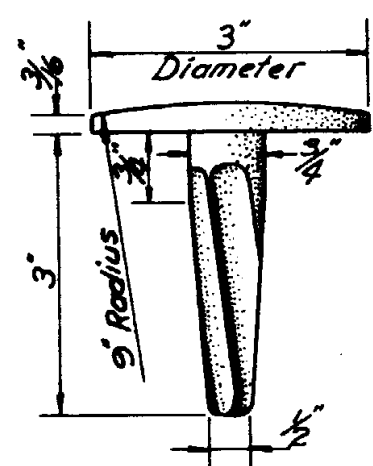
Project Marker to be furnished by the State and installed and marked by the Engineer at each end of all Federal Aid Projects.
Project Markers shall be placed on R/W line.

Bench Mark to be established by the Engineer on culvert headwalls, bridge curbs, abutment walls, R/W markers, F.A. project markers or other permanent structures.
Location and data shall be noted on "As Built" plans.

1-40-6(15)

ARIZONA HIGHWAY DEPT.
ELEV.
⊕
STA.
19

PLAN BENCH MARKER



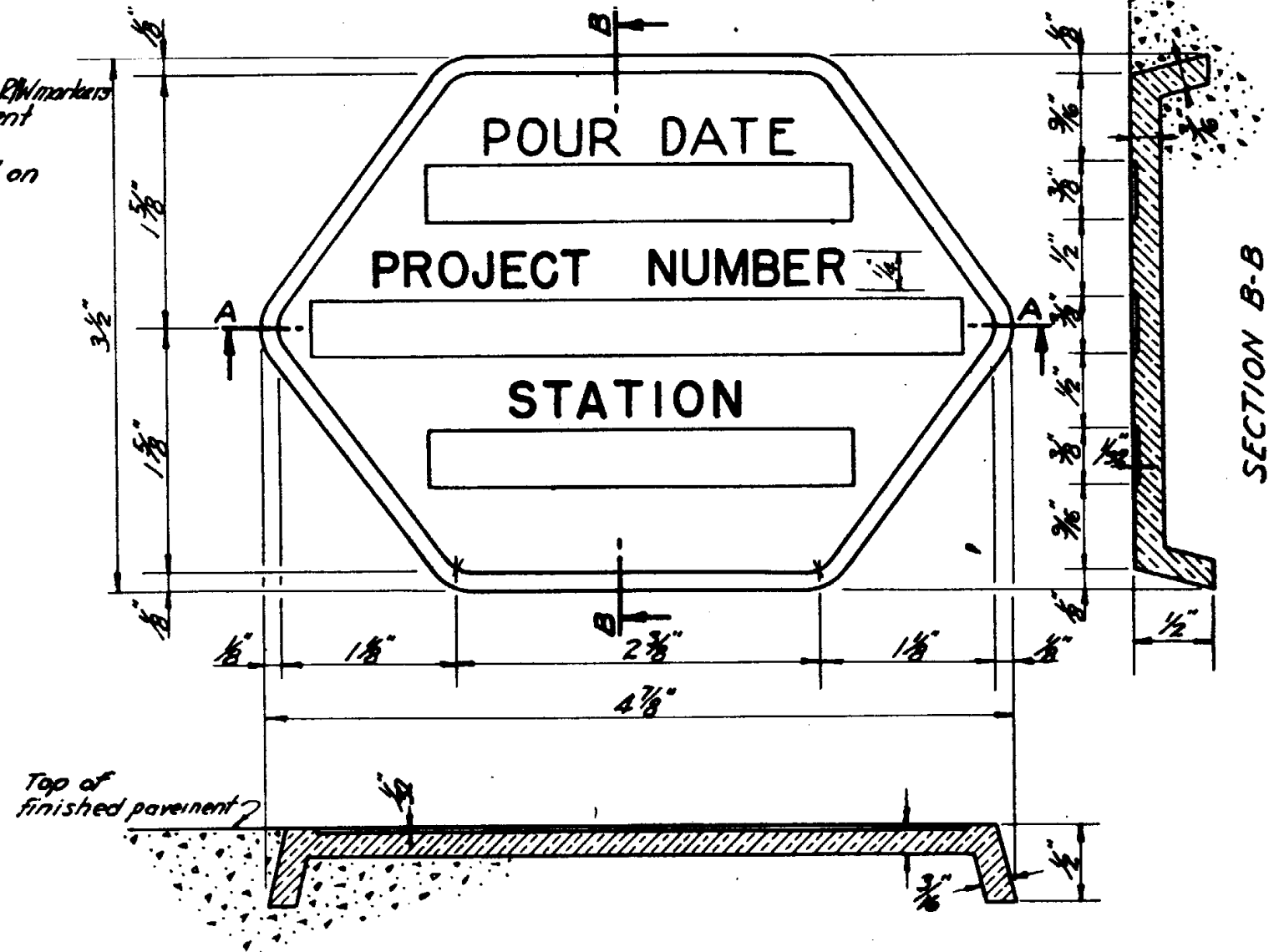
ELEVATION

STD. BENCH MARKER OR SURVEY MONUMENT MARKER
Markers will be furnished by the State and installed by the Contractor.

ARIZONA HIGHWAY DEPT.
19

PLAN SURVEY MONUMENT MARKER

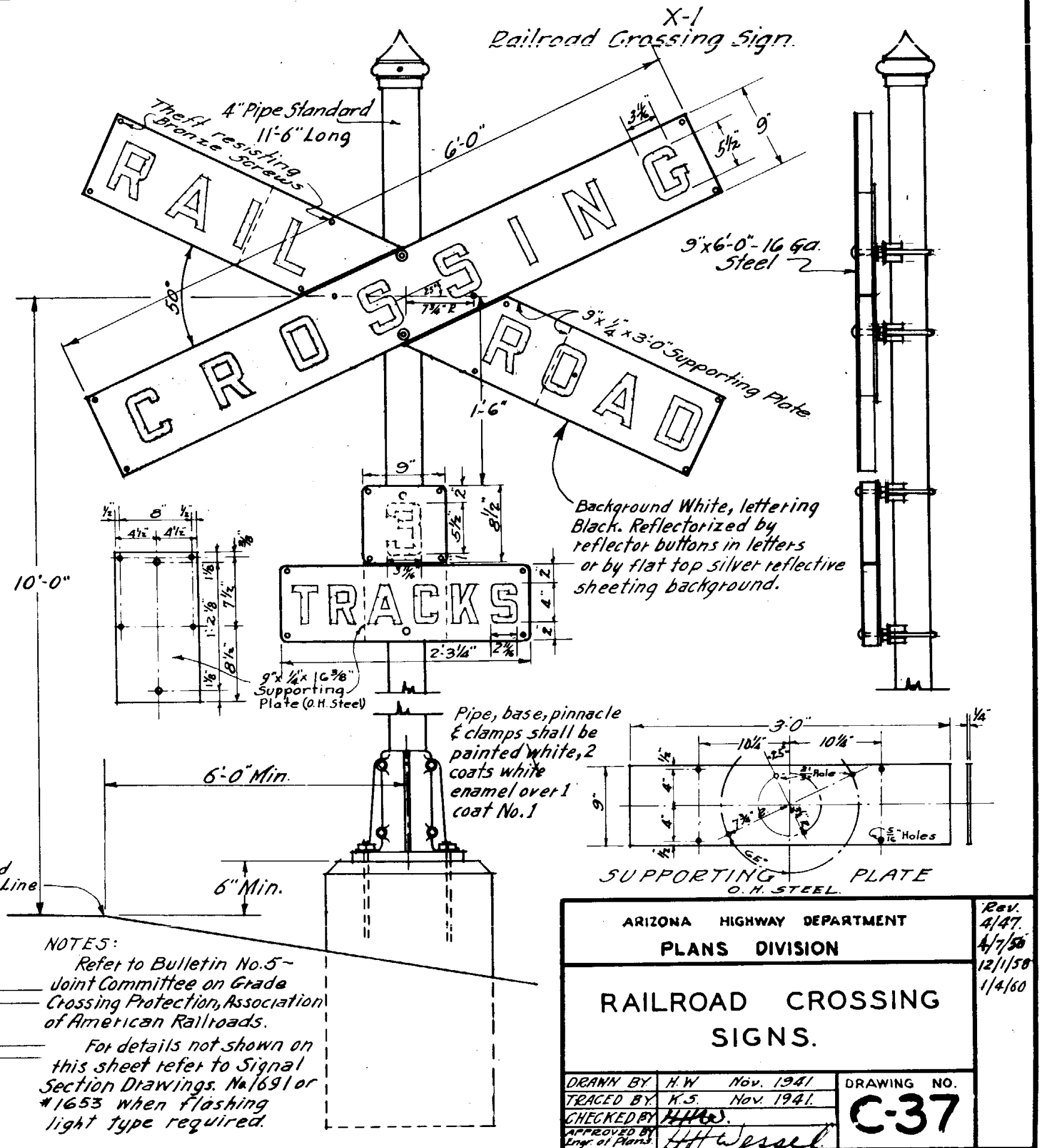
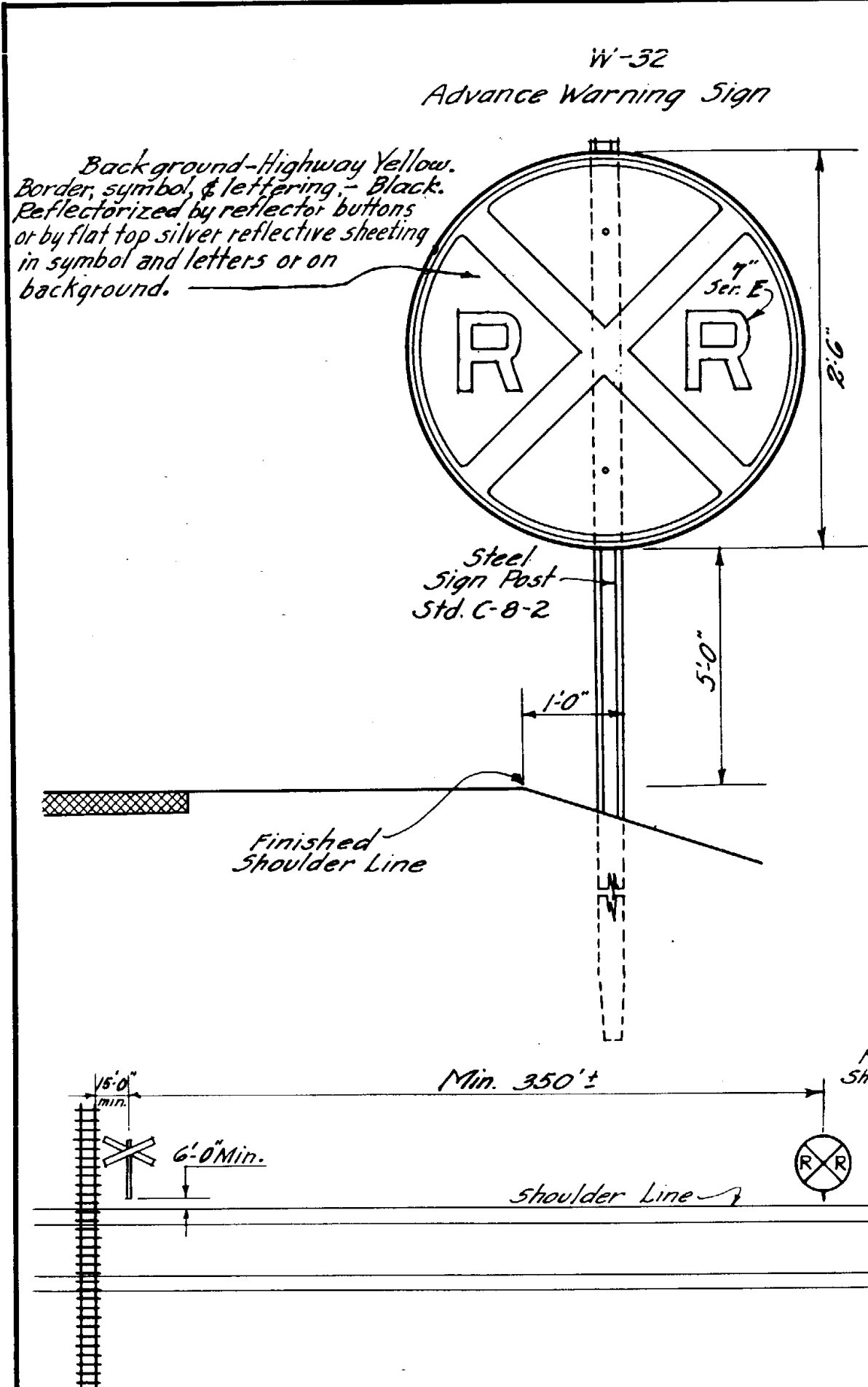
Reference transit point shall be punched in cap by the Engineer.

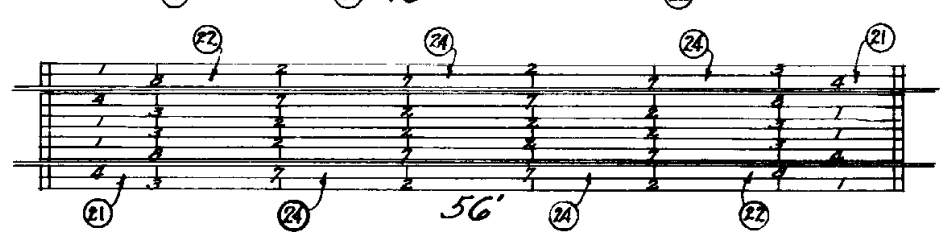
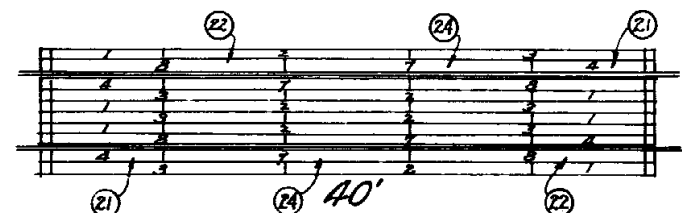
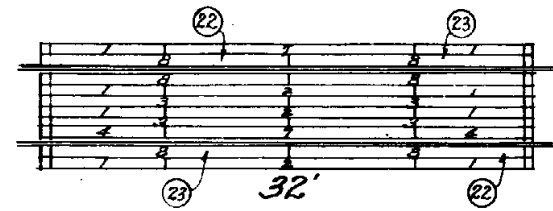
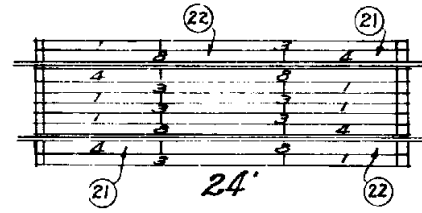
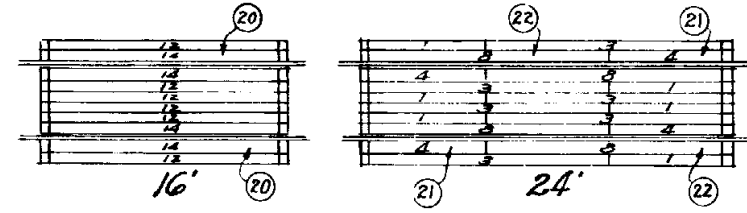
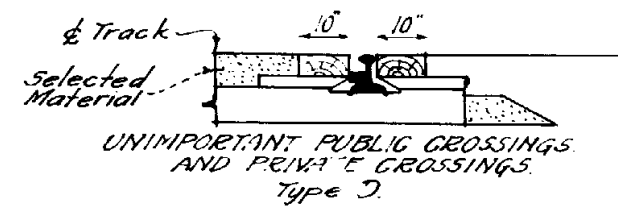
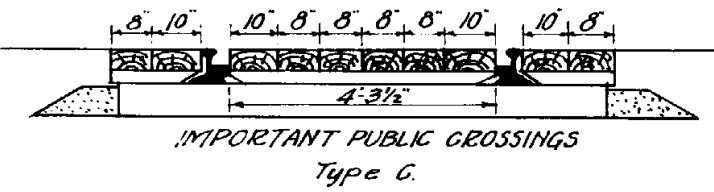
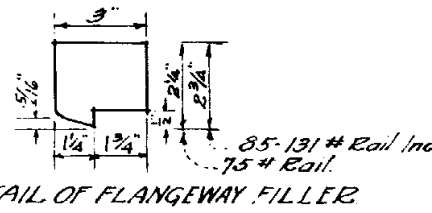
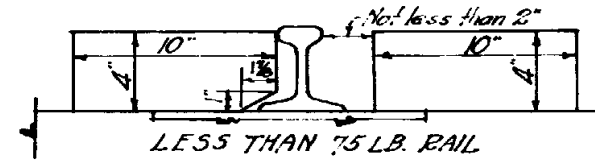
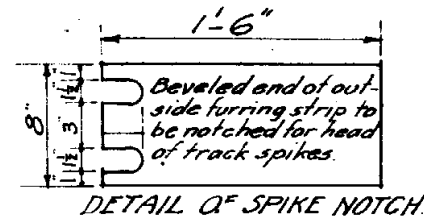
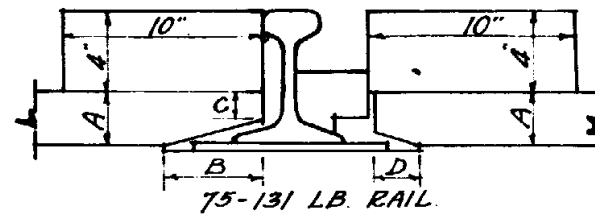


SECTION A-A CONSTRUCTION MARKER
For concrete pavement.
Scale - Full Size

Marker to be made of brass or bronze, and is to be furnished by the State and placed at beginning and end of each days pour, after marking by the Engineer

ARIZONA HIGHWAY DEPARTMENT		REV. 3-20-50 12/1/58 1/4/60
PLANS DIVISION		
PROJECT MARKER BENCH MARKER CONSTRUCTION MARKER		
DRAWN		
TRACED	GM Nov 1-65	DRAWING NO. C-38
CHECKED	HTW	
APPROVED		
PLANS ENGR	HTW Weasel	





Type G

IMPORTANT PUBLIC CROSSINGS
FURRING STRIP DIMENSIONS AND FT. B.M. PER CROSSING

	A	B	C	D	16'	24'	32'	40'	48'	56'
75 lb. Rail	3/8"	3"	1/8"	1"	63	91	119	148	176	204
85 " "	1"	4"	1/8"	1"	78	114	149	185	220	255
90 " "	1 1/2"	4"	3/8"	1"	125	182	238	295	352	408
110 " "	2 1/4"	5"	1"	2"	156	227	298	369	440	510
112 & 130 lb Rail	2 3/8"	5"	1 3/8"	2"	187	272	357	442	527	612
131 lb Rail	3 1/8"	5"	1 3/8"	2"	219	313	407	501	595	689

For lengths and number required see "BILL OF MATERIAL"

Type D

UNIMPORTANT PUBLIC CROSSINGS
AND PRIVATE CROSSINGS
FURRING STRIP DIMENSIONS & FT. B.M. PER CROSSING

	A	B	C	D	8'	16'	24'
75 lb. Rail	3/8"	3"	1/8"	1"	26	47	68
85 " "	1"	4"	1/8"	1"	32	59	85
90 " "	1 1/2"	4"	3/8"	1"	51	94	136
110 " "	2 1/4"	5"	1"	2"	64	117	170
112 & 130 lb Rail	2 3/8"	5"	1 3/8"	2"	77	141	204
131 lb Rail	3 1/8"	5"	1 3/8"	2"	90	164	238

For lengths and number required see "BILL OF MATERIAL"

BILL OF MATERIAL												TYPE D									
Plank No.	Description.	TYPE C IMPORTANT PUBLIC CROSSINGS												UNIMPORTANT PUBLIC AND PRIVATE CROSSINGS							
		75-131 lb Rail						Less than 75 lb Rail													
		16'	24'	32'	40'	48'	56'	16'	24'	32'	40'	48'	56'								
1	4"x8"x8'-0" one end beveled	6	8	6	8	6		6	8	6	8	6									
2	4"x8"x16'-0"		4	6	10	12			4	6	10	12									
3	4"x8"x16'-0" one end beveled	6	4	6	4	6		6	4	6	4	6									
4	4"x10"x8'-0" " " "	4	2	4	2	4		2	2	2	2	2									
7	4"x10"x16'-0"		1	4	5	8			1	2	3	4									
8	4"x10"x16'-0" one end beveled	4	6	4	6	4		2	2	2	2	2									
12	4"x8"x16'-0" both ends beveled	6						6													
14	4"x10"x16'-0" " " "	4						2													
20	4"x10"x16'-0" " " " base cut							2													
21	4"x10"x8'-0" one end beveled " "								2		2		2								
22	4"x10"x16'-0" " " " " "								2	2	2	2	2								
23	4"x10"x16'-0" " " " " "									2		2									
24	4"x10"x16'-0" base cut										2	2	4								
25	4"x10"x8'-0" both ends beveled																				
26	4"x10"x8'-0" both ends beveled base cut																				
Flangeway Fillers - 16'-0" long.		2	3	4	5	6	7														
Ft. B.M. Planks and Flangeway Filler		601	901	1202	1502	1802	2103	558	837	1116	1395	1674	1955								
Furring Strips 4'-3 1/2" long		11	16	21	26	31	36														
" " 1'-6" long		22	32	42	52	62	72														
20 d Common Nails (31 per lb) No. of lbs.		3	4 1/2	5 1/2	7	8	9 1/2														
* 1/2 x 12" Lag Screws (68 lb ea) (90 lb rail) "		88 1/2	143	187	231 1/2	275 1/2	320														
* 3/8 x 12" Boat Spikes (53 lb ea) (and over) "		69	111 1/2	146	180 1/2	215	249 1/2														
* 1/2 x 10" lag screws (54 lb ea) (less than) "		70 1/2	113 1/2	148 1/2	183 1/2	219	254	70 1/2	113 1/2	148 1/2	183 1/2	219	254								
* 3/8 x 10" boat spikes (44 lb ea) (90 lb rail) "		57 1/2	92 1/2	121	150	178 1/2	207	57 1/2	92 1/2	121	150	178 1/2	207								
1/2" Cut Washers (27 per lb) "		5	8	10 1/2	13	15	17 1/2	5	8	10 1/2	13	15	17 1/2								

NOTES

Optional with Engineer - planks may be fastened with lag screws or boat spikes, with or without washers under heads of either. All planks shall be double fastened at ends and single fastened, staggered, at intermediate ties. Furring strips to be fastened with 20d nails.

All necessary milling shall be done at treating plant before treatment. Dimensions shown are after seasoning and treatment.

Number of plank to be stripped on each plank as indicated, at treating plant. Encircled numbers on plan sketches denote base cut planks for rails less than 75 lb.

It is desirable to have the track in good condition before crossings are installed. Use of sawed ties is preferable.

Holes for lag screws and boat spikes (boring for boat spikes optional with Engineer) to be bored in the field. 1/2" diameter for lag screws and 3/8" diameter for boat spikes. Depth of boring for lag screws shall be 8" for 12" lag screws and 6" for 10" lag screws. For boat spikes, holes shall be bored through plank and furring strip only.

Driving nails to be placed in each plank about one foot from south or west end.

Ends of planks must not project past the ties, eliminating the possibility of catching dragging equipment; if necessary, ties must be spaced accordingly.

Planks in crossings having sharp angles of intersection with the track may be stepped to permit economical use, in which case furring should be cut even with edge of plank and remainder used on other end of crossing.

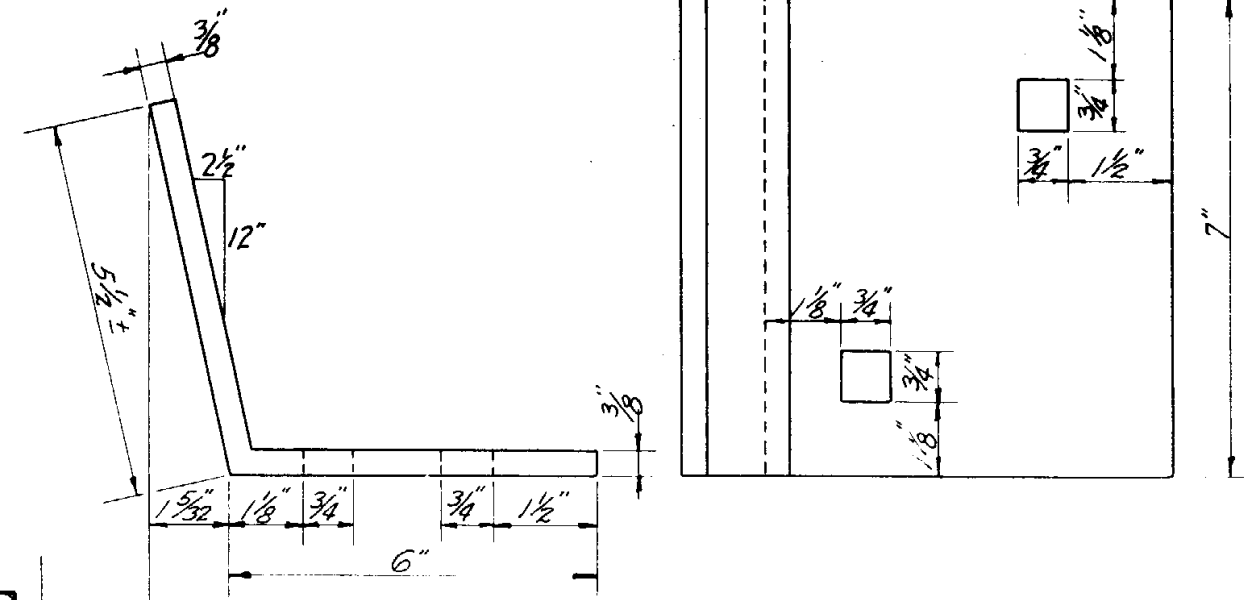
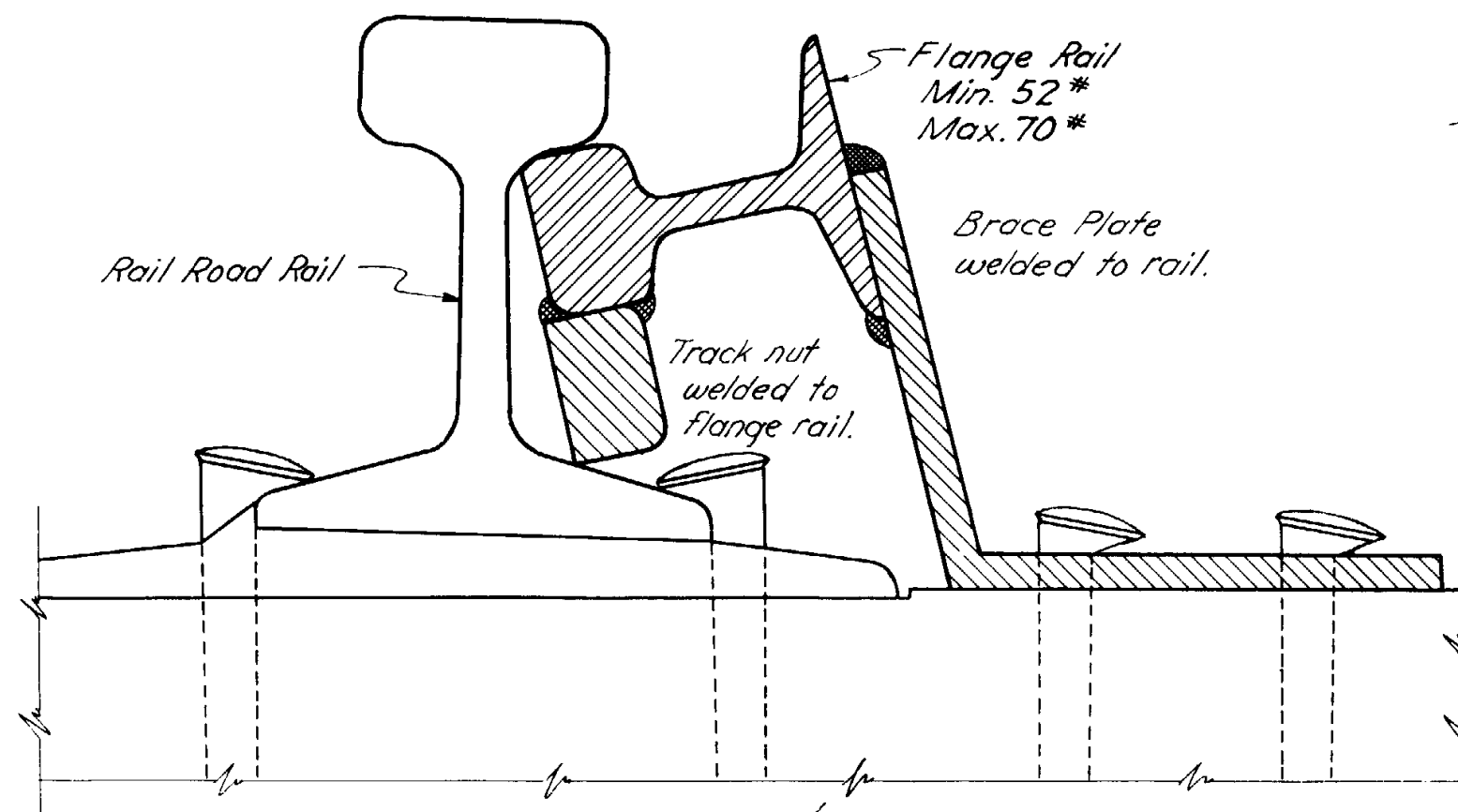
When ordering planked crossings in which standard layout cannot be used a layout sketch fully dimensioned, shall accompany the order so that all planks may be properly milled at treating plant. Sketch shall show the change from switch tie to cross ties so that the proper thickness furring strips may be furnished.

Cutside planks for private crossings may be omitted, in which case also omit one-half of furring strips and hardware shown in tables.

For crossings on Southern Pacific Company use S. P. Standard C.S. 576

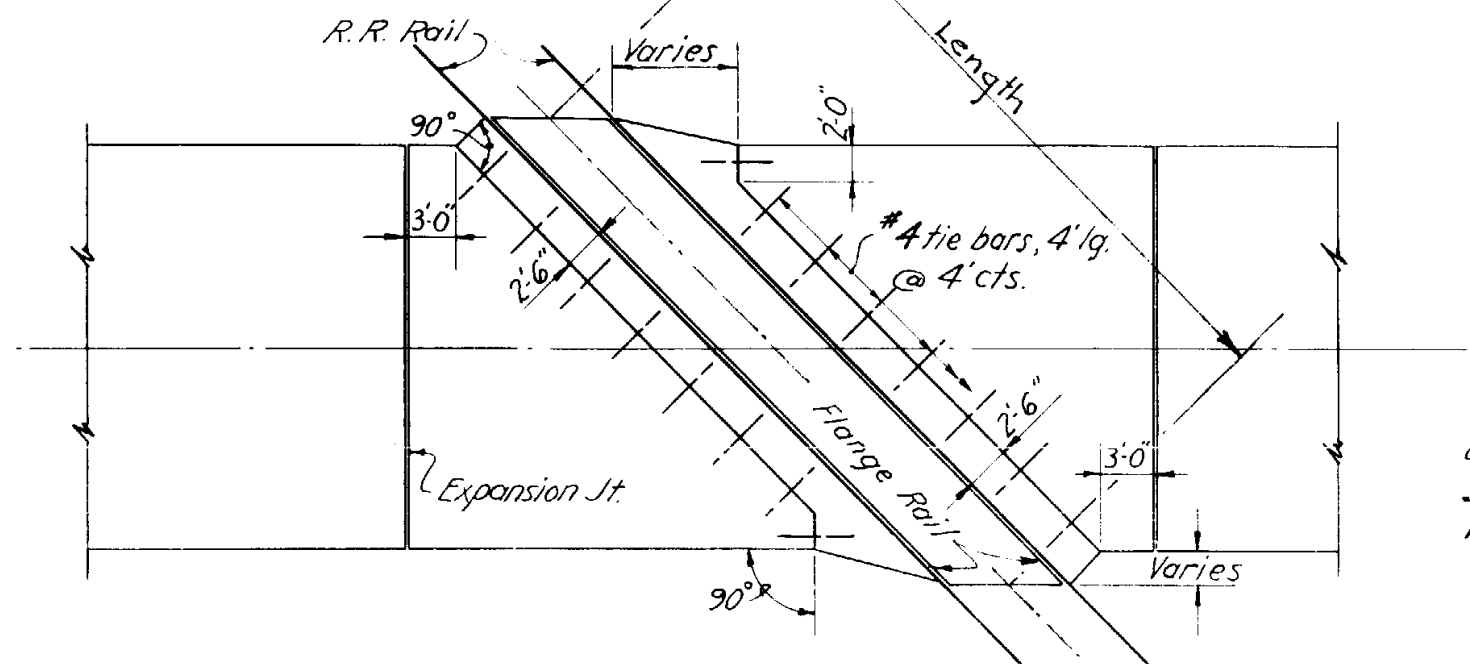
For crossings on Santa Fe Railway use S. F. Standard C.E.S. 50136-744

ARIZONA HIGHWAY DEPARTMENT		REV. 12/1/58
PLANS DIVISION		
STANDARD RAILROAD	PLANKED CROSSINGS	
DRAWN BY: W.M.D. JAN. 1936	CHECKED BY: H.H.W. JULY 1938	DRAWING NO. C-36
APPROVED BY: H.H.W. JULY 1938		



BRACE PLATE FOR FLANGE RAIL

R.R. CROSSING ASSEMBLY DETAILS



SKewed R.R. CROSSING FOR CONCRETE PAVEMENT

Notes ~

Standard R.R. Crossing consists of two flange rails and necessary number of brace plates and brace nuts. Welded nut and brace plate to be placed every third tie. Construction and assembly details as shown.

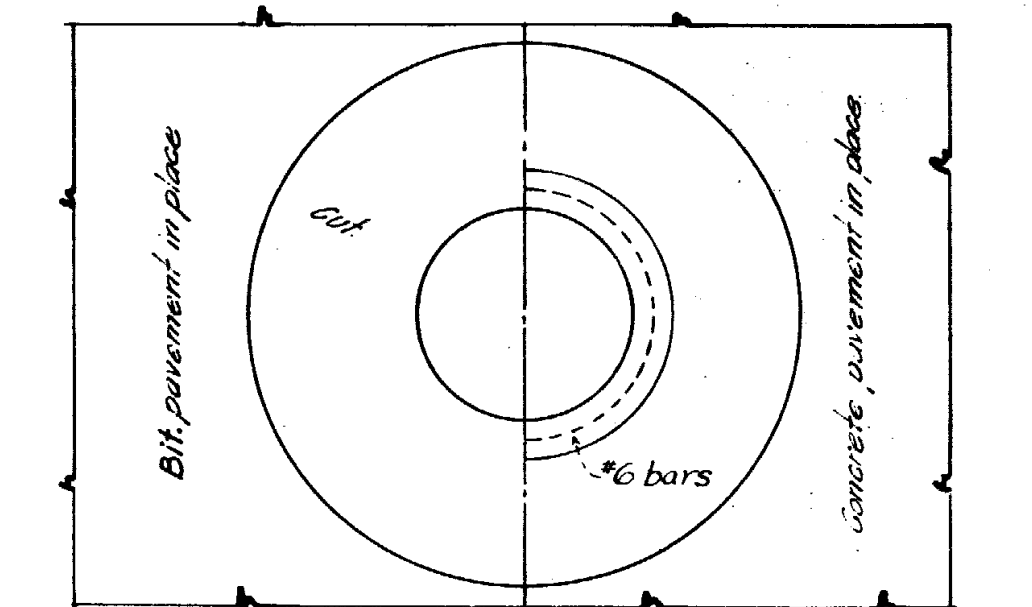
Length of R.R. Crossing is noted on plans in lineal feet.

For crossings on Southern Pacific Company use S. P. Standard CS576

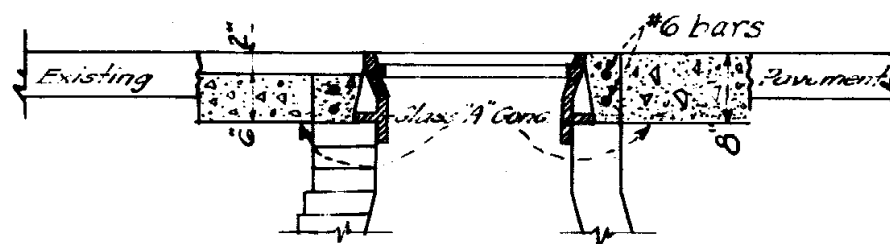
For crossings on Santa Fe Railway use S.F. Standard C.E.S. 50136-744

Finished Roadway Surface of crossing (between rails) shall be same as adjacent roadway, unless noted otherwise on plans.

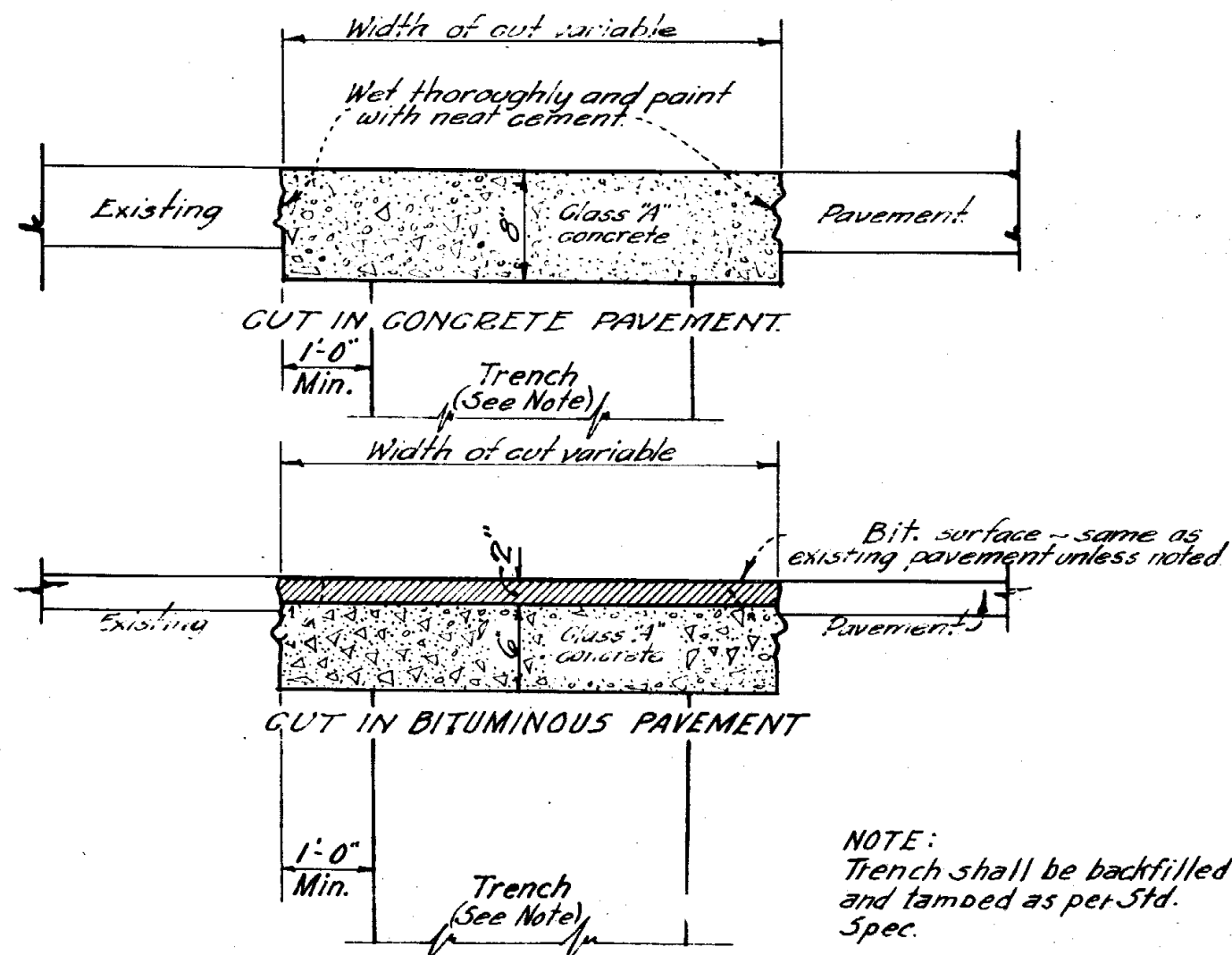
ARIZONA HIGHWAY DEPARTMENT		REV. 12, 1949
PLANS DIVISION		
RAILROAD CROSSING		
DRAWN		DRAWING NO C-35
TRACED	GH Nov. 1945	
CHECKED	H.H.W.	
APPROVED		
PLANS ENGR		



HALF PLAN BITUMINOUS PAVEMENT HALF PLAN CONCRETE PAVEMENT

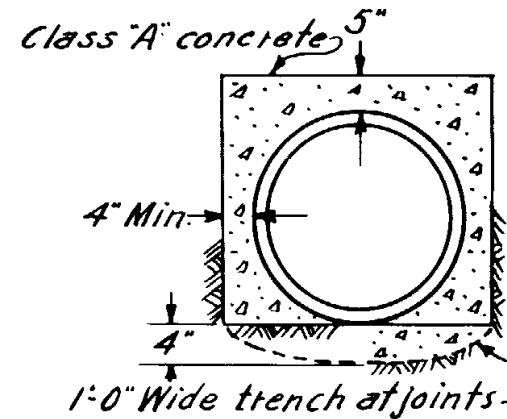
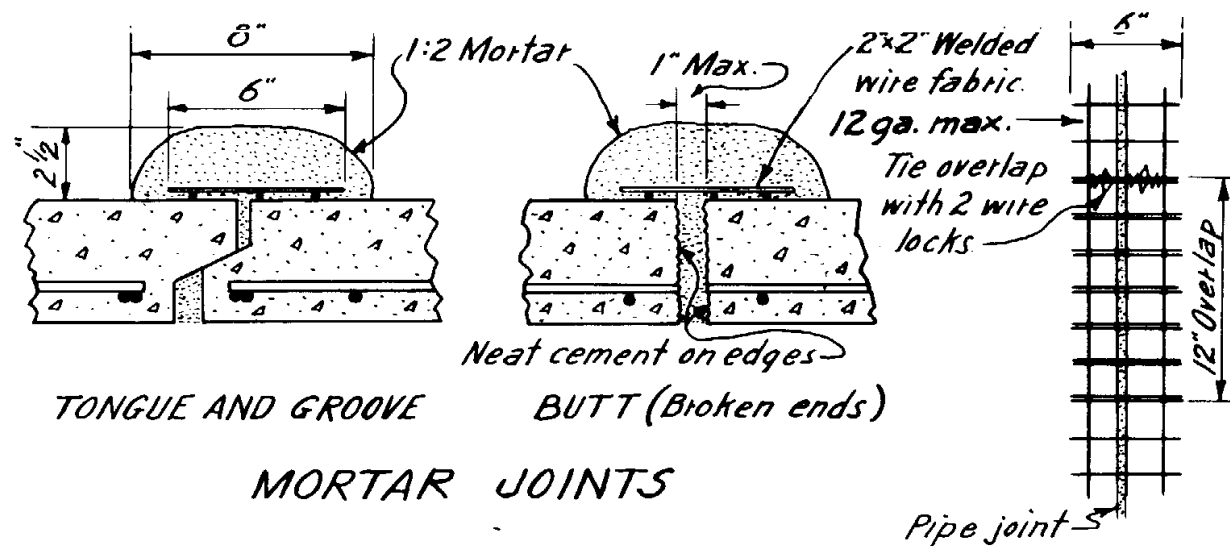


CUT FOR MANHOLE - FRAME & COVER



NOTE:
Trench shall be backfilled and tamped as per Std. Spec.

ARIZONA HIGHWAY DEPARTMENT		REV.
PLANS DIVISION		3-20-50
PAVEMENT CUT AND REPLACEMENT		4/10/55
DRAWN BY O.A. OCT. 1935		12/1/58
TRACED BY K.S. JULY 1938		
CHECKED BY H.H.W. JULY 1938		
APPROVED BY		
DRAWING NO. C-34		



STRENGTH PIPE AND BEDDING NEEDED											
H Feet above pipe	1'-6" to 10'	10' to 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'
TYPE 1	C-III	C-IV	C-V								
TYPE 2				C-III	C-IV	B-IV	B-IV	B-V	B-V	B-V	B-V
TYPE 3	C-II	C-III	B-III	C-IV	B-IV	B-IV	B-IV	B-IV			

GENERAL NOTES

Mortar joints shall be used unless rubber gasket joints are specified.

Rubber gasketed joints shall conform to standard specifications.

Pipe spacing in multiple installations shall be $\frac{1}{2}$ nominal diameter but not less than 3'. Where headwalls are used, spacing shall be as shown on headwall standards.

Backfill material and backfilling shall conform to the standard specifications.

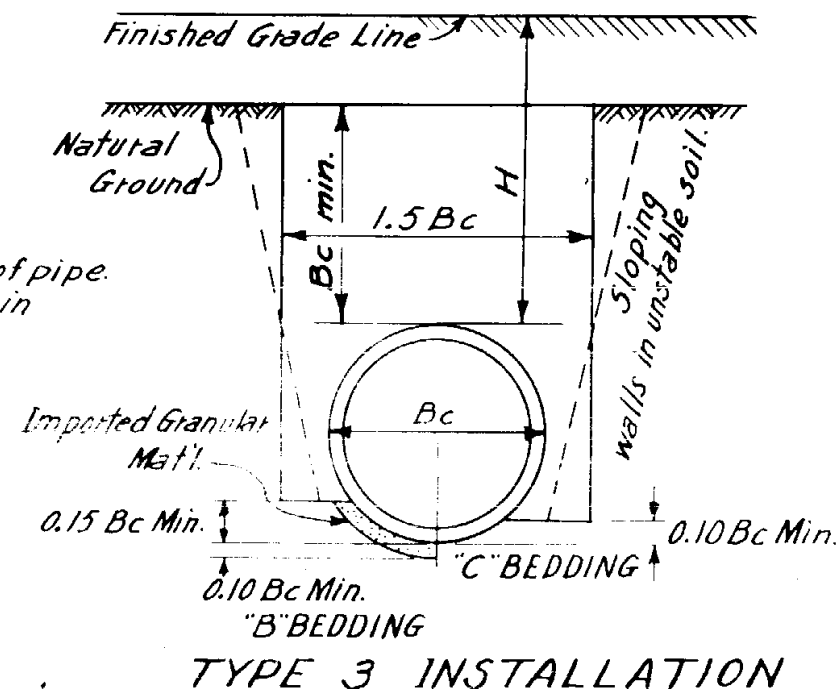
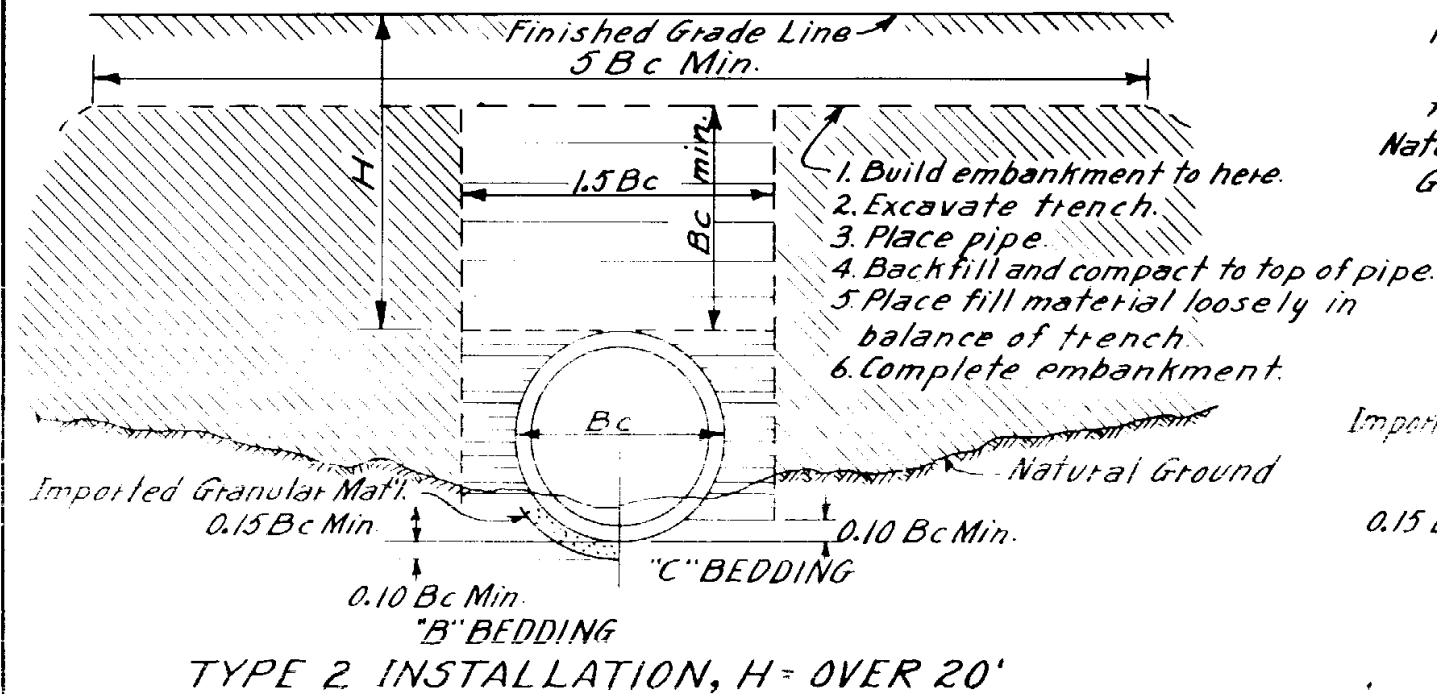
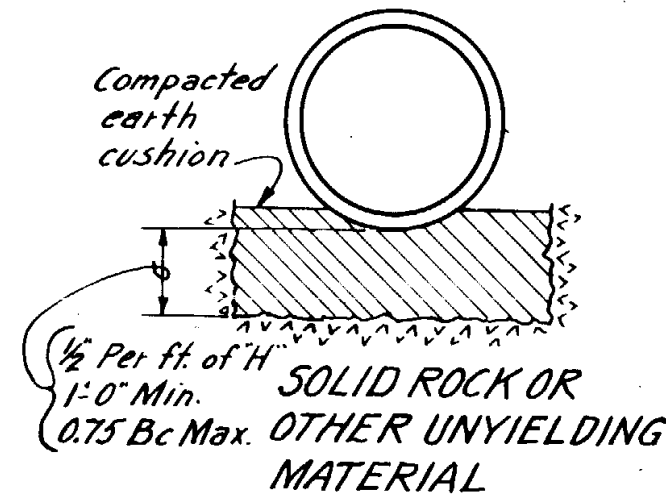
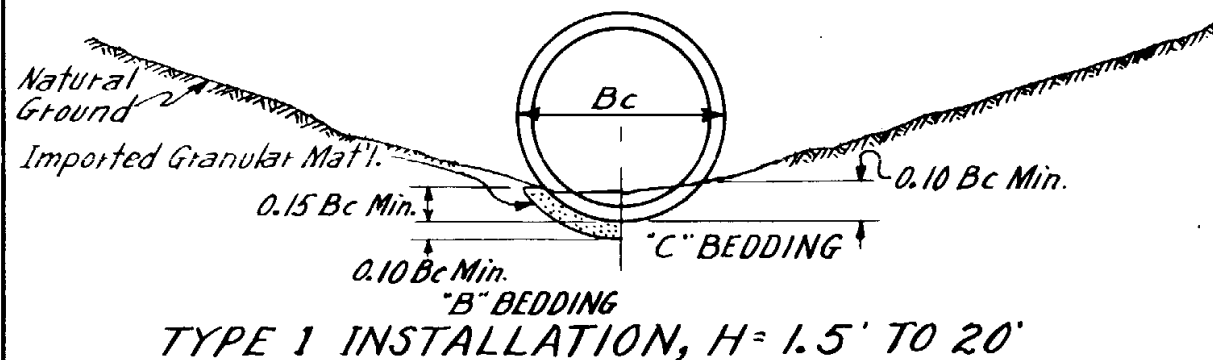
There shall be minimum cover of 1'-6" at all points within the roadway. Reference Standard C-13

Pipe specification reference A.A.S.H.O. M170

"B" or "C" = Class of bedding.

II, III, IV and V = Class of R.C. pipe.

1, 2 and 3 = Type of installation.



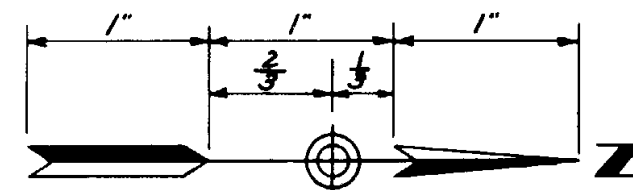
THIS DETAIL SUPERSEDES DRAWING C-33

ARIZONA HIGHWAY DEPARTMENT		REV.
PLANS DIVISION		1/4/60
REINFORCED CONCRETE PIPE AND INSTALLATION		
DRAWN	R.E. Willow - March 58	DRAWING NO.
TRACED	L.P. Moe - June 58	C-33-1
CHECKED	12-1-58	
APPROVED	Heidecker	
ENGR. PLANS		

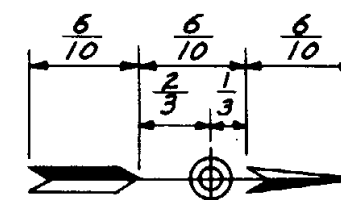
STATE OR NATIONAL LINE	----
COUNTY LINE	----
TOWNSHIP OR RANGE LINE	----
SECTION LINE	----
QUARTER SECTION LINE	----
FOREST OR RESERVATION LINE	////// SHADING ON INSIDE OF LINE
HIGHWAY R/W LINE	----
CONTROL OF ACCESS LINE	BLU-ZIP NO. BP33 SHADING ON OUTSIDE OF LINE
UNFENCED PROPERTY	----
SECTION AND QUARTER CORNERS	○
TELEPHONE OR TELEGRAPH LINE	●
POWER LINE	■
DOWN GUY AND ANCHOR	⊙
TRAFFIC SIGN	⊠
ROAD GUARD	●
GUIDE POST	●
STANDARD BARBED WIRE FENCE	—X—X—X—X—X—X—X—X—X—X—
WOOD FENCE	—□—□—□—□—□—□—□—□—□—□—
FABRIC WIRE FENCE	—○—○—○—○—○—○—○—○—○—○—
CATTLE GUARD	—■—■—■—■—■—■—■—■—■—■—
PIPE CULVERTS	NEW EXISTING
REINFORCED CONCRETE CULVERTS	NEW EXISTING
GROUND LINE—EARTH	~~~~~
GROUND LINE—ROCK	~~~~~
EXISTING ROAD	WIDTH & TYPE
OBLITERATE PAVEMENT	BLU-ZIP NO. BP12
SIDE ROAD TURNOUT	NEW EXISTING
TREES AND SHRUBS	☼ ☼ ☼ ☼ ☼
CHANNEL OR DITCH	—→—→—→—→—→—→—→—→—→—
DYKE OR LEVEE	=====
BANK PROTECTION	XXXXXX
RETAINING WALL	=====

DROP INLET	—X—X—X—X—X—X—X—X—X—X—
RAILROAD CROSSING SIGNS	⊗
RAILROAD TRACK	—X—X—X—X—X—X—X—X—X—X—
COMBINED CURB & GUTTER	NEW EXISTING
MANHOLE	NEW EXIST. TO BE ADJUSTED
FIRE HYDRANT	NEW EXIST.
VALVE (WATER OR GAS)	W G
METER BOX	⊠
STREET LIGHT	⊗ ON EXT. ARM
WATER LINE	W
GAS LINE	G
IRRIGATION LINE	IRR
STORM SEWER	SS
SANITARY SEWER	S
WELL OR PUMP HOUSE	⊠
SURVEY MONUMENT	NEW EXIST.
R/W MARKER	NEW EXIST.
MILE POST	NEW EXIST.
ANGLE POINT AND ANGLE	△
NEW CONCRETE PAVEMENT	BLU-ZIP NO. BP34
NEW BIT. MIX. PAVEMENT	BLU-ZIP NO. BP94
EXISTING PAVEMENT	BLU-ZIP NO. BP3
BIT. PAVEMENT (SECTION)	—
P.C. CONCRETE (SECTION)	—
AGGREGATE BASE-COARSE	—
AGGREGATE BASE-FINE	—
SELECT MATERIAL	—

FED. ROAD DIV. NO.	STATE	PROJ. NO.	SHEET NO.	TOTAL SHEETS	AS BUILT
7	ARIZ.				
7 1/2 / 10	5 / 10	1 5 / 10	5 / 10	5 / 10	1



USE ON LARGE SCALE DRAWINGS



USE ON SMALL SCALE DRAWINGS

ARIZONA HIGHWAY DEPARTMENT PLANS DIVISION			REV. 1-4-60
PLANS SYMBOLS			
DRAWN	L.O. Moe, 10-1-58	DRAWING NO.	C-43
TRACED	L.O. Moe, 10-15-58		
CHECKED	12-1-58		
APPROVED ENGR. PLANS	H. L. Leidenberger		