

STATE OF ARIZONA
STATE HIGHWAY DEPARTMENT

PLANS DIVISION
1947

ROADWAY STANDARDS
FOR USE IN
FIELD AND OFFICE

"C" & "D"

ISSUED TO



G.H.

HIGHWAY PLANS SERVICES

7-28-50 P.M.

5-11-50

672

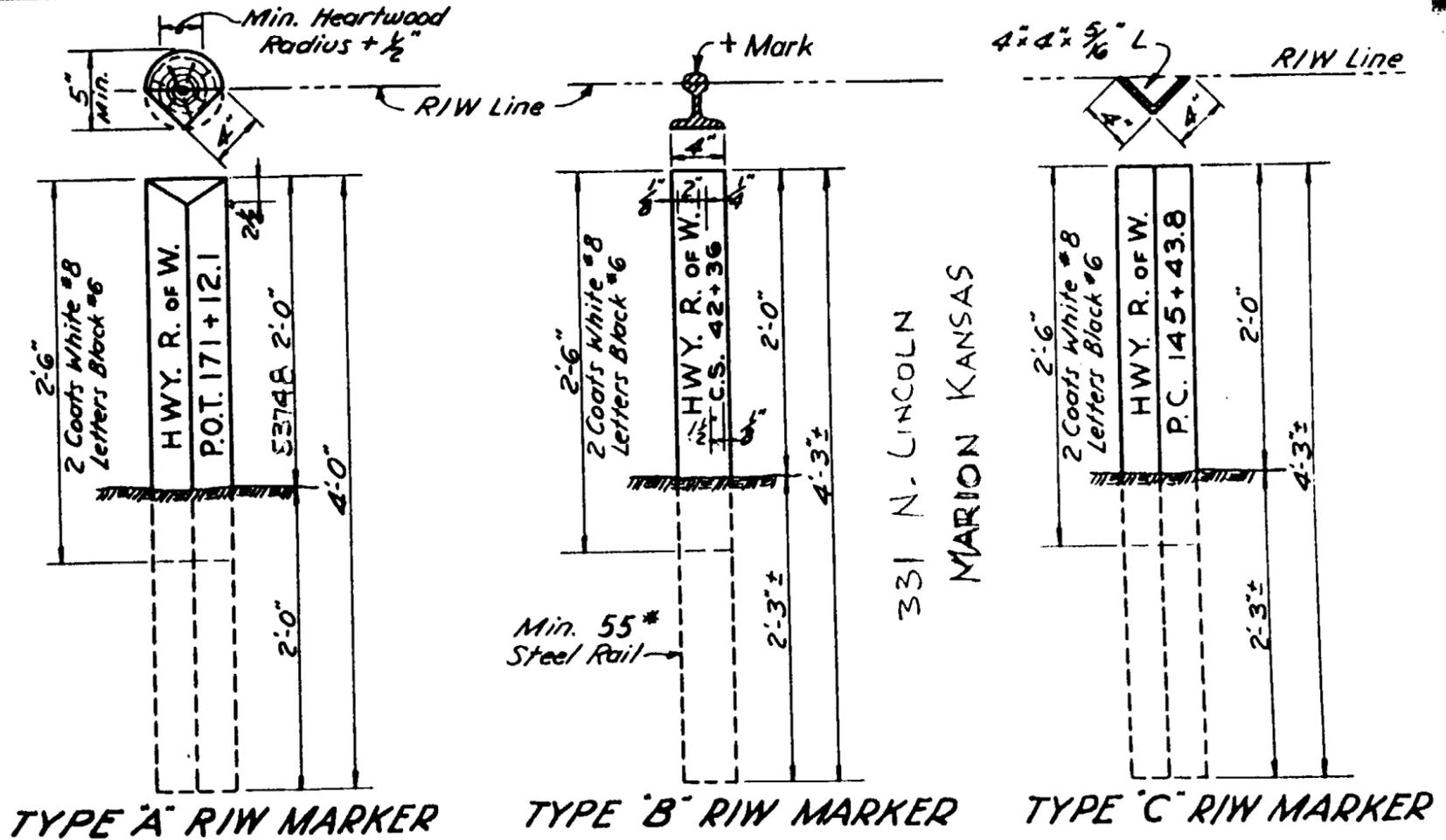
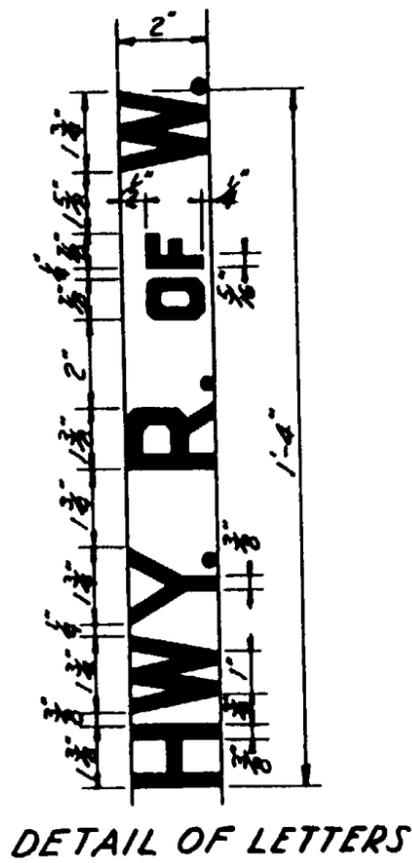
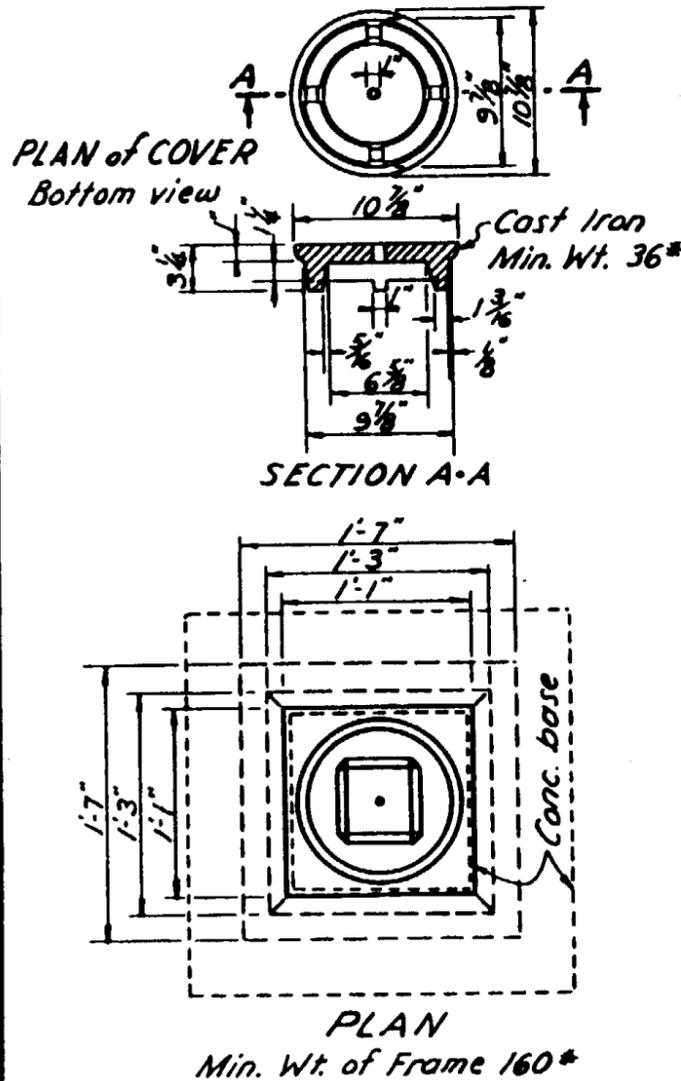
VS 603 790

ARIZONA STATE HIGHWAY DEPARTMENT - PLANS DIVISION

INDEX TO CONSTRUCTION STANDARDS

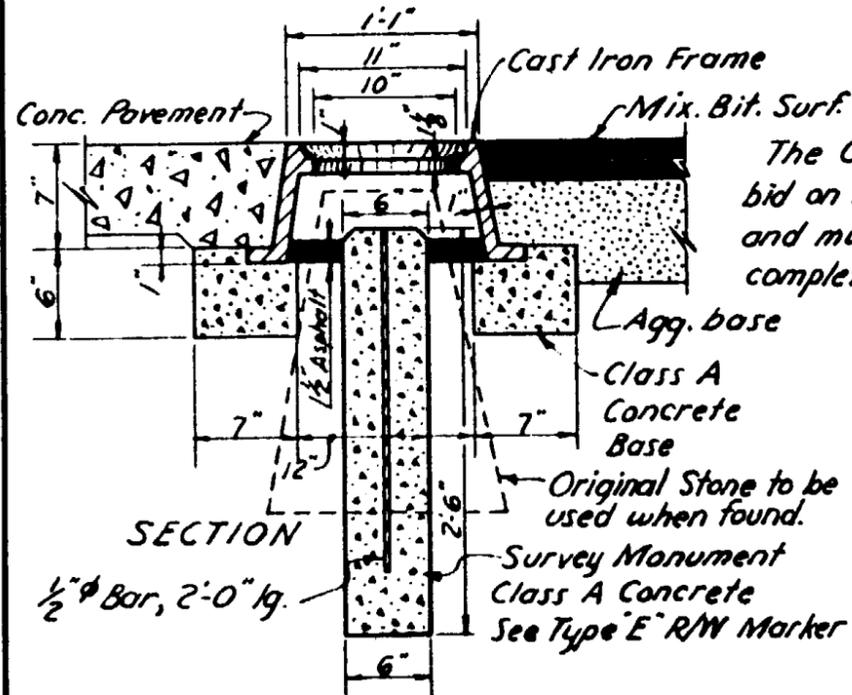
DRWG. NO.	SUBJECT
C-23	BANK PROTECTION
C-38	BENCH MARKER
C-25	CATCH BASIN NO. 1
C-26	CATCH BASIN NO. 2
C-27	CATCH BASIN NO. 3
C-24	CATCH BASIN, CORRUGATED METAL
C-14	CATTLE GUARD
C-4	CHANNELS
C-20	CONCRETE CURB AND GUTTER
C-19	CONCRETE PAVEMENT JOINTS ~ LONGITUDINAL
C-18	CONCRETE PAVEMENT JOINTS ~ TRANSVERSE
C-33	CONCRETE PIPE AND INSTALLATION
C-33	CONCRETE PIPE, ENCASEMENT OF (DETAIL X)
C-38	CONCRETE CONSTRUCTION MARKER
C-24	CORRUGATED METAL PIPES, PERFORATED
C-10	CORRUGATED METAL PIPES, STRUTS FOR
C-21	CURB AND GUTTER MEASUREMENT
C-3	CURBS, EMBANKMENT
C-4	DITCHES
C-4	DIKES
C-15	FENCE AND GATES, WOOD POSTS
C-16	FENCE AND GATES, STEEL POSTS
C-17	FENCE, INDUSTRIAL TYPE
C-5	FORD TYPE A, CONCRETE WALLS
C-6	FORD TYPE B, WOOD WALLS
C-8	GUIDE POSTS
C-3	GUTTERS, ROADWAY
C-12	HEADWALLS, CEMENT RUBBLE
C-12	HEADWALLS, PLAIN CONCRETE
C-9	HEADWALLS, REINF. CONC. ~ STRAIGHT, "L", AND "U" TYPE
C-10	HEADWALLS, REINF. CONC. ~ WING TYPE
C-11	HEADWALLS, REINF. CONC. ~ DROP INLET

DRWG. NO.	SUBJECT
C-42	INSTALLATION OF ROAD GUARD AT STRUCTURE APPROACHES
C-32	IRRIGATION GATE
C-31	IRRIGATION STANDPIPE NO. 1 AND NO. 2
C-32	IRRIGATION VALVE
C-30	MANHOLES NO. 1 AND NO. 2
C-28	MANHOLE FRAME AND COVER NO. 1
C-29	MANHOLE FRAME AND COVER NO. 2
C-38	MARKERS ~ PROJECT, BENCH, CONCRETE CONSTRUCTION
C-1	MARKERS ~ RIGHT OF WAY
C-38	MILE POST
C-39	PARABOLIC CROWN FORMULA AND TABLES
C-34	PAVEMENT CUT AND REPLACEMENT
C-41	PLANT CONSERVATION
C-13	PIPE CULVERT INSTALLATION
C-38	PROJECT MARKER
C-35	RAILROAD CROSSING - FLANGE RAIL
C-36	RAILROAD CROSSING - PLANKED
C-37	RAILROAD CROSSING SIGNS
C-22	RETAINING WALLS - CEMENT RUBBLE & DRY RUBBLE
C-23	RIP RAP, PLAIN AND GROUTED
C-7	ROAD GUARD
C-41	ROCK AND EARTH CUTS
C-6	ROCK BASKET
C-1	R/W MARKERS
C-20	SIDEWALK
C-2	SLOPES, CUT AND EMBANKMENT
C-2	SLOPE ROUNDING
C-40	SLOPE ROUNDING GAUGE
C-21	STREET INTERSECTION GRADES
C-1	SURVEY MONUMENT AND COVER
C-10	STRUTS FOR C.M.P.
C-3	TURNOUTS, PAVED
C-33	VITRIFIED CLAY PIPE
C-20	VALLEY GUTTER



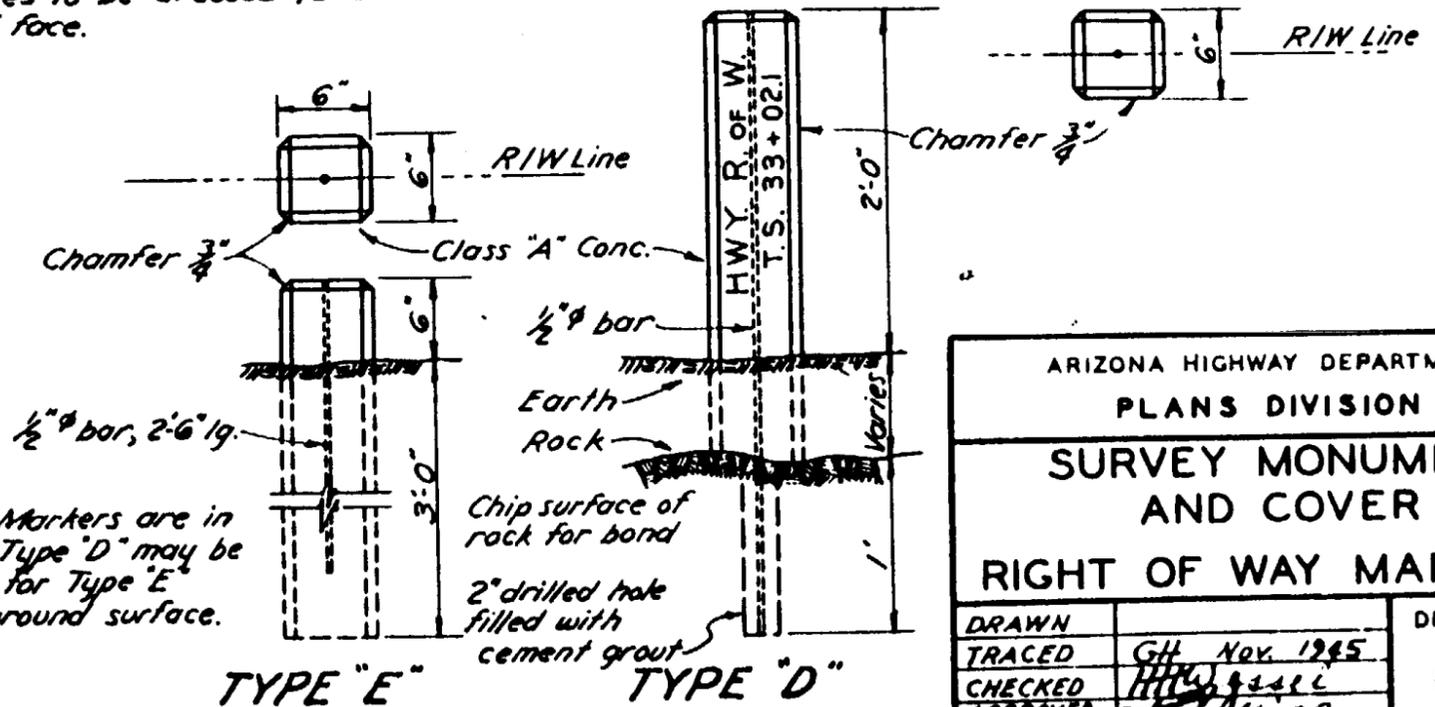
Posts to be native juniper, native cedar, or native cypress. Minimum 5" diameter at top. Top to be beveled 2 1/2" and two sides to be dressed to a minimum 4" face.

RIW Markers to be erected where shown on the plans, or as determined by the engineer.



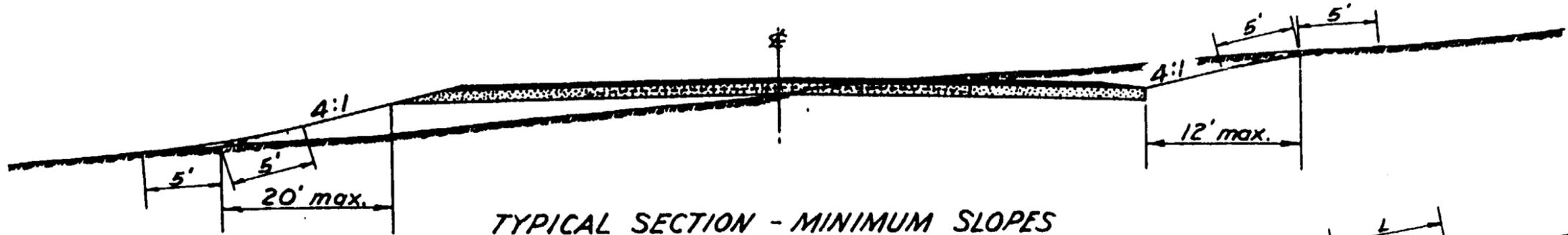
The Contractor shall bid on the frame, cover, and monument as unit complete in place

When RIW Markers are in solid rock, Type 'D' may be substituted for Type 'E' below the ground surface.

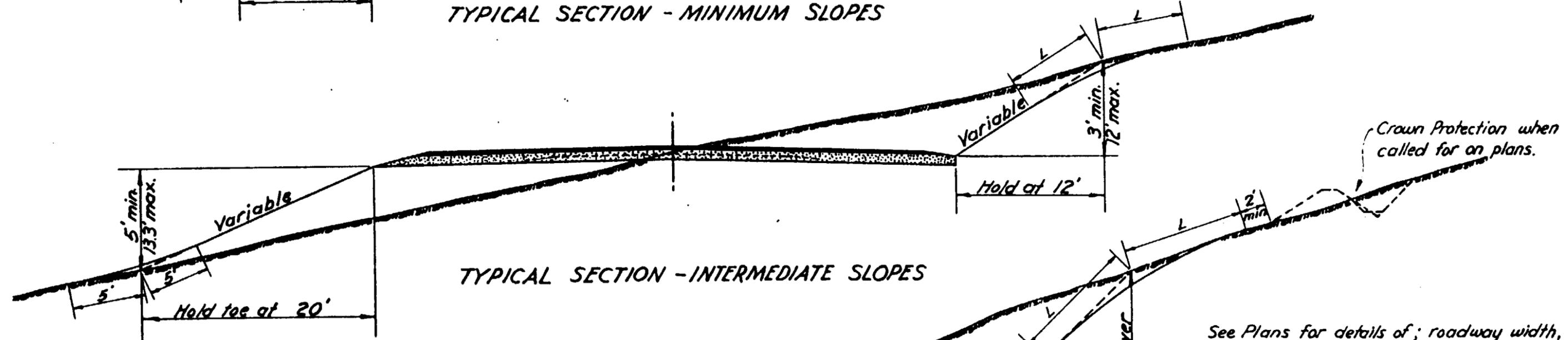


ARIZONA HIGHWAY DEPARTMENT PLANS DIVISION		REV. 3/17/50
SURVEY MONUMENT AND COVER		
RIGHT OF WAY MARKERS		
DRAWN		DRAWING NO.
TRACED	G.H. Nov. 1945	C-1
CHECKED	H.W. 1945	
APPROVED ENGR. PLANS	E. Miller	

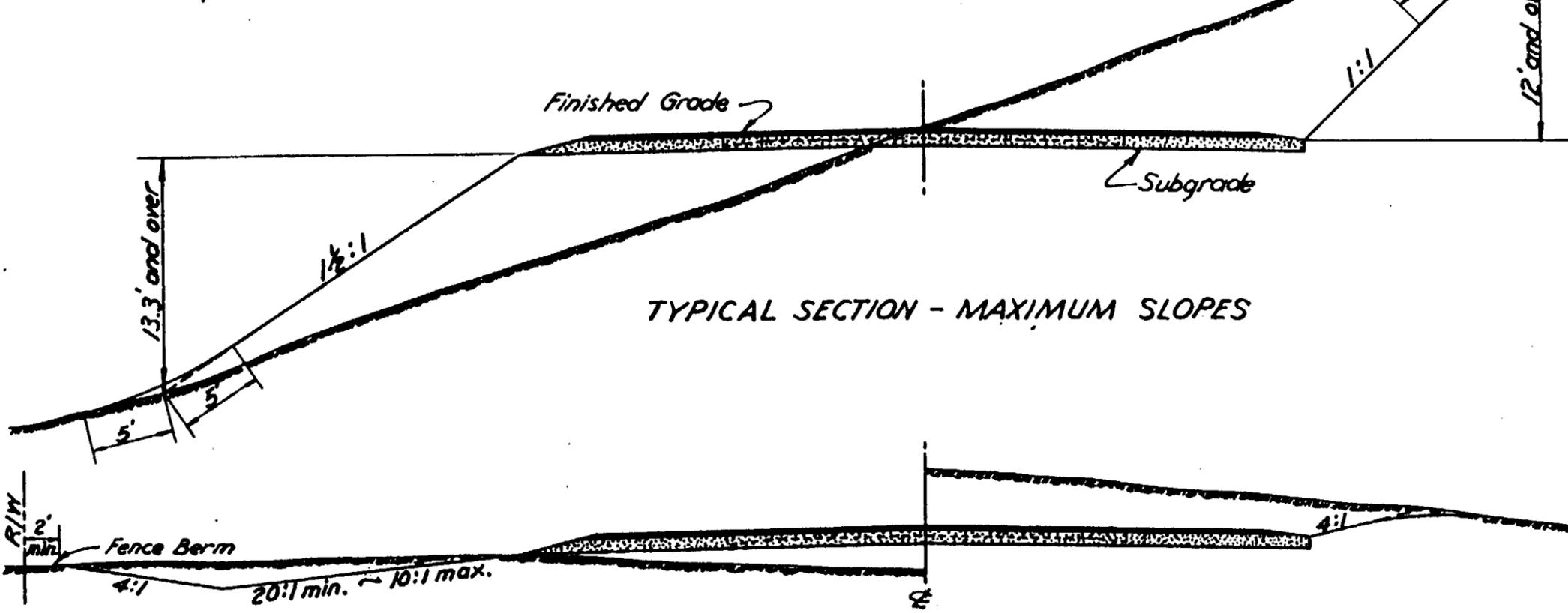
SURVEY MONUMENT & COVER



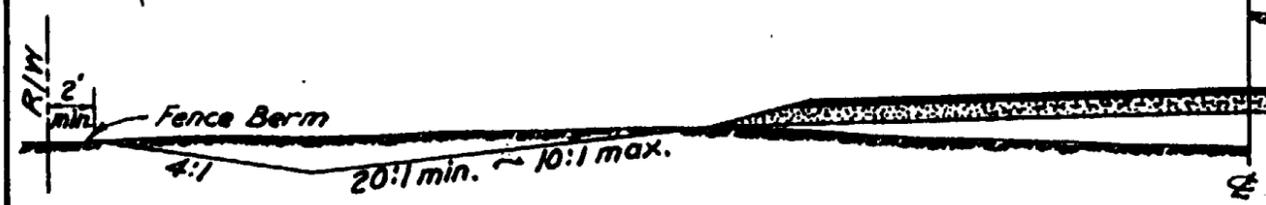
TYPICAL SECTION - MINIMUM SLOPES



TYPICAL SECTION - INTERMEDIATE SLOPES



TYPICAL SECTION - MAXIMUM SLOPES



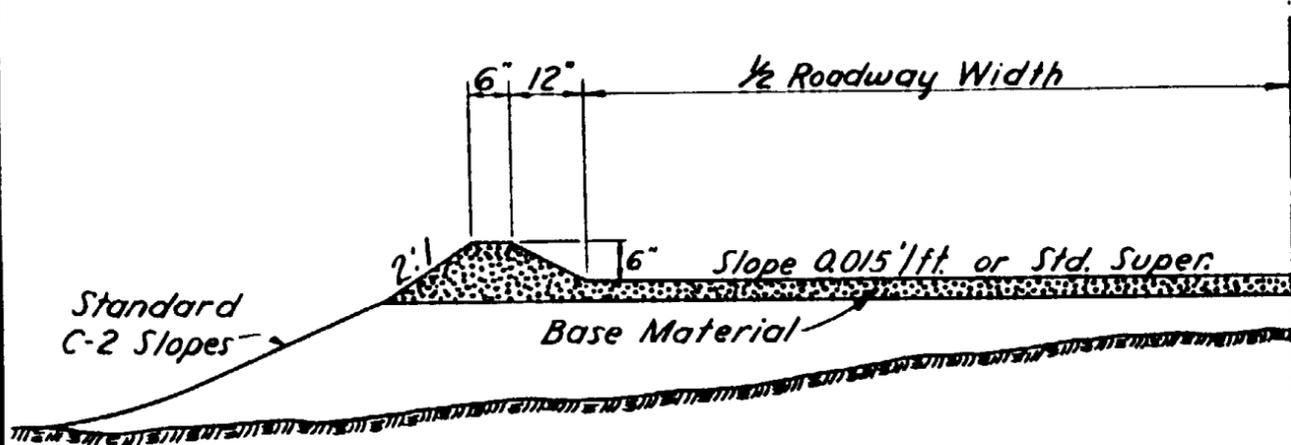
HALF SECTION - SIDE BORROW



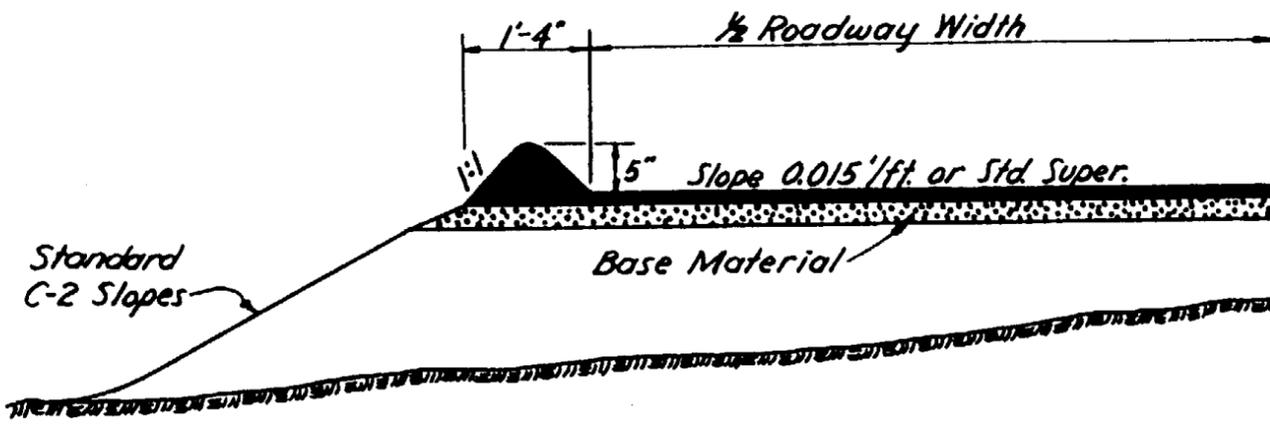
HALF SECTION - MINOR CUTS

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 Mix. Bit. 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.

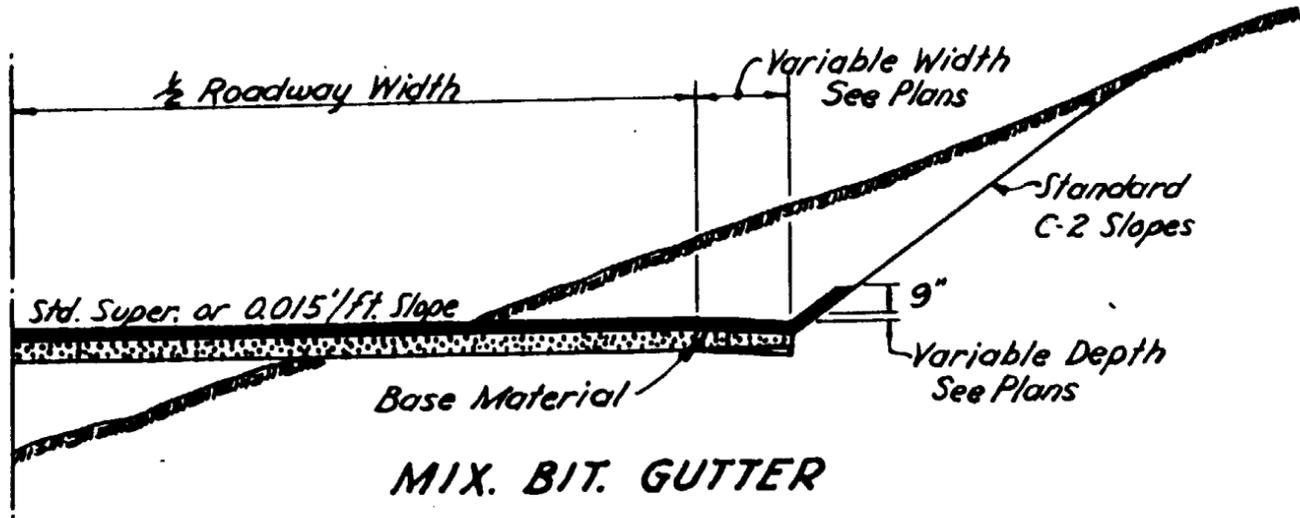
ARIZONA HIGHWAY DEPARTMENT		REV.
PLANS DIVISION		
SLOPES		
SLOPE ROUNDING		
DRAWN	GM Nov. 1965	DRAWING NO. C-2
TRACED	GM Nov. 1965	
CHECKED	<i>[Signature]</i>	
APPROVED PLANS ENGR.	<i>[Signature]</i>	



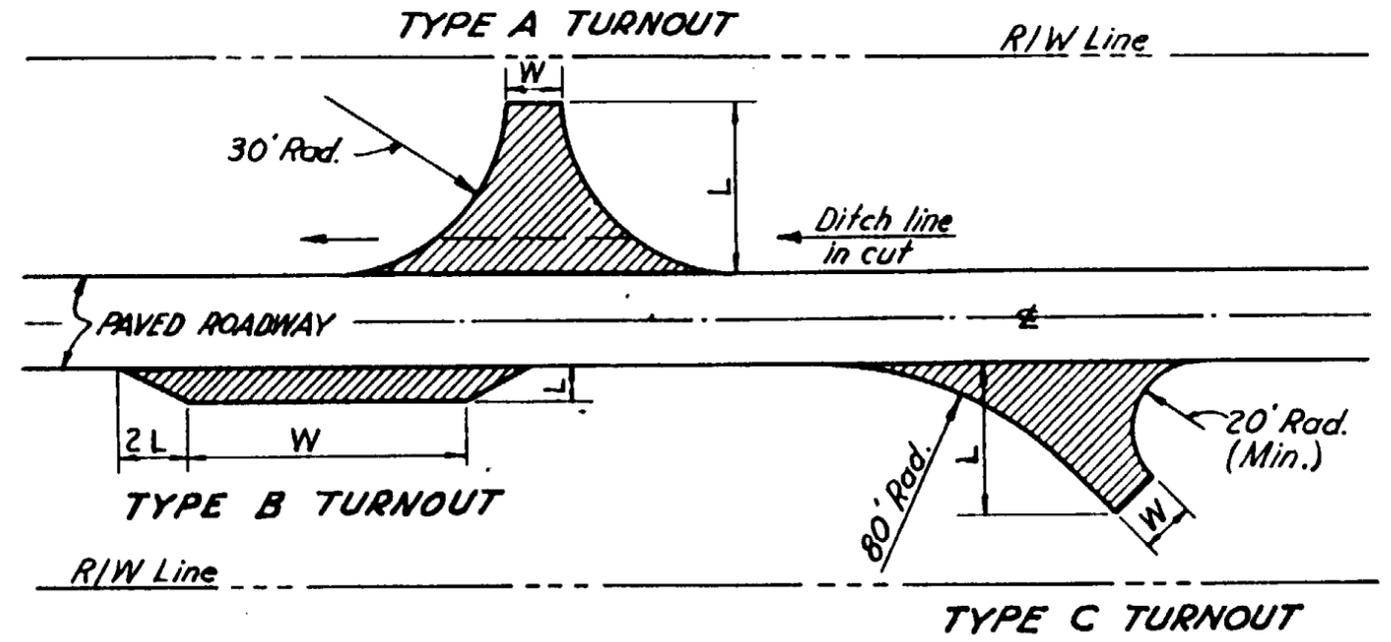
CURB FOR GRAVEL RDWY.



MIX. BIT. CURB



MIX. BIT. GUTTER



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' x 30' M. B. 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.

ARIZONA HIGHWAY DEPARTMENT		REV. 3/17/50
PLANS DIVISION		
MIX. BIT. & GRAVEL CURBS MIX. BIT. GUTTER PAVED TURNOUTS		
DRAWN	GH Nov. 1945	DRAWING NO. C-3
TRACED	GH Nov. 1945	
CHECKED	HTW	
APPROVED ENGR. PLANS	E. J. Miller	



CROWN DYKE

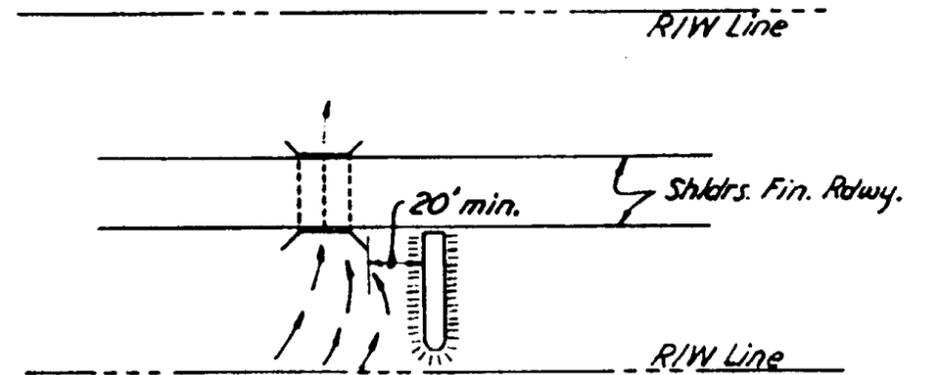
To be paid for by lineal measure.

CROWN DITCH

To be paid for by lineal measure

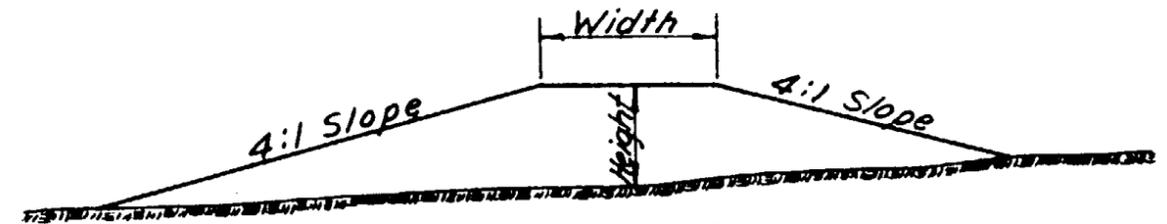
Crown protection should be constructed in such a manner that the flow of intercepted water shall not exceed 0.5%.

Grader ditch section may be used with the approval of the Engineer, or where called for on Plans.

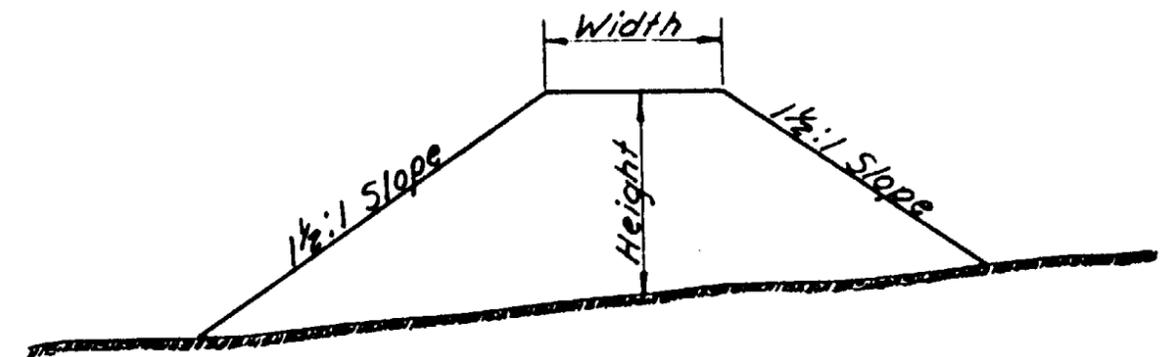


TYPICAL DIKE INSTALLATION AT STRUCTURE

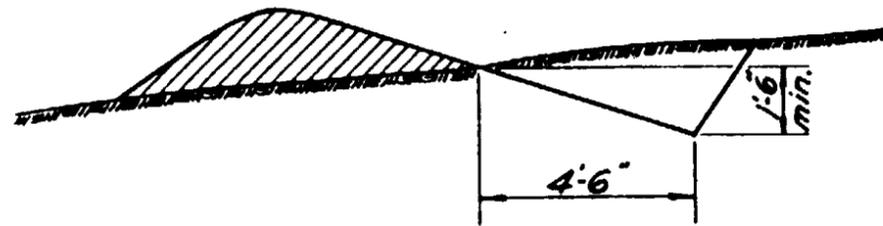
Dykes at structures to be so placed that they create a water cushion.



TYPE B DIKE

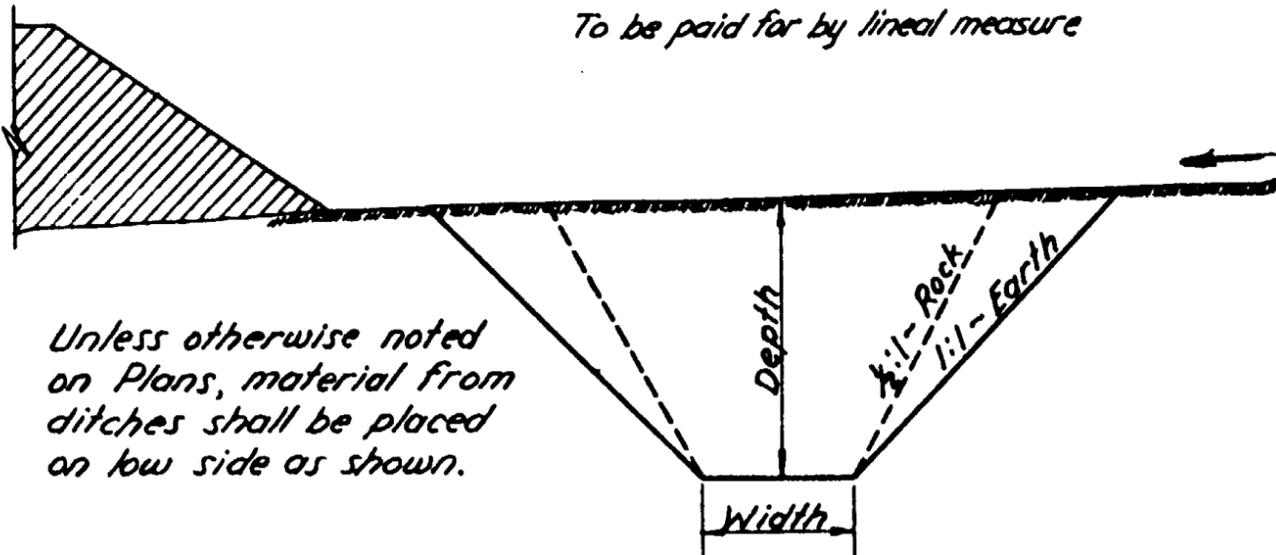


TYPE A DIKE



GRADER DITCH

To be paid for by lineal measure

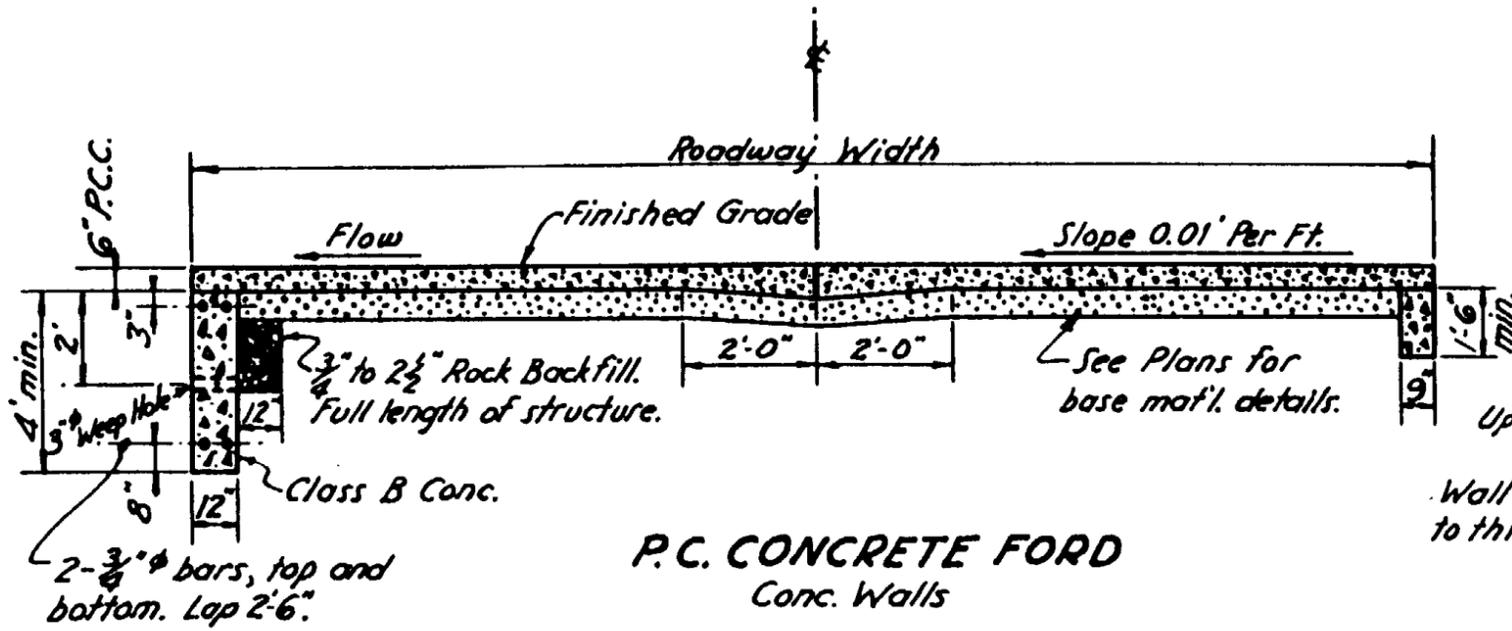


DITCH OR CHANNEL

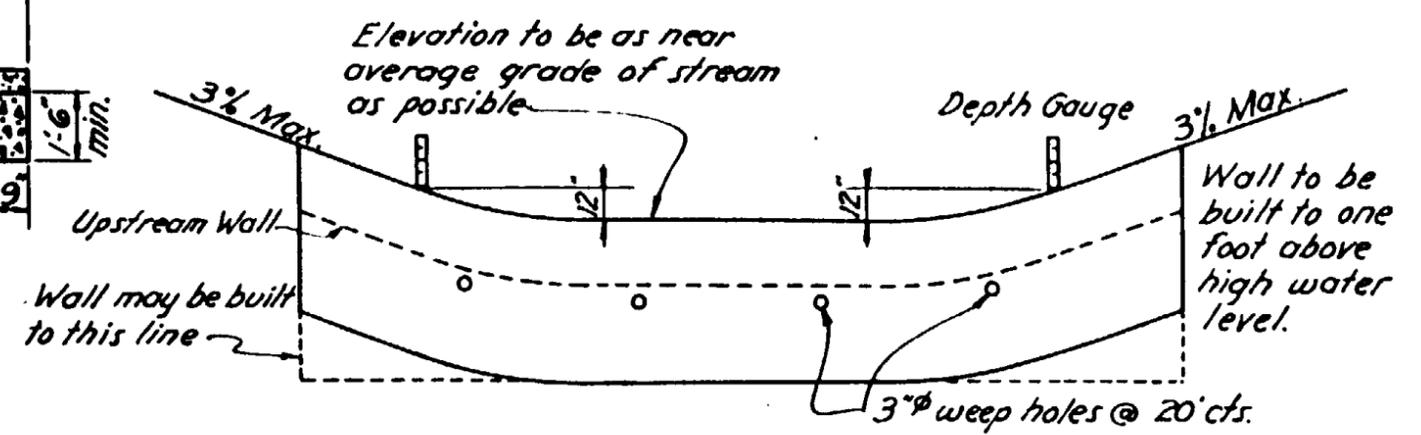
Unless otherwise noted on Plans, material from ditches shall be placed on low side as shown.

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

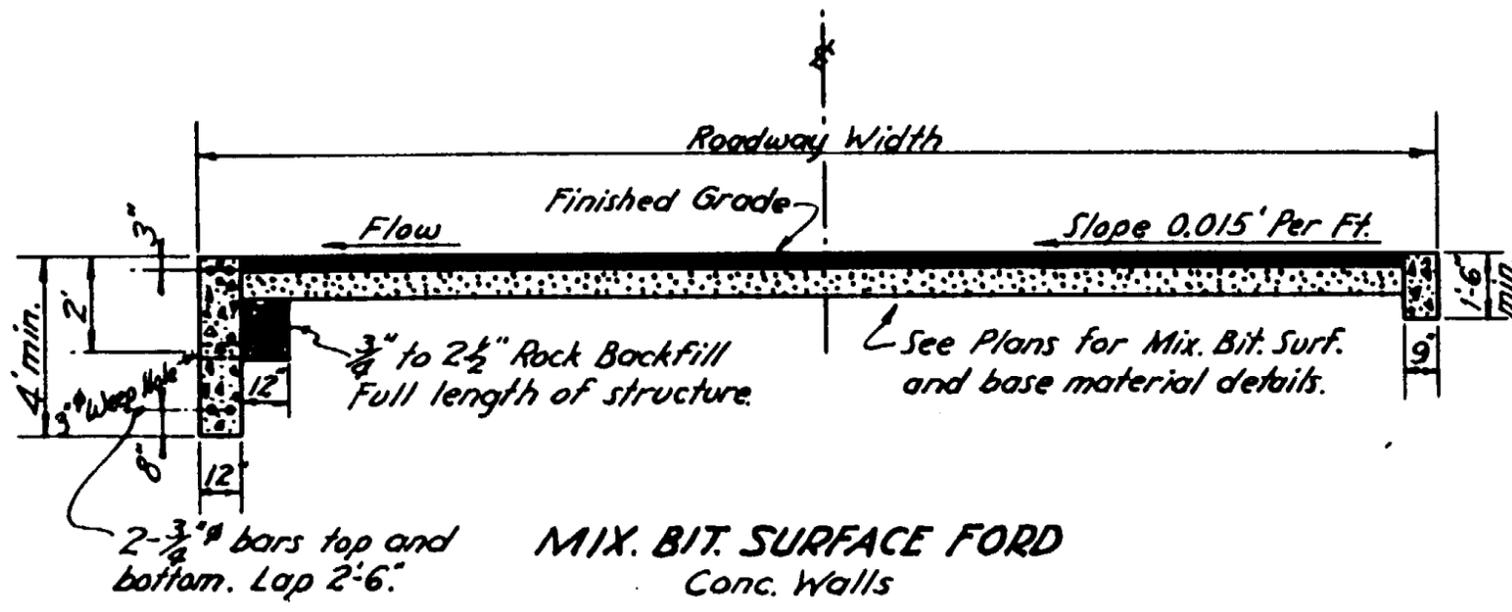
ARIZONA HIGHWAY DEPARTMENT		REV.
PLANS DIVISION		
DITCHES AND DYKES		
DRAWN	GH Dec. 1945	DRAWING NO. C-4
TRACED	GH Dec. 1945	
CHECKED	[Signature]	
APPROVED PLANS ENGR	[Signature]	



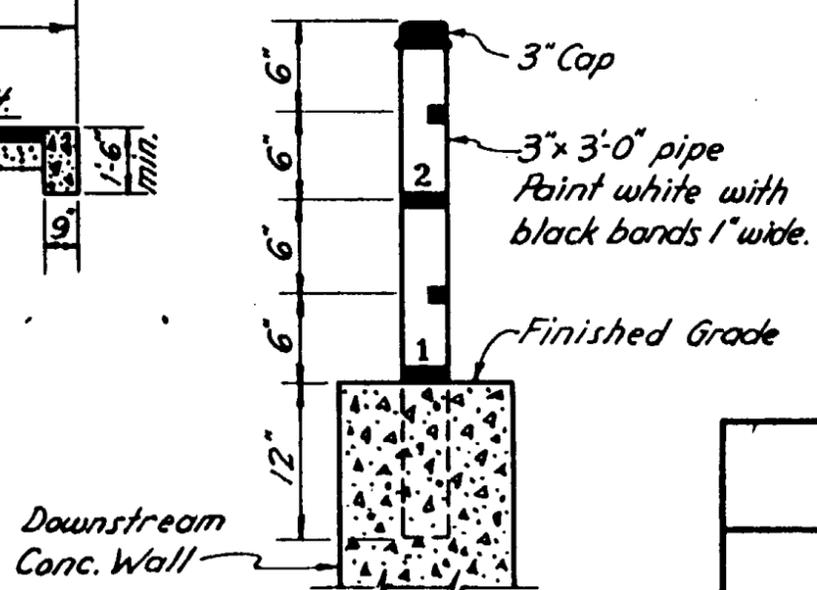
P.C. CONCRETE FORD
Conc. Walls



ELEVATION LOOKING UPSTREAM



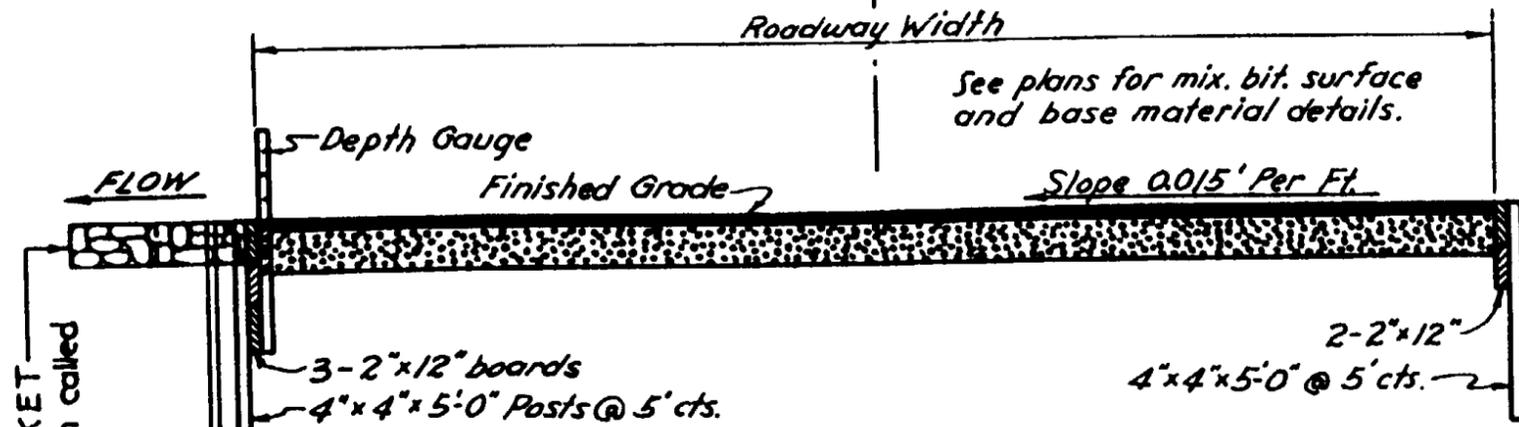
MIX. BIT. SURFACE FORD
Conc. Walls



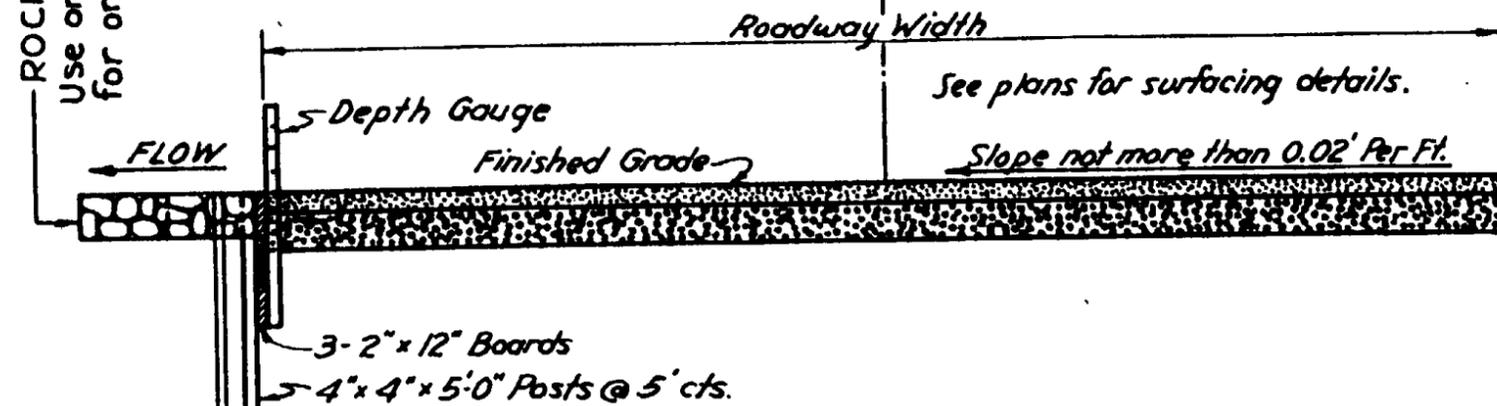
DEPTH GAUGE INSTALLATION

ARIZONA HIGHWAY DEPARTMENT PLANS DIVISION		REV.
TYPE "A" FORD		
DRAWN	C.B.B. July 1945	DRAWING NO. C-5
TRACED	GH Nov. 1945	
CHECKED	HHW	
APPROVED ENGR. PLANS	E. Miller	

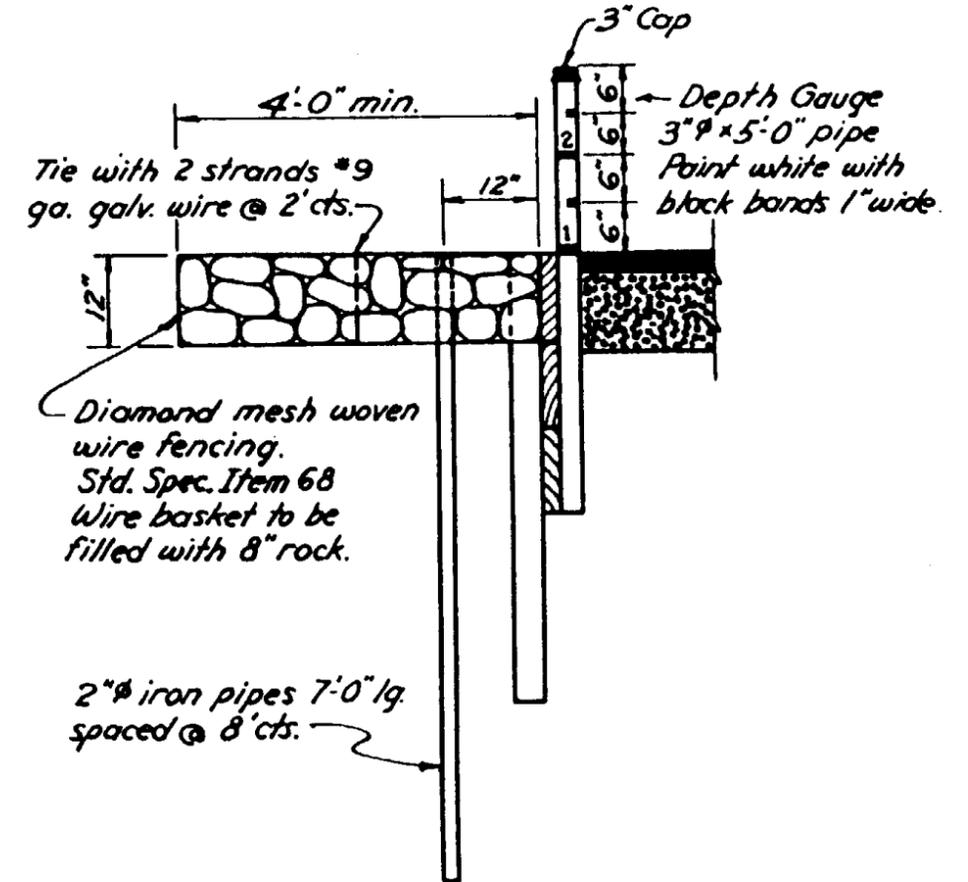
Note - All timber to be structural grade.



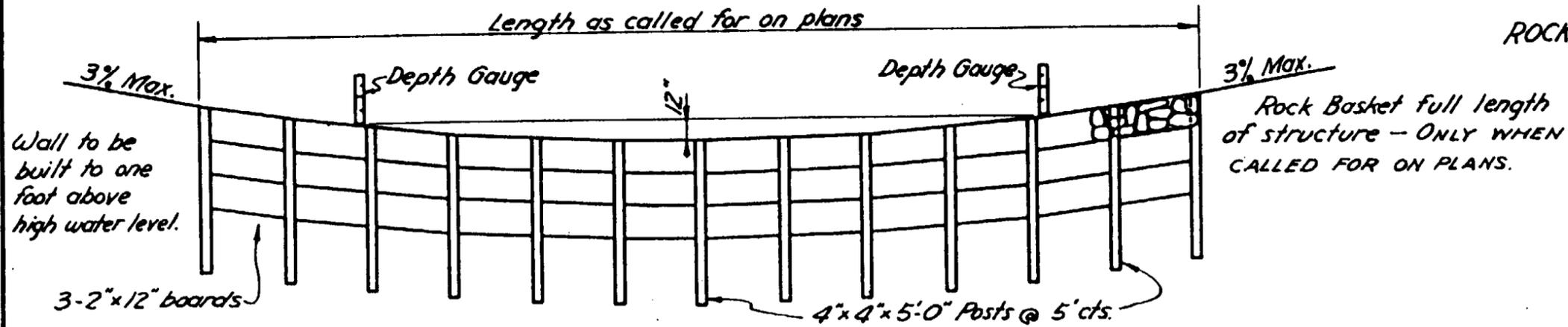
MIX. BIT. SURFACE FORD
Wood Walls



GRAVEL SURFACE FORD

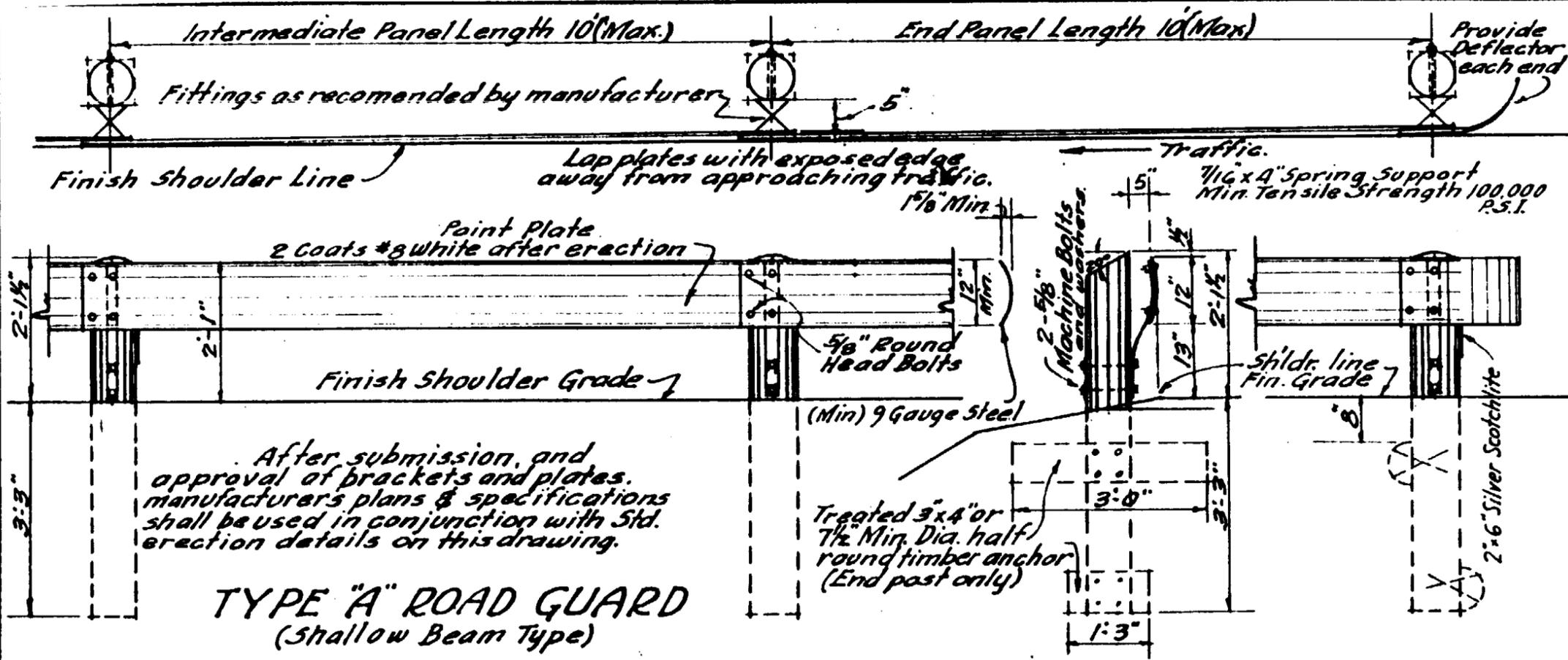


DETAIL OF ROCK FILLED WIRE BASKET

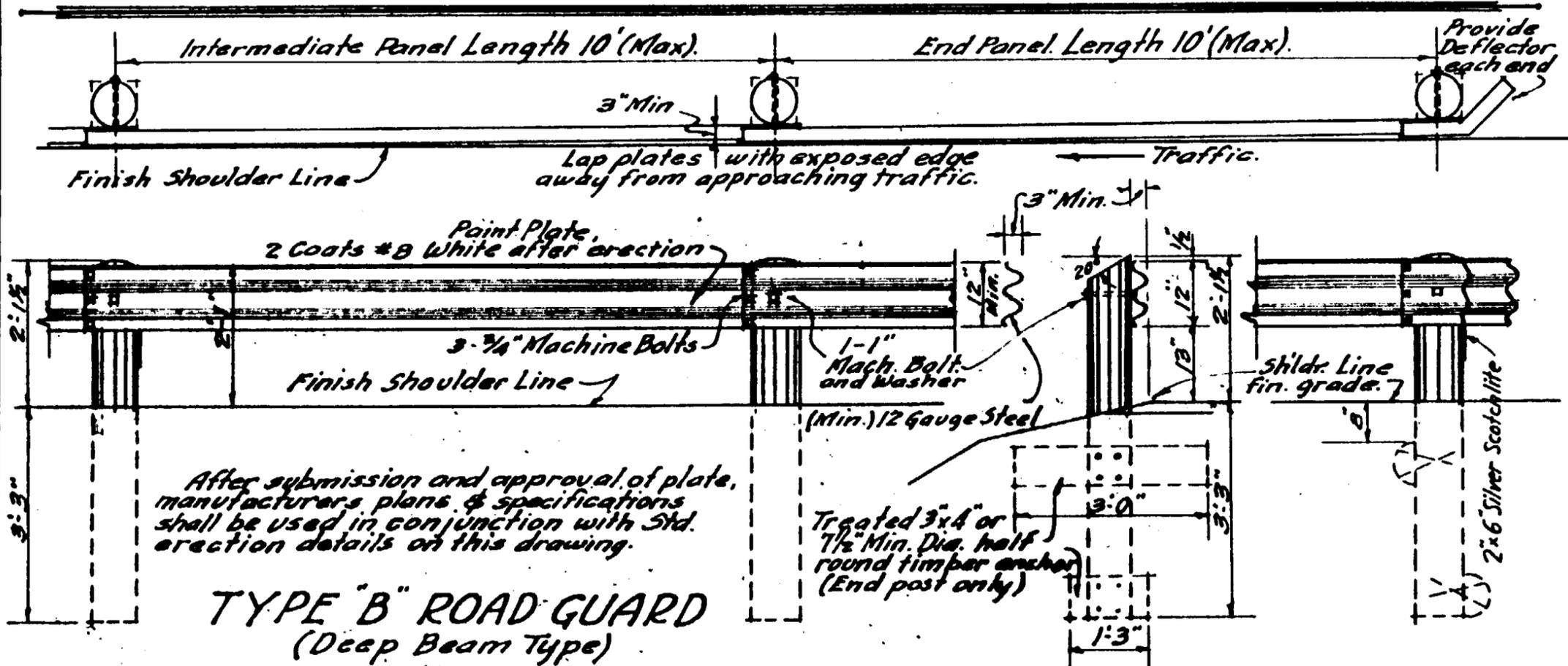


ELEVATION LOOKING UPSTREAM

ARIZONA HIGHWAY DEPARTMENT		REV. 3/17/50
PLANS DIVISION		
TYPE "B" FORD ROCK BASKET		
DRAWN	C.B.B. July 1945	DRAWING NO. C-6
TRACED	GH Nov. 1945	
CHECKED	HFW	
APPROVED ENGR. PLANS	<i>E. C. Miller</i>	



TYPE "A" ROAD GUARD
(Shallow Beam Type)



TYPE "B" ROAD GUARD
(Deep Beam Type)

GENERAL NOTES

In order to secure proper alignment, all bolt holes shall be bored and tops of posts trimmed after posts are set.

Treated structural timber posts shall be minimum 6"x6" (Rough) and need not be painted.

Native timber (Round) posts shall be 6" Minimum and 9" Maximum diameter at a point 6" below top of post, and 7 1/2" minimum and 10 1/2" maximum diameter at the butt, and shall be graded for size so that in any one continuous section of road guard the top diameters shall not vary more than one inch.

Each post shall be painted 2 coats of #6 (Black) over 1 coat of #7 (Primer) on upper 3 feet of post.

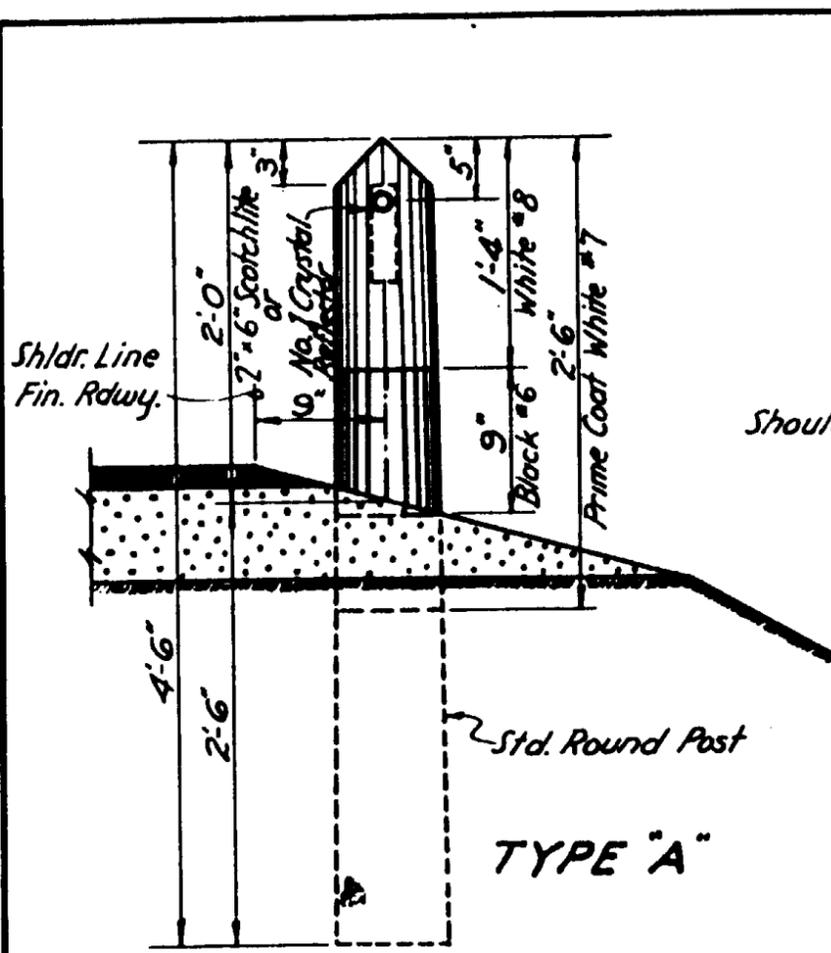
Steel posts, if galvanizing is waived, shall be painted 2 coats of #5 (black) over 1 coat of #1 (primer) full length.

All posts for Road Guard shall meet the requirements of the Arizona Highway Department Standard Specifications (1948) under items 51 and 52 and shall be able to withstand a minimum theoretical bending moment of 50,000 inch pounds.

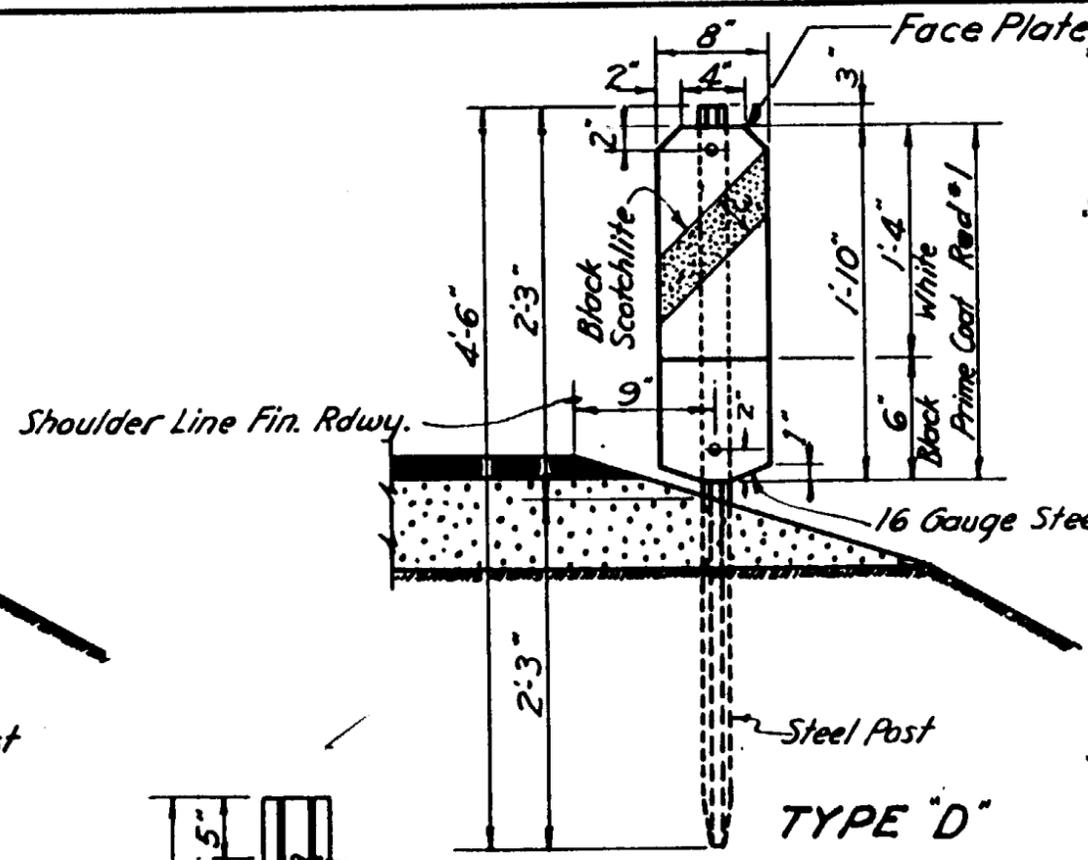
Unless otherwise called for, either type A or B Road Guard may be used.

Place 2"x6" silver scotch lite tab on end posts and every third intermediate post, facing traffic.

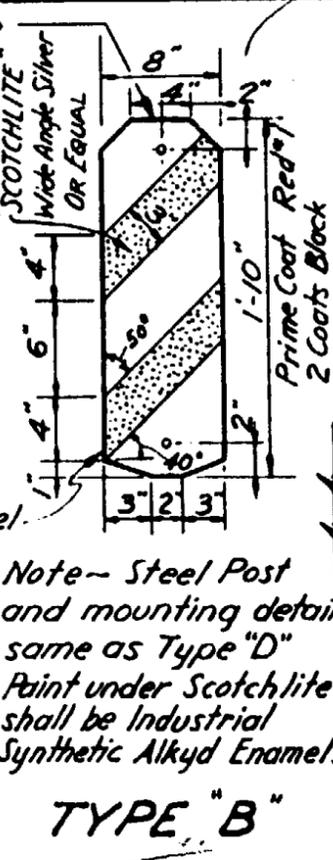
ARIZONA HIGHWAY DEPARTMENT PLANS DIVISION		REV. 2/7/49 8/5/49 3/17/50
ROAD GUARD		
REDRAWN K. Stokes 1/14/49	TRACED K. Stokes 1/16/49	DRAWING NO. C-7
APPROVED ENGR. PLANS. (Signature)		



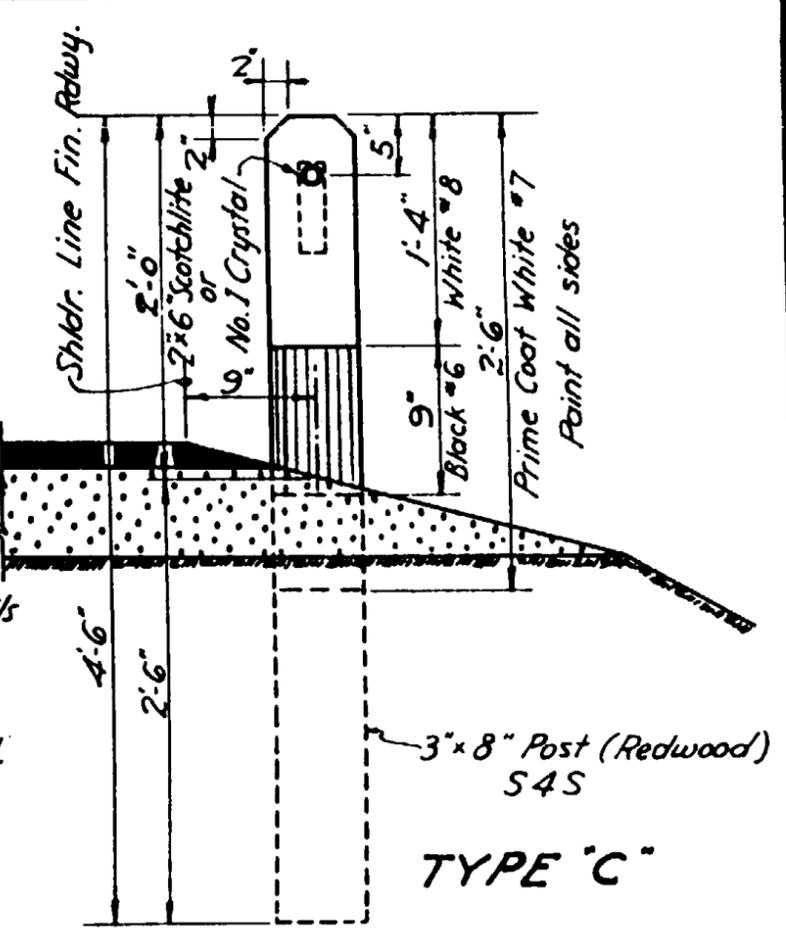
TYPE "A"



TYPE "D"

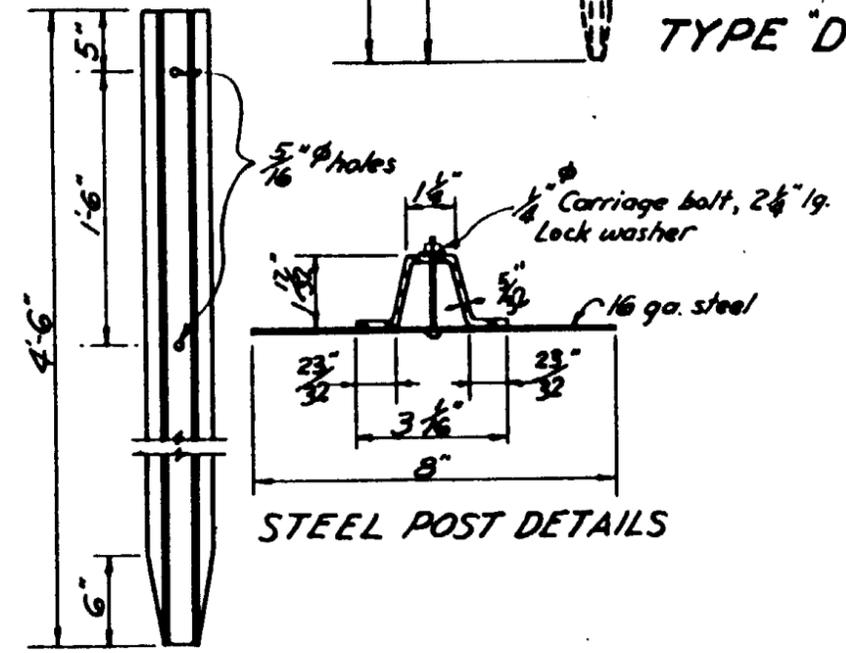
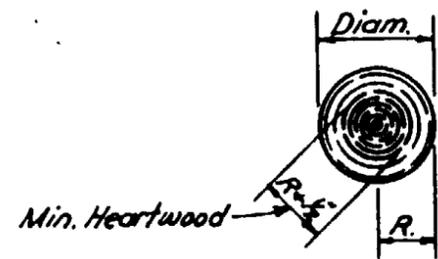


TYPE "B"



TYPE "C"

Note - Steel Post and mounting details same as Type "D" Paint under Scotchlite shall be Industrial Synthetic Alkyd Enamel.



STEEL POST DETAILS

Round posts shall be 6" min. and 9" max. diameter at a point 6" below top of post and 7 1/2" min. and 10 1/2" max. diameter at the butt. They shall be graded for size so that in any one continuous row of guide posts the top diameters shall not vary more than 1". Measurement for size shall be made after shrinkage.

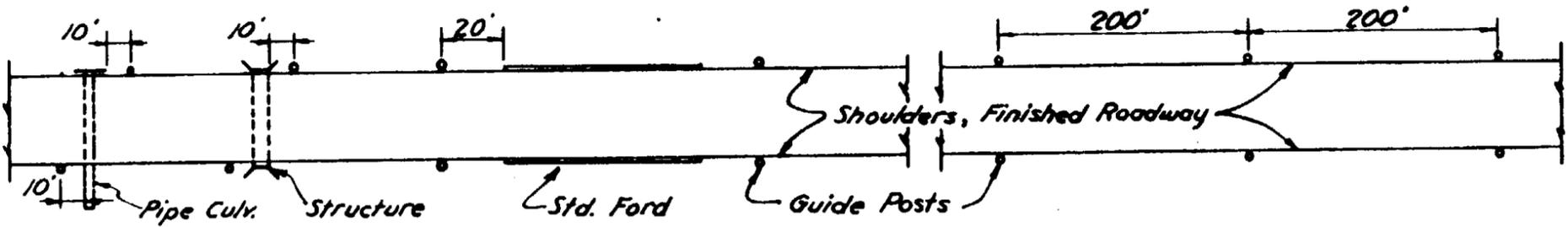
Where rectangular posts are used, they shall be 3"x8", S4S.

All guide posts shall conform to Std. Specifications.

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

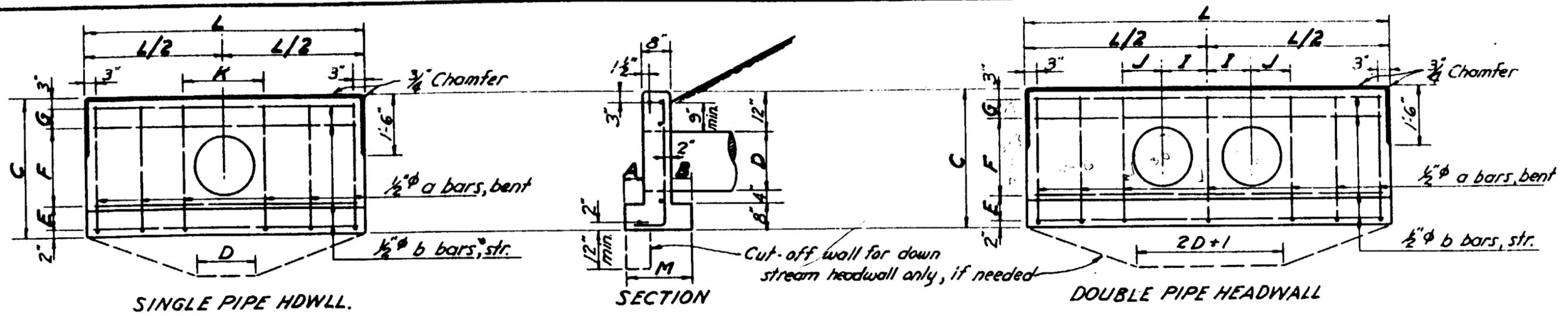
When placed in rows, guide posts shall be spaced at 200 ft. ctrs. unless otherwise called for on plans.

After erection and painting, install a No. 1 Crystal reflector button or Silver Scotchlite tab in each post, facing traffic.



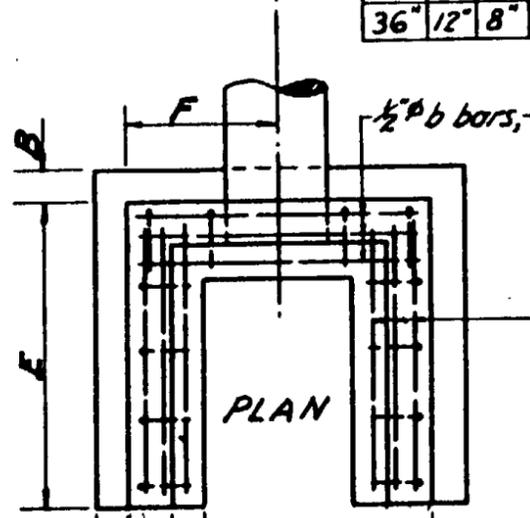
TYPICAL GUIDE POST INSTALLATION

ARIZONA HIGHWAY DEPARTMENT		REV. 3-20-50
PLANS DIVISION		
GUIDE POSTS		
DRAWN	C.B.B. July 1945	DRAWING NO. C-8
TRACED	GH Nov. 1945	
CHECKED	HPH	
APPROVED ENGR. PLANS	F. Miller	

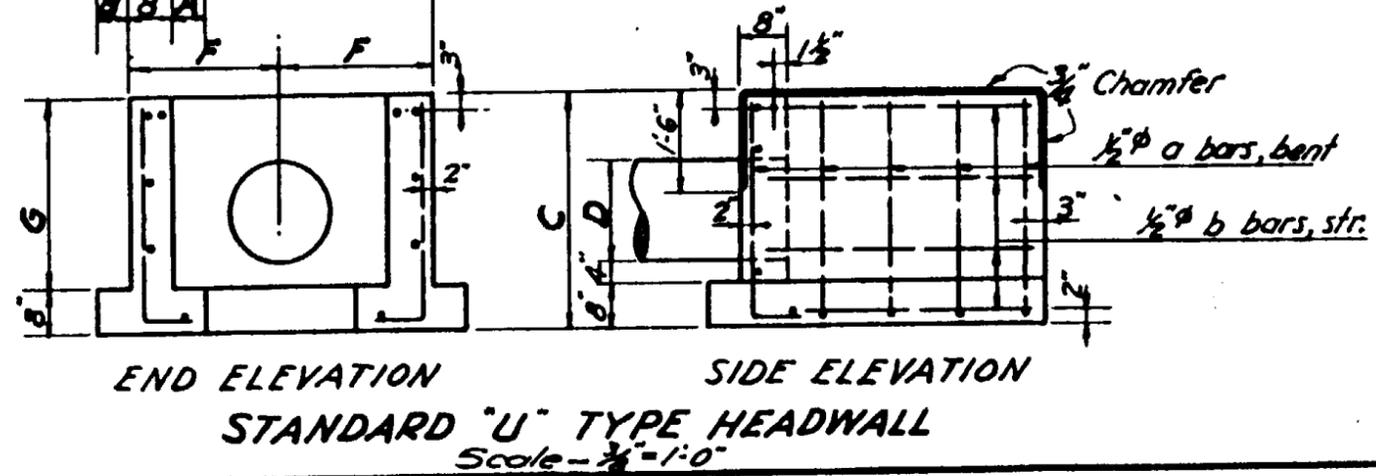
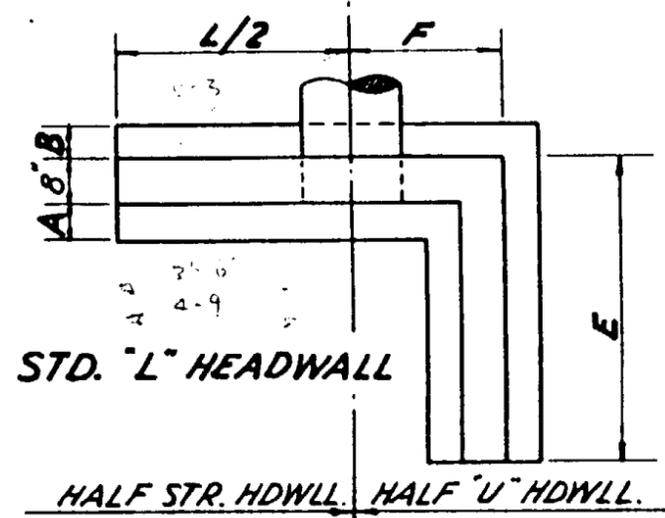


STANDARD STRAIGHT HEADWALLS
Scale 3/8" = 1'-0"

SINGLE PIPE HEADWALL											DOUBLE PIPE HEADWALL																				
Diam. D	DIMENSIONS									A' Conc. C.Y.	Steel - 1/2" phi bars		Reinf. Lbs.	DIMENSIONS									A' Conc. C.Y.	Steel - 1/2" phi bars		Reinf. Lbs.					
	A	B	C	E	F	G	K	L	M		a bars No.	b bars Lgth.		A	B	C	E	F	G	L	M	I		J	a bars No.		b bars Lgth.				
18"	6"	6"	3'-6"	7"	2'-0"	6"	2'-0"	7'-0"	1'-8"	0.7	6	4'-0"	5	6'-6"	35	6"	6"	3'-6"	7"	2'-0"	6"	9'-3"	1'-8"	1'-1"	1'-0"	0.95	7	4'-0"	5	9'-0"	50
24"	8"	8"	4'-0"	8"	2'-4"	7"	2'-6"	8'-0"	2'-0"	1.0	6	4'-9"	5	7'-9"	45	8"	8"	4'-0"	8"	2'-4"	7"	11'-0"	2'-0"	1'-6"	1'-3"	1.30	7	4'-9"	5	10'-9"	55
30"	8"	8"	4'-6"	8"	2'-10"	7"	3'-0"	10'-6"	2'-0"	1.4	8	5'-3"	5	10'-3"	60	8"	8"	4'-6"	8"	2'-10"	7"	14'-0"	2'-0"	1'-9"	1'-6"	1.70	9	5'-3"	5	13'-9"	75
36"	12"	8"	5'-0"	8"	3'-4"	7"	3'-6"	13'-0"	2'-4"	2.0	10	6'-0"	5	12'-9"	82	12"	8"	5'-0"	8"	3'-4"	7"	17'-0"	2'-4"	2'-0"	1'-9"	2.45	11	6'-0"	5	16'-9"	100

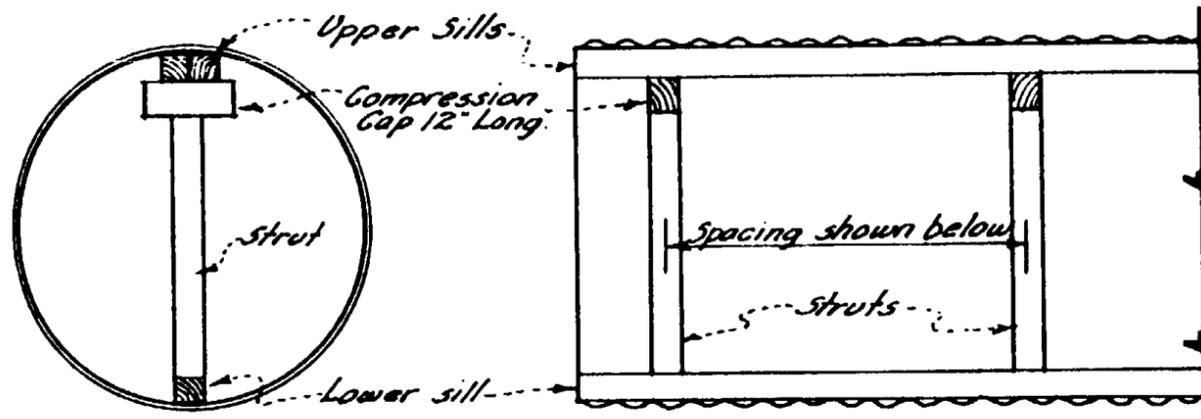


"U" HEADWALL						SINGLE PIPES						"L" HEADWALL								
Diam. D	Steel - 1/2" phi bars				A' Conc. C.Y.	Reinf. Lbs.	DIMENSIONS					A' Conc. C.Y.	Reinf. Lbs.	Steel - 1/2" phi bars						
	a bars No.	b bars Lgth.	a bars No.	b bars Lgth.			A	B	C	E	F			G	a bars No.	b bars Lgth.	a bars No.	b bars Lgth.		
18"	12	4'-0"	15	4'-3"	1.3	75	6"	6"	3'-6"	4'-6"	2'-3"	2'-10"	1.0	55	9	4'-0"	5	5'-6"	5	4'-3"
24"	14	4'-9"	17	5'-3"	1.9	105	8"	8"	4'-0"	5'-6"	2'-9"	3'-4"	1.5	75	11	4'-9"	5	6'-6"	6	5'-3"
30"	18	5'-3"	17	6'-3"	2.5	135	8"	8"	4'-6"	6'-6"	3'-3"	3'-10"	2.0	95	13	5'-3"	5	8'-3"	6	6'-3"
36"	20	6'-0"	19	7'-3"	3.3	170	12"	8"	5'-0"	7'-6"	3'-9"	4'-4"	2.6	125	15	6'-0"	5	10'-0"	7	7'-3"



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.		
STRAIGHT, "L" AND "U" TYPE REINF. CONCRETE HEADWALLS		
DRAWN TRACED CHECKED APPROVED PLANS ENGR.	GH Nov. 1945 GH Nov. 1945 HPC E. Miller	DRAWING NO. C-9



METHOD OF PLACING STRUTS

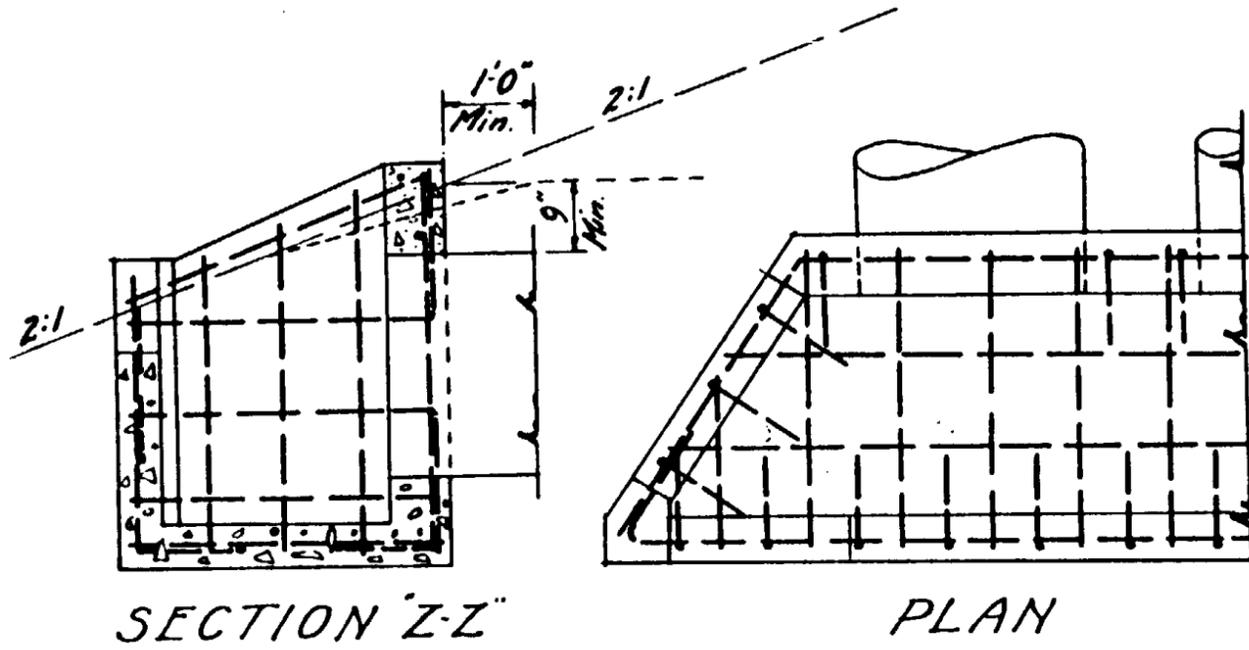
Compression caps to be of soft wood to allow compression. Top and bottom sills and comp. caps shall be same size as struts.

STRUTS FOR FULL GIRGLE C.M.P. VERT. DIAM. +5%									
Diam In.	1' to 5' fill		5' to 10' fill		10' to 20' fill		20' to 30' fill		Length of strut
	Size In.	Space Ft.	Size In.	Space Ft.	Size In.	Space Ft.	Size In.	Space Ft.	
48	4x4	6	4x4	6	4x4	6	4x4	6	4'x4' ~ 3'-2 3/8"
54	4x4	6	4x4	6	4x4	6	4x4	6	4'x4' ~ 3'-8 3/4"
60	4x4	6	4x4	6	4x4	6	4x4	6	4'x4' ~ 4'-3"
66	4x4	6	4x4	6	4x4	6	4x4	6	4'x4' ~ 4'-9 1/4"
72	4x4	6	4x4	6	4x4	6	4x4	5	4'x4' ~ 5'-3 3/8"
78	4x4	6	4x4	6	4x4	6	4x4	4.5	4'x4' ~ 5'-9 3/8"
84	4x4	6	4x4	6	4x4	6	4x4	4	4'x4' ~ 6'-4 1/4"
90	4x4	6	4x4	6	4x4	5.5	4x4	3.5	4'x4' ~ 6'-10 1/4"
96	4x4	6	4x4	6	4x4	5	4x4	3.5	4'x4' ~ 7'-4 3/4"

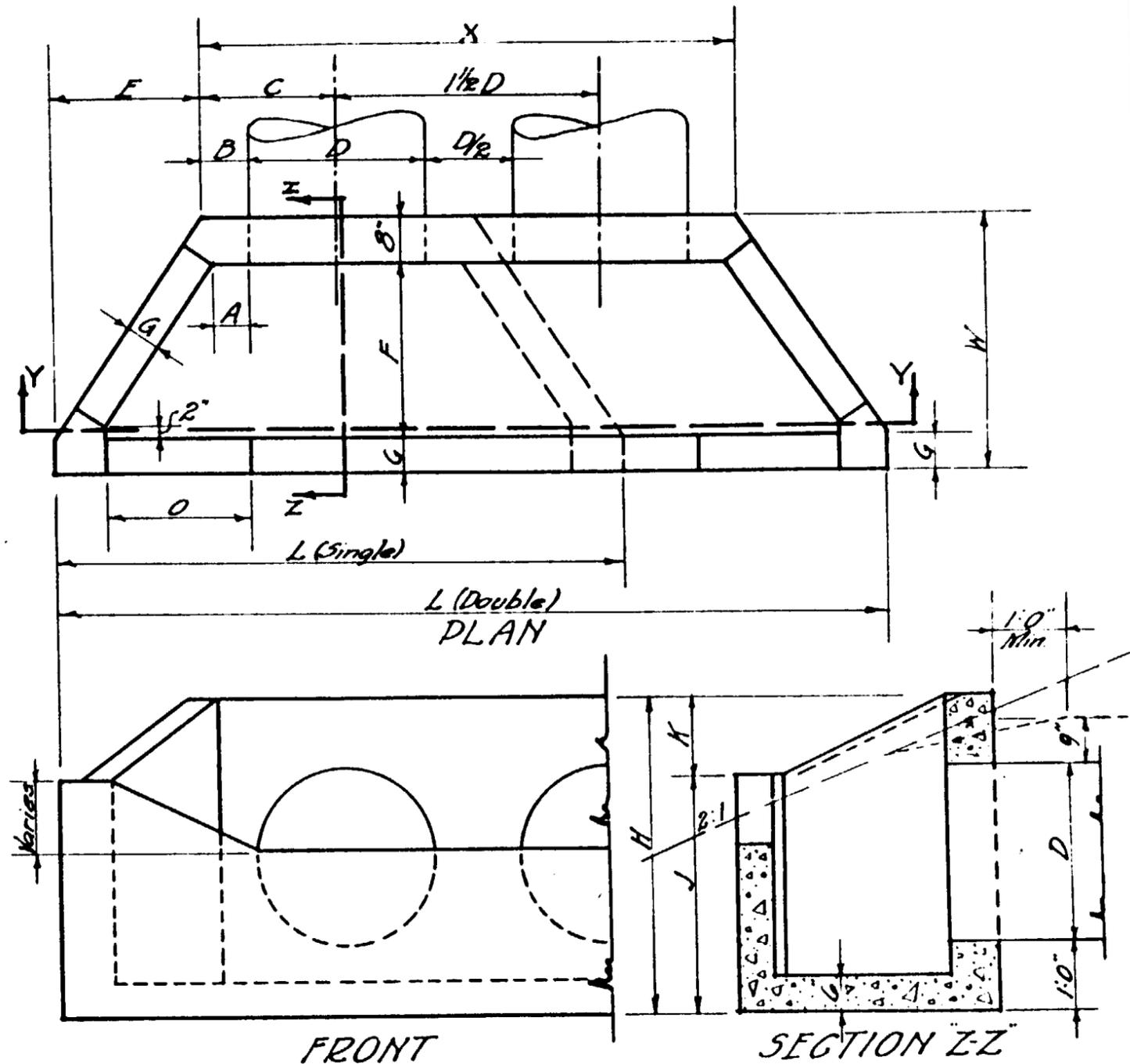
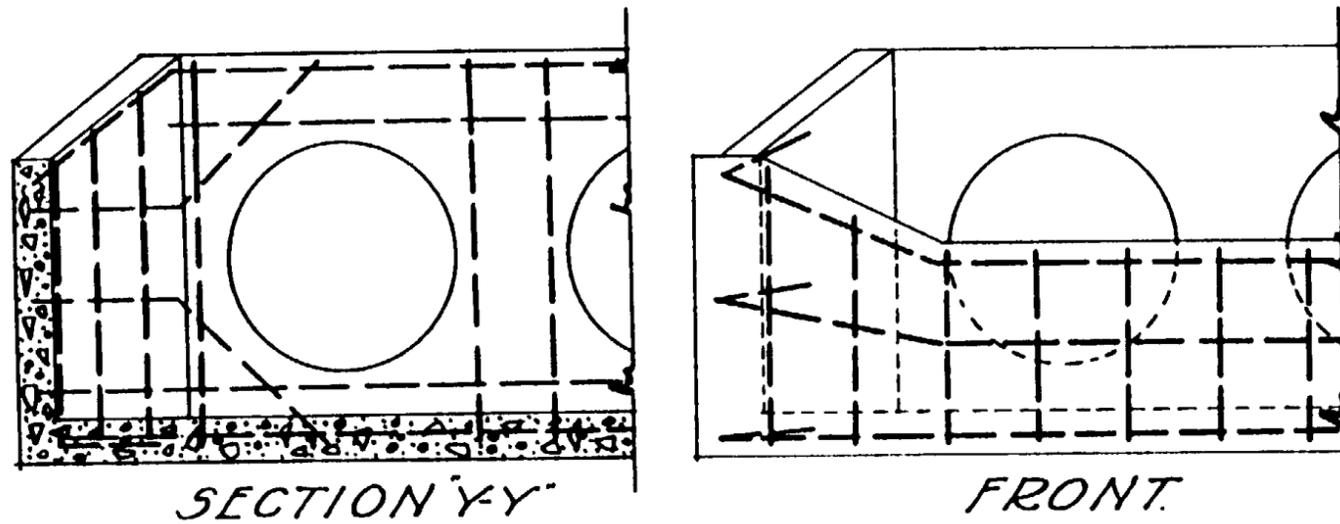
No struts will be required for 48" C.M.P. for fills of less than 15 feet unless so noted on plans.

ONE HEADWALL STEEL LIST - 84" to 66"

Mark	Size	Bend	No.	84"		78"		72"		66"		
				Lath	No.	Lath	No.	Lath	No.	Lath	No.	
01	1/2"	A	2	3'-6"	2	3'-6"	2	3'-6"	2	3'-6"	2	3'-6"
02	"	A	2	4'-0"	2	4'-0"	2	4'-0"	2	4'-0"	2	4'-0"
03	"	A	2	4'-6"	2	4'-6"	2	4'-6"	2	4'-6"	2	4'-6"
04	"	A	2	5'-0"	2	5'-0"	2	5'-0"	2	5'-0"	2	5'-0"
05	"	A	2	5'-6"	2	5'-6"	2	5'-6"	2	5'-6"	2	5'-6"
06	"	A	2	6'-0"	2	6'-0"	2	6'-0"	2	6'-0"	2	6'-0"
07	"	A	2	6'-6"	2	6'-6"	2	6'-6"	2	6'-6"	2	6'-6"
08	"	A	2	7'-0"	2	7'-0"	2	7'-0"	2	7'-0"	2	7'-0"
09	"	A	2	7'-6"	2	7'-6"	2	7'-6"	2	7'-6"	2	7'-6"
10	"	A	2	8'-0"	2	8'-0"	2	8'-0"	2	8'-0"	2	8'-0"
11	"	A	2	8'-6"	2	8'-6"	2	8'-6"	2	8'-6"	2	8'-6"
12	"	A	2	9'-0"	2	9'-0"	2	9'-0"	2	9'-0"	2	9'-0"
13	"	A	2	9'-6"	2	9'-6"	2	9'-6"	2	9'-6"	2	9'-6"
14	"	A	2	10'-0"	2	10'-0"	2	10'-0"	2	10'-0"	2	10'-0"
15	"	A	2	10'-6"	2	10'-6"	2	10'-6"	2	10'-6"	2	10'-6"
16	"	A	2	11'-0"	2	11'-0"	2	11'-0"	2	11'-0"	2	11'-0"
17	"	A	2	11'-6"	2	11'-6"	2	11'-6"	2	11'-6"	2	11'-6"
18	"	A	2	12'-0"	2	12'-0"	2	12'-0"	2	12'-0"	2	12'-0"
19	"	A	2	12'-6"	2	12'-6"	2	12'-6"	2	12'-6"	2	12'-6"
20	"	A	2	13'-0"	2	13'-0"	2	13'-0"	2	13'-0"	2	13'-0"
21	"	A	2	13'-6"	2	13'-6"	2	13'-6"	2	13'-6"	2	13'-6"
22	"	A	2	14'-0"	2	14'-0"	2	14'-0"	2	14'-0"	2	14'-0"
23	"	A	2	14'-6"	2	14'-6"	2	14'-6"	2	14'-6"	2	14'-6"
24	"	A	2	15'-0"	2	15'-0"	2	15'-0"	2	15'-0"	2	15'-0"
25	"	A	2	15'-6"	2	15'-6"	2	15'-6"	2	15'-6"	2	15'-6"
26	"	A	2	16'-0"	2	16'-0"	2	16'-0"	2	16'-0"	2	16'-0"
27	"	A	2	16'-6"	2	16'-6"	2	16'-6"	2	16'-6"	2	16'-6"
28	"	A	2	17'-0"	2	17'-0"	2	17'-0"	2	17'-0"	2	17'-0"
29	"	A	2	17'-6"	2	17'-6"	2	17'-6"	2	17'-6"	2	17'-6"
30	"	A	2	18'-0"	2	18'-0"	2	18'-0"	2	18'-0"	2	18'-0"
31	"	A	2	18'-6"	2	18'-6"	2	18'-6"	2	18'-6"	2	18'-6"
32	"	A	2	19'-0"	2	19'-0"	2	19'-0"	2	19'-0"	2	19'-0"
33	"	A	2	19'-6"	2	19'-6"	2	19'-6"	2	19'-6"	2	19'-6"
34	"	A	2	20'-0"	2	20'-0"	2	20'-0"	2	20'-0"	2	20'-0"
35	"	A	2	20'-6"	2	20'-6"	2	20'-6"	2	20'-6"	2	20'-6"
36	"	A	2	21'-0"	2	21'-0"	2	21'-0"	2	21'-0"	2	21'-0"
37	"	A	2	21'-6"	2	21'-6"	2	21'-6"	2	21'-6"	2	21'-6"
38	"	A	2	22'-0"	2	22'-0"	2	22'-0"	2	22'-0"	2	22'-0"
39	"	A	2	22'-6"	2	22'-6"	2	22'-6"	2	22'-6"	2	22'-6"
40	"	A	2	23'-0"	2	23'-0"	2	23'-0"	2	23'-0"	2	23'-0"
41	"	A	2	23'-6"	2	23'-6"	2	23'-6"	2	23'-6"	2	23'-6"
42	"	A	2	24'-0"	2	24'-0"	2	24'-0"	2	24'-0"	2	24'-0"
43	"	A	2	24'-6"	2	24'-6"	2	24'-6"	2	24'-6"	2	24'-6"
44	"	A	2	25'-0"	2	25'-0"	2	25'-0"	2	25'-0"	2	25'-0"
45	"	A	2	25'-6"	2	25'-6"	2	25'-6"	2	25'-6"	2	25'-6"
46	"	A	2	26'-0"	2	26'-0"	2	26'-0"	2	26'-0"	2	26'-0"
47	"	A	2	26'-6"	2	26'-6"	2	26'-6"	2	26'-6"	2	26'-6"
48	"	A	2	27'-0"	2	27'-0"	2	27'-0"	2	27'-0"	2	27'-0"
49	"	A	2	27'-6"	2	27'-6"	2	27'-6"	2	27'-6"	2	27'-6"
50	"	A	2	28'-0"	2	28'-0"	2	28'-0"	2	28'-0"	2	28'-0"
51	"	A	2	28'-6"	2	28'-6"	2	28'-6"	2	28'-6"	2	28'-6"
52	"	A	2	29'-0"	2	29'-0"	2	29'-0"	2	29'-0"	2	29'-0"
53	"	A	2	29'-6"	2	29'-6"	2	29'-6"	2	29'-6"	2	29'-6"
54	"	A	2	30'-0"	2	30'-0"	2	30'-0"	2	30'-0"	2	30'-0"
55	"	A	2	30'-6"	2	30'-6"	2	30'-6"	2	30'-6"	2	30'-6"
56	"	A	2	31'-0"	2	31'-0"	2	31'-0"	2	31'-0"	2	31'-0"
57	"	A	2	31'-6"	2	31'-6"	2	31'-6"	2	31'-6"	2	31'-6"
58	"	A	2	32'-0"	2	32'-0"	2	32'-0"	2	32'-0"	2	32'-0"
59	"	A	2	32'-6"	2	32'-6"	2	32'-6"	2	32'-6"	2	32'-6"
60	"	A	2	33'-0"	2	33'-0"	2	33'-0"	2	33'-0"	2	33'-0"
61	"	A	2	33'-6"	2	33'-6"	2	33'-6"	2	33'-6"	2	33'-6"
62	"	A	2	34'-0"	2	34'-0"	2	34'-0"	2	34'-0"	2	34'-0"
63	"	A	2	34'-6"	2	34'-6"	2	34'-6"	2	34'-6"	2	34'-6"
64	"	A	2	35'-0"	2	35'-0"	2	35'-0"	2	35'-0"	2	35'-0"
65	"	A	2	35'-6"	2	35'-6"	2	35'-6"	2	35'-6"	2	35'-6"
66	"	A	2	36'-0"	2	36'-0"	2	36'-0"	2	36'-0"	2	36'-0"
67	"	A	2	36'-6"	2	36'-6"	2	36'-6"	2	36'-6"	2	36'-6"
68	"	A	2	37'-0"	2	37'-0"	2	37'-0"	2	37'-0"	2	37'-0"
69	"	A	2	37'-6"	2	37'-6"	2	37'-6"	2	37'-6"	2	37'-6"
70	"	A	2	38'-0"	2	38'-0"	2	38'-0"	2	38'-0"	2	38'-0"
71	"	A	2	38'-6"	2	38'-6"	2	38'-6"	2	38'-6"	2	38'-6"
72	"	A	2	39'-0"	2	39'-0"	2	39'-0"	2	39'-0"	2	39'-0"
73	"	A	2	39'-6"	2	39'-6"	2	39'-6"	2	39'-6"	2	39'-6"
74	"	A	2	40'-0"	2	40'-0"	2	40'-0"	2	40'-0"	2	40'-0"
75	"	A	2	40'-6"	2	40'-6"	2	40'-6"	2	40'-6"	2	40'-6"
76	"	A	2	41'-0"	2	41'-0"	2	41'-0"	2	41'-0"	2	41'-0"
77	"	A	2	41'-6"	2	41'-6"	2	41'-6"	2	41'-6"	2	41'-6"
78	"	A	2	42'-0"	2	42'-0"	2	42'-0"	2	42'-0"	2	42'-0"
79	"	A	2	42'-6"	2	42'-6"	2	42'-6"	2	42'-6"	2	42'-6"
80	"	A	2	43'-0"	2	43'-0"	2	43'-0"	2	43'-0"	2	43'-0"
81	"	A	2	43'-6"	2	43'-6"	2	43'-6"	2	43'-6"	2	43'-6"
82	"	A	2	44'-0"	2	44'-0"	2	44'-0"	2	44'-0"	2	44'-0"
83	"	A	2	44'-6"	2	44'-6"	2	44'-6"	2	44'-6"	2	44'-6"
84	"	A	2	45'-0"	2	45'-0"	2	45'-0"	2	45'-0"	2	45'-0"
85	"	A	2	45'-6"	2	45'-6"	2	45'-6"	2	45'-6"	2	45'-6"
86	"	A	2	46'-0"	2	46'-0"	2	46'-0"	2	46'-0"	2	46'-0"
87	"	A	2	46'-6"	2	46'-6"	2	46'-6"	2	46'-6"	2	46'-6"
88	"	A	2	47'-0"	2	47'-0"	2	47'-0"	2	47'-0"	2	47'-0"
89	"	A	2	47'-6"	2	47'-6"	2	47'-6"	2	47'-6"	2	47'-6"
90	"	A	2	48'-0"	2	48'-0"	2	48'-0"	2	48'-0"	2	48'-0"
91	"	A	2	48'-6"	2	48'-6"	2	48'-6"	2	48'-6"	2	48'-6"
92	"	A	2	49'-0"	2	49'-0"	2	49'-0"	2	49'-0"	2	49'-0"
93	"	A	2	49'-6"	2	49'-6"	2	49'-6"	2	49'-6"	2	49'-6"
94	"	A	2	50'-0"	2	50'-0"	2	50'-0"	2	50'-0"	2	50'-0"
95	"	A	2	50'-6"	2	50'-6"	2	50'-6"	2	50'-6"	2	50'-6"
96	"	A	2	51'-0"	2	51'-0"	2	51'-0"	2	51'-0"	2	51'-0"
97	"	A	2	51'-6"	2	51'-6"	2	51'-6"	2	51'-6"	2	51'-6"
98	"	A	2	52'-0"	2	52'-0"	2	52'-0"	2	52'-0"	2	52'-0"
99	"	A	2	52'-6"	2	52'-6"	2	52'-6"	2	52'-6"	2	52'-6"
100	"	A	2	53'-0"	2	53'-0"	2	53'-0"	2	53'-0"	2	53'-0"
101	"	A	2	53'-6"	2	53'-6"	2	53'-6"	2	53'-6"	2	53'-6"
102	"	A	2	54'-0"	2	54'-0"	2	54'-0"	2	54'-0"	2	54'-0"
103	"	A	2	54'-6"	2	54'-6"	2	54'-6"	2	54'-6"	2	54'-6"
104	"	A	2	55'-0"	2	55'-0"	2	55'-0"	2	55'-0"	2	55'-0"
105	"	A	2	55'-6"	2	55'-6"	2	55'-6"	2	55'-6"	2	55'-6"
106	"	A	2	56'-0"	2	56'-0"	2	56'-0"	2	56'-0"	2	56'-0"
107	"	A	2	56'-6"	2	56'-6"	2	56'-6"	2	56'-6"	2	56'-6"
108	"	A	2	57'-0"	2	57'-0"	2	57'-0"	2	57'-0"	2	57'-0"
109	"	A	2	57'-6"	2	57'-6"	2	57'-6"	2	57'-6"	2	57'-6"
110	"	A	2	58'-0"	2	58'-0"	2	58'-0"	2	58'-0"	2	58'-0"
111	"	A	2	58'-6"	2	58'-6"	2	58'-6"	2	58'-6"	2	58'-6"
112	"	A	2	59'-0"	2	59'-0"	2					

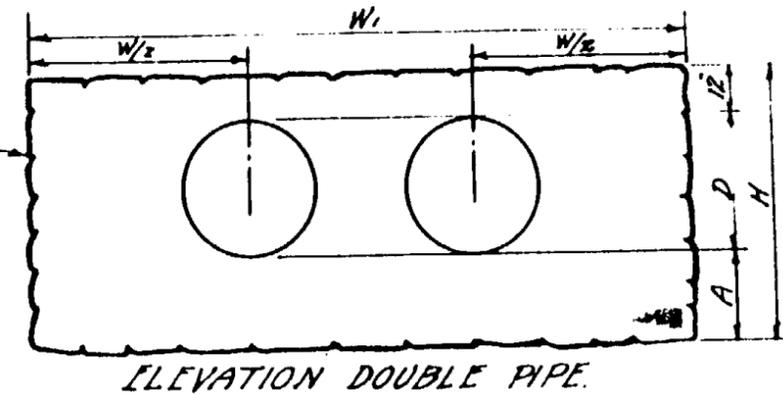
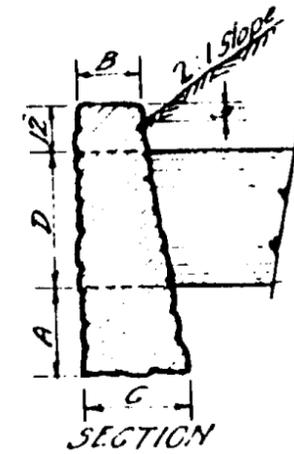
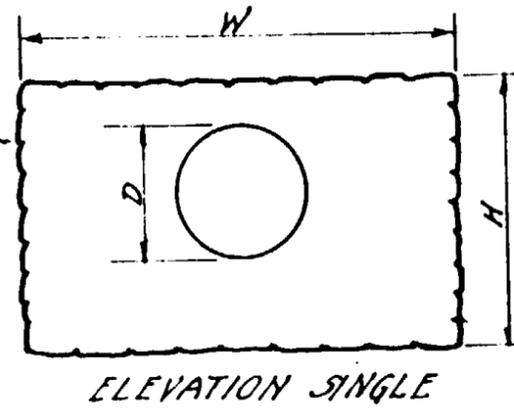
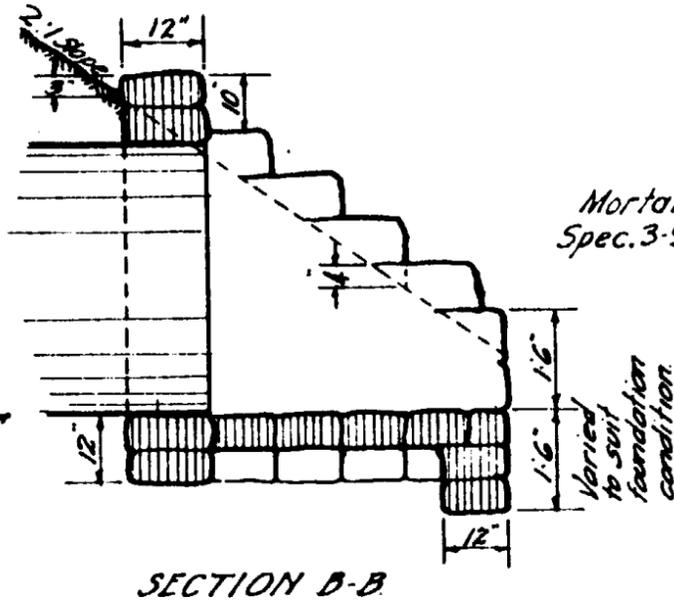
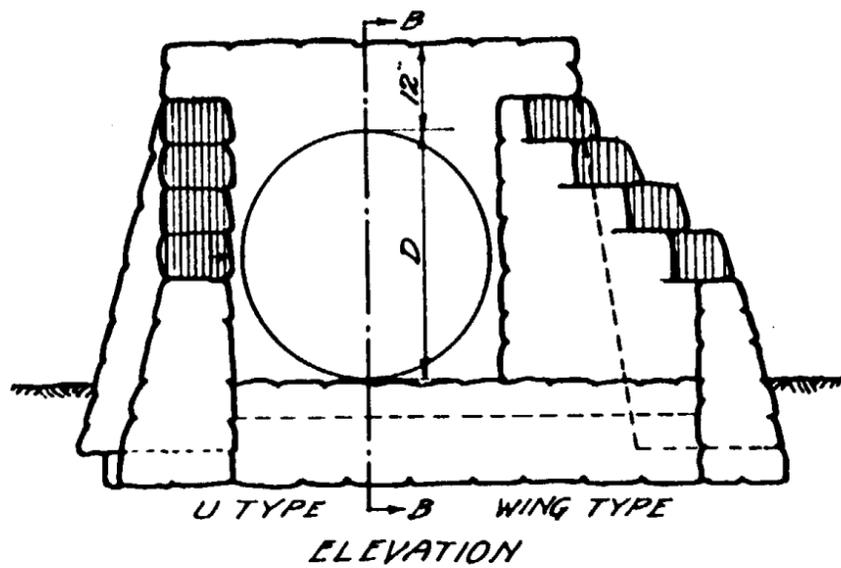


Note - All reinforcing to be $\frac{1}{2}$ " ϕ deformed bars approx. 12" o.c.



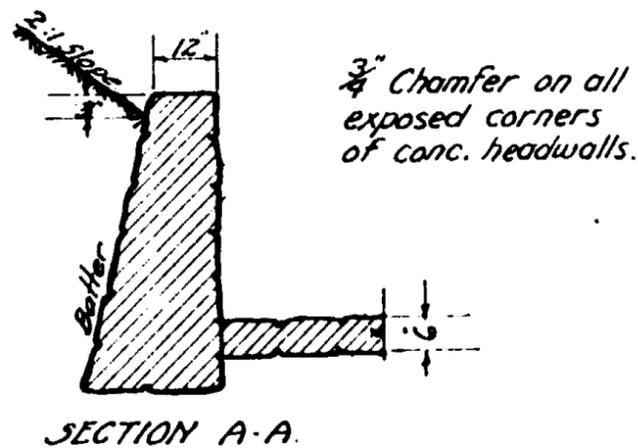
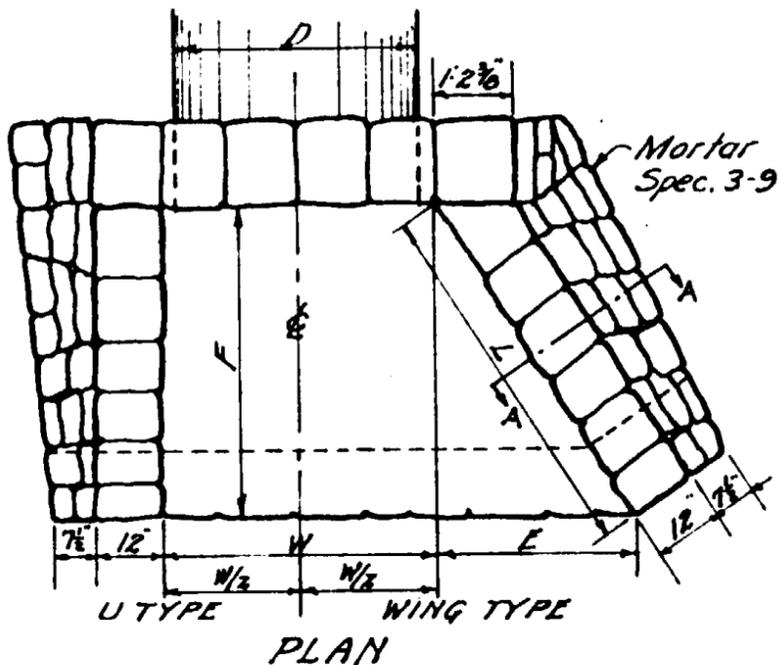
Pipe D	Dimensions				W	Dimensions										Quantities			
	L Single	L Double	X Single	X Double		A	B	C	E	F	G	H	J	K	O	Glass A Conc. %	Reinf. Steel Single	Reinf. Steel Double	
18"	5'-0"	7'-3"	2'-4"	4'-7"	2'-6"	3"	5"	1'-2"	1'-4"	1'-4"	6"	3'-6"	2'-9"	9"	1'-0"	.67	.94	65"	110"
24"	6'-9 $\frac{1}{4}$ "	9'-9 $\frac{1}{4}$ "	3'-4"	6'-4"	3'-1"	6"	8"	1'-8"	1'-8 $\frac{1}{2}$ "	1'-11"	6"	4'-0"	3'-1"	11"	1'-6"	1.07	1.48	90"	150"
30"	8'-0 $\frac{3}{4}$ "	11'-9 $\frac{3}{4}$ "	3'-10"	7'-7"	3'-8"	6"	8"	1'-11"	2'-1 $\frac{1}{2}$ "	2'-6"	6"	4'-6"	3'-5"	1'-1"	2'-0"	1.41	2.09	115"	165"
36"	9'-4"	13'-10"	4'-4"	8'-10"	4'-3"	6"	8"	2'-2"	2'-6"	3'-1"	6"	5'-0"	3'-8"	1'-4"	2'-6"	1.88	2.78	135"	195"
42"	10'-9 $\frac{1}{4}$ "	16'-0 $\frac{1}{4}$ "	5'-0"	10'-3"	4'-11"	6"	8"	2'-6"	2'-10 $\frac{1}{2}$ "	3'-8"	7"	5'-6"	4'-0"	1'-6"	2'-9"	2.64	3.78	196"	268"

ARIZONA HIGHWAY DEPARTMENT		REV.
PLANS DIVISION		
DROP INLET HEADWALLS		
DRAWN	K.S. Oct. 1939	DRAWING NO.
TRACED	K.S. Oct. 1939	C-11
CHECKED	H.H. C.	
APPROVED	E.J. Miller	



A.S.T.M. MIN. SHELL THICKNESS OF CONCRETE PIPE

In. Diam.	Shell Thickness
18	2"
24	3"
30	3½"
36	4"
42	4½"
48	5"
54	5½"
60	6"



STRAIGHT TYPE HEADWALLS

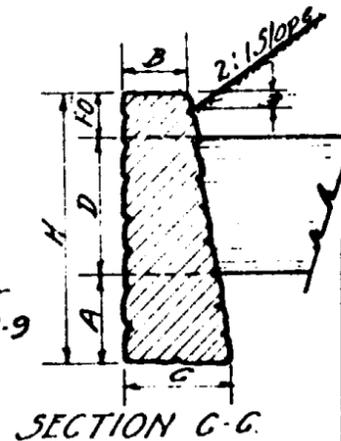
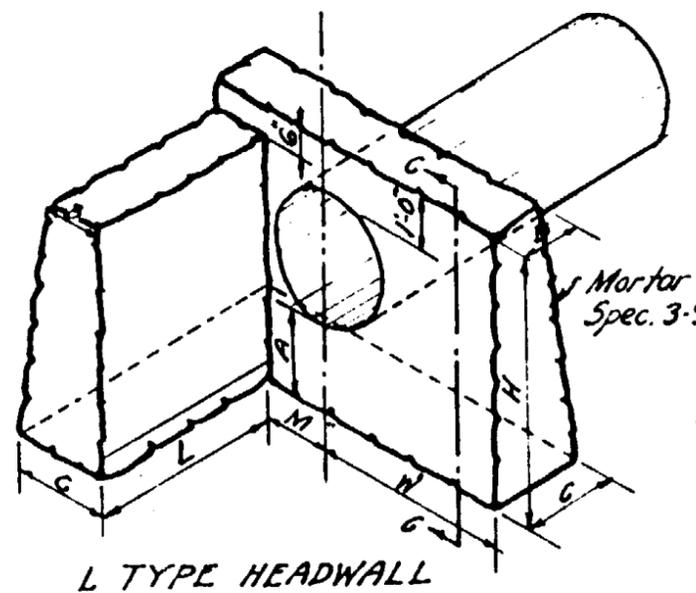
Diam. D	Dimensions				Single Pipe		Double Pipe	
	A	B	C	H	W	Cu. Yds.	W	Cu. Yds.
18	1-0"	1-0"	1-4"	3-11"	7-0"	1.11	9-8"	1.59
24	1-4"	1-0"	1-8"	4-10"	8-0"	1.75	11-6"	2.43
30	1-8"	1-0"	2-0"	5-9"	10-6"	3.08	14-7"	4.11
36	2-0"	1-0"	2-4"	6-8"	13-0"	5.05	17-8"	6.58

Note - Quantities are for one headwall only.

WING AND U TYPE HEADWALLS

Diam. D	Wing Type			U Type			Double Pipe			
	L	F	W	Area S.F.	Cu. Yds.	Cu. Yds.	W	Area S.F.	Cu. Yds.	Cu. Yds.
30"	2'-0 1/2"	1'-6"	3'-7"	4.91	2.52	2.57	7'-8"	9.82	3.93	3.88
36"	3'-7 1/2"	2'-0"	4'-2"	7.07	3.36	3.56	8'-10"	14.14	4.51	4.71
42"	4'-6"	2'-6"	4'-9"	9.62	4.31	4.71	10'-0"	19.24	5.73	6.13
48"	5'-5"	3'-0"	5'-8"	12.56	5.40	6.03	11'-2"	25.12	7.17	7.74
54"	6'-3 1/2"	3'-6"	6'-6"	15.90	6.66	7.57	12'-4"	31.80	8.70	9.57
60"	7'-2 1/2"	4'-0"	7'-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. See table for shell thickness of various sizes of pipe. Dimension W to be increased to take care of increased width or length due to skew.



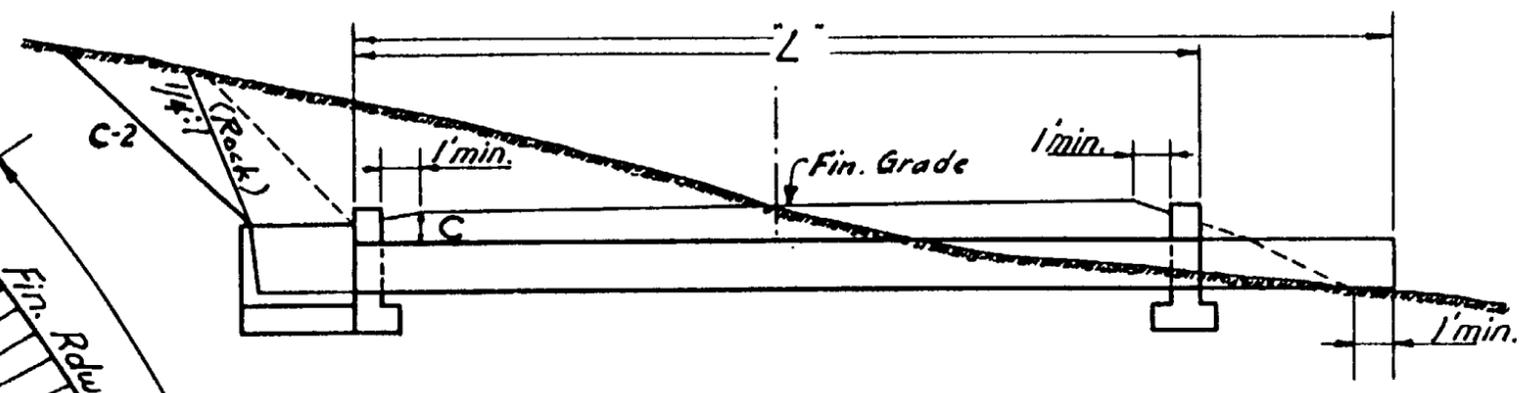
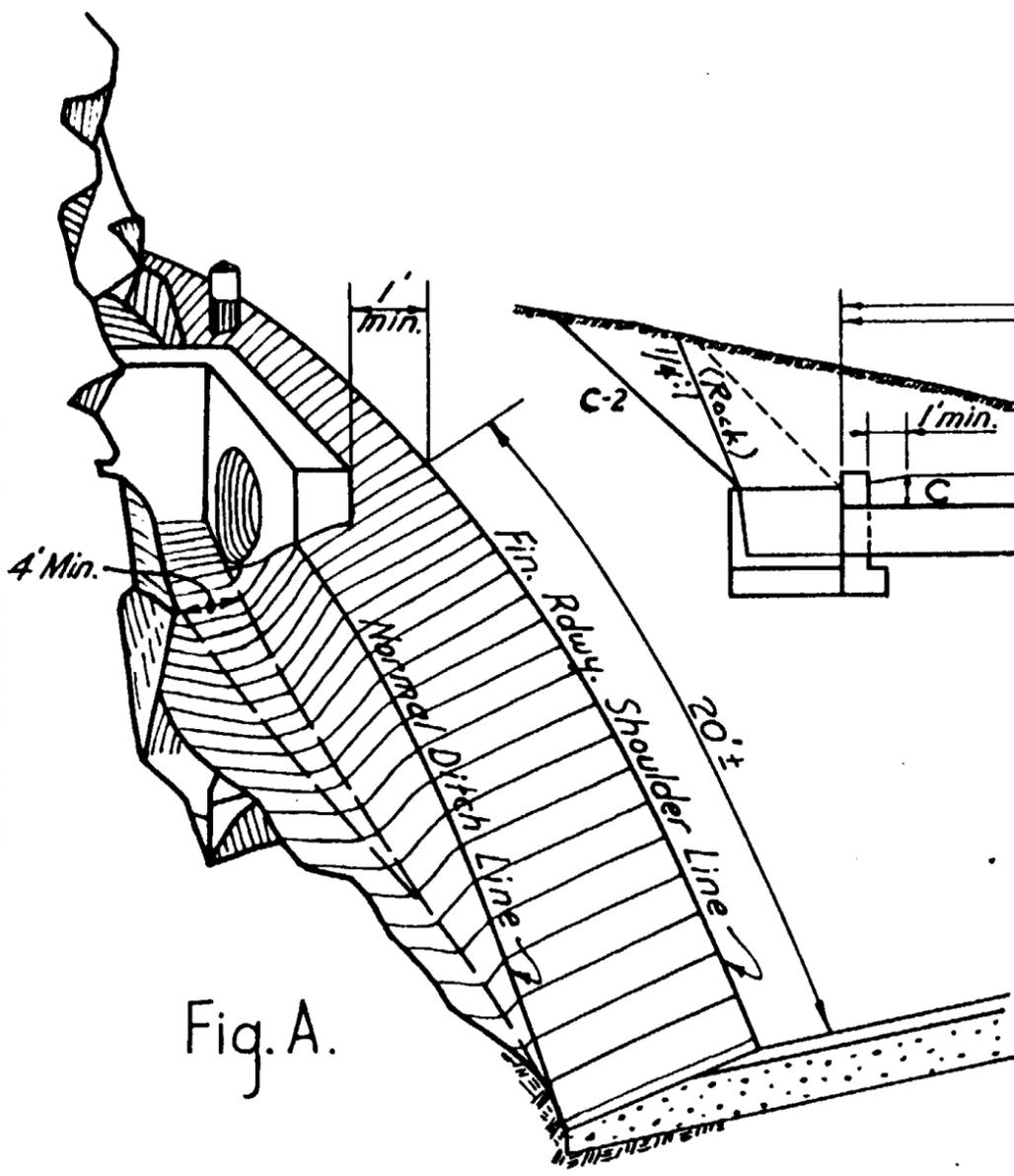
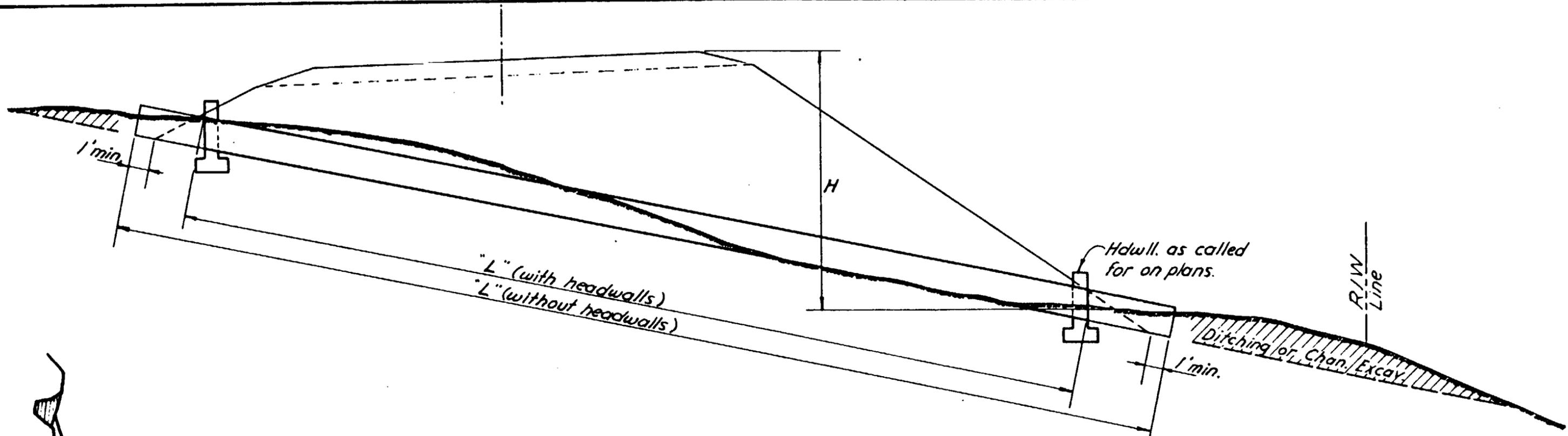
L TYPE HEADWALLS

Diam. D	Dimensions						Cu. Yds.	M.
	A	B	C	H	W	L		
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.R.R. DRAWING 1936	DRAWING NO. C-12
TRACED BY	K.S. JUNE, 1933	
CHECKED BY	M.W. JULY 1938	
APPROVED	<i>E. Miller</i>	



Length of culvert "L", shall be computed in even 2' lengths for C.M.P. and Conc. Pipes as a basis for estimates. Each side where height of embankment "H" is more than 10', add $\frac{3}{10}H$ to measured "L" to obtain total length required. Inside face of headwall should be at least 1' outside of finished shoulder line.

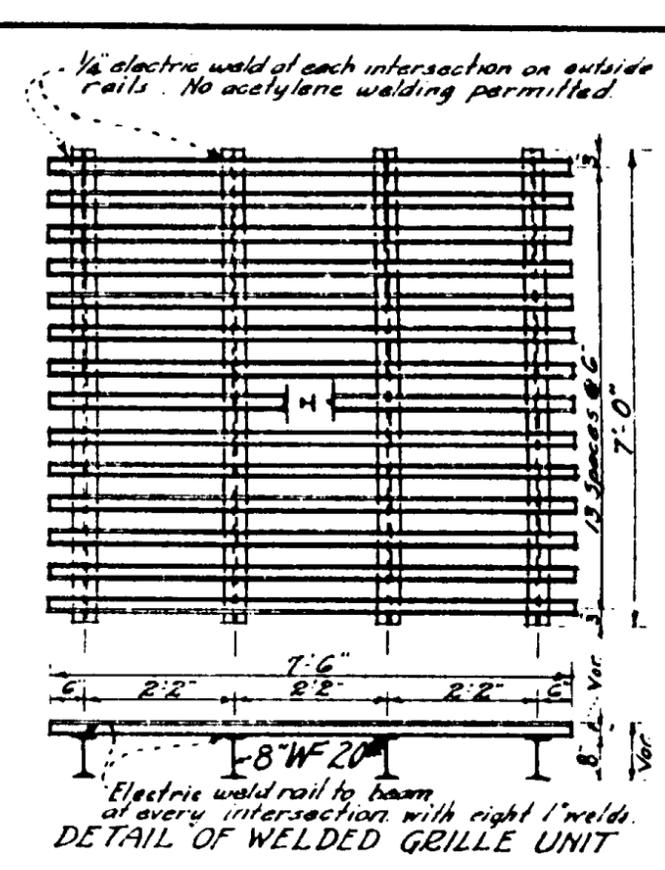
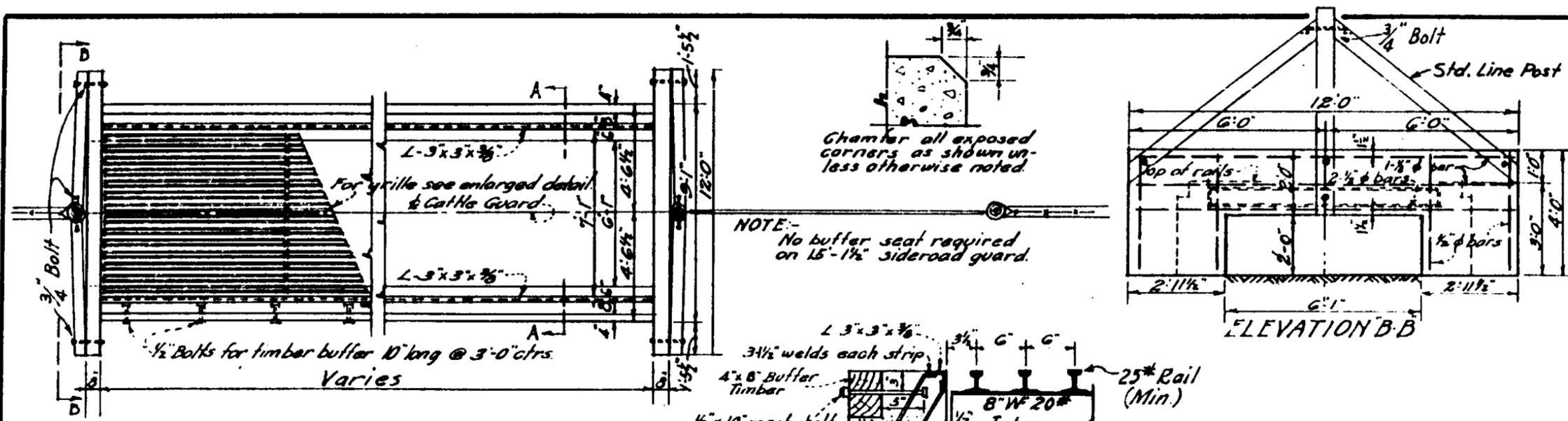
Pipe should be laid on a straight gradient (1% min.) and on solid base at all points.

Minimum cover "C" shall be 24" for standard strength tile or conc. pipes and 9" for double strength conc., tile, or corrugated metal pipes.

Catch basins, in connection with angle headwalls, shall be excavated as shown in Fig. A and classed as channel excavation.

Warp embankment slopes at pipe culverts to 2:1 where Std. C-2 calls for flatter slopes.

ARIZONA HIGHWAY DEPARTMENT		REV. 3-20-50
PLANS DIVISION		
PIPE CULVERT INSTALLATION		
DRAWN	GH Nov. 1945	DRAWING NO. C-13
TRACED	GH Nov. 1945	
CHECKED	H.H. Jessel	
APPROVED PLANS ENGR.	E. Miller	

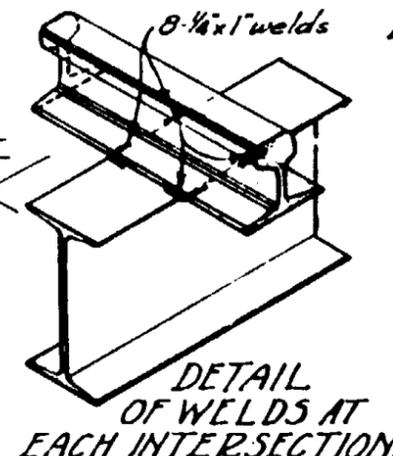
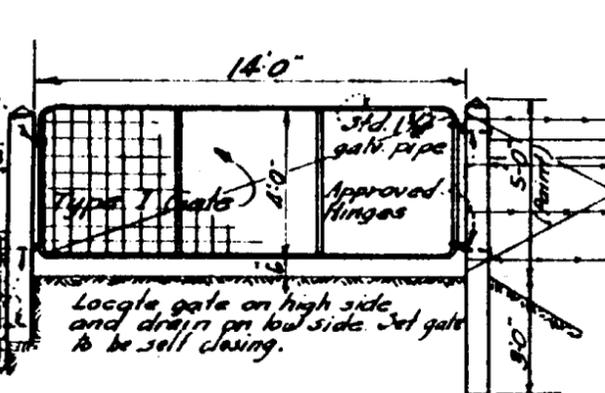
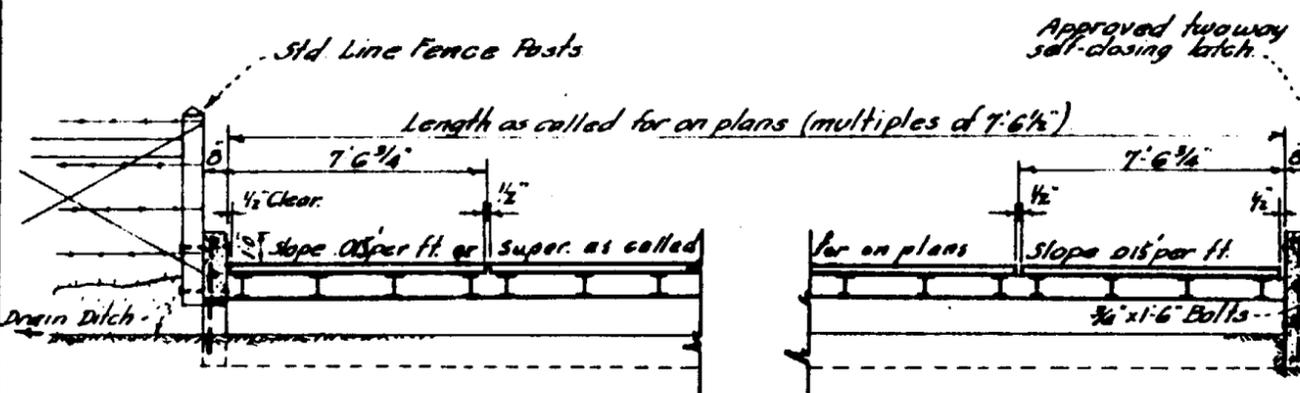


Paint Note:-
 Shop Coat - All rails and structural steel to be painted 1 coat paint No. 1
 All posts 1 coat paint No. 7 and 1 coat paint No. 8

GENERAL PLAN

PART SECTION A-A
 Rail Treads

DETAIL OF WELDED GRILLE UNIT

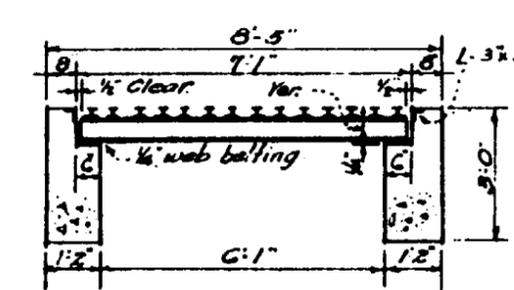
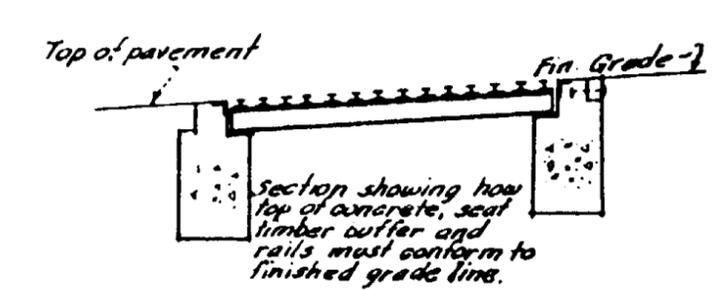


SECTION ON CENTER LINE FOR ANY WIDTH ROADWAY

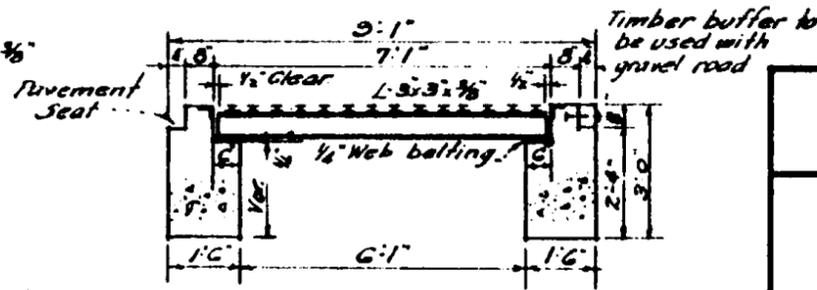
DETAIL OF WELDS AT EACH INTERSECTION

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.

MATERIAL LIST					
Item	Qty	Size	Length	Steel	Concr
Common to all guard lengths					
Post/bound	2	6" x 6" min			
"	5	8" 0"			
Bolts	10	3/4" 8"	1' 6"		
Reinf. Bars	8	1/2" 8"	11' 6"	60.70	
"	3	3" 6"	18' 40"		
Gate	1	14'-0" x 14'-0"	Complete		
6 Unit - 40' Roadway					
Concrete					14.9
Fabricated L	2	3x3x3/8	45'-4"		
Web Bolting	48	6" x 6" x 1/4"			
3 Unit - 34' Roadway					
Concrete					12.71
Fabricated L	2	3x3x3/8	37'-9"		
Web Bolting	48	6" x 6" x 1/4"			
4 Unit - 28' x 28' Roadway					
Concrete					10.53
Fabricated L	2	3x3x3/8	30' 7 1/2"		
Web Bolting	36	6" x 6" x 1/4"			
2 Unit - SIDEROAD					
Concrete					5.23
Fabricated L	2	3x3x3/8	13'-1"		
Web Bolting	16	6" x 6" x 1/4"			



FOR SIDEROAD ONLY
 No buffer seat required.



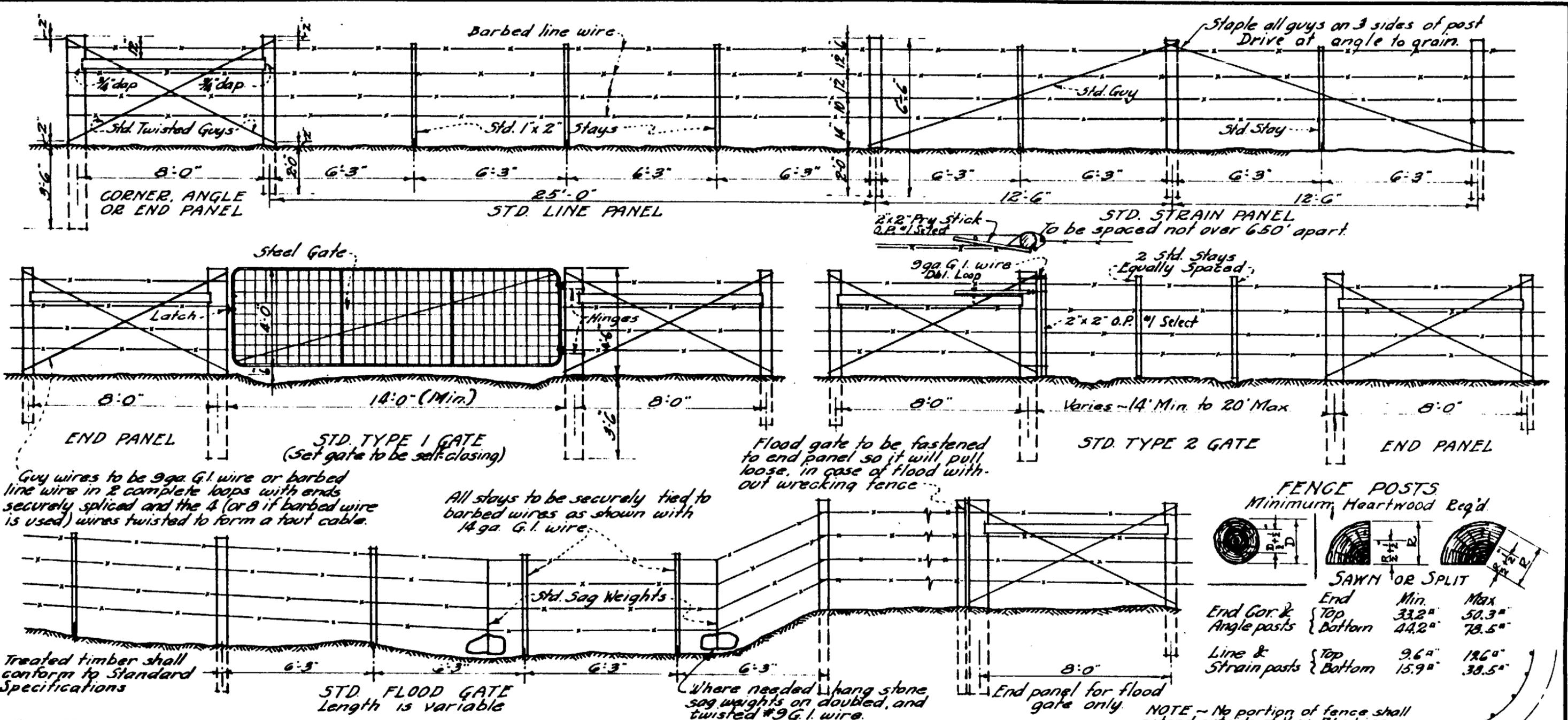
FOR ROADWAYS OF 24' OR MORE
 SECTION A-A

ARIZONA HIGHWAY DEPARTMENT
 PLANS DIVISION

CATTLE GUARDS

DRAWN	W.M.D. MAY, 1936	DRAWING NO. C-14
TRACED	K.S. JUNE, 1938	
CHECKED	H.W. JULY, 1938	
APPROVED BY GR PLANS	G. Miller	

REV. Weld 5/15/44
 I Paper 6/8/47
 3-20-50



LIST OF MATERIALS

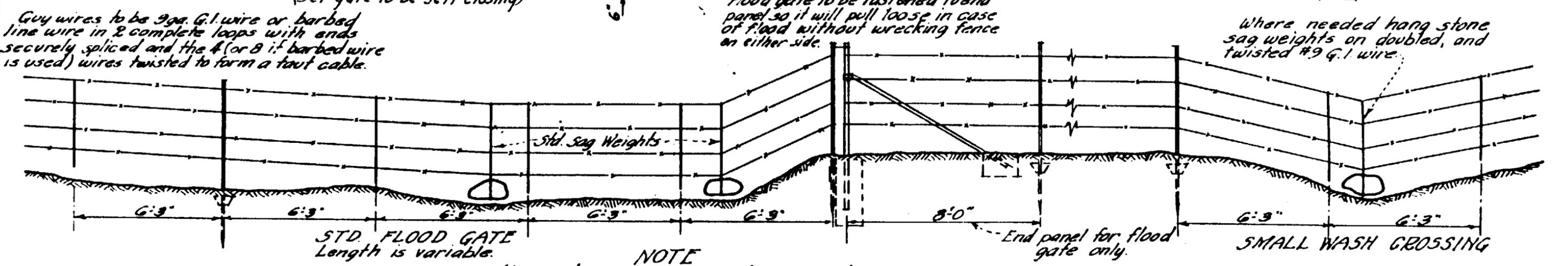
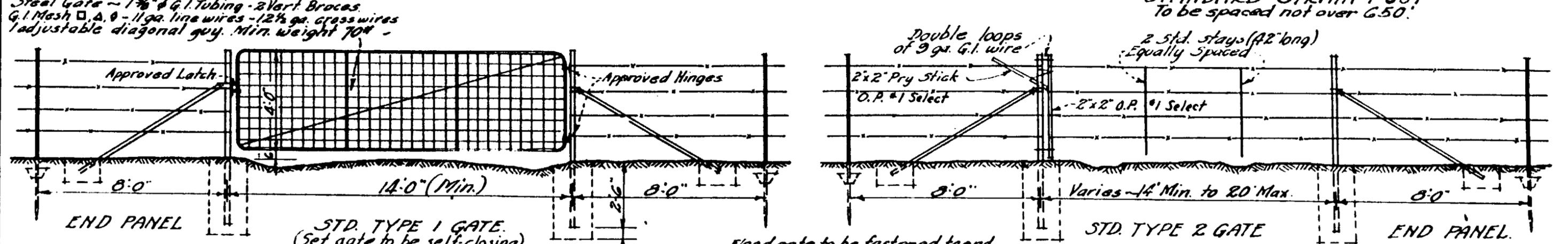
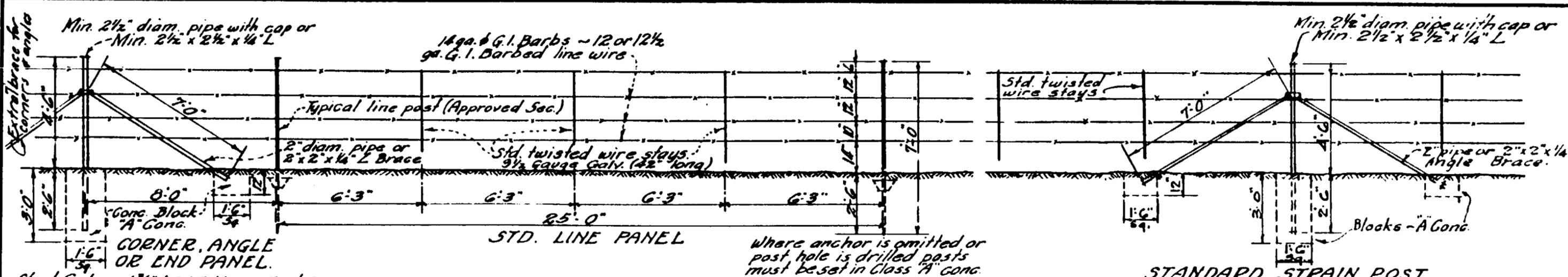
ITEM	SPECIFICATION	ITEM	SPECIFICATION
End, corner & Angle Posts	Native Juniper, Native Cedar or Native Cypress 8' long - 6 1/2" to 8" top diam. - 7 1/2" to 10" butt diam. or Treated Timber 6" x 6" x 8'-0"	Type 1 Gate	Frame - 1 1/2" diam G.I. Tubing - 2 Vert. braces (G.I.) Filler fabric - G.I. Mesh □, △, or ◇ - Line wires 11 ga. - Cross wires 12 1/2 ga. - One adjustable diagonal guy from corner to corner. Min. weight of gate - 70 lbs.
Line & Strain Posts	Native Juniper, Native Cedar or Native Cypress 6'-6" Long - 3 1/2" to 5" top diam. - 4 1/2" to 7" butt diam. or Treated Timber 4" x 4" x 6'-6"	Hinges #1 Gate	Approved rustproof malleable iron or steel.
Gate Post #1 Gate	Native Juniper, Native Cedar or Native Cypress 8' long - 8" Min. diam. or Treated Timber 6" x 6" x 8'-0"	Latch #1 Gate	Approved 2 way self closing rustproofed malleable iron or steel.
Barbed line wire	G.I. Barbed Cattle wire 12 or 12 1/2 ga. - 14 gauge round barbs @ 5" intervals	Loops #2 Gate	9 ga. Galv. wire.
Fence Stays	Rough Sawn Yellow Pine - 1" x 2" x 4'-4"	Sag weights	9 ga Galv. wire (and stone)
End panel braces	Native Juniper, Cedar or Cypress - 4" to 6" diam. or Treated Timber - 4" x 4"	Stay tie wires	14 ga. Galv. wire.
End Piece #2 Gate	Rough Sawn O.P. #1 Select 2" x 2" x 4'-6"	Guy wires	9 ga. Galv. wire.
		Staples	1 1/2" polished wire.
		Nails for braces	16 d. Galv. wire.

ARIZONA HIGHWAY DEPARTMENT
PLANS DIVISION

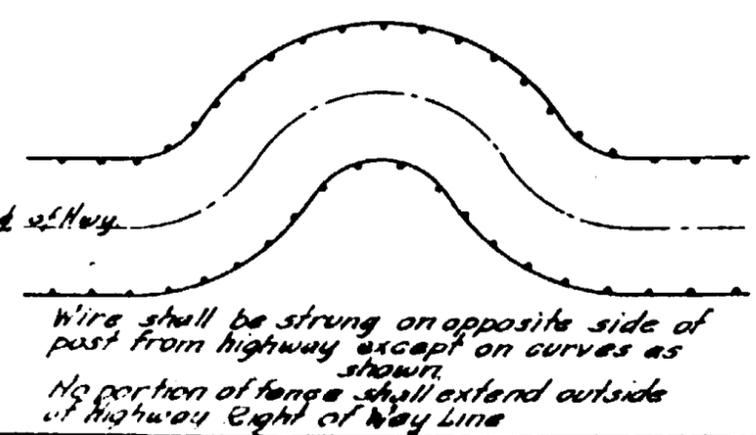
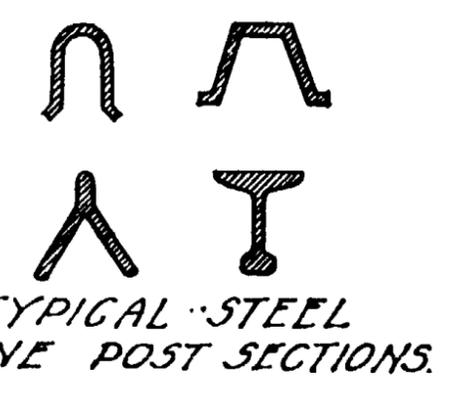
**LINE FENCE AND GATES
WOOD POSTS**

DRAWN K.S. 6/1/38	DRAWING NO. C-15
TRACED K.S. 6/1/38	
CHECKED H.H.W. 7/20/38	
APPROVED E. Miller	

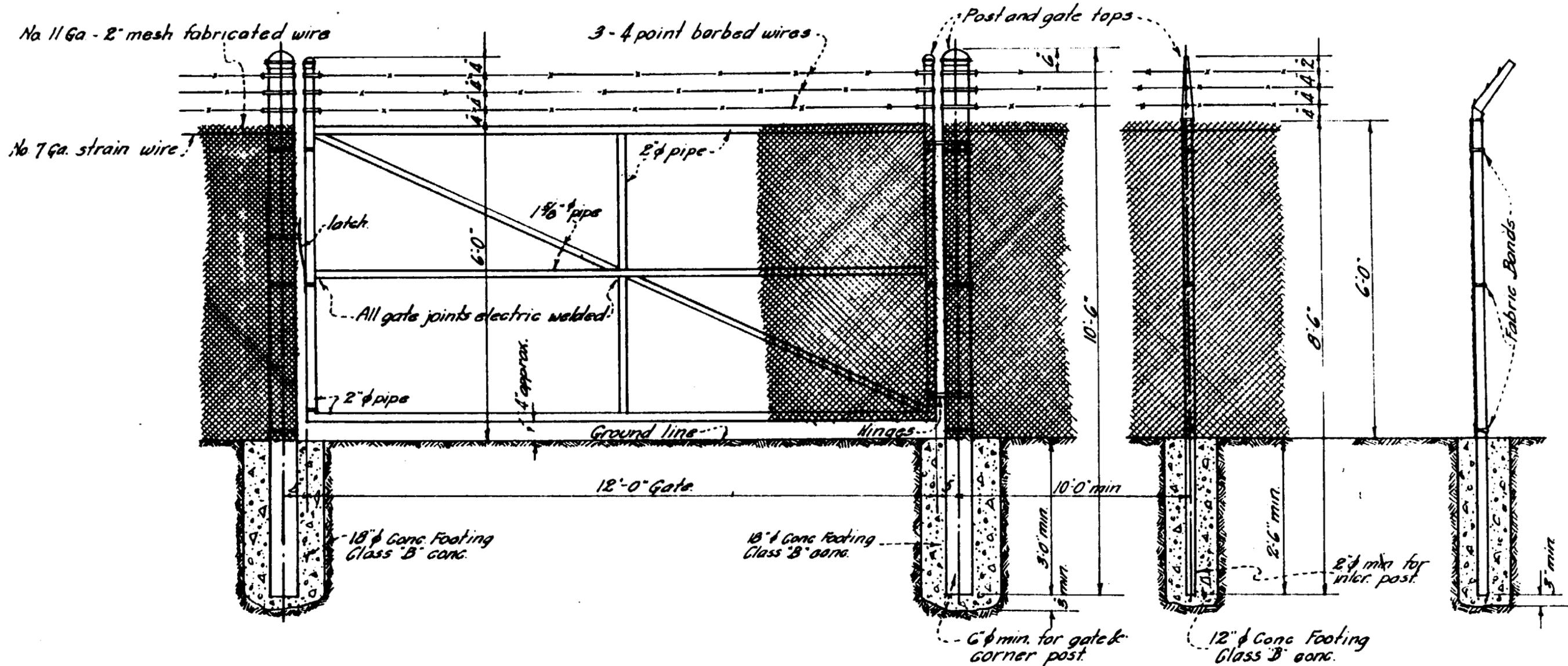
REV. Heartwood 3-25-41
Revised Timmer 8-1-41
3-20-50



NOTE
Line posts may be T-rail, U-section or similar commercial production (excepting angles or ells). They shall be rail steel grade and rolled from standard section tee rails or re-rolled rails, both produced by the open hearth process. They shall have punched web, knobs or corrugated gages to hold wire in position and weigh 1.93 lbs. per ft. exclusive of anchor, with a minus variation of 2% allowed. Clamps of 10 gauge (or heavier) galv. wire shall be provided for attaching fence and punched lug type fasteners are not permitted. All posts and braces shall be painted to manufacturers standard or galvanized.

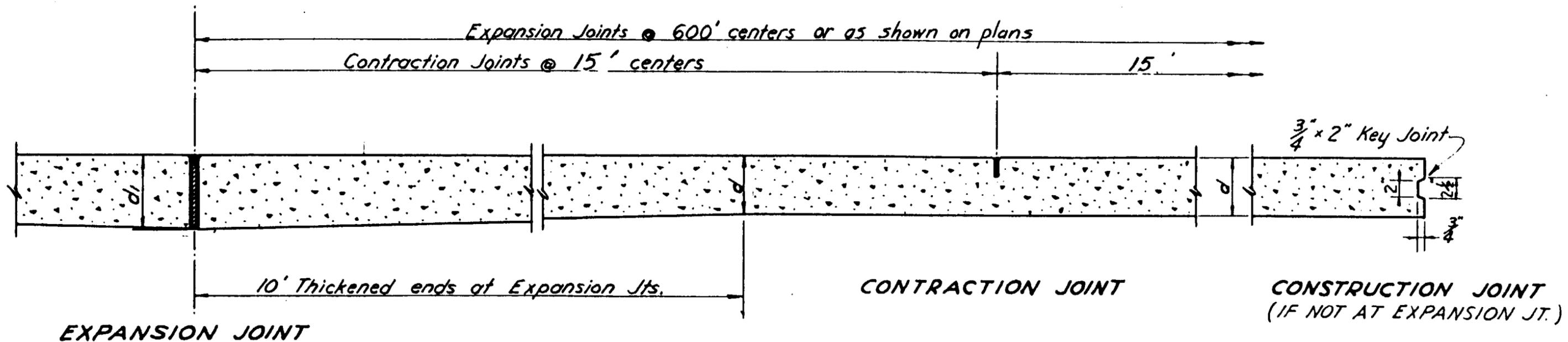


ARIZONA HIGHWAY DEPARTMENT		REV.
PLANS DIVISION		5/25/38
LINE FENCE AND GATES		6/17/38
STEEL POSTS		3-20-50
DRAWN	K.S. JUNE, 1938	DRAWING NO.
TRACED	K.S. JUNE, 1938	C-16
CHECKED	H.H.W. July 1938	
APPROVED	E. Miller	

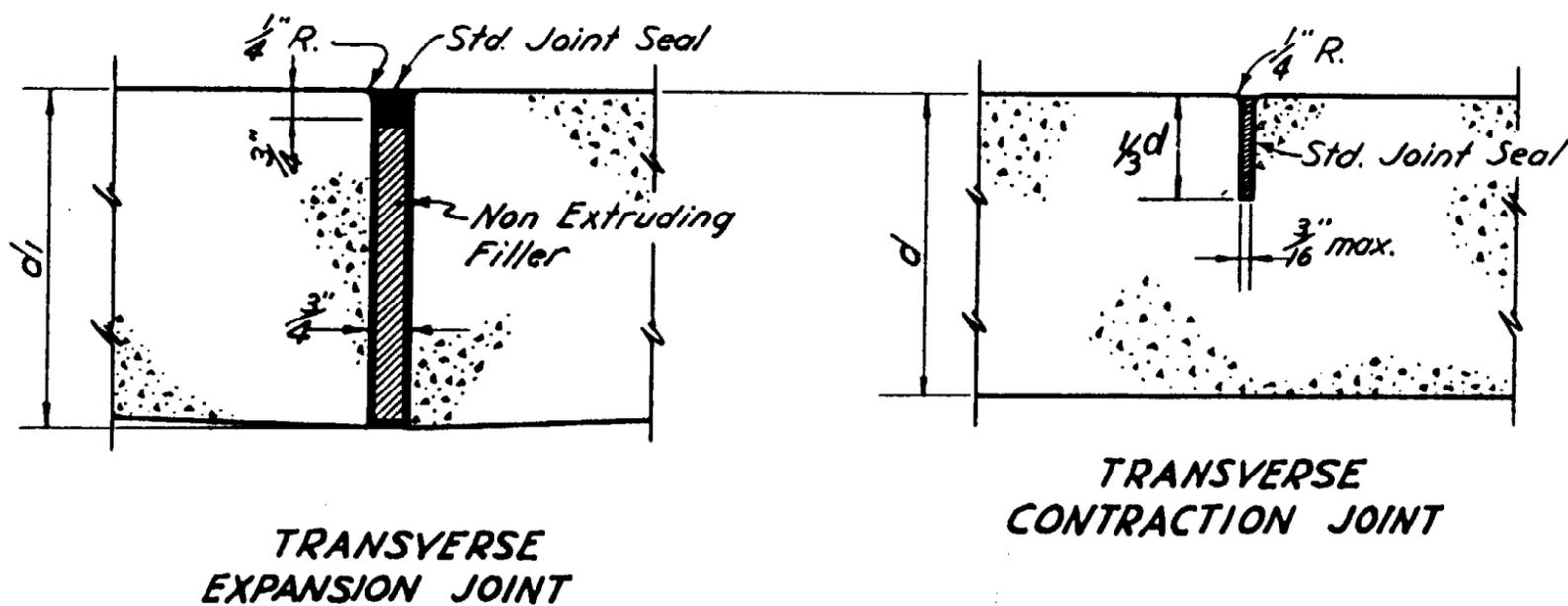


FABRICATED WIRE FENCE & GATE.
 Any standard make of fence may be used which is similar
 to detail shown above. Entire assembly to be hot galvanized.

ARIZONA HIGHWAY DEPARTMENT		REV.
PLANS DIVISION		
INDUSTRIAL TYPE FABRICATED WIRE FENCE		
DRAWN BY W.M.D. Jan. 1936	DRAWING NO.	C-17
TRACED BY K.S. July 1938		
CHECKED BY H.H.V. July 1938		
APPROVED BY Eng'g of Plans E. Miller		

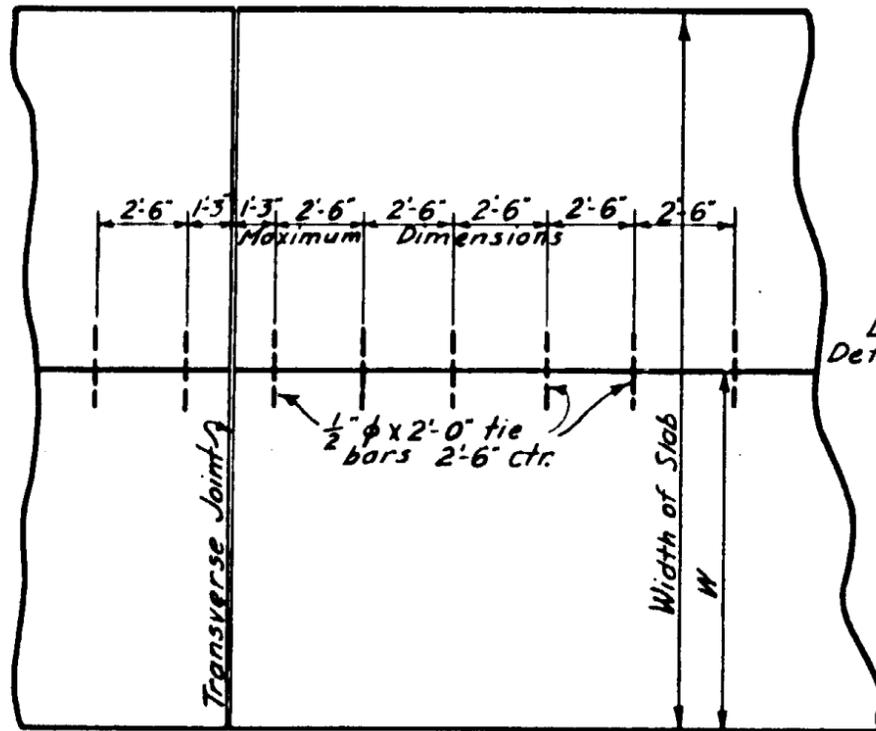


LONGITUDINAL SECTION THRU PAVEMENT

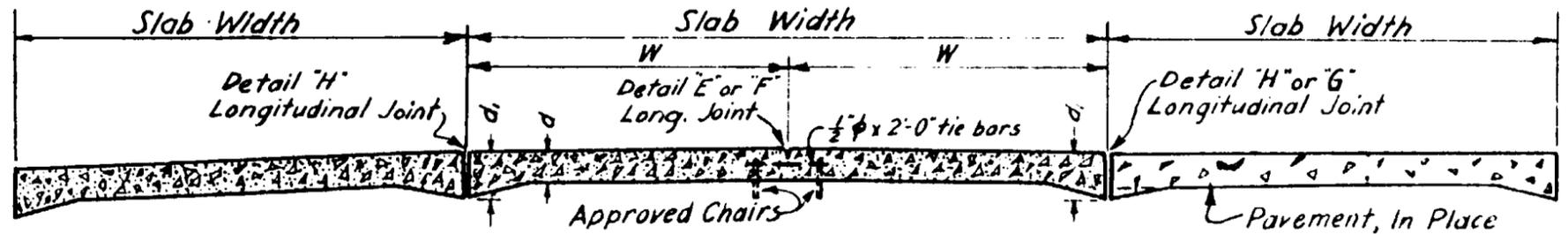


All general requirements may be superseded by special notations on the plans.
 At intersections of side roads or streets, joints shall be so placed as to give the intersection a symmetrical appearance and to conform to the cross section of the intersecting road or street.

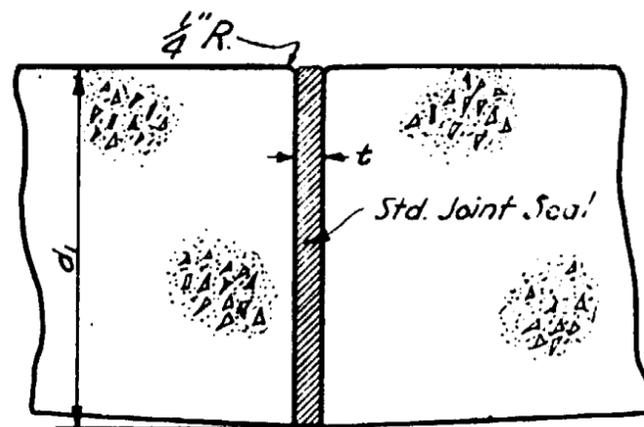
ARIZONA HIGHWAY DEPARTMENT		REV. 3/17/50
PLANS DIVISION		
TRANSVERSE JOINTS FOR PORTLAND CEMENT CONCRETE PAVEMENT		
DRAWN	GH Jan. 1946	DRAWING NO. C-18
TRACED	GH Jan. 1946	
CHECKED	HHW	
APPROVED ENGR. PLANS	E. Miller	



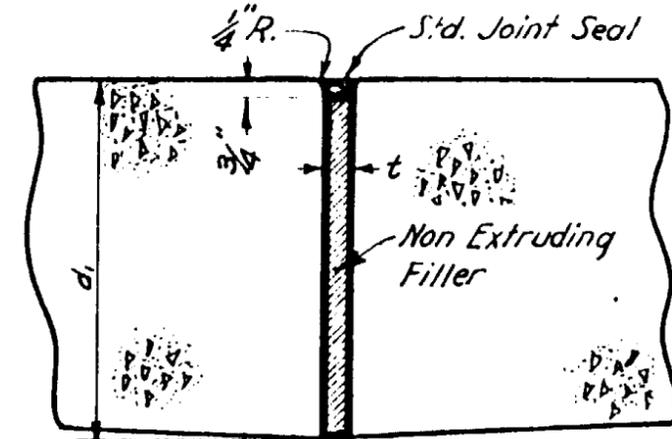
PLAN OF LONGITUDINAL JOINT
DETAIL "E" OR "F"



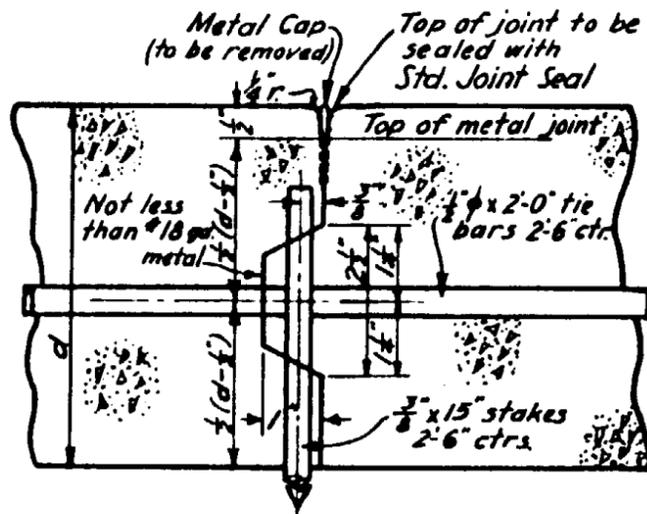
CROSS-SECTION



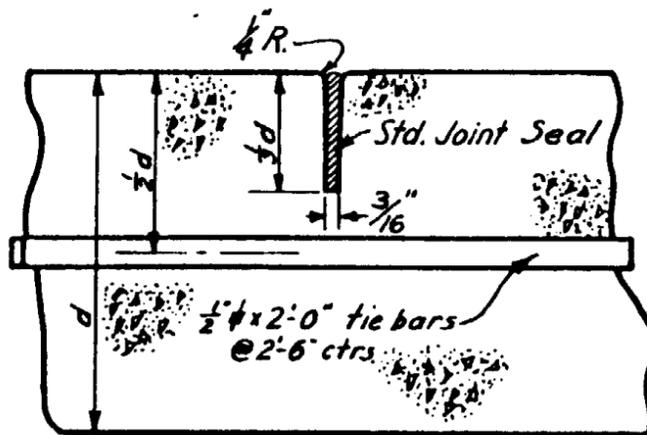
LONGITUDINAL JOINT
DETAIL "G"



LONGITUDINAL JOINT
DETAIL "H"



LONGITUDINAL JOINT
DETAIL "E"



LONGITUDINAL JOINT
DETAIL "F"

GENERAL NOTES

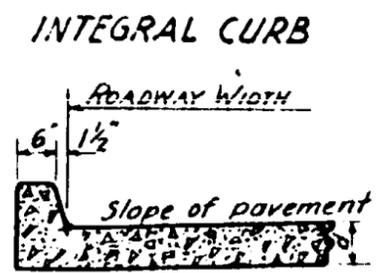
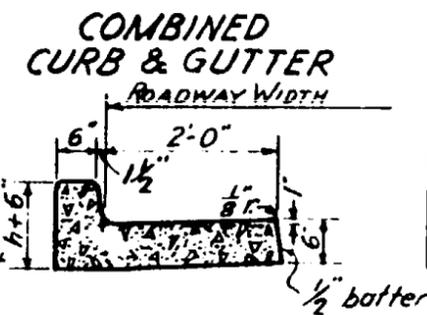
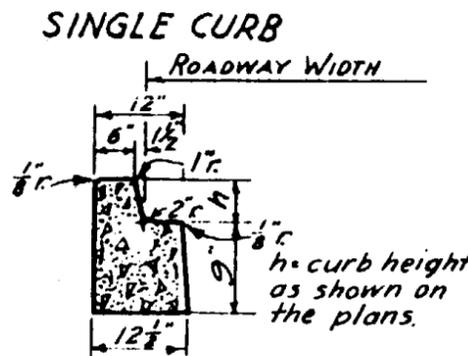
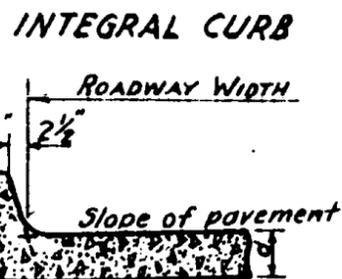
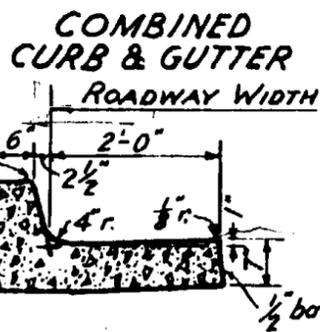
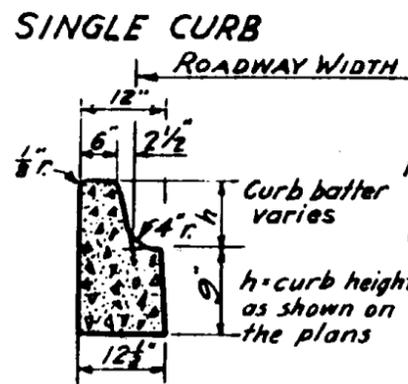
Width (t) of longitudinal expansion joints shall be $\frac{1}{2}$ " unless otherwise noted on the plans.
 All tie bars in center joints shall be deformed bars and shall have unbroken bond. They shall be held securely in place, parallel to the subgrade & perpendicular to the center line of the road, by the use of metal chairs of approved design and made for that purpose.
 The edging tool used for all longitudinal joints shall be so constructed as to provide a smooth troweled surface 3" wide on each side of the joint.

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

If approved by the District Engineer, other deformations may be used.

ARIZONA HIGHWAY DEPARTMENT PLANS DIVISION			REV. 5-29-35 744 Details 8-1-41 W 8-7-41 1-17-46
LONGITUDINAL JOINTS FOR PORTLAND CEMENT CONCRETE PAVEMENT			
DRAWN	O.K.	MAR. 1935	DRAWING NO. C-19
TRACED	M.A.K.	JUNE 1938	
CHECKED	H.H.W.	JULY 1938	
APPROVED ENGR. PLANS	E. Miller		

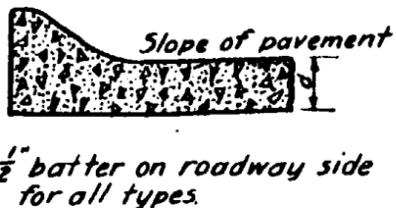
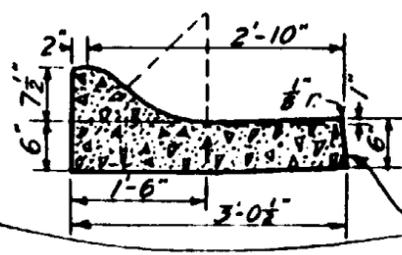
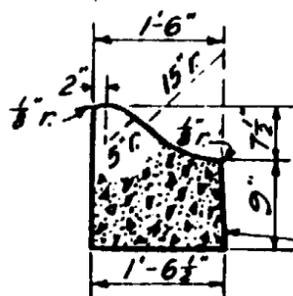
NOTE: - Eodii shown for single curbs are typical throughout for respective type.



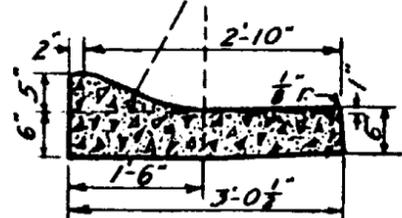
TYPE "A" (For 6" curb height or over)

d = pavement thickness as shown on the plans.

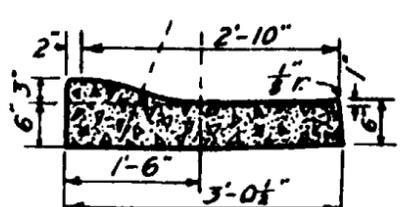
TYPE "B" (For curb height of less than 6")



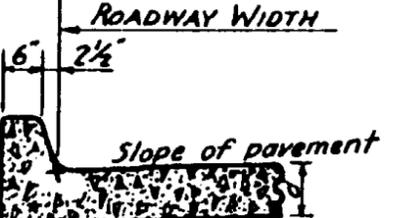
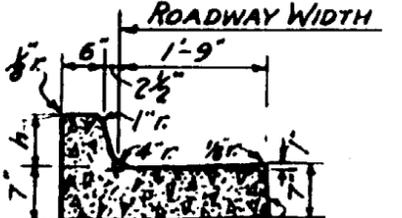
TYPE "C"



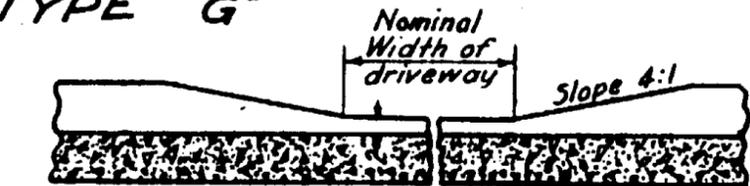
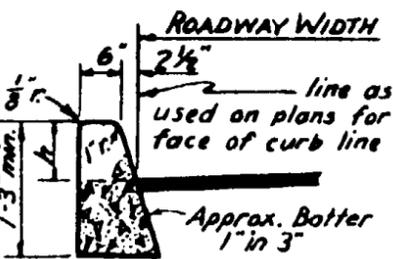
TYPE "E"



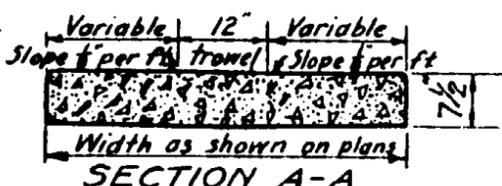
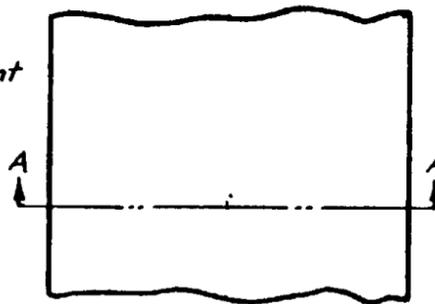
TYPE "F"



TYPE "G"



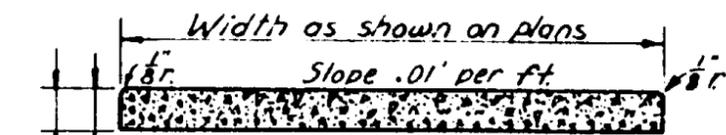
DEPRESSED CURB FOR DRIVEWAY ENTRANCE



VALLEY GUTTER

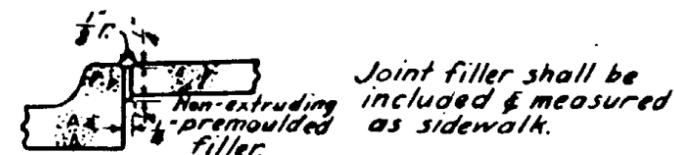
GENERAL NOTES

All curbs & gutters to be single course Class "A" concrete unless otherwise specified on the plans. Where plaster coat is called for it shall consist of 1/2" of 1:2 cement mortar on exposed surfaces of curb & gutter.
 All curbs shall be trowel finished.
 All flow lines of gutters shall be troweled to an accurate grade for a width of 9".
 Curbs, or curb & gutter shall have a 1/4" open expansion joint, extending all the way through the concrete, every 20 feet.
 In integral curb all expansion & contraction joints shall extend through the curb.
 Expansion joints to be placed at all radius points.



Sidewalk shall be single course Class "A" concrete, float finished and shall be marked in squares.
 A 1/4" open expansion joint shall be placed every 15 ft and a 1/2" pre-moulded filler joint between sidewalk & curb, as shown in detail below.
 Sidewalk across driveways shall be 6" thick.

CONCRETE SIDEWALK

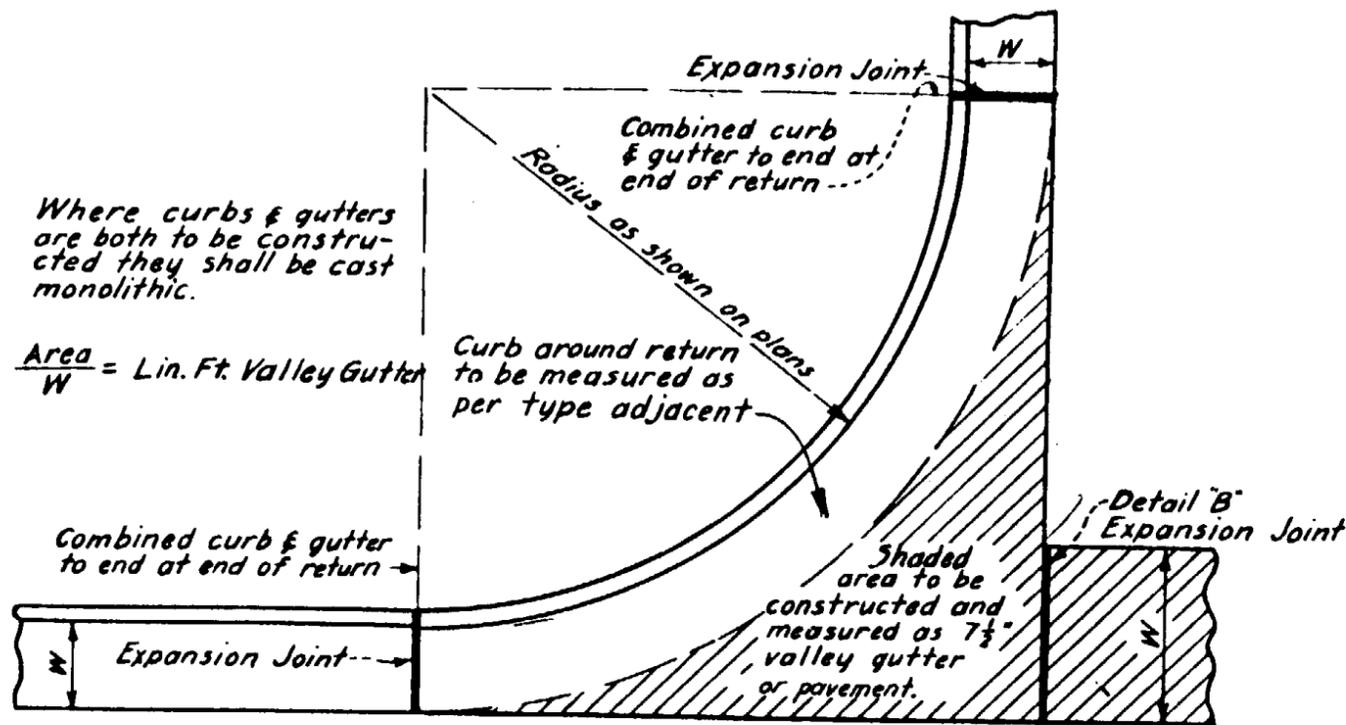


EXPANSION JOINT BETWEEN CURB & SIDEWALK

ARIZONA HIGHWAY DEPARTMENT PLANS DIVISION		REV. 2 8 50 3 11 50 3-31-50
CONCRETE CURBS, GUTTERS & SIDEWALKS		
DRAWN TRACED CHECKED APPROVED ENGR PLANS	D.K. MAR. 1935 H.A.K. JUNE 1938 H.M.Y. JULY 1938 E. Miller	DRAWING NO. C-20

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

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



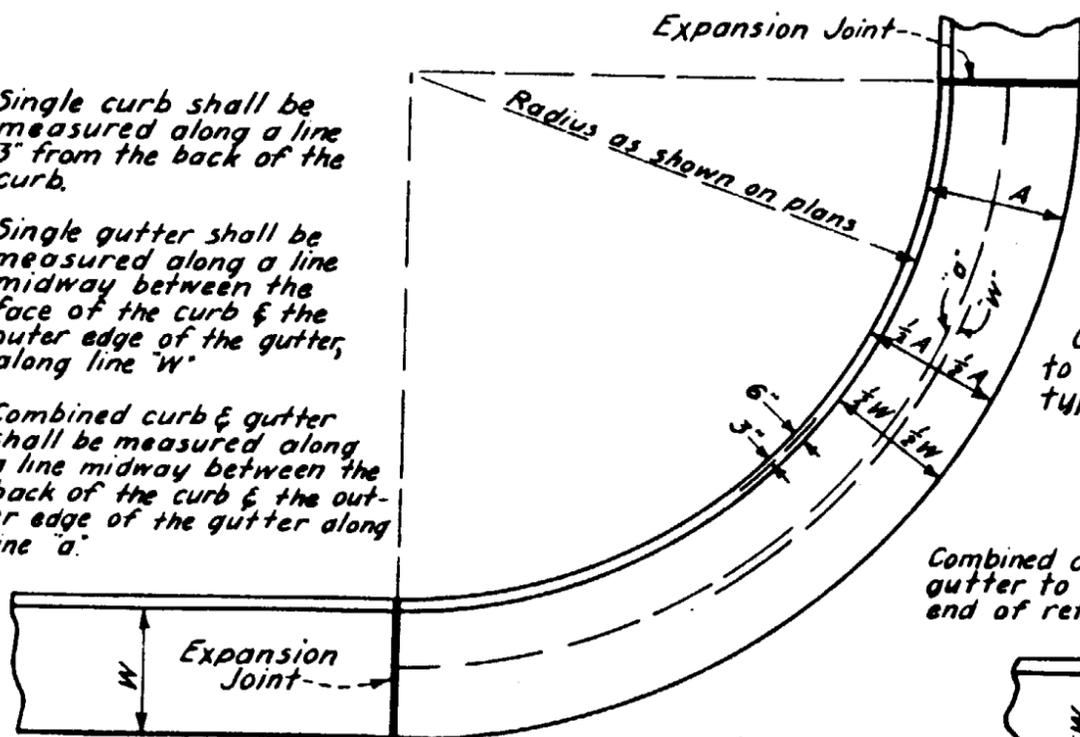
TYPICAL CONSTRUCTION OF VALLEY GUTTER AT STREET INTERSECTION OR ALLEY

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".

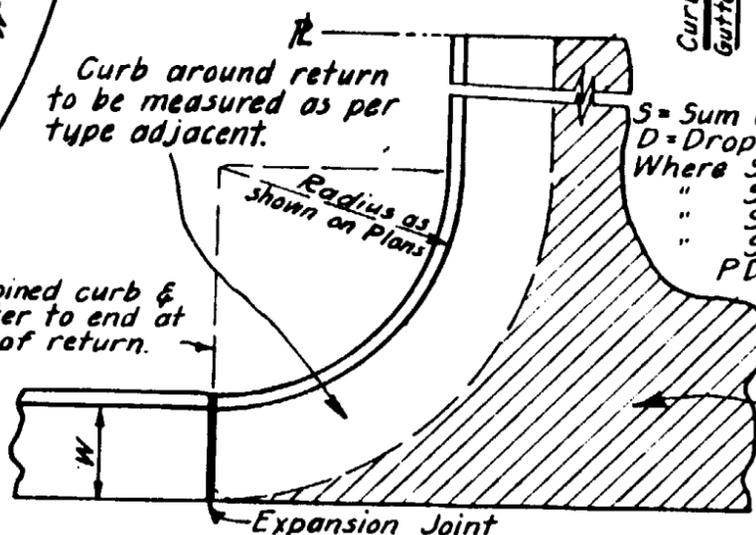
Combined curb & gutter shall be measured along a line midway between the back of the curb & the outer edge of the gutter along line "a".



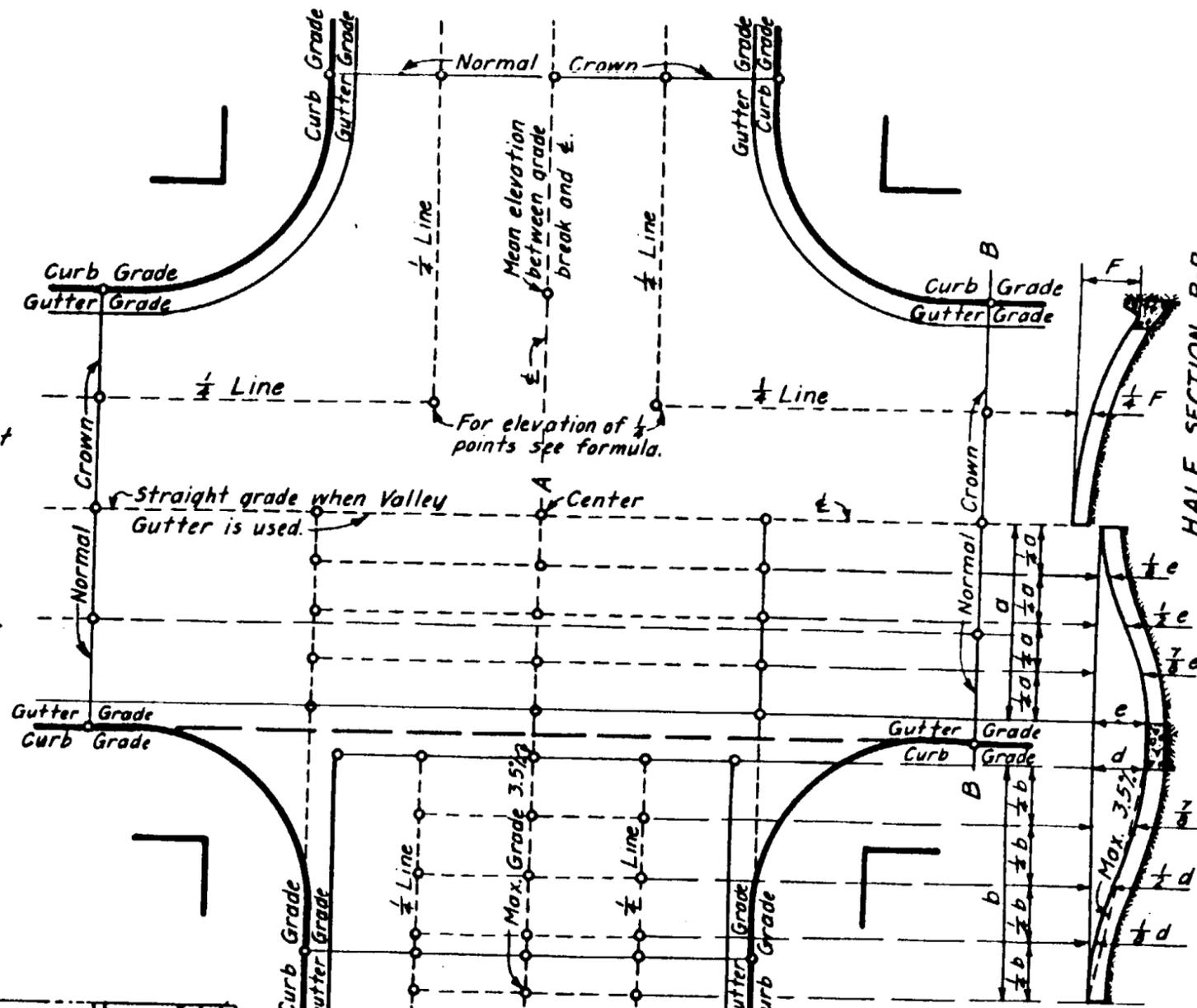
MEASUREMENT OF CURB, GUTTER OR COMBINED CURB & GUTTER ON CURVES

Curb around return to be measured as per type adjacent.

Combined curb & gutter to end at end of return.



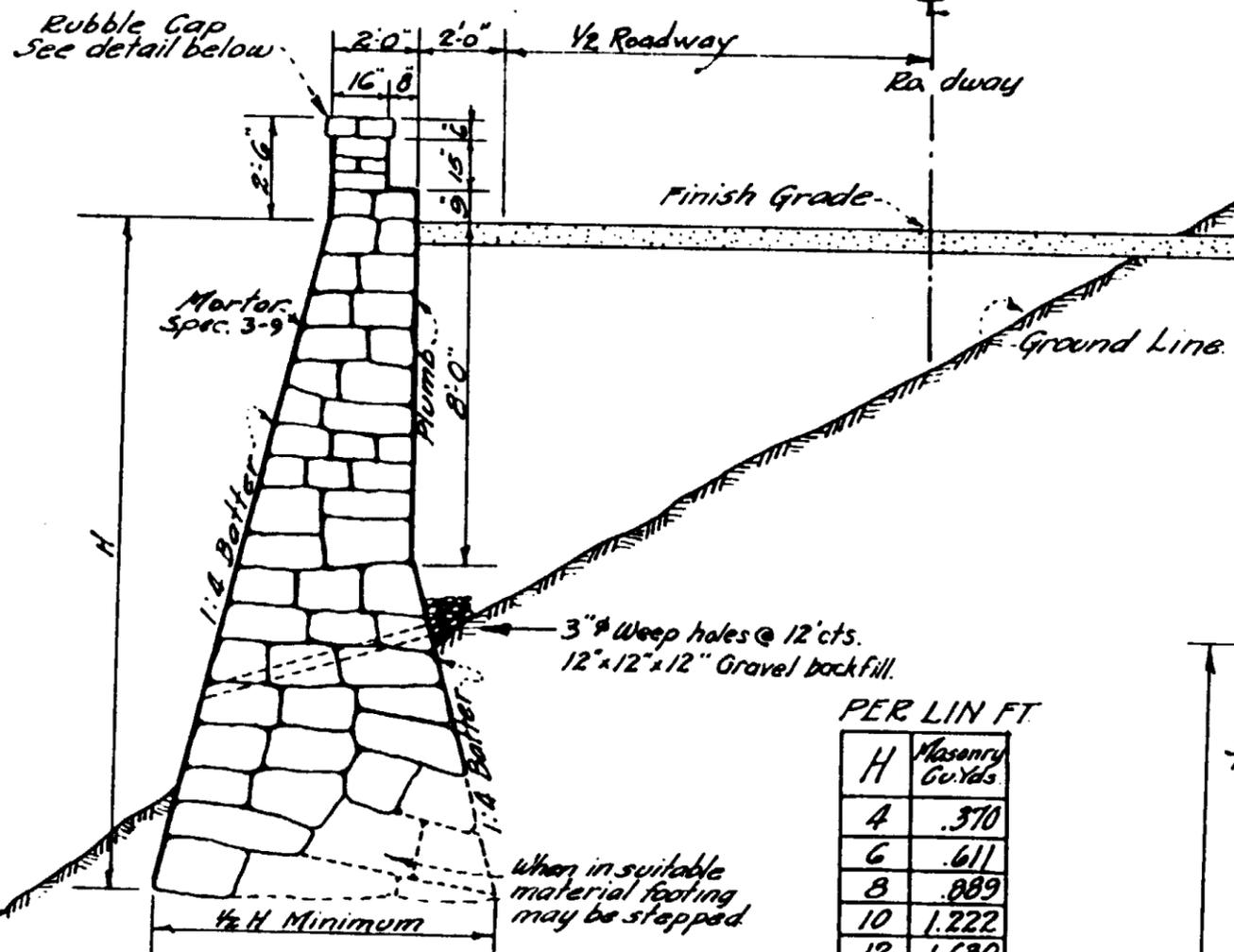
TYPICAL CONSTRUCTION OF CEMENT CONCRETE ALLEYS OR DRIVEWAYS



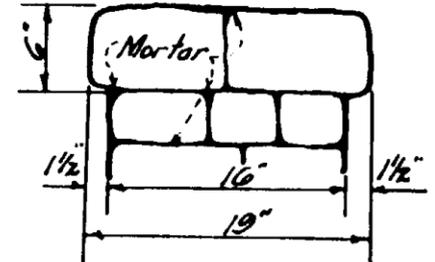
FORMULA FOR QUARTER POINTS

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 = 91 " 100, P = 0.18
" S = 101 " 110, P = 0.19
" S = 111 " 136, P = 0.20
PD = drop from center of intersection to the quarter point.

ARIZONA HIGHWAY DEPARTMENT PLANS DIVISION		REV.
CURB & GUTTER MEASUREMENT AND STREET INTERSECTION GRADES		
DRAWN	O.K. & W.M.D. 1933-38	DRAWING NO. C-21
TRACED	H.A.K. JUNE, 1938	
CHECKED	H.W.W. JULY 1938	
APPROVED		
ENGR. PLANS	<i>S. Schiller</i>	



SECTION TYPE A.

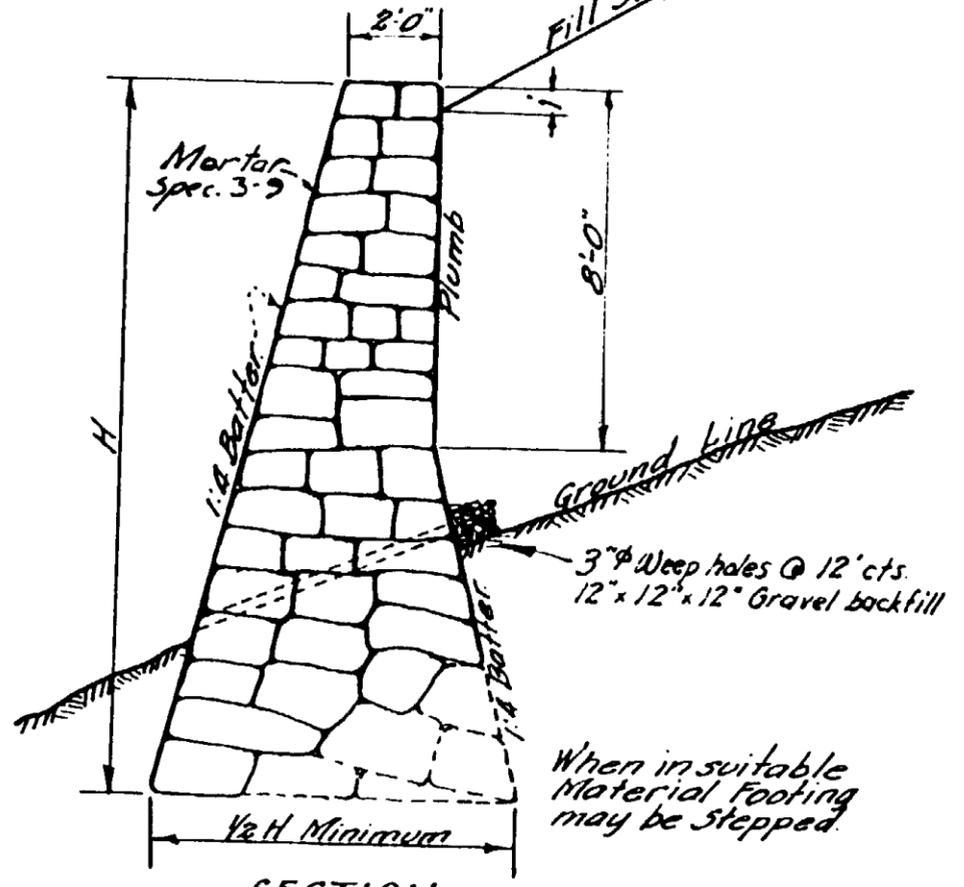


RUBBLE GAP DETAIL.

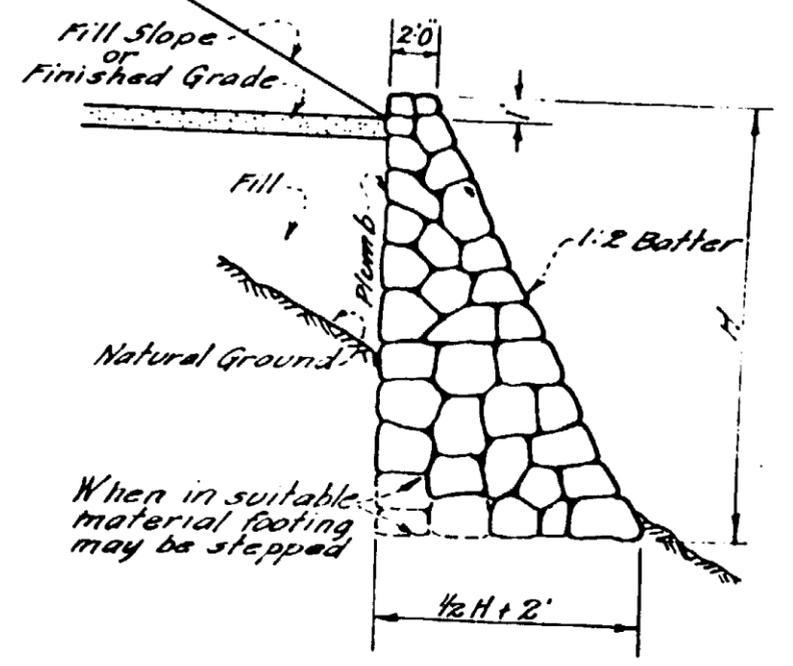
PER LIN FT.

H	Masonry Cu. Yds.
4	.370
6	.611
8	.889
10	1.222
12	1.630
14	2.111
16	2.667
18	3.296
20	4.000
22	4.778
24	5.630
26	6.556
28	7.556
30	8.630

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



SECTION TYPE B.



SECTION DRY RUBBLE RETAINING WALL

To find quantities of rock required.

$$\frac{H^2}{4} + 2H = \text{Cu. Yds. per lineal ft. of wall}$$

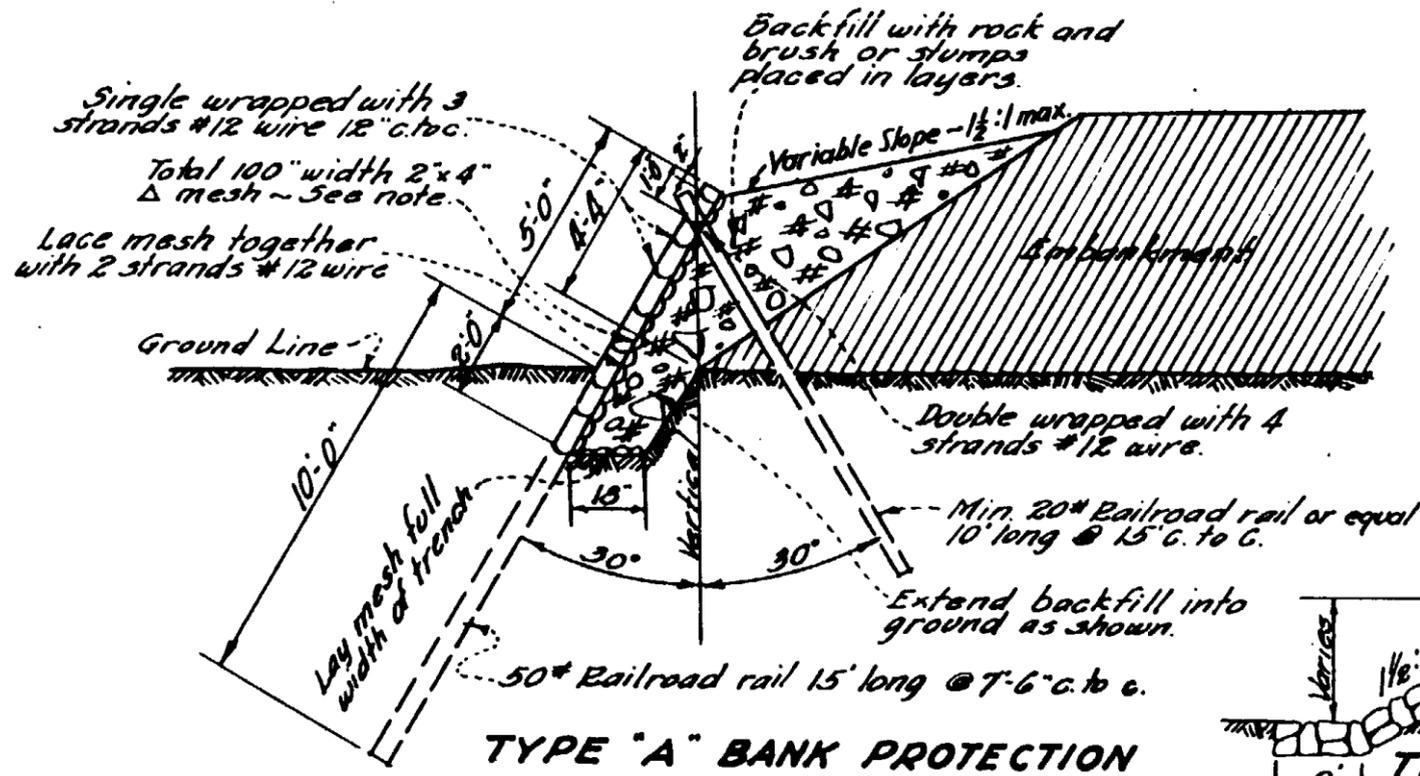
Example:-
To find Cu. Yds. of rock per ft. of 10' high wall

$$\frac{10 \times 10}{4} + 2 \times 10 = 45 \text{ C.F. } \frac{45}{27} = 1.66 \text{ C.Y. per lin. ft.}$$

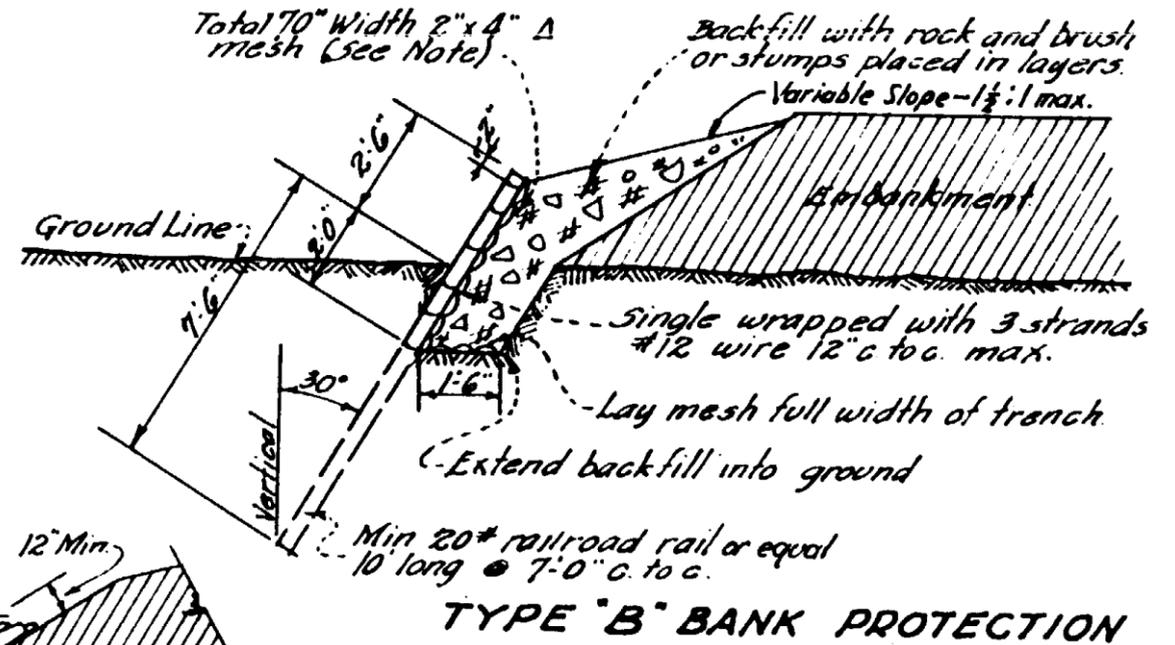
Note:-
Due to disintegrating character of some types of rock, height of wall should be limited to 10 ft. unless otherwise approved by Laboratory.

Material to be used in construction of wall to be approved by laboratory.

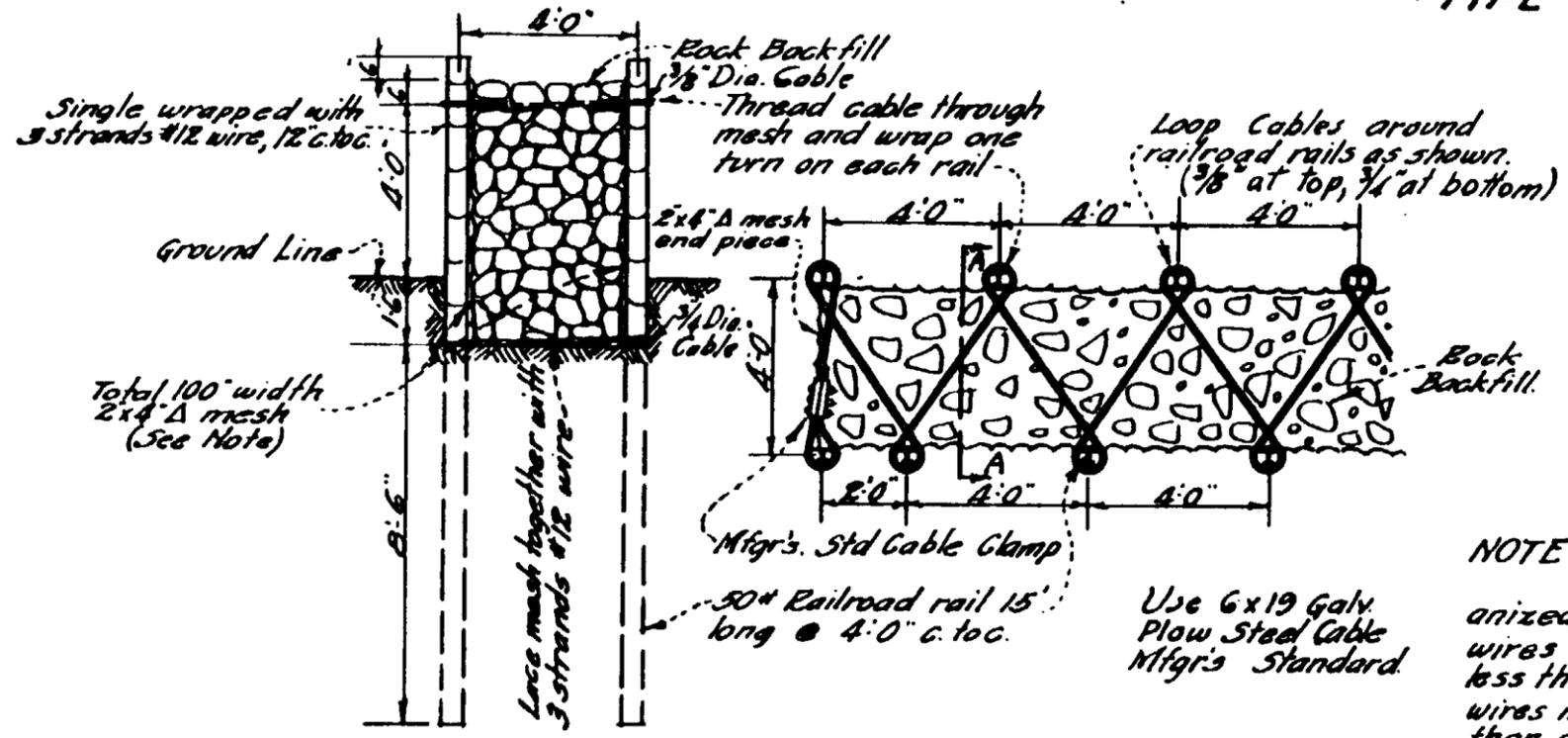
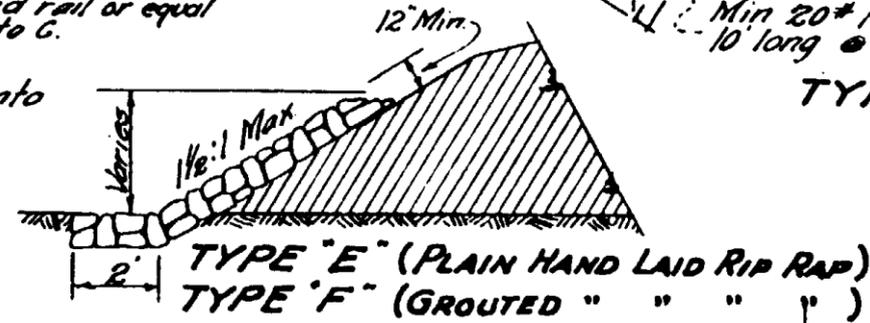
ARIZONA HIGHWAY DEPARTMENT PLANS DIVISION		REV.
CEMENT RUBBLE AND DRY RUBBLE RETAINING WALLS		
DRAWN BY	W.M.B. JAN 1938	DRAWING NO. C-22
TRACED BY	K.S. JUNE 1938	
CHECKED BY	N.H.W. JULY 1938	
APPROVED CHIEF OF PLANS	<i>[Signature]</i>	



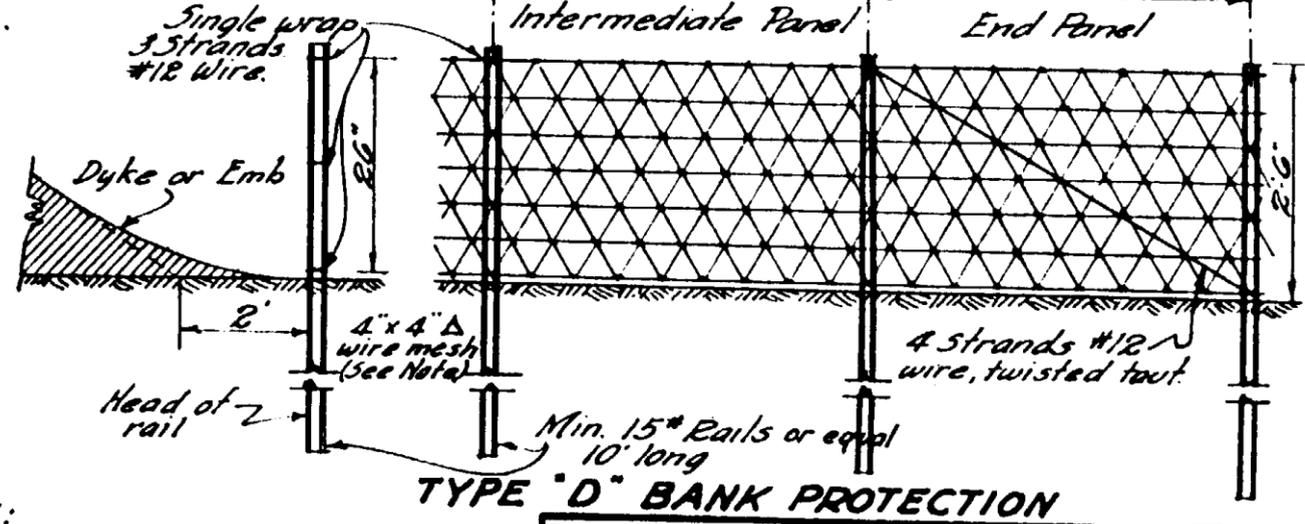
TYPE "A" BANK PROTECTION



TYPE "B" BANK PROTECTION



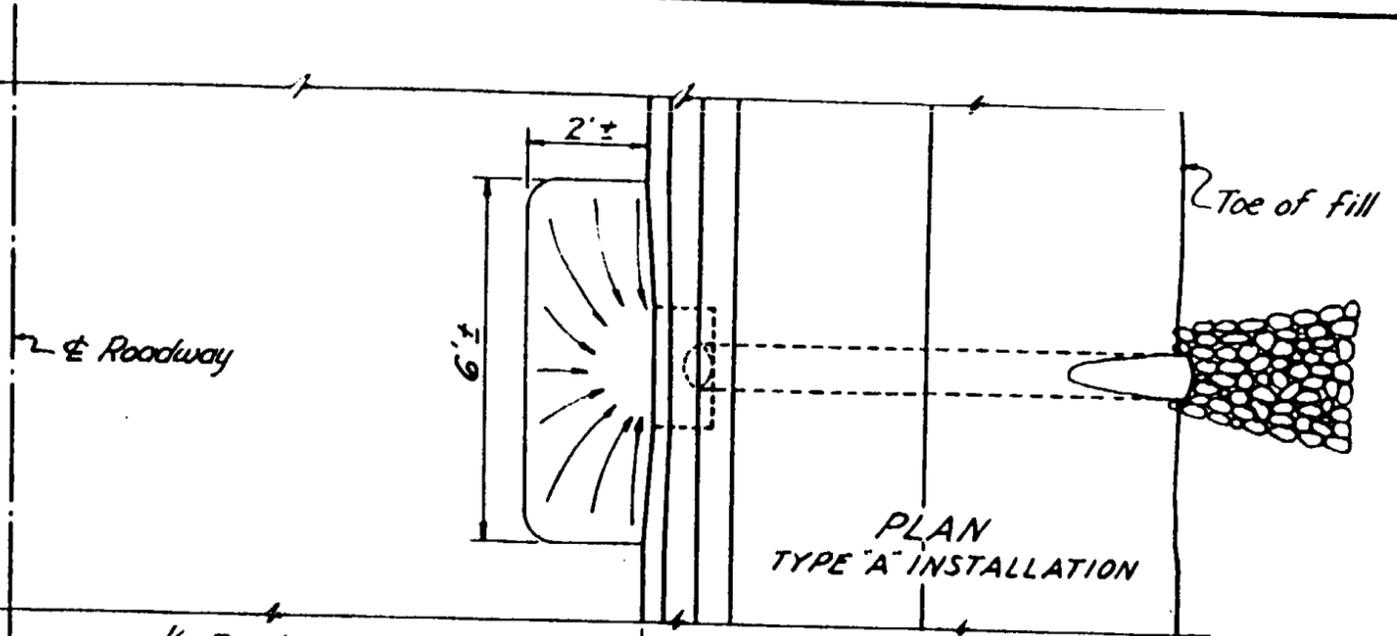
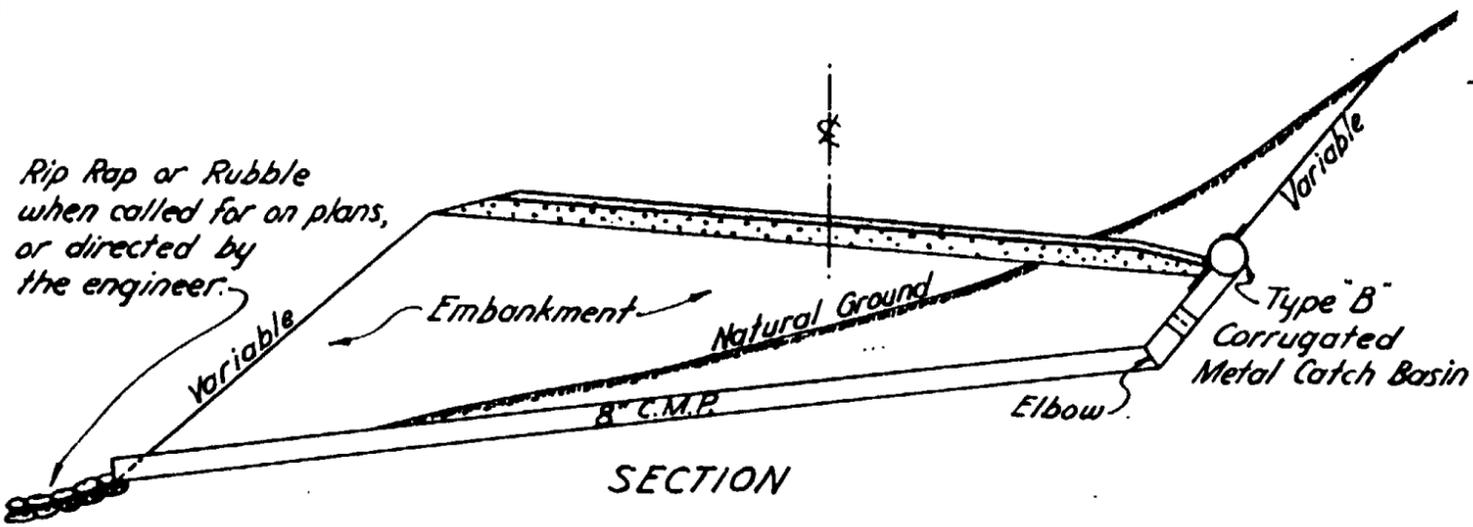
SECTION A-A
TYPE "C" BANK PROTECTION



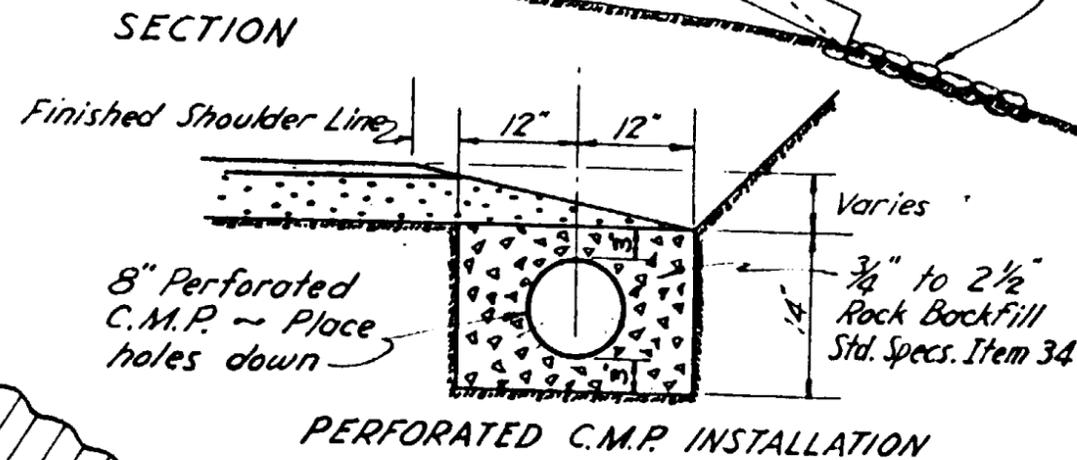
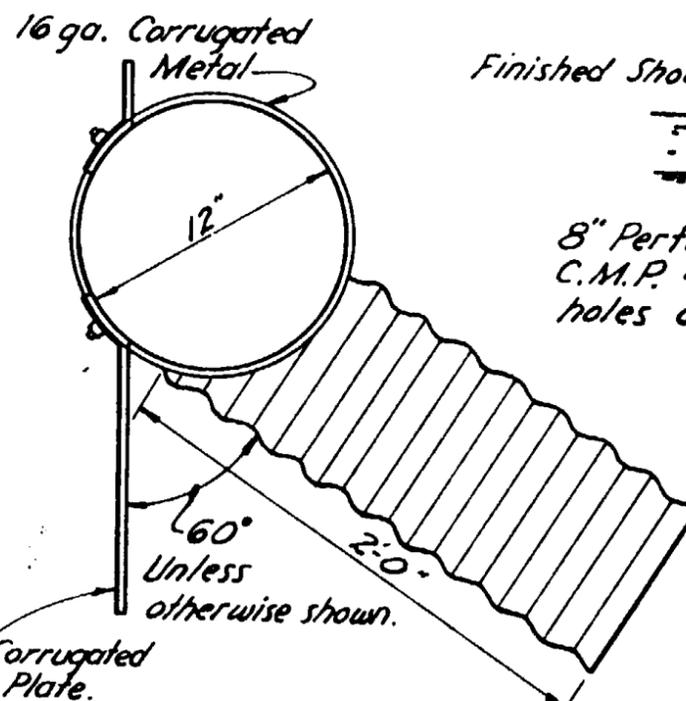
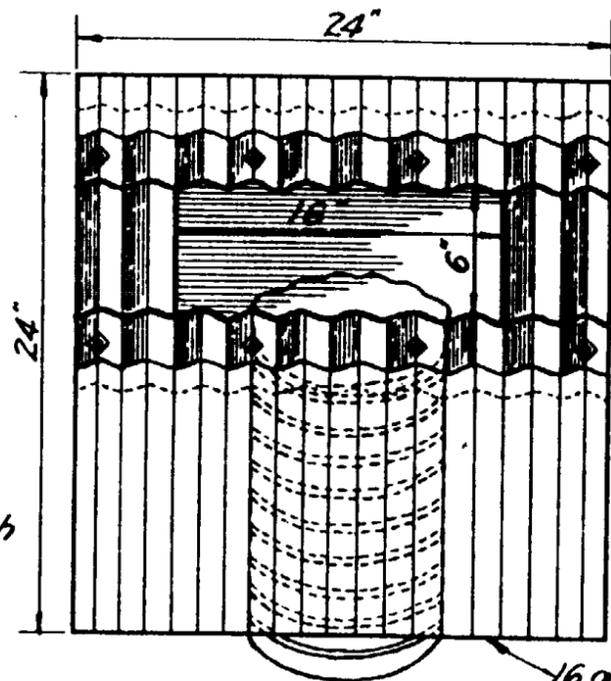
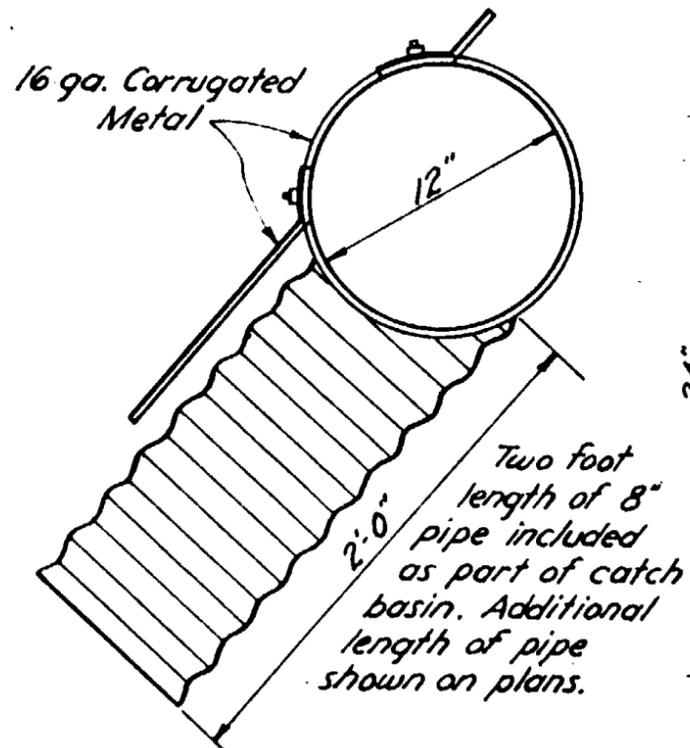
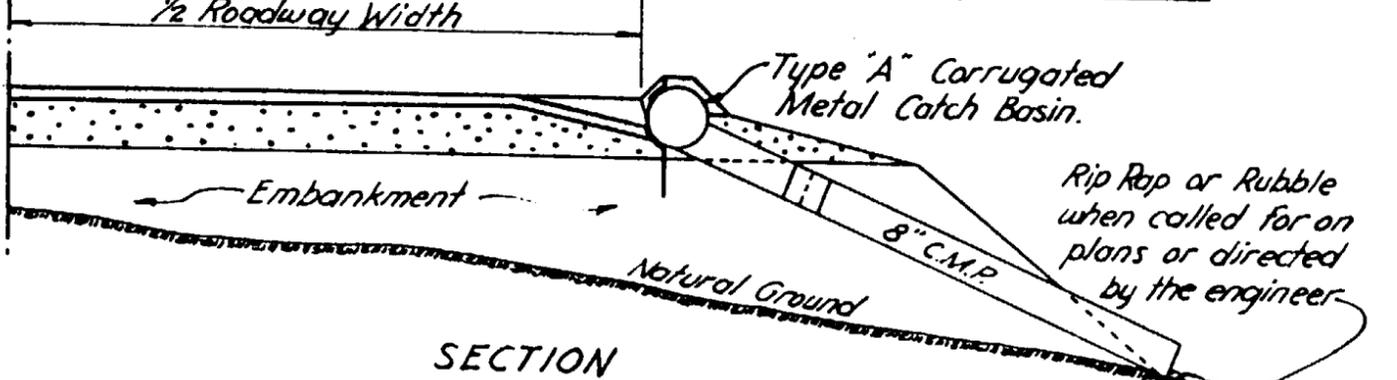
TYPE "D" BANK PROTECTION

NOTE:
Wire mesh to be either galvanized or galvanealed. Horizontal wires to be 2 strands, twisted, not less than 12 1/2 gauge. Vertical cross wires not less than 14 gauge. Where more than one width is used, lace together with 2 strands #12 wire and tie at every rail. All wire to be galvanized as per std. specs.
1/4 - 10/10 Galvanized welded wire fabric may be substituted for Δ mesh if approved by the engineer.

ARIZONA HIGHWAY DEPARTMENT PLANS DIVISION		REV. 5, 1935 4/19/41 12-20-45 6-28-47 3-20-50
BANK PROTECTION, RIP RAP		DRAWING NO. C-23
DRAWN H.A.K. JUNE, 1935	TRACED K.S. JUNE, 1938	
CHECKED H.H.H. July 1938	APPROVED ENGR. PLANS C. W. Miller	



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.

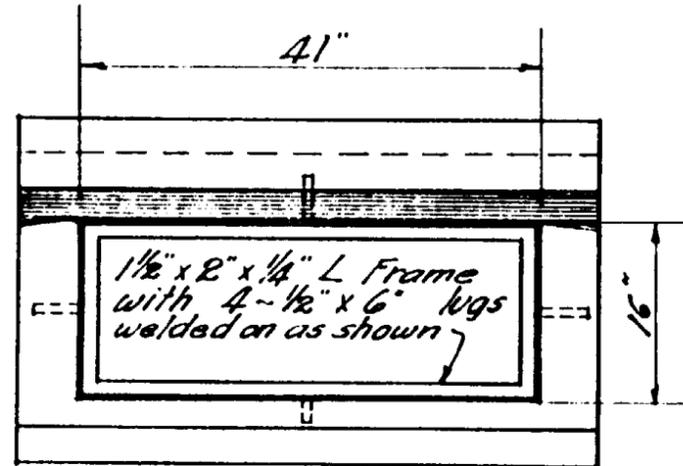


SIDE ELEVATION
TYPE "B"

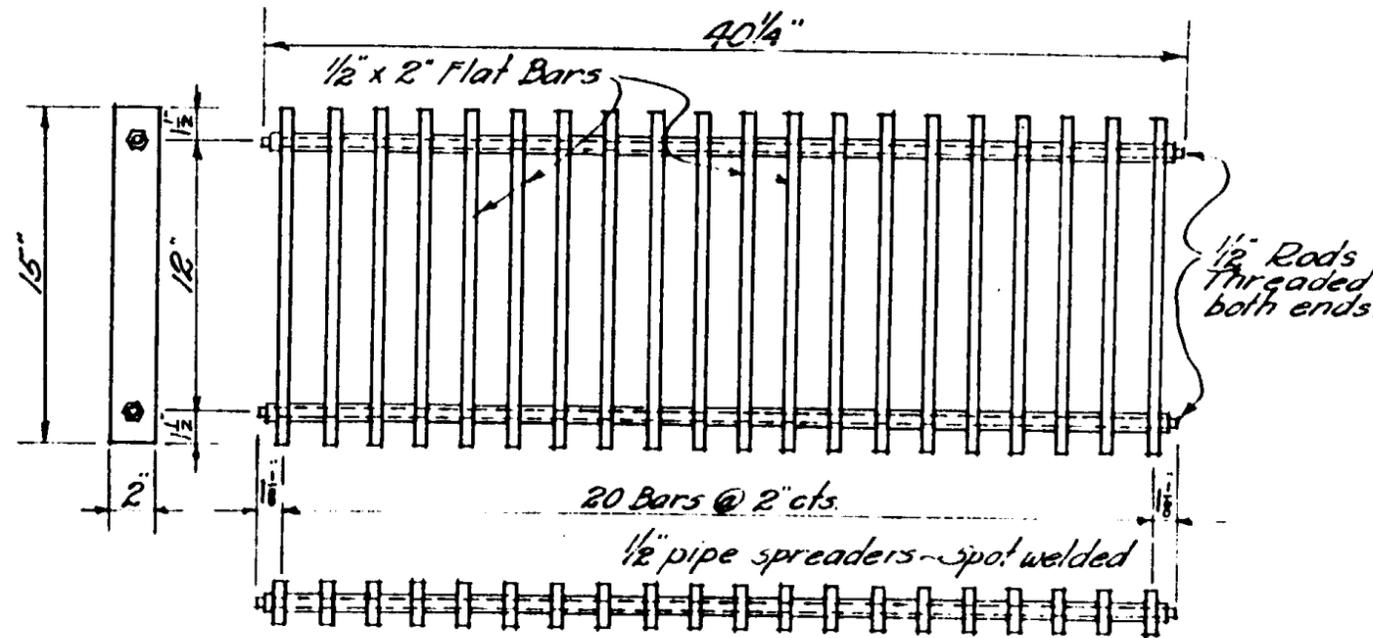
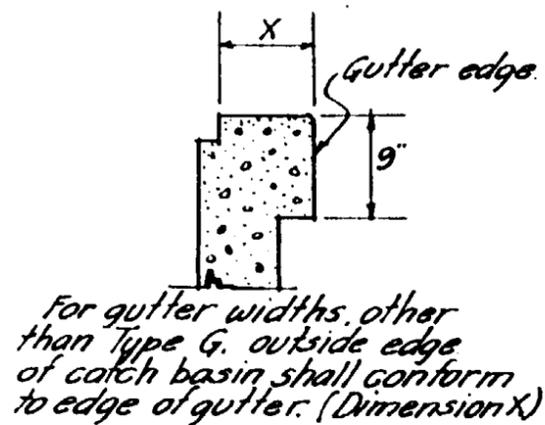
FRONT ELEVATION
CATCH BASINS

SIDE ELEVATION
TYPE "A"

ARIZONA HIGHWAY DEPARTMENT PLANS DIVISION		REV. 3/17/50
CORRUGATED METAL CATCH BASINS AND PERFORATED C.M.P.		
DRAWN	C.B.B. July 1945	DRAWING NO. C-24
TRACED	GH Nov. 1945	
CHECKED	HTW	
APPROVED PLANS ENGR.	<i>E. Miller</i>	

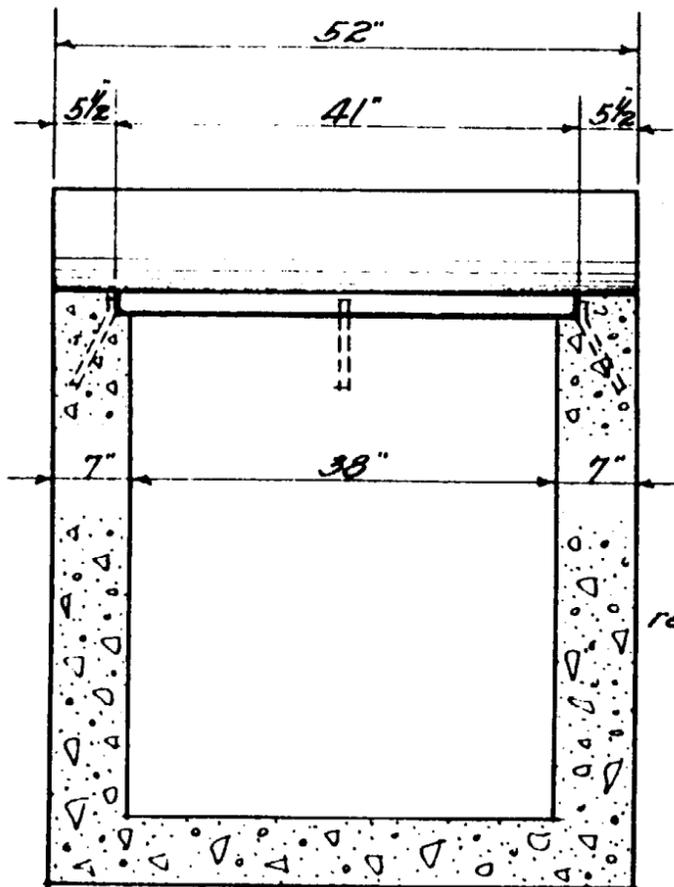


PLAN

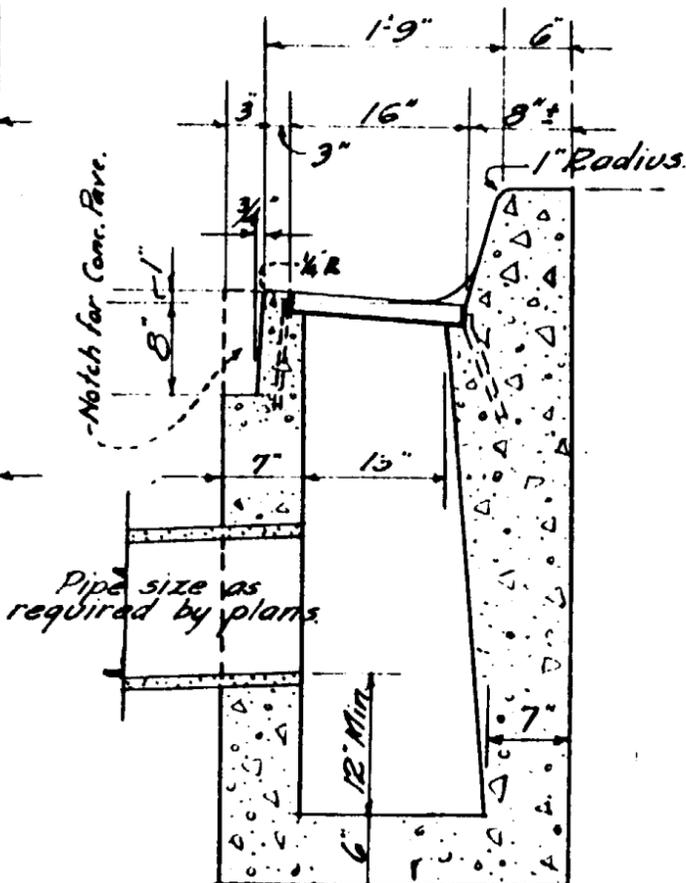


2.6' per grate

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



LONGITUDINAL SEC.



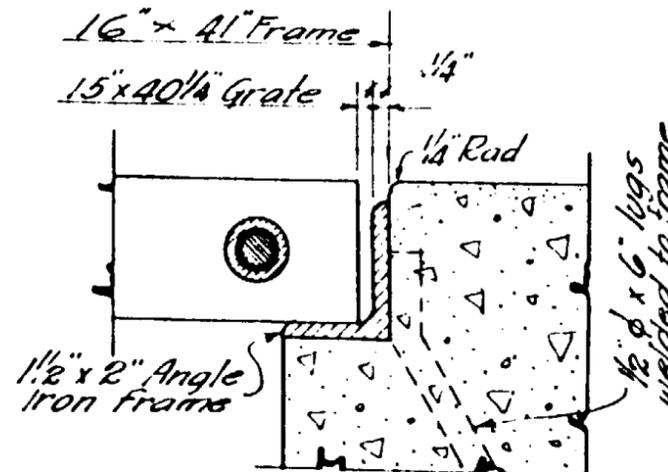
CROSS SECTION

DETAIL OF NO. 1 CATCH BASIN

Scale - 3/4" = 1'-0"

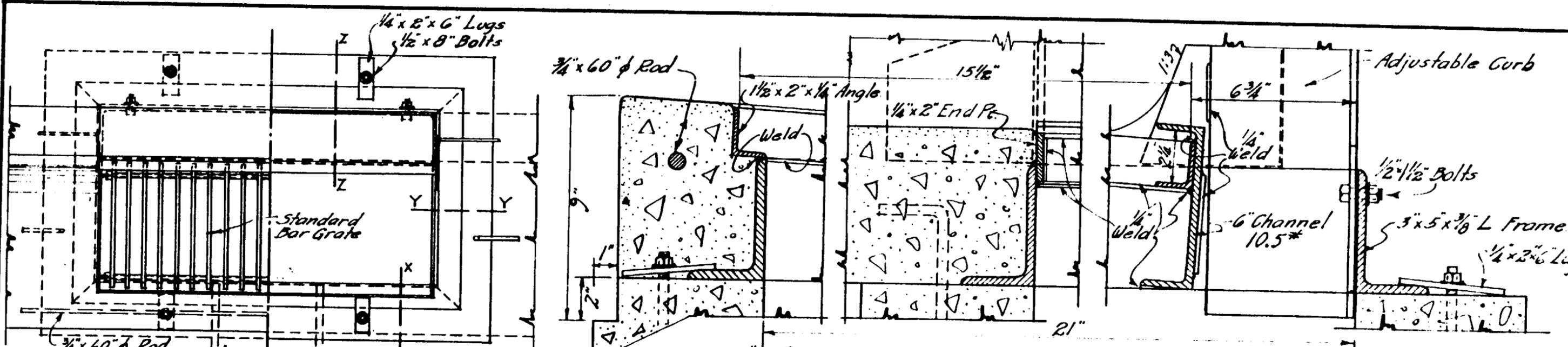
GENERAL NOTES

- 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 with a suitable edger.
- All structural iron, including bar grate, shall have a shop coat of No. 1 paint and a second coat of No. 9 paint.
- When catch basins are located in curb returns, the catch basin curb face shall conform to the radius of the return.



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

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



HALF PLAN GUTTER & GRATE

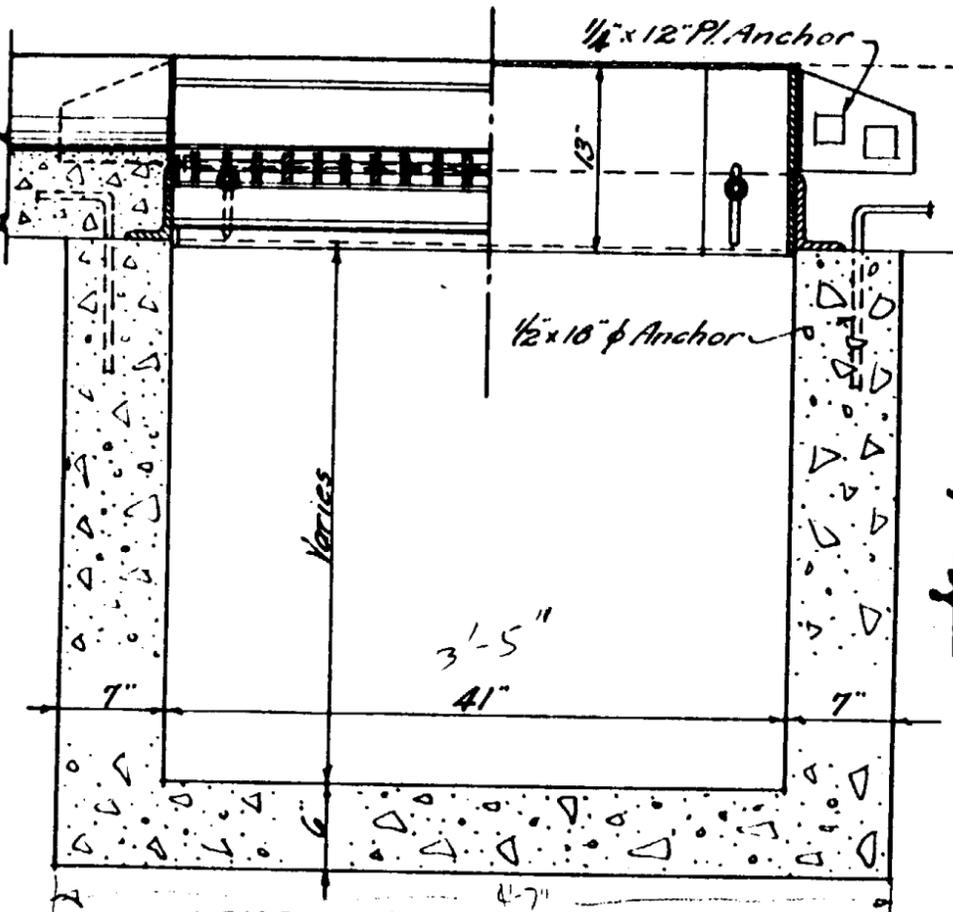
HALF PLAN FRAME & ANCHORS

SECTION X-X

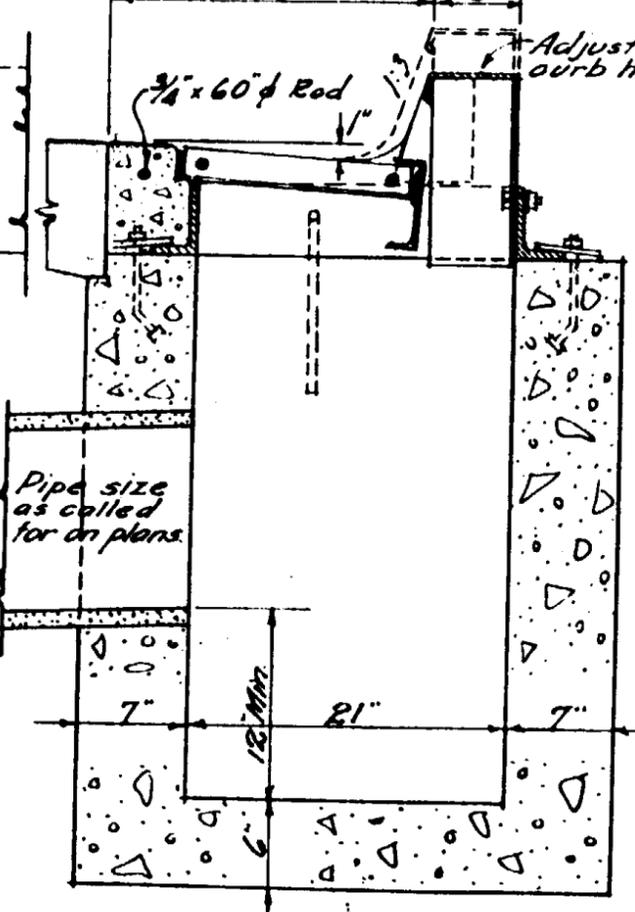
SECTION Y-Y

SECTION Z-Z

DETAILS OF STEEL FRAME - Scale - 3" = 1'-0"



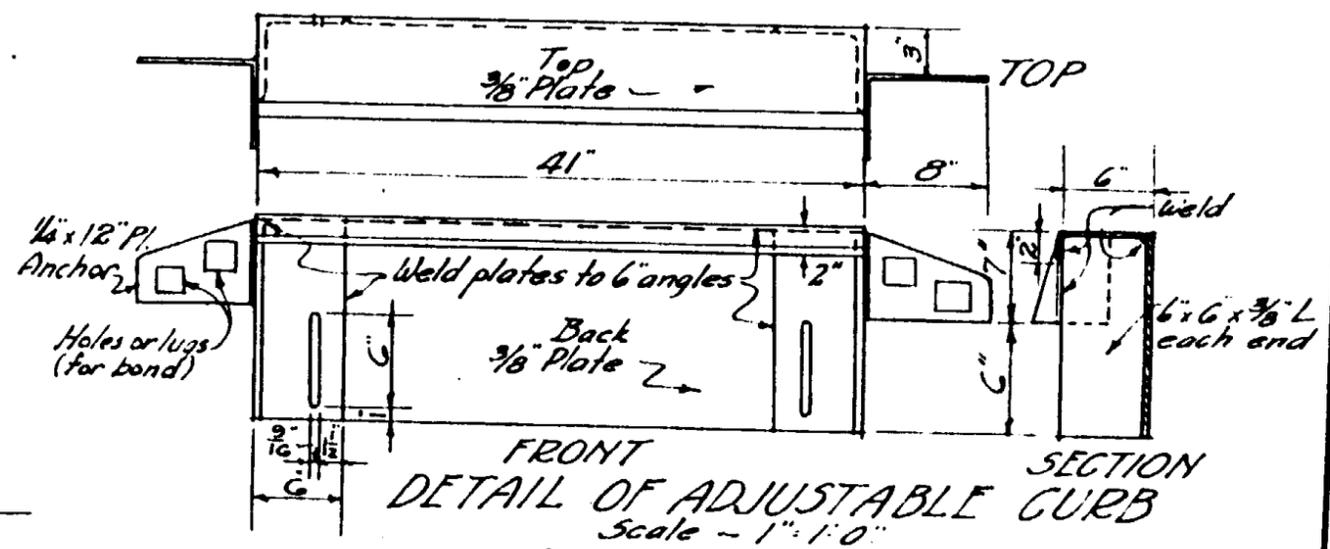
LONGITUDINAL SECTION



CROSS SECTION

DETAILS OF NO. 3 CATCH BASIN
Scale - 1" = 1'-0"

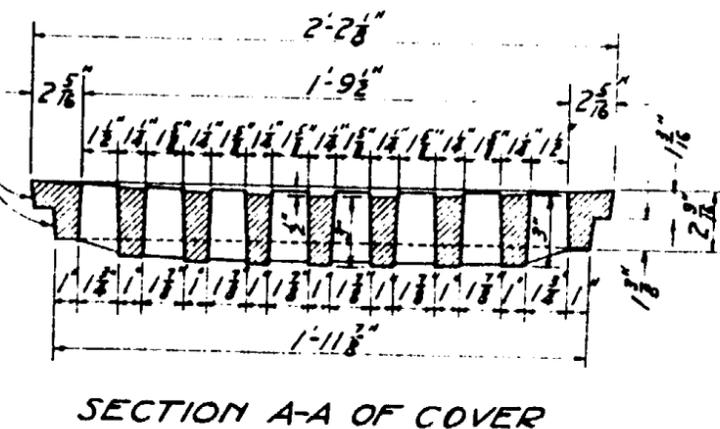
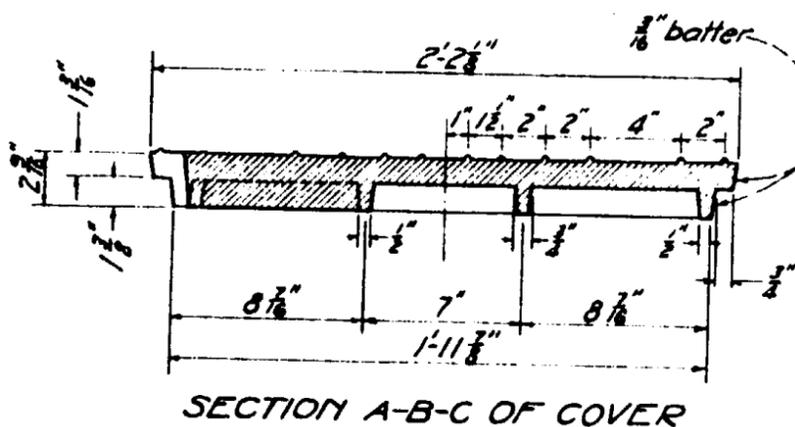
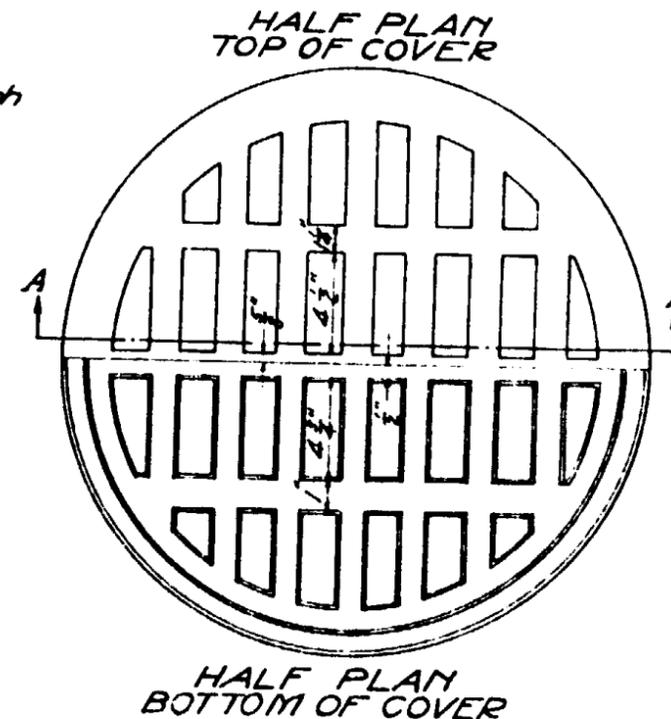
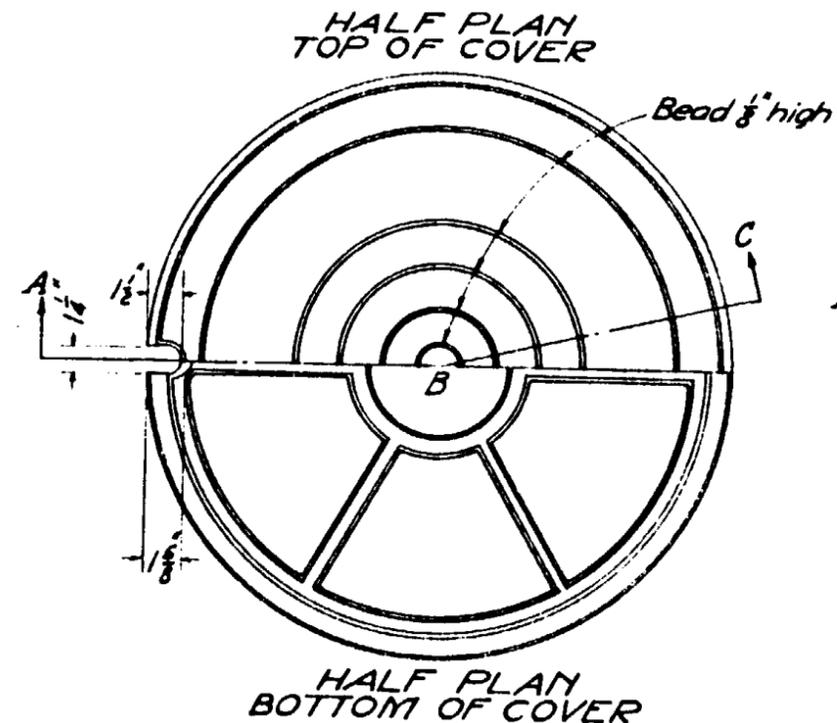
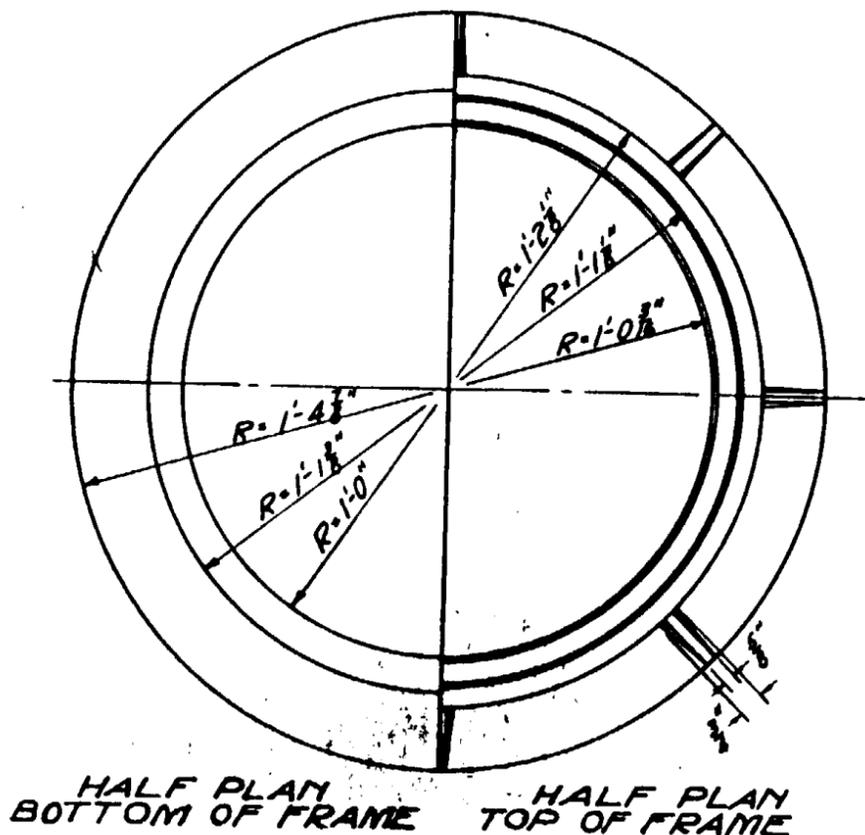
Warp face of Standard curb and gutter into catch basin in lengths of 2 feet on each side if necessary.
All structural iron to be given a shop coat of No. 1 paint and a second coat of No. 9 Paint.
Detail is for Type 6 curb and gutter. If other types are used the concrete shall be warped to fit Catch Basin.



FRONT DETAIL OF ADJUSTABLE CURB
Scale - 1" = 1'-0"

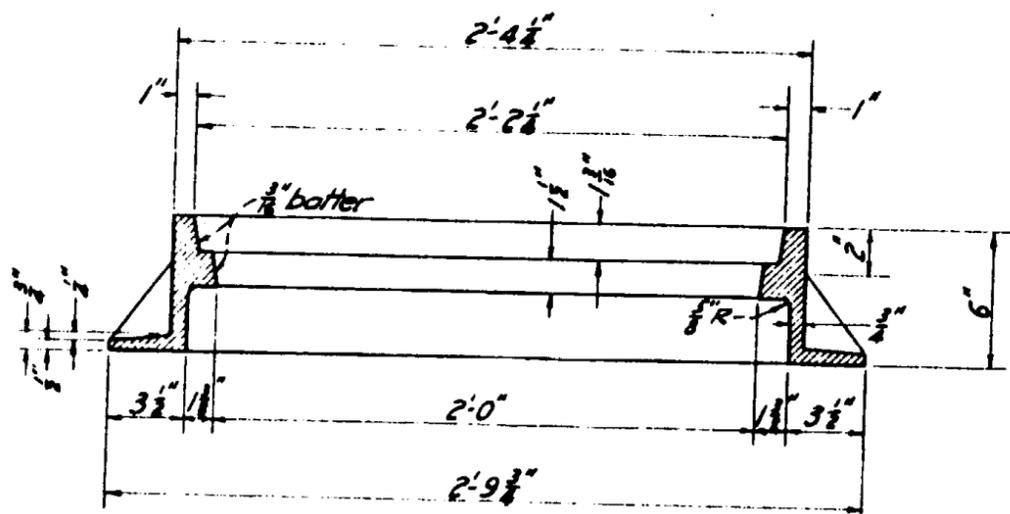
All concrete to be class A, and all exposed edges are to be finished with a suitable edger.

ARIZONA HIGHWAY DEPARTMENT		REV. 8-1-41
PLANS DIVISION		
CATCH BASIN NO. 3		
DRAWN	H.H.W.	DRAWING NO. C-27
TRACED	K.S.	
CHECKED	H.H.W.	
APPROVED	<i>E. Miller</i>	



TYPE "A" COVER
Approx. weight 190 lbs.

TYPE "B" COVER
Approx. weight 280 lbs.



SECTION OF FRAME
Approx. weight 205 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.

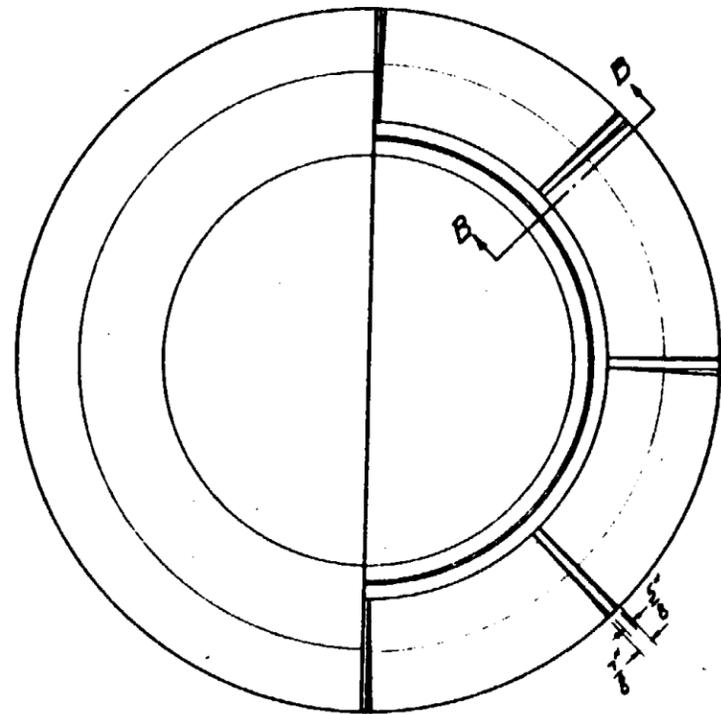
Type A cover shall be used unless otherwise specified.

Notations as shown on the plans shall be as follows: Std. M.H. Frame & Cover No. 1-B, the letter denoting the type of cover.

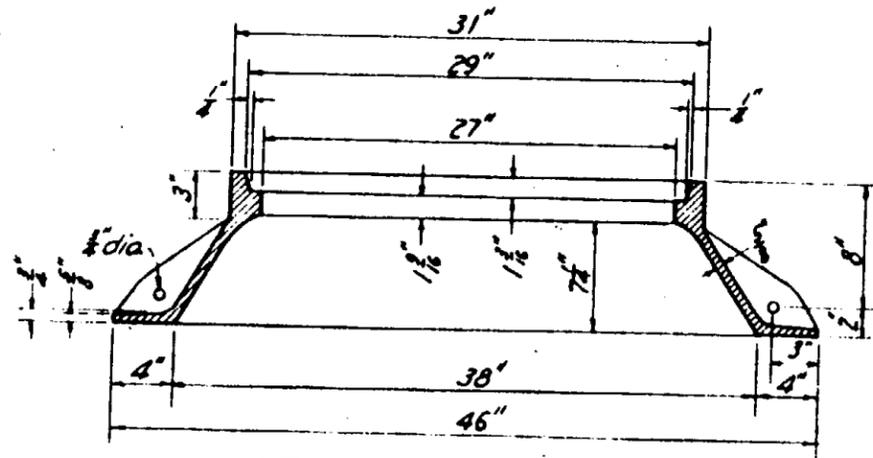
The bearing faces shall be machined so that the cover will have a uniform bearing in any position in the frame.

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

ARIZONA HIGHWAY DEPARTMENT PLANS DIVISION		REV.
MANHOLE FRAME & COVER NO. 1		
DRAWN TRACED CHECKED APPROVED END OF PLANS	OK OK L.M. <i>E. Miller</i>	OCT. 1915 " " " DRAWING NO. C-28

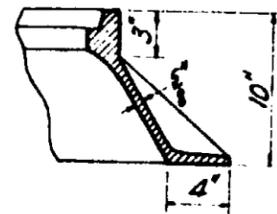


HALF PLAN
BOTTOM OF FRAME HALF PLAN
TOP OF FRAME



SECTION OF FRAME

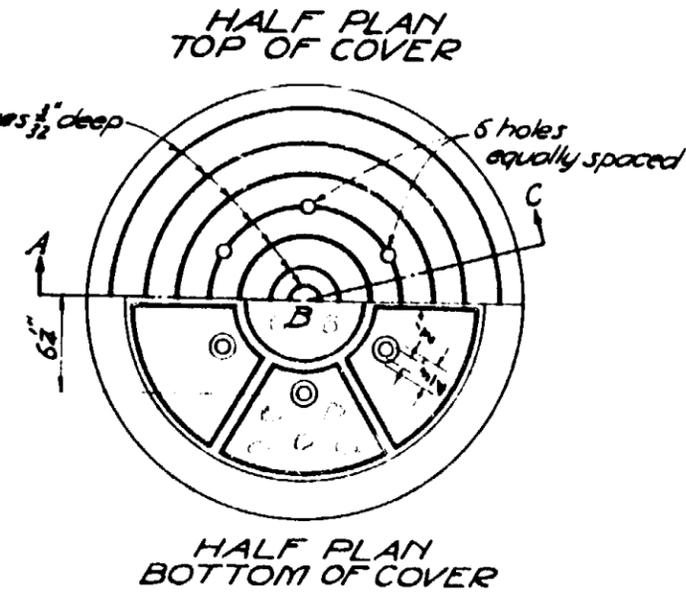
Approx. weight 377 lbs.



SECTION B-B

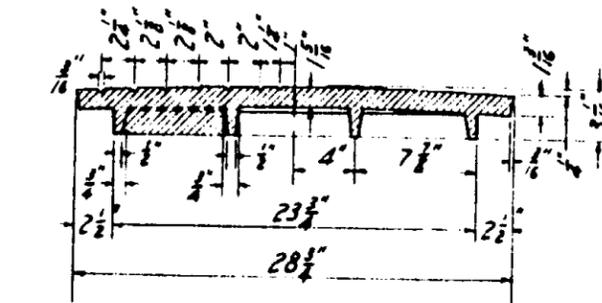
The bearing faces shall be machined so that the cover will have a uniform bearing in any position in the frame.

Scale 1"=1'-0"



HALF PLAN
TOP OF COVER

HALF PLAN
BOTTOM OF COVER



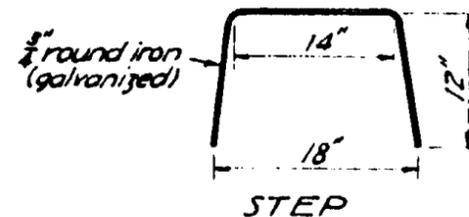
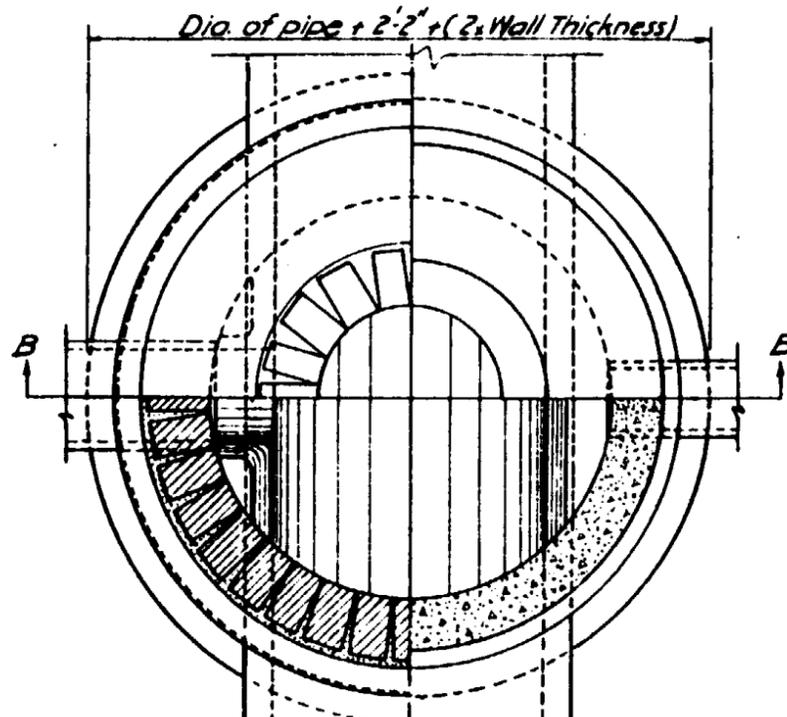
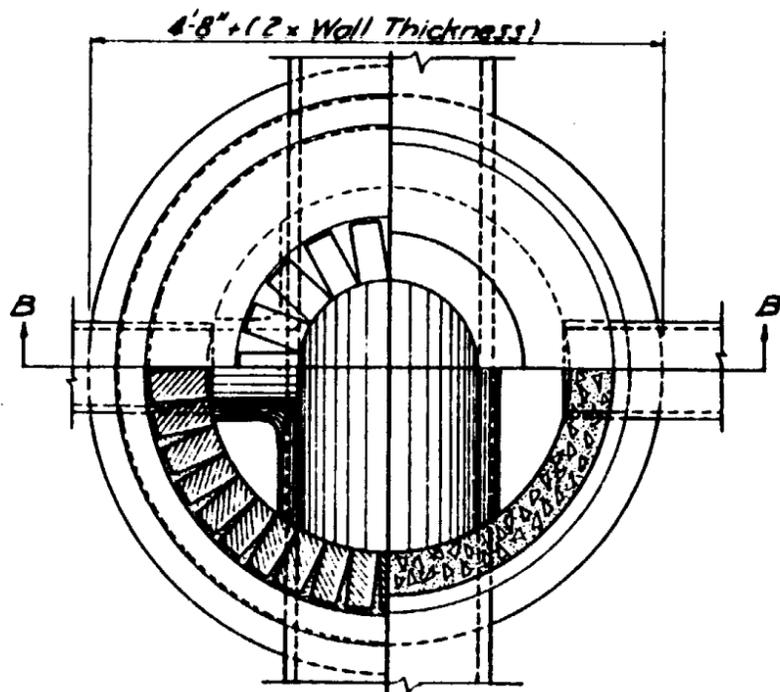
SECTION A-B-C OF COVER

Approx. weight 210 lbs.

ARIZONA HIGHWAY DEPARTMENT PLANS DIVISION		REV.
MANHOLE FRAME & COVER NO. 2		
DRAWN	OK	DEF 515
TRACED	OK	" "
CHECKED	" "	" "
APPROVED	E. J. Miller	
BY OF PLANS	DRAWING NO.	C-29

HALF PLAN

HALF PLAN

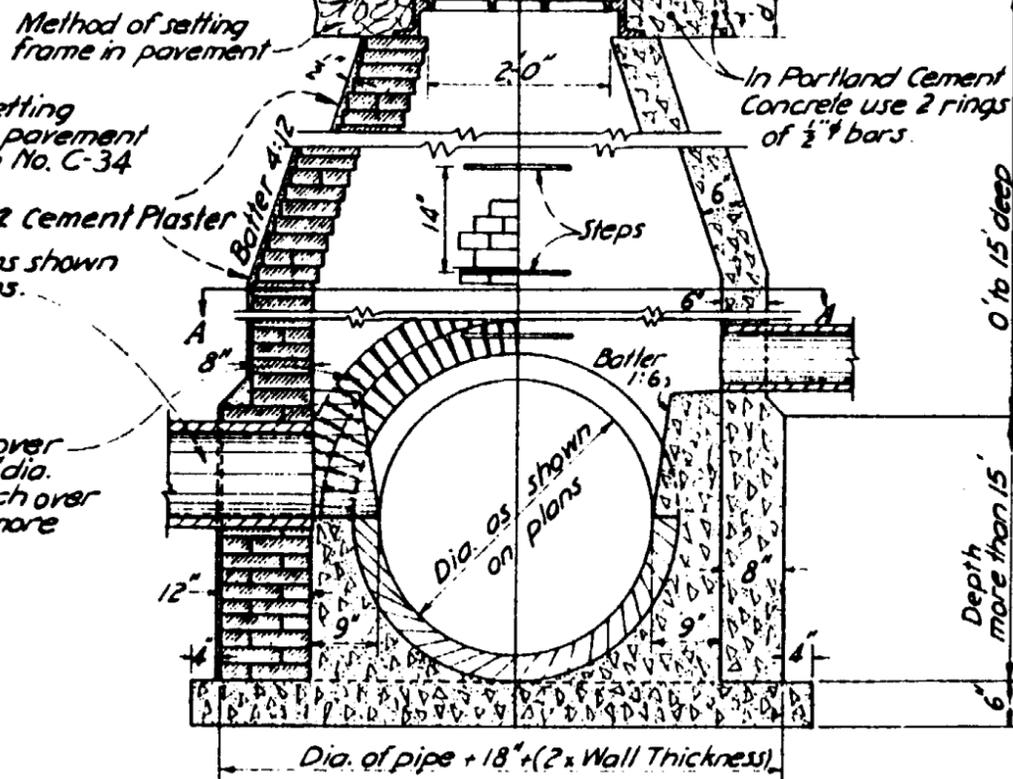
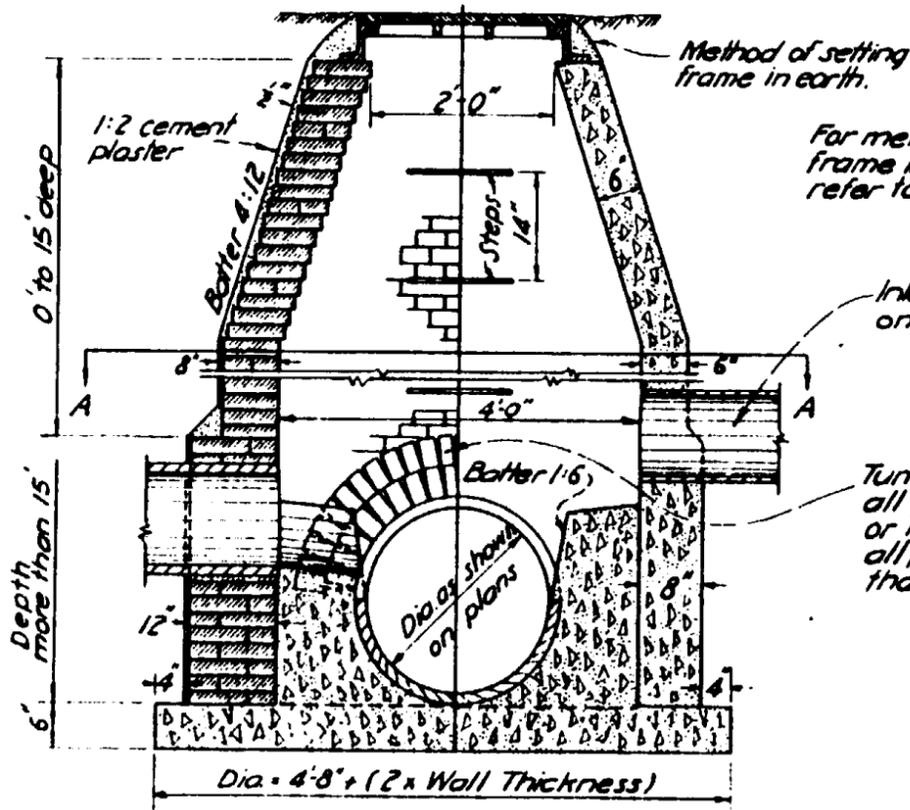


HALF SECTION A-A

HALF SECTION A-A

BRICK CONCRETE

BRICK CONCRETE



SECTION B-B

SECTION B-B

BRICK CONCRETE

BRICK CONCRETE

STANDARD MANHOLE NO. 1
FOR PIPES 6" TO 27"

STANDARD MANHOLE NO. 2
FOR PIPES 30" OR MORE

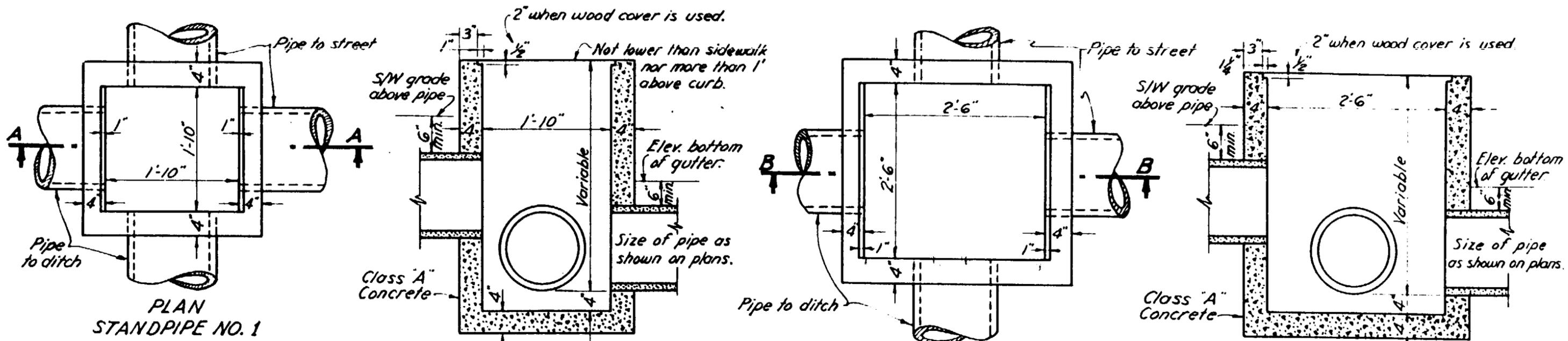
Scale 3/4" = 1'-0"

Manhole frame & cover No. 1 is shown. Other types may be substituted if noted on the plans.

All concrete shall be Class "A".

Every 5th course of brick shall be laid as stretchers.

ARIZONA HIGHWAY DEPARTMENT PLANS DIVISION		REV. July 17, 35 No. 2
MANHOLE NO. 1 & NO. 2		
DRAWN TRACED CHECKED APPROVED ENG. OF PLANS	CA OK L.V. <i>E. J. Miller</i>	DRAWING NO. C-30

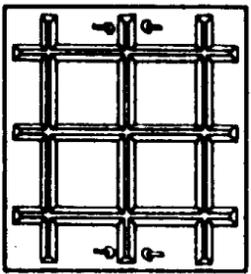
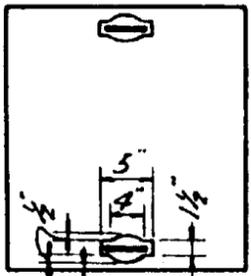
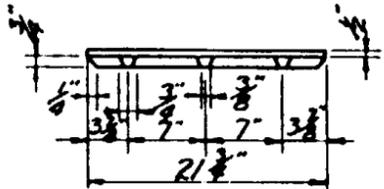


PLAN STANDPIPE NO. 1

SECTION A-A

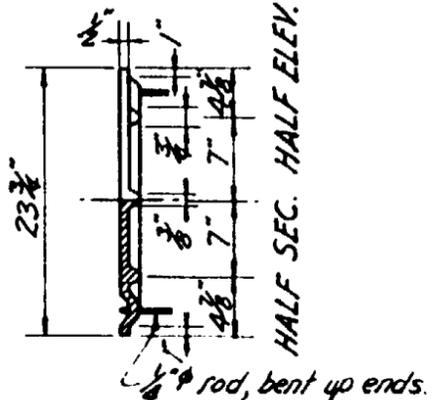
PLAN STANDPIPE NO. 2

SECTION B-B

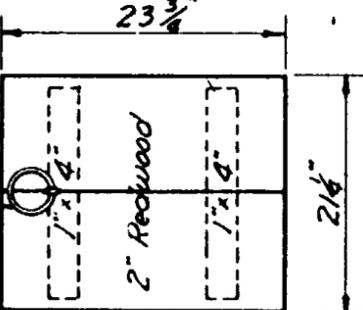


CAST IRON COVER FOR STANDPIPE NO. 1

BOTTOM

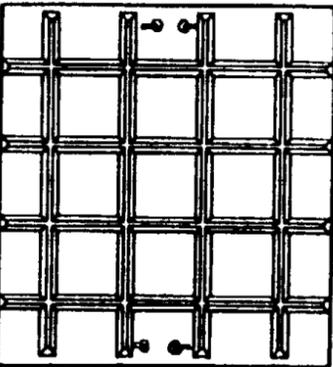
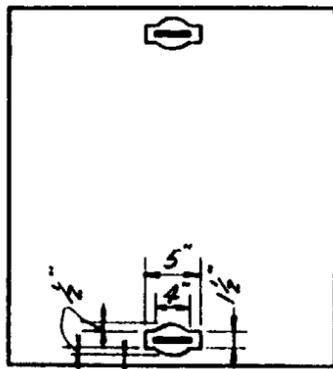
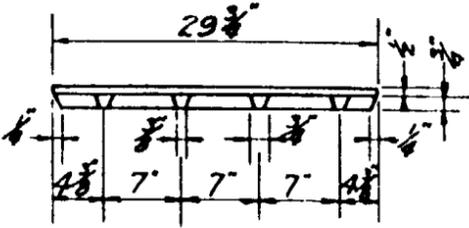


HALF SEC. HALF ELEV.



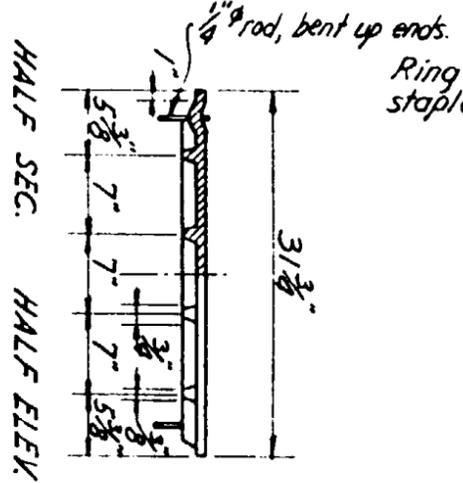
PLAN OF REDWOOD COVER FOR STANDPIPE NO. 1

Redwood cover may be used when top of standpipe is above sidewalk.

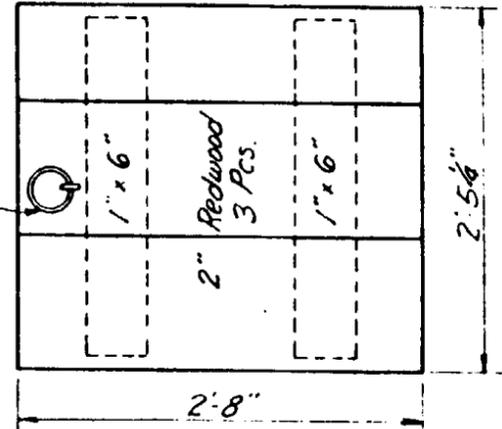


CAST IRON COVER FOR STANDPIPE NO. 2

BOTTOM



HALF SEC. HALF ELEV.



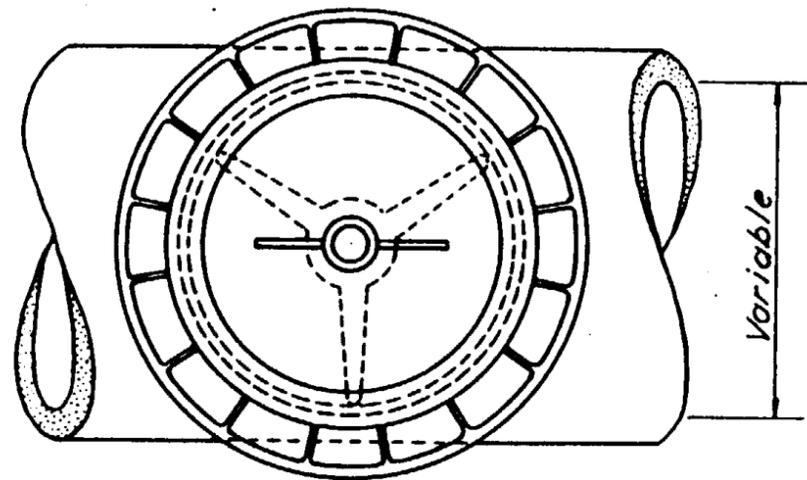
PLAN OF REDWOOD COVER FOR STANDPIPE NO. 2

Redwood cover may be used when top of standpipe is above sidewalk.

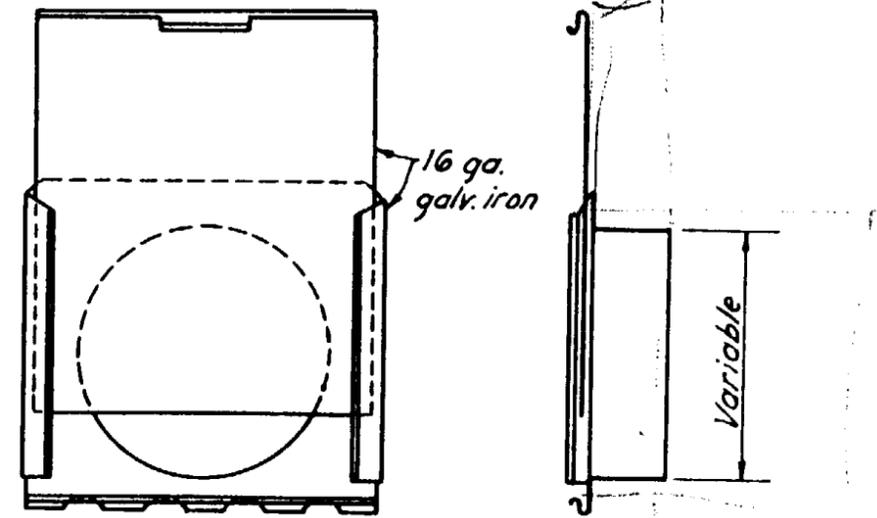
STANDARD IRRIGATION STANDPIPE NO. 2

STANDARD IRRIGATION STANDPIPE NO. 1

ARIZONA HIGHWAY DEPARTMENT		REV.
PLANS DIVISION		
IRRIGATION STANDPIPE NO. 1 AND NO. 2		
DRAWN	PHOENIX STANDARD	DRAWING NO. C-31
TRACED	G.H. DEC. 1945	
CHECKED	H.H.W.	
APPROVED		
PLANS ENGR.		



PLAN

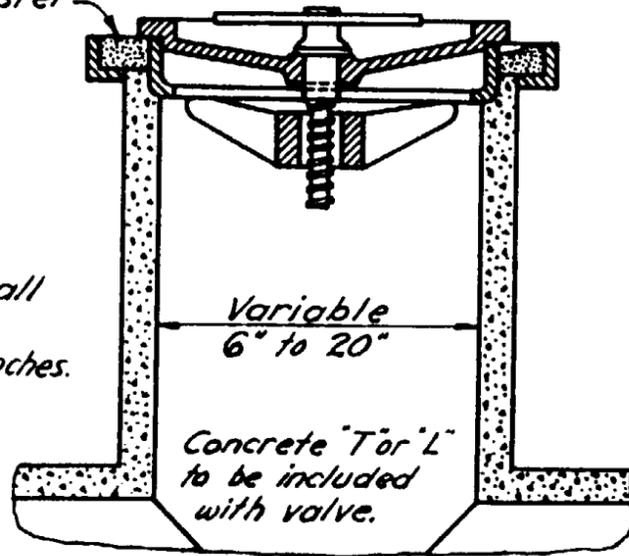


ELEVATION

SECTION

STANDARD IRRIGATION GATE
DETAIL "O"

Cement Plaster

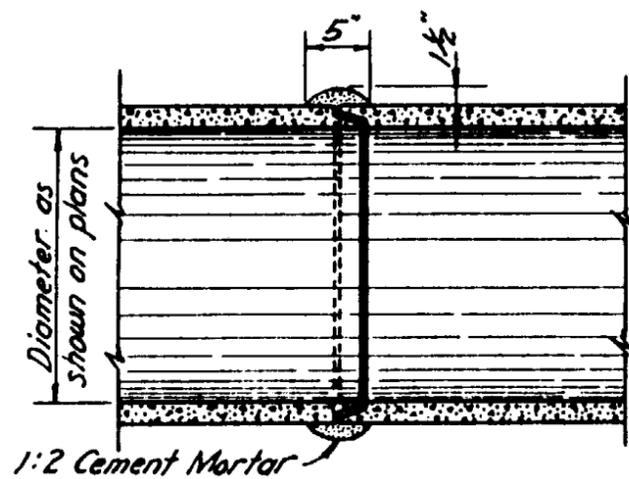


Snow alfalfa valve
or its equivalent.
Number of valve shall
correspond to the
size of the pipe in inches.
No. 6 to No. 20.

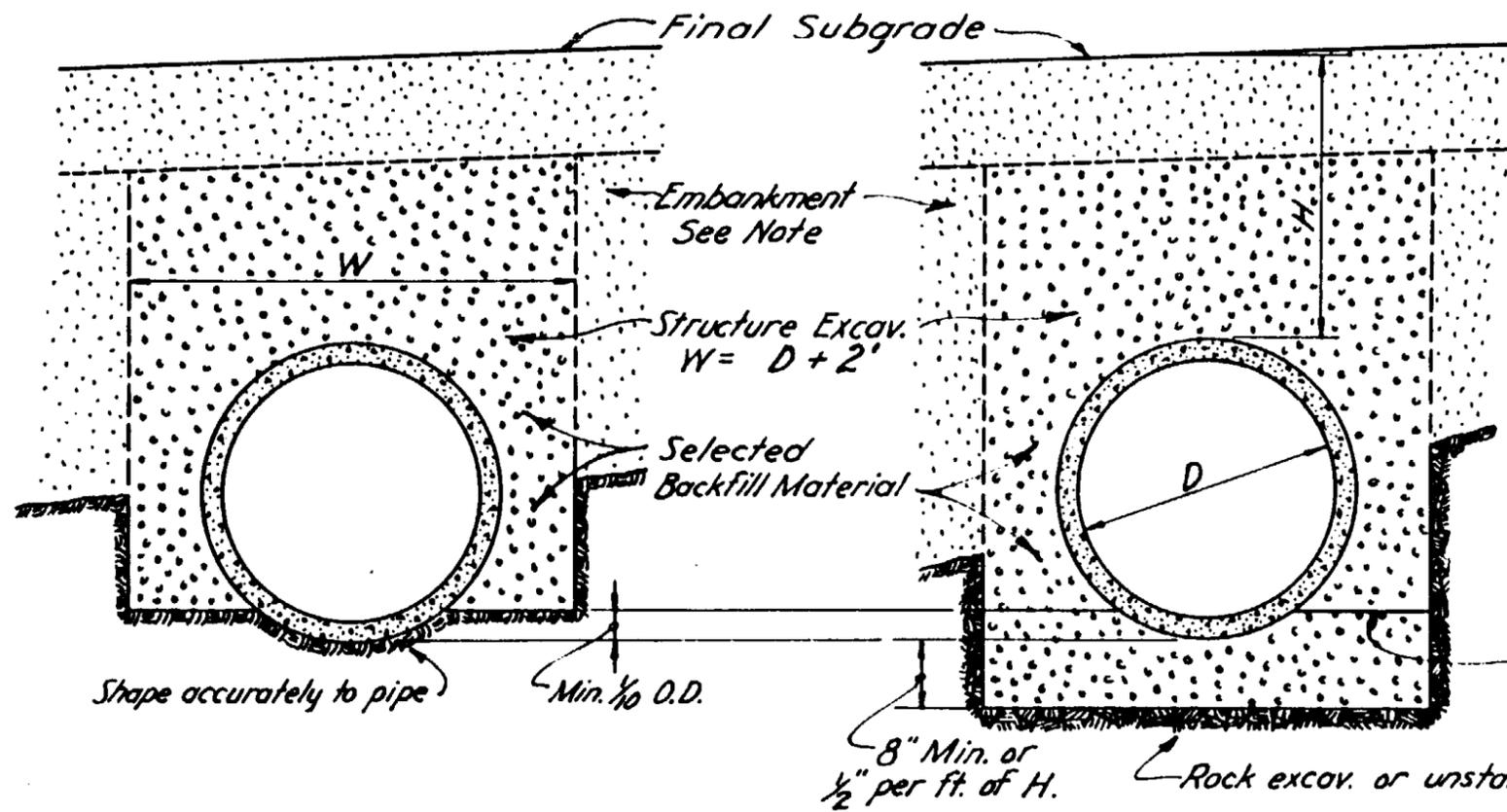
PART SECTION

STANDARD IRRIGATION VALVE
DETAIL "C"

ARIZONA HIGHWAY DEPARTMENT		REV.
PLANS DIVISION		
IRRIGATION VALVE		
IRRIGATION GATE		
DRAWN	O.K. Dec. 1935	DRAWING NO. C-32
TRACED	GH Nov. 1945	
CHECKED	<i>[Signature]</i>	
APPROVED PLANS ENGR.	<i>[Signature]</i>	



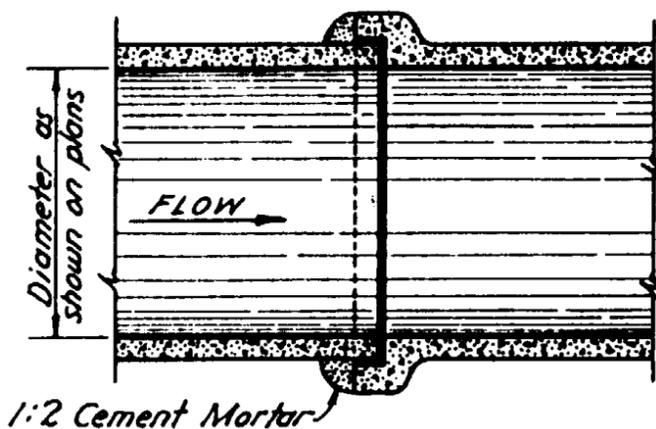
1:2 Cement Mortar
**BEVELED END
CONCRETE PIPE**



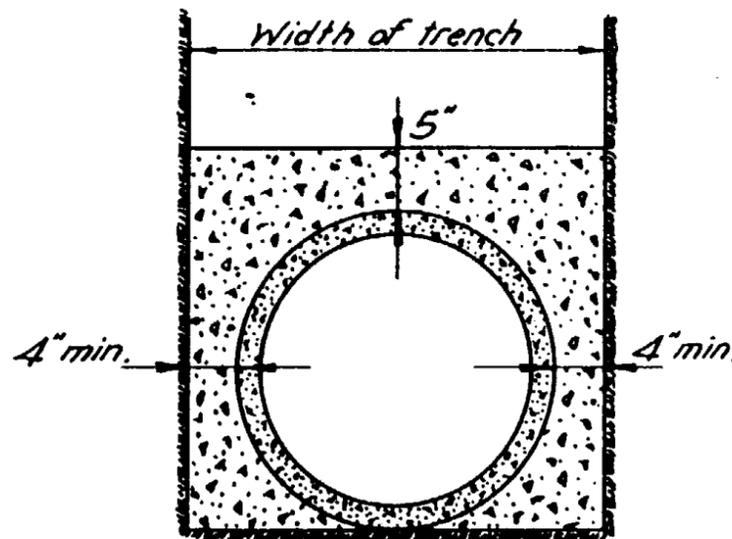
Note— Prior to placing pipe, the roadway embankment shall be placed and compacted to an elevation of at least 9" above the proposed grade for the top of double strength pipe and 24" above the top of std. strength pipe. Then the trench shall be excavated and the pipe installed, backfilled and tamped as per specifications. See specifications for strength requirements.

Backfill to this line before placing pipe.

TYPICAL INSTALLATION OF CONCRETE OR TILE PIPE

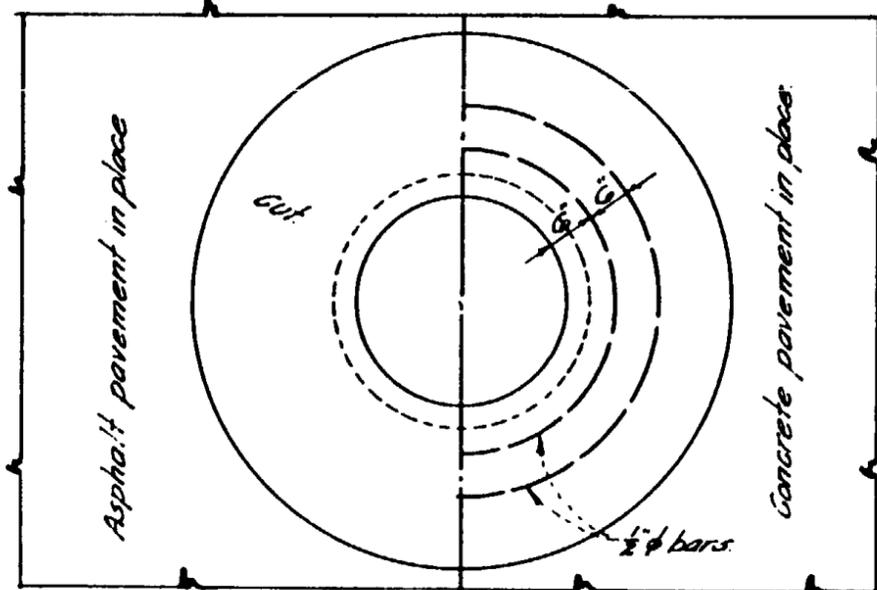


1:2 Cement Mortar
**BELL & SPIGOT
CONCRETE PIPE OR
VITRIFIED CLAY PIPE**

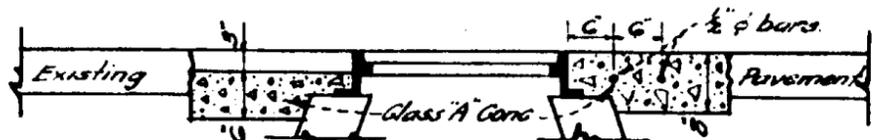


**DETAIL "X"
CONCRETE ENCASUREMENT**

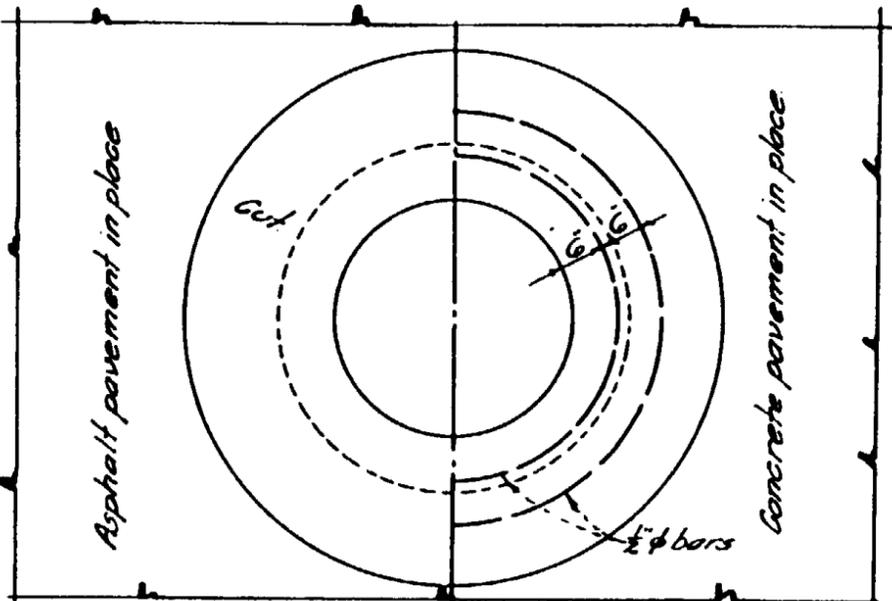
ARIZONA HIGHWAY DEPARTMENT PLANS DIVISION		REV.
CONCRETE AND VITRIFIED CLAY PIPE		
DRAWN TRACED CHECKED APPROVED PLANS ENGR.	GH Nov. 1945 <i>[Signature]</i>	DRAWING NO. C-33



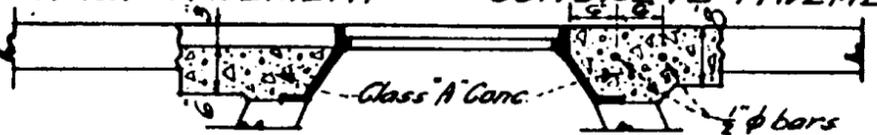
HALF PLAN ASPHALT PAVEMENT HALF PLAN CONCRETE PAVEMENT.



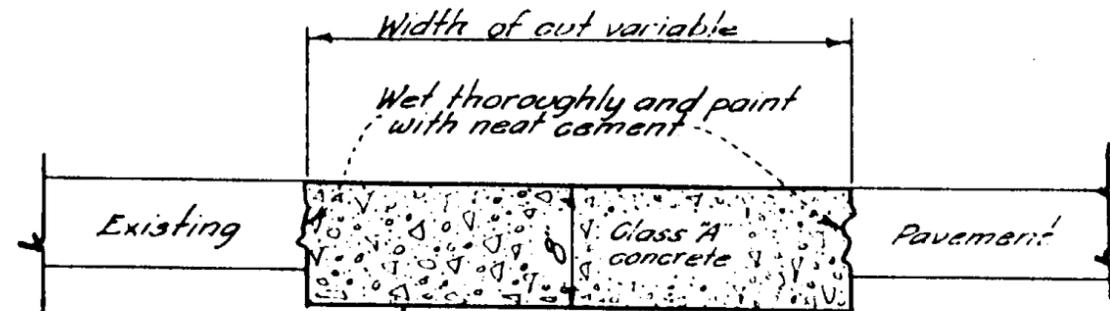
CUT FOR MANHOLE ~ FRAME & COVER NO. 1



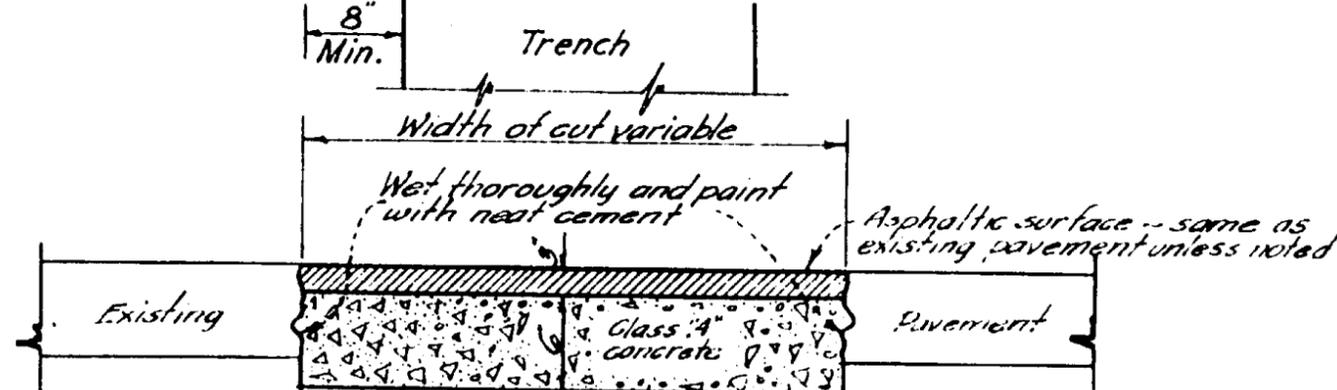
HALF PLAN ASPHALT PAVEMENT HALF PLAN CONCRETE PAVEMENT



CUT FOR MANHOLE ~ FRAME & COVER NO. 2



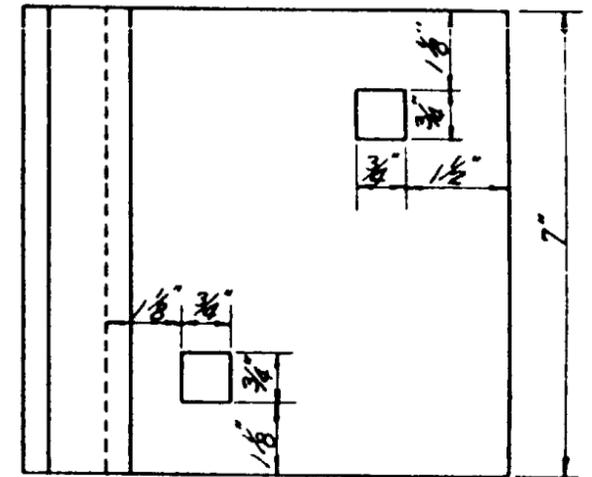
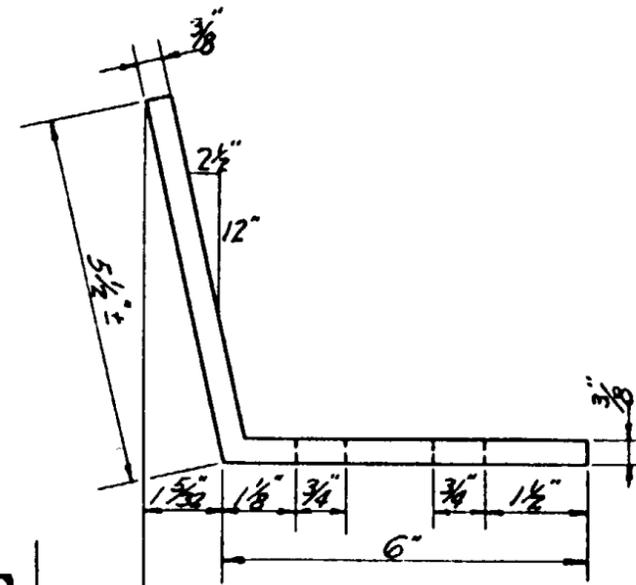
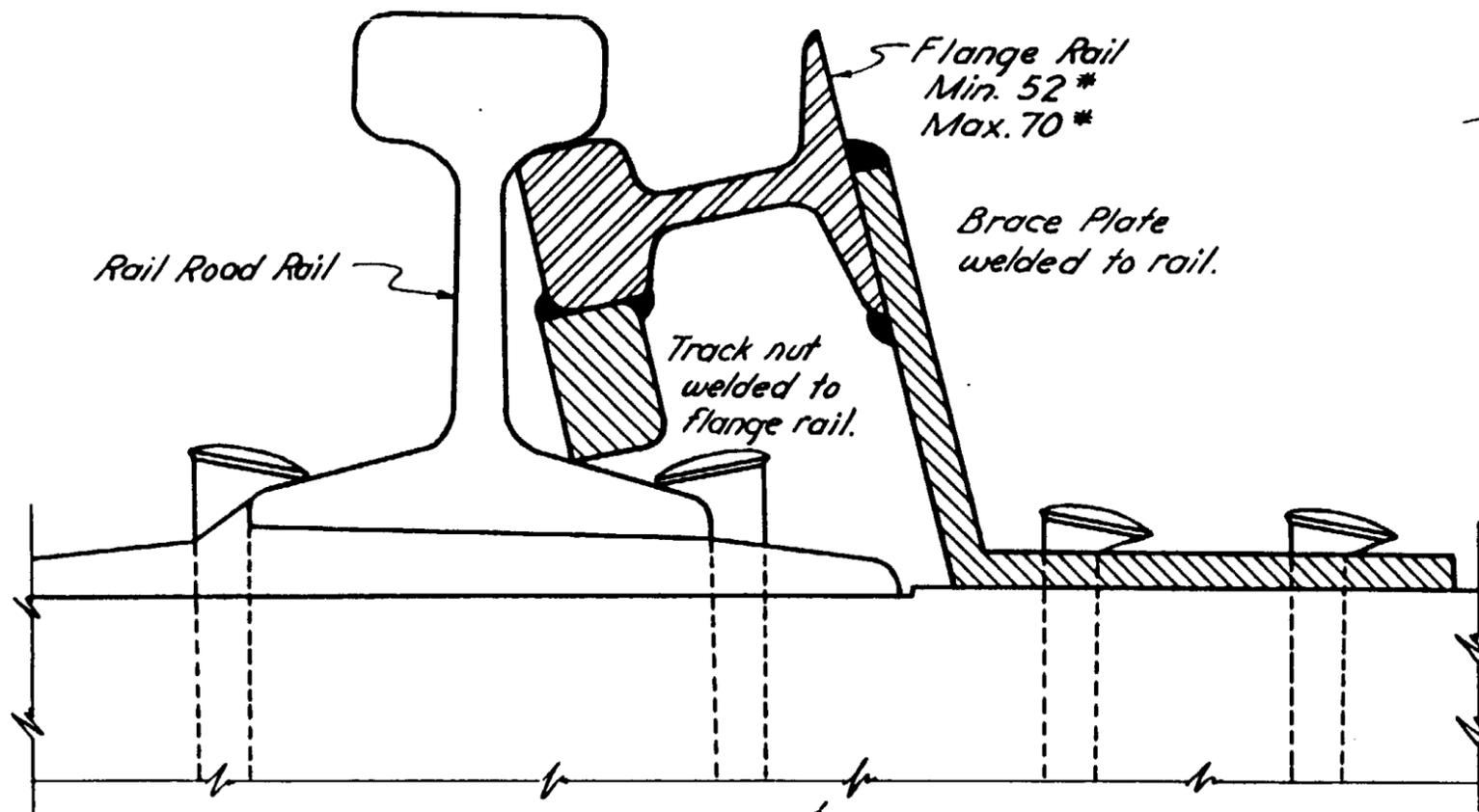
CUT IN CONCRETE PAVEMENT



CUT IN ASPHALT PAVEMENT

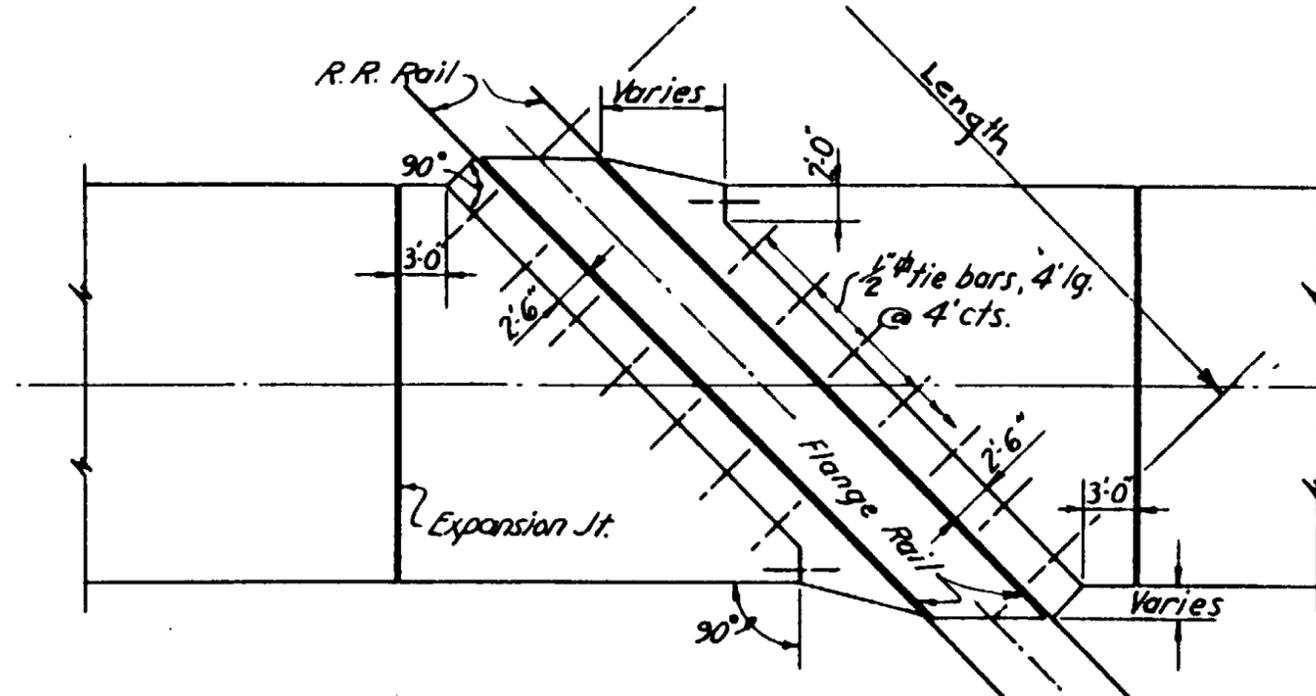
Note: Replacement shown is for Class 'A' pavement only, and does not apply to oil cake unless specified.

ARIZONA HIGHWAY DEPARTMENT PLANS DIVISION		REV. 3-20-50
PAVEMENT CUT REPLACEMENTS		
DRAWN BY	O.A. OCT 1935	DRAWING NO. C-34
TRACED BY	K.S. JULY 1938	
CHECKED BY	H.W. JULY 1938	
APPROVED BY	<i>[Signature]</i>	



BRACE PLATE FOR FLANGE RAIL

R.R. CROSSING ASSEMBLY DETAILS



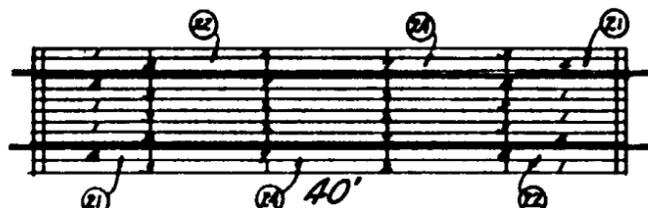
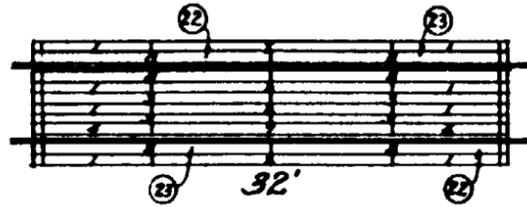
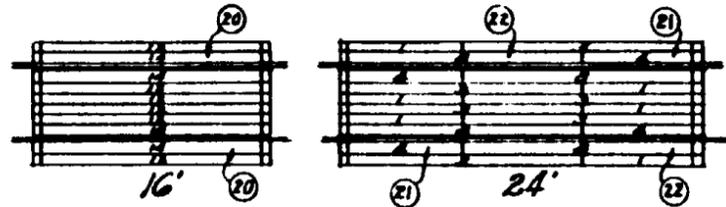
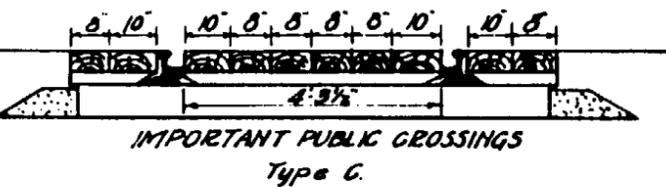
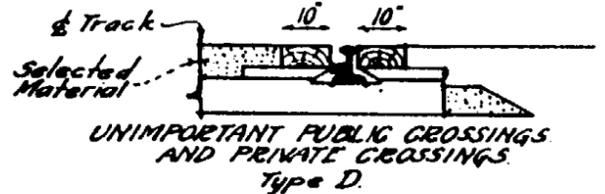
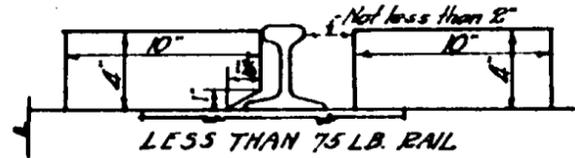
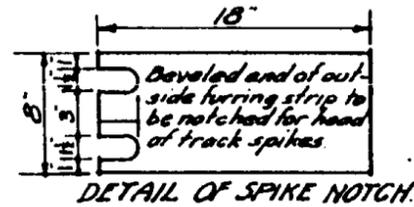
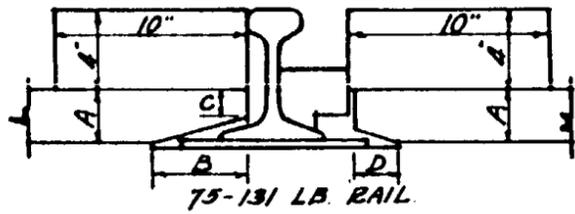
SKewed R.R. CROSSING FOR CONCRETE PAVEMENT

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.

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

ARIZONA HIGHWAY DEPARTMENT		REV.
PLANS DIVISION		
RAILROAD CROSSING		
DRAWN		DRAWING NO. C-35
TRACED	GH Nov. 1945	
CHECKED	<i>[Signature]</i>	
APPROVED PLANS ENGR.	<i>[Signature]</i>	



Type C
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"	1/2"	1"	63	91	119	147	176	204
85 "	1"	4"	3/4"	1"	78	114	149	185	220	255
90 "	1 1/2"	4"	3/4"	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 1/4"	2"	187	272	357	442	527	612
131 lb Rail	3 1/8"	5"	1 1/2"	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 KING

	A	B	C	D	16'	24'	32'
75 lb Rail	3/8"	3"	1/2"	1"	26	37	48
85 "	1"	4"	3/4"	1"	32	59	85
90 "	1 1/2"	4"	3/4"	1"	51	94	136
110 "	2 1/4"	5"	1"	2"	64	117	170
112 & 130 lb Rail	2 3/8"	5"	1 1/4"	2"	77	141	204
131 lb Rail	3 1/8"	5"	1 1/2"	2"	90	164	238

For lengths and number required see BILL OF MATERIAL.

Plank No.	Description	BILL OF MATERIAL										TYPE D				
		TYPE C										UNIMPORTANT PUBLIC AND PRIVATE CROSSINGS				
		IMPORTANT PUBLIC CROSSINGS					LESS THAN 75 LB RAIL									
		75-131 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	6	6	8	6	8	6	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	2		
23	4"x10"x16'-0" " " " "									2		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	2403	558	837	1116	1395	1674	1953		
Furring Strips 4'-9 1/2" long		11	16	21	26	31	36									
" " " " 18" long		22	32	42	52	62	72									
20 d Common Nails (21 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	149	187	231 1/2	275 1/2	320									
3/8 x 12 Boat Spikes (.53 lb ea) (handover) "		69	111 1/2	146	180 1/2	215 1/2	249 1/2									
1/2 x 10 Lag screws (.54 lb ea) (less than) "		70 1/2	119 1/2	148 1/2	183 1/2	219 1/2	254 1/2	70 1/2	113 1/2	148 1/2	183 1/2	219 1/2	254 1/2			
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			

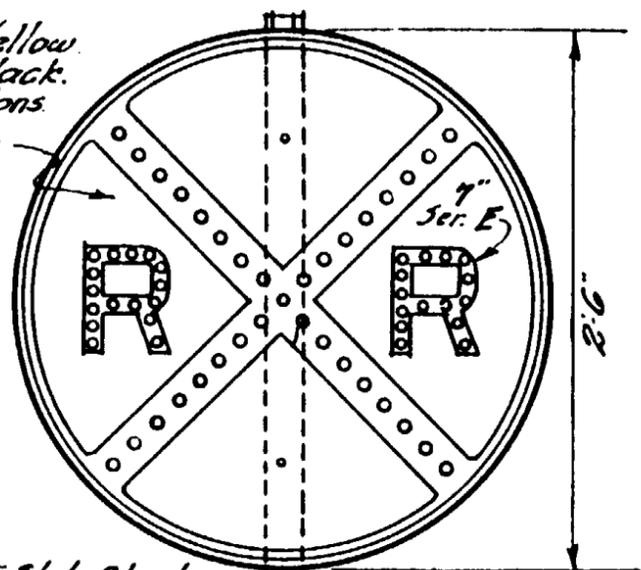
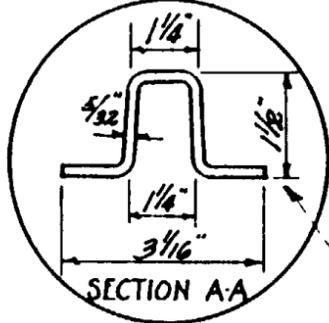
- NOTES**
- Optional with Engineer - planks may be fastened with lag screws or boat spikes, with or without washers under head of either. All planks shall be double fastened at ends and single fastened, staggered, at intermediate ties. Furring strips to be fastened with 20d nails.
 - All necessary milling shall be done at treating plant before treatment. Dimensions shown are after seasoning and treatment.
 - Number of plank to be strapped on each plank, as indicated, at treating plant. Enclosure 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, rivet screws (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.
 - Dating 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 at 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.
 - Outside planks for private crossings may be omitted, in which case use omit one-half of furring strips and hardware shown in tables.

ARIZONA HIGHWAY DEPARTMENT		REV.
PLANS DIVISION		
STANDARD RAILROAD	PLANKED CROSSINGS	
DRAWN BY: W.M.D. JAN. 1936	DRAWING NO. C-36	
TRACED BY: K.S. JULY 1938		
CHECKED BY: H.H.W. JULY 1938		
APPROVED BY: E. Mueller		

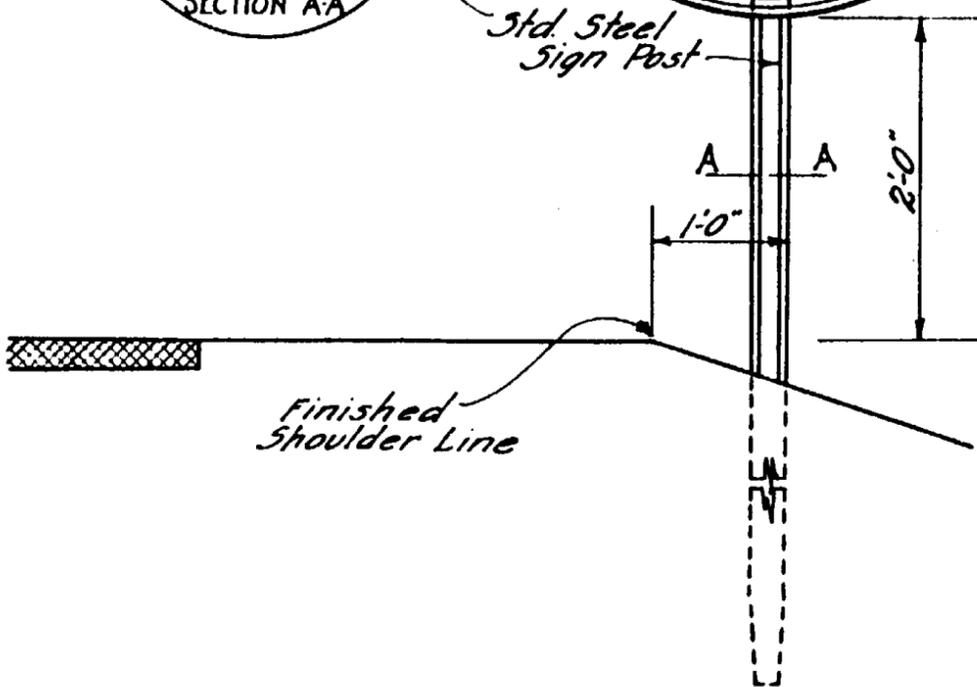
Std. W-32
Advance Warning Sign

Background-Highway Yellow
Border, symbol, & lettering - Black.
Reflectorized by reflector buttons
in symbol and letters, or by
reflecting coating background

21 (Min) No. 1 in bars
30 (Min) No. 5 in letters

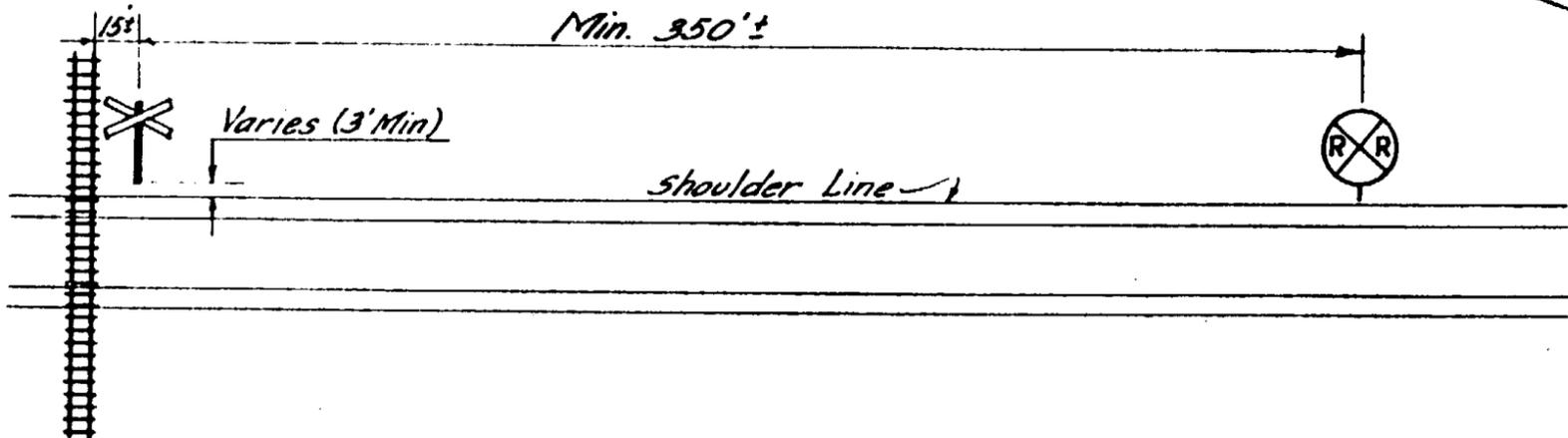


Std. Steel Sign Post

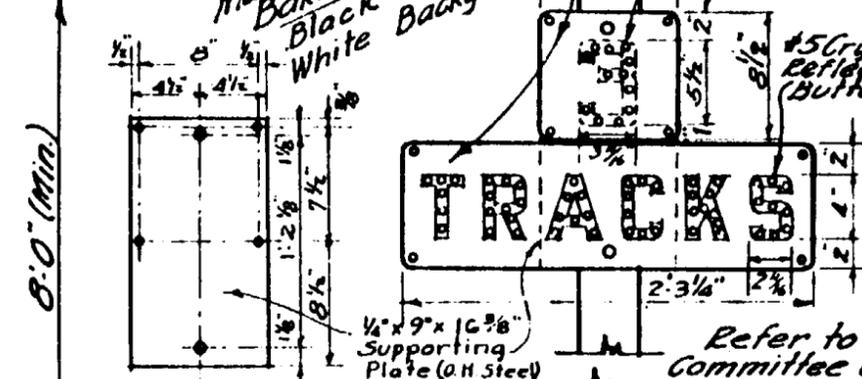
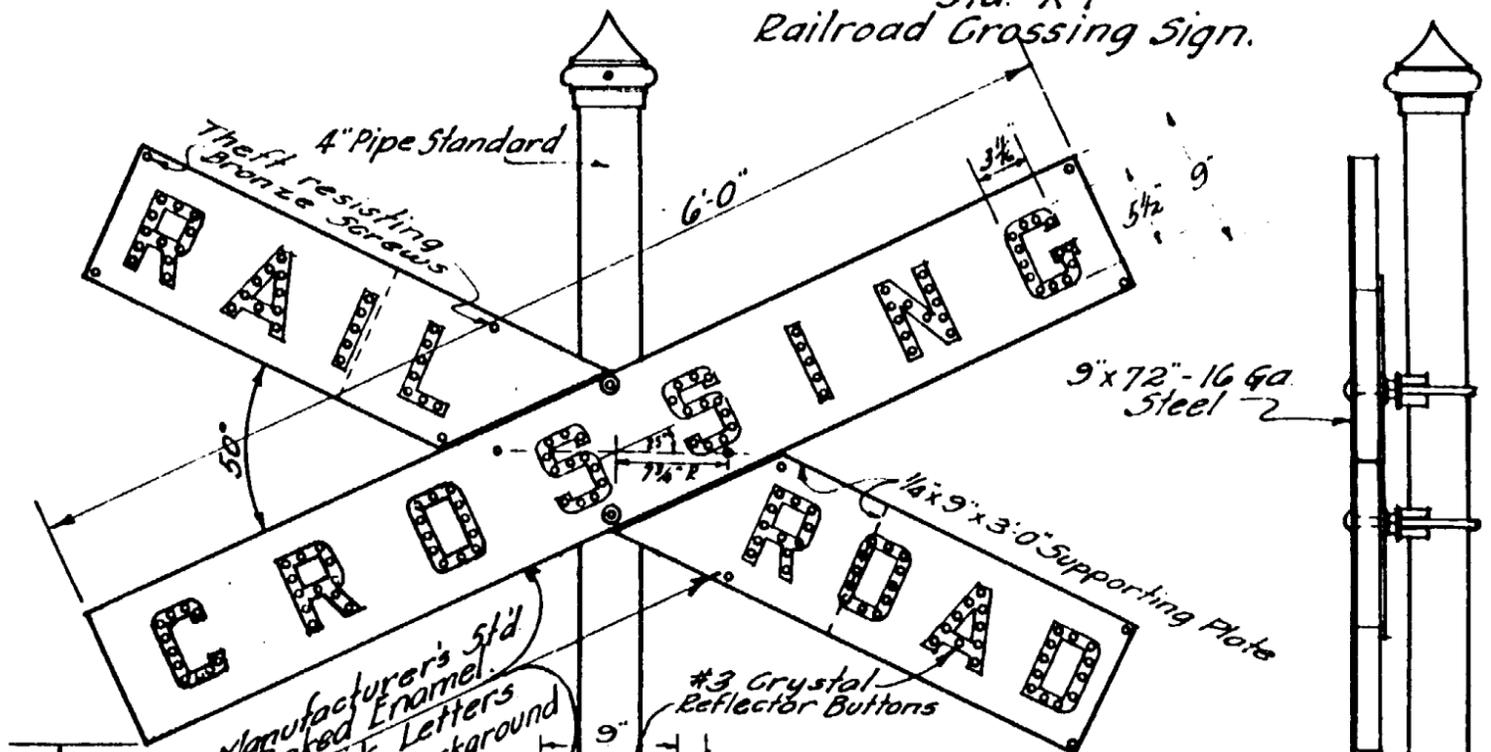


Finished Shoulder Line

Min. 350'

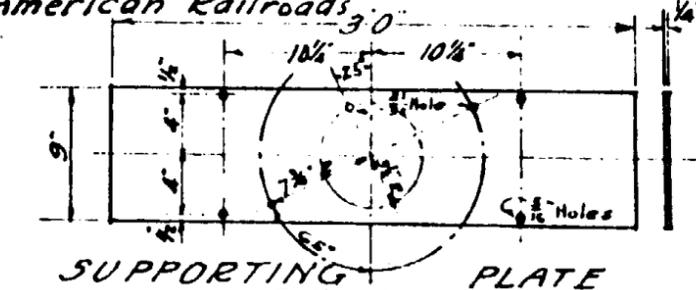


Std. X-1
Railroad Crossing Sign.



Pipe, base, pinnacle,
& Clamps shall be
painted white, 2 coats No. 8
over 1 coat No. 1.

NOTE
Refer to Bulletin No. 4 - Joint
Committee on Grade Crossing Protection,
Assoc. of American Railroads



ARIZONA HIGHWAY DEPARTMENT
PLANS DIVISION

RAILROAD CROSSING
SIGNS.

DRAWN BY	H.W. Nov. 1931	DRAWING NO.
TRACED BY	K.S. Nov. 1931	
CHECKED BY	H.W.	C-37
APPROVED BY	E.C. Miller	

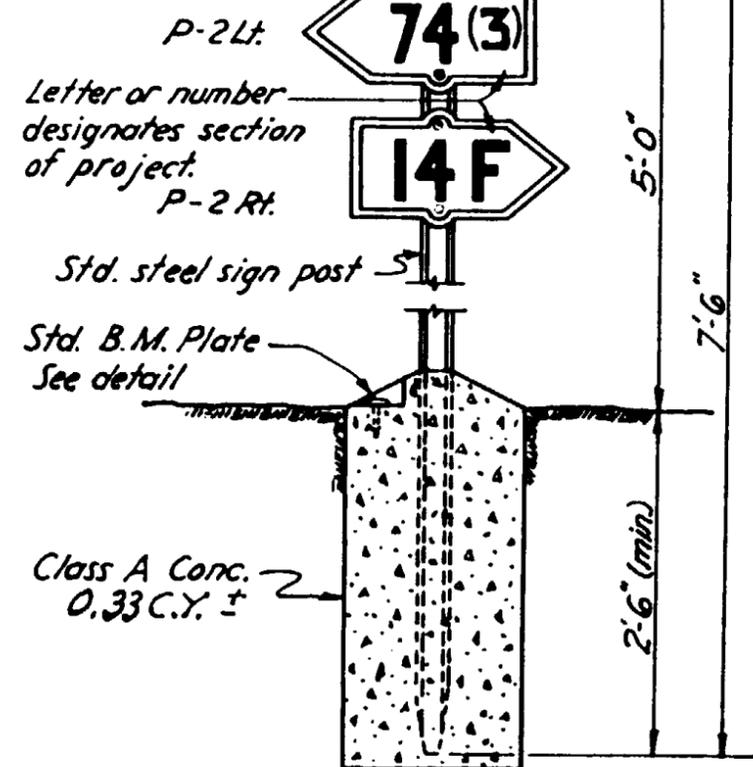
Rev.
4/27
4/7/50

FAU

FAS

FAP

P-1



Letter or number designates section of project.

P-2 Lt.

P-2 Rt.

Std. steel sign post

Std. B.M. Plate See detail

Class A Conc. 0.33 C.Y. ±

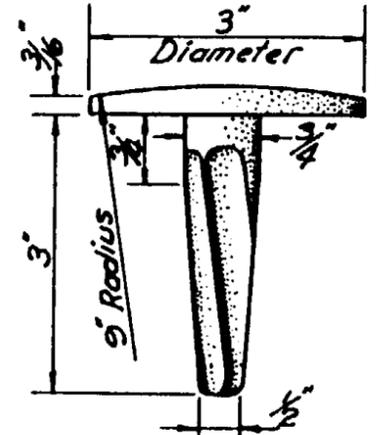
PROJECT MARKER

Project Marker to be furnished by the State and installed and marked by the Project Engineer at each end of all Federal Aid Projects.

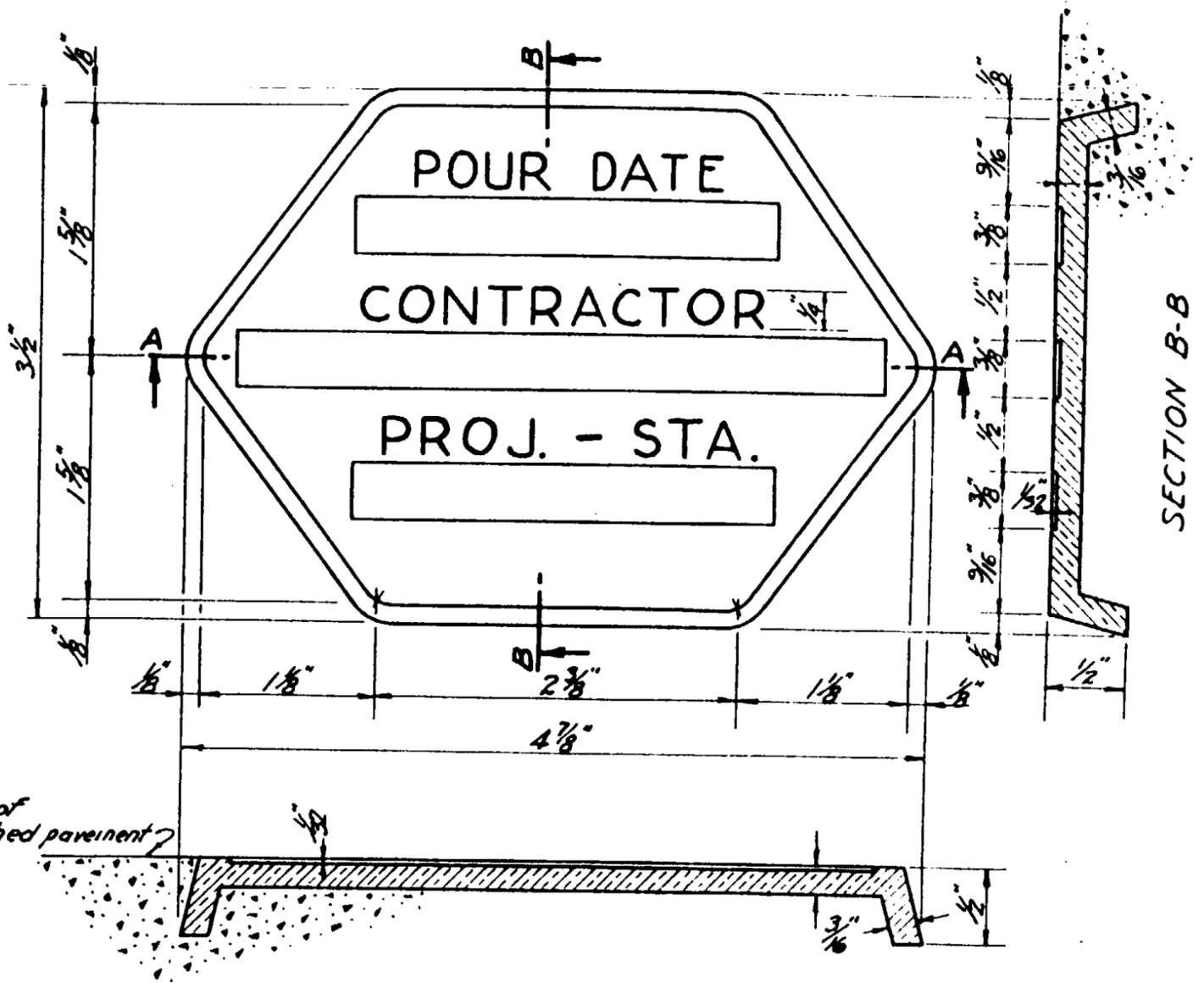
Project Markers are to be placed on R/W line, but not more than 100' from E of road if R/W is greater than 100'.

Bench Mark to be established and installed by the Project Engineer on culvert headwalls, bridge curbs, abutment walls, F.A. project markers or other permanent structures.

Location and data shall be noted on "As Built" plans.



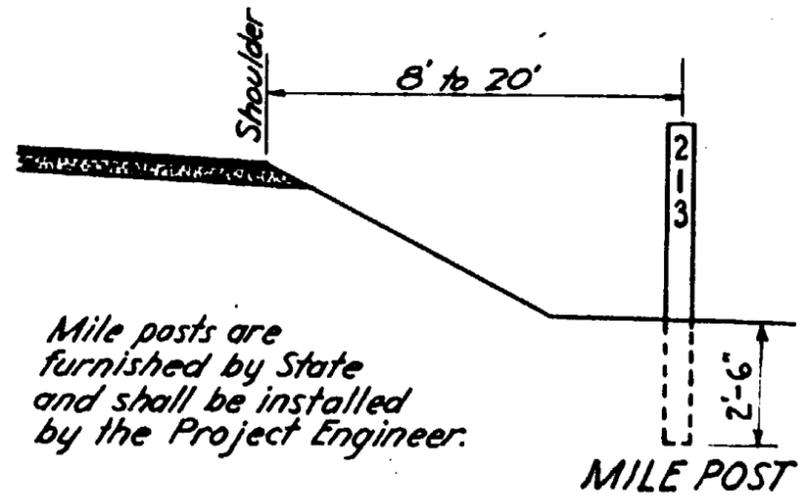
ELEVATION STD. BENCH MARK



SECTION A-A CONCRETE CONSTRUCTION MARKER

Scale - Full Size

Marker to be made of brass or bronze, and is to be furnished and placed at beginning and end of each days pour, after marking, by Proj. Engr.



Mile posts are furnished by State and shall be installed by the Project Engineer.

MILE POST

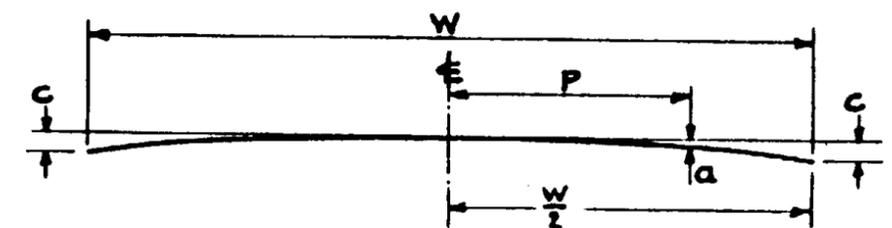
ARIZONA HIGHWAY DEPARTMENT		REV. 3-20-50
PLANS DIVISION		
PROJECT MARKER		
MILE POST, BENCH MARKER		
CONC. CONST. MARKER		
DRAWN	G.H. Nov. 1945	DRAWING NO. C-38
TRACED		
CHECKED		
APPROVED PLANS ENGR. E. J. Miller		

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	1.25	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	4.28	5.43	6.67	7.99	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	39.15	42.87	46.76	50.83	55.07	59.48	64.06	68.82	73.75	78.85	84.13	89.58	95.20	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	29.78	33.18	36.71	40.47	44.44	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	27.12	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	8.45	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	39.86	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	6.25	11.11	17.36	25.00	34.83	44.44	56.25	69.44	84.83	C																																	
22	0.83	3.31	7.44	13.22	20.66	29.75	40.50	52.89	66.94	82.64	C																																		
20	1.00	4.00	9.00	16.00	25.00	36.00	49.00	64.00	81.00	C																																			
18	1.25	4.94	11.11	19.75	30.86	44.44	60.49	79.01	C																																				
16	1.56	6.25	14.06	25.00	39.06	56.25	76.56	C																																					
14	2.04	8.16	18.37	32.65	51.02	73.47	C																																						
12	2.78	11.11	25.00	44.44	69.44	C																																							

W = FULL WIDTH OF ROADWAY - FEET

FORMULA



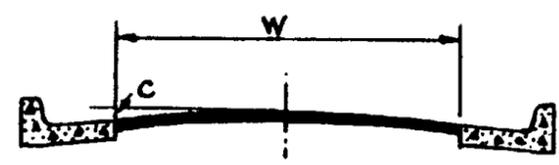
$$\frac{a}{C} = \frac{P^2}{\left(\frac{W}{2}\right)^2} \quad \text{OR} \quad a = \frac{CP^2}{\left(\frac{W}{2}\right)^2}$$

USE OF TABLE

EXAMPLE :

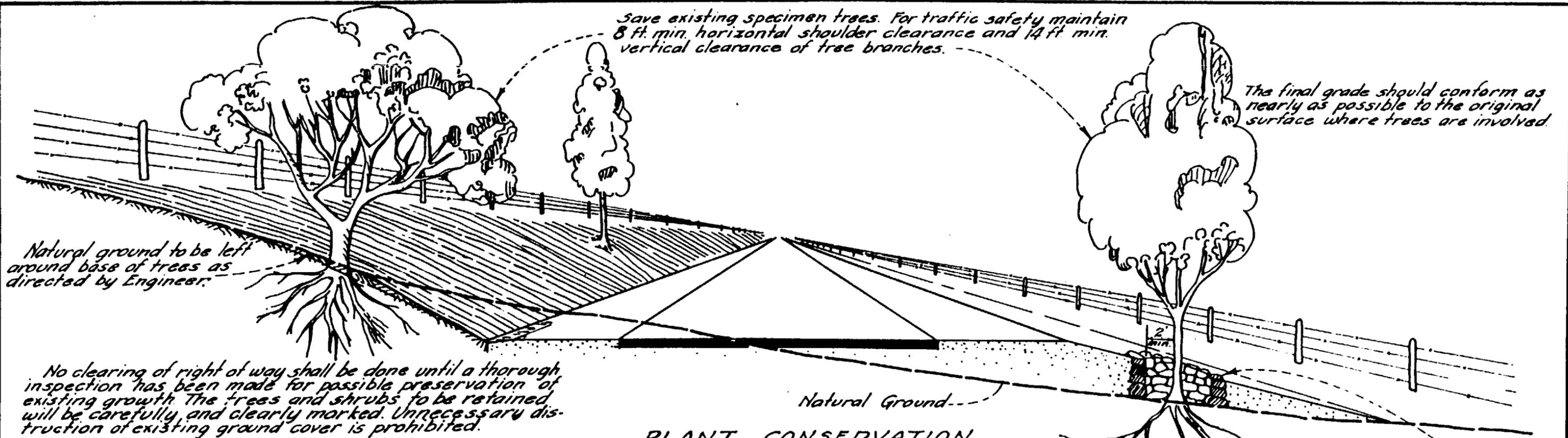
ASSUME W = 40 FT. AND C = 0.45 FT.
FIND a IF P = 8 FT.

TABLE SHOWS a = 16.00% OF C, OR 0.45 x 0.16 = 0.072 FT.

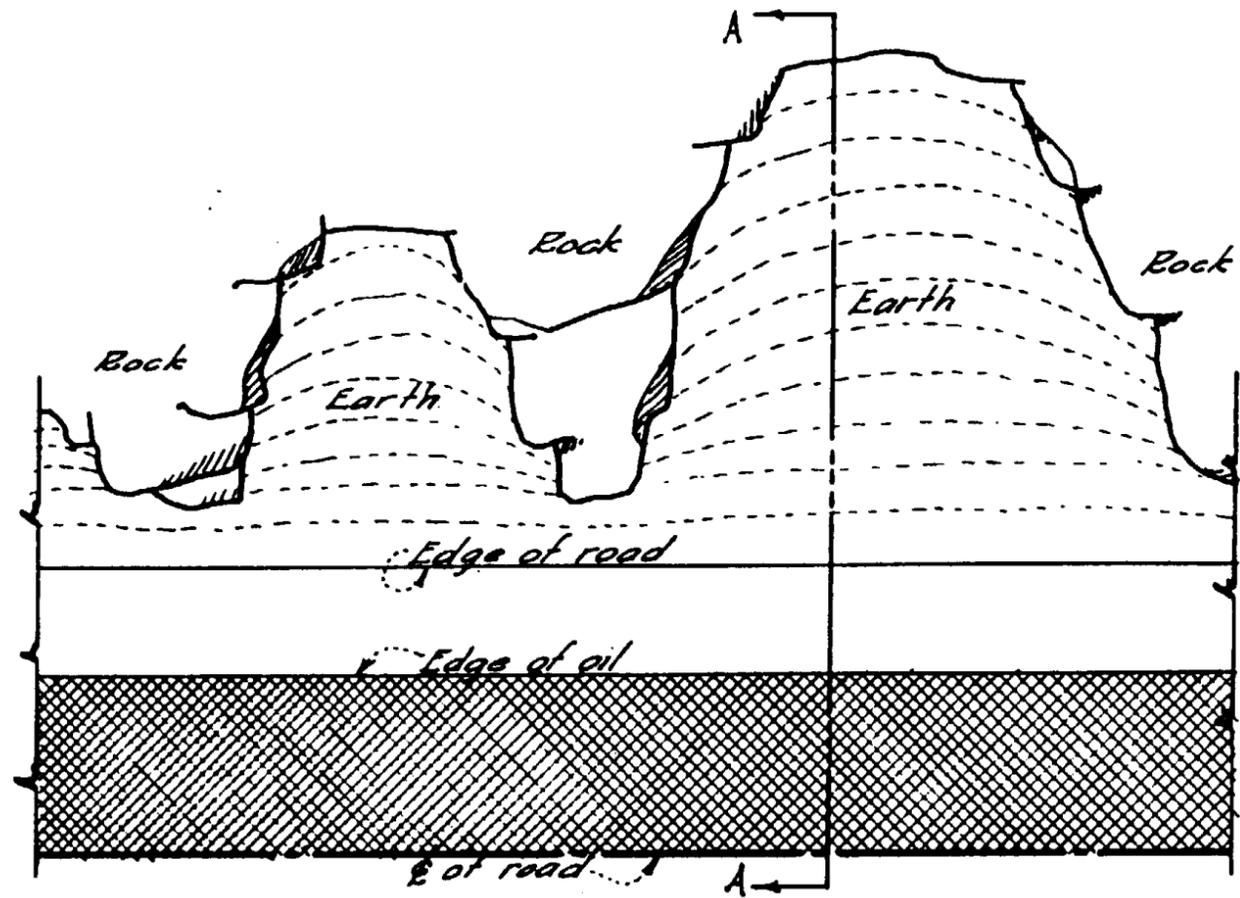


INTERPRETATION OF "W" AND "C"
WHERE CURBS AND GUTTERS ARE USED

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

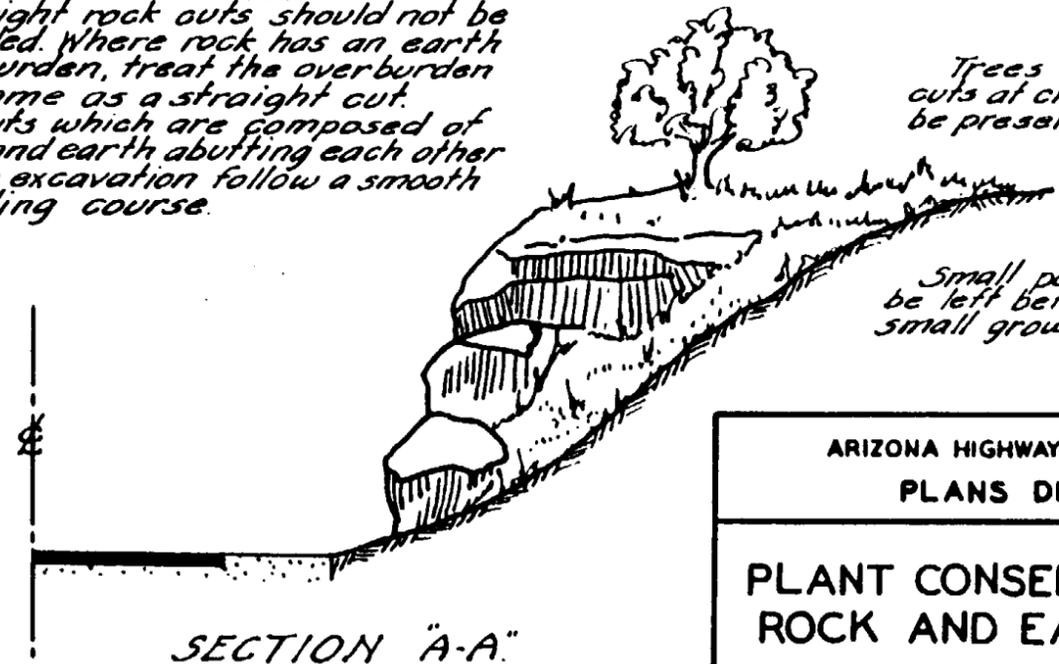


PLANT CONSERVATION.



PLAN ~ ROCK & EARTH CUT.

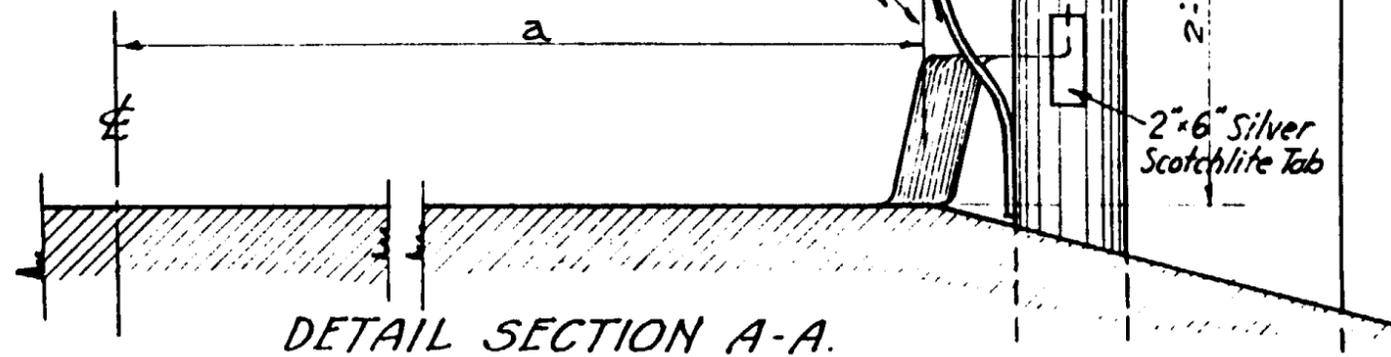
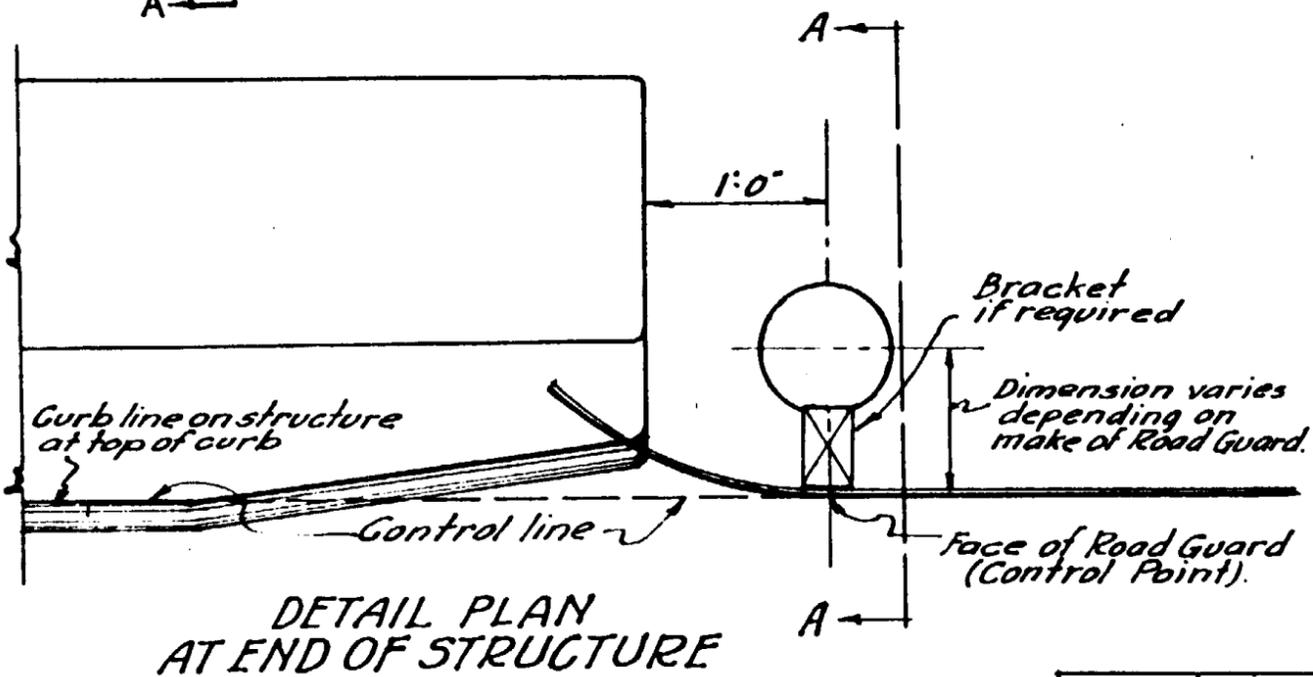
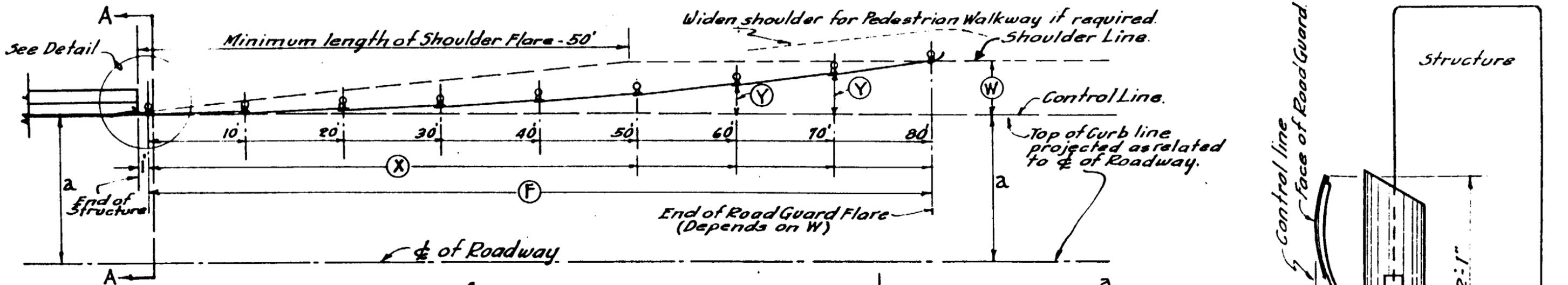
ROCK WORK.
 Straight rock cuts should not be rounded. Where rock has an earth overburden, treat the overburden the same as a straight cut. In cuts which are composed of rock and earth abutting each other let the excavation follow a smooth rounding course.



SECTION "A-A"

ARIZONA HIGHWAY DEPARTMENT PLANS DIVISION		REV.
PLANT CONSERVATION & ROCK AND EARTH CUTS		
DRAWN	W.M.D. JAN., 1936	DRAWING NO.
TRACED	K.S. JUNE, 1938	C-41
CHECKED	H.H.W. July, 1938	
APPROVED ENGR. PLANS	E.J. Miller	

TYPICAL INSTALLATION PLAN OF ROAD GUARD AT BRIDGE APPROACHES



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 past away from structure
- Y = Offset to face of Road Guard at each post.

X	Y					
	W=3	W=4	W=5	W=6	W=7	W=8
10	0.12	0.11	0.10	0.09	0.09	0.08
20	0.48	0.44	0.41	0.38	0.35	0.32
30	1.08	1.00	0.92	0.85	0.78	0.72
40	1.92	1.78	1.63	1.49	1.38	1.28
50	3.00	2.78	2.55	2.34	2.16	2.00
60		4.00	3.67	3.38	3.11	2.88
70			5.00	4.59	4.24	3.92
80				6.00	5.53	5.12
90					7.00	6.48
100						8.00
	F=50	F=60	F=70	F=80	F=90	F=100

GENERAL NOTES :-

When value of "W" is different than shown in Table, then use Basic formula to find values for Y.

When Road Guard is to be continued beyond end of Road Guard Flare required for "W" offset, the face of Road Guard shall then be continued at the shoulder line. Modify last offset to avoid kink.

When "W" = 0, no flare is required. Shoulder line is then the control line.

Offset from Roadway $\phi = Y + a$ - All figures are expressed in feet.

Place Road Guard both sides of roadway.

ARIZONA HIGHWAY DEPARTMENT PLANS DIVISION		REV. 3/17/50
INSTALLATION OF ROAD GUARD AT STRUCTURE APPROACHES		
DRAWN TRACED CHECKED APPROVED ENG'R. PLANS	L. Mc Dougall 1/10/50 K. Stokor 1/12/49 H. W. Duggan 1/25/50 H. W. Duggan 1/25/50	DRAWING NO. C-42