

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

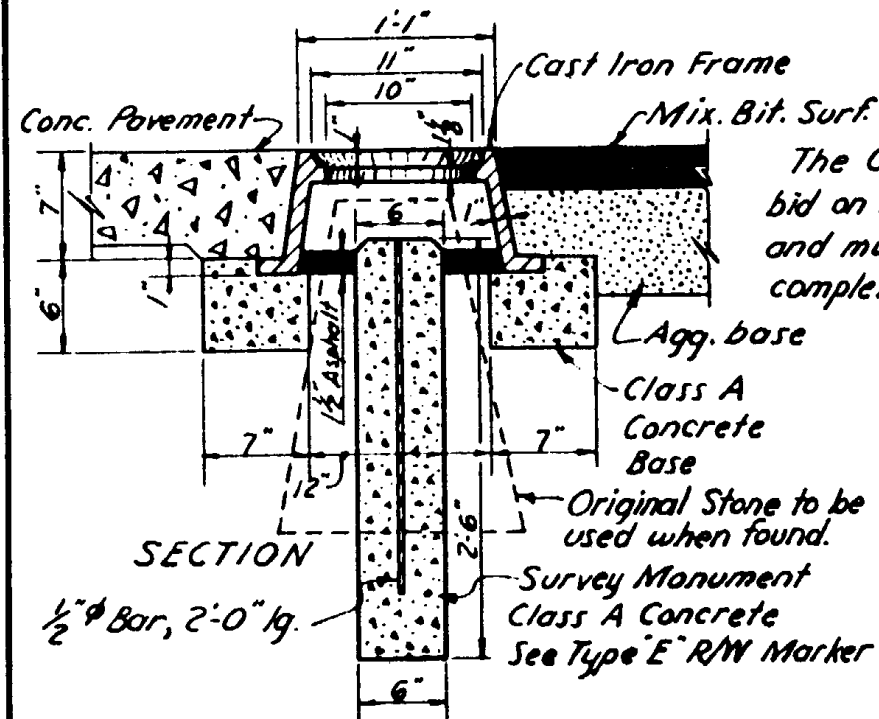
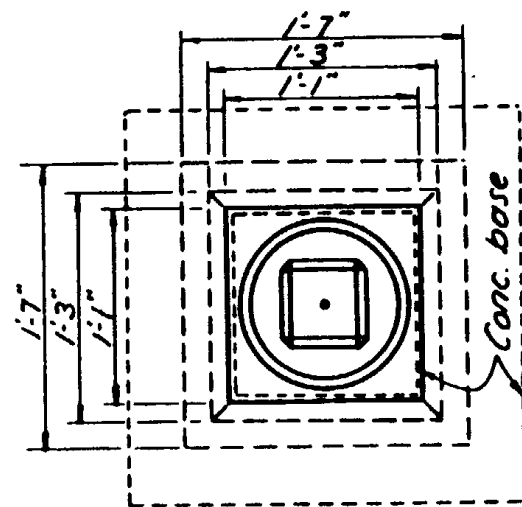
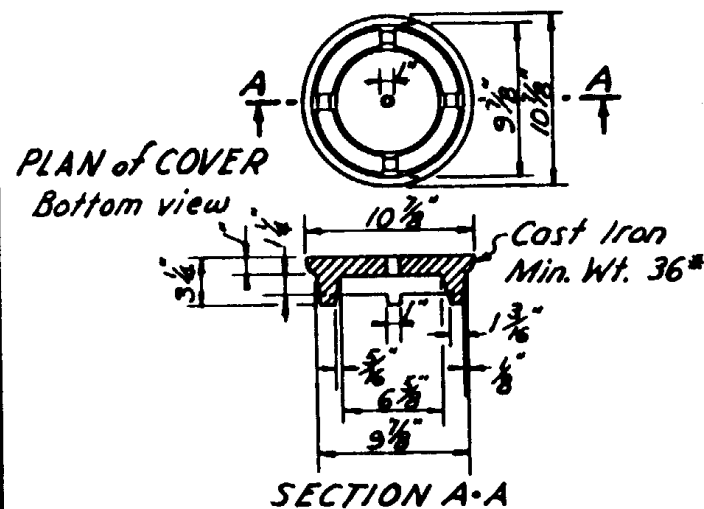
VS600 7/50

ARIZONA STATE HIGHWAY DEPARTMENT - PLANS DIVISION

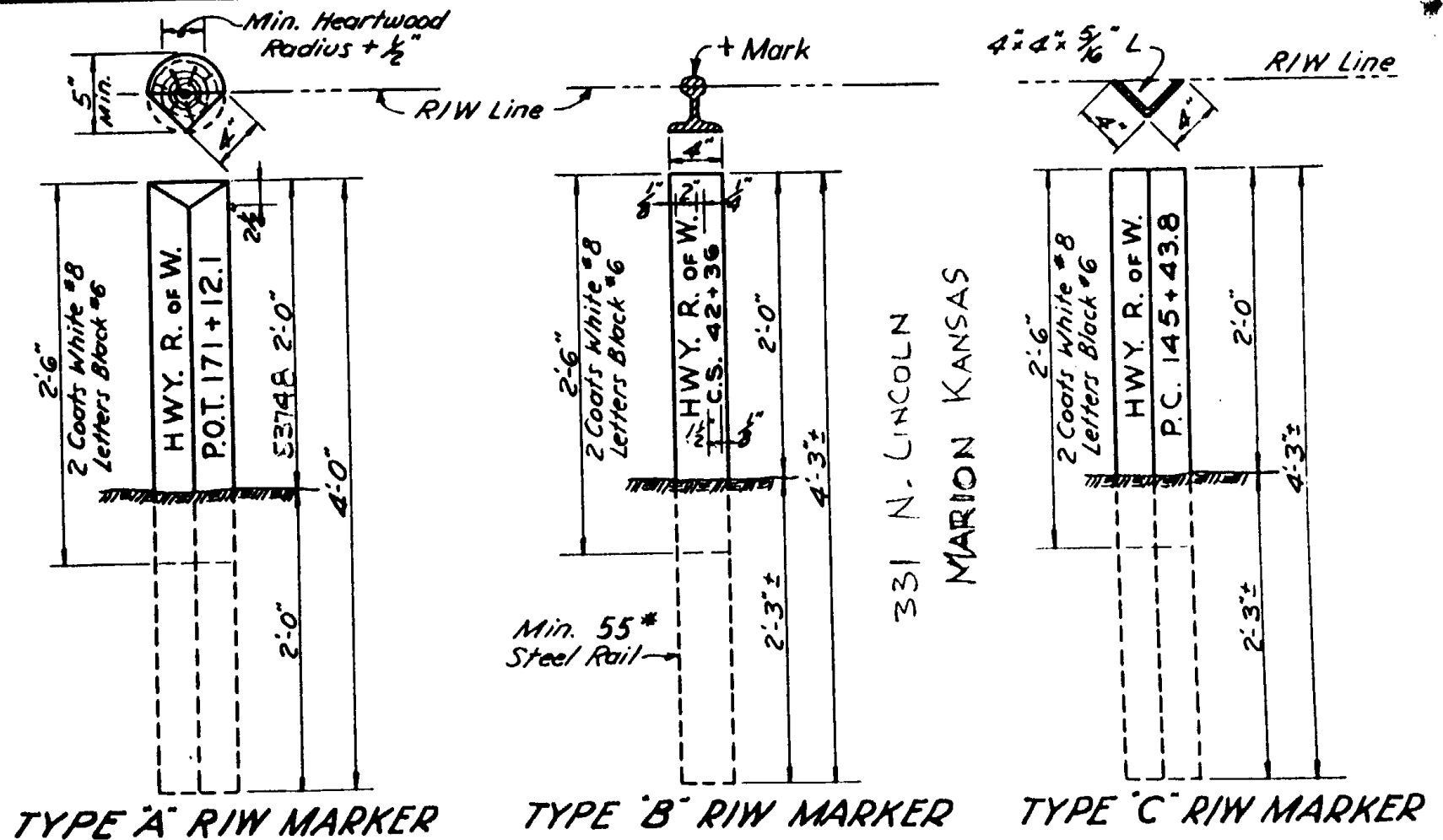
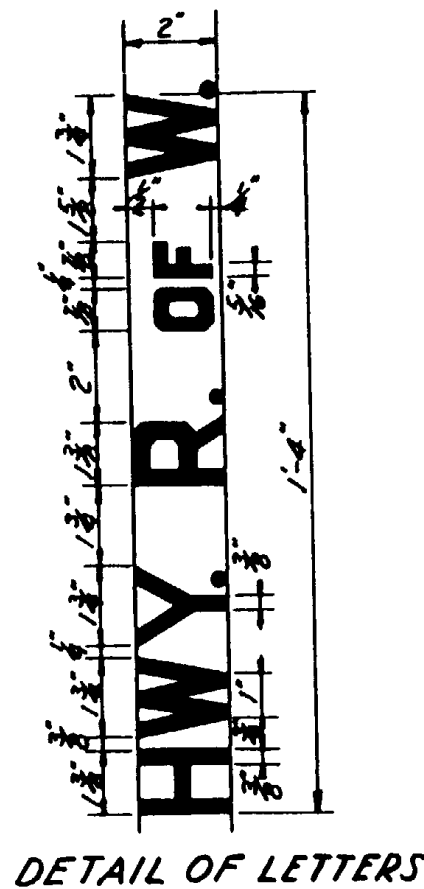
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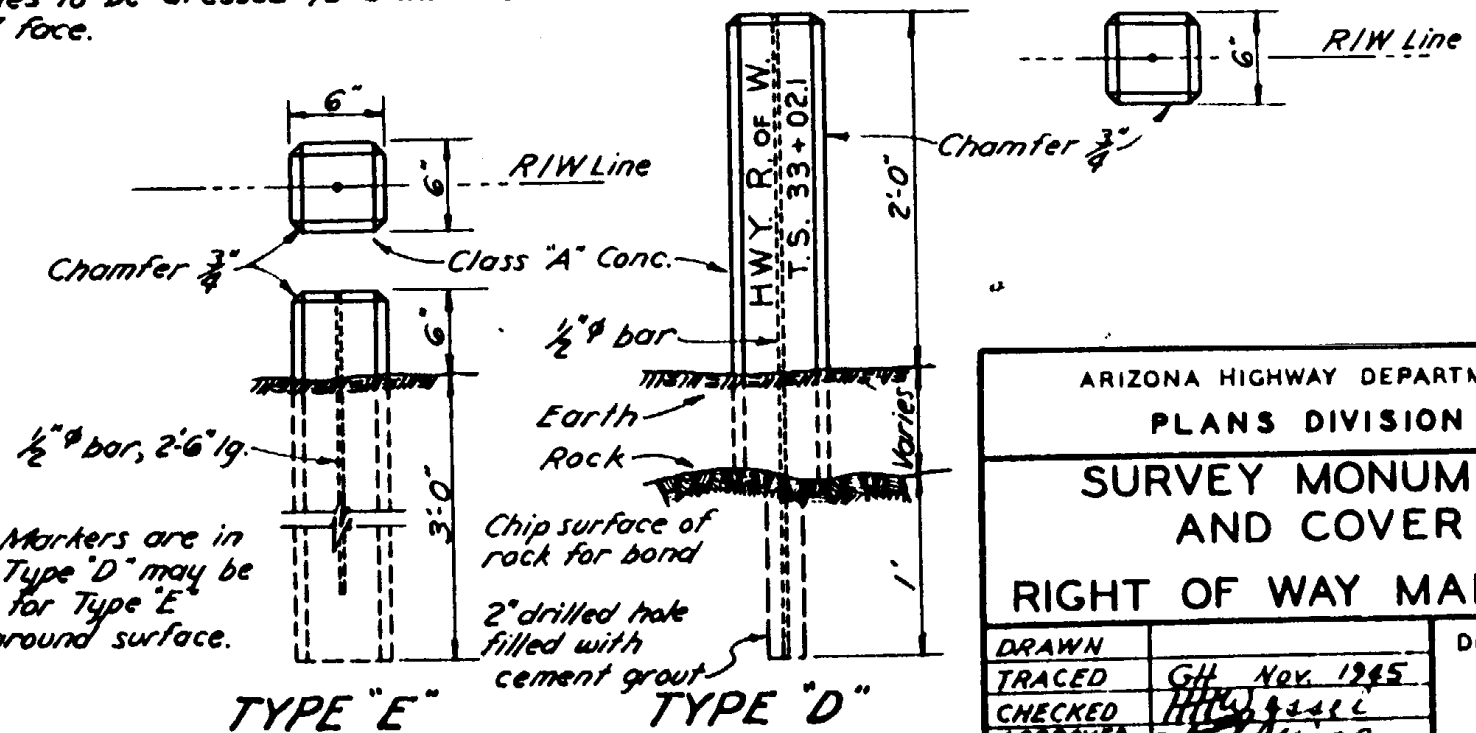


SURVEY MONUMENT & COVER



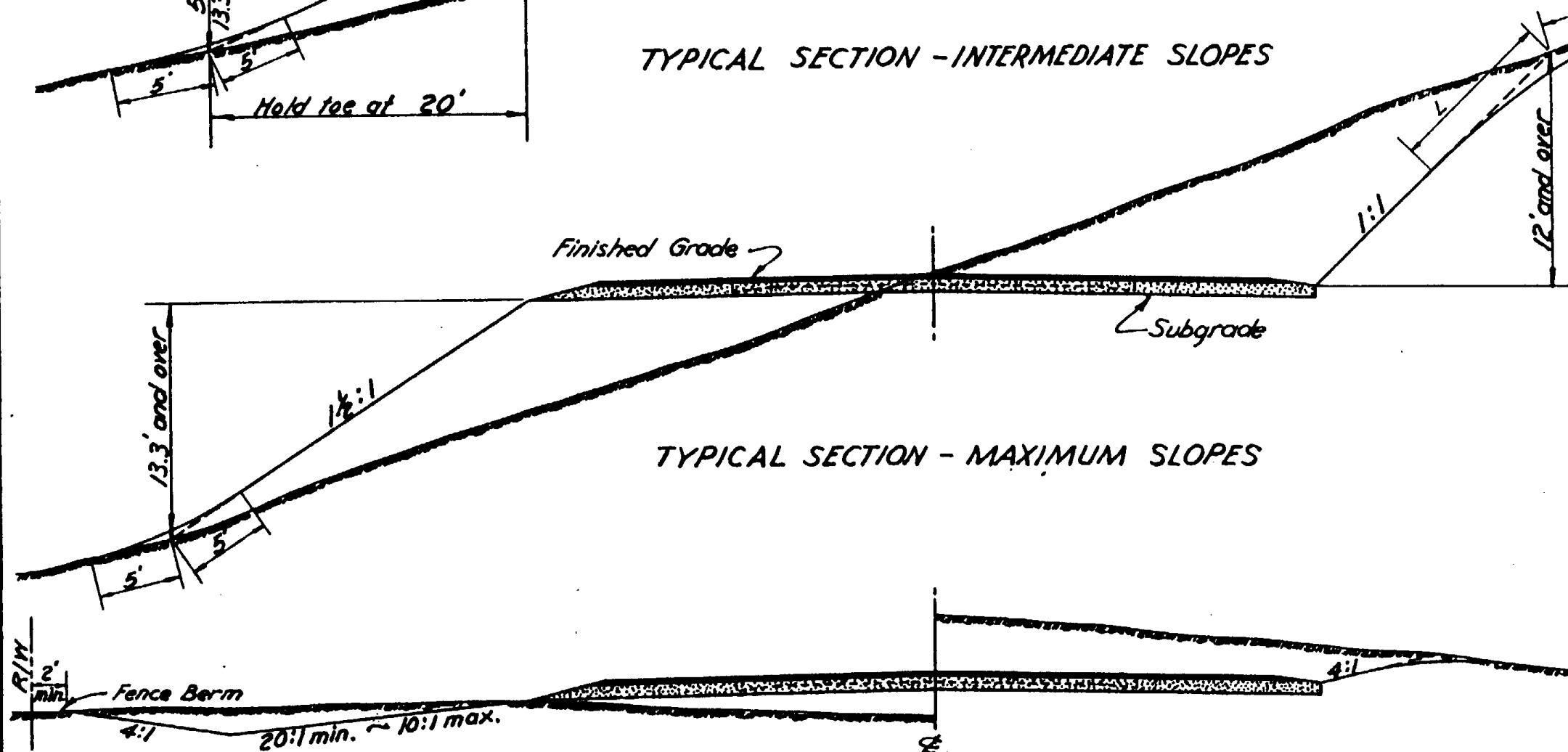
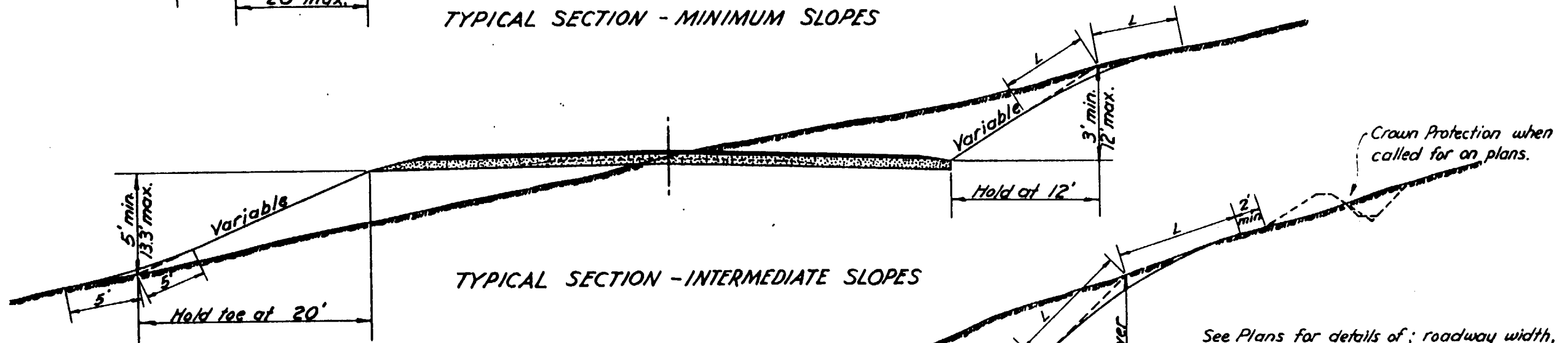
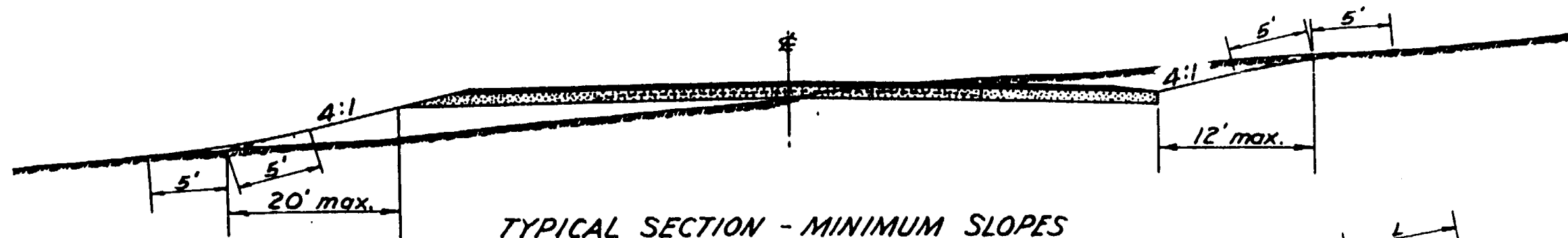
Posts to be native juniper, native cedar,
or native cypress. Minimum 5" diameter
at top. Top to be beveled 2 1/2" and two
sides to be dressed to a minimum
4" face.

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

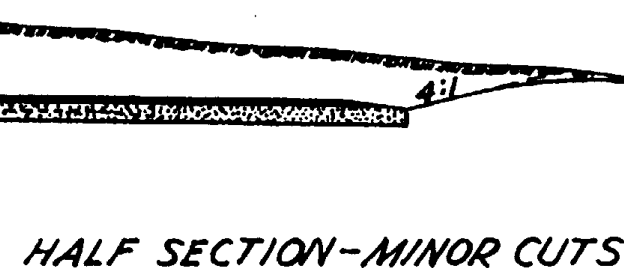
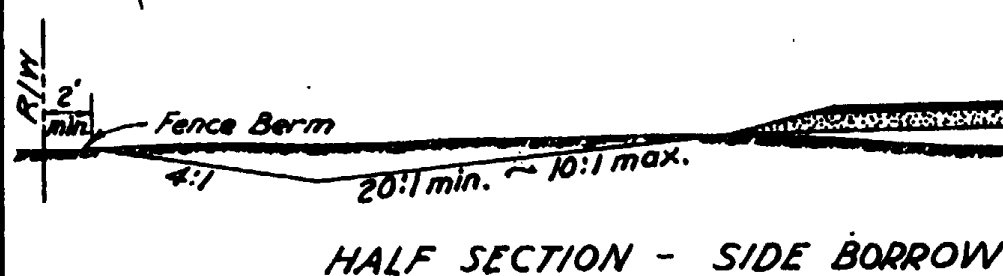


When RIW Markers are in
solid rock, Type 'D' may be
substituted for Type 'E'
below the ground surface.

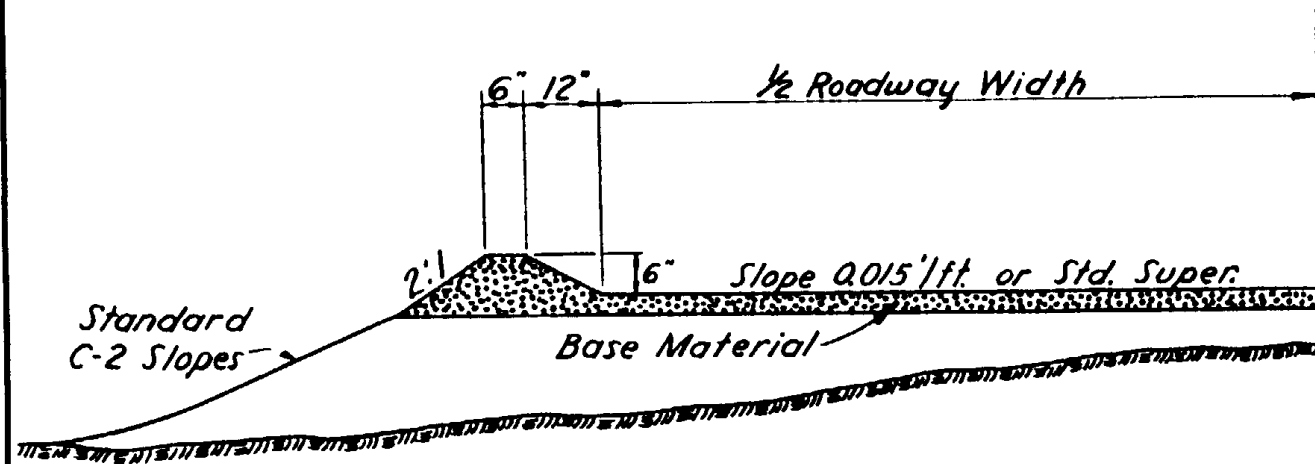
ARIZONA HIGHWAY DEPARTMENT PLANS DIVISION		REV. 3/17/50
SURVEY MONUMENT AND COVER		
RIGHT OF WAY MARKERS		
DRAWN	GH Nov. 1945	DRAWING NO. C-1
TRACED	HH 9-2-46	
CHECKED	HH 9-2-46	
APPROVED ENGR. PLANS	E. Mueller	



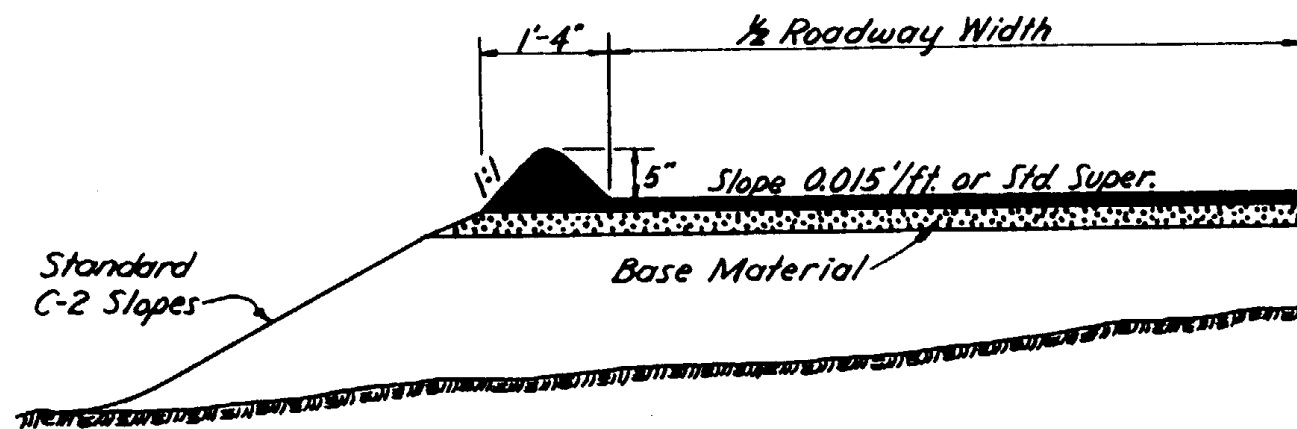
See Plans for details of; roadway width, cut ditch, type and thickness of roadway surfacing, superelevation, and curve widening.
 Standard Crown Slope for P.C. Concrete 0.01' per foot; for Bit. Surf. Treat. and Mix. Bit. Surf. 0.015' per foot.
 Standard Cut and embankment slopes as shown on this sheet 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.



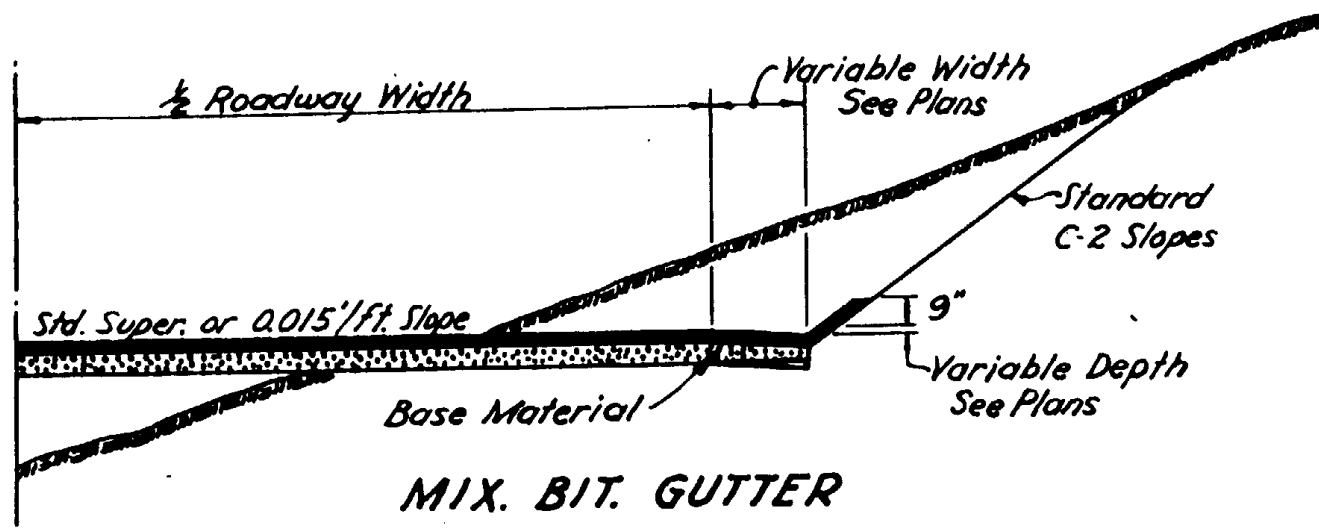
ARIZONA HIGHWAY DEPARTMENT			REV.
PLANS DIVISION			
SLOPES			
SLOPE ROUNDING			
DRAWN	GH	Nov. 1965	DRAWING NO. C-2
TRACED	GH	Nov. 1965	
CHECKED	HTB		
APPROVED	Ed Miller		
PLANS ENGR.			



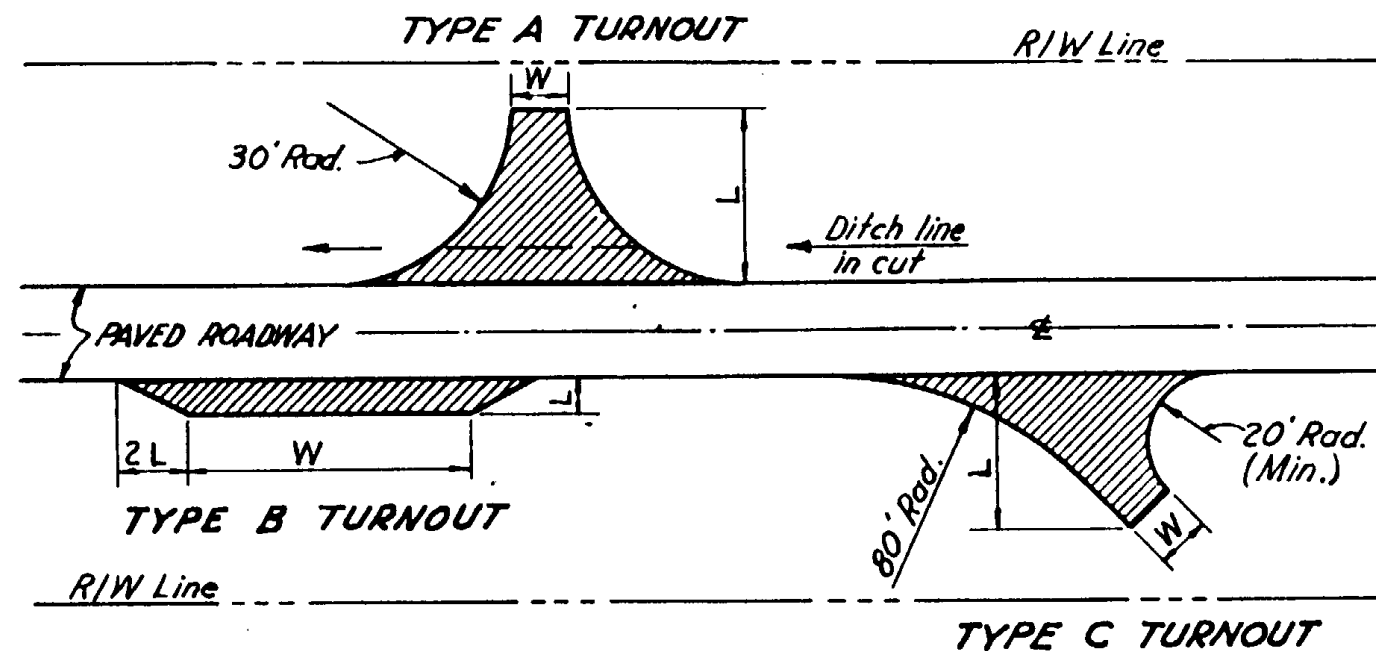
CURB FOR GRAVEL RDWY.



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'x30' 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.
PLANS DIVISION		3/17/50
MIX. BIT. & GRAVEL CURBS		
MIX. BIT. GUTTER		
PAVED TURNOUTS		
DRAWN	GH Nov. 1945	DRAWING NO. C-3
TRACED	GH Nov. 1945	
CHECKED	HHW	
APPROVED	<i>E. J. Miller</i>	
ENGR. PLANS	<i>E. J. Miller</i>	



CROWN DYKE

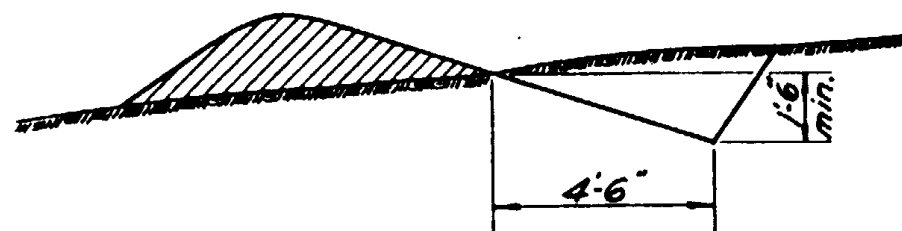
To be paid for by lineal measure.

CROWN DITCH

To be paid for by lineal measure

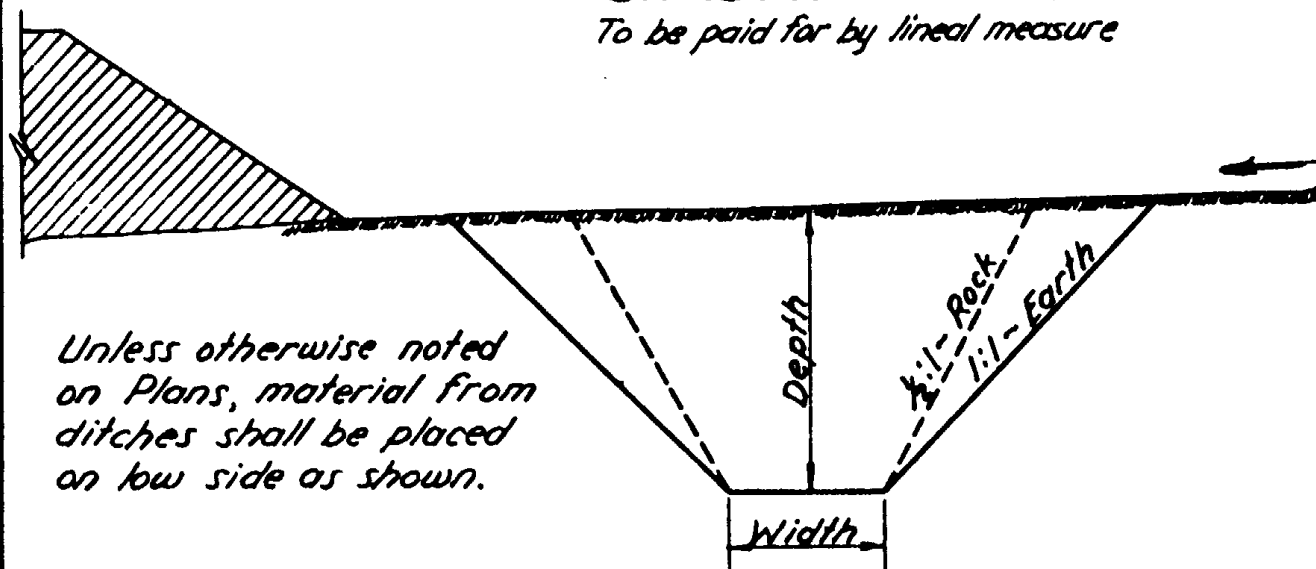
Crown protection should be constructed in such a manner that the flow of intercepted water shall not exceed 0.5%.

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



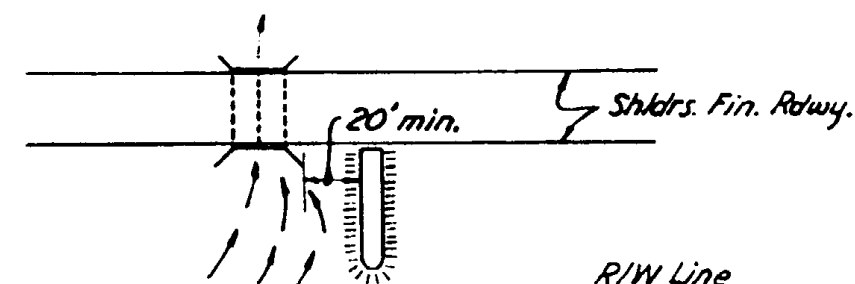
GRADER DITCH

To be paid for by lineal measure



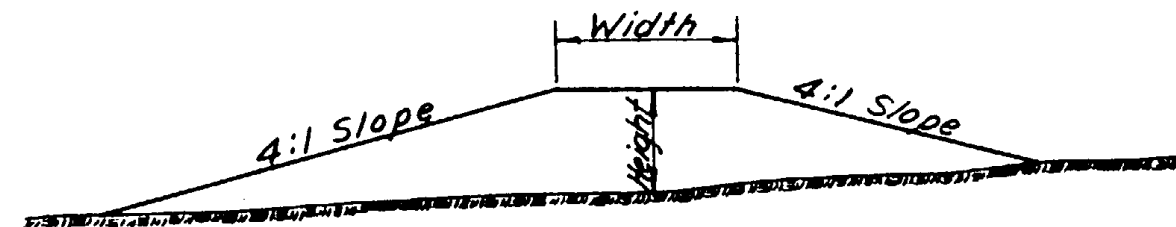
Unless otherwise noted on Plans, material from ditches shall be placed on low side as shown.

DITCH OR CHANNEL

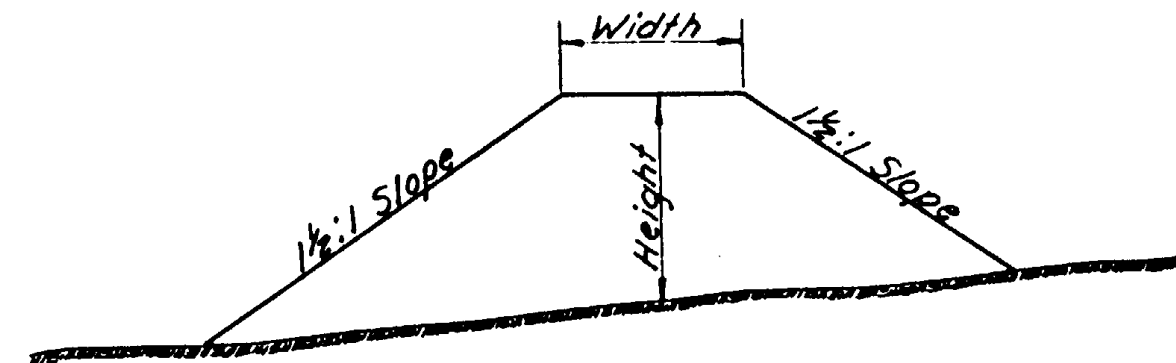


TYPICAL DIKE INSTALLATION AT STRUCTURE

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



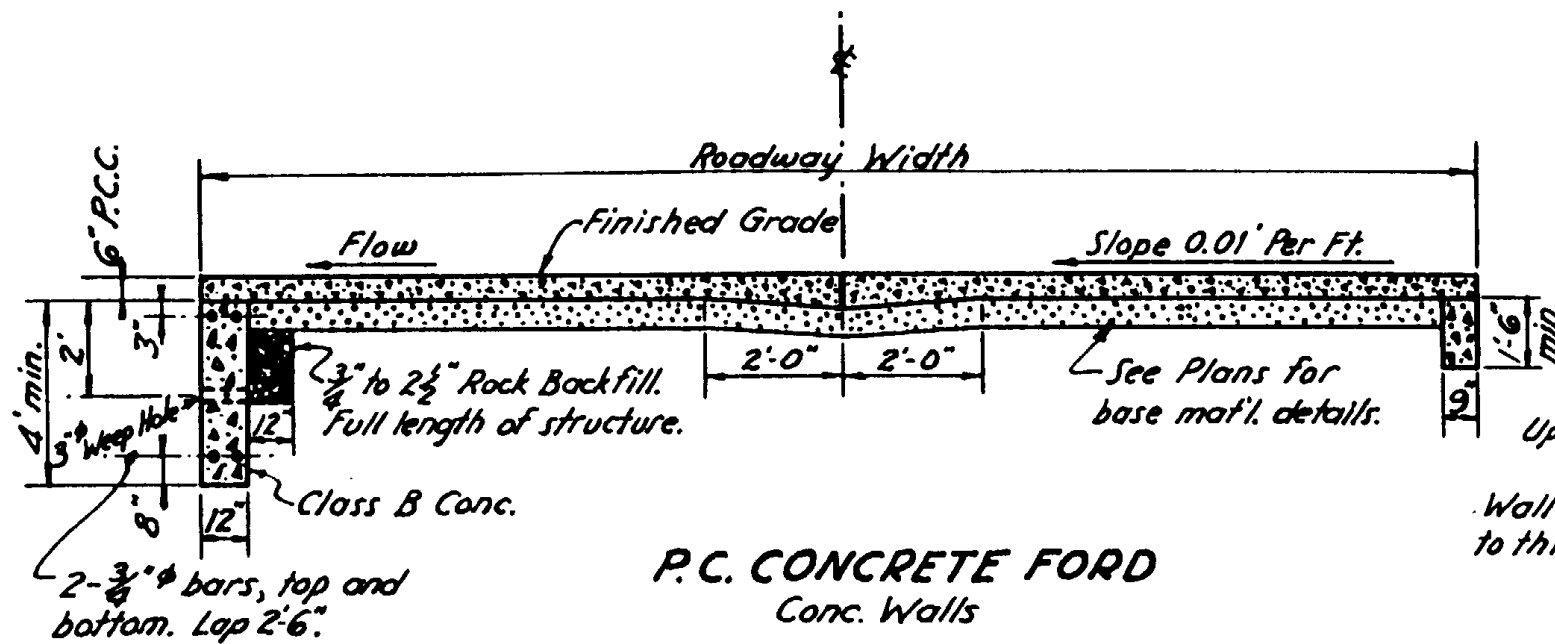
TYPE B DIKE



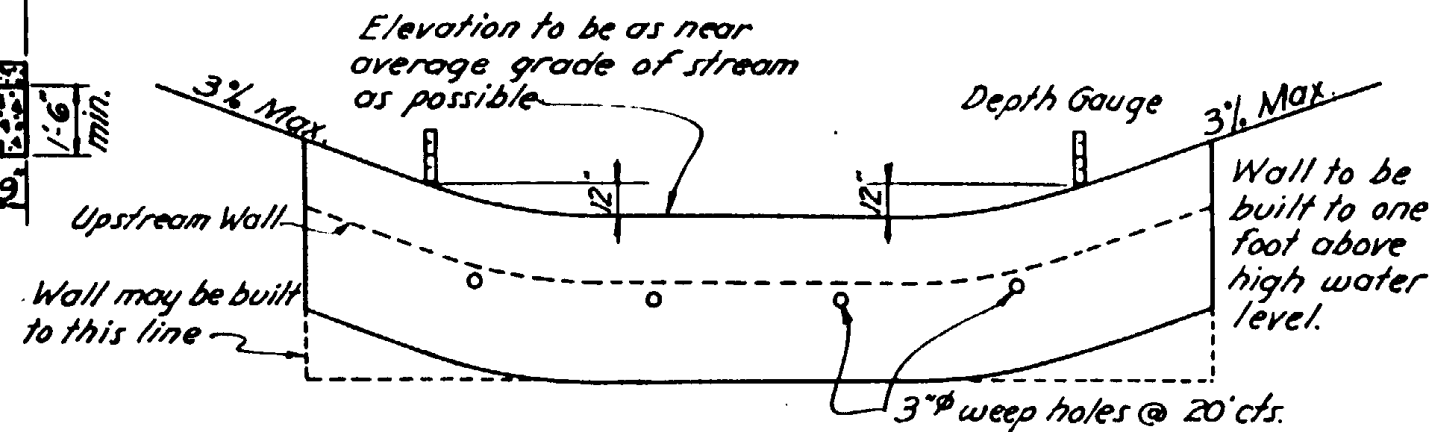
TYPE A DIKE

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

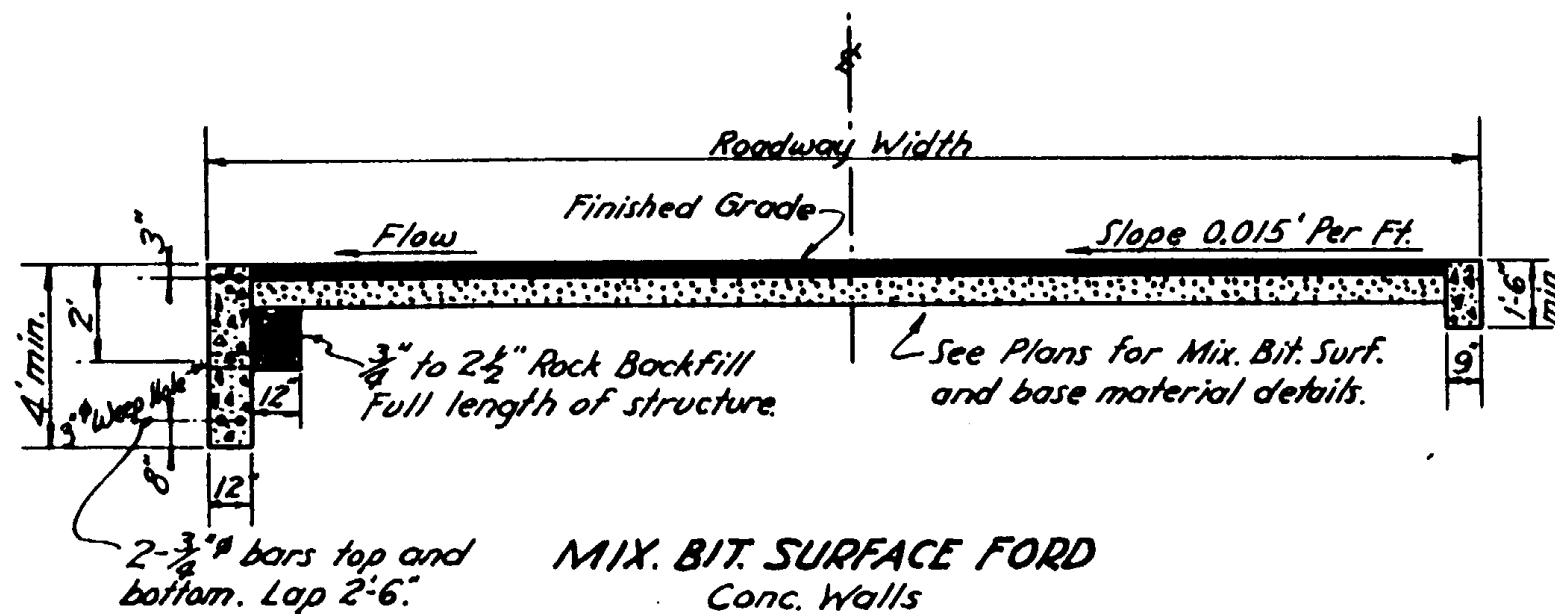
ARIZONA HIGHWAY DEPARTMENT			REV.
PLANS DIVISION			
DITCHES AND DYKES			
DRAWN	GH	Dec. 1945	DRAWING NO. C-4
TRACED	GH	Dec. 1945	
CHECKED	HEB		
APPROVED PLANS ENG'R	E. J. Sullivan		



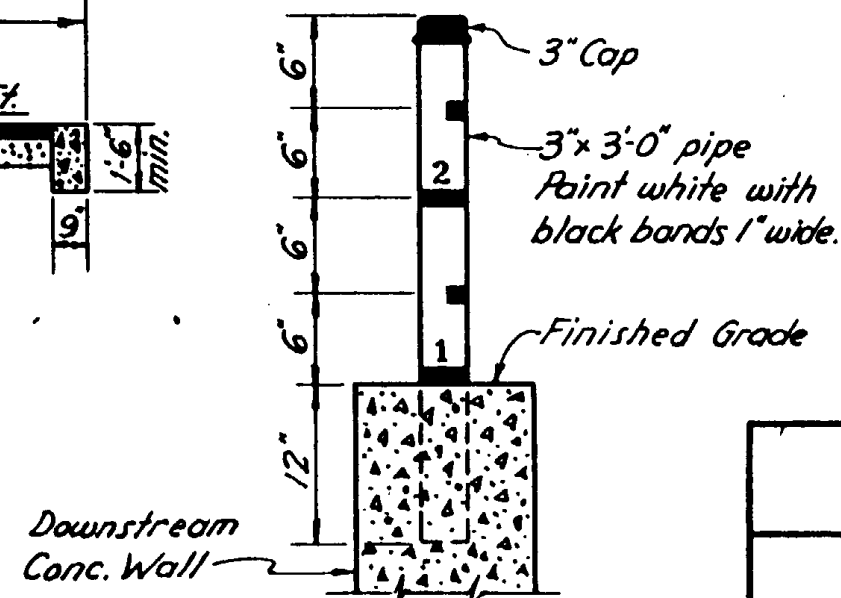
P.C. CONCRETE FORD
Conc. Walls



ELEVATION LOOKING UPSTREAM

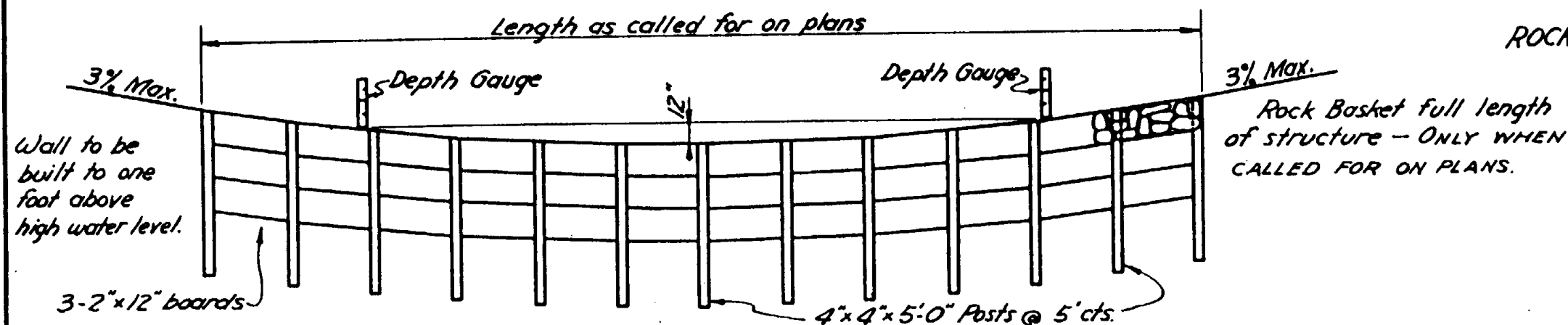
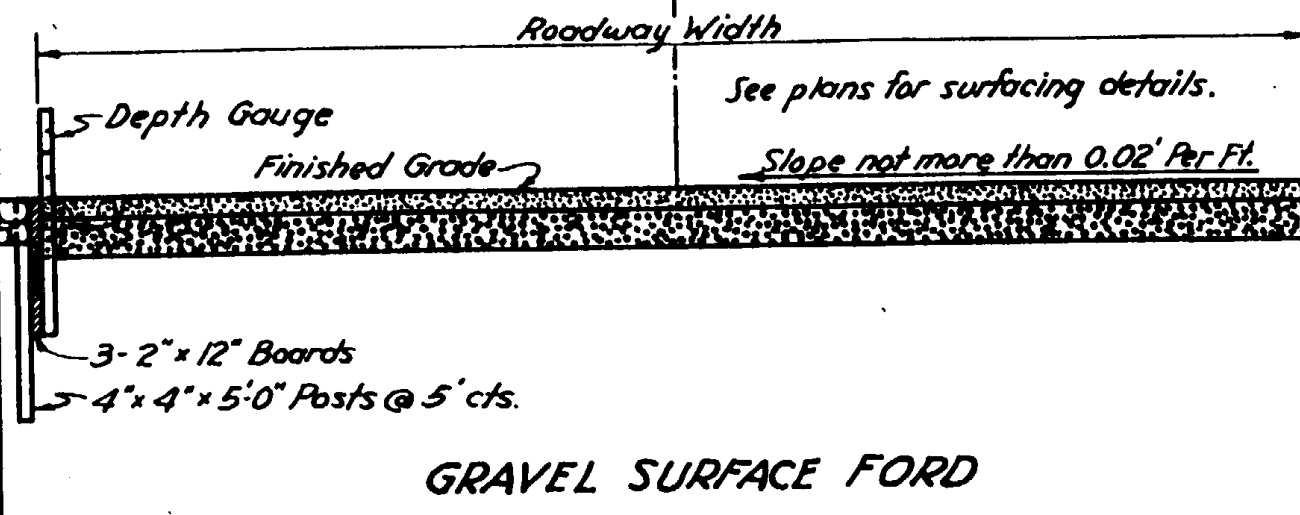
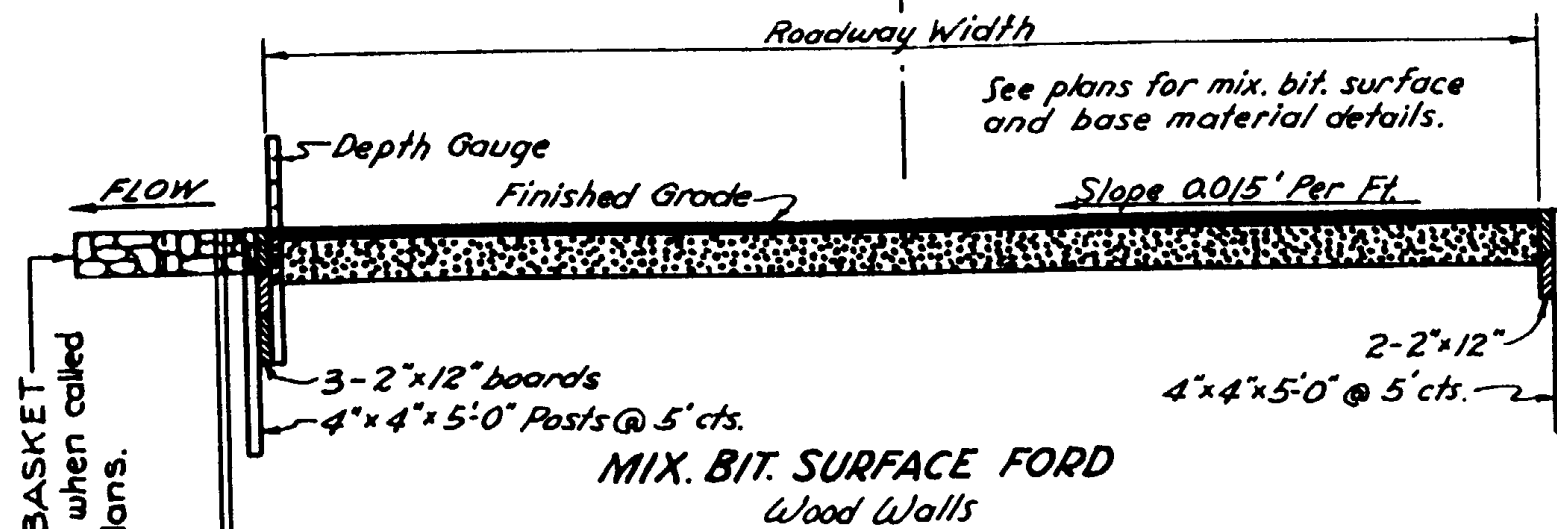


MIX. BIT. SURFACE FORD
Conc. Walls

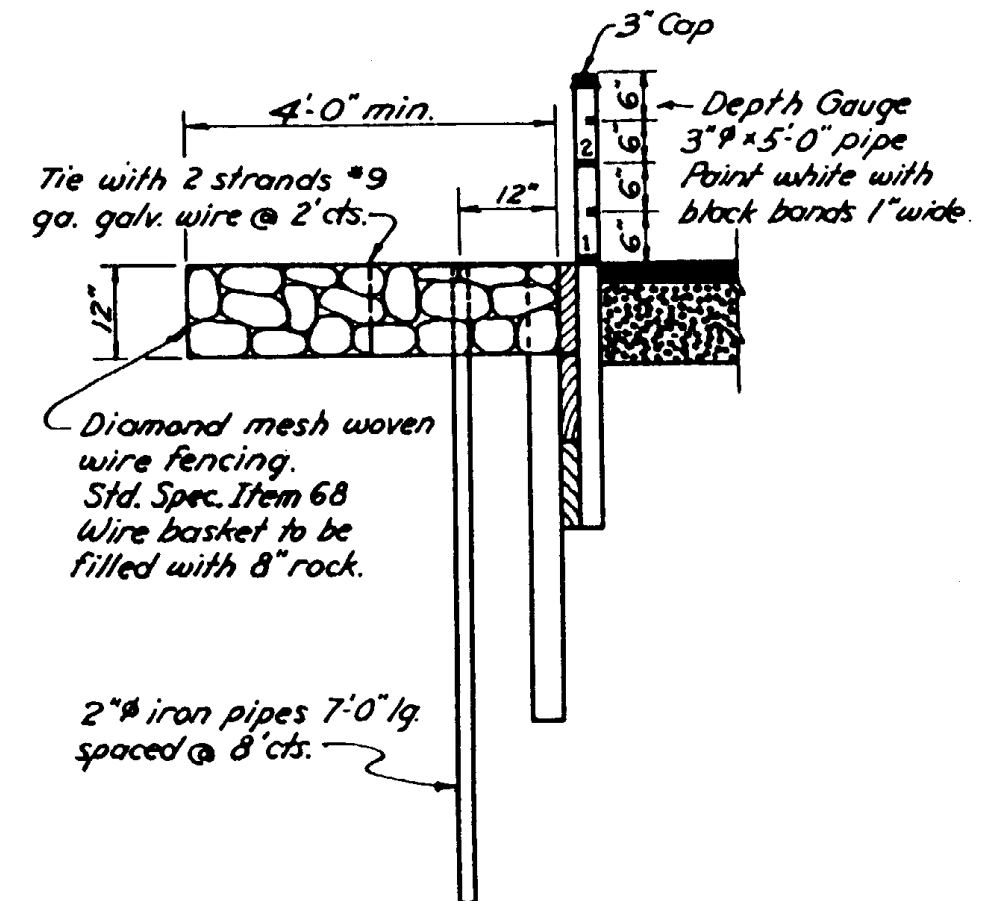


DEPTH GAUGE INSTALLATION

ARIZONA HIGHWAY DEPARTMENT PLANS DIVISION			REV.
TYPE "A" FORD			
DRAWN	C.B.B. July 1945	DRAWING NO. C-5	
TRACED	G.H. Nov. 1945		
CHECKED	H.H.W.		
APPROVED ENG'R PLANS	E. C. Miller		



Note - All timber to be structural grade.



DETAIL OF
ROCK FILLED WIRE BASKET

ARIZONA HIGHWAY DEPARTMENT
PLANS DIVISION

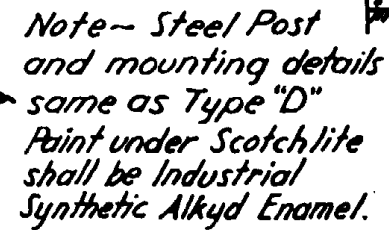
REV.
3/17/50

TYPE "B" FORD
ROCK BASKET

DRAWN C.B.B. July 1945
TRACED GH Nov. 1945
CHECKED H.H.W.
APPROVED ENGR. PLANS E.C. Miller

DRAWING NO.

C-6



Round posts shall be 6" min. and 9" max. diameter at a point 6" below top of post and 7½" min. and 10½" 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" x 8", 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.



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	HHH	
APPROVED ENGR. PLANS	<i>E. Miller</i>	

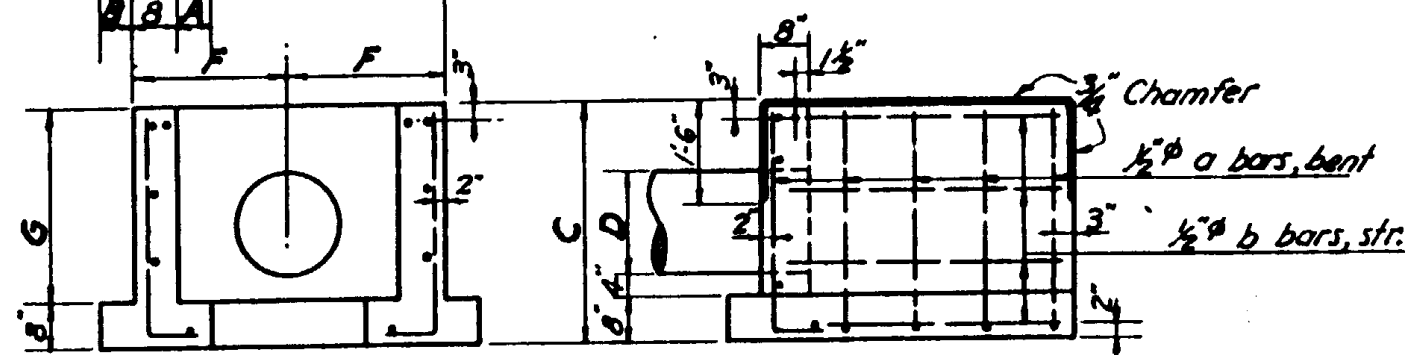


DOUBLE PIPE HEADWALL

STD. "L" HEADWALL

STD. "L" HEADWALL

HALF STR. HDWLL. HALF "U" HDWLL.



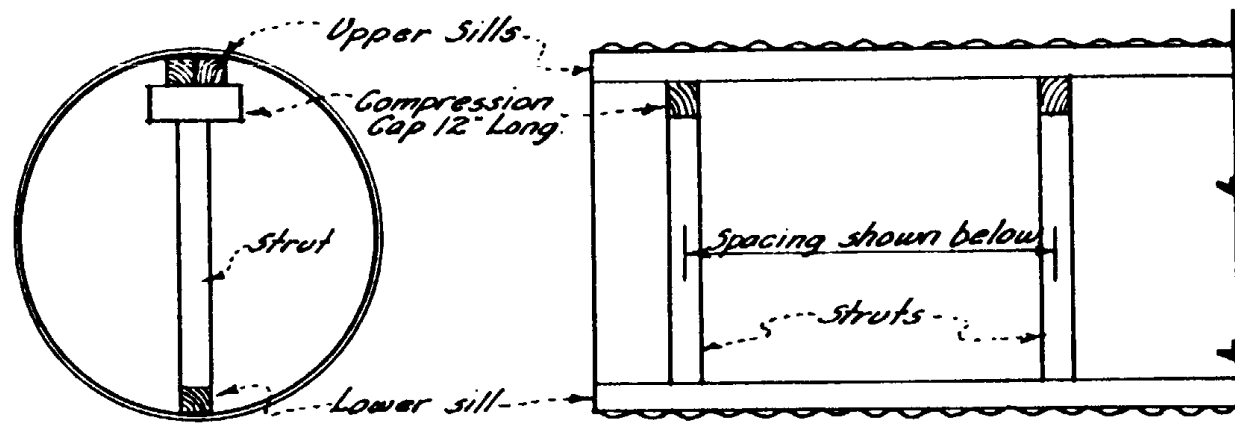
END ELEVATION

SIDE ELEVATION

STANDARD "U" TYPE HEADWALL
Scale - $\frac{1}{4}'' = 1'-0''$

Note :
Std. "L" Hdwall. is made up
of $\frac{1}{2}$ "U" and $\frac{1}{2}$ Str. Hdwall.

ARIZONA HIGHWAY DEPARTMENT		REV. 3-20-50
PLANS DIVISION		
STRAIGHT, "L" AND "U" TYPE REINF. CONCRETE HEADWALLS		
DRAWN	GH Nov. 1945	DRAWING NO. C-9
TRACED	GH Nov. 1945	
CHECKED	HHW	
APPROVED PLANS ENGR.	<i>E. J. Miller</i>	



METHOD OF PLACING STRUTS

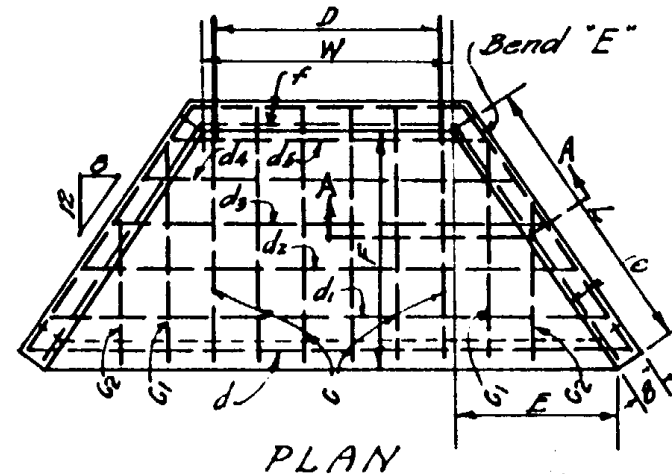
Compression caps to be of soft wood to allow compression. Top and bottom sills and comp. caps shall be same size as struts.

STRUTS FOR FULL CIRCLE 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 1/2"
96	4x4	6	4x4	6	4x4	5	4x4	3.5	4"x4" - 7'-4 3/4"

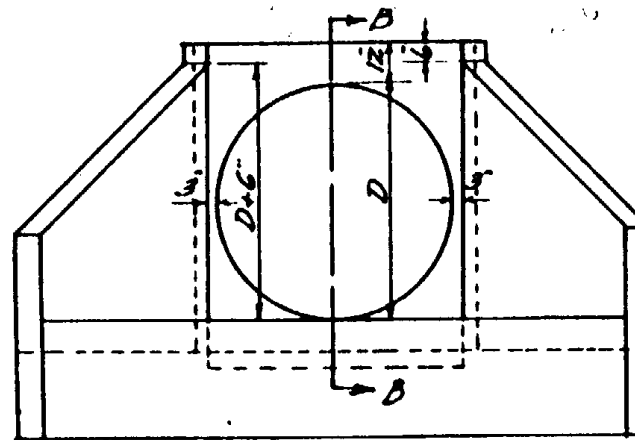
No struts will be required for 48" C.M.P. for fills of less than 15 feet unless so noted on plans.

ONE HEADWALL STEEL LIST - 84" to 66"

Mark	Size	Bend	No.	Length	Mark	Size	Bend	No.	Length	Mark	Size	Bend	No.	Length
a1	1/2"	A	2	3'-6"	a1	1/2"	A	2	3'-6"	a1	1/2"	A	2	3'-6"
a2	"	A	2	4'-0"	a2	"	A	2	4'-0"	a2	"	A	2	4'-0"
a3	"	A	2	4'-6"	a3	"	A	2	4'-6"	a3	"	A	2	4'-6"
a4	"	A	2	5'-0"	a4	"	A	2	5'-0"	a4	"	A	2	5'-0"
a5	"	A	2	5'-6"	a5	"	A	2	5'-6"	a5	"	A	2	5'-6"
a6	"	A	2	6'-0"	a6	"	A	2	6'-0"	a6	"	A	2	6'-0"
b1	"	Str.	C	6'-3"	b1	"	Str.	C	6'-3"	b1	"	Str.	C	6'-3"
b2	"	"	2	4'-3"	b2	"	"	2	4'-3"	b2	"	"	2	4'-3"
b3	"	"	2	2'-0"	b3	"	"	2	2'-0"	b3	"	"	2	2'-0"
b4	"	"	2	3'-8"	b4	"	"	2	4'-6"	b4	"	"	2	4'-11"
b5	"	"	2	7'-2"	b5	"	"	2	6'-1"	b5	"	"	2	5'-9"
b6	"	"	2	7'-11"	b6	"	"	2	7'-2"	b6	"	"	2	6'-4"
c1	"	Str.	G	13'-2"	c1	"	Str.	G	11'-8"	c1	"	Str.	G	10'-1"
c2	"	"	1	12'-2"	c2	"	"	1	10'-7"	c2	"	"	1	8'-9"
c3	"	"	1	10'-10"	c3	"	"	1	9'-3"	c3	"	"	1	7'-5"
c4	"	"	1	9'-6"	c4	"	"	1	7'-11"	c4	"	"	1	5'-4"
c5	"	"	1	8'-2"	c5	"	"	1	6'-7"	c5	"	"	1	5'-1"
c6	"	"	1	6'-10"	c6	"	"	1	5'-0"	c6	"	"	1	4'-0"
d1	"	"	2	3'-6"	d1	"	"	2	3'-0"	d1	"	"	2	2'-0"
d2	"	"	2	3'-2"	d2	"	"	2	2'-8"	d2	"	"	2	2'-0"
d3	"	"	1	13'-4"	d3	"	"	1	11'-0"	d3	"	"	1	8'-0"



PLAN



ELEVATION

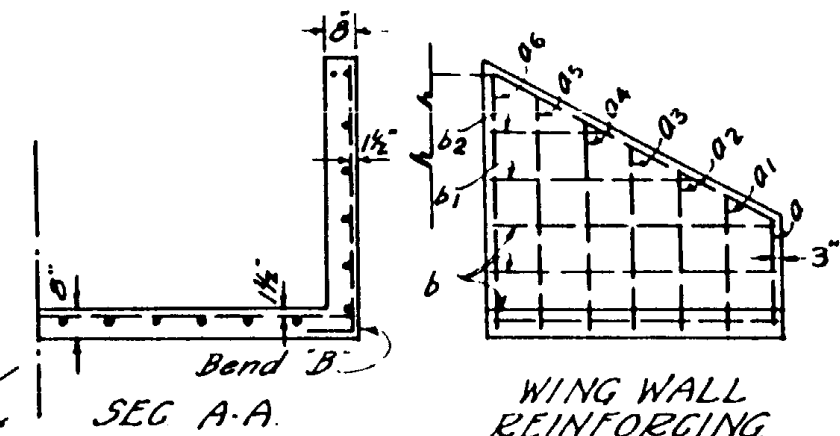
WING TYPE HEADWALL DETAILS

Drawn for 60" C.M.P.

Scale 1/4" = 1'-0"

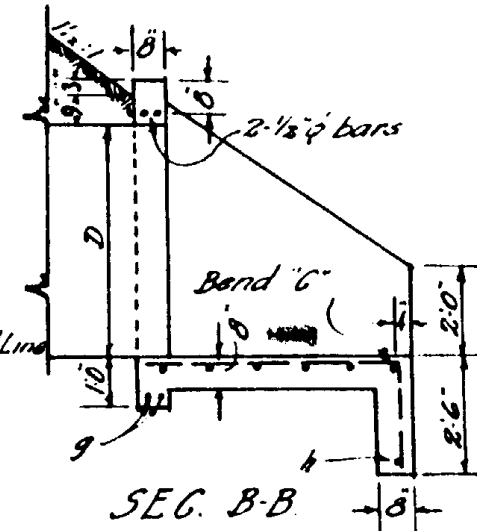
ONE HEADWALL STEEL LIST - 60" to 42"

Mark	Size	Bend	No.	Length	Mark	Size	Bend	No.	Length	Mark	Size	Bend	No.	Length
a1	1/2"	A	2	3'-6"	a1	1/2"	A	2	3'-6"	a1	1/2"	A	2	3'-6"
a2	"	A	2	4'-0"	a2	"	A	2	4'-0"	a2	"	A	2	4'-0"
a3	"	A	2	4'-6"	a3	"	A	2	4'-6"	a3	"	A	2	4'-6"
a4	"	A	2	5'-0"	a4	"	A	2	5'-0"	a4	"	A	2	5'-0"
a5	"	A	2	5'-6"	a5	"	A	2	5'-6"	a5	"	A	2	5'-6"
a6	"	A	2	6'-0"	a6	"	A	2	6'-0"	a6	"	A	2	6'-0"
b1	"	Str.	C	6'-3"	b1	"	Str.	C	6'-3"	b1	"	Str.	C	6'-3"
b2	"	"	2	4'-3"	b2	"	"	2	3'-9"	b2	"	"	2	3'-6"
b3	"	"	2	2'-0"	b3	"	"	2	1'-9"	b3	"	"	2	1'-9"
b4	"	"	2	3'-8"	b4	"	"	2	4'-6"	b4	"	"	2	4'-11"
b5	"	"	2	7'-2"	b5	"	"	2	6'-1"	b5	"	"	2	5'-9"
b6	"	"	2	7'-11"	b6	"	"	2	7'-2"	b6	"	"	2	6'-4"
c1	"	Str.	G	13'-2"	c1	"	Str.	G	11'-8"	c1	"	Str.	G	10'-1"
c2	"	"	1	12'-2"	c2	"	"	1	10'-7"	c2	"	"	1	8'-9"
c3	"	"	1	10'-10"	c3	"	"	1	9'-3"	c3	"	"	1	7'-5"
c4	"	"	1	9'-6"	c4	"	"	1	7'-11"	c4	"	"	1	5'-4"
c5	"	"	1	8'-2"	c5	"	"	1	6'-7"	c5	"	"	1	5'-1"
c6	"	"	1	6'-10"	c6	"	"	1	5'-0"	c6	"	"	1	4'-0"
d1	"	"	2	3'-6"	d1	"	"	2	3'-0"	d1	"	"	2	2'-0"
d2	"	"	2	3'-2"	d2	"	"	2	2'-8"	d2	"	"	2	2'-0"
d3	"	"	1	13'-4"	d3	"	"	1	11'-0"	d3	"	"	1	8'-0"



SEC. A-A.

All bars 1/2" @ 13" centers



SEC. B-B.

WING TYPE HEADWALL

SINGLE PIPES

D	Dimensions				Water Way	Conc. C.Y.	Steel Lbs.
L	E	F	W				
42	3'-7 1/4"	2'-0"	3'-0"	4'-0"	9.6	1.90	115
48	4'-6"	2'-6"	3'-9"	4'-6"	12.6	2.46	140
54	5'-4 1/4"	3'-0"	4'-6"	5'-0"	15.9	3.07	175
60	6'-3 1/4"	3'-6"	5'-3"	5'-6"	19.6	3.75	215
66	7'-2 1/4"	4'-0"	6'-0"	6'-0"	23.8	4.37	255
72	8'-1 1/4"	4'-6"	6'-9"	6'-6"	28.3	5.16	295
78	9'-0 1/4"	5'-0"	7'-6"	7'-0"	33.2	6.00	340
84	9'-11"	5'-6"	8'-3"	7'-6"	38.5	6.91	395

Note
Dimension W to be increased to take care of increased width or length due to skew. Quantities are for 1 headwall only.

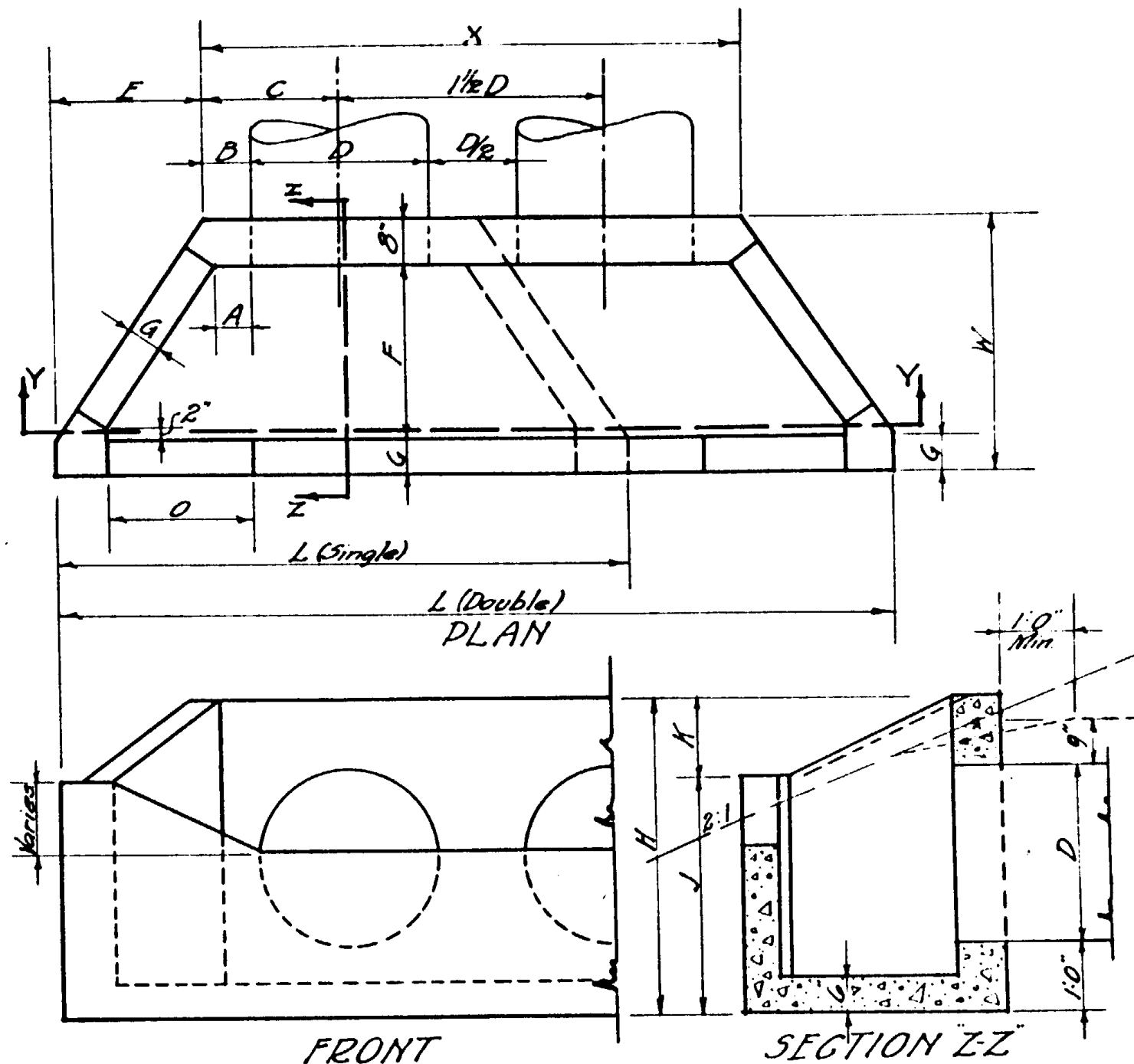
ARIZONA HIGHWAY DEPARTMENT
PLANS DIVISION

HEADWALLS AND STRUTS
FOR C.M.P.'S 42" TO 84" DIA.

DRAWN BY W.M.R. FEB, 1936
TRACED BY K.S. JUNE, 1938
CHECKED BY H.M.W. JULY 1938
APPROVED [Signature]

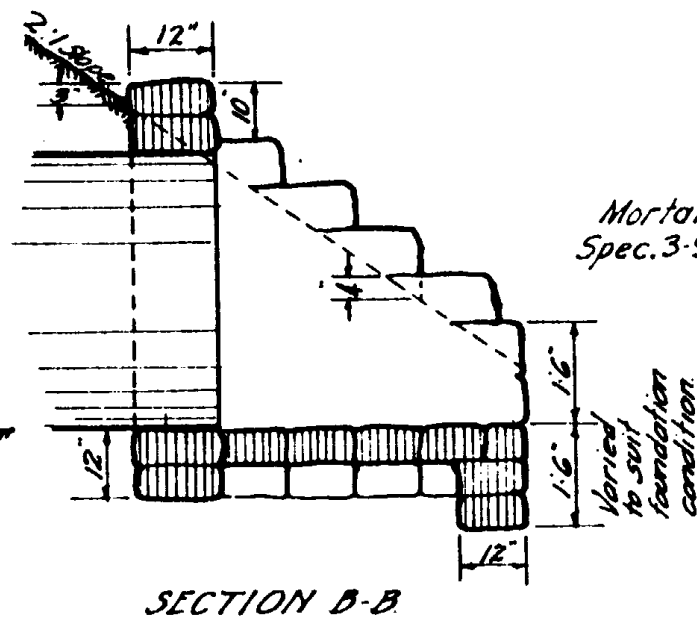
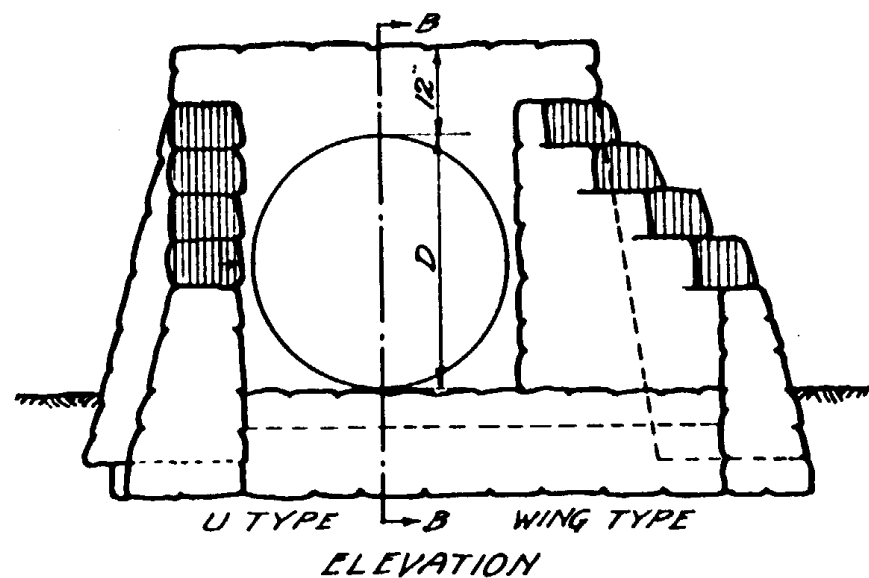
DRAWING NO.
C-10

REV.
66-84
Added
5-12-47



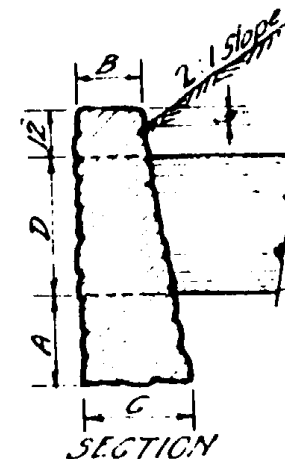
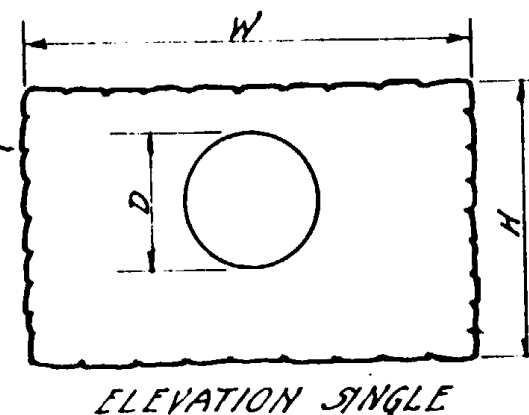
Pipe	Dimensions															Quantities			
	L		X		W	A	B	C	E	F	G	H	J	K	O	Class A Conc. C.Y.		Reinf. Steel	
	Single	Double	Single	Double												Single	Double	Single	Double
18"	5'-0"	7'-3"	2'-4"	4'-7"	2'-6"	3"	5"	1'-2"	1'-4"	1'-4"	6"	3'-6"	2'-9"	9"	1'-0"	67	94	65"	110"
24"	6'-9 $\frac{1}{4}$ "	9'-9 $\frac{1}{4}$ "	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 $\frac{1}{4}$ "	3'-10"	7'-7"	3'-8"	6"	8"	1'-11"	2'-1 $\frac{1}{8}$ "	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 $\frac{1}{8}$ "	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. C-11
TRACED	K.S. Oct. 1939	
CHECKED	<i>H.H. [unclear]</i>	
APPROVED PLANS DIV.	<i>E. J. Miller</i>	

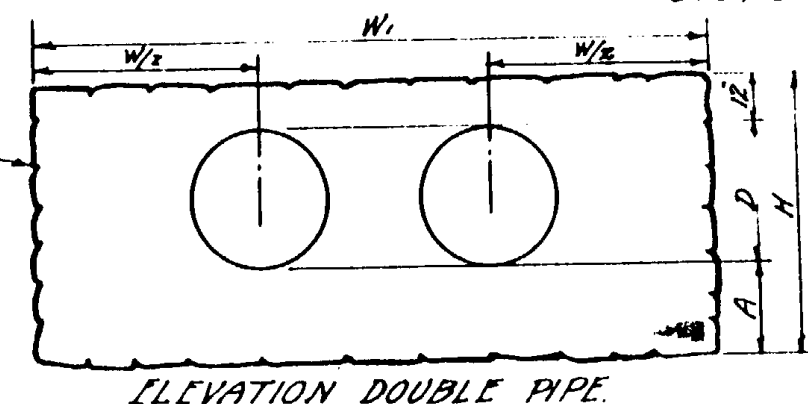


Mortar
Spec. 3-9

Varied
to suit
foundation
condition.

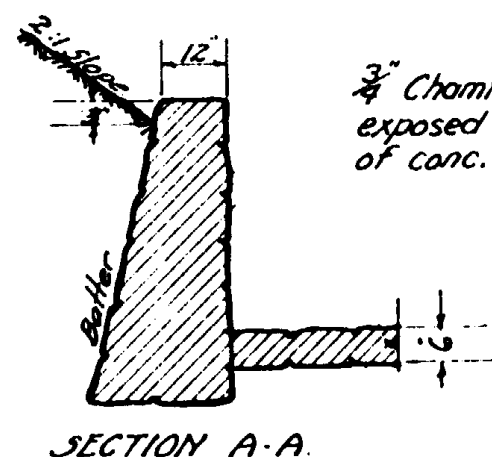
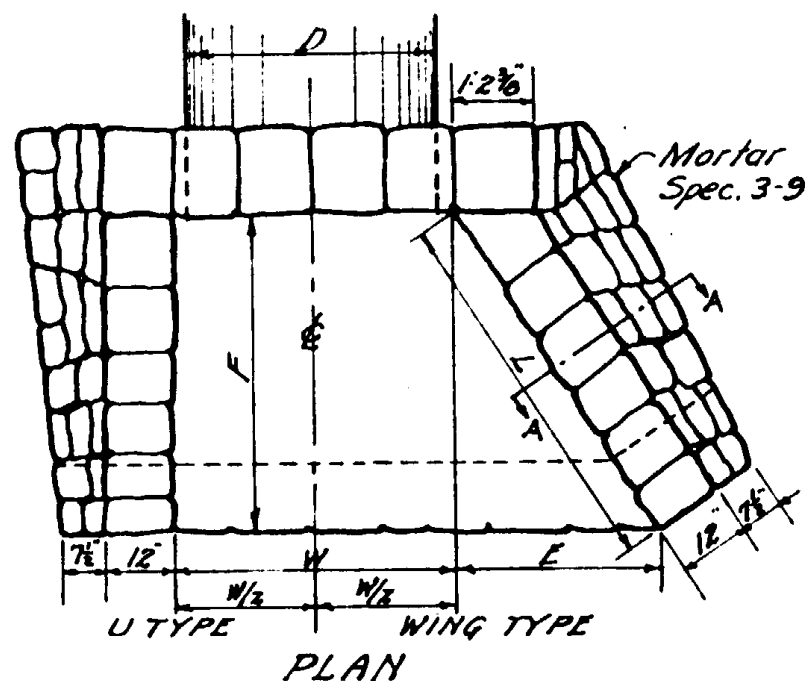


Mortar
Spec. 3-9



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

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



3" Chamfer on all
exposed corners
of conc. headwalls.

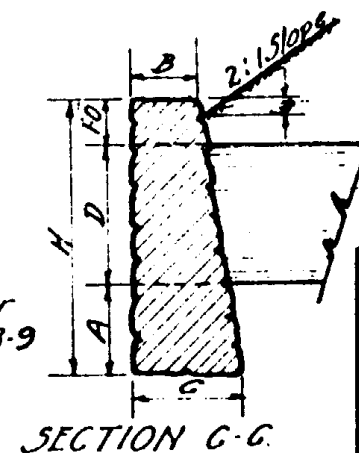
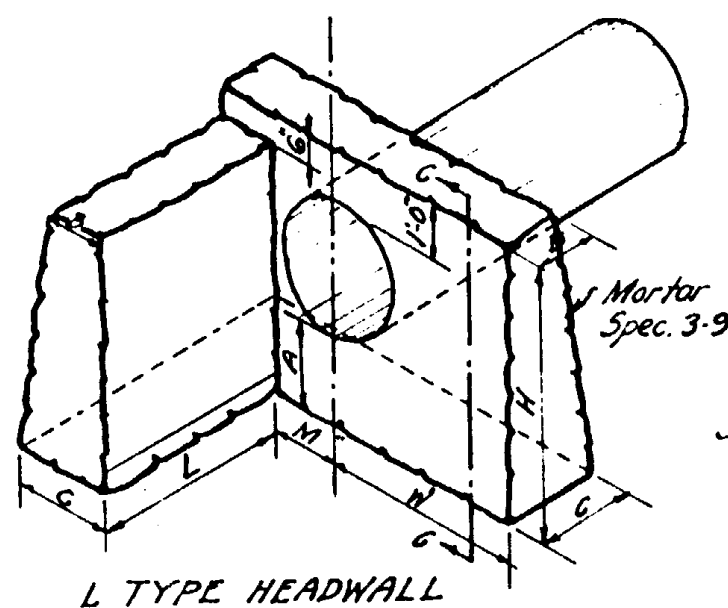
STRAIGHT TYPE HEADWALLS

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"	1.99
24"	1'-4"	1'-0"	1'-8"	4'-10"	8'-0"	1.75	11'-6"	2.93
30"	1'-8"	1'-0"	2'-0"	5'-9"	10'-6"	3.08	14'-7"	4.11
36"	2'-0"	1'-0"	2'-4"	6'-8"	13'-0"	5.05	17'-8"	6.58

Note—Quantities are for one headwall only.

WING AND U TYPE HEADWALLS									
Dimensions			Single Pipe			Double Pipe			
Diam.	Wing Type	F	F	W	Area S.F.	U Type Cu. Yds.	Wing Type Cu. Yds.	W	Area S.F.
30"	2'-0"	1'-6"	2'-3"	3'-7"	4.91	2.52	2.57	7'-8"	9.82
36"	3'-0"	2'-0"	3'-0"	4'-2"	7.07	3.36	3.56	8'-10"	14.14
42"	4'-0"	2'-6"	3'-9"	4'-9"	9.62	4.31	4.71	10'-0"	19.24
48"	5'-0"	3'-0"	4'-6"	5'-8"	12.36	5.40	6.03	11'-2"	25.12
54"	6'-0"	3'-6"	5'-3"	5'-11"	15.30	6.66	7.53	12'-4"	31.80
60"	7'-0"	4'-0"	6'-0"	6'-6"	19.63	8.05	9.21	13'-6"	39.26

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

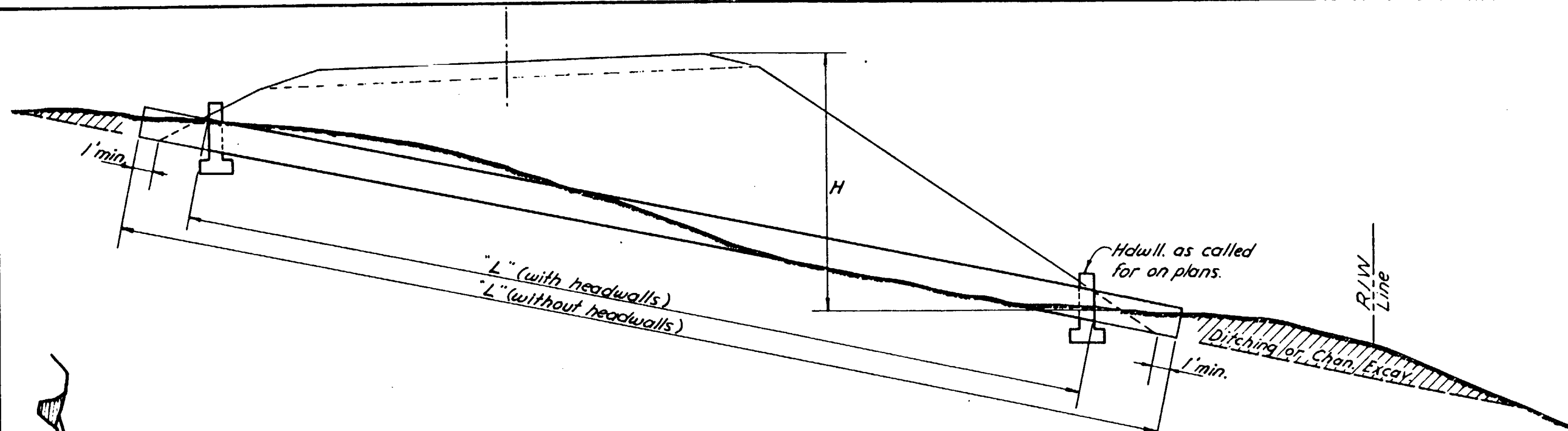
HEADWALLS
PLAIN CONCRETE OR
CEM. RUBBLE MASONRY

DRAWN BY A.R.R. DRAWING 1936
TRACED BY K.S. JUNE, 1939
CHECKED BY M.W. JULY 1938
APPROVED E.M. Miller

DRAWING NO.

C-12

REV.
m.v. 1945



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.

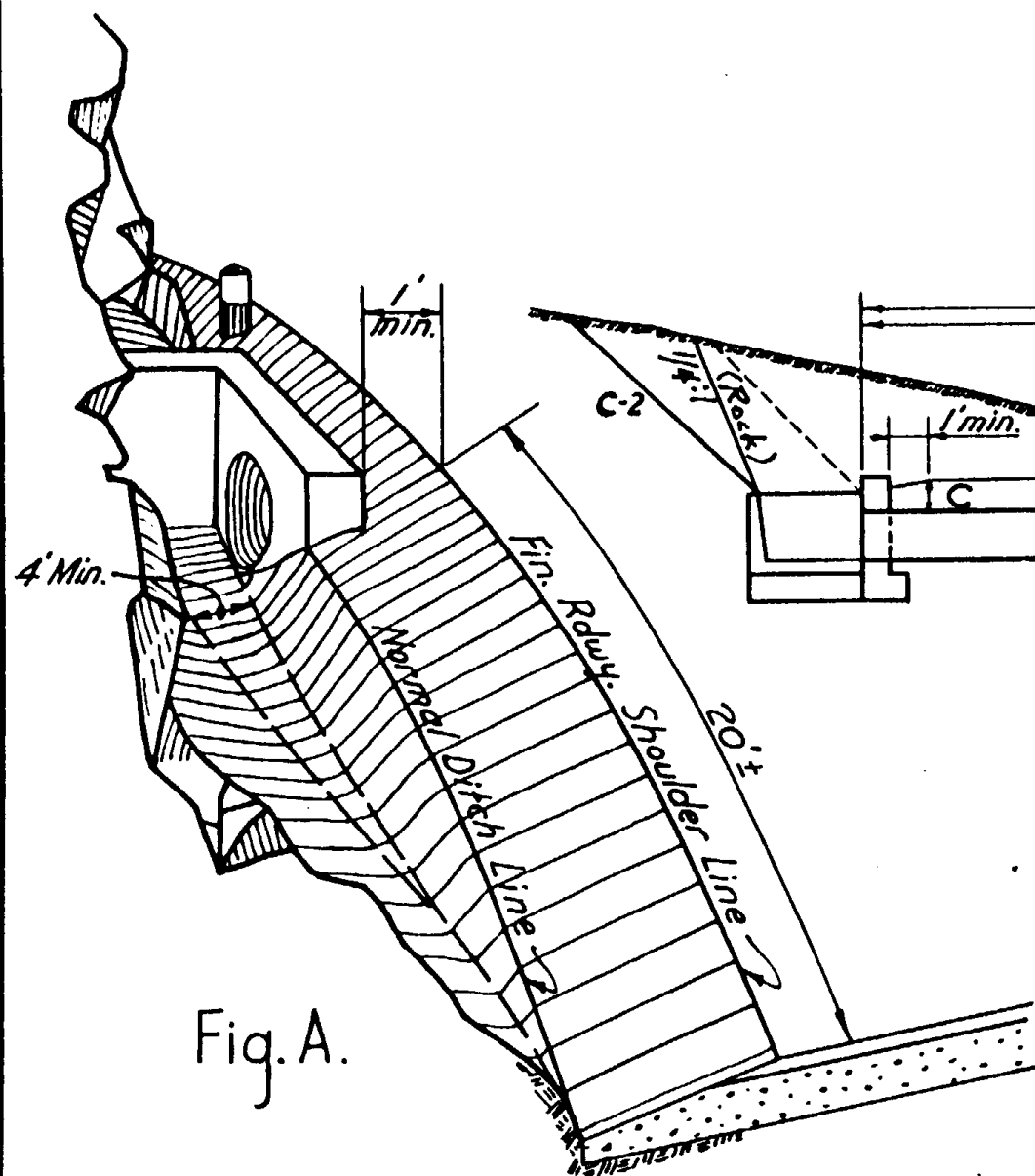
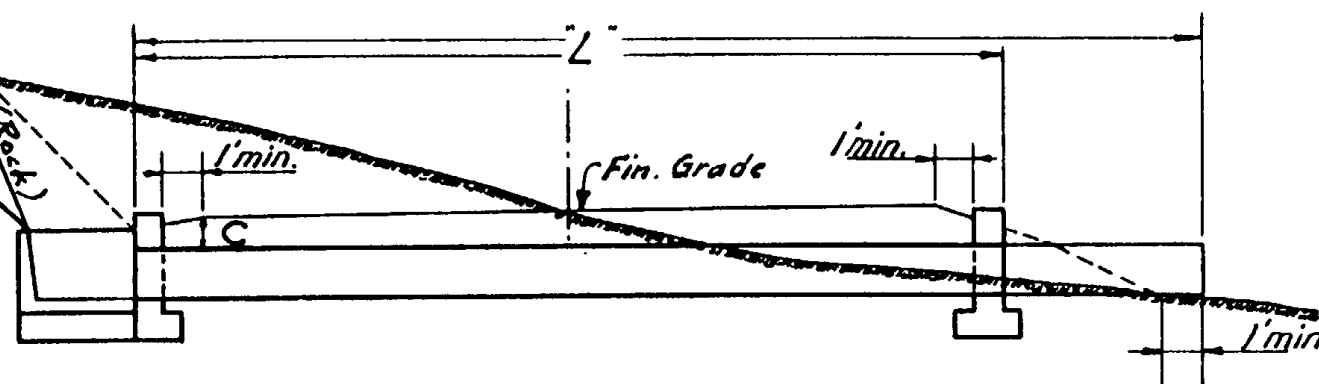
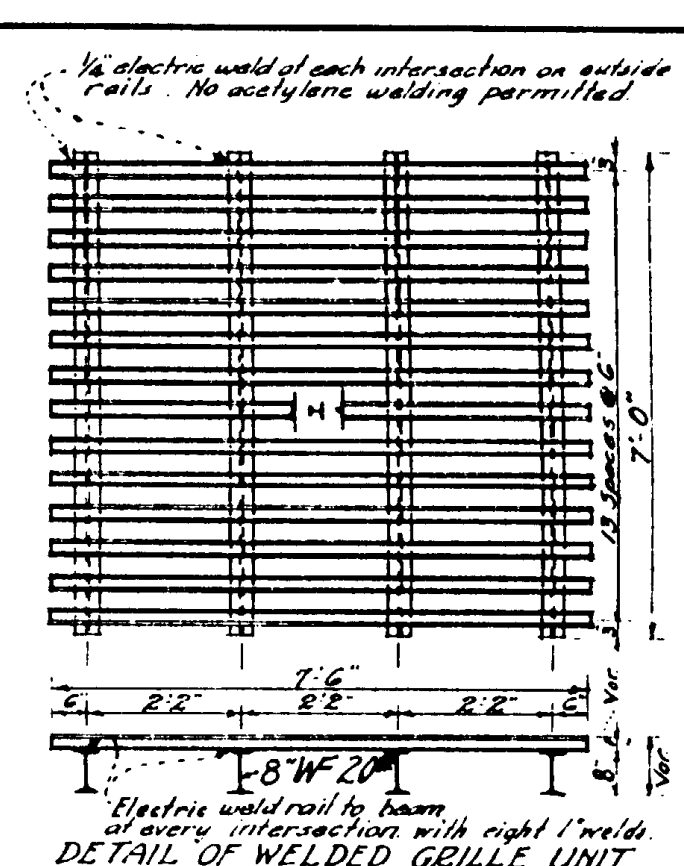


Fig. A.

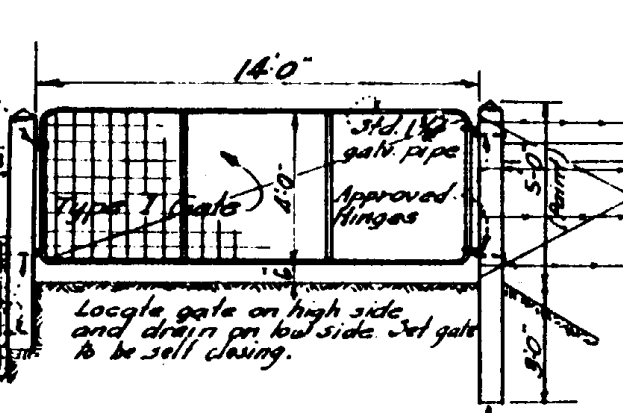


ARIZONA HIGHWAY DEPARTMENT			REV. 3-20-50
PLANS DIVISION			
PIPE CULVERT INSTALLATION			
DRAWN	GH	Nov. 1945	DRAWING NO. C-13
TRACED	GH	Nov. 1945	
CHECKED	H. J. Jessel		
APPROVED	E. Miller		
PLANS ENGR.			



PART SECTION A-A.
Rail Treads.

Technical drawing of a cross-section of a bridge structure. The drawing shows an 8" W 20# I-beam supporting a 25# Rail (Min). The rail is secured with 3/4" web bolts 6" x 6" cemented with hot asphalt. The I-beam is connected to a concrete pier with 3/4" welds and 4" x 6" Buffer Timbers. The pier is reinforced with 2" x 4" straps 1' 3" long alternate @ 24" cts. A 1/2" x 10" mach. bolt is also shown.



8-1/4 x 1 welds

DETAIL OF WELDS AT EACH INTERSECTION

MATERIAL LIST					
Item	Qty	Size	Length	Std. &	Correct
Common to all guard lengths					
Post, Round	2		2'-6" min		
" "	5		8'-0" "		
Bolts	10	3/8"	1'-6"		
Reinf. Bars	8	3/8"	11'-6"		60.70
" "	3	"	3'-6"		18.40
Gate	1	1'-0" x 14'-0"			Complete
6 Unit - 40' Roadway					
Concrete					14.9
Fabricated L	2	3/4" x 3/4" x 45'-4"			
Web Belling	40	6" x 6" x 1/4"			
3 Unit - 34' Roadway					
Concrete					12.71
Fabricated L	2	3/4" x 3/4" x 37'-9"			
Web Belling	40	6" x 6" x 1/4"			
4 Unit - 26' x 28' Roadway					
Concrete					10.53
Fabricated L	2	3/4" x 3/4" x 40'-2"			
Web Belling	32	6" x 6" x 1/4"			
2 Unit - SIDEROAD					
Concrete					5.23
Fabricated L	2	3/4" x 3/4" x 12'-1"			
Web Belling	16	6" x 6" x 1/4"			

8. Aug - 3 unit

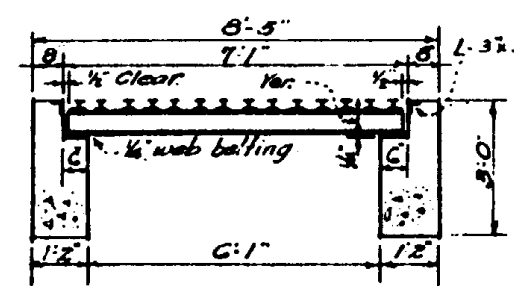


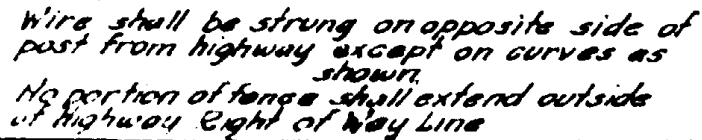
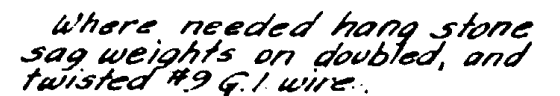
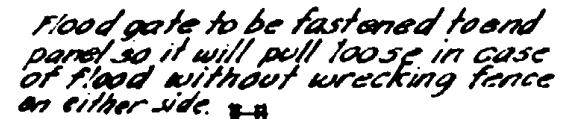
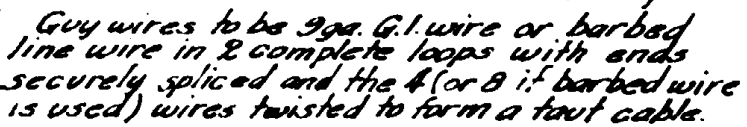
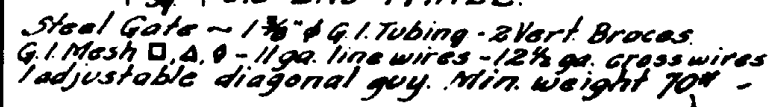
Diagram illustrating the cross-section of a timber buffer for a gravel road. The buffer is composed of a central timber beam (labeled "Timber buffer to be used with gravel road") supported by a 1/2" clear space. The beam is 6'-1" long and 3'-0" high. The total width of the buffer is 9'-1", with a 7'-1" section in the middle. The beam is 1/4" web bolting. The buffer is used with a gravel road and a pavement seat.

FOR ROADWAYS OF 24' OR MORE
SECTION A-A.

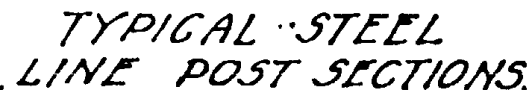
CATTLE GUARDS

REV.
Weld
3/15/46
J. Brown
6/1/47
3-20-50

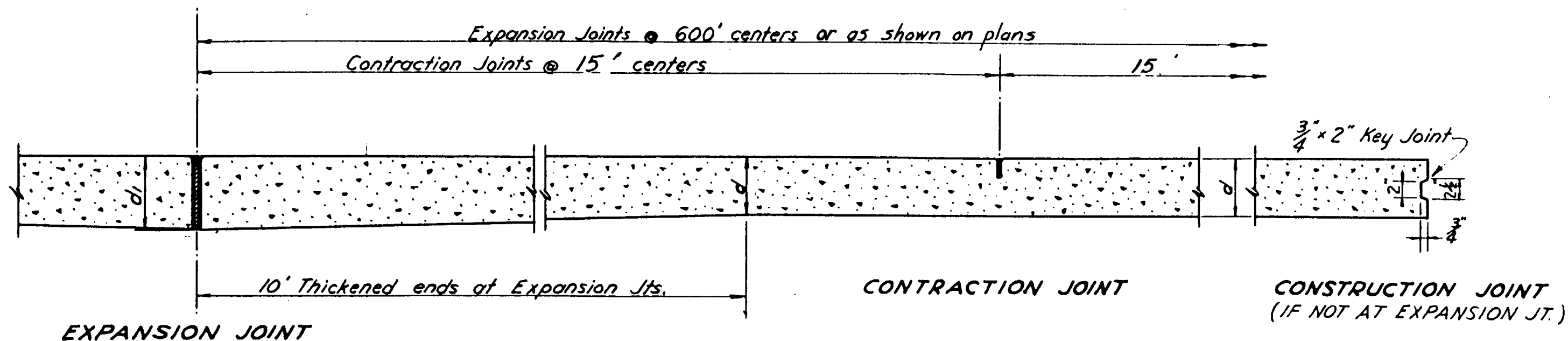
DRAWN	W.M.D. MAY, 1936	DRAWING NO. C-14
TRACED	M.S. JUNE, 1938	
CHECKED	H.H.W. JULY 1938	
APPROVED BY GR PLANS	<i>G. Miller</i>	



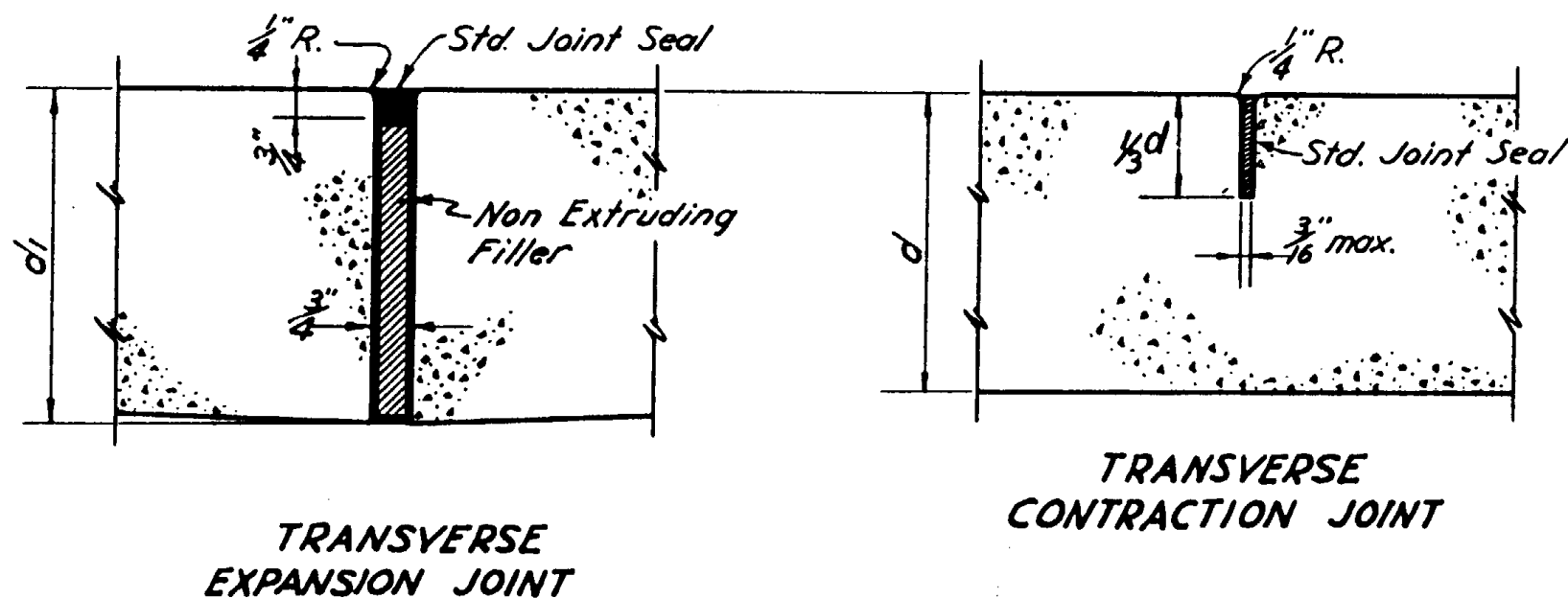
NOTE
Line posts may be T-rail, U-section or similar commercial production (excepting angles or ells). They shall be rail steel grade and rolled from standard section tee rails or re-rolled rails, both produced by the open hearth process. They shall have punched web, knobs or corrugated edges to hold 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 PLANS DIVISION		REV. 5/14/30 10/2/30 1/1/31 2/15/31 5/1/31 6/12/31 3-20-50
LINE FENCE AND GATES STEEL POSTS		
DRAWN TRACED CHECKED APPROVED ENGR PLANS	K.S. JUNE, 1930 K.S. JUNE, 1930 H.H.W. JULY 1930 <i>E.H. McLean</i>	DRAWING NO. C-16

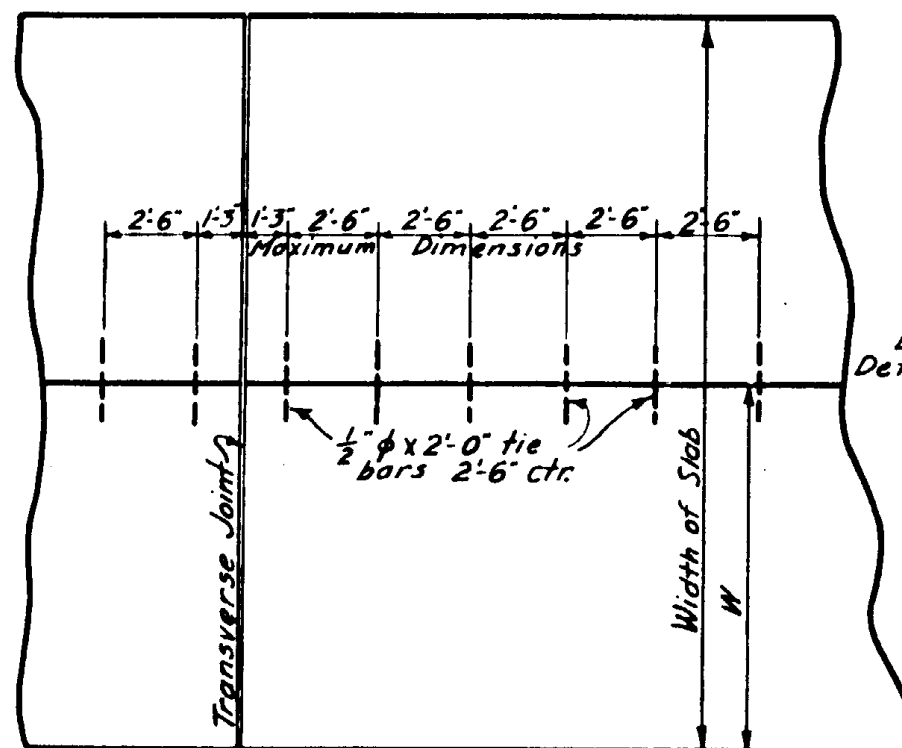


LONGITUDINAL SECTION THRU PAVEMENT

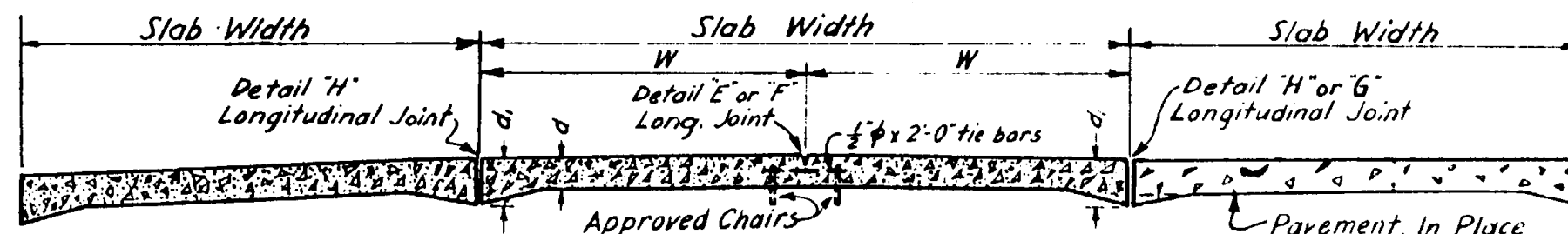


All general requirements may be superseded by special notations on the plans.
At intersections of side roads or streets, joints shall be so placed as to give the intersection a symmetrical appearance and to conform to the cross section of the intersecting road or street.

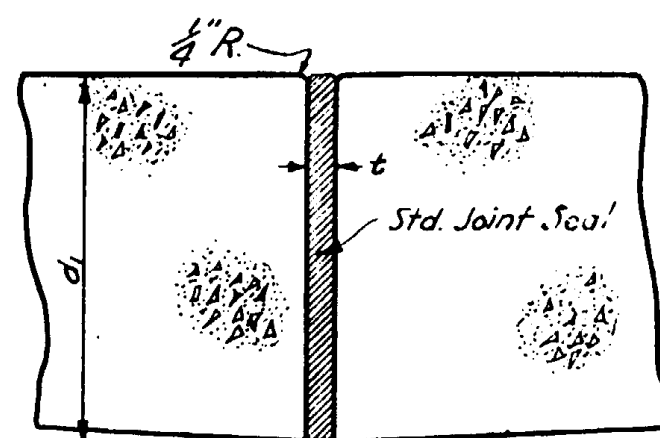
ARIZONA HIGHWAY DEPARTMENT			REV. 3/17/50
PLANS DIVISION			
TRANSVERSE			
JOINTS FOR PORTLAND CEMENT			
CONCRETE PAVEMENT			
DRAWN	GH	Jan. 1946	DRAWING NO. C-18
TRACED	GH	Jan. 1946	
CHECKED	HHW		
APPROVED ENGR. PLANS	E. Miller		



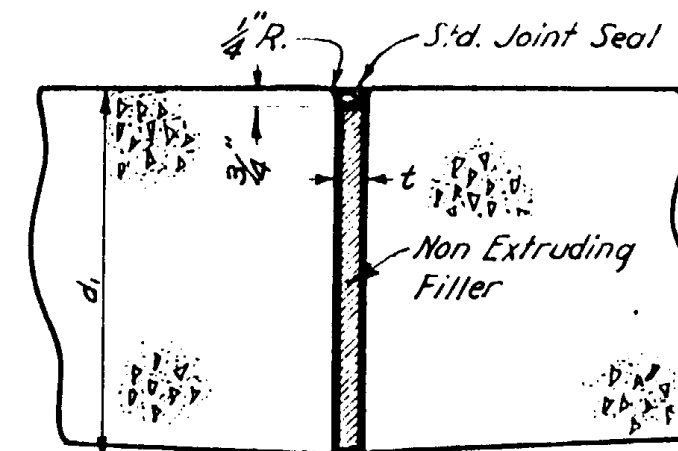
PLAN OF LONGITUDINAL JOINT
DETAIL "E" OR "F"



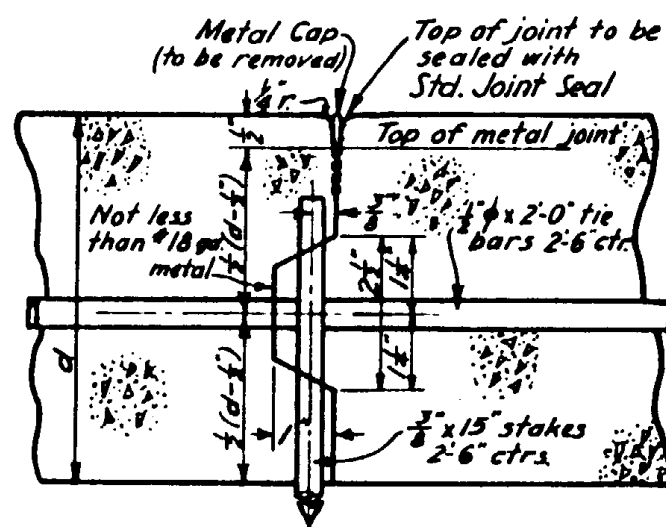
CROSS-SECTION



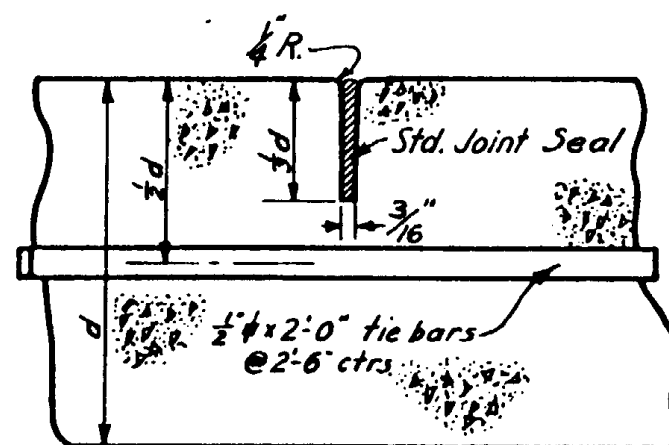
LONGITUDINAL JOINT
DETAIL "G"



LONGITUDINAL JOINT
DETAIL "H"



LONGITUDINAL JOINT
DETAIL "E"



LONGITUDINAL JOINT
DETAIL "F"

GENERAL NOTES

Width (t) of longitudinal expansion joints shall be 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.

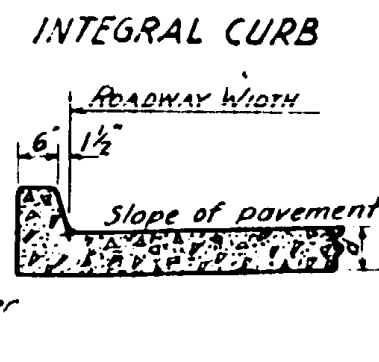
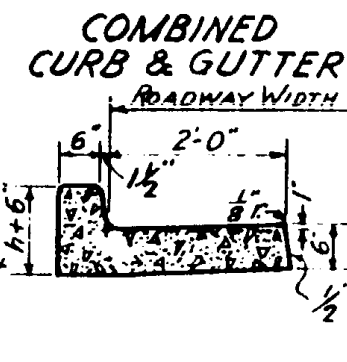
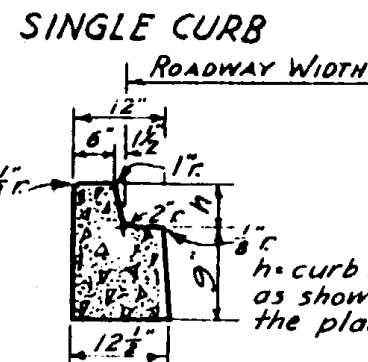
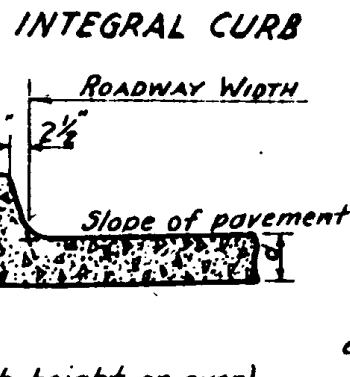
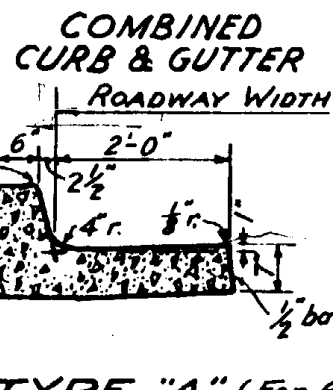
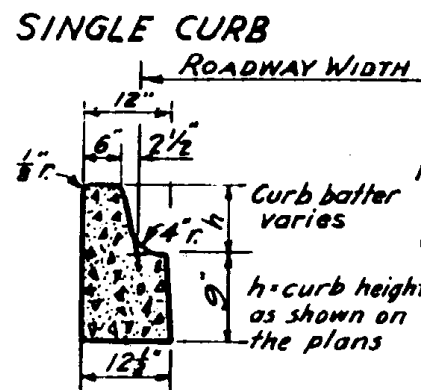
The edging tool used for all longitudinal joints shall be so constructed as to provide a smooth troweled surface 3" wide on each side of the joint.

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

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

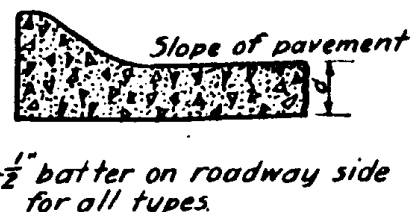
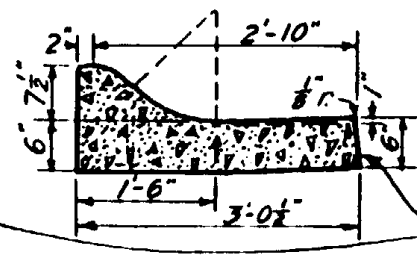
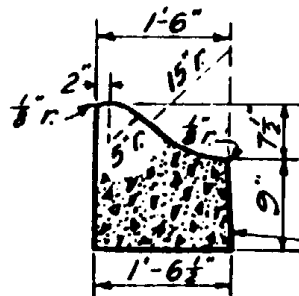
ARIZONA HIGHWAY DEPARTMENT PLANS DIVISION			REV. 8-1-41 H.A.K. Details 8-1-41 W 8-1-41 1-17-46
LONGITUDINAL JOINTS FOR PORTLAND CEMENT CONCRETE PAVEMENT			
DRAWN	O.K.	MAR. 1935	DRAWING NO. C-19
TRACED	H.A.K.	JUNE 1938	
CHECKED	H.H.W.	JULY 1938	
APPROVED ENGR PLANS	E. Miller		

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

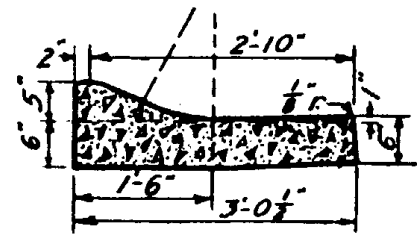
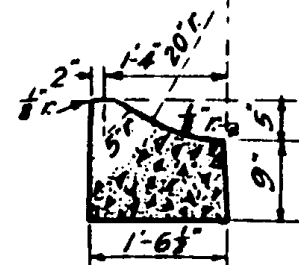


TYPE "A" (For 6" curb height or over)

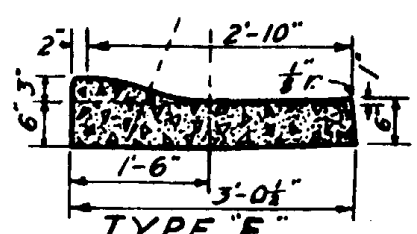
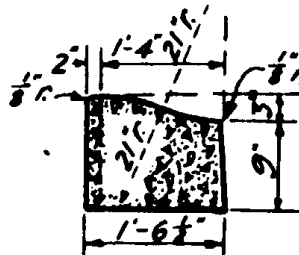
d = pavement thickness as shown on the plans.



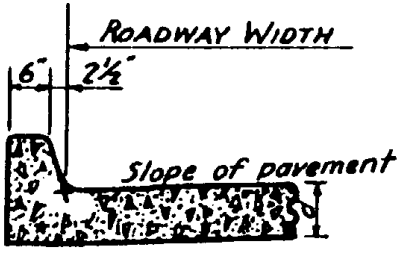
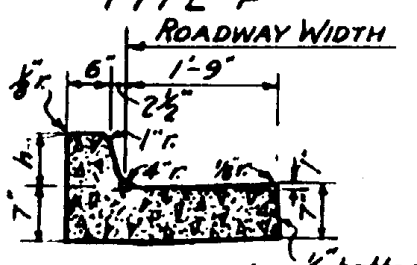
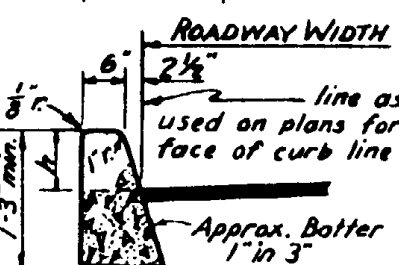
TYPE "C"



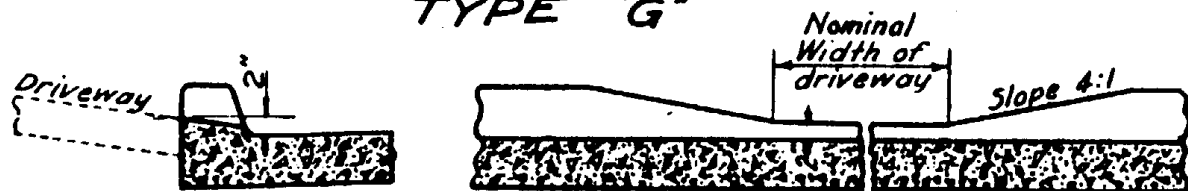
TYPE "E"



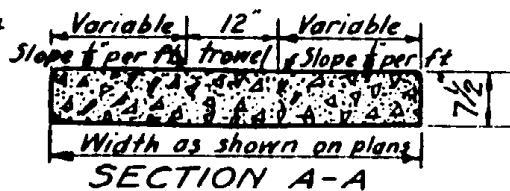
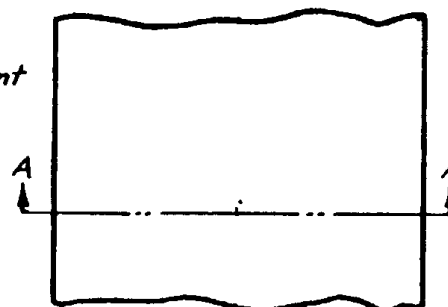
TYPE "F"



TYPE "G"



DEPRESSED CURB FOR DRIVEWAY ENTRANCE

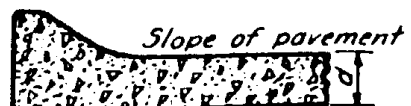
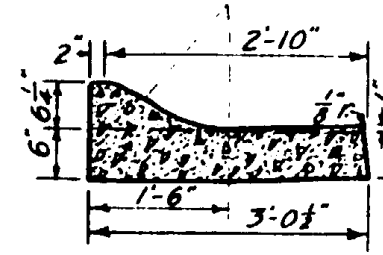


VALLEY GUTTER

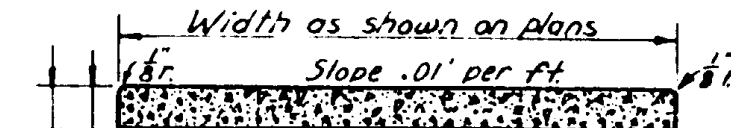
GENERAL NOTES

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.

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

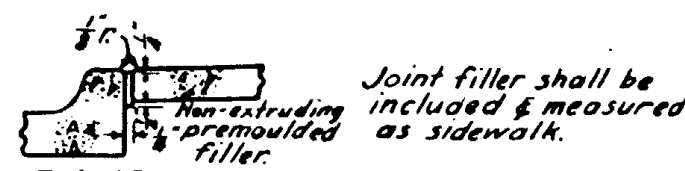


TYPE "D"



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 1/4" 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 3/11/61 3-31-50
CONCRETE CURBS, GUTTERS & SIDEWALKS			
DRAWN TRACED CHECKED APPROVED ENGR PLANS	D.K. MAR. 1935 H.A.K. JUNE 1938 H.M. JULY 1938 E. Miller	DRAWING NO. C-20	

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

Curb around return
to be measured as
per type adjacent — plans.

Combined curb & gutter
to end at end of return.

Expansion Joint-

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

Expansion Joint-

Combined curb
& gutter to end of
end of return - - -

rb around return
be measured as
r type adjacent—

Detail "B" Expansion Joint

Shaded area to be constructed and measured as 7½' valley gutter or pavement.

Expansion Joint-

Radius as shown on plans

Curb around return
to be measured as per
type adjacent.

Combined curb &
gutter to end at
end of return. -

Expansion Joint

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 , $P = 0.18$

$S=101 \quad " \quad 110, P = 0.19$

$S=111$ " 136 , $P = 0.20$

PD = drop from center of intersection to the quarter point.

ARIZONA HIGHWAY DEPARTMENT
PLANS DIVISION

CURB & GUTTER MEASUREMENT AND STREET INTERSECTION GRADES

DRAWN	O.K. & WMD. 1933-34
TRACED	H.A.K. JUNE, 1938
CHECKED	H.H.W. JULY 1938
APPROVED ENGR. PLANS	<i>[Signature]</i>

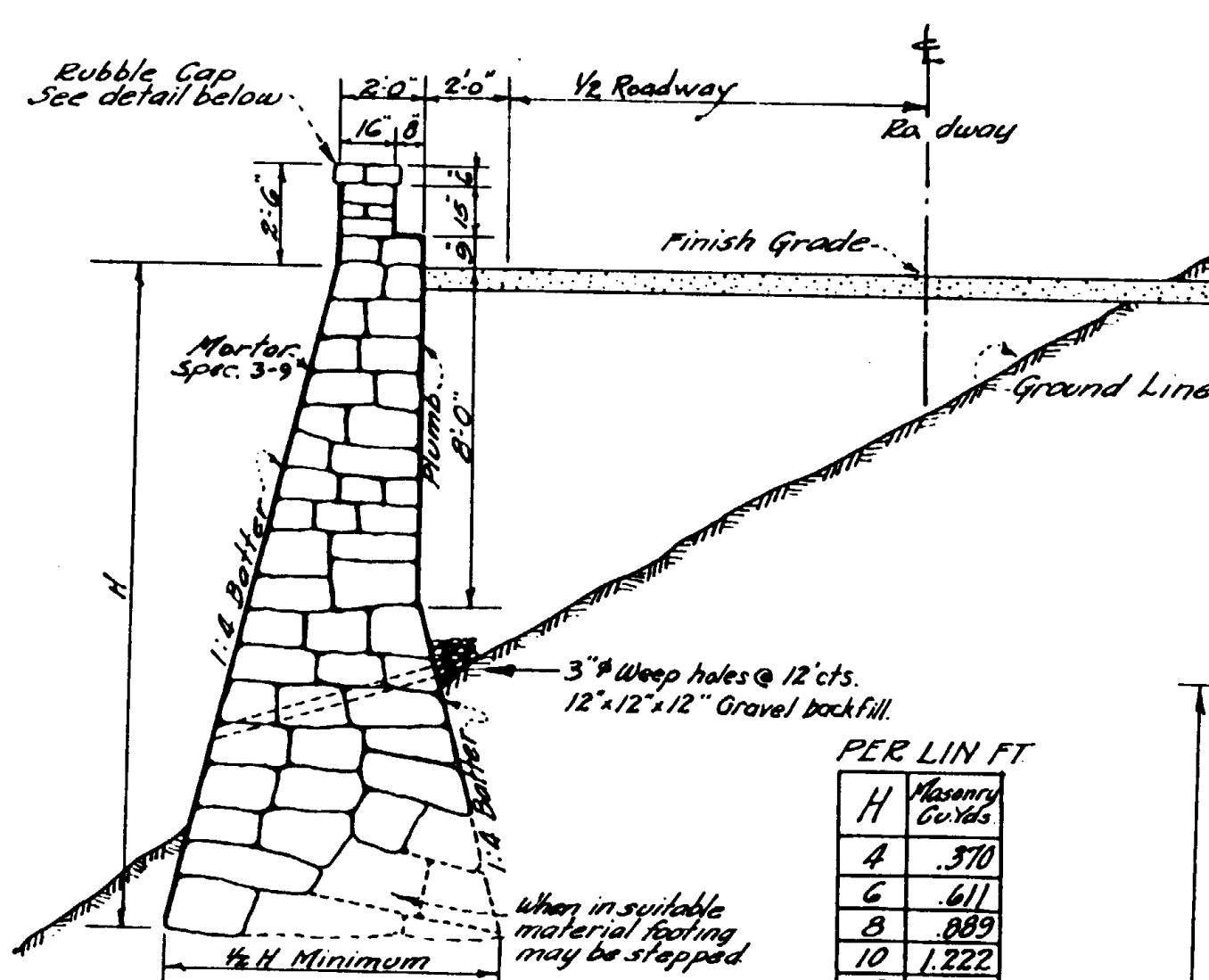
DRAWING NO

C-21

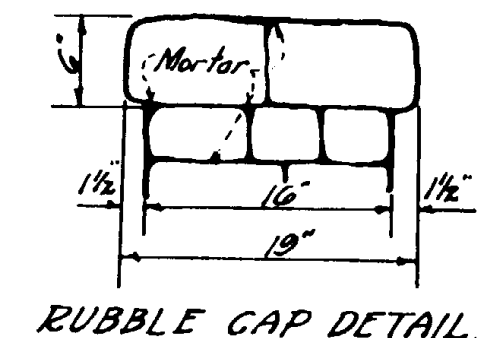
REV.

HALF SECTION B-B

SECTION A-A



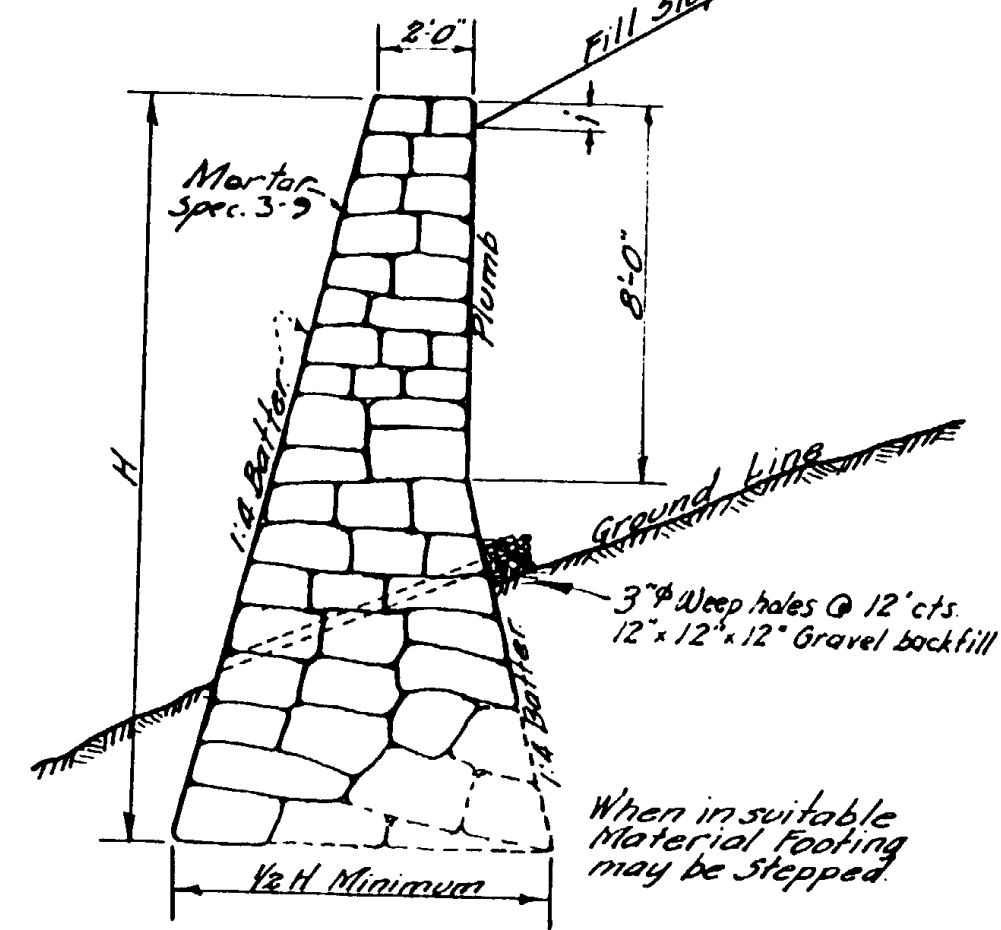
SECTION
TYPE A.



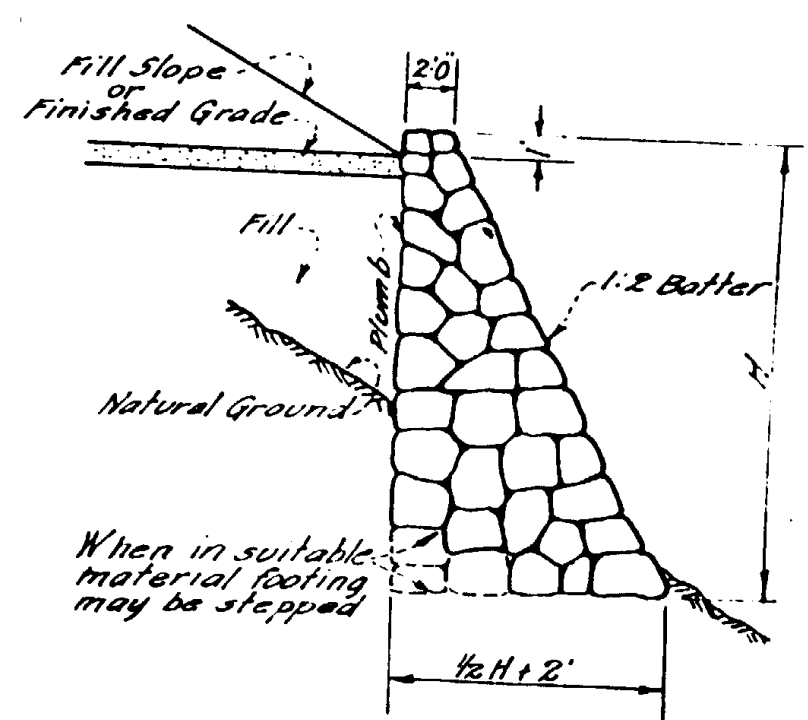
Note:-
For parapet on top of
retaining wall add per
linear ft. .145 Cu. Yds. of
masonry.

PER LIN. FT.

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



SECTION
TYPE B



SECTION
DRY RUBBLE
RETAINING WALL

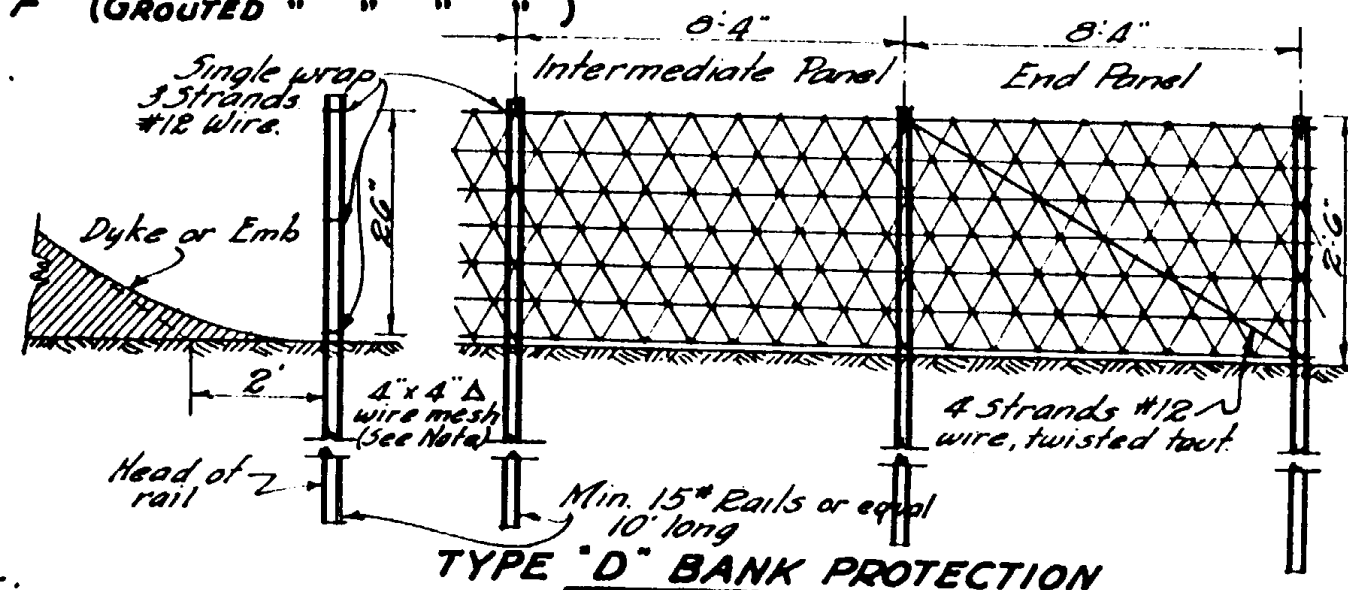
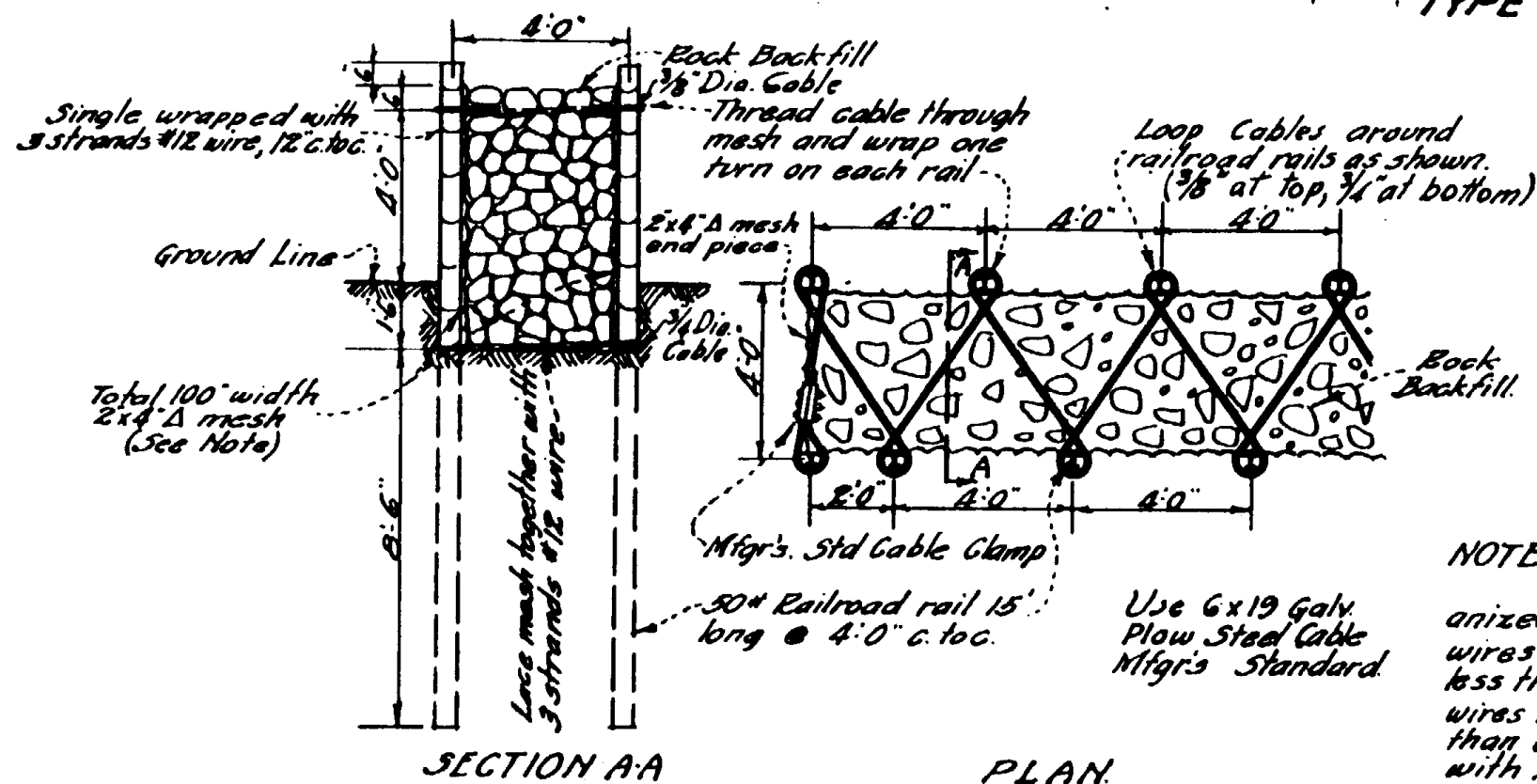
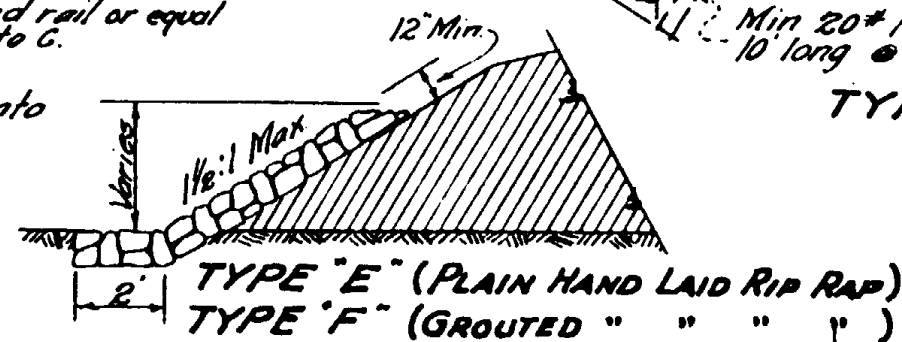
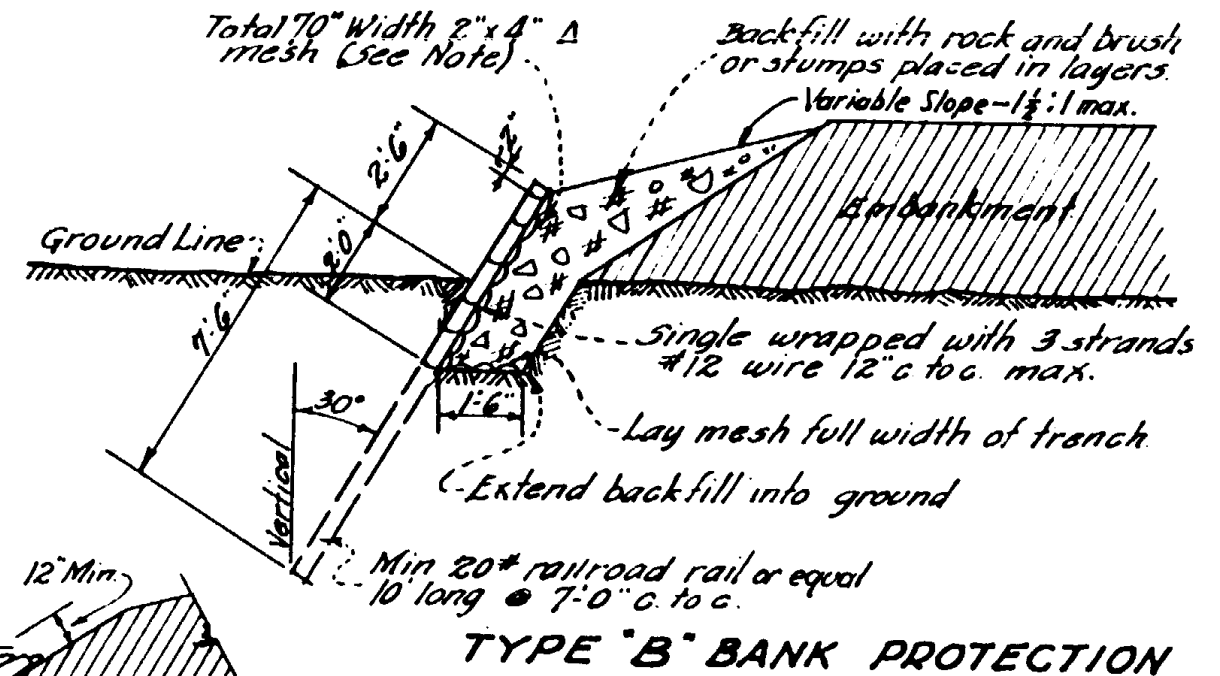
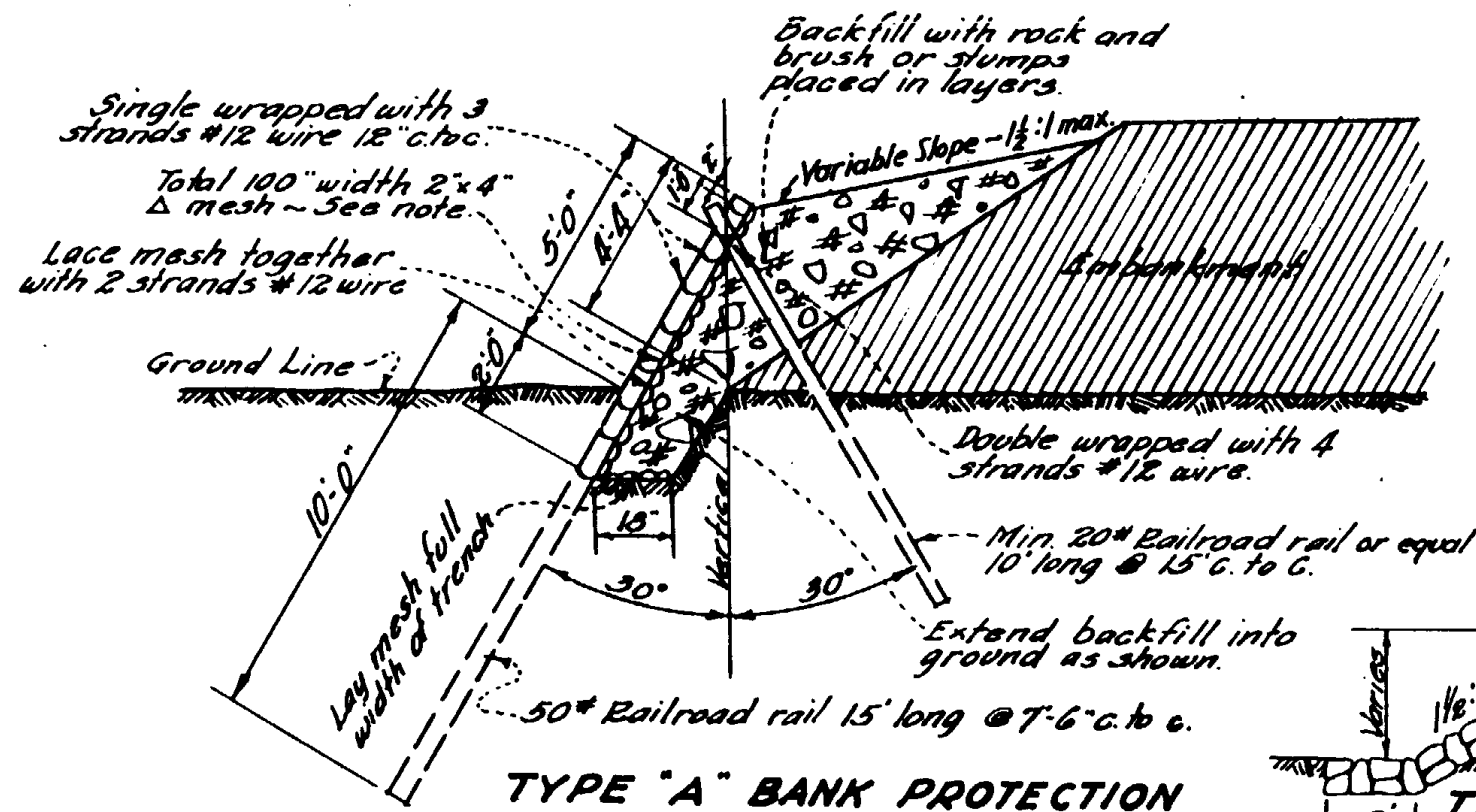
To find quantities of rock required.
 $\frac{H^2 + 2H}{27} = \text{Cu. Yds. per lineal ft. of wall}$

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 ap-
proved 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	TRACED BY K.S. JUNE 1938	DRAWING NO. C-22
CHECKED BY H.H.W. JULY 1938	APPROVED E.H. Miller	

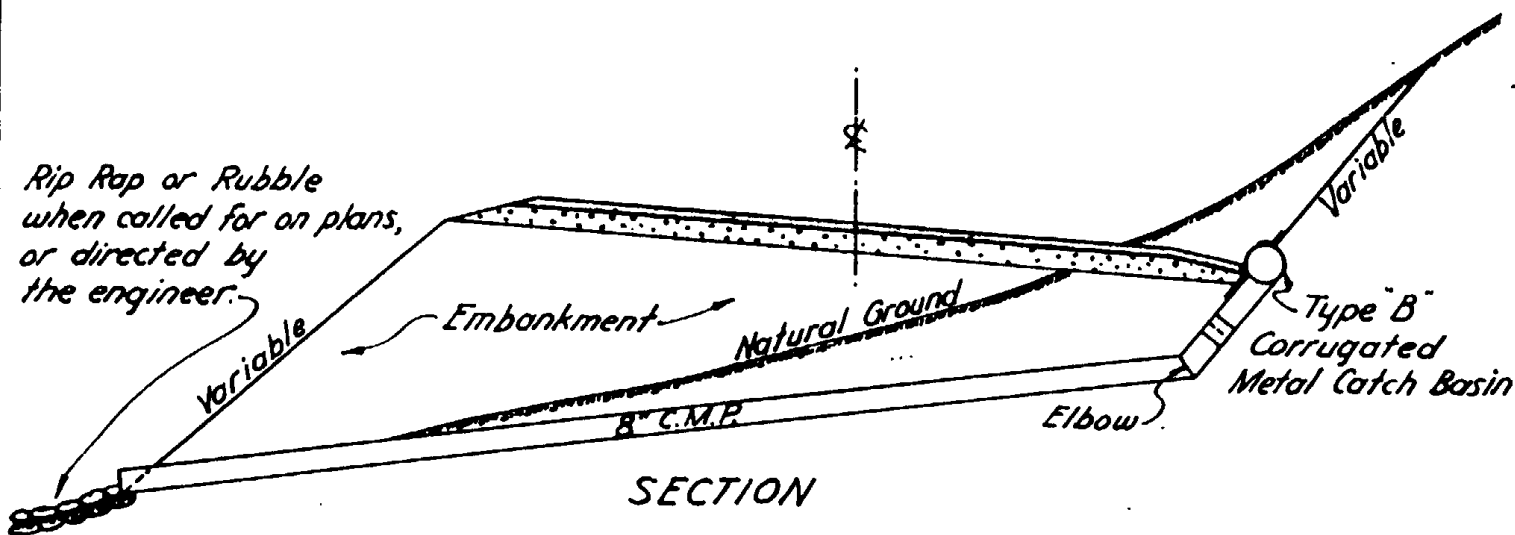


NOTE:

Wire mesh to be either galvanized or galvanealed. Horizontal wires to be 2 strands, twisted, not less than 12½ 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.

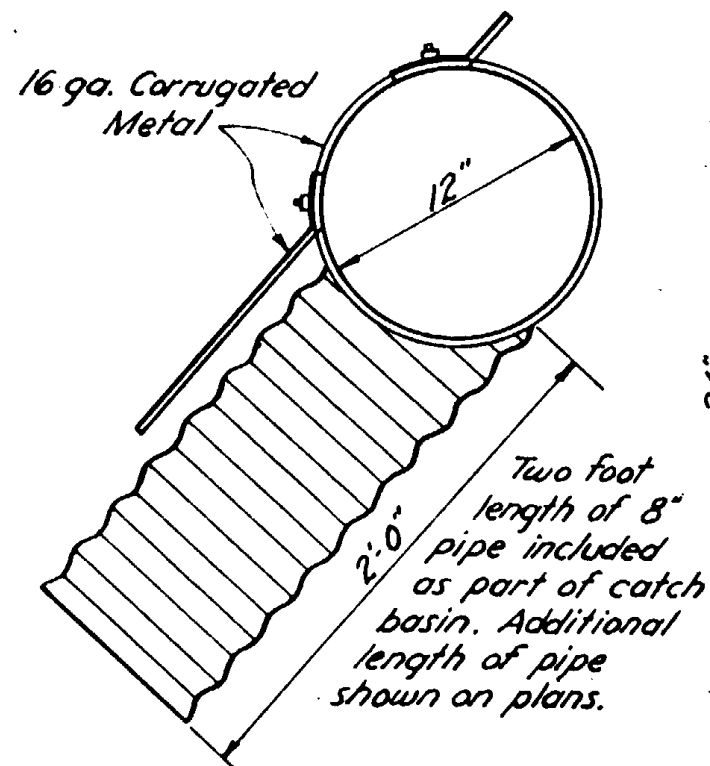
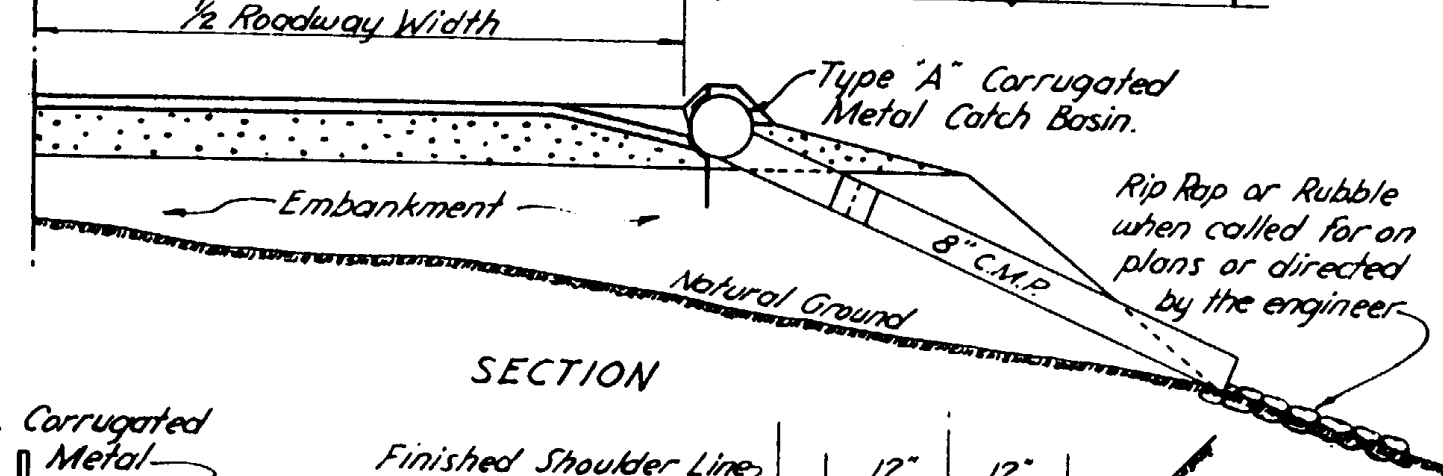
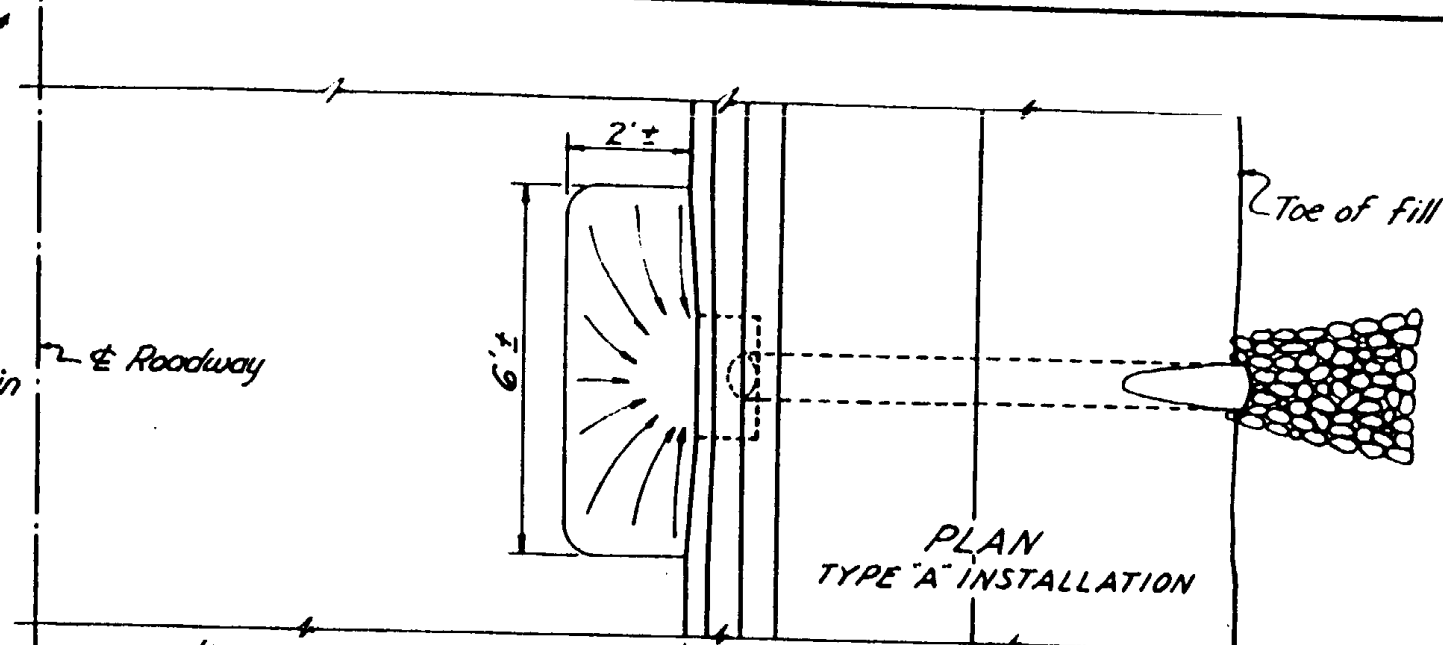
1/4 - 10/10 Galvanized welded wire fabric may be substituted for 4 mesh if approved by the engineer.

ARIZONA HIGHWAY DEPARTMENT PLANS DIVISION		REV. Exp'd 4/9/41 12-20-41 6-24-41 3-20-50
BANK PROTECTION, RIP RAP		
DRAWN TRACED CHECKED APPROVED ENGINE PLANS	H.A.K. JUNE, 1935 K.S. JUNE, 1939 H.H.H. July 1939 <i>E.H. Miller</i>	DRAWING NO. C-23

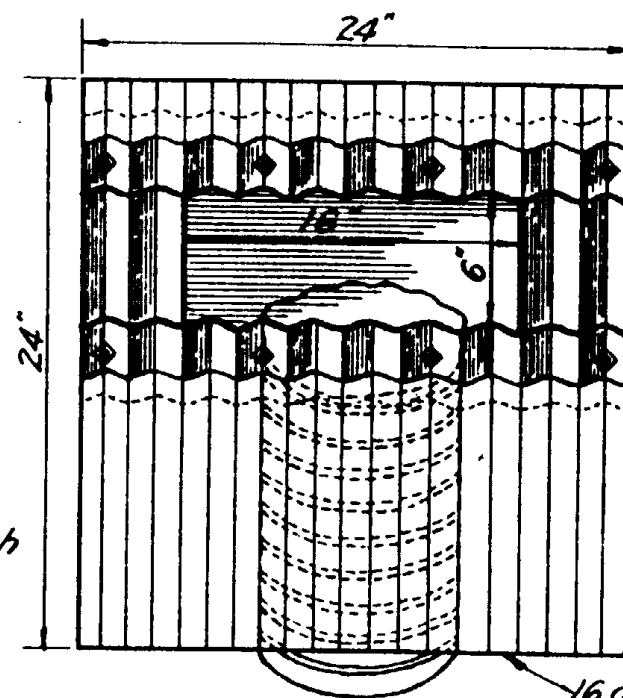


Note—

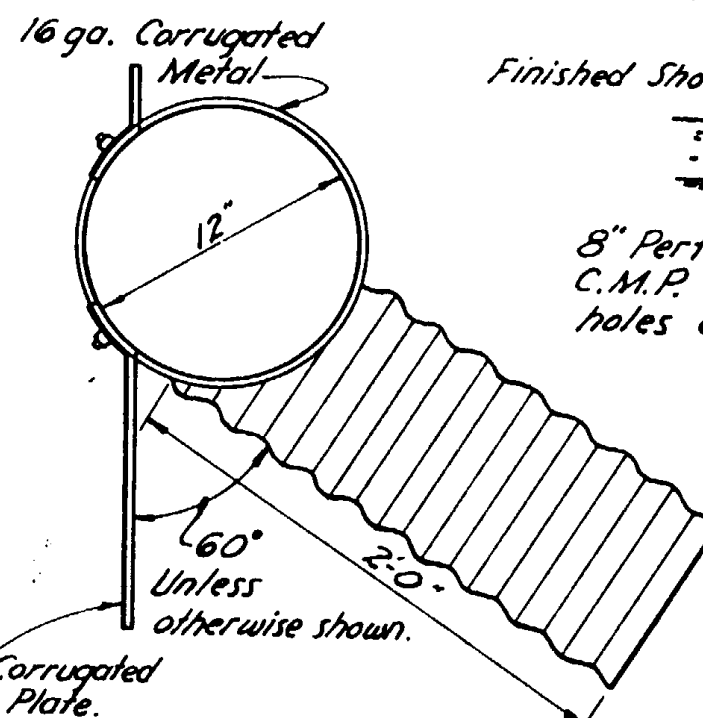
Include elbow as part of total length. Call for hinged band coupling for pipe joints. Use 12" band width for pipes over 12' long, 7" band width for pipes 12' long or less. Catch basin to have bituminous coating. C.M.P. shall be plain unless otherwise specified. Catch basin shall be shifted to fit the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



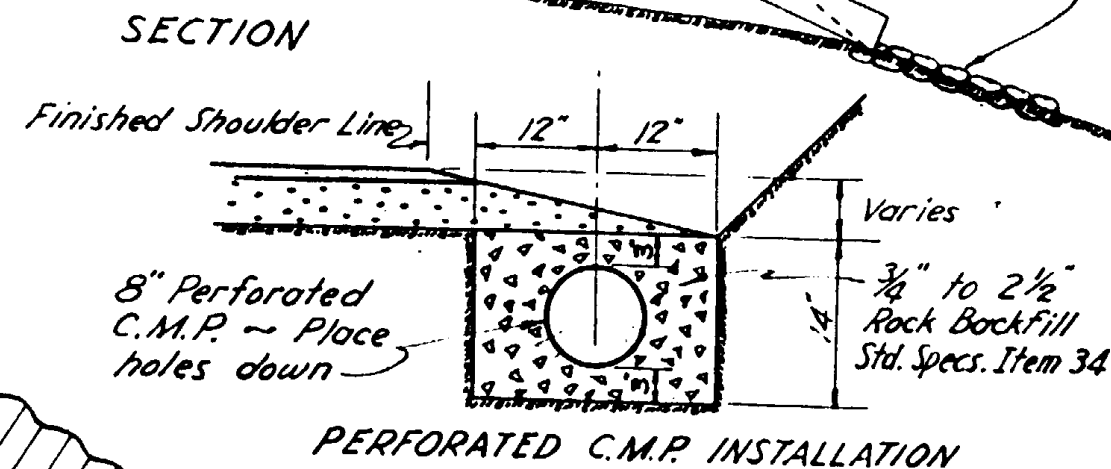
SIDE ELEVATION
TYPE "B"



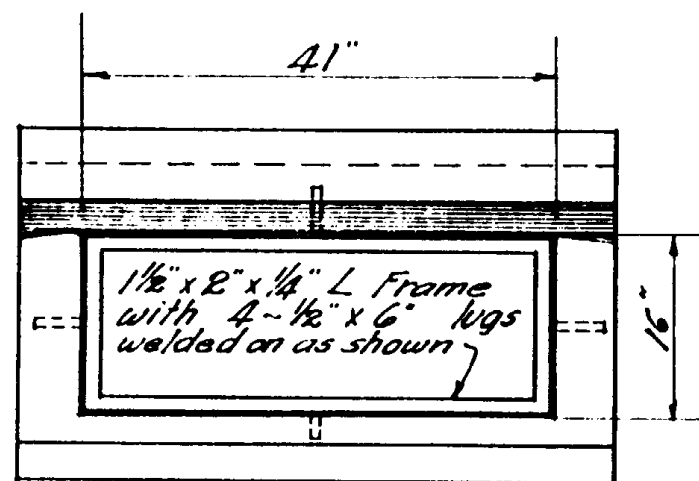
FRONT ELEVATION
CATCH BASINS



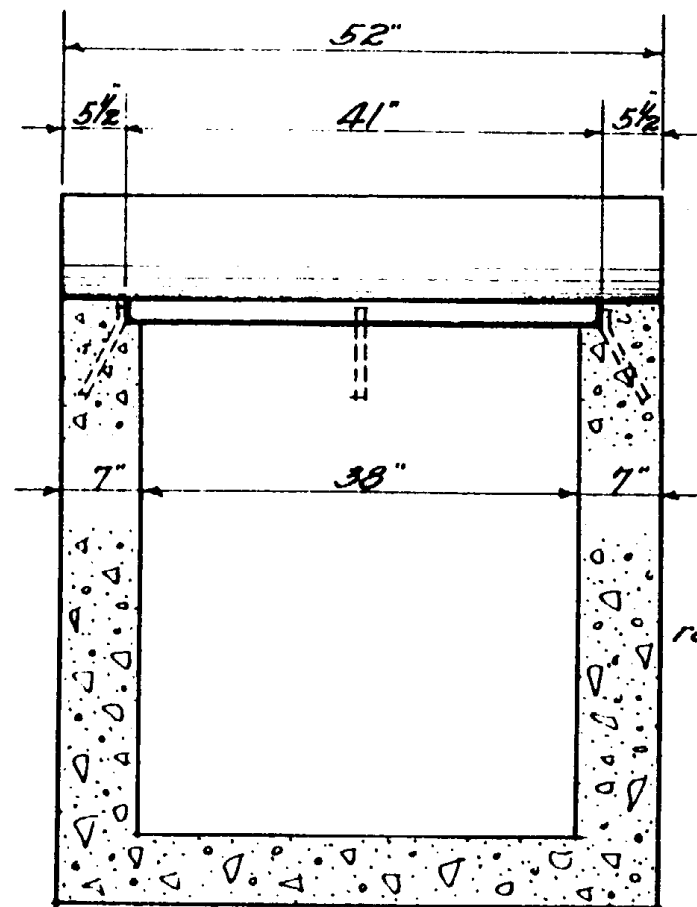
SIDE ELEVATION
TYPE "A"



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



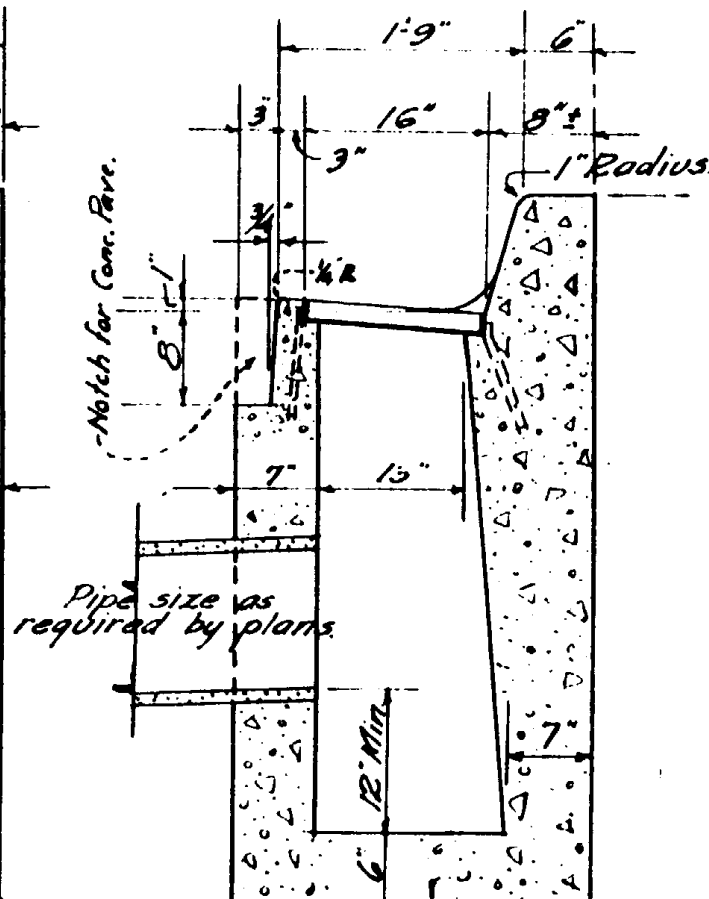
PLAN



LONGITUDINAL SEC.

DETAIL OF NO. 1 CATCH BASIN

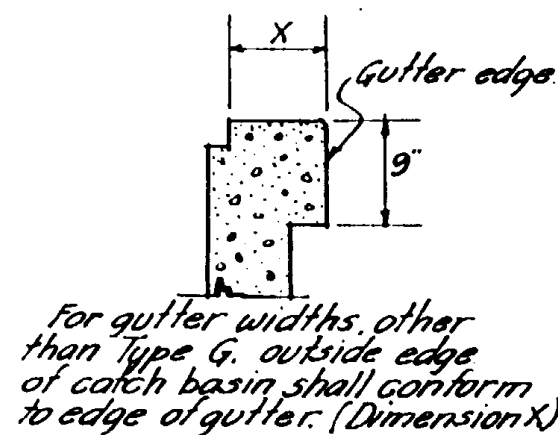
Scale ~ 3/4" = 1'-0"



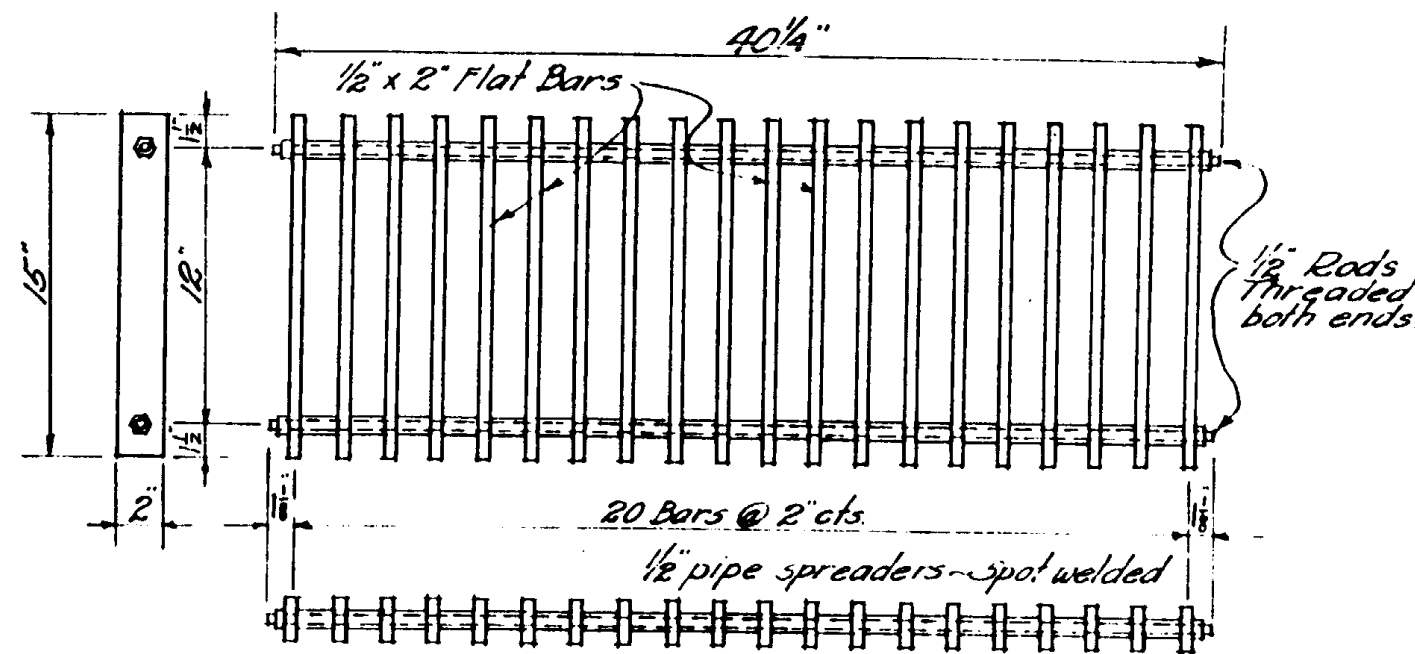
CROSS SECTION

DETAIL OF NO. 1 CATCH BASIN

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



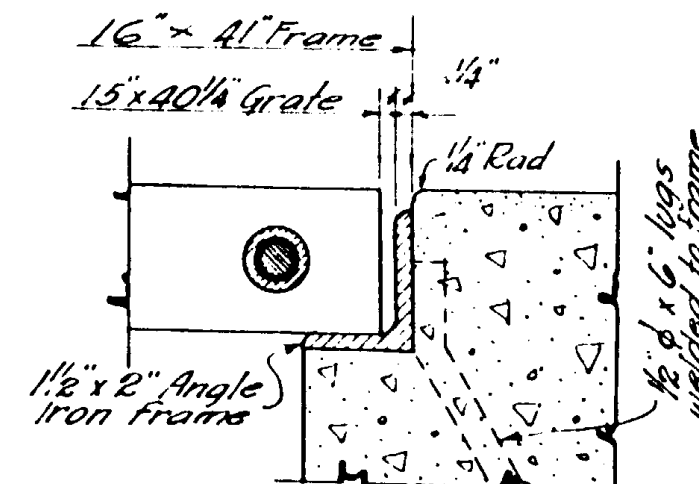
For gutter widths other than Type G, outside edge of catch basin shall conform to edge of gutter. (Dimension X)



2.6' per grate

BAR GRATE
Scale ~ 1 1/2" = 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.



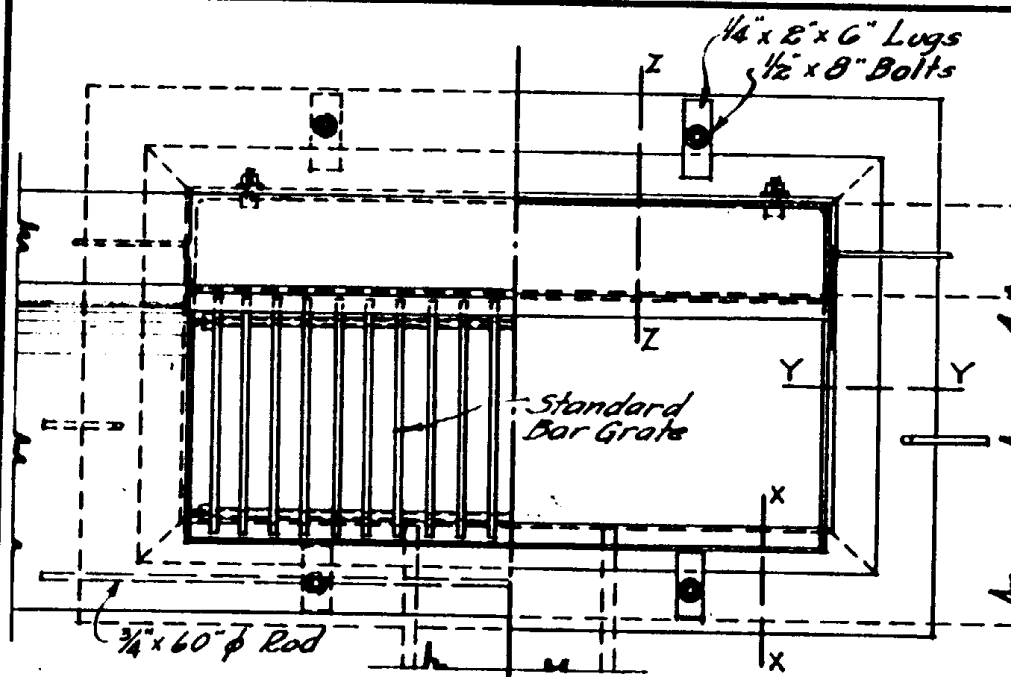
DETAIL OF ANGLE
FRAME GRATE SUPPORT
Scale ~ 3/8" = 1'

ARIZONA HIGHWAY DEPARTMENT
PLANS DIVISION

REV.
8-1-41
6-14-47

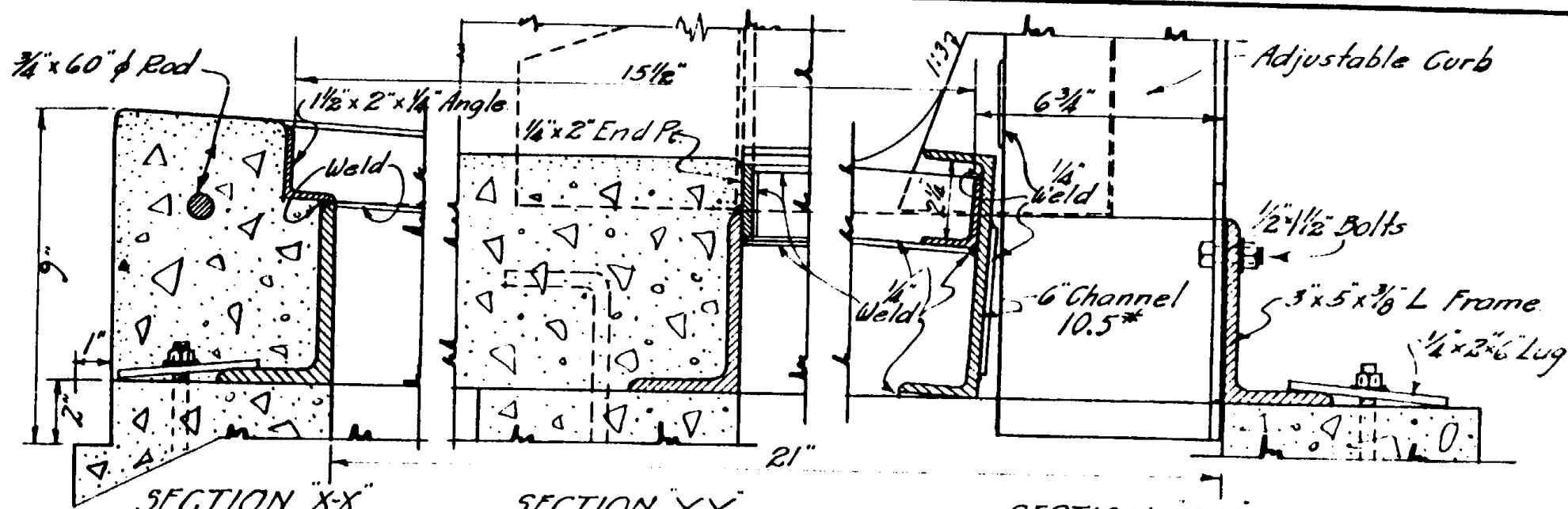
CATCH BASIN
NO. 1

DRAWN	H.N.W.	DRAWING NO. C-25
TRACED	K.S.	
CHECKED	H.H.W.	
APPROVED	E. Miller	



HALF PLAN
GUTTER & GRATE

HALF PLAN
FRAME & ANCHORS



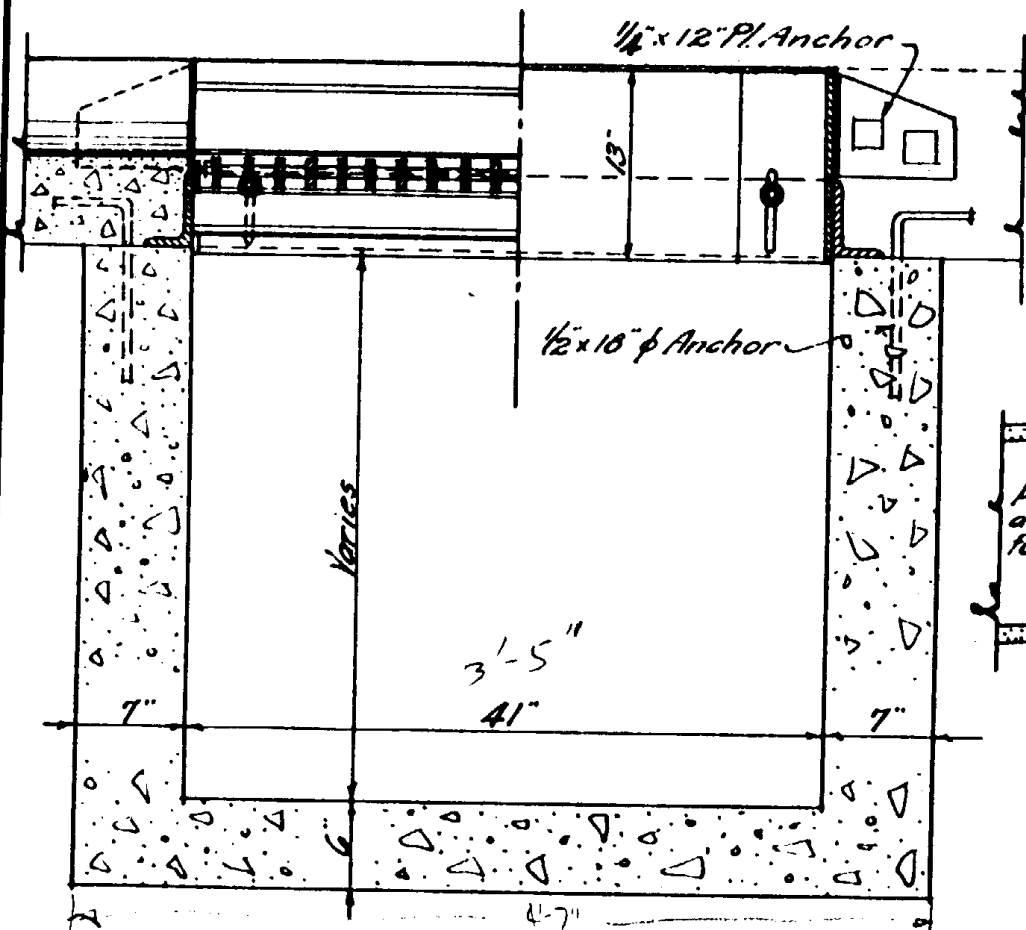
SECTION X-X

SECTION Y-Y

SECTION Z-Z

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

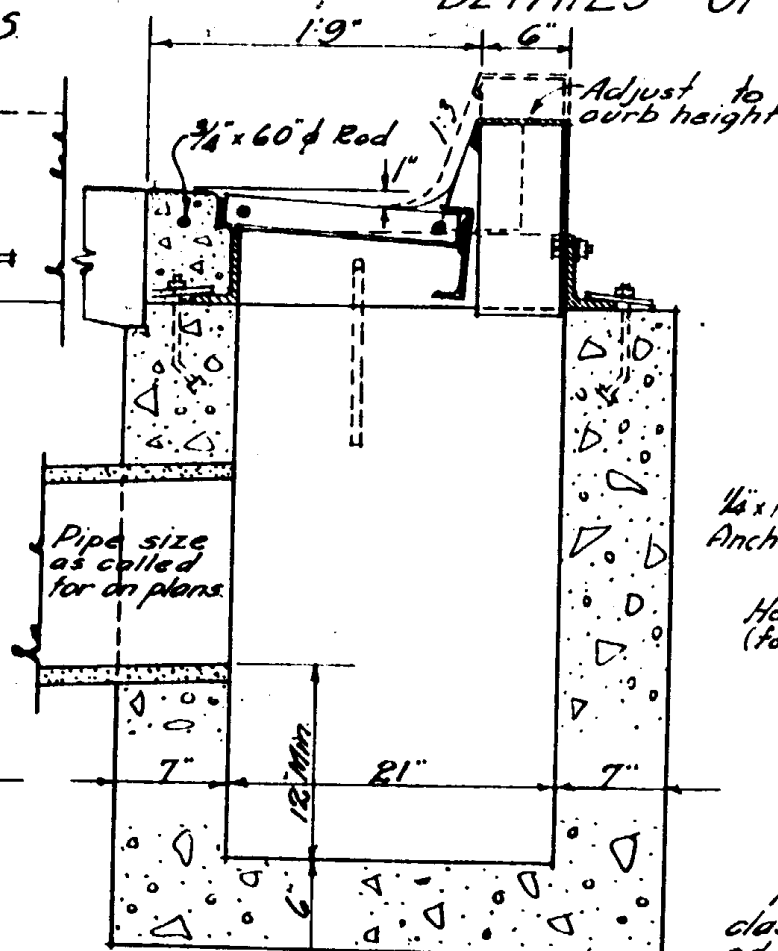
Warp face of Standard curb and gutter into catch basin in lengths of 2 feet on each side if necessary.
All structural iron to be given a shop coat of No. 1 paint and a second coat of No. 9 Paint.
Detail is for Type G curb and gutter. If other types are used the concrete shall be warped to fit Catch Basin.



LONGITUDINAL SECTION

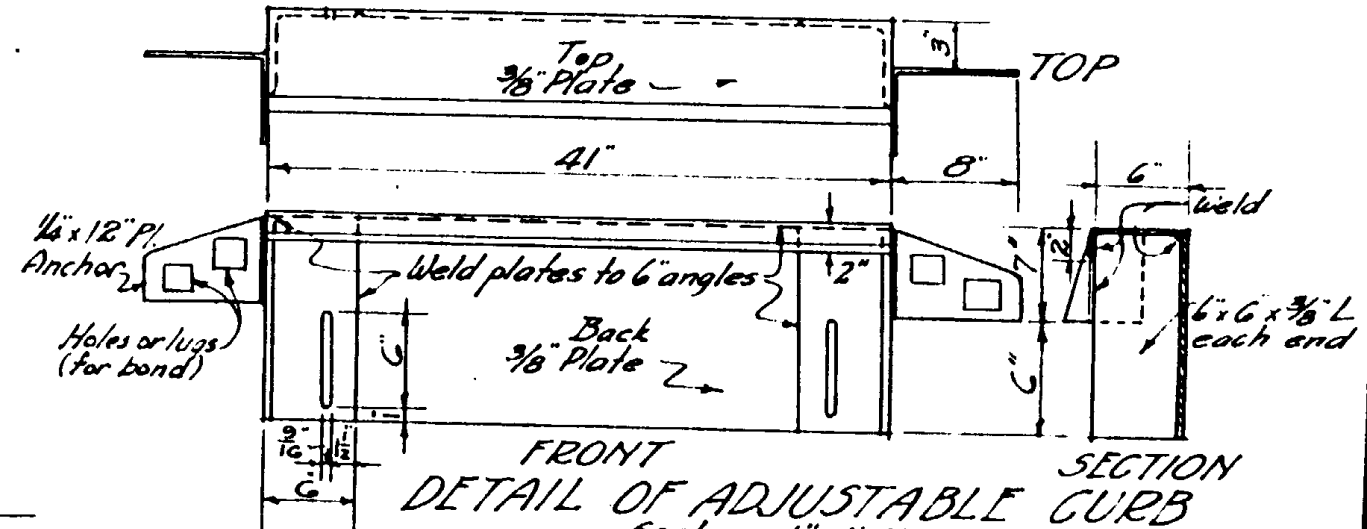
DETAILS OF NO. 3 CATCH BASIN

Scale ~ 1" = 1'-0"



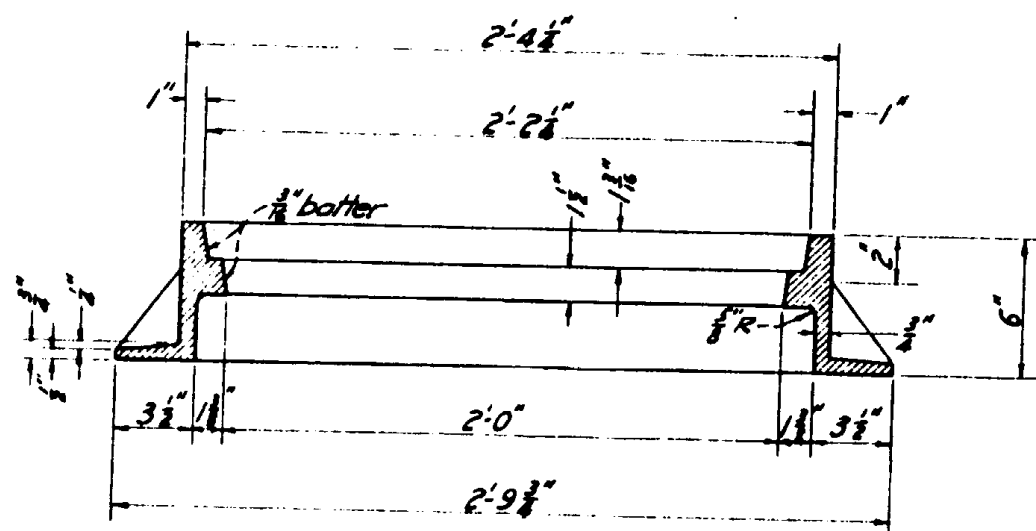
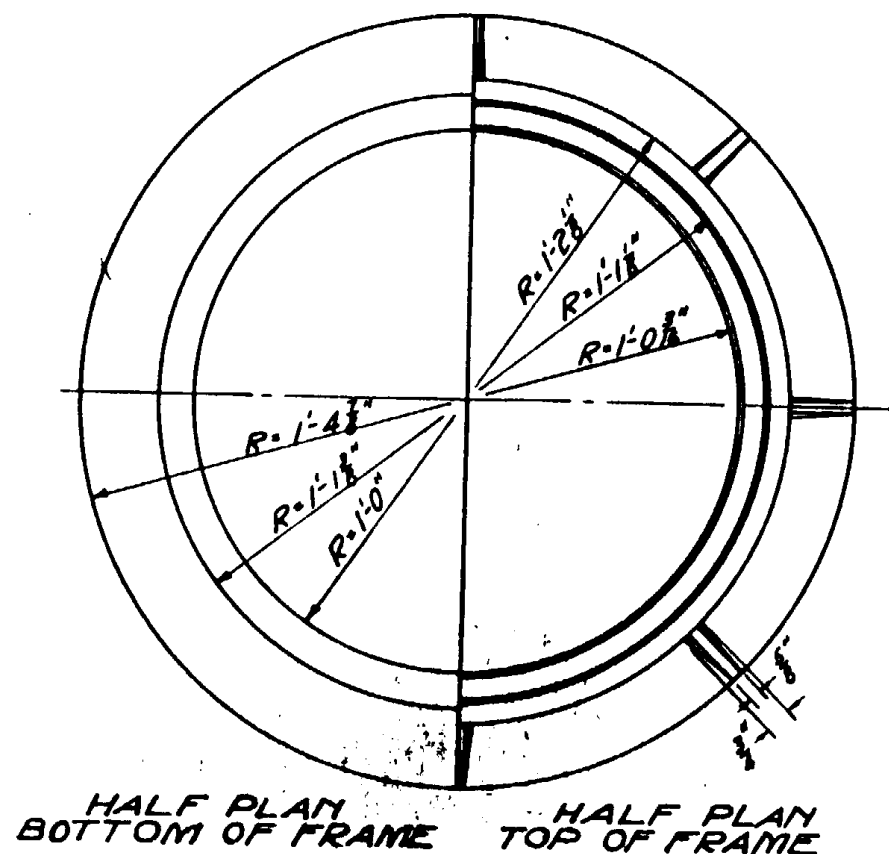
CROSS SECTION

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

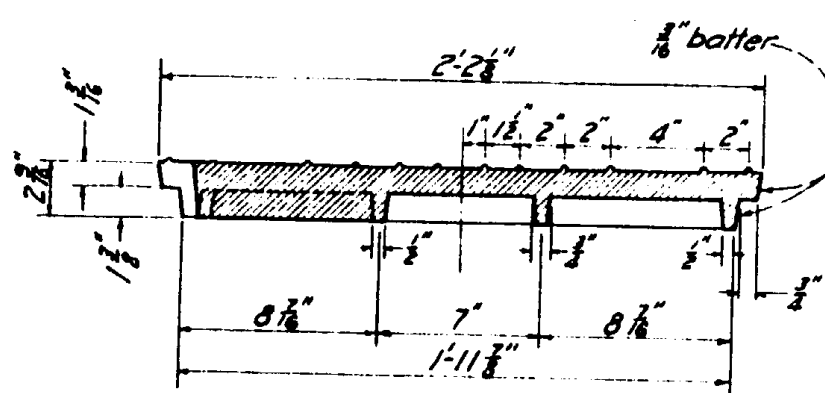
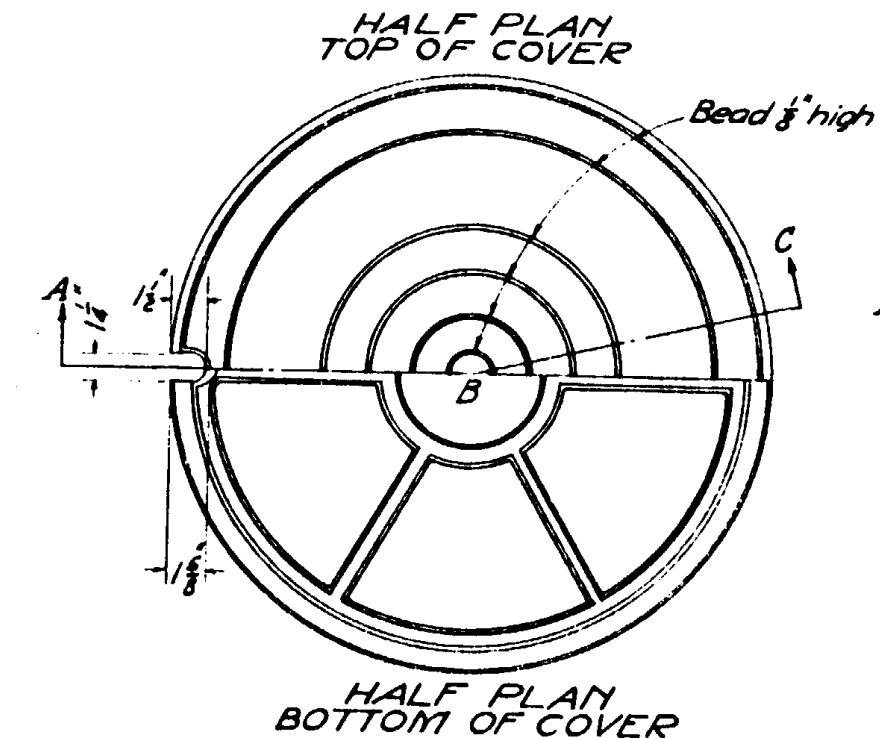


FRONT
DETAIL OF ADJUSTABLE CURB
Scale ~ 1" = 1'-0"

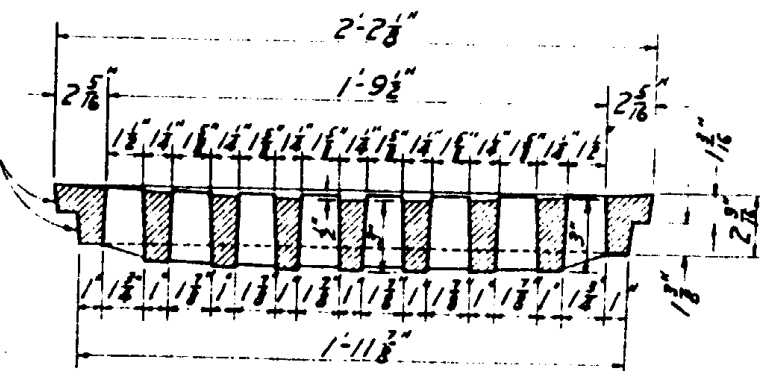
ARIZONA HIGHWAY DEPARTMENT			REV. 8-1-41
PLANS DIVISION			
CATCH BASIN NO. 3			
DRAWN	H. H. W.	DRAWING NO. C-27	
TRACED	K. S.		
CHECKED	H. H. W.		
APPROVED	<i>E. Miller</i>		



Approx. weight 205 lbs.



TYPE "A" COVER
Approx. weight 190 lbs.



TYPE "B" COVER
Approx. weight 280 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.

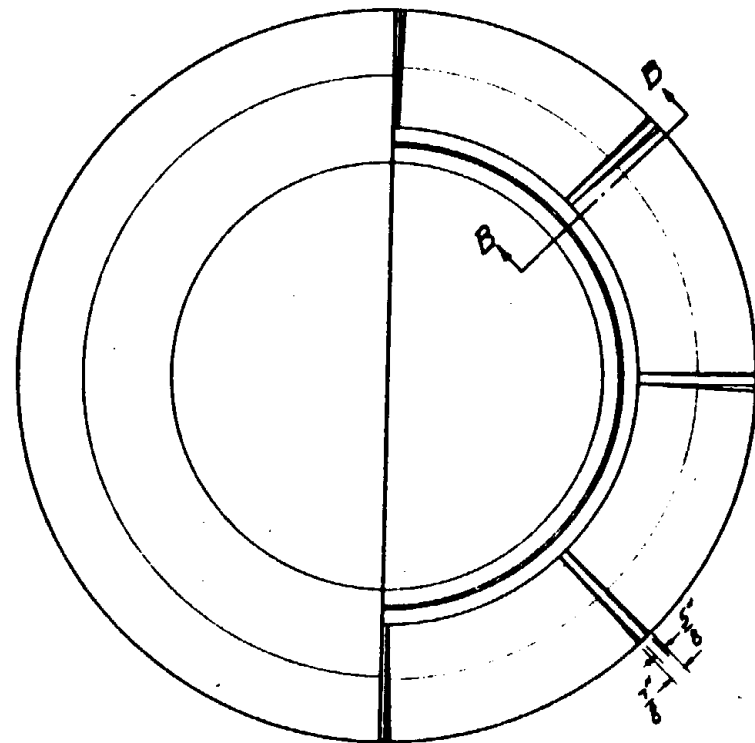
Type "A" cover shall be used unless otherwise specified.

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.

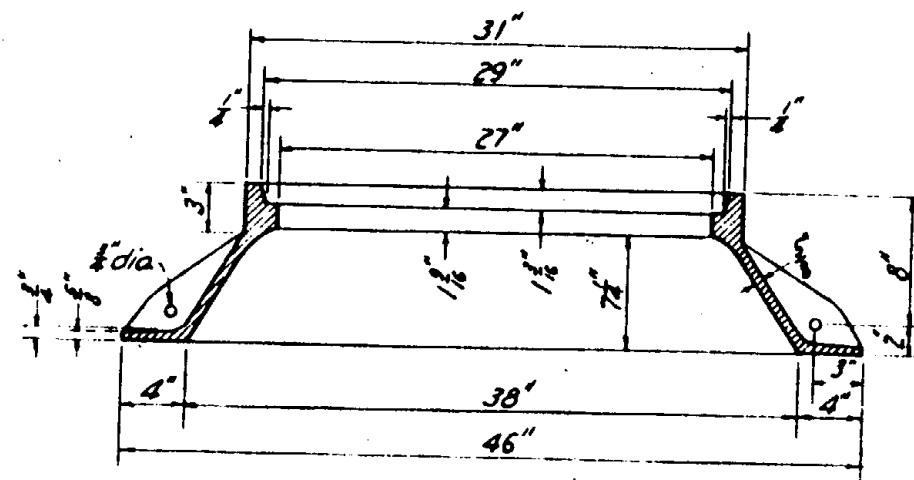
Scale 1 1/2" = 1'-0"

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



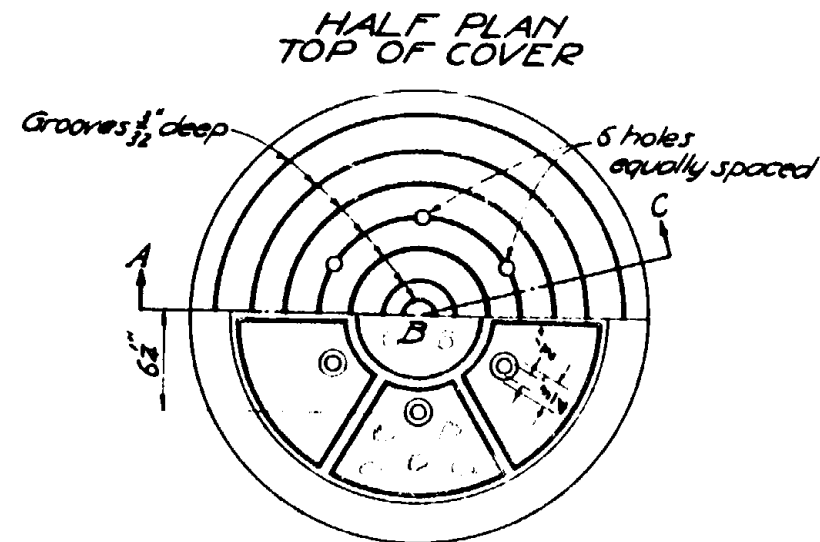
HALF PLAN
BOTTOM OF FRAME

HALF PLAN
TOP OF FRAME

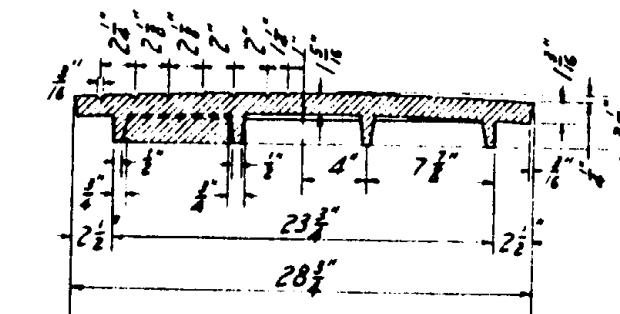


SECTION OF FRAME

Approx. weight 377 lbs.

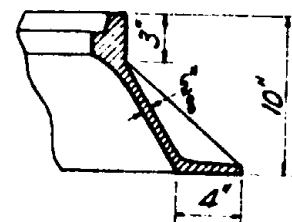


HALF PLAN
BOTTOM OF COVER



SECTION A-B-C OF COVER

Approx. weight 210 lbs.



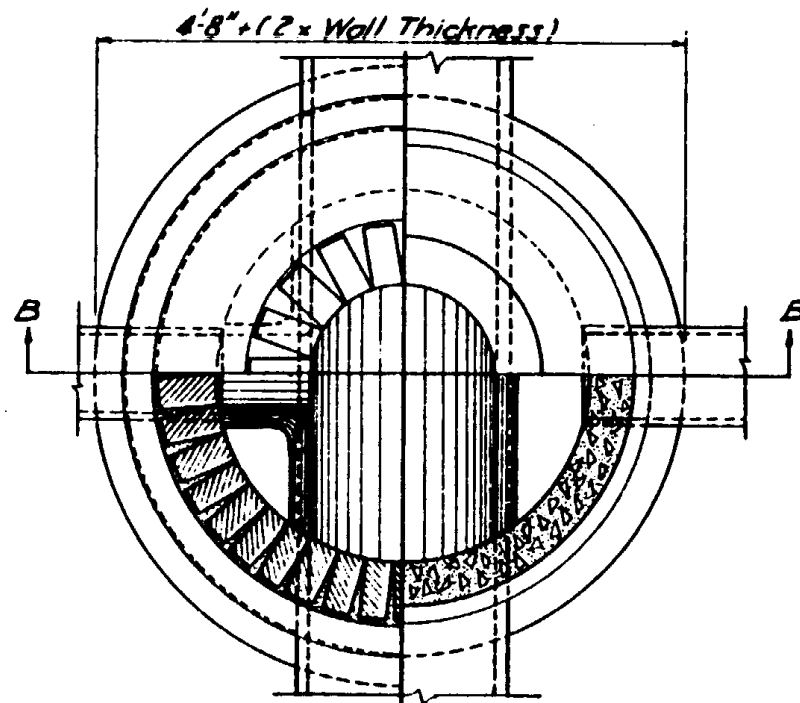
SECTION B-B

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"

ARIZONA HIGHWAY DEPARTMENT PLANS DIVISION		REV.
MANHOLE FRAME & COVER NO.2		
DRAWN TRACED CHECKED	OK OK OK	DRAWING NO.
APPROVED BY OF PLANS	<i>E. J. Miller</i>	C-29

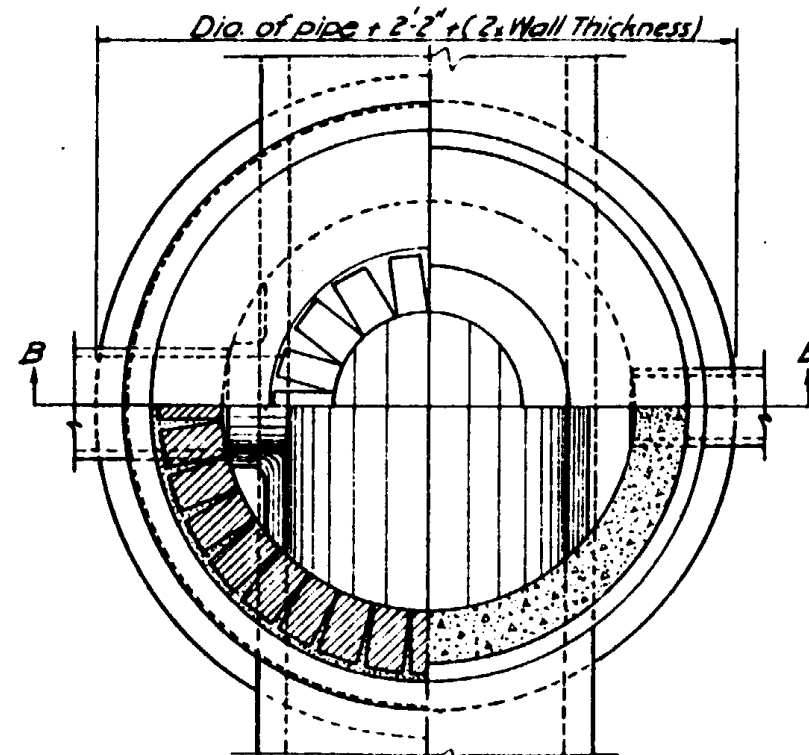
HALF PLAN



HALF SECTION A-A

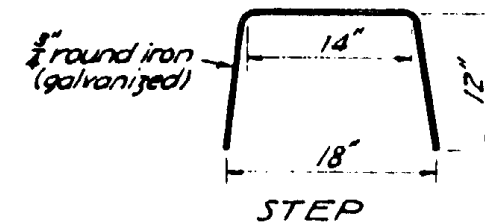
BRICK CONCRETE

HALF PLAN

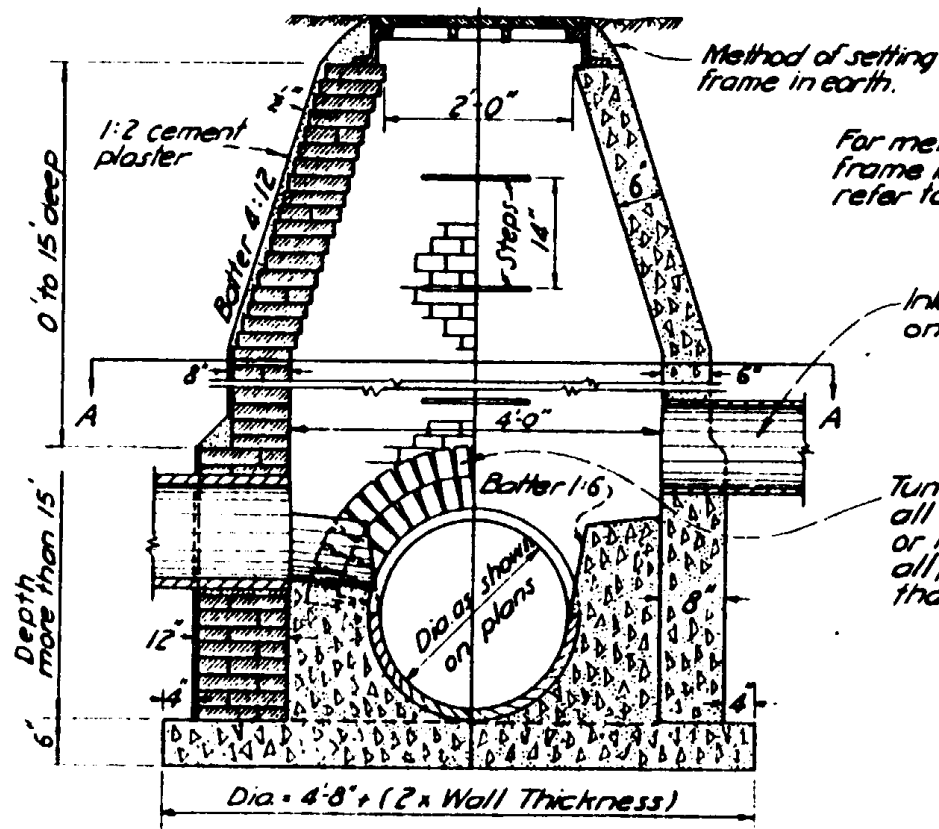


HALF SECTION A-A

BRICK CONCRETE



STEP



SECTION B-B

BRICK CONCRETE

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

Method of setting
frame in pavement

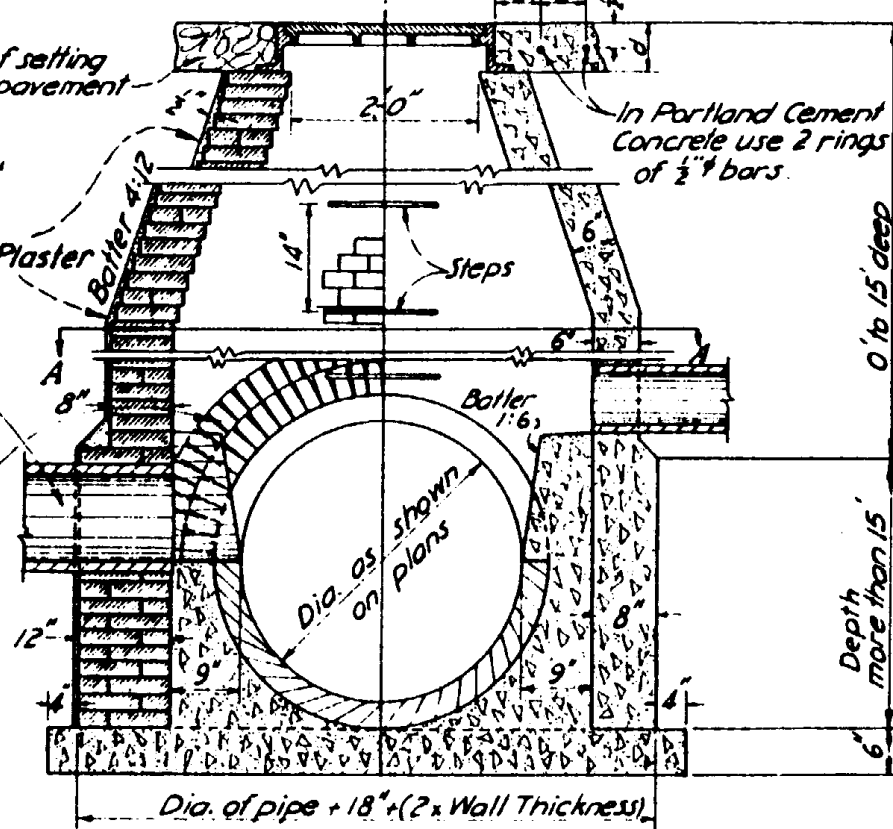
For method of setting
frame in existing pavement
refer to Drawing No. C-34

1:2 Cement Plaster

Inlet pipes as shown
on the plans.

Turn 4" arch over
all pipes 12" dia.
or less. 8" arch over
all pipes of more
than 12" dia.

Scale 1/2" = 1'-0"



SECTION B-B

BRICK CONCRETE

STANDARD MANHOLE NO. 2
FOR PIPES 30" OR MORE

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

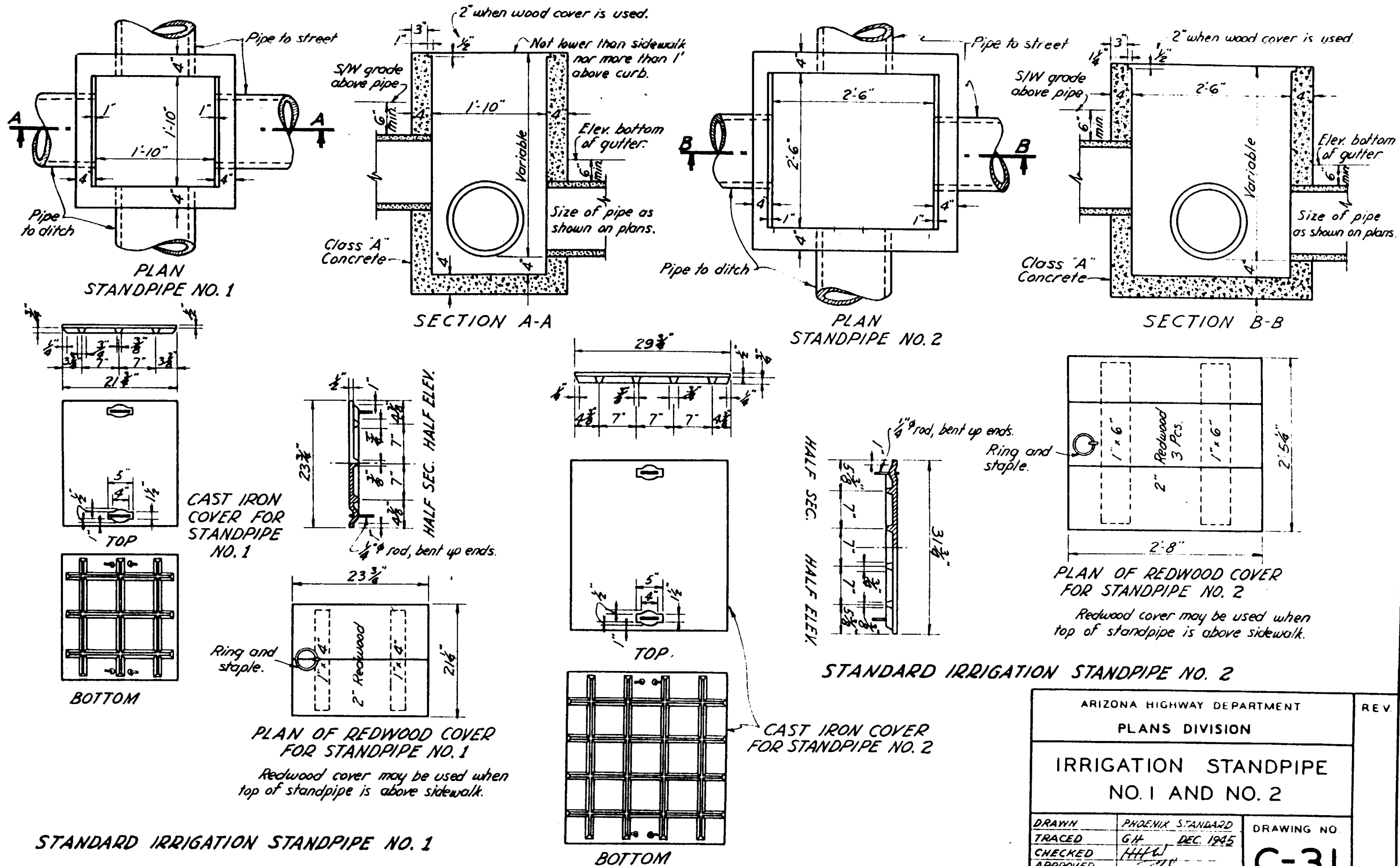
MANHOLE
NO. 1 & NO. 2

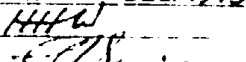
DRAWN
TRACED
CHECKED
APPROVED
ENG. OF PLANS

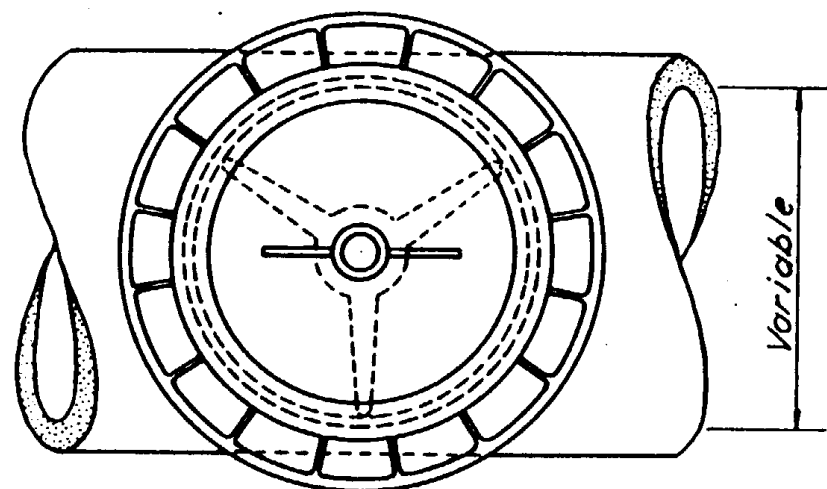
CA
OK
L.V.
E. J. Miller

DRAWING NO.
C-30

REV.
July 17, 1935
No. 2

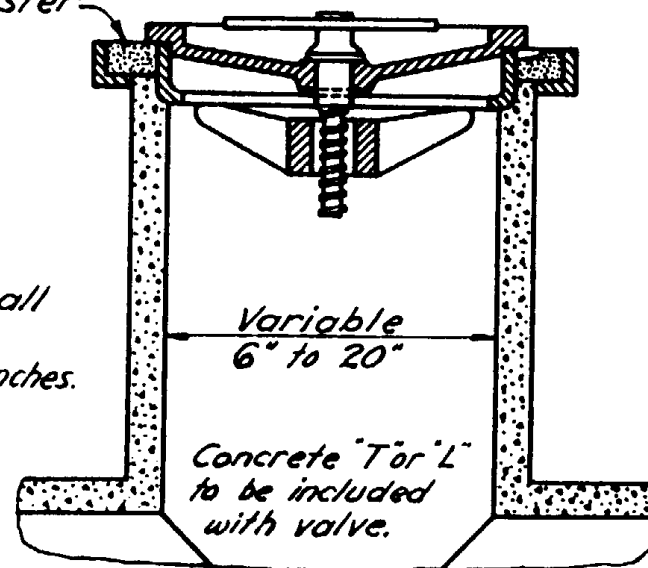


ARIZONA HIGHWAY DEPARTMENT		REV.
PLANS DIVISION		
IRRIGATION STANDPIPE NO. 1 AND NO. 2		
DRAWN	PHOENIX STANDARD	DRAWING NO. C-31
TRACED	G.H. DEC. 1945	
CHECKED	H.H.W.	
APPROVED		
PLANS ENG'R.	E. C. McPhee	



PLAN

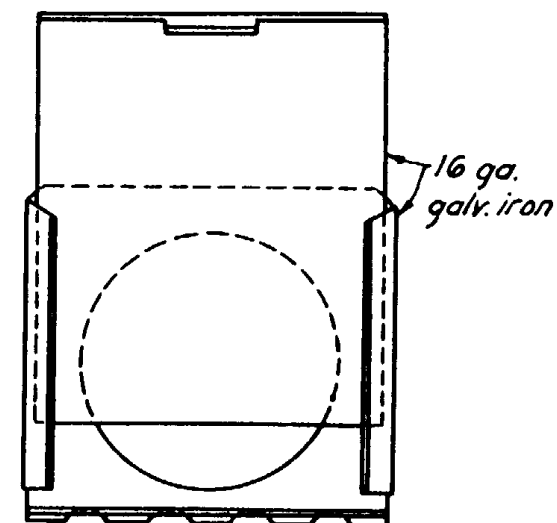
Cement Plaster



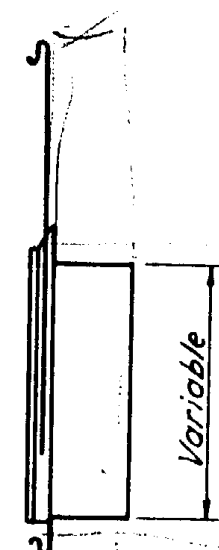
PART SECTION

STANDARD IRRIGATION VALVE
DETAIL "C"

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



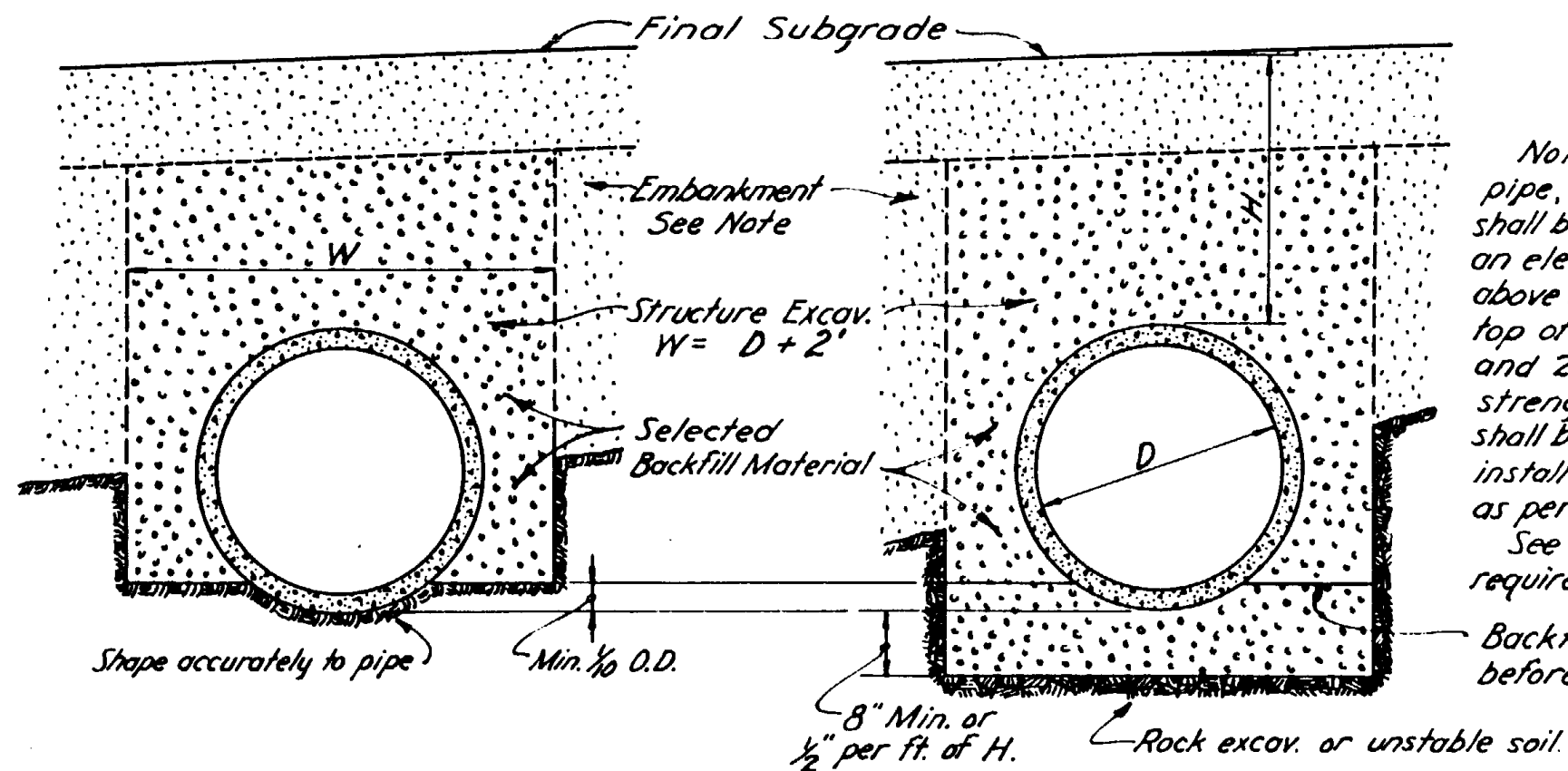
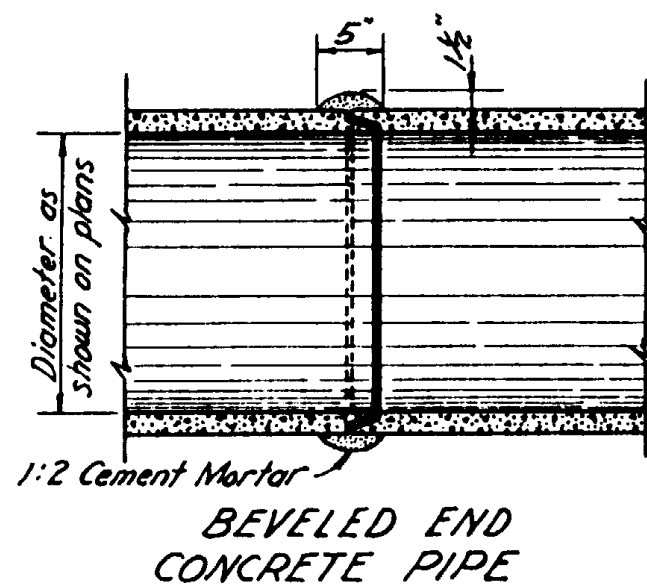
ELEVATION



SECTION

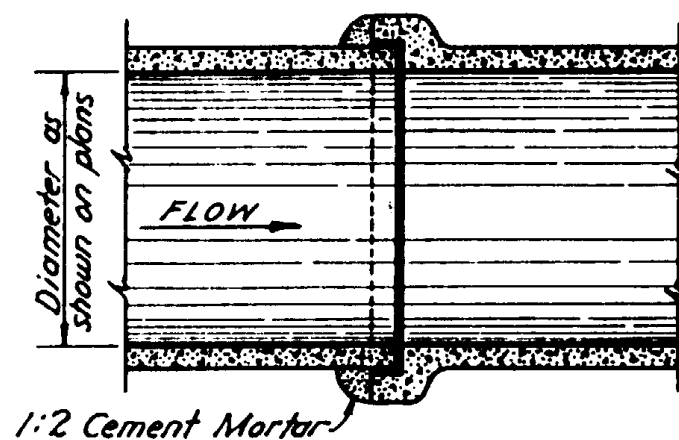
STANDARD IRRIGATION GATE
DETAIL "O"

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>HHH</i>		
APPROVED PLANS ENGR.	<i>E. T. Miller</i>		

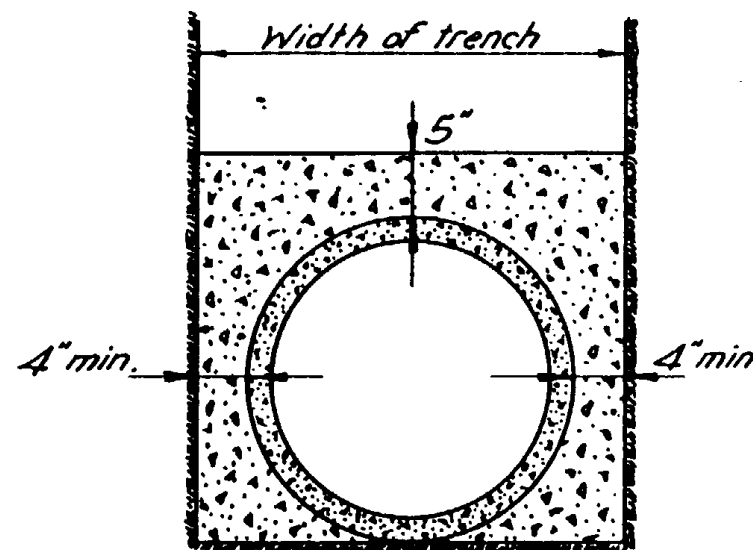


Note— Prior to placing pipe, the roadway embankment shall be placed and compacted to an elevation of at least 9" above the proposed grade for the top of double strength pipe and 24" above the top of std. strength pipe. Then the trench shall be excavated and the pipe installed, backfilled and tamped as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

TYPICAL INSTALLATION OF CONCRETE OR TILE PIPE

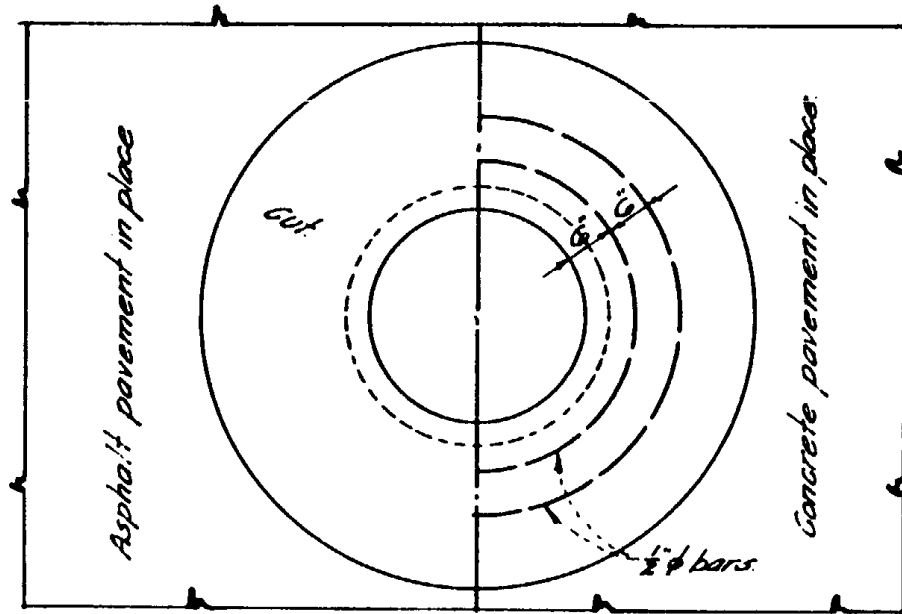


BELL & SPIGOT CONCRETE PIPE OR VITRIFIED CLAY PIPE

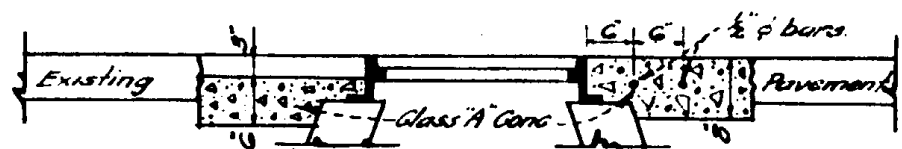


DETAIL "X" CONCRETE ENCASEMENT

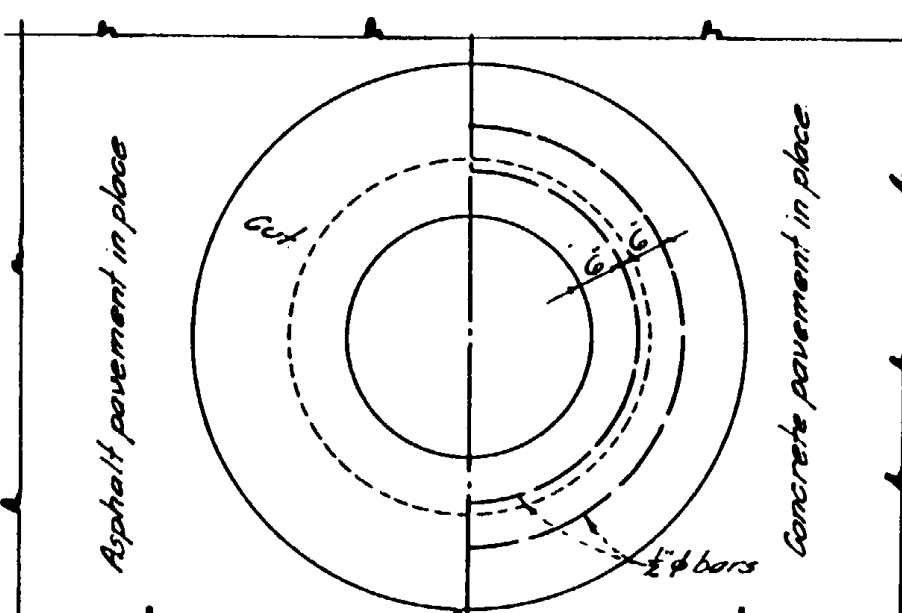
ARIZONA HIGHWAY DEPARTMENT		REV.
PLANS DIVISION		
CONCRETE AND VITRIFIED CLAY PIPE		
DRAWN		DRAWING NO. C-33
TRACED	GH Nov. 1945	
CHECKED		
APPROVED		
PLANS ENGR.	<i>E. Miller</i>	



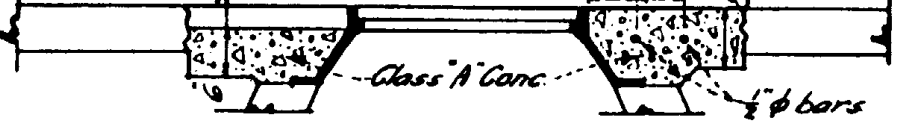
HALF PLAN ASPHALT PAVEMENT HALF PLAN CONCRETE PAVEMENT.



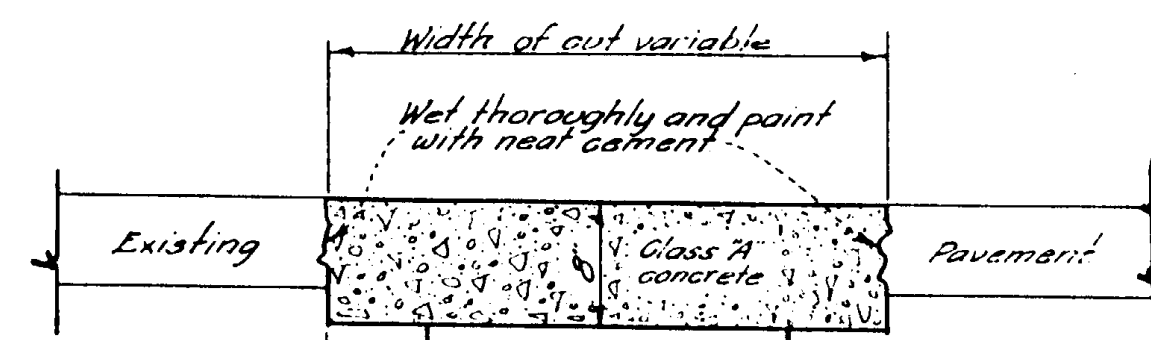
CUT FOR MANHOLE ~ FRAME & COVER NO. 1.



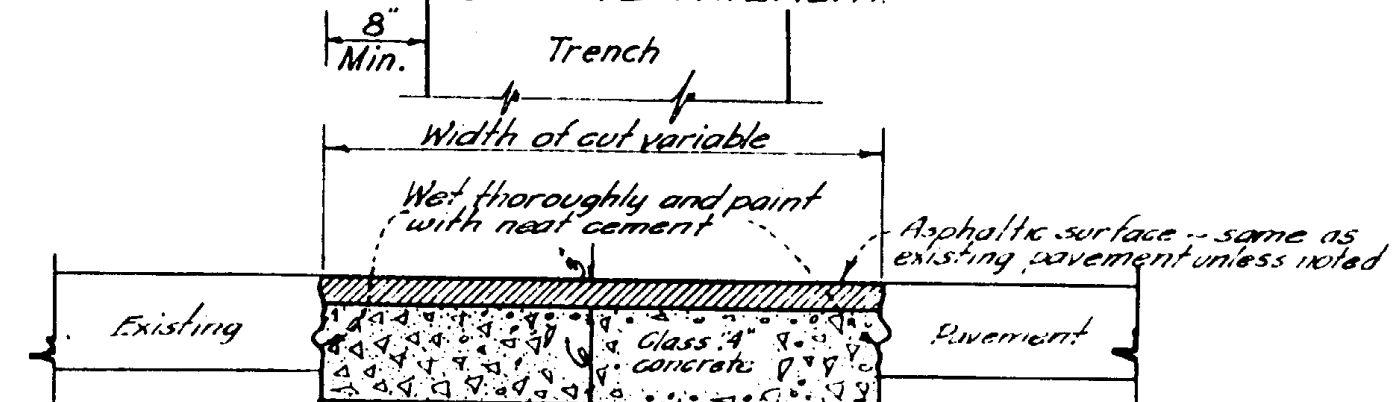
HALF PLAN ASPHALT PAVEMENT HALF PLAN CONCRETE PAVEMENT



CUT FOR MANHOLE ~ FRAME & COVER NO. 2.



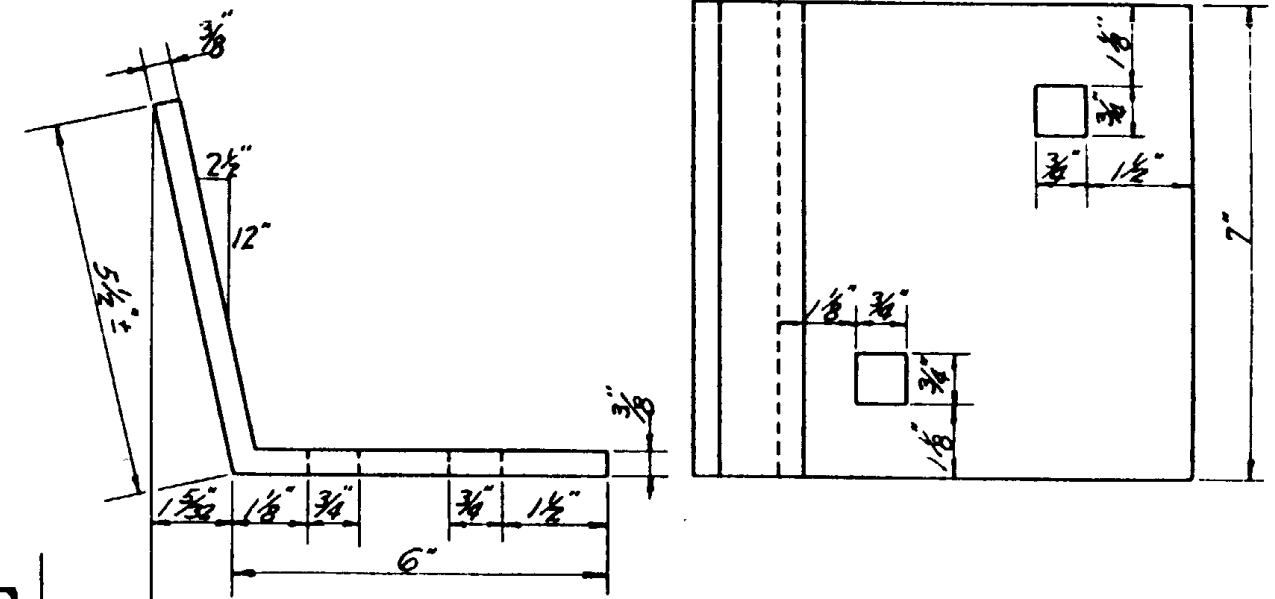
CUT IN CONCRETE PAVEMENT.



CUT IN ASPHALT PAVEMENT

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

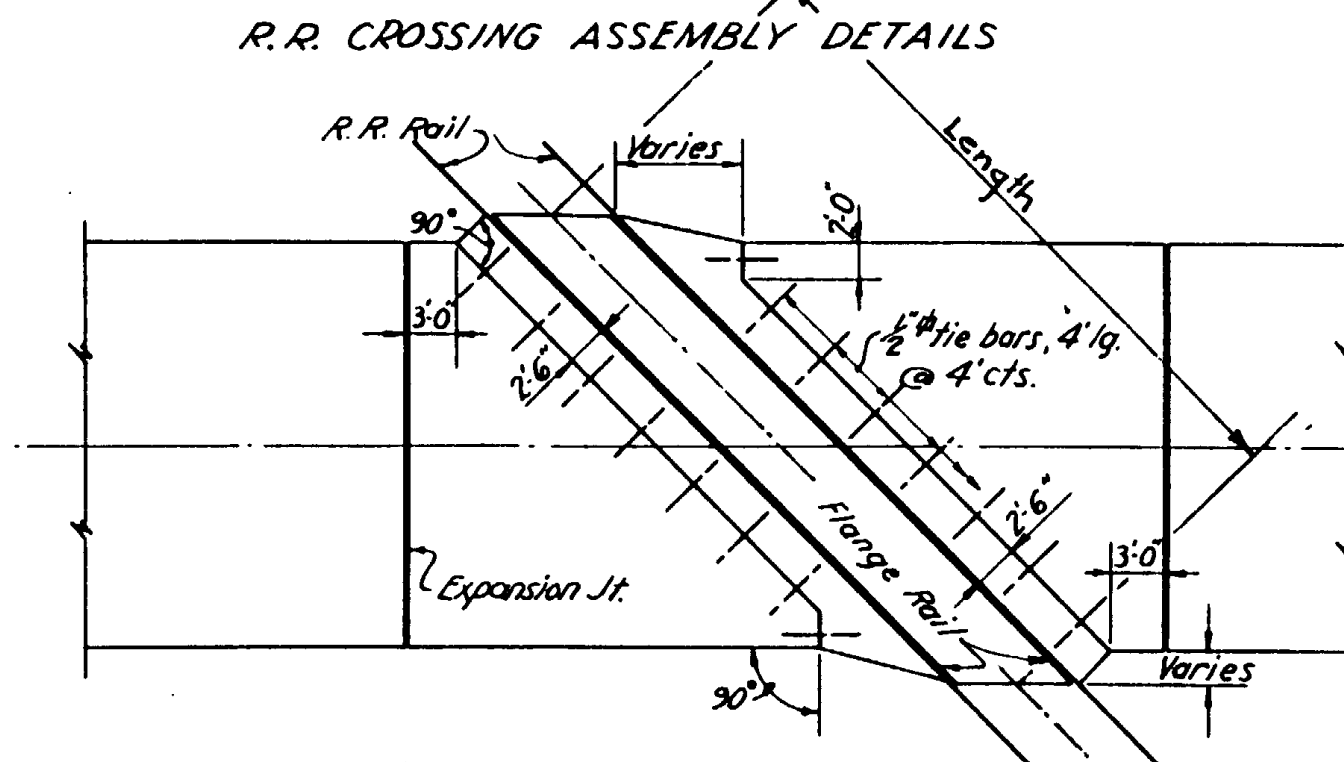
ARIZONA HIGHWAY DEPARTMENT PLANS DIVISION		REV. 3-20-50
PAVEMENT CUT REPLACEMENTS		
DRAWN BY	O.A. OCT 1935	DRAWING NO. C-34
TRACED BY	K.S. JULY 1938	
CHECKED BY	H.W. JULY 1938	
APPROVED BY	E. J. Miller	



Notes ~

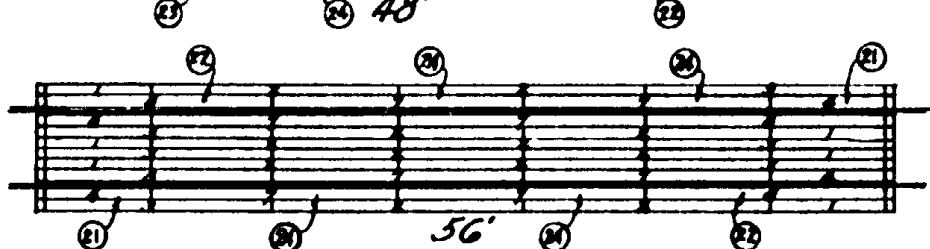
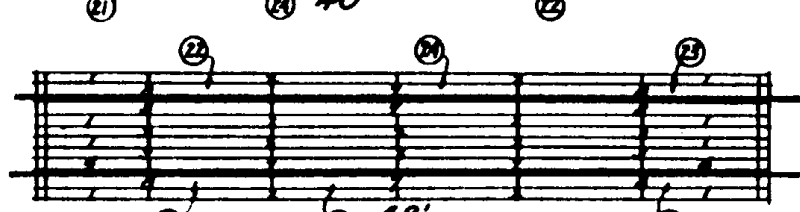
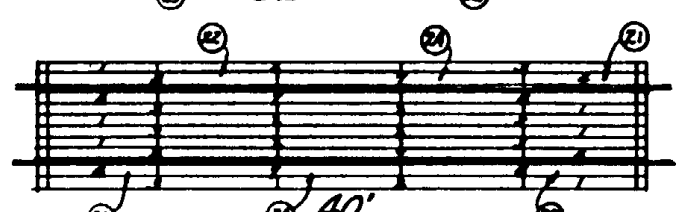
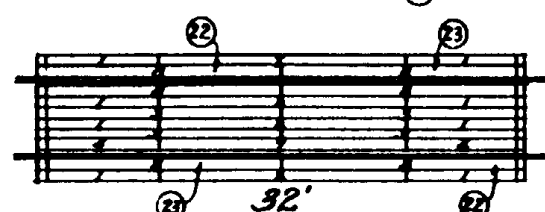
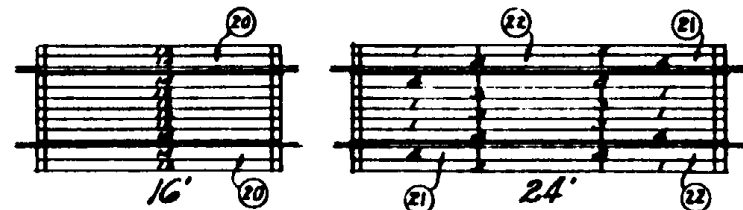
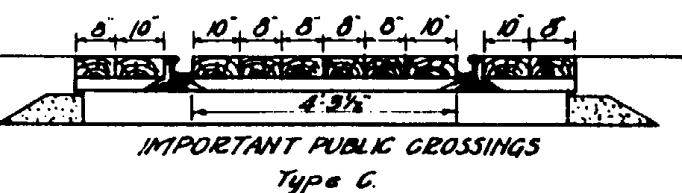
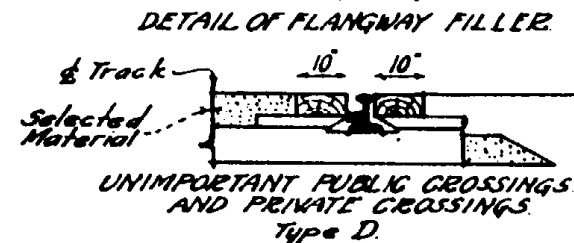
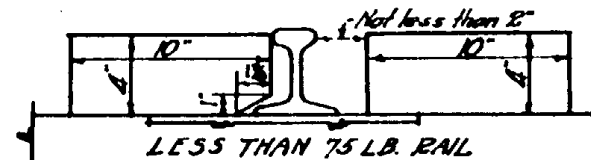
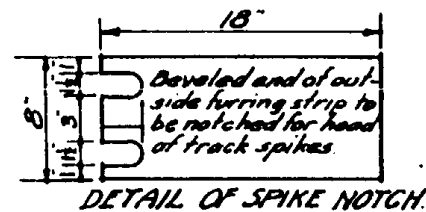
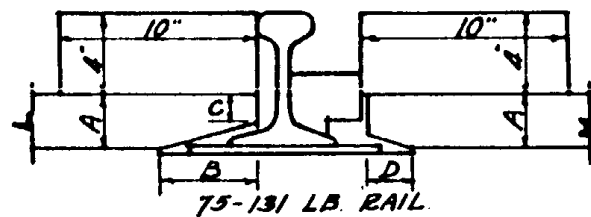
Standard R.R. Crossing consists of two flange rails and necessary number of brace plates and brace nuts. Welded nut and brace plate to be placed every third tie. Construction and assembly details as shown. Length of R.R. Crossing is noted on plans in lineal feet.

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



SKewed R.R. Crossing for Concrete Pavement

ARIZONA HIGHWAY DEPARTMENT PLANS DIVISION		REV.
RAILROAD CROSSING		
DRAWN		DRAWING NO. C-35
TRACED	GH Nov. 1945	
CHECKED	<i>[Signature]</i>	
APPROVED	<i>[Signature]</i>	
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	3/4"	3"	1/4"	1"	63	91	119	147	175	204
85 "	1"	4"	1/4"	1"	78	114	149	185	220	255
90 "	1 1/2"	4"	3/8"	1"	125	182	238	295	352	409
110 "	2 1/4"	5"	1"	2"	156	227	298	369	440	510
112 & 130 lb Rail	2 3/4"	5"	1 1/4"	2"	187	272	357	442	527	612
131 lb Rail	3 1/4"	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	8'	16'	24'
75 lb Rail	3/4"	3"	1/4"	1"	26	47	68
85 "	1"	4"	1/4"	1"	32	59	85
90 "	1 1/2"	4"	3/8"	1"	51	94	136
110 "	2 1/4"	5"	1"	2"	64	117	170
112 & 130 lb Rail	2 3/4"	5"	1 1/4"	2"	77	141	204
131 lb Rail	3 1/4"	5"	1 1/2"	2"	90	164	238

For lengths and number required see BILL OF MATERIAL.

Plank No.		BILL OF MATERIAL										TYPE D			
		TYPE C										UNIMPORTANT PUBLIC			
		IMPORTANT PUBLIC CROSSINGS										AND PRIVATE CROSSINGS			
		75-131 lb Rail					Less than 75 lb Rail								
		16'	24'	32'	40'	48'	56'	16'	24'	32'	40'	48'	56'		
1	4"x8"x8'-0" one end beveled	6	8	6	8	6	6	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		
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								
Pl. B.M. Planks and Flangeway Filler		601	901	1202	1502	1802	2103	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 1/2 x 12 Lag Screws (6.8 lb ea) (90 lb rail) "		88 1/2	143	187	231 1/2	275 1/2	320								
3/4 x 12 Bolt Spikes (53 lb ea) (and over) "		69	111 1/2	146	180 1/2	215	249 1/2								
1 1/2 x 10" lag screws (54 lb ea) (less than) "		70 1/4	113 1/4	148 1/4	183 1/4	218 1/4	253 1/4	70 1/4	113 1/4	148 1/4	183 1/4	218 1/4	253 1/4		
3/4 x 10" bolt spikes (44 lb ea) (90 lb rail) "		57 1/4	92 1/4	121	150	179 1/4	207 1/4	57 1/4	92 1/4	121	150	179 1/4	207 1/4		
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 bolt 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. Encircled numbers on plan sketches denote base cut planks for rails less than 75 lb.
 - It is desirable to have the track in good condition before crossings are installed. Use of sawed ties is preferable.
 - Holes for lag screws, and bolt spikes (boring for bolt spikes optional with Engineer) to be bored in the field, 1/2" diameter for lag screws and 3/4" diameter for bolt spikes. Depth of boring for lag screws shall be 8" for 12" lag screws and 6" for 10" lag screws. For bolt spikes, holes shall be bored through plank and furring strip only.
 - Boring 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
PLANS DIVISION

STANDARD RAILROAD
PLANKED CROSSINGS

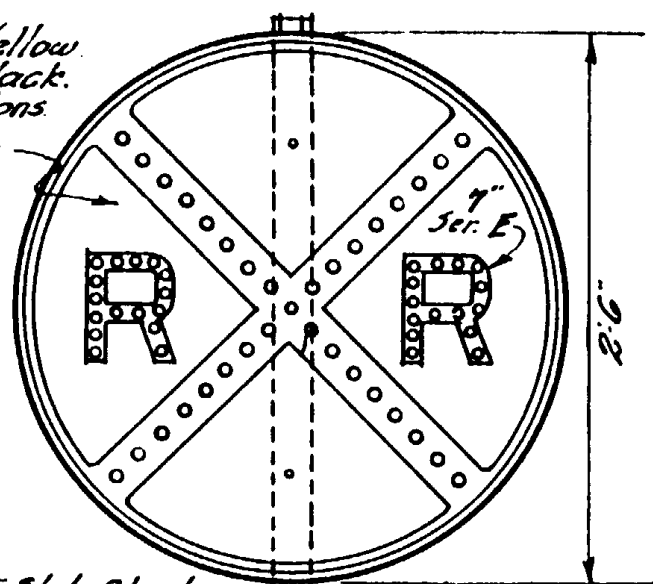
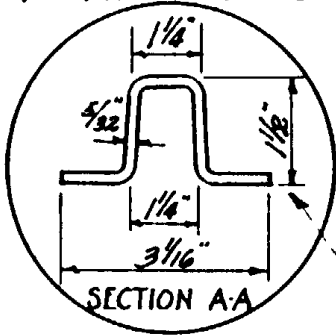
DRAWN BY: W.M.D. JAN. 1936
TRACED BY: K.S. JULY 1938
CHECKED BY: H.W. JULY 1938
APPROVED BY: E.C. Miller
DRAWING NO. C-36

This drawing taken from A.T. & S.F. drawing No. 56-50

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



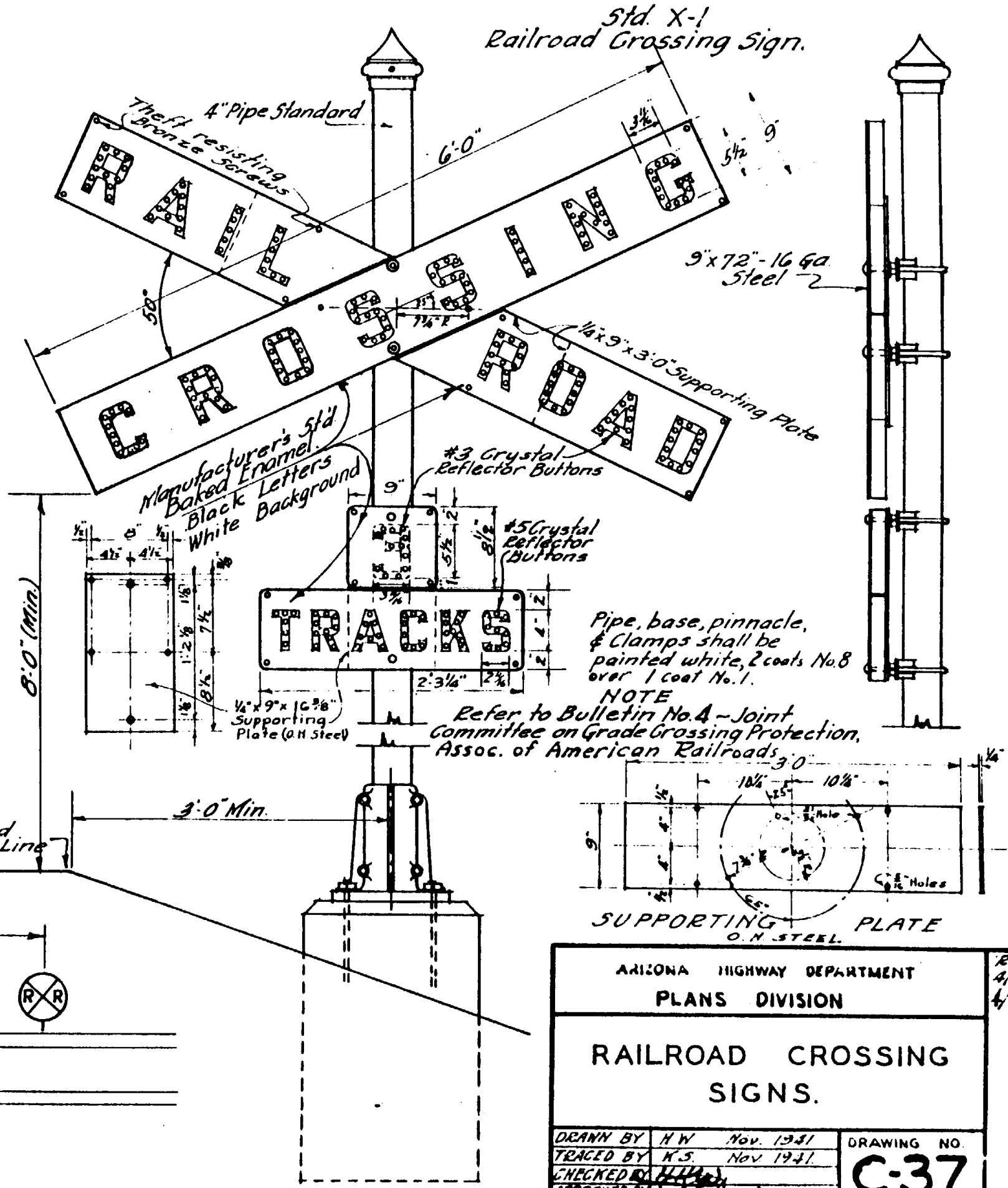
Std. Steel
Sign Post

Finished
Shoulder Line

Min. 350'

Varies (3' Min)

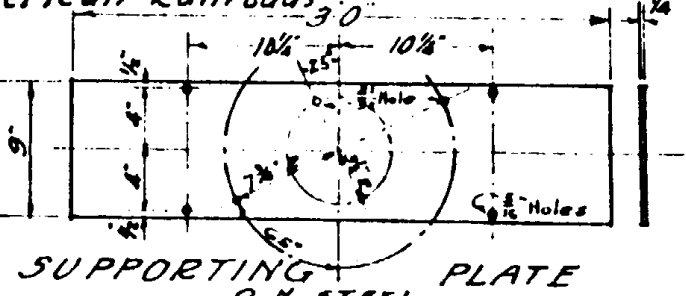
Shoulder Line



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



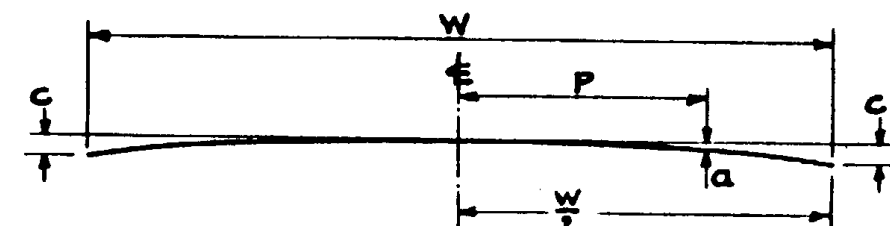
ARIZONA HIGHWAY DEPARTMENT PLANS DIVISION			Rev. 4/47 4/7/50
RAILROAD CROSSING SIGNS.			
DRAWN BY	H.W.	Nov. 1941	DRAWING NO. C-37
TRACED BY	H.S.	Nov. 1941	
CHECKED BY	H.W.		
APPROVED BY Eng. of Plans			

REV.
3-20-54

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

P →	1'	2'	3'	4'	5'	6'	7'	8'	9'	10'	11'	12'	13'	14'	15'	16'	17'	18'	19'	20'	21'	22'	23'	24'	25'	26'	27'	28'	29'	30'	31'	32'	33'	34'	35'	36'	37'	38'	39'	40'	41'	42'	43'	44'	45'
90	0.05	0.20	0.44	0.79	1.23	1.78	2.42	3.16	4.00	4.94	5.96	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	5.33	6.57	7.96	9.47	11.11	12.89	14.79	16.83	19.00	21.30	23.73	26.30	28.99	31.82	34.78	37.87	41.09	44.44	47.93	51.54	55.29	59.17	63.18	67.32	71.60	76.00	80.54	85.21	90.01	94.94	C						
76	0.07	0.28	0.62	1.11	1.73	2.49	3.39	4.43	5.61	6.93	8.38	9.97	11.70	13.57	15.58	17.73	20.01	22.44	25.00	27.70	30.54	33.52	36.63	39.89	43.28	46.81	50.48	54.29	58.24	62.33	66.55	70.91	75.42	80.06	84.83	89.75	94.81	C							
74	0.07	0.29	0.66	1.17	1.83	2.63	3.58	4.67	5.92	7.30	8.83	10.52	12.34	14.32	16.44	18.70	21.11	23.67	26.37	29.22	32.21	35.35	38.64	42.07	45.65	49.38	53.25	57.27	61.43	65.74	70.20	74.80	79.55	84.44	89.48	94.67	C								
72	0.08	0.31	0.69	1.23	1.93	2.78	3.78	4.94	6.25	7.72	9.34	11.11	13.04	15.12	17.36	19.75	22.30	25.00	27.85	30.86	34.03	37.35	40.82	44.44	48.23	52.16	56.25	60.49	64.89	69.44	74.15	79.01	84.02	89.20	94.52	C									
70	0.08	0.33	0.73	1.31	2.04	2.94	4.00	5.22	6.61	8.16	9.88	11.76	13.80	16.00	18.37	20.90	23.59	26.45	29.47	32.65	36.00	39.51	43.18	47.02	51.02	55.18	59.51	64.00	68.65	73.47	78.35	83.39	88.50	93.77	C										
68	0.09	0.35	0.78	1.38	2.16	3.11	4.24	5.54	7.01	8.65	10.47	12.46	14.62	16.95	19.46	22.15	25.00	28.03	31.23	34.60	38.15	41.87	45.76	49.83	54.07	58.48	63.06	67.82	72.75	77.85	83.13	88.58	94.20	C											
66	0.09	0.37	0.83	1.47	2.29	3.30	4.50	5.87	7.43	9.18	11.10	13.21	15.51	17.99	20.65	23.49	26.52	29.78	33.18	36.71	40.47	44.41	48.54	52.86	57.35	62.03	66.90	71.94	77.17	82.59	88.18	93.97	C												
64	0.10	0.39	0.88	1.56	2.44	3.52	4.79	6.25	7.91	9.77	11.82	14.06	16.50	19.14	21.97	25.00	28.22	31.64	35.25	39.06	43.07	47.27	51.66	56.25	61.04	66.02	71.19	76.56	82.13	87.89	93.85	C													
62	0.10	0.42	0.94	1.66	2.60	3.75	5.10	6.66	8.43	10.41	12.59	14.98	17.59	20.40	23.41	26.64	30.07	33.71	37.56	41.62	45.89	50.36	55.05	59.94	65.04	70.34	75.86	81.58	87.51	93.65	C														
60	0.11	0.44	1.00	1.78	2.78	4.00	5.44	7.11	9.00	11.11	13.44	16.00	18.78	21.78	25.00	28.44	32.11	36.00	40.11	44.44	49.00	53.78	58.78	64.00	69.44	75.11	81.00	87.11	93.44	C															
58	0.12	0.48	1.07	1.90	2.97	4.28	5.83	7.61	9.63	11.89	14.39	17.12	20.10	23.31	26.75	30.44	34.36	38.52	42.93	47.56	52.44	57.55	62.90	68.49	74.32	80.38	86.68	93.22	C																
56	0.13	0.51	1.15	2.04	3.19	4.59	6.25	8.16	10.33	12.76	15.43	18.37	21.56	25.00	28.70	32.65	36.86	41.33	46.05	51.02	56.25	61.73	67.47	73.47	79.72	86.22	92.98	C																	
54	0.14	0.55	1.23	2.19	3.43	4.94	6.72	8.78	11.11	13.72	16.60	19.75	23.18	26.89	30.86	35.12	39.64	44.44	49.52	54.87	60.49	66.39	72.57	79.01	85.73	92.73	C																		
52	0.15	0.59	1.33	2.37	3.70	5.33	7.25	9.47	11.98	14.79	17.90	21.30	25.00	28.99	33.28	37.87	42.75	47.93	53.40	59.17	65.24	71.60	78.25	85.21	92.46	C																			
50	0.16	0.64	1.44	2.56	4.00	5.76	7.84	10.24	12.96	16.00	19.36	23.04	27.04	31.36	36.00	40.96	46.24	51.84	57.76	64.00	70.56	77.44	84.64	92.16	C																				
48	0.17	0.69	1.56	2.78	4.34	6.25	8.51	11.11	14.06	17.36	21.00	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	8.65	12.46	16.95	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	19.46	25.00	31.64	39.06	47.27	56.25	66.02	76.56	87.89	C																													
30	0.44	1.78	4.00	7.11	11.11	16.00	21.78	28.44	36.00	44.44	53.78	64.00	75.11	87.11	C																														
28	0.51	2.04	4.59	8.16	12.76	18.37	25.00	32.65	41.33	51.02	61.73	73.47	86.22	C																															
26	0.59	2.37	5.33	9.47																																									

FORMULA



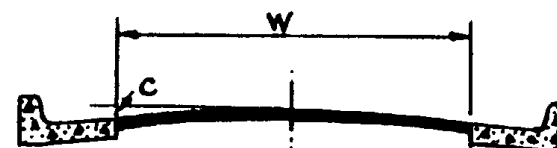
$$\frac{a}{C} = \frac{P^2}{\left(\frac{W}{2}\right)^2} \quad \text{OR} \quad a = \frac{CP^2}{\left(\frac{W}{2}\right)^2}$$

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 $0.45 \times 0.16 = 0.072$ FT.



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

ARIZONA STATE HIGHWAY DEPARTMENT
PLANS DIVISION

PARABOLIC CROWN
FORMULA AND TABLE

CALCULATED AND DRAWN JUNE 1941
BY LESLIE McDUGALL - HIGHWAY DESIGNER

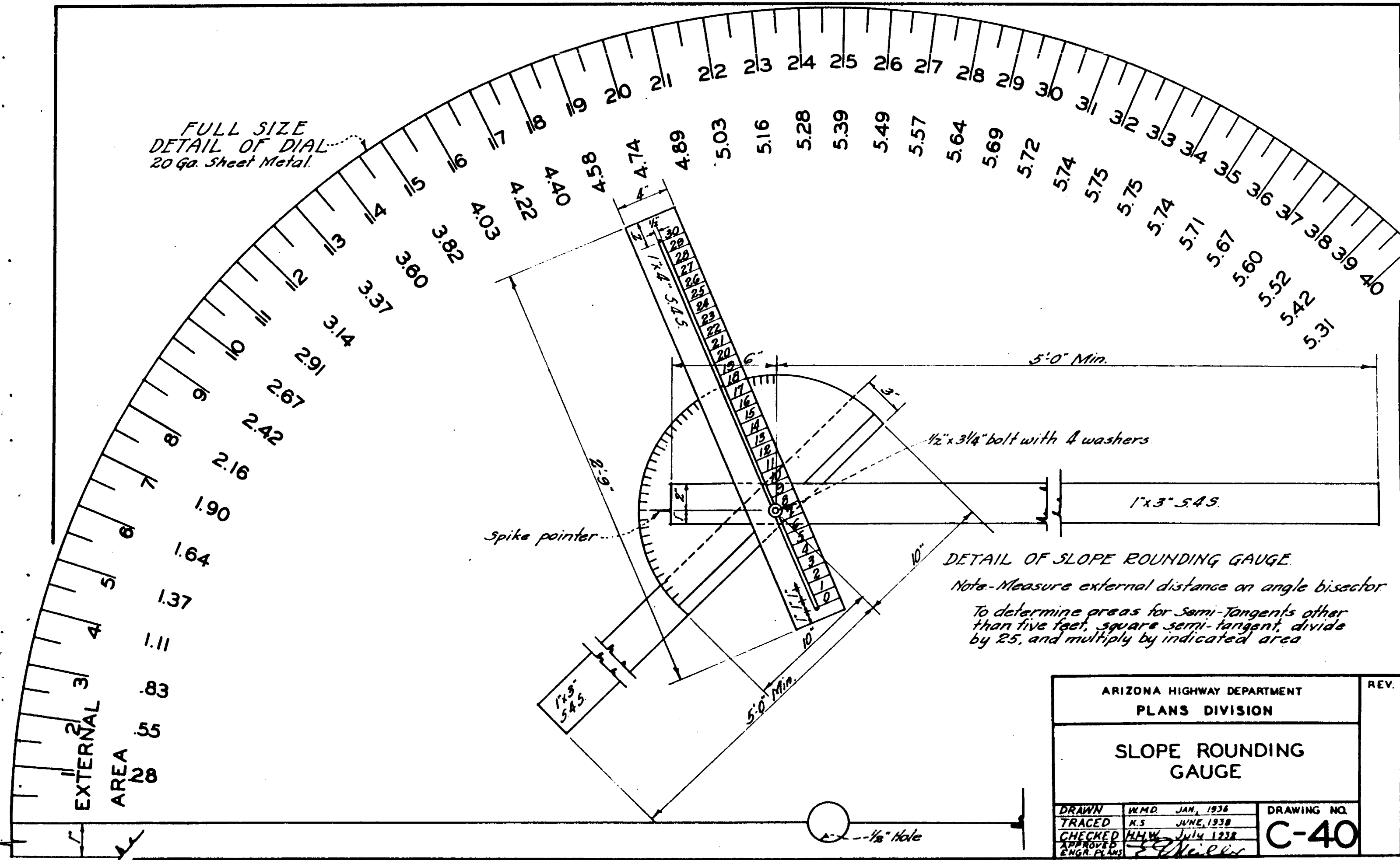
STANDARD DRWG. NO.

CHECKED BY

APPROVED BY
ENGINEER OF PLANS

C-39

FULL SIZE
DETAIL OF DIAL
20 Ga. Sheet Metal.



DETAIL OF SLOPE ROUNDING GAUGE

Note.-Measure external distance on angle bisector

To determine areas for semi-tangents other than five feet, square semi-tangent, divide by 25, and multiply by indicated area.

ARIZONA HIGHWAY DEPARTMENT
PLANS DIVISION

SLOPE ROUNDING
GAUGE

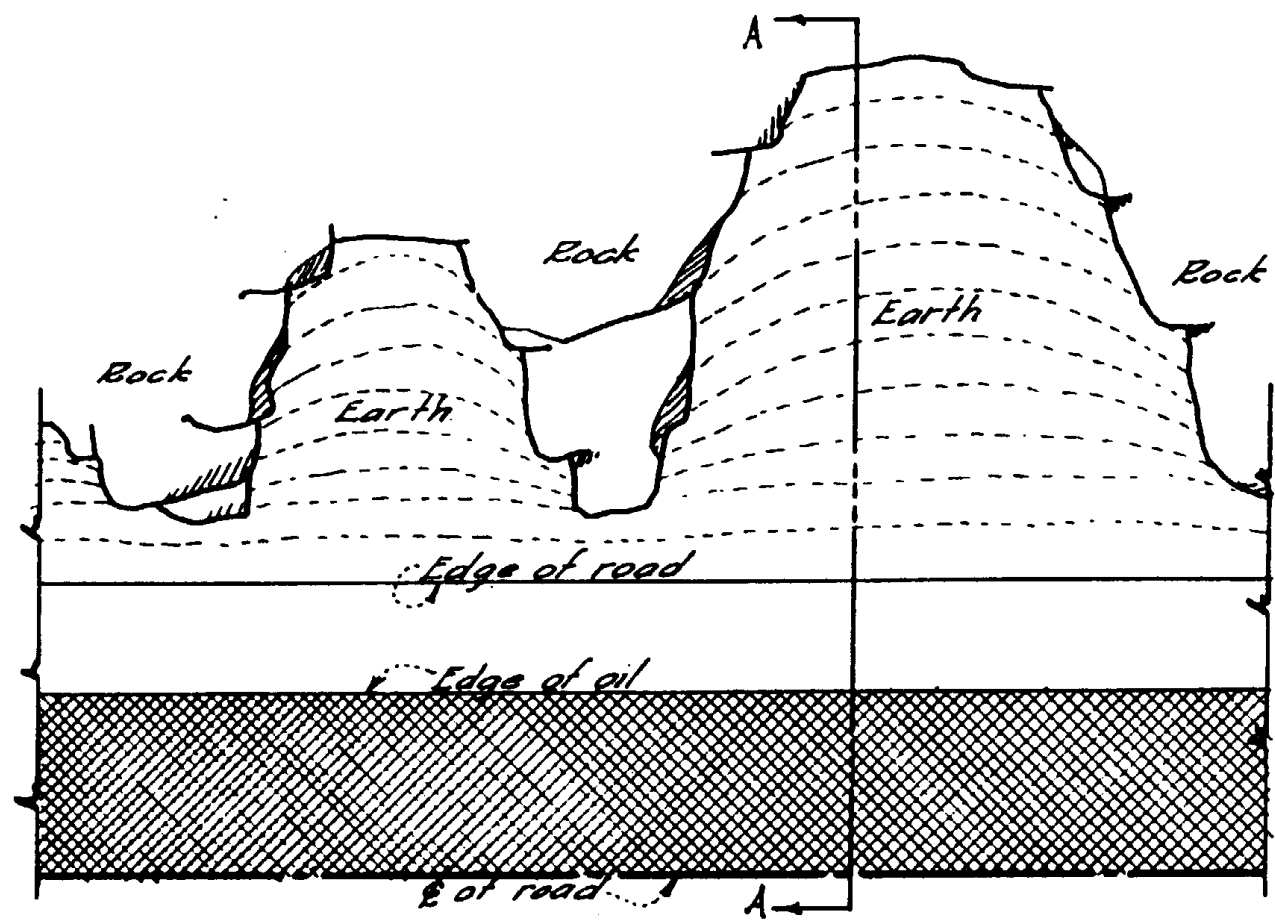
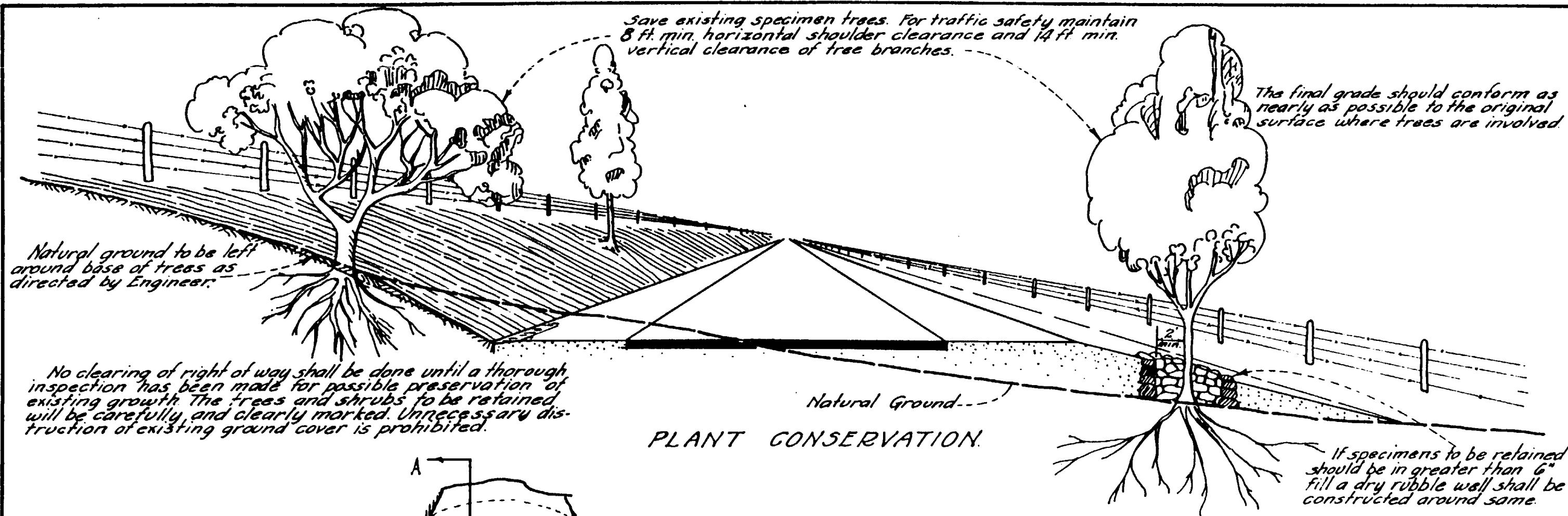
DRAWN WMD JAN, 1936
TRACED K.S. JUNE, 1938
CHECKED H.H.W. JULY 1938
APPROVED ENGR. PLANS

DRAWING NO.

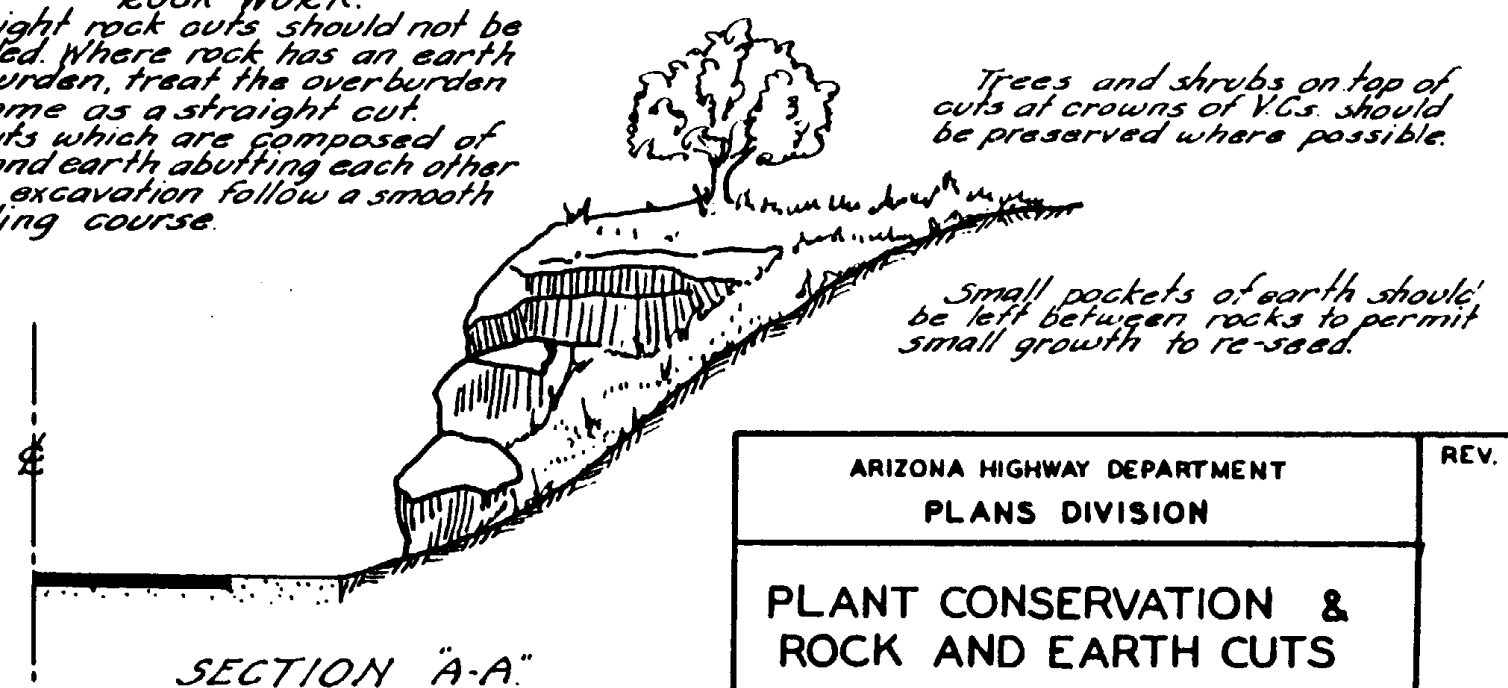
C-40

REV.

1/2" Hole

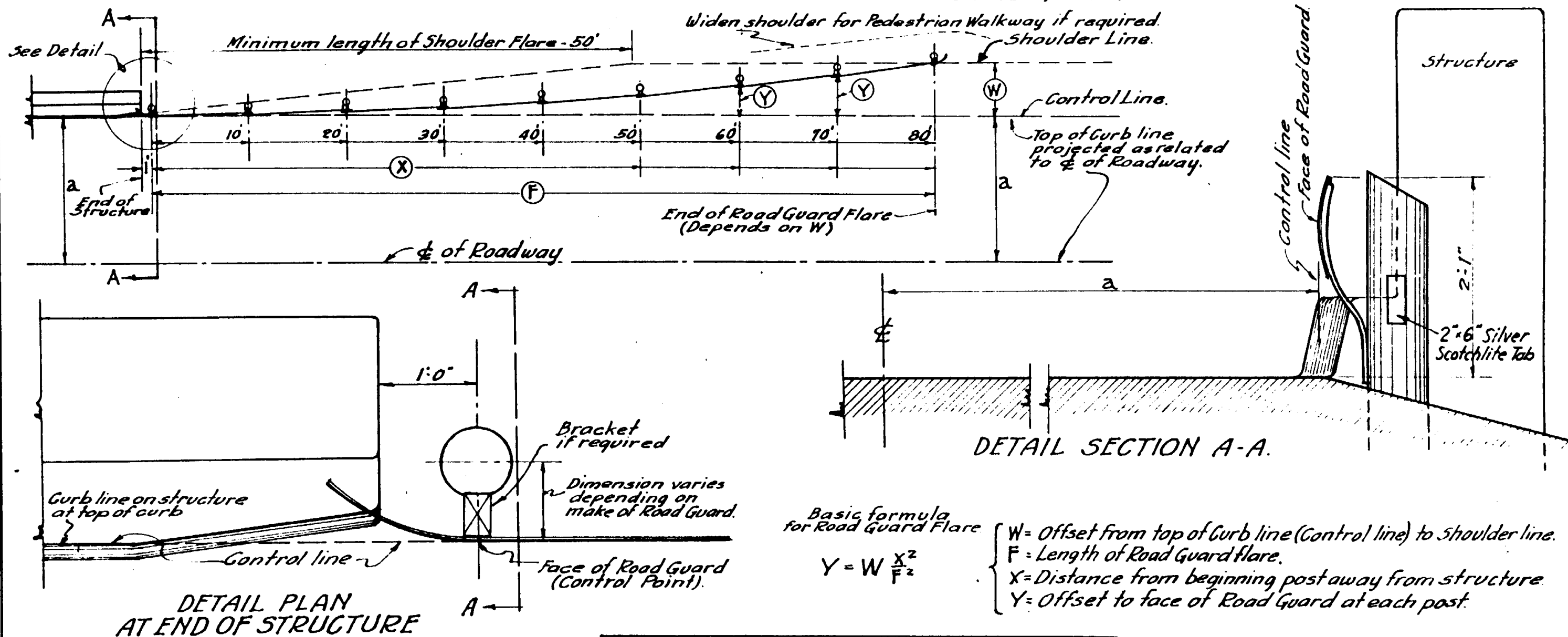


ROCK WORK.
 Straight rock cuts should not be rounded. Where rock has an earth overburden, treat the overburden the same as a straight cut.
 In cuts which are composed of rock and earth abutting each other let the excavation follow a smooth rounding course.



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

TYPICAL INSTALLATION PLAN OF ROAD GUARD AT BRIDGE APPROACHES



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.

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

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