

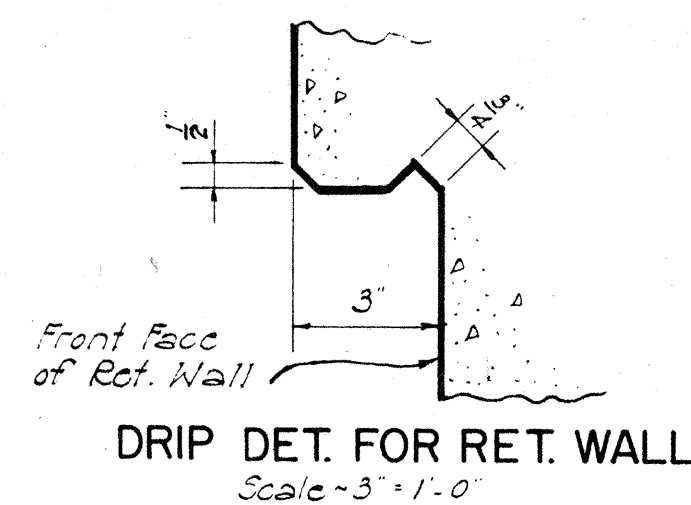
NAME DATE

Use correct name of bridge
LEFT HAND SIDE

Date of year built
RIGHT HAND SIDE

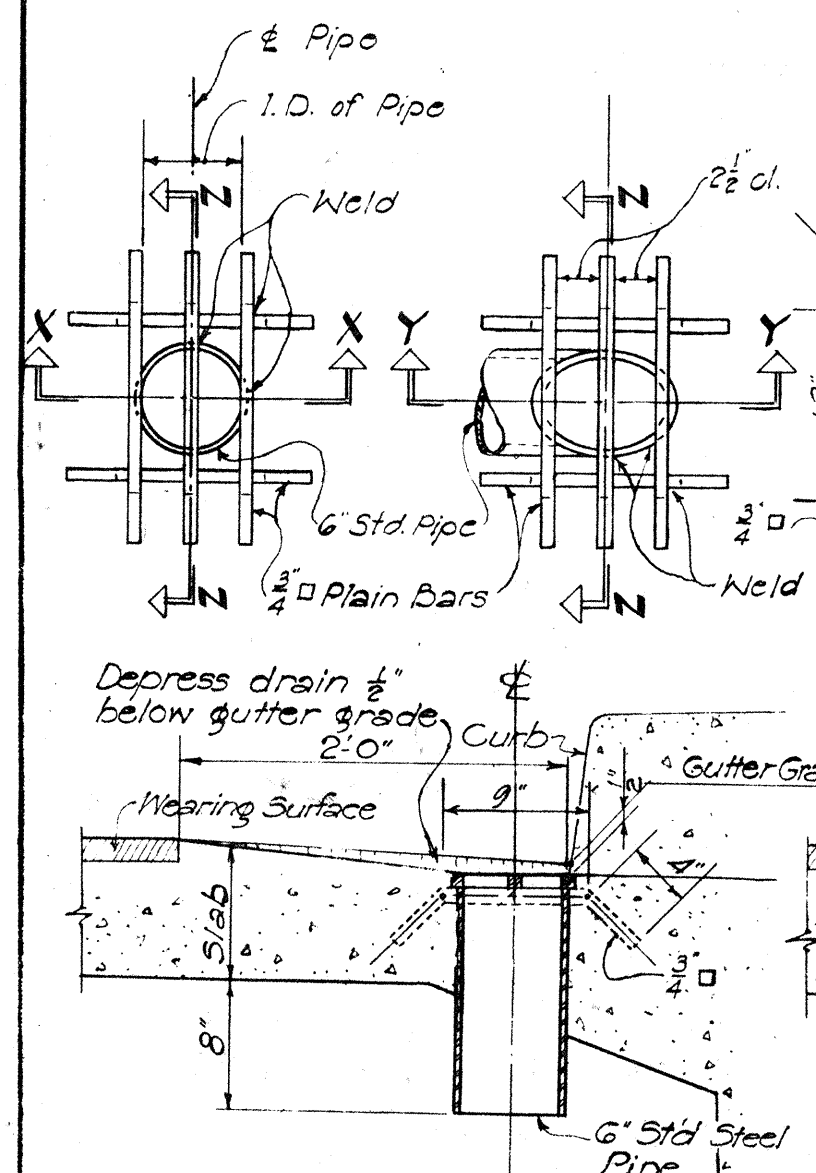
DETAIL OF LETTERS AND FIGURES AT BOTH APPROACHES

NOTE: Name of bridge to be placed in left end post panels and date in right post panels on entering bridge using modified block letters 3" in height. In case of stream crossings use name of stream for name of bridge. For all others use name as designated by the Engineer.



DRIP DET. FOR RET. WALL
Scale: 3/4" = 1'-0"

END POST GROOVE DET.
Scale: 3/4" = 1'-0"



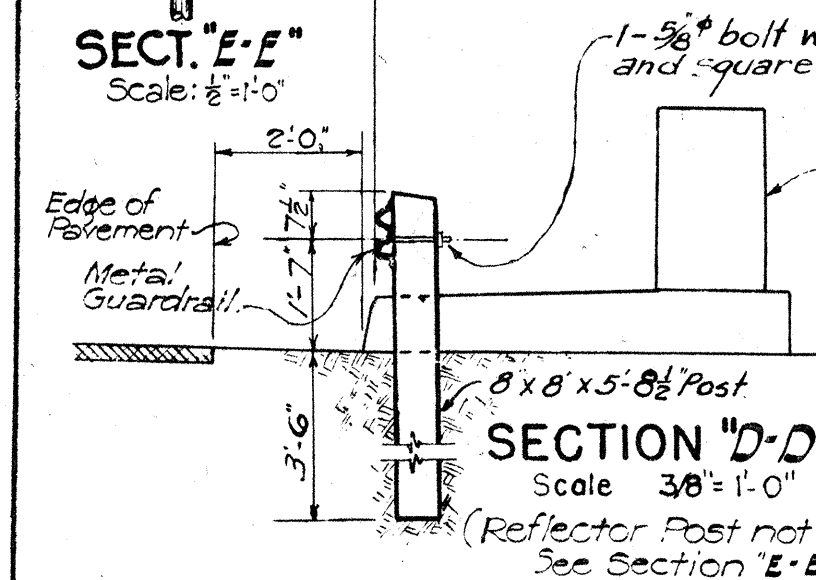
SECTION "X-X"

DRAINAGE DETAIL

Scale: 1" = 1'-0"

SECTION "Y-Y"

NOTE: See REGULATORY & WARNING Signs Sheet for details of W-42, W-43, and railing posts. See Std. Details Sheet for reinforcement of conc. posts.



SECT. "E-E"

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

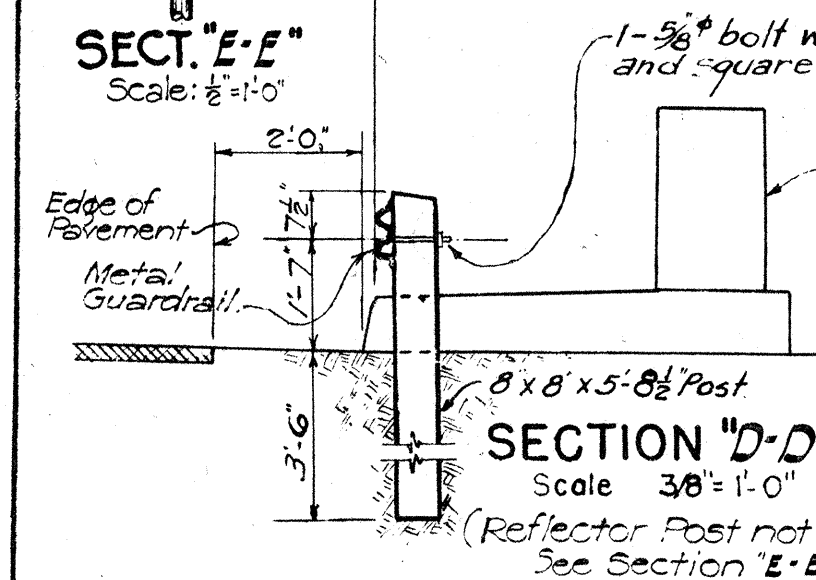
SECTION "D-D"

Scale: 3/8" = 1'-0"

(Reflector Post not shown)
See Section "E-E"

SECTION "Y-Y"

NOTE: See REGULATORY & WARNING Signs Sheet for details of W-42, W-43, and railing posts. See Std. Details Sheet for reinforcement of conc. posts.



SECT. "E-E"

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

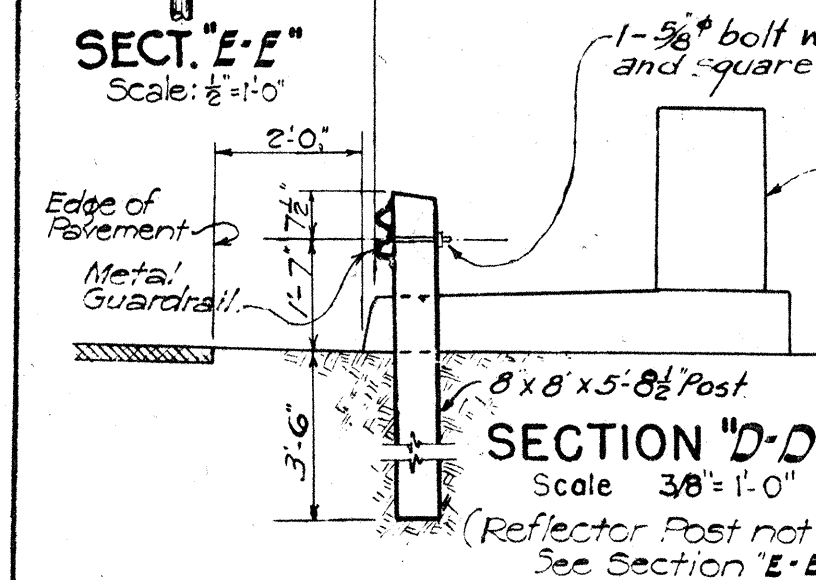
SECTION "D-D"

Scale: 3/8" = 1'-0"

(Reflector Post not shown)
See Section "E-E"

SECTION "Y-Y"

NOTE: See REGULATORY & WARNING Signs Sheet for details of W-42, W-43, and railing posts. See Std. Details Sheet for reinforcement of conc. posts.



SECT. "E-E"

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

SECTION "D-D"

Scale: 3/8" = 1'-0"

(Reflector Post not shown)
See Section "E-E"

GENERAL NOTES

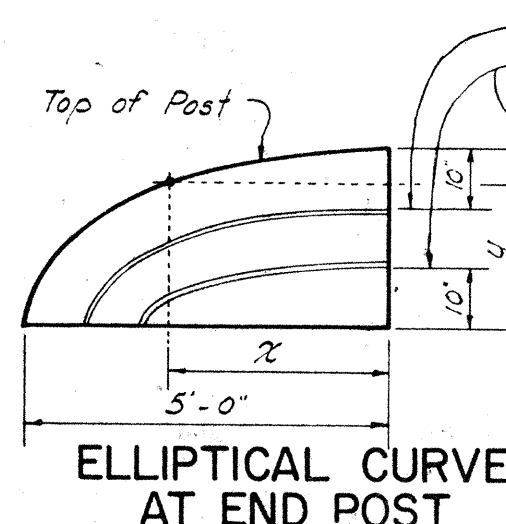
CONCRETE: Class of concrete to be used in different parts of the structure are as noted on plans.
REINFORCING STEEL: All reinforcing steel shall be Billet Steel Bars A.S.T.M. A15 intermediate grade.
Steel shall be made by the open-hearth or Electric Furnace Process. Mill certificate shall be required.

Deformations shall conform to A.S.T.M. A305.
Splicing of reinforcing other than in main deck slab, girder and frame bars shall be done as shown in above sketch except where shown otherwise. Splices are to be staggered. Splices in main girder and frame bars are permitted only in bars exceeding 60'-0" in length at points to be indicated by the Engineer. These splices to be electrically welded according to detail and specifications. No allowance will be made in the quantities for extra weight of steel required for splices not shown on the plans.
Minimum spacing between parallel bars shall be 2 1/2 times the diameter of the bars, but in no case shall the clear distance between the bars be less than 1 1/2 times the maximum size of the coarse aggregate.
Minimum covering, measured from the surface of the concrete to the face of any reinforcing bar, shall be not less than 2 inches except in slabs where the minimum covering shall be 1 1/2 inch. In the footings of abutments and retaining walls and in piers the minimum covering shall be 3 inches. In work exposed to the action of sea water the minimum covering shall be 4 inches except in precast concrete piles where a minimum of 3" may be used.
All dimensions relating to reinforcing are to centers of bars unless otherwise noted.

CONSTRUCTION JOINTS: All construction joints to have surface roughened and 1:2 cement grout applied immediately before the second pour. Construction joints to be located at places indicated in the plans. See Sec. 46.3.F(3) of the "Standard Specifications."

ELLIPSE COORDINATES

Top of Post	X	0	1'-0"	1'-6"	2'-0"	2'-6"	3'-0"	3'-6"	4'-0"	4'-6"	4'-10"	5'-0"
	Y	0	2'-6"	2'-5 1/2"	2'-4 1/2"	2'-3 1/2"	2'-2"	2'-0"	1'-9 1/2"	1'-6"	1'-3 1/2"	1'-0"
Top Line of Upper Groove	X	0	6"	1'-0"	1'-6"	2'-0"	2'-6"	3'-0"	3'-6"	4'-0"	4'-6"	4'-10"
	Y	0	1'-8"	1'-7 1/2"	1'-6 1/2"	1'-5 1/2"	1'-4"	1'-3 1/2"	1'-2"	1'-1 1/2"	1'-0"	0
Bot. Line of Lower Groove	X	0	6"	1'-0"	1'-6"	2'-0"	2'-6"	3'-0"	3'-6"	4'-0"	4'-6"	4'-10"
	Y	0	10"	9 1/2"	9"	8 1/2"	8"	7 1/2"	7"	6 1/2"	6"	0



GUARDRAIL OFFSET

X	W=3'	W=4'	W=5'	W=6'	W=7'	W=8'
12.5	0.19	0.16	0.14	0.12	0.09	0.08
25.0	0.75	0.64	0.55	0.49	0.35	0.32
37.5	1.69	1.44	1.25	1.10	0.78	0.72
50.0	3.00	2.56	2.22	1.96	1.38	1.28
62.5		4.00	3.47	3.06	2.16	2.00
75.0			5.00	4.41	3.11	2.88
87.5				6.00	4.23	3.96
100.0					5.53	5.12
112.5					7.00	6.48
125.0						8.00

W = Guardrail flare
X = Distance from post at bridge to offset points
Y = Guardrail flare offset

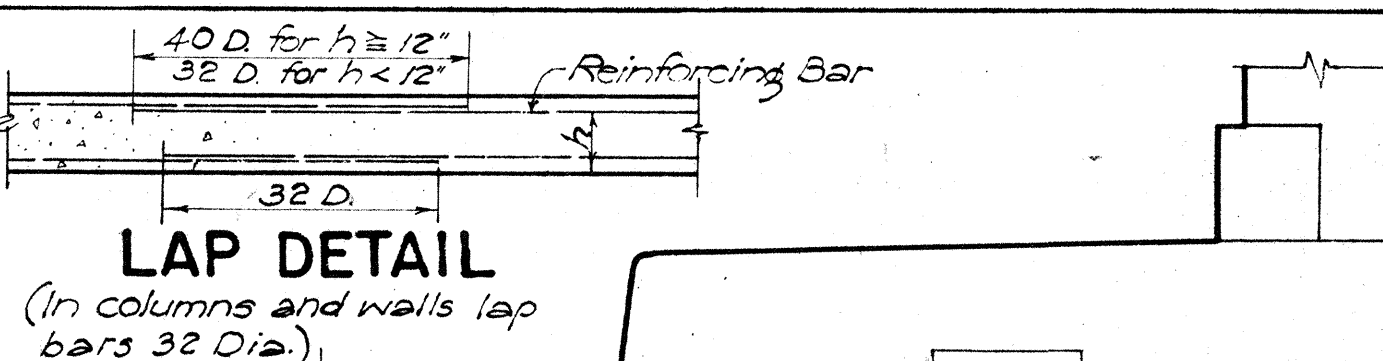
NOTE: See REGULATORY & WARNING Signs Sheet for details of W-42, W-43, and railing posts. See Std. Details Sheet for reinforcement of conc. posts.

8' x 8' x 5'-8 1/2" Post
See Proposal Schedule for material.

Shoulder Line?

12'-6" Spacing for stakeout of guardrail flare (Not for location of posts)

PLAN - METAL GUARDRAIL FLARE
Scale: 1/8" = 1'-0"



LAP DETAIL

(In columns and walls lap bars 32 Dia.)

Provide opening of sufficient size to insert head of bolt.

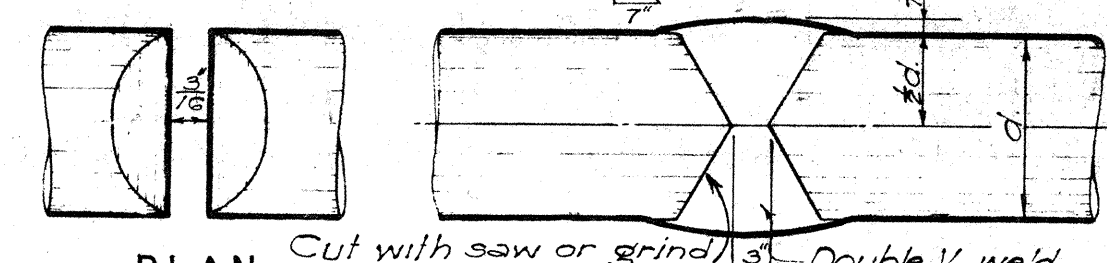
SECTION "G-G"

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

JOINT FILLER: Joint filler, when called for in plans, shall be incidental to concrete and will not be paid for separately.

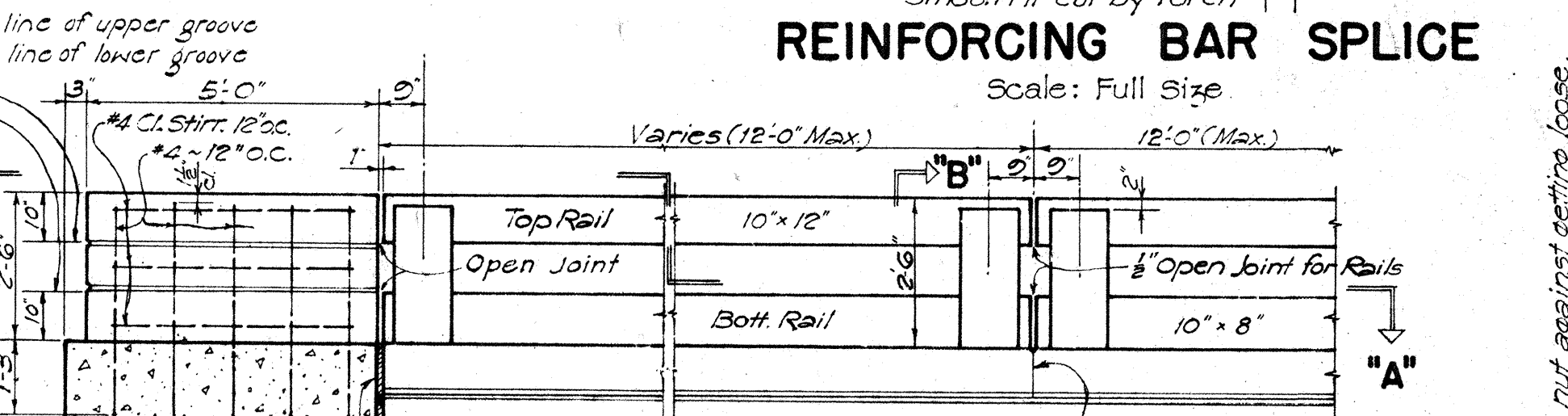
DETAIL OF PIPE HANGERS AND INSERTS

NOTE: Carbon content of reinforcing bars for welding shall not be over 0.40%. Low hydrogen electrodes E7015 or E7018 shall be used with preheat and interpass temperature not less than 200°F.



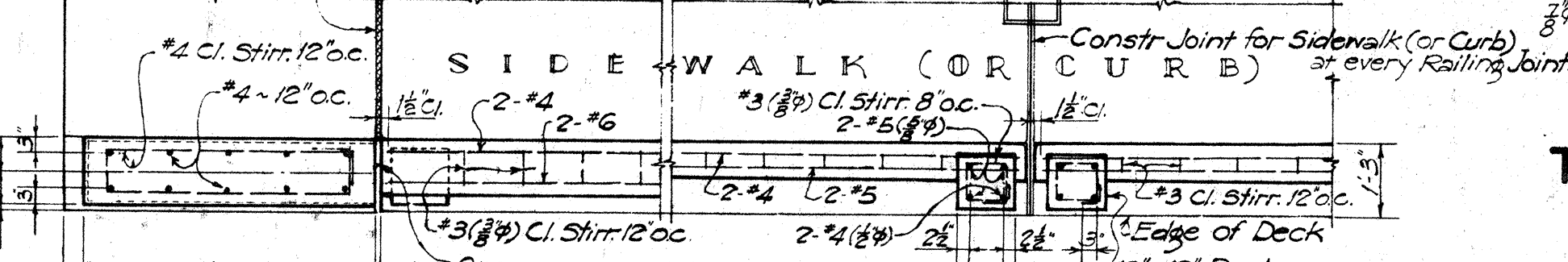
REINFORCING BAR SPLICE

Scale: Full Size



"ELEVATION" RAILING AND END POST DETAIL

Scale: 3/8" = 1'-0"



PLAN "A-A"

TOP RAIL - Bottom forms for top rails shall be kept in place a minimum of 14 days from date of pour.

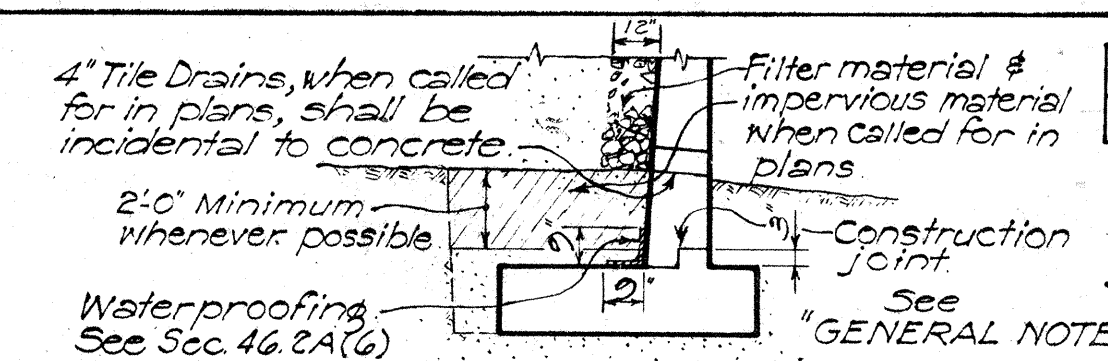
Widen for pedestrian walkway when required.

Edge of Pavement

12'-6" Spacing for stakeout of guardrail flare (Not for location of posts)

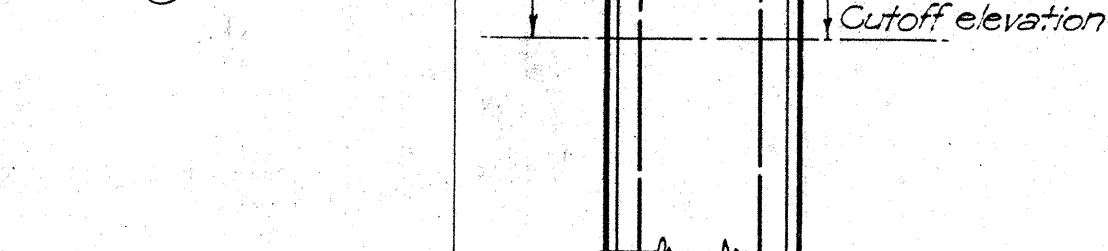
Edge of Pavement

PLAN - METAL GUARDRAIL FLARE
Scale: 1/8" = 1'-0"



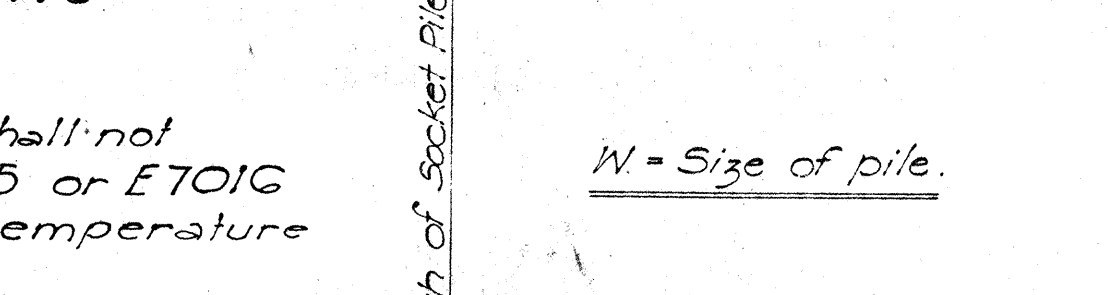
CONSTRUCTION JOINT, WATERPROOFING AND WEEPHOLES.

NOTE: Inserts, bolts, plates, nuts & washers to be Bronze conforming to A.S.T.M. Designation B22 and shall be class "D" grade.

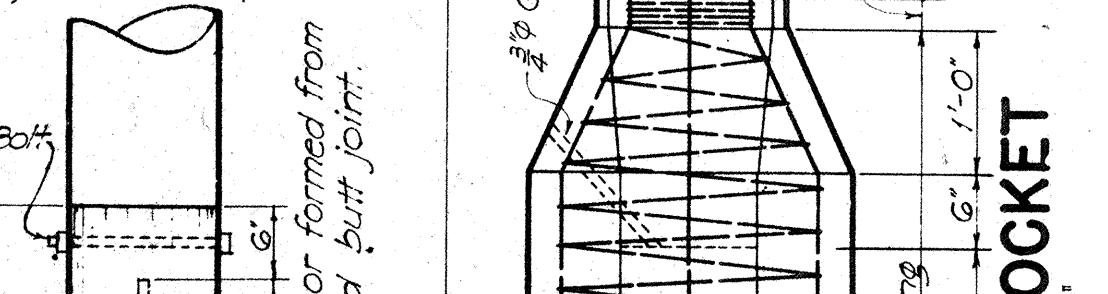


PILE CUTOFF

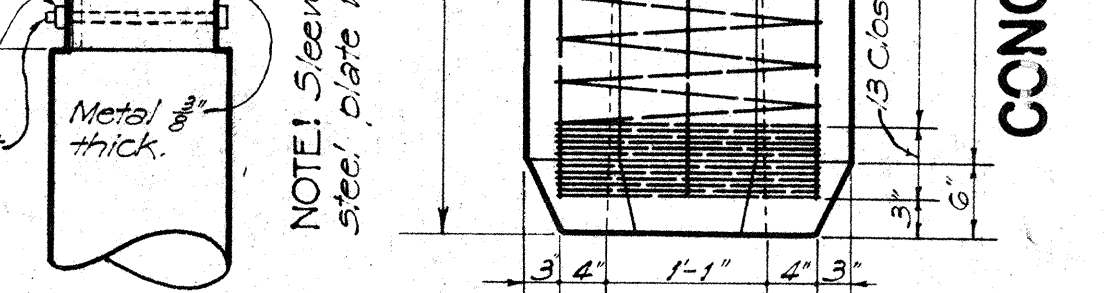
NOTE: Contractor to take proper precautions to prevent the concrete from flowing into the opening of the insert.



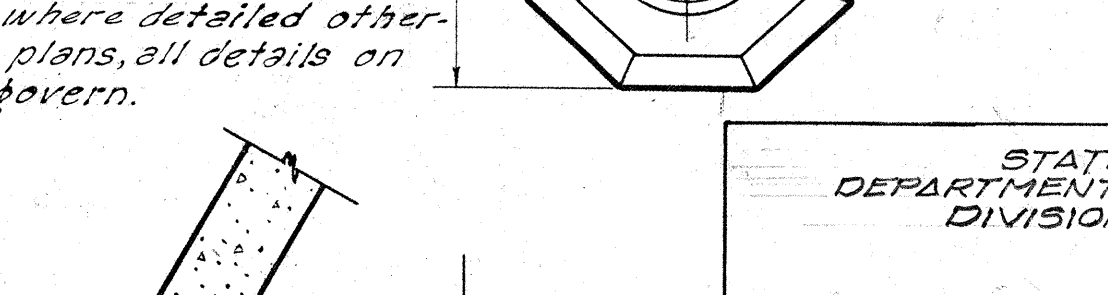
NOTE: Sleeve may be pipe or formed from steel plate with arc welded butt joint.



NOTE: Sleeve may be pipe or formed from steel plate with arc welded butt joint.



NOTE: Sleeve may be pipe or formed from steel plate with arc welded butt joint.



NOTE: Sleeve may be pipe or formed from steel plate with arc welded butt joint.

REV.	DATE	BY	CHKD.	REASON
1	1961	43		

STATE OF HAWAII
DEPARTMENT OF TRANSPORTATION
DIVISION OF HIGHWAYS

STANDARD BRIDGE DETAILS

Scales as noted

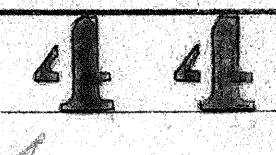
APPROVED BY: _____

DIRECTOR

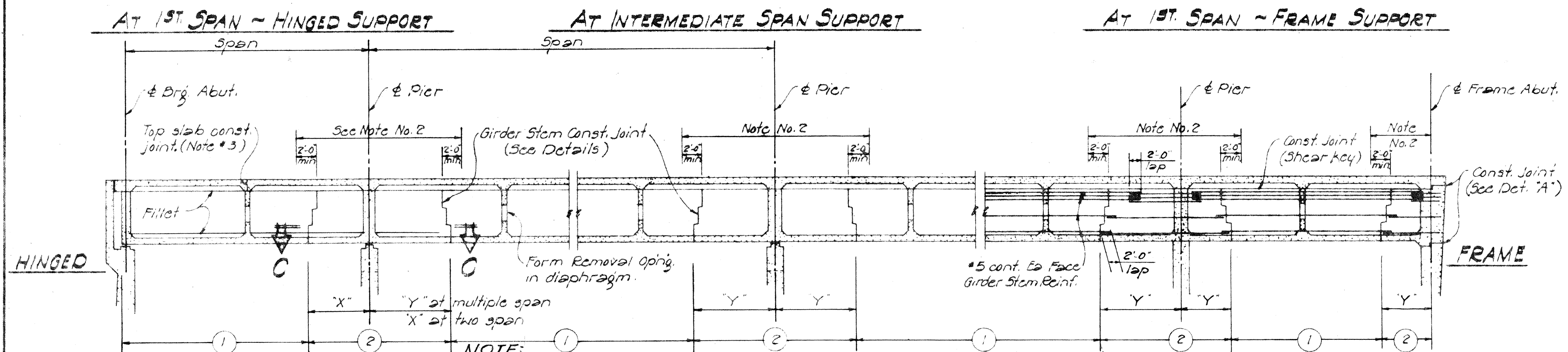
DATE: Aug. 26, 1959

SHEET NO. OF SHEETS

43

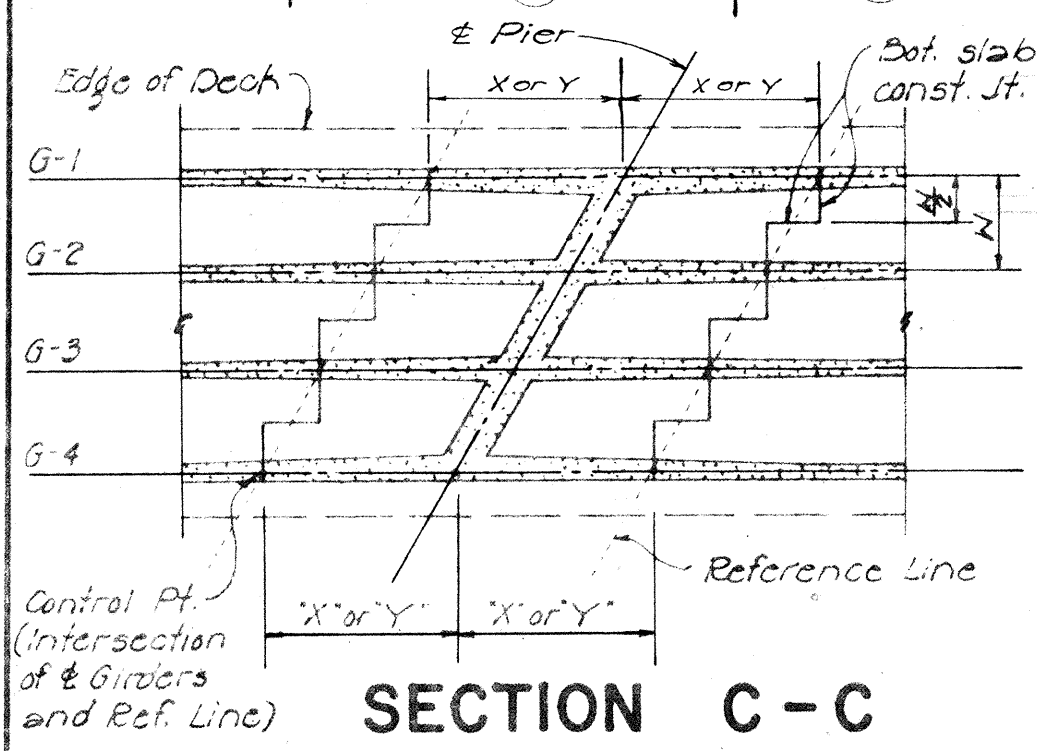


May 59
Oct. 60

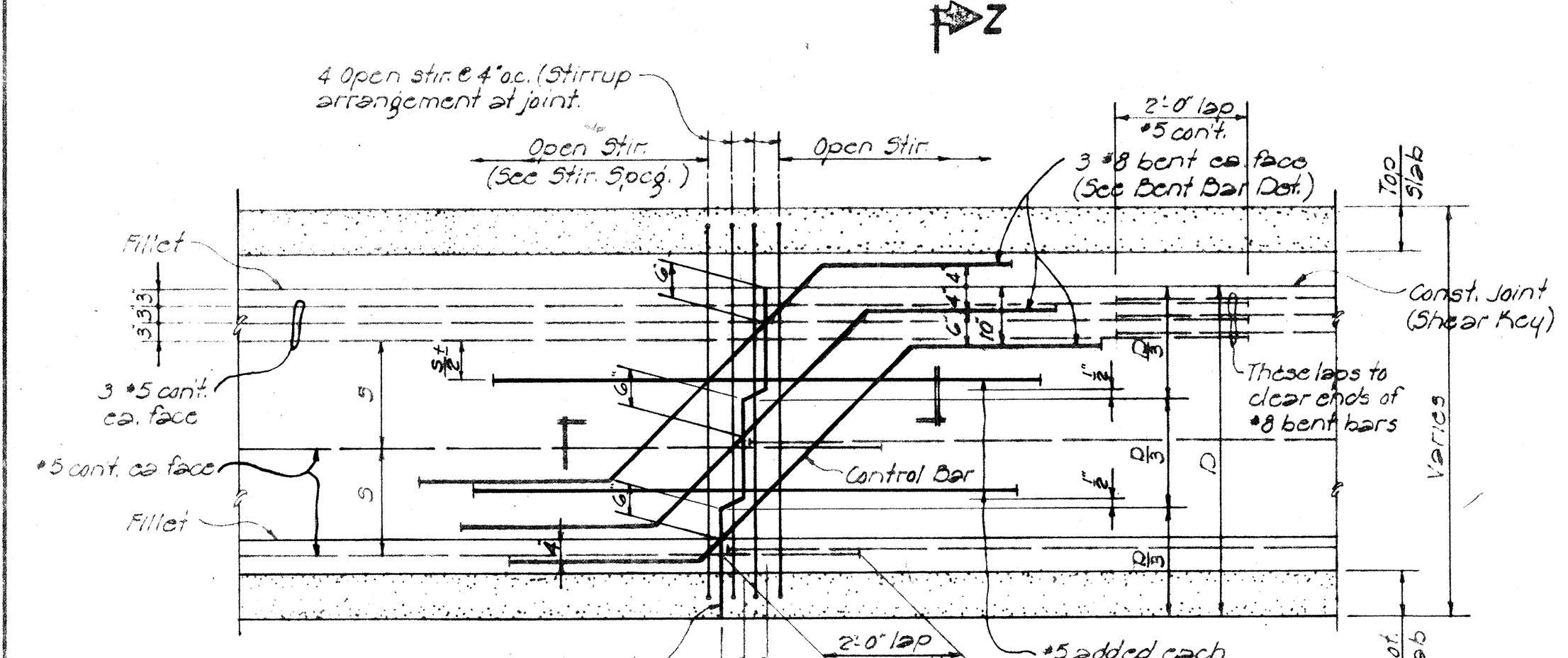


NOTE:
 No. 1-Numbers (1) & (2) indicate sequence of placing bottom slab & girder stem concrete. (2) may be placed simultaneously with (1) when approved by the Engr. and provided that (1) sections are placed top of slab in adjoining spans. For any deviation from the above the contractor shall submit a diagram to the Engr. for approval.
 No. 2- No top slab construction joint or form removal opening shall be located in the region over the piers as noted.
 No. 3- When top slab forms are not removed, const. joint in top slab shall be located over an intermediate diaphragm.
 No. 4- Dimension "X" = 1/4 span "Y" = 1/5 span
 No. 5- No lapping of main girder bars shall be permitted at construction joints.

PLACING DIAGRAM FOR SUPERSTRUCTURE CONCRETE

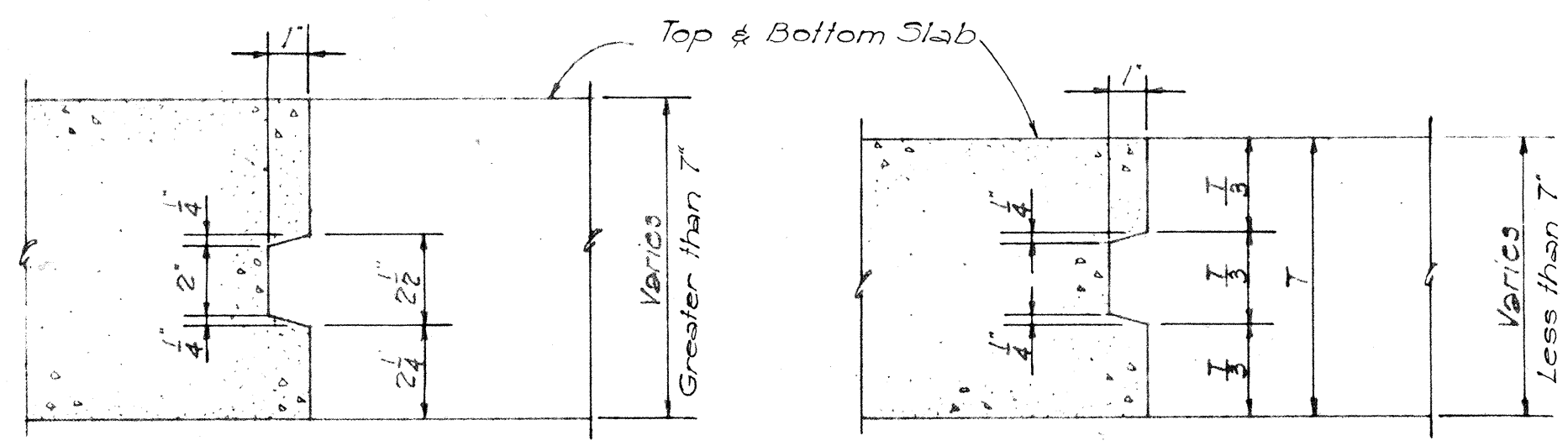


SECTION C-C
SHOWING TREATMENT OF CONST. JOINT FOR BRIDGES ON SKEW

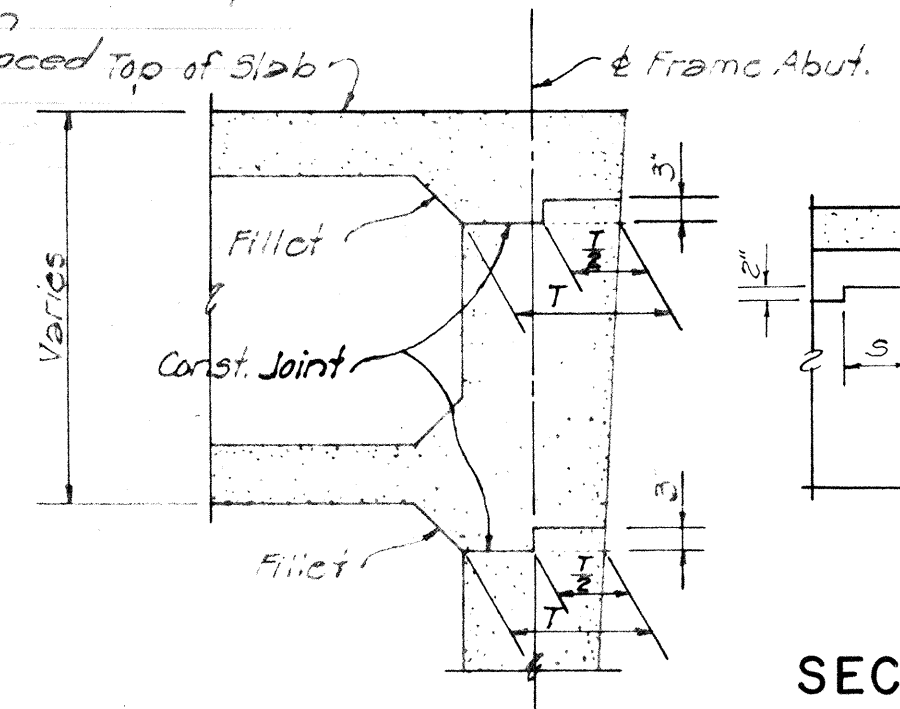


NOTE:
 D = Depth of girder stem to bottom of slab.
 S = Spacing of #5 const. girder stem long. bars.

GIRDER STEM CONST. JOINT

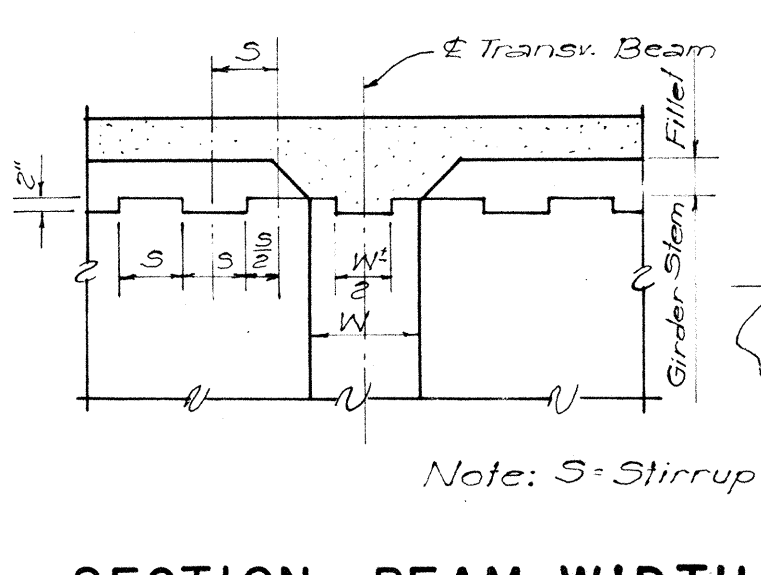


TOP AND BOTTOM SLAB CONST. JOINT



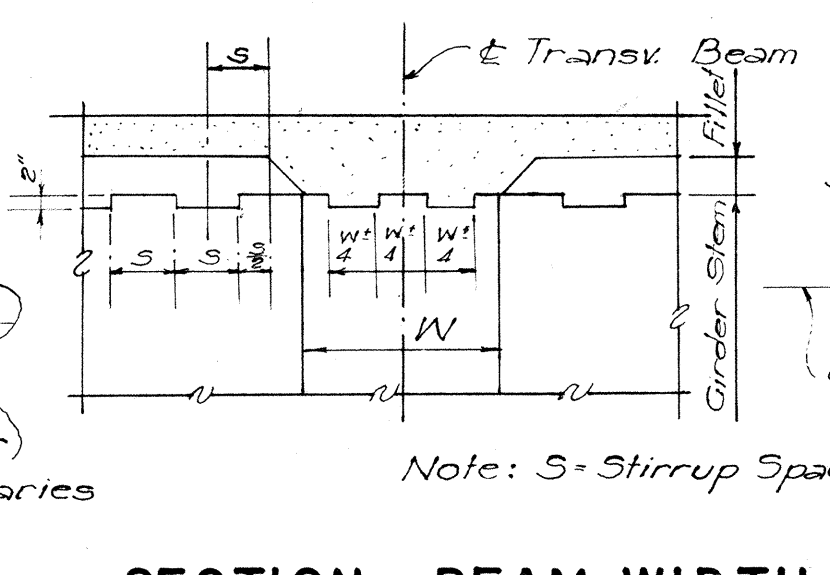
DETAIL - A

SECTION - BEAM WIDTH LESS THAN 2'-0"

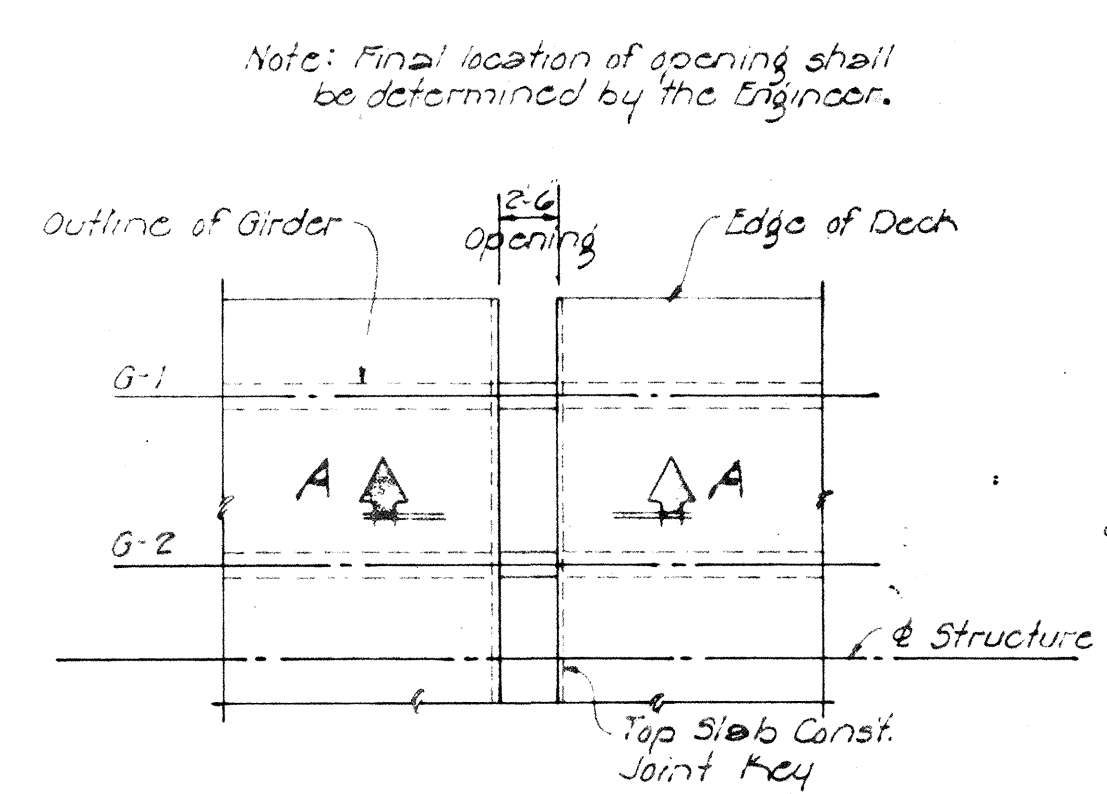


PLAN

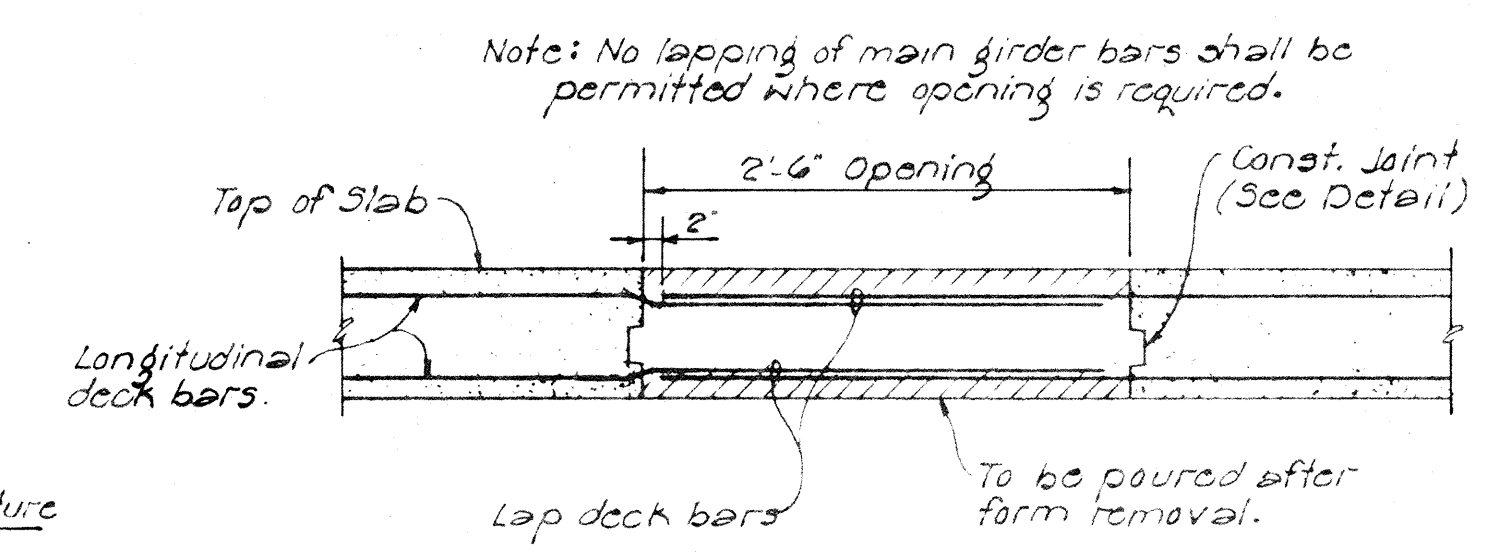
SECTION - BEAM WIDTH MORE THAN 2'-0"



PLAN



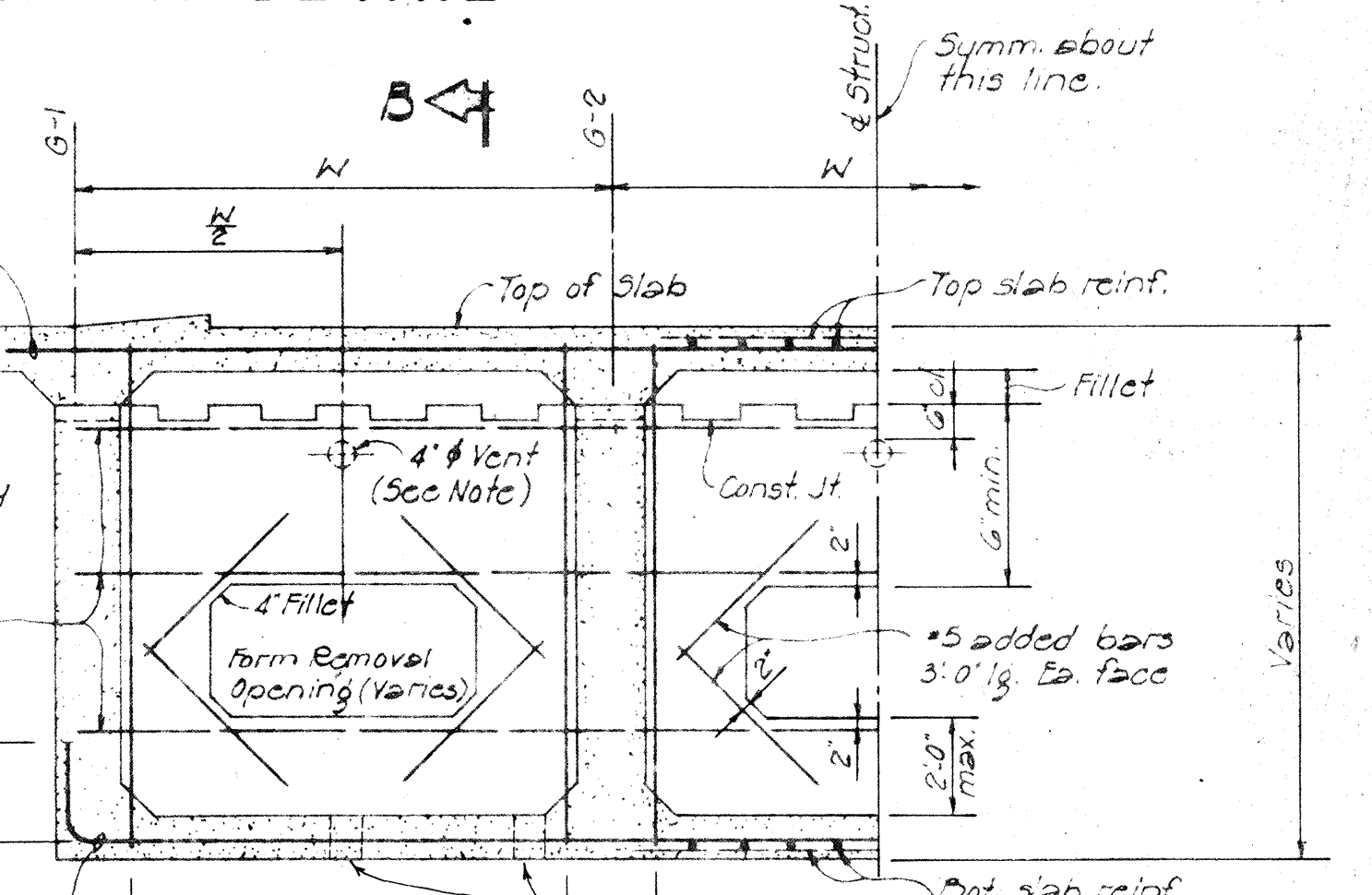
PART PLAN - DECK
SHOWING FORM REMOVAL OPENING



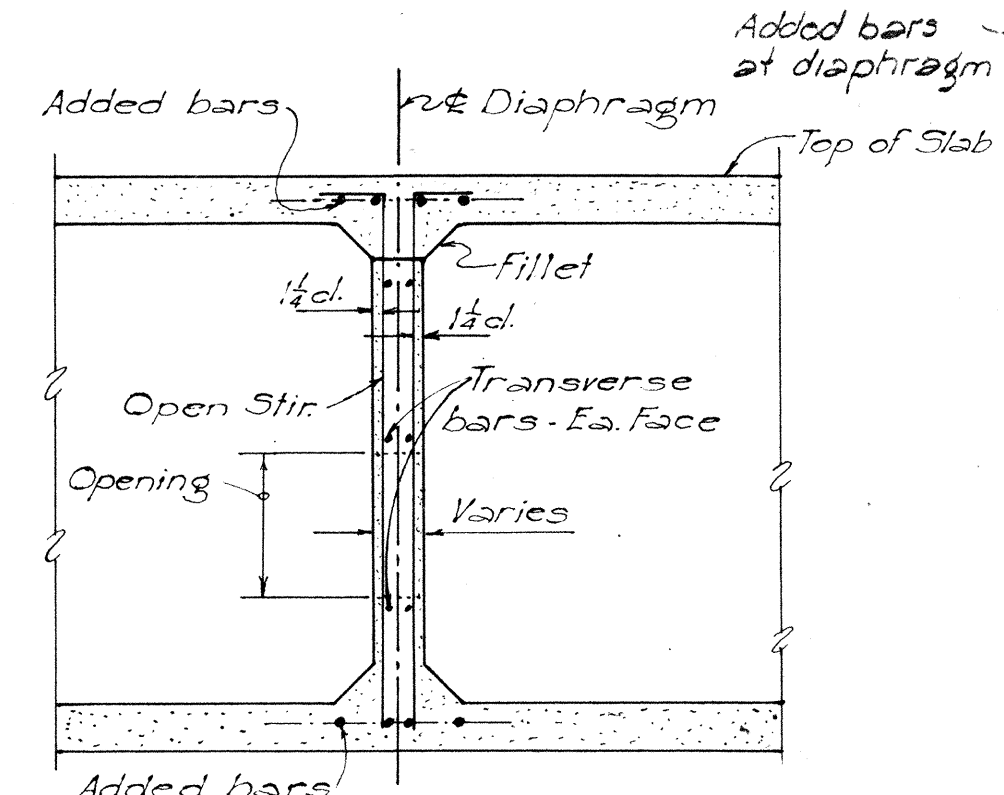
SECTION A-A

SHEAR KEY DETAIL

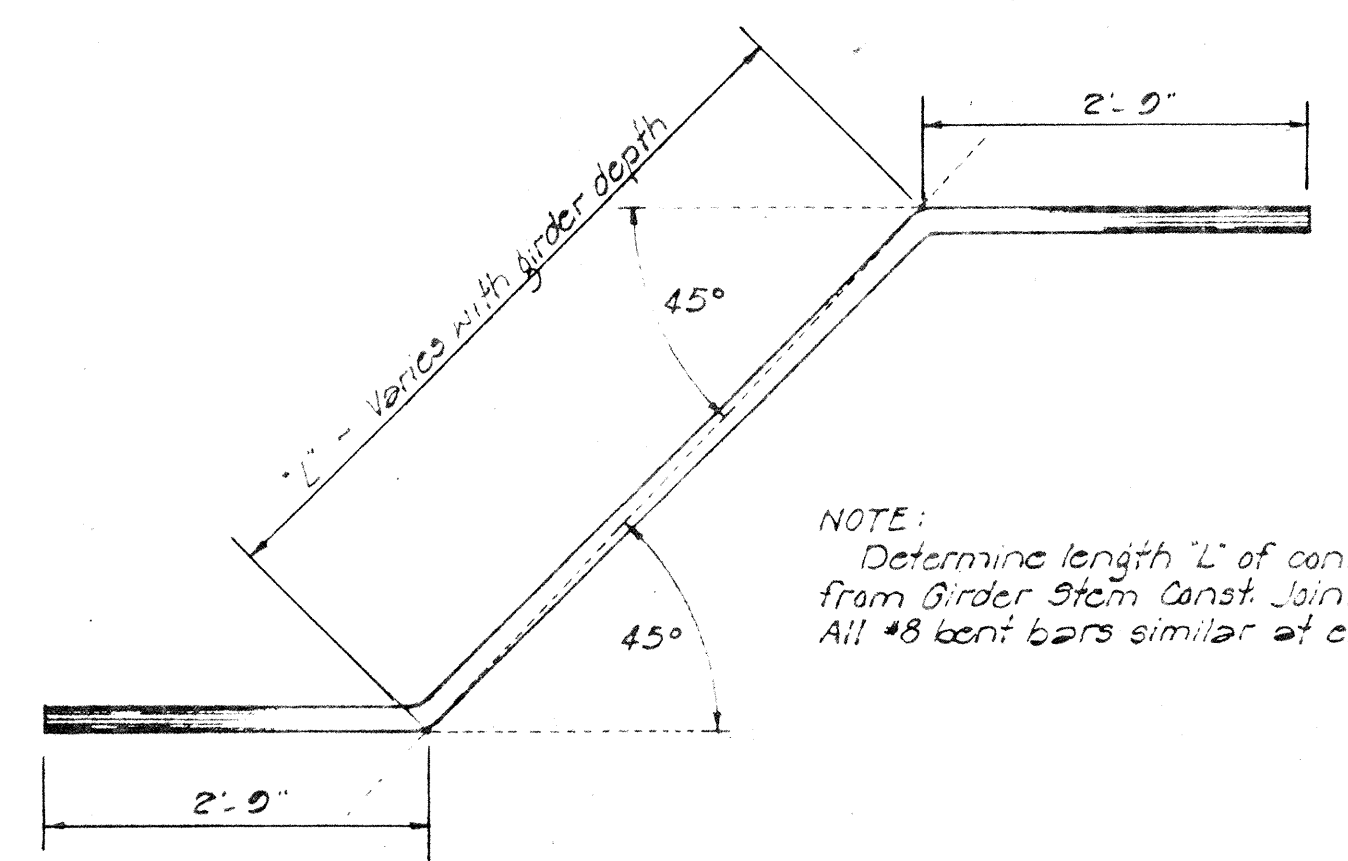
NOTE:
 If Contractor elects to leave top slab forms in place, form removal opening shall be omitted and replaced by 4" vent.



FORM REMOVAL OPENING DETAIL IN DIAPHRAGM



SECTION B-B



DETAIL - NO. 8 BENT BAR

NOTE:
 Determine length "L" of control bar from Girder Stem Const. Joint detail. All #8 bent bars similar at each joint.

GENERAL NOTE

Except where detailed otherwise in the plans, all details on this sheet govern.

STATE OF HAWAII
DEPARTMENT OF TRANSPORTATION
DIVISION OF HIGHWAYS

STANDARD DETAILS

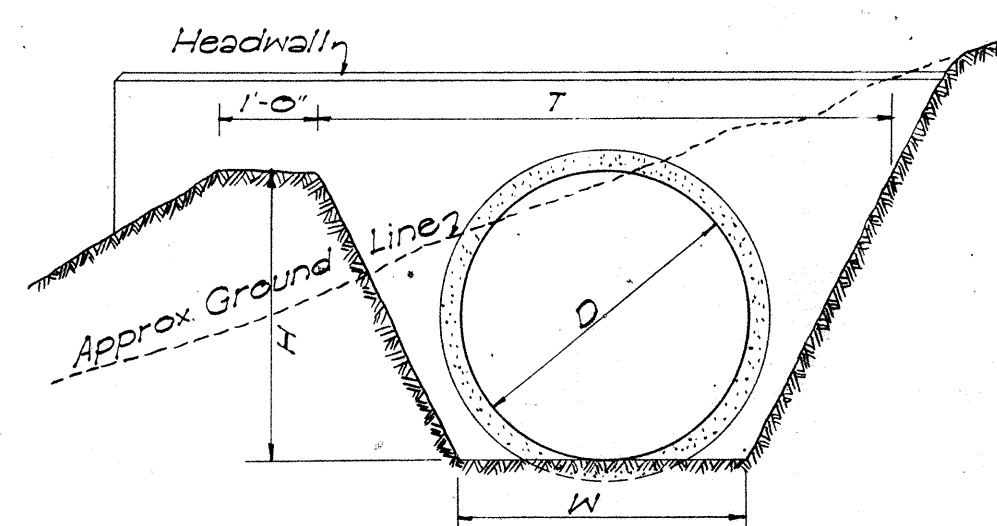
BOX GIRDER

SCALES AS NOTED

APPROVED: DATE: Aug. 26, 1959
DIRECTOR

AUG. 1957

DATA FOR OUTLET DITCH				
D	W	H	T=N+H	
18"	24"	2'-0"	4'-0"	
24"	30"	2'-0"	4'-6"	
30"	30"	2'-6"	5'-0"	
36"	36"	3'-0"	6'-0"	

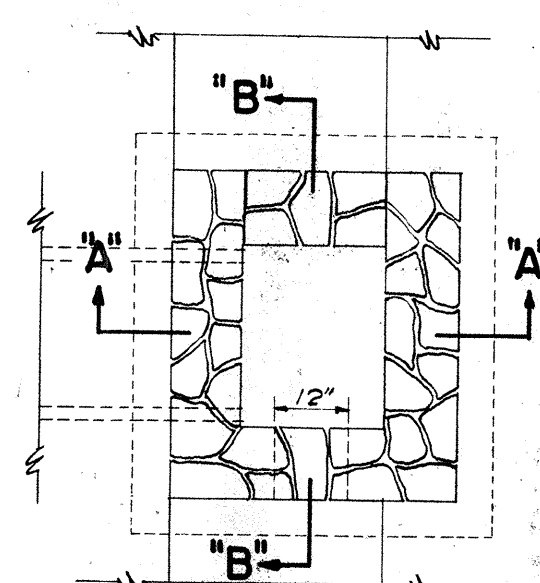


DETAIL OF OUTLET DITCH

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

DATA FOR MASONRY DROP INTAKE					Where Variables Equal
D'	D	L=D+G	Cu. Yds.	Cu. Yds.	
23"	18"	2'-5"	3.02	4'-6"	
30"	24"	3'-0"	3.61	5'-0"	
37"	30"	3'-7"	4.21	5'-6"	
44"	36"	4'-2"	4.85	6'-0"	

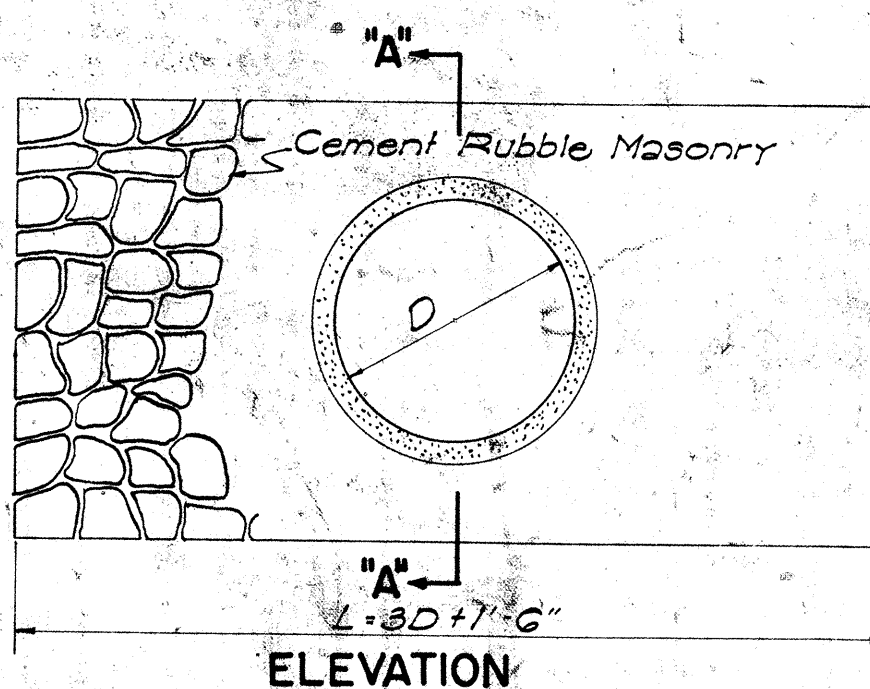
NOTE: Dimension "X" is assumed as 2'-4" in figuring the above quantities.



DETAIL OF MASONRY DROP INTAKE

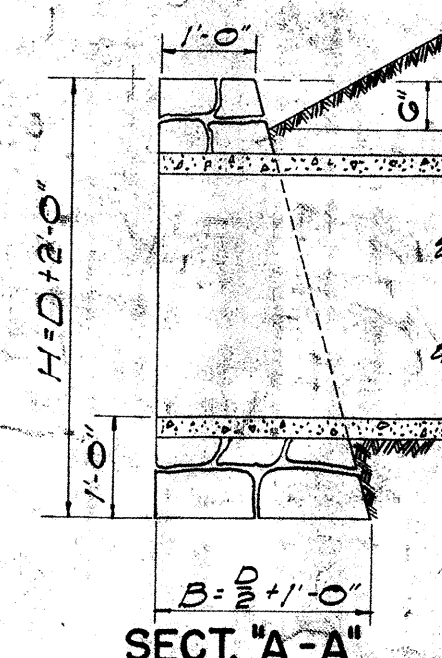
Scale: 3/8" = 1'-0"

DATA - MASONRY HEADWALL					Where Variables Equal
D	H	B	L	Cu. Yds.	
18"	3'-6"	1'-0"	6'-0"	0.85	0.03
24"	4'-0"	2'-0"	7'-6"	1.28	1.41
30"	4'-6"	2'-3"	9'-0"	1.83	2.00
36"	5'-0"	2'-6"	10'-6"	2.40	2.72



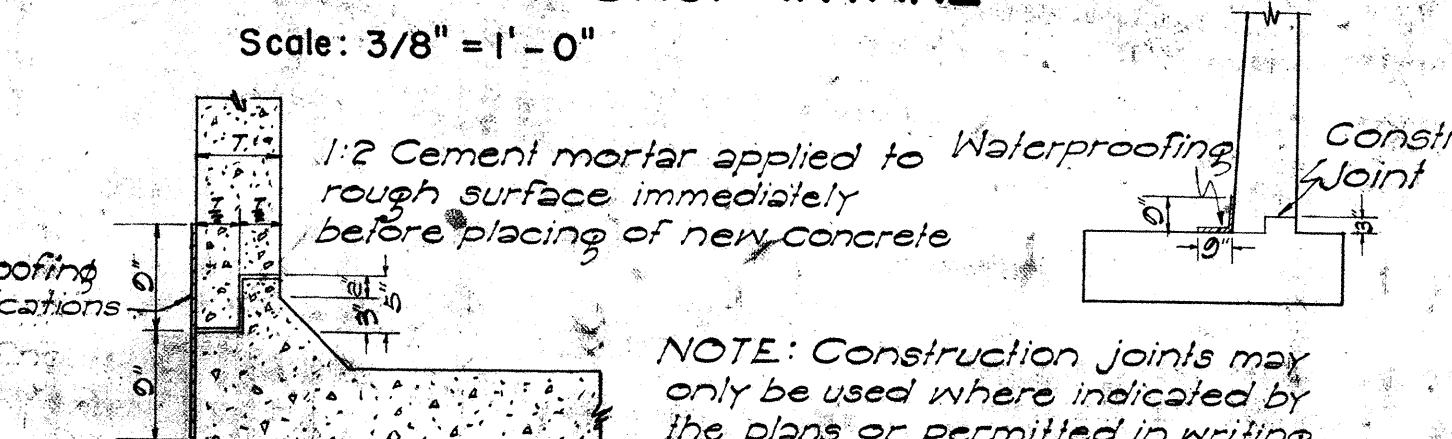
DETAIL OF MASONRY HEADWALL

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



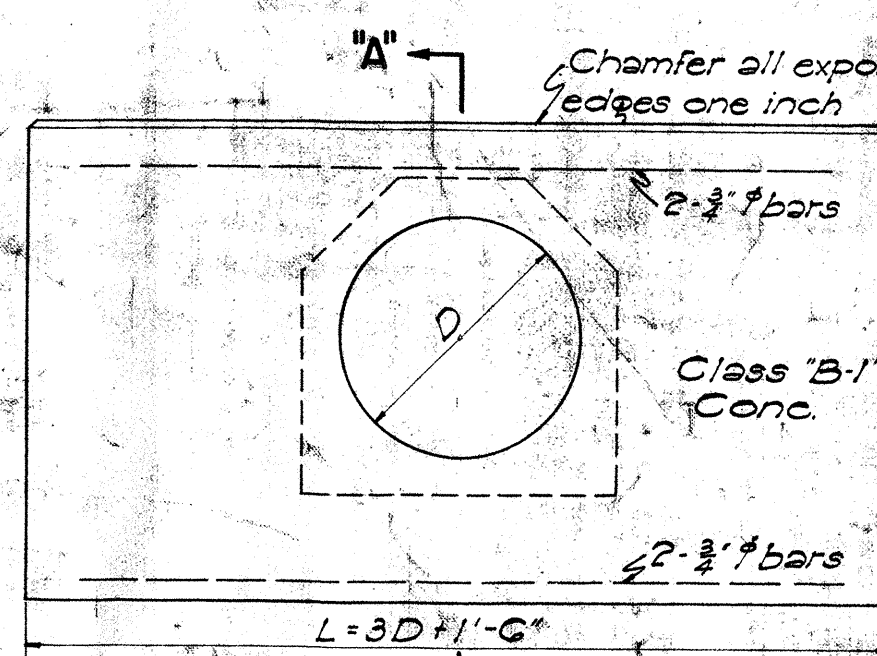
ELEVATION

SECTION "A-A"



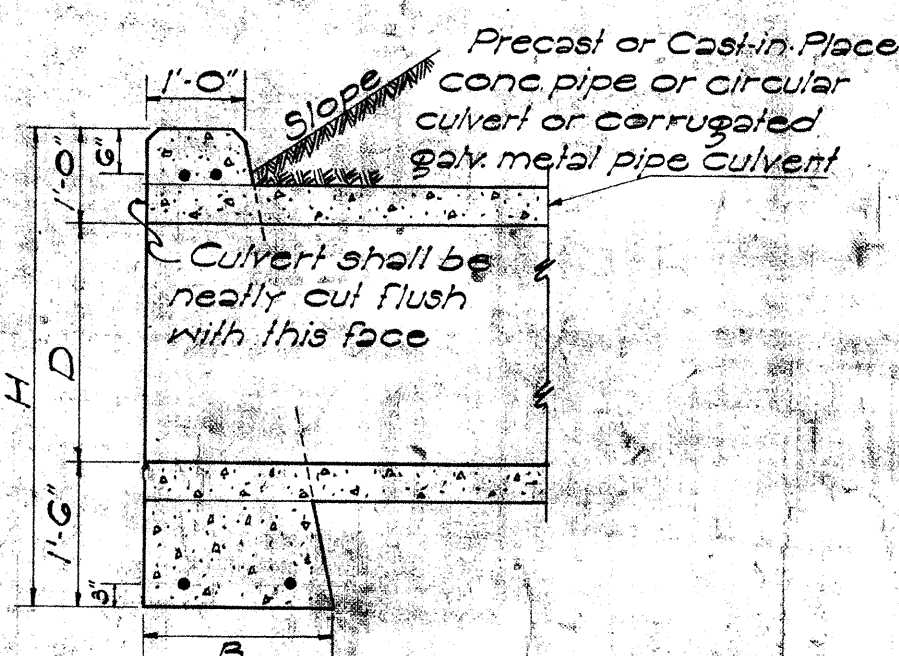
CONSTR. JOINT DETAILS

NOTE: Construction joints may only be used where indicated by the plans or permitted in writing by the Engineer.



ELEVATION

SECTION "A-A"

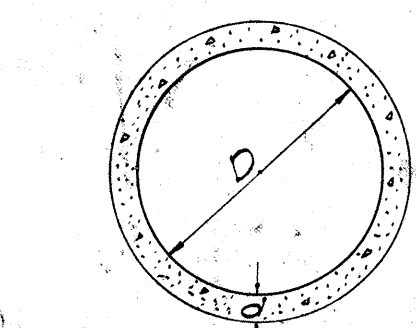


SECTION "A-A"

DATA FOR CONCRETE PROTECTION OVER CULVERTS				
X	Y	Z		
6" for 18"D		Z must be from pipe to face of trench		
7" " 24"D				
8" " 30"D				
9" " 36"D		Minimum = X		
10" " 42"D		Maximum pay quantity will be Z=12"		
11" " 48"D				
12" " 54"D				

SECT. OF CULVERT WITH CONC. PROTECTION

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



CONC. PIPE CULVERT

NOTE: Thickness of reinforcing and concrete used, are to conform with the approved design as provided by the Specifications.

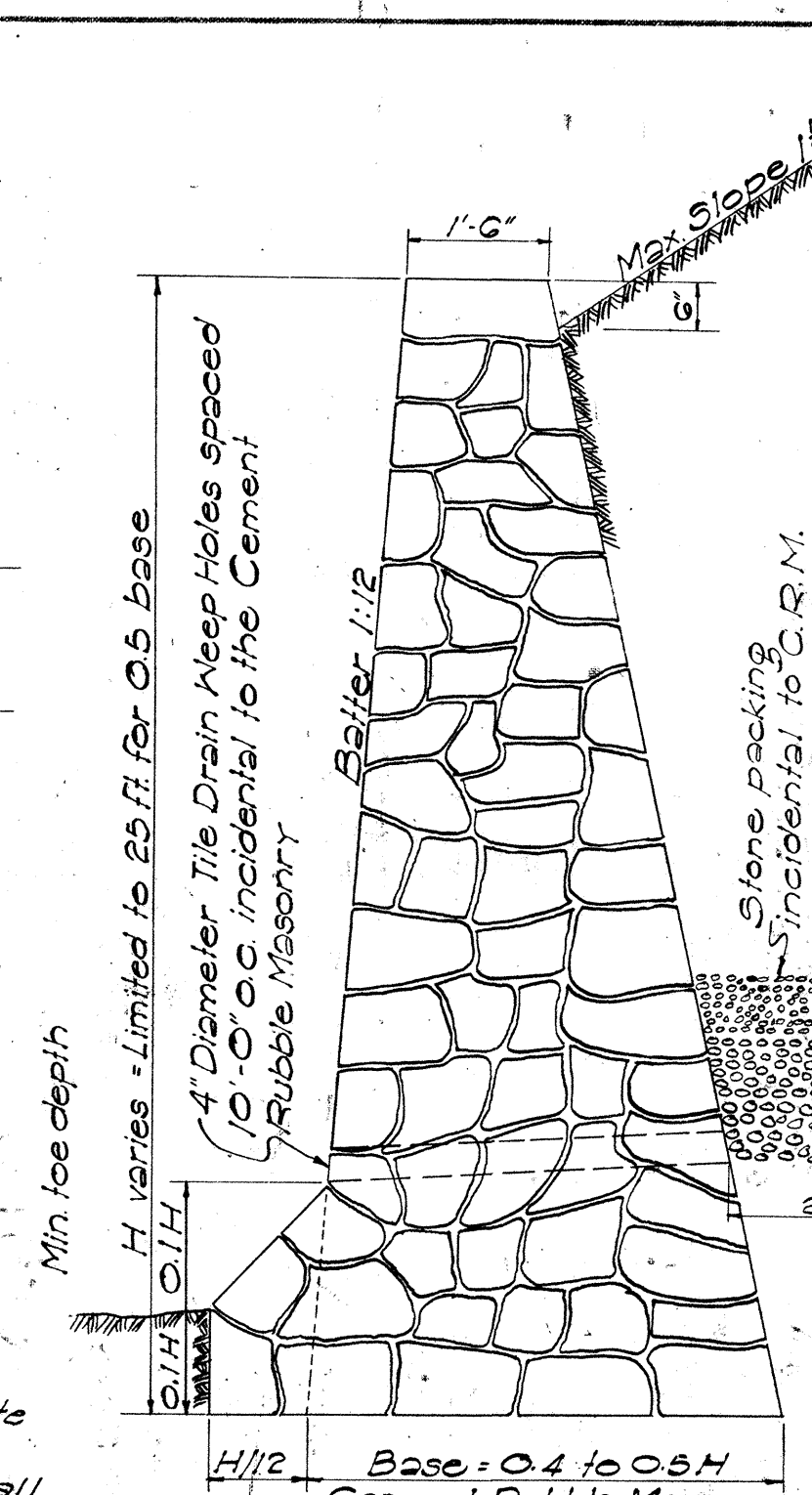
DATA - CAST-IN-PLACE CONC. CULVERT				
D	d	W	Cu. Yds. per ft.	
18"	4"	2'-2"	0.11	
24"	4 1/2"	2'-0"	0.14	
30"	5"	3'-4"	0.19	
36"	5 1/2"	3'-11"	0.26	

CAST-IN-PLACE CONC. CULVERT

DATA FOR CONC. HEADWALL					Steel For One Headwall
D	B	L	H	Cu. Yds.	No. of Bars Size Length Lbs.
18"	1'-6"	6'-0"	4'-0"	0.02	1.00 4 3/4" 5'-0" 23
24"	1'-6"	7'-6"	4'-6"	1.25	11.88 4 3/4" 7'-0" 42
30"	2'-0"	9'-0"	5'-0"	1.05	2.17 4 3/4" 8'-6" 51
36"	2'-0"	10'-6"	5'-6"	2.45	2.74 4 3/4" 10'-0" 60
42"	2'-6"	12'-0"	6'-0"	3.87	4 3/4" 11'-6" 69
48"	2'-6"	13'-6"	6'-6"	4.66	4 3/4" 13'-0" 78

DETAIL OF CONCRETE HEADWALL

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



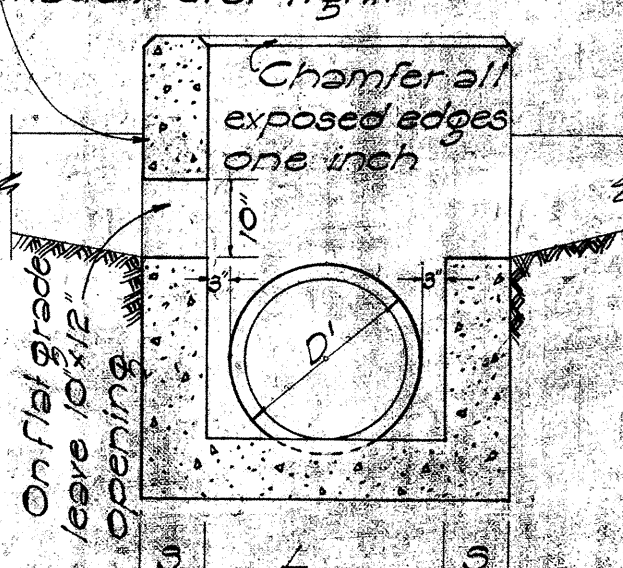
SECTION OF HIGH CEMENT RUBBLE MASONRY RETAINING WALL OR SEAWALL

SECTION OF LOW MASONRY RETAINING WALL OR SEAWALL

DATA - CONC. DROP INTAKE					Where Variables Equal
D'	D	L=D+G	Cu. Yds.	Cu. Yds.	
23"	18"	2'-5"	3.02	4'-6"	
30"	24"	3'-0"	3.61	5'-0"	
37"	30"	3'-7"	4.21	5'-6"	
44"	36"	4'-2"	4.85	6'-0"	
51"	42"	4'-9"	5.48	6'-6"	
58"	48"	5'-6"	6.11	7'-0"	

NOTE: Dimension "X" is assumed as 2'-4" in figuring the above quantities.

NOTE: This type of structure shall also be used for the Drop Intakes of Syphons connected with Irrigation Ditches or Flumes with appropriate changes to dimensions. In this case all joints must be made water tight.



SECTION "B-B"

DETAIL OF CONCRETE DROP INTAKE

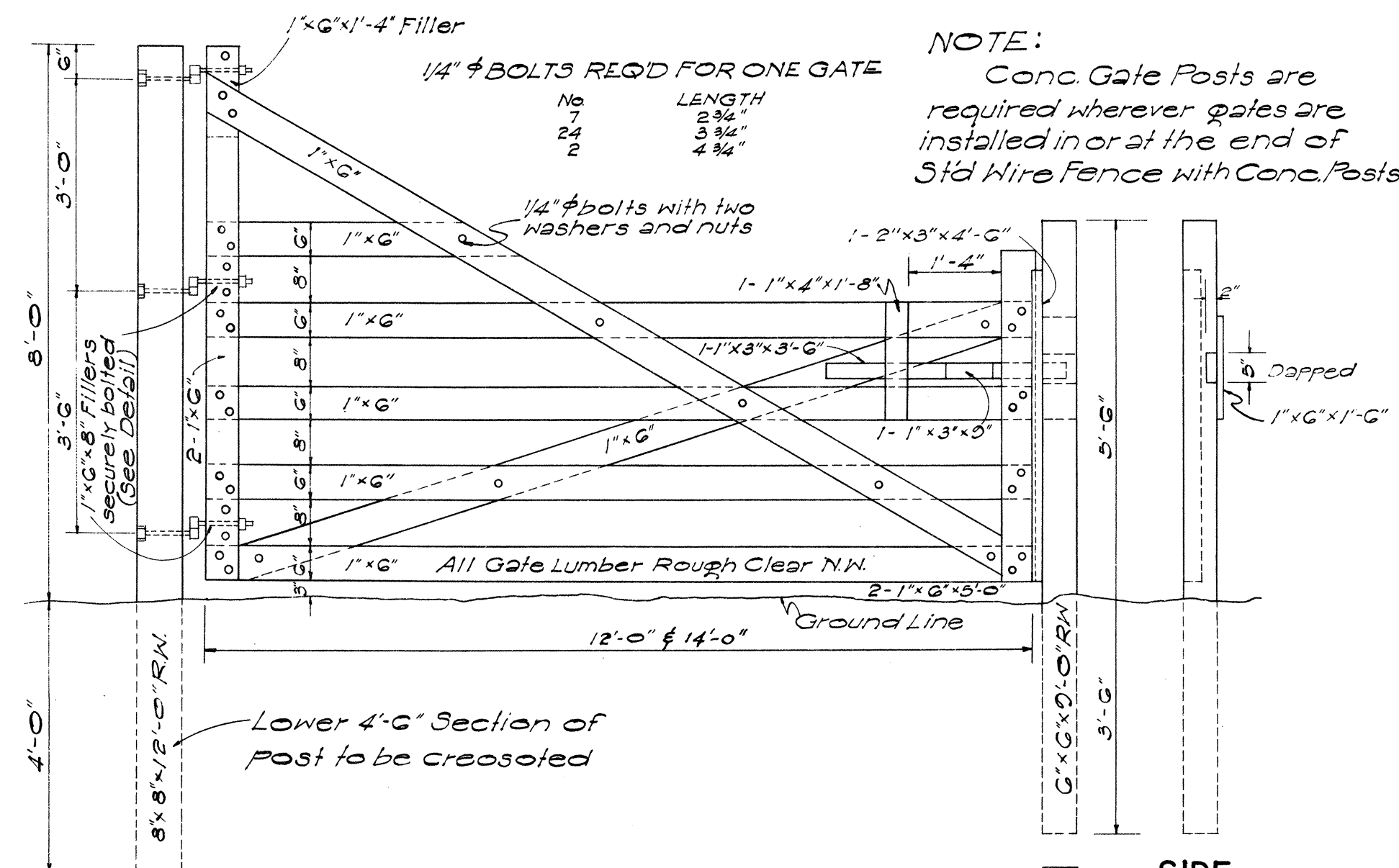
Scale: 1/2" = 1'-0"

DEPARTMENT OF TRANSPORTATION
DIVISION OF HIGHWAYS
STATE OF HAWAII

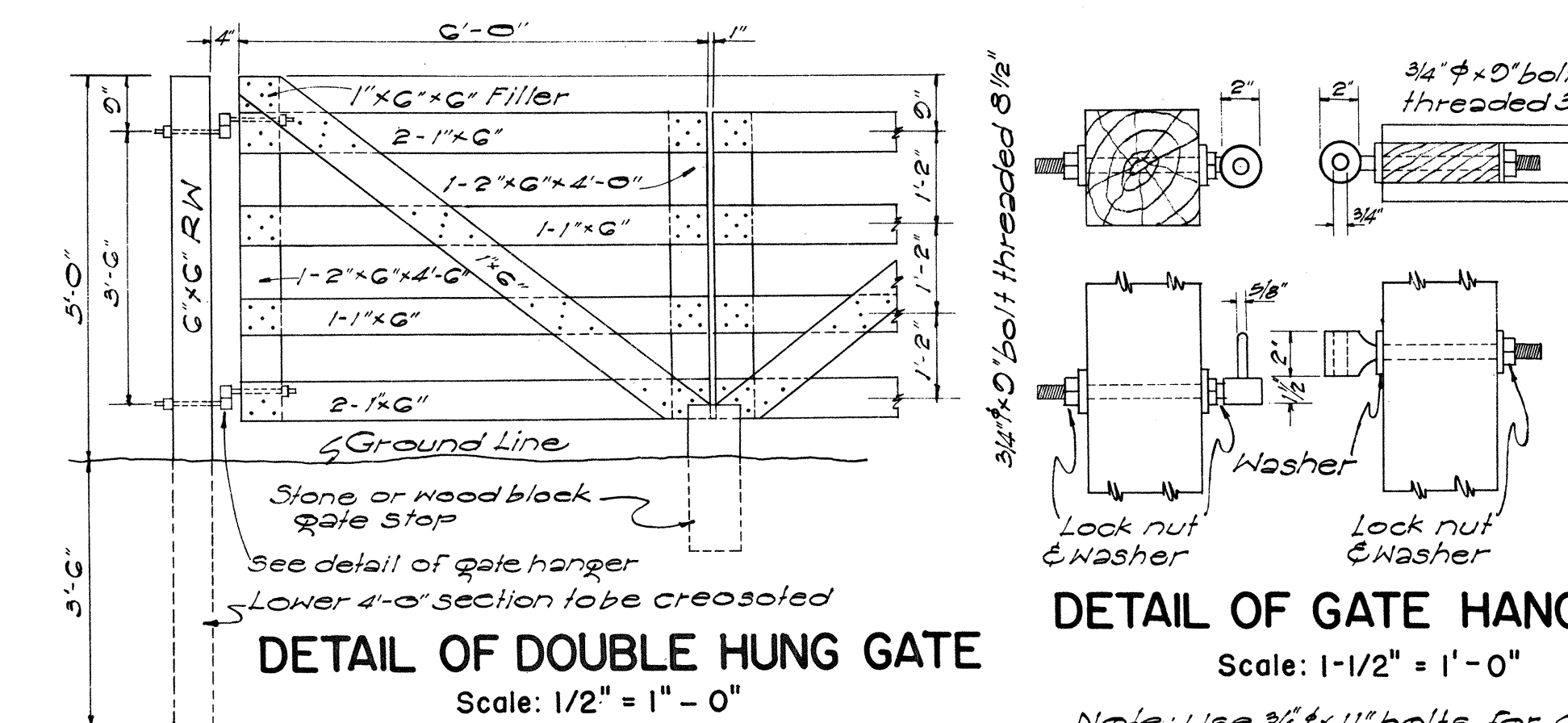
STANDARD DETAILS
DROP INTAKES, RETAINING WALLS,
HEADWALLS, CONSTRUCTION JOINTS
SCALES AS NOTED

SHEET NO. OF SHEETS

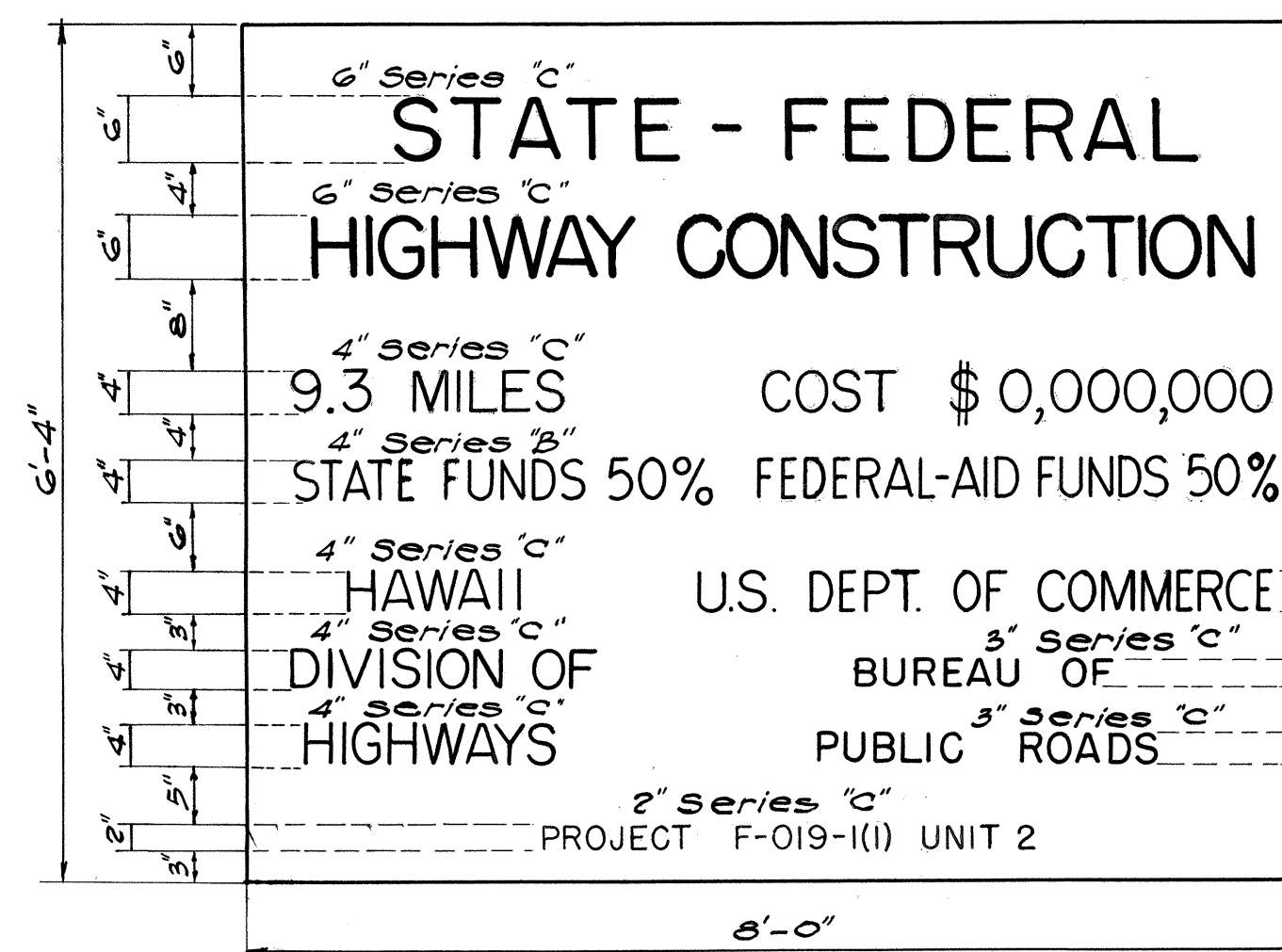
AUG. 1957



DETAIL OF CATTLE GATE
Scale: 1/2" = 1'-0"

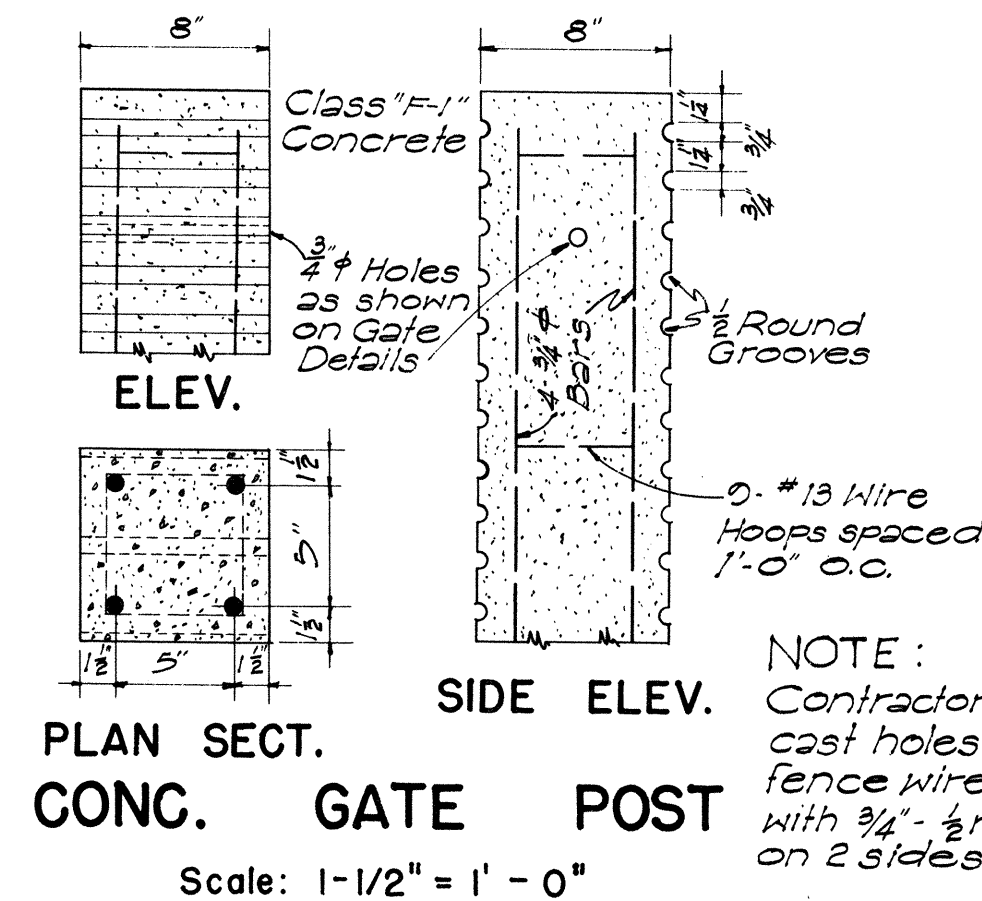


DETAIL OF DOUBLE HUNG GATE
Scale: 1/2" = 1'-0"
See note regarding use of Conc. Posts

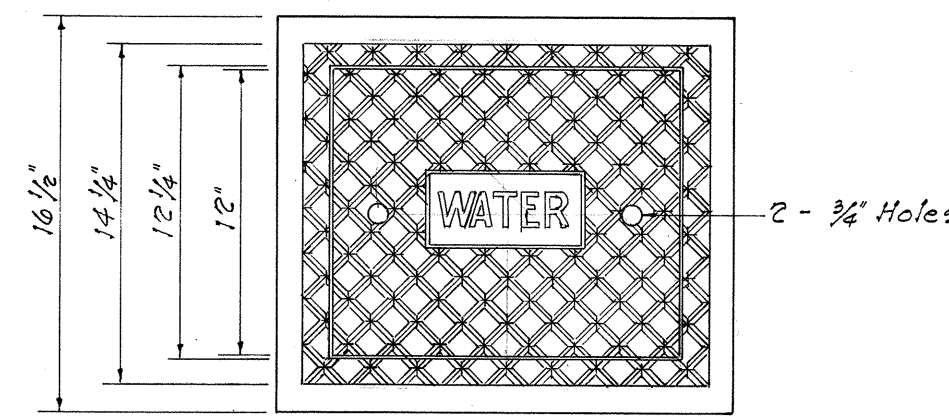


PRIMARY SYSTEM PROJECT SIGN
Scale: 3/4" = 1'-0"

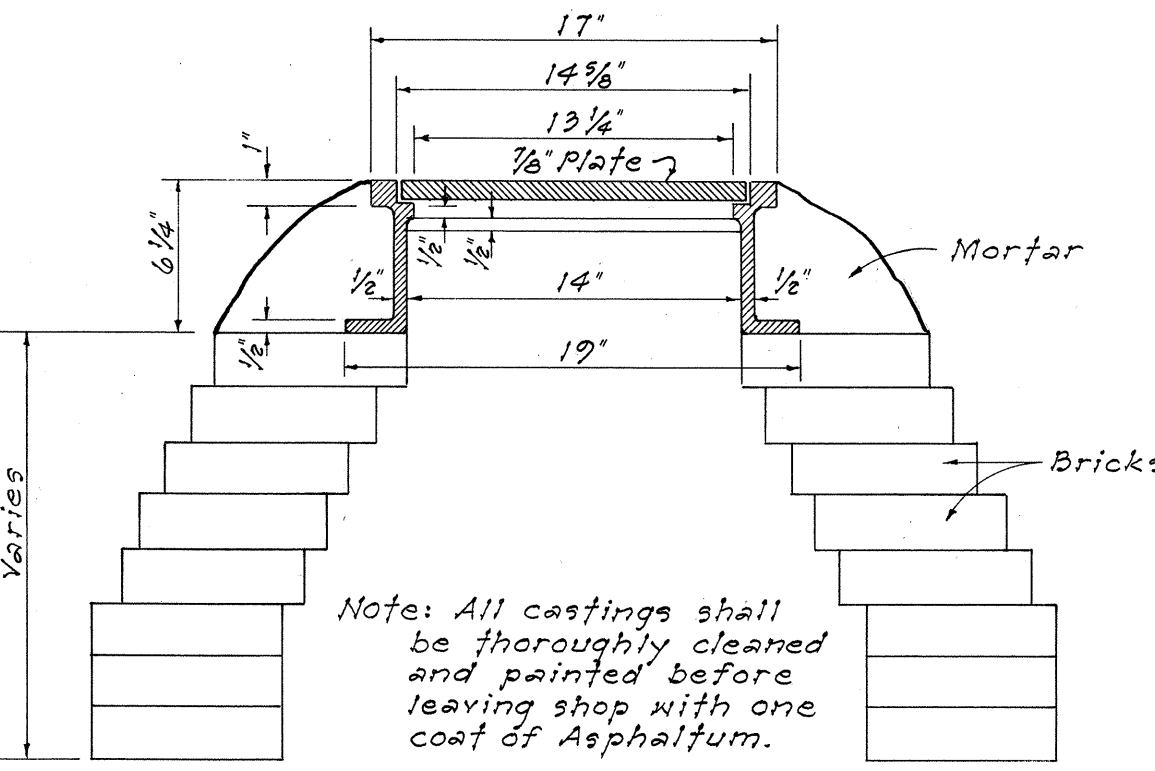
NOTE:
Conc. Gate Posts are required wherever gates are installed in or at the end of Std Wire Fence with Conc. Posts



CONC. GATE POST
Scale: 1-1/2" = 1'-0"

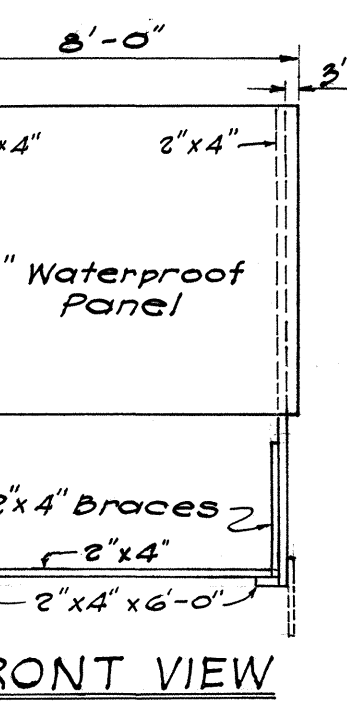


DETAILS OF STANDARD WIRE FENCE WITH WOOD POSTS
Scale: 3/8" = 1'-0"

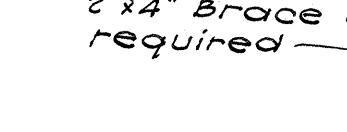


DETAILS OF BRICK VALVE BOX WITH CAST IRON FRAME & COVER
Scale: 1 1/2" = 1'-0"

- General Notes for Primary System Project Sign.**
1. The Contractor shall construct, install, and maintain the Project Signs at the locations shown on the plans and as ordered by the Engineer.
 2. All costs incurred in the construction, installing, and maintenance of the Signs will not be paid for separately, but shall be considered as included in the unit prices paid for the various items in the proposal.
 3. The Signs shall be removed and stockpiled at the completion of the project as ordered by the Engineer and are to become State property.
 4. The cost figure shall be furnished the Contractor at his request.



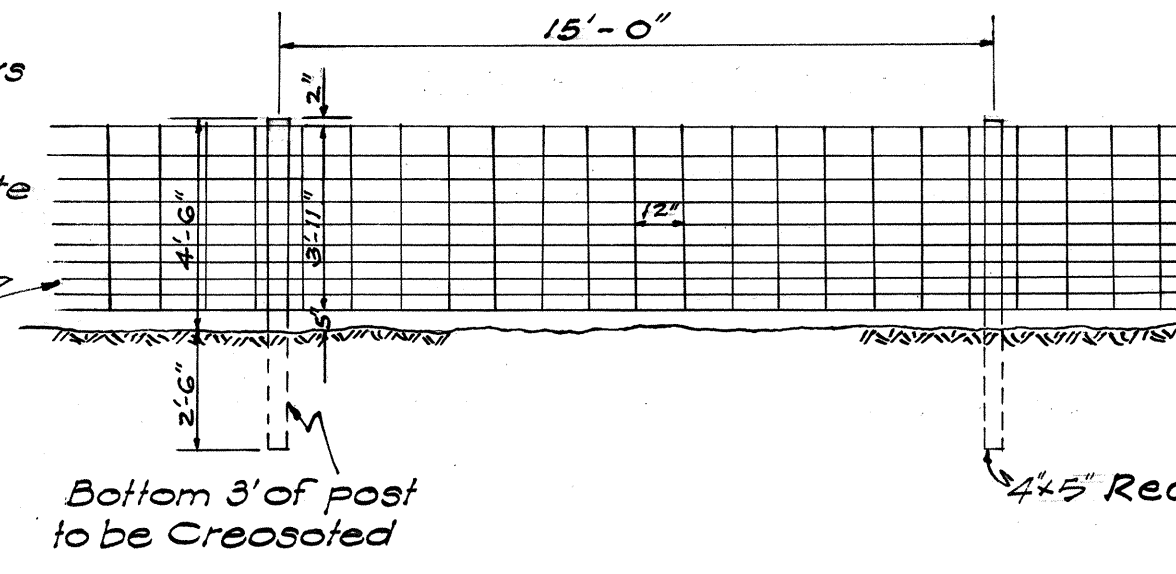
FRONT VIEW



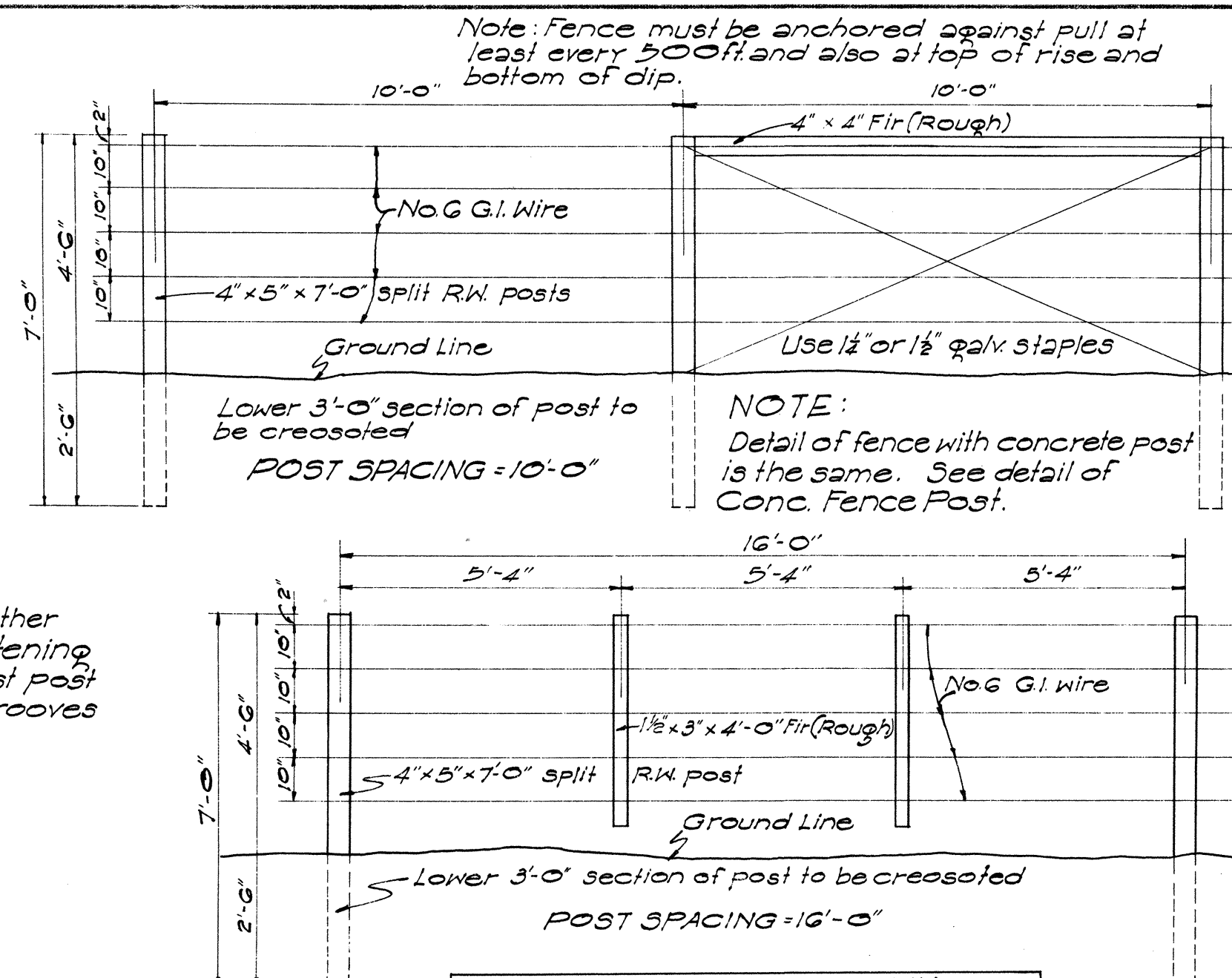
SIDE VIEW



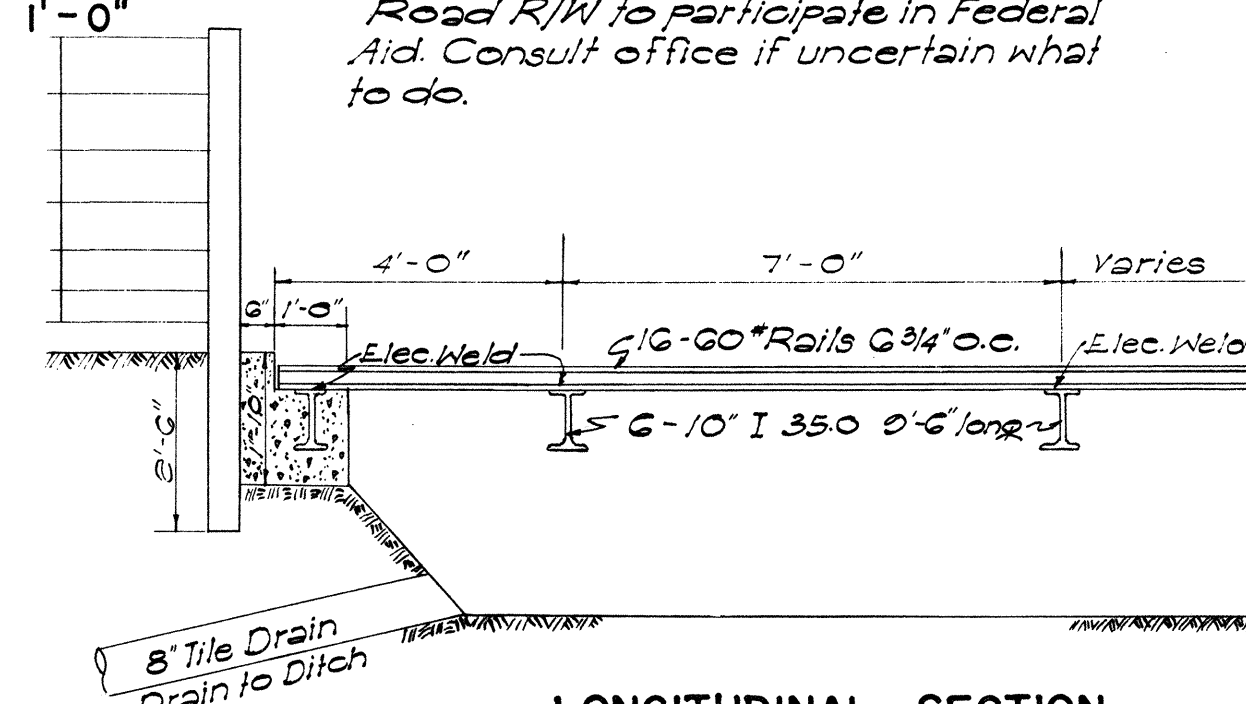
ELEVATION
Scale: 1/2" = 1'-0"



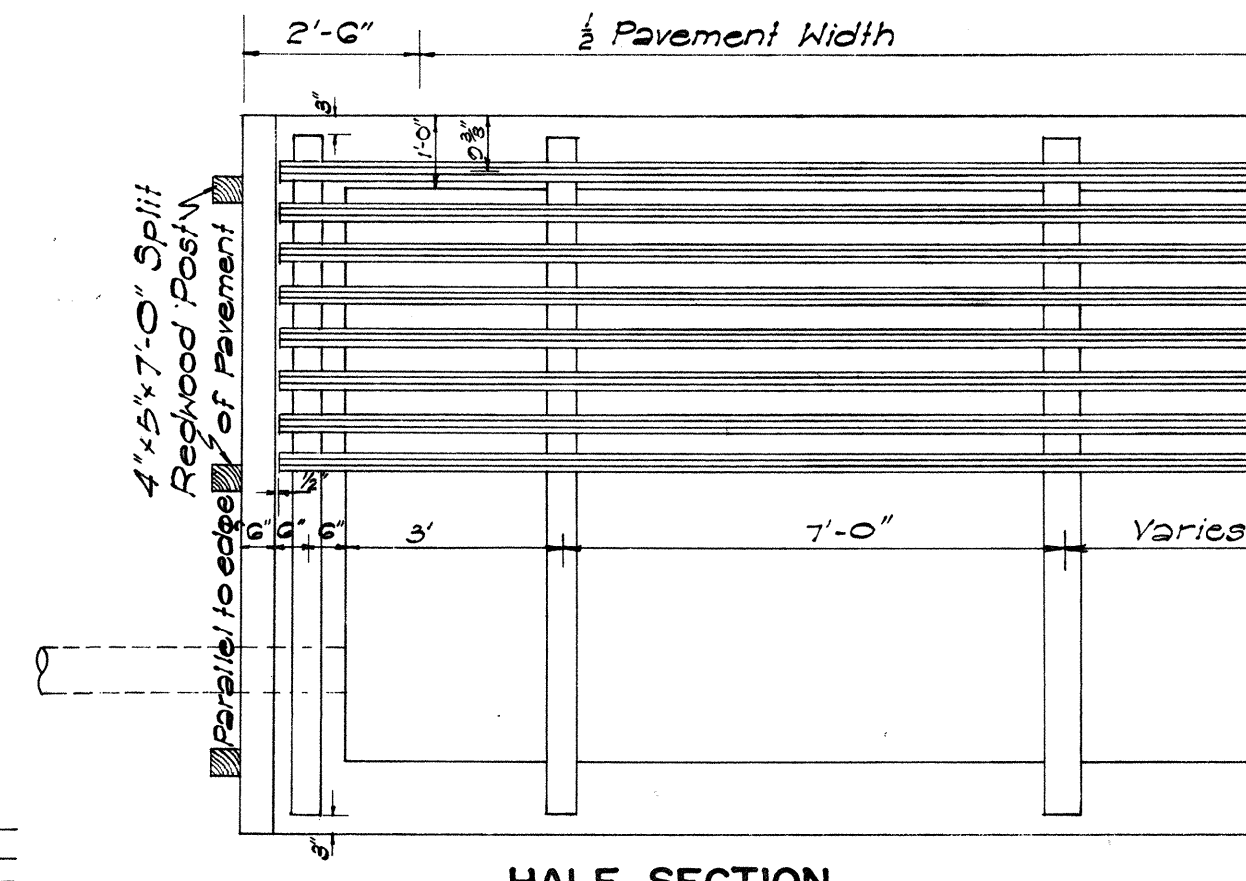
DETAIL OF WOVEN WIRE FENCE
Scale: 1/4" = 1'-0"



DETAILS OF STANDARD WIRE FENCE WITH WOOD POSTS
Scale: 3/8" = 1'-0"

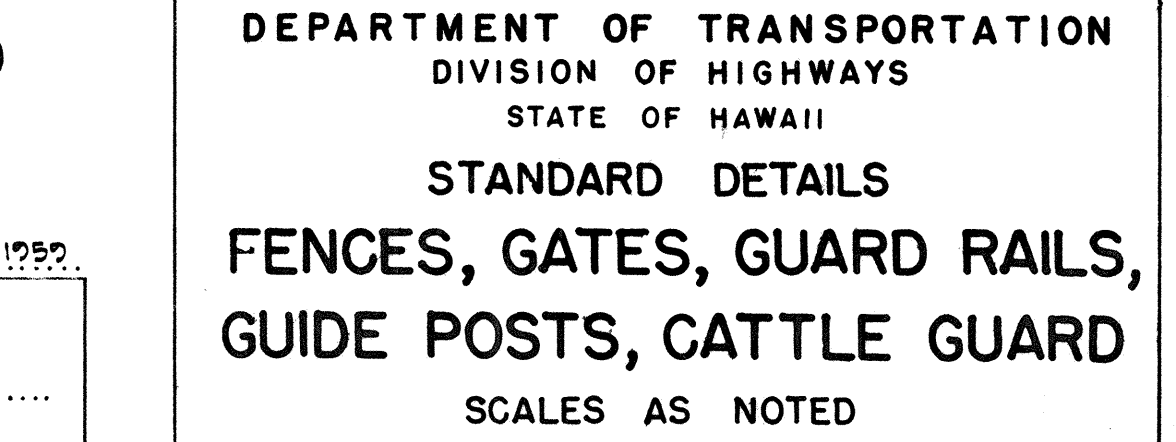


LONGITUDINAL SECTION



HALF SECTION

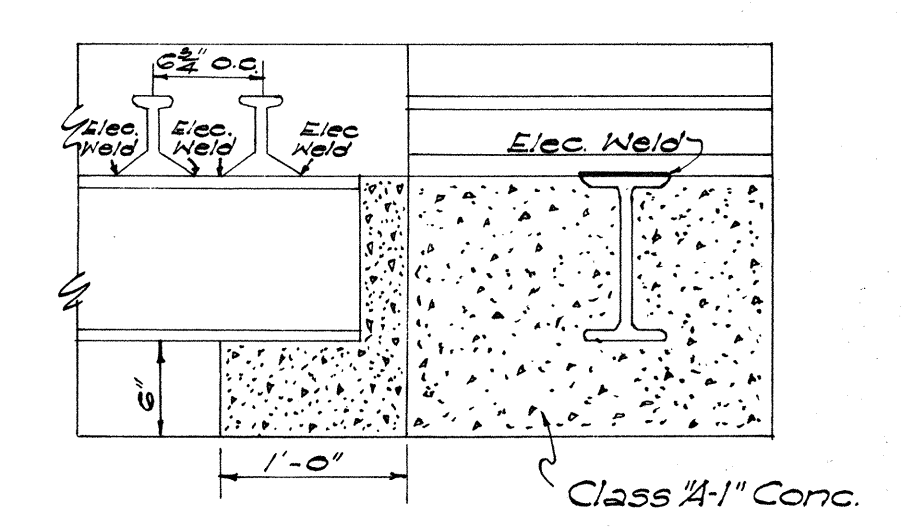
DETAIL OF CATTLE GUARD
Scale: 3/8" = 1'-0"



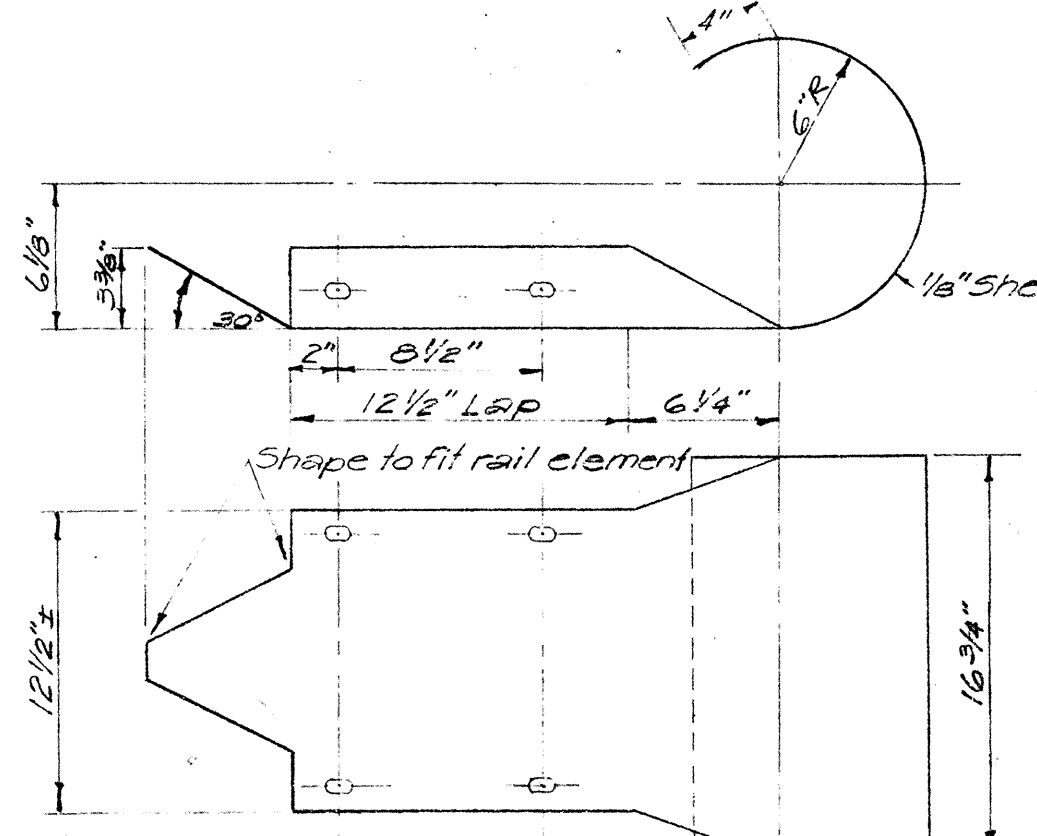
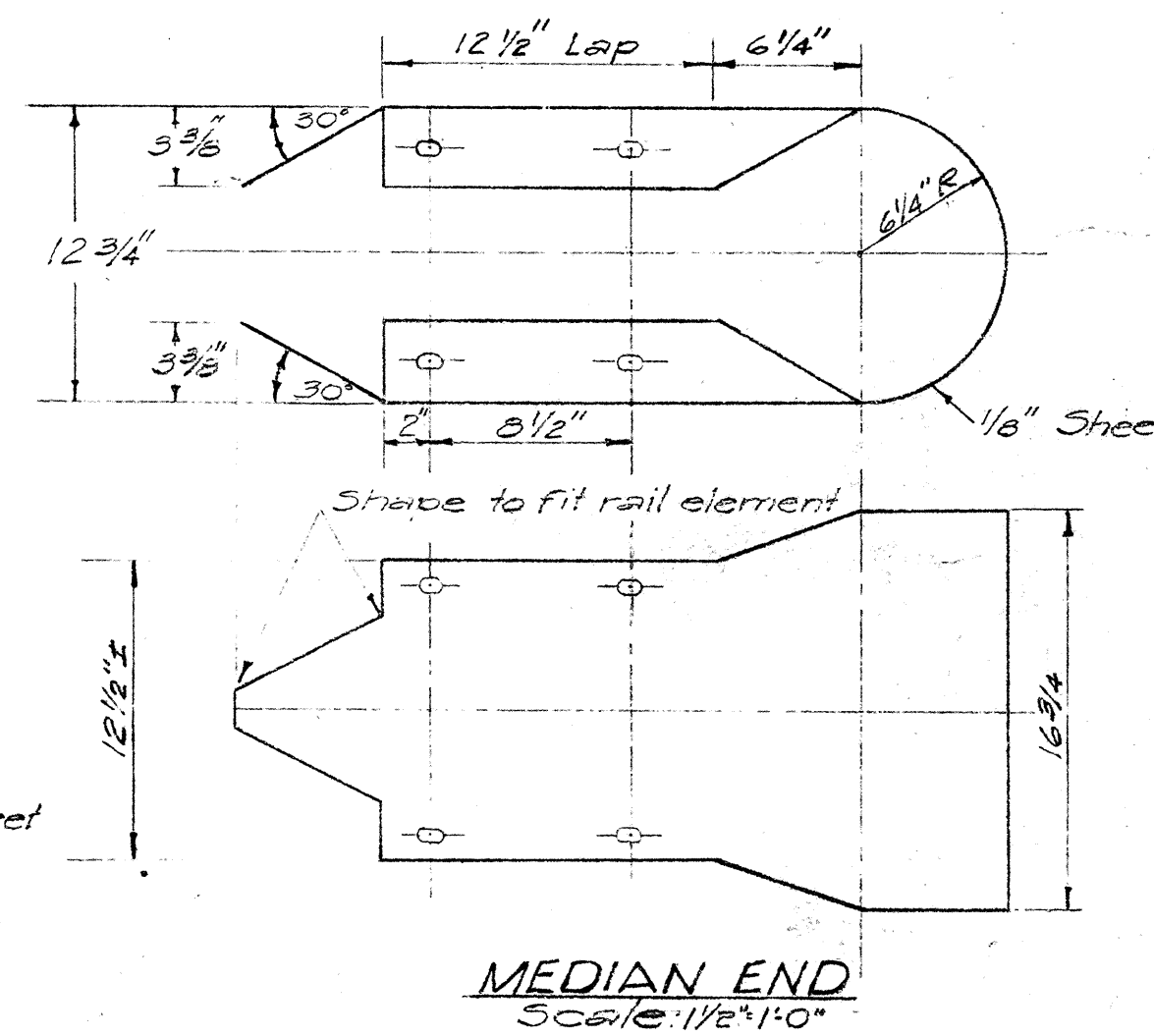
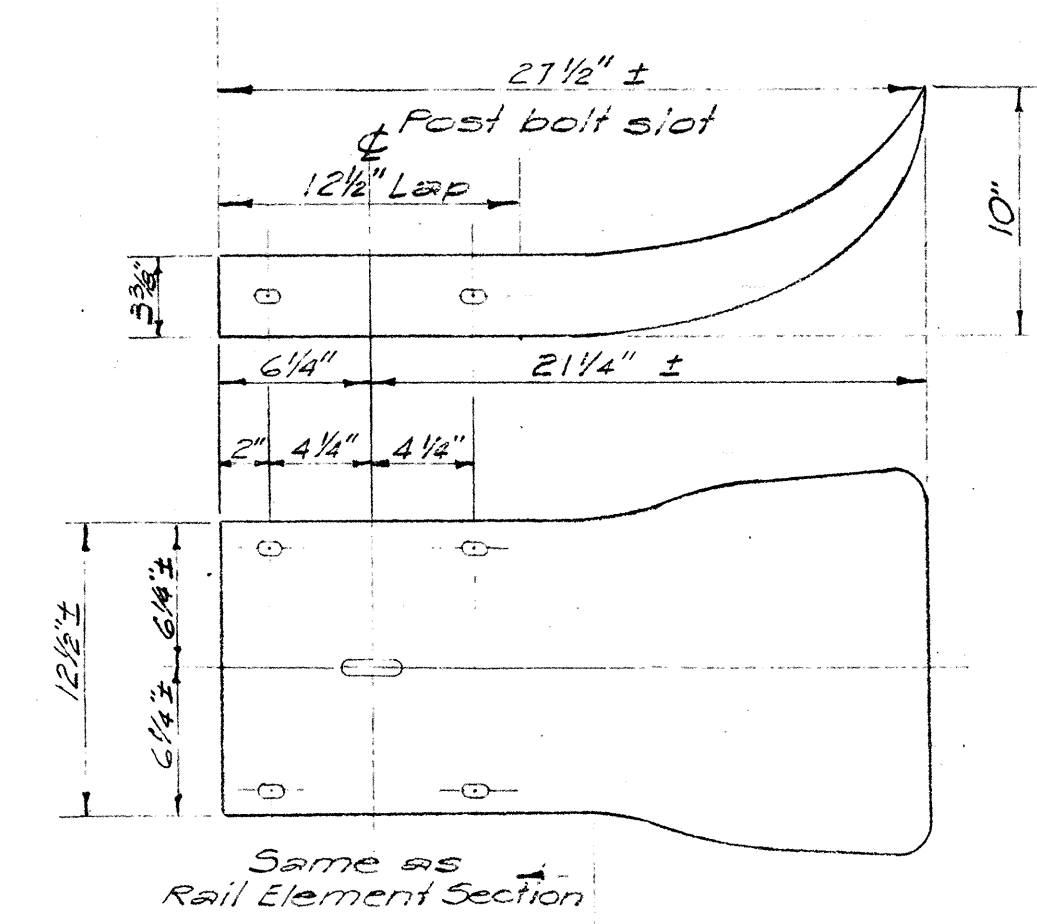
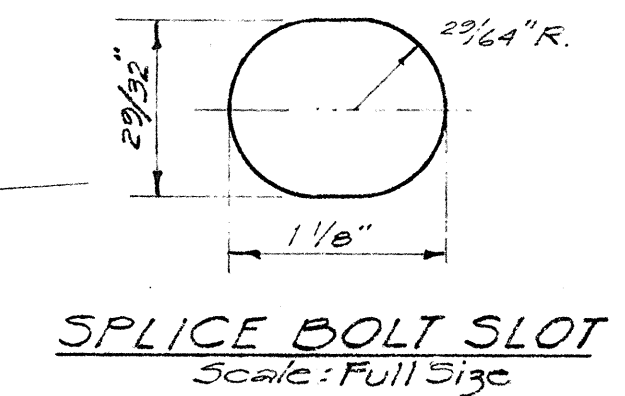
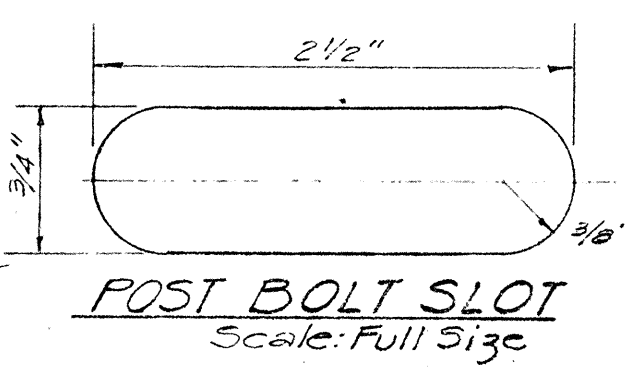
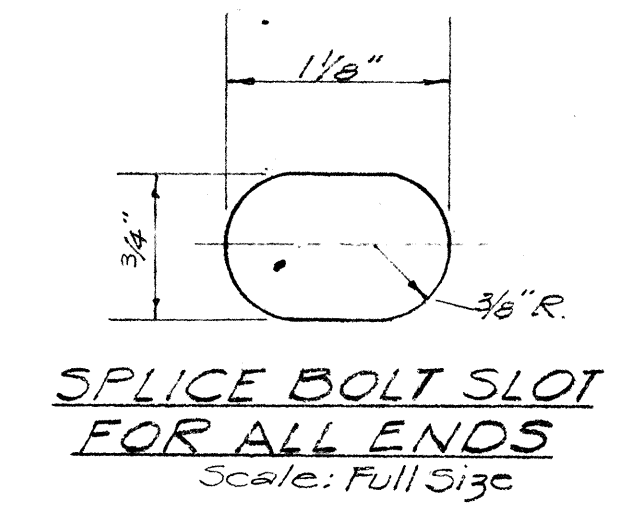
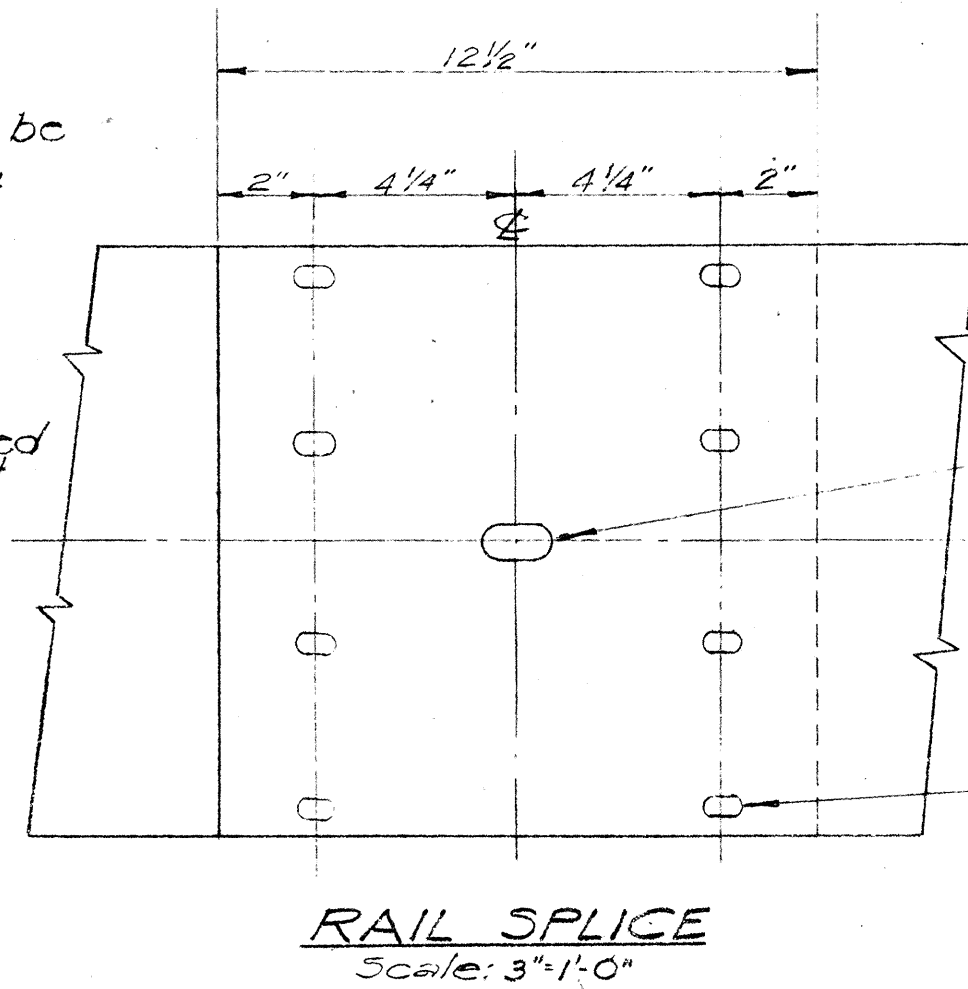
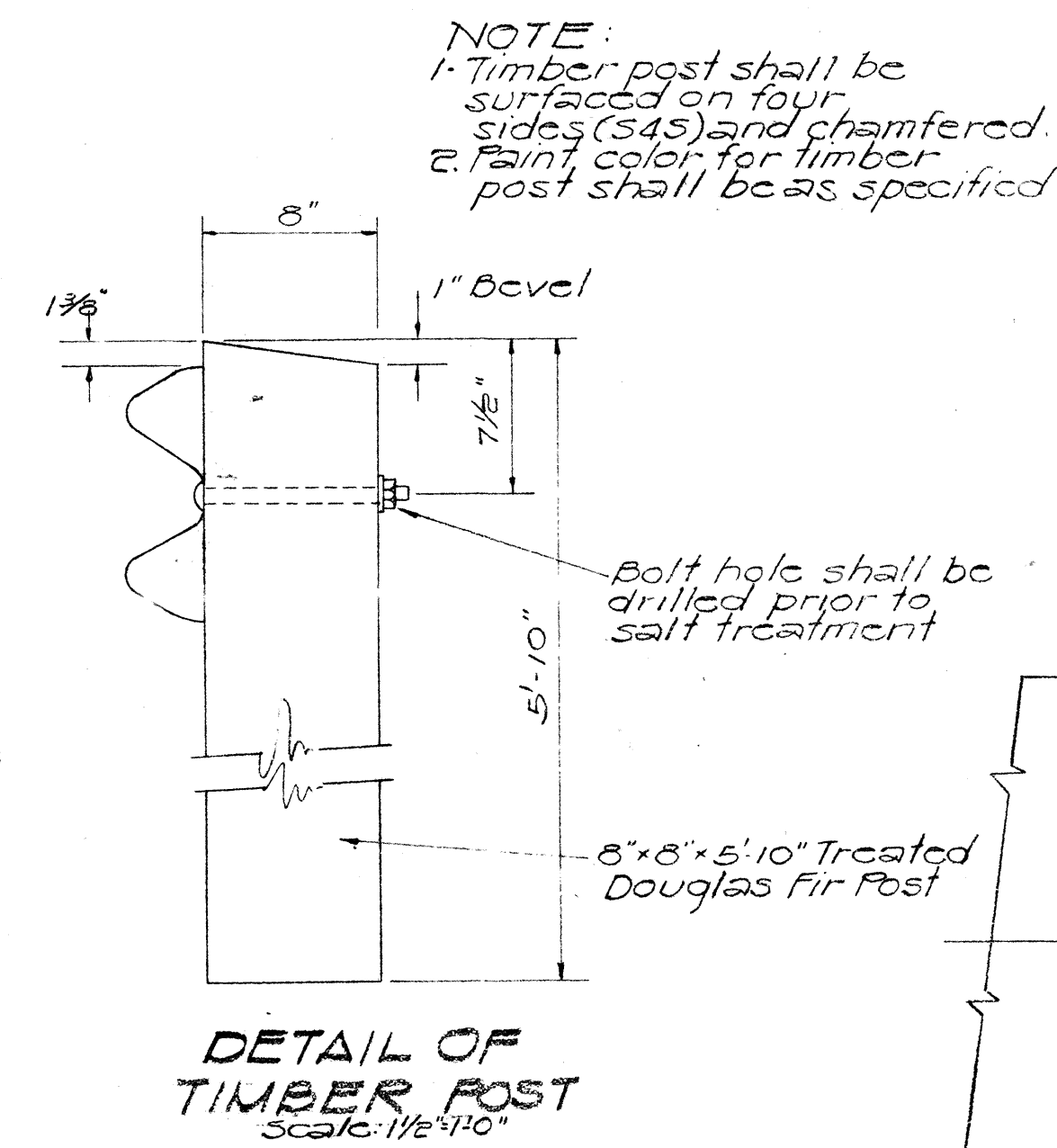
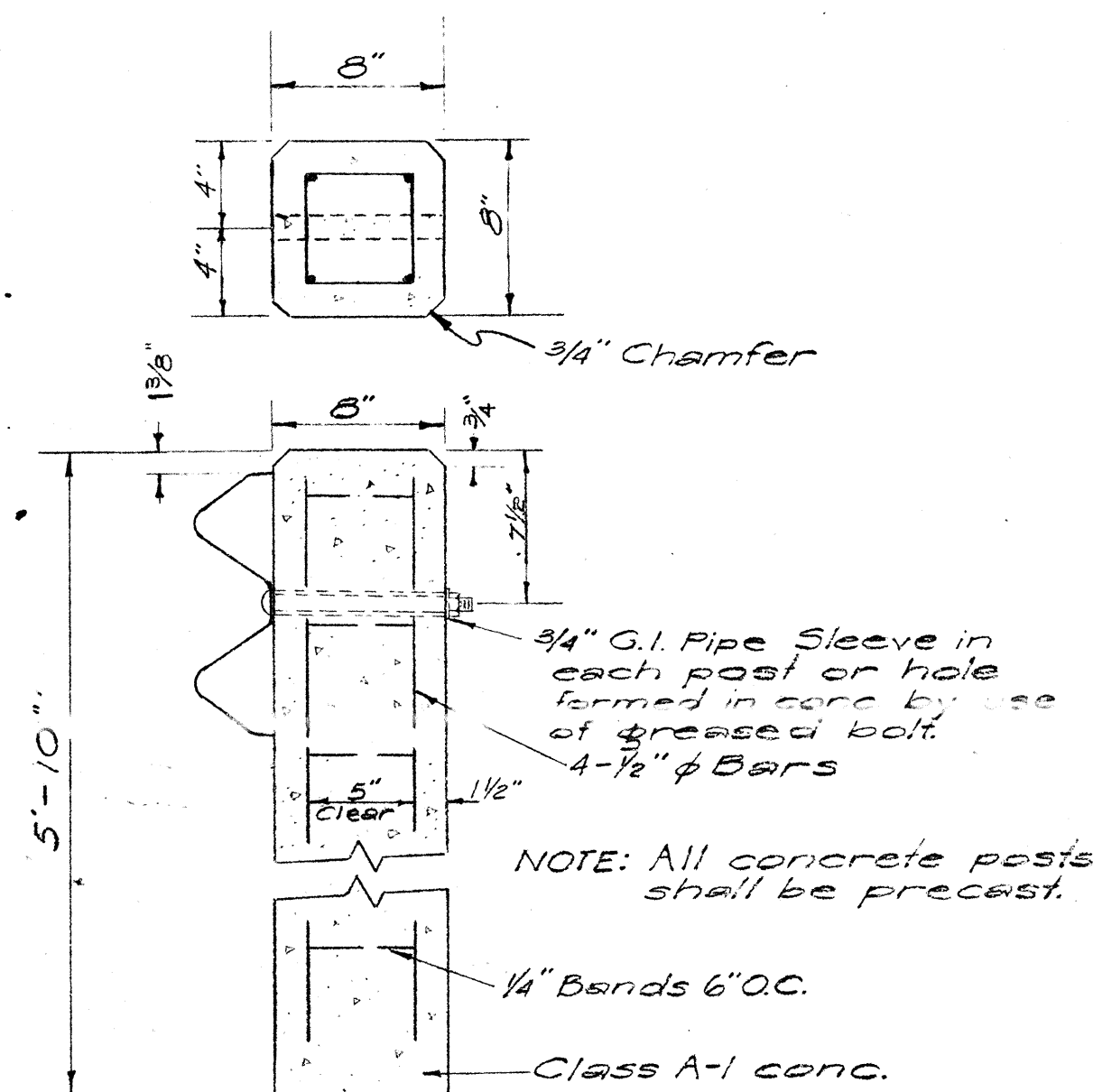
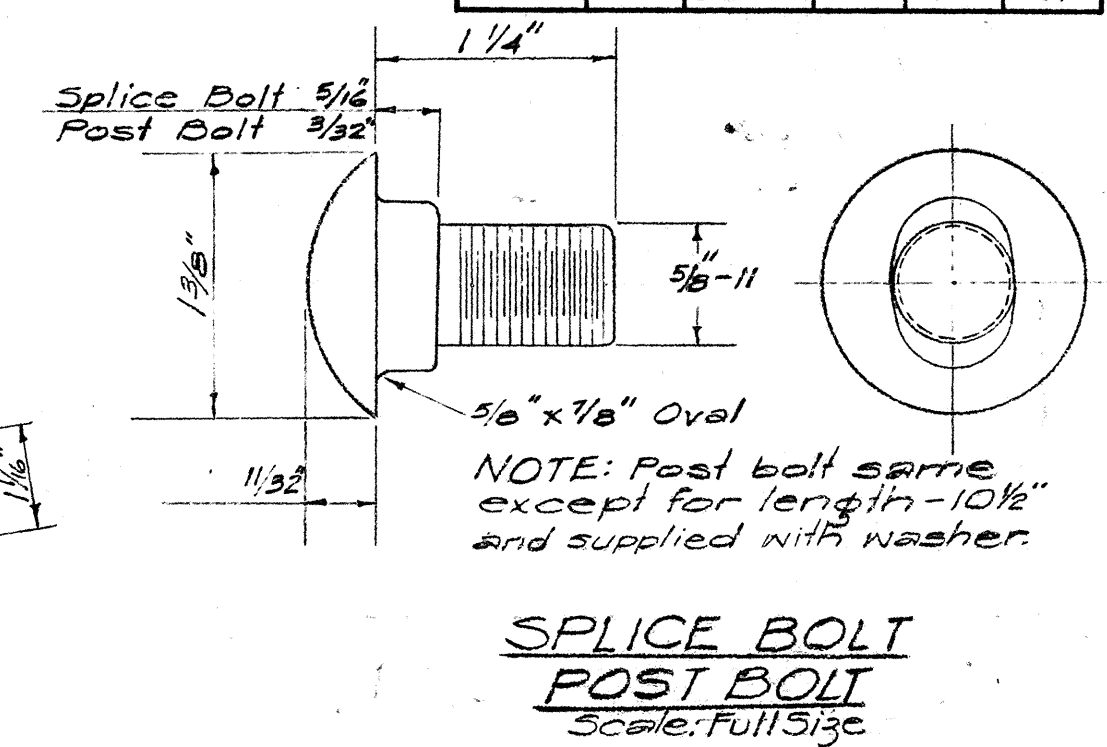
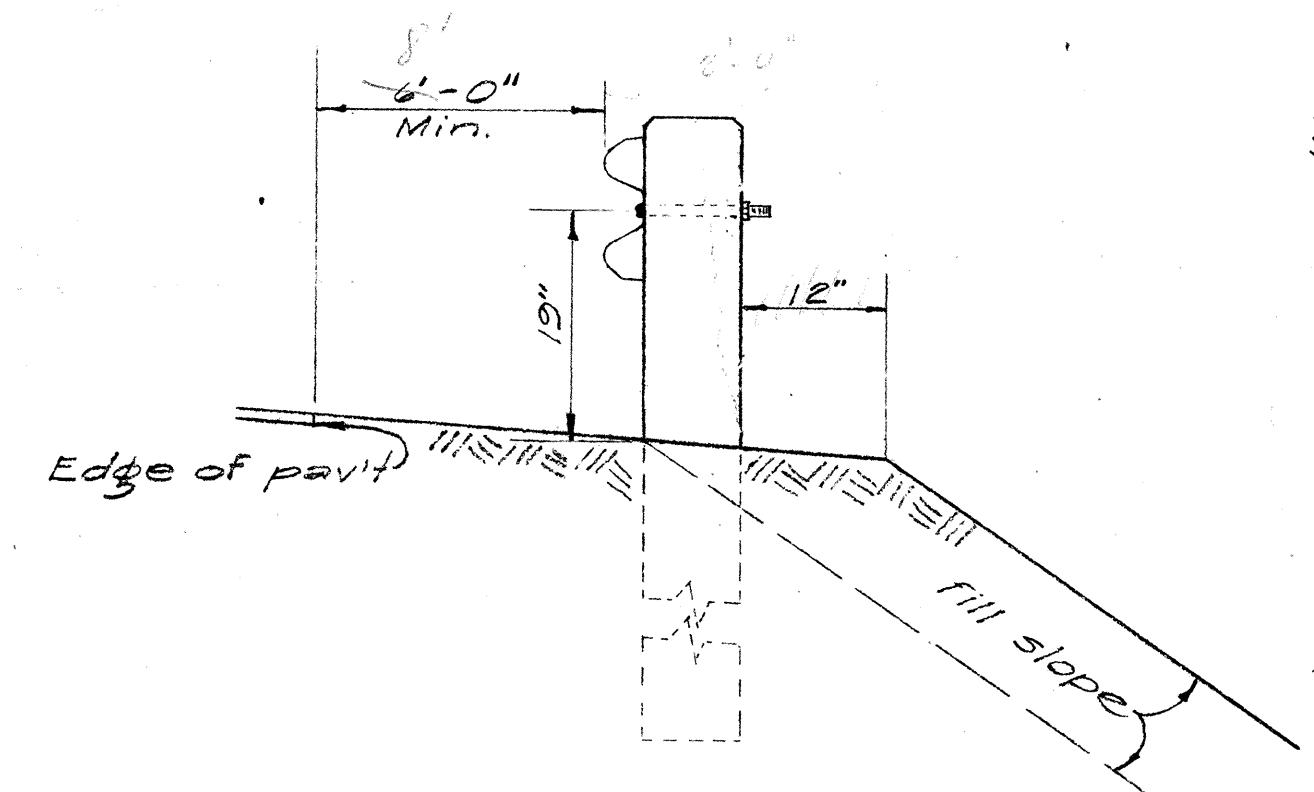
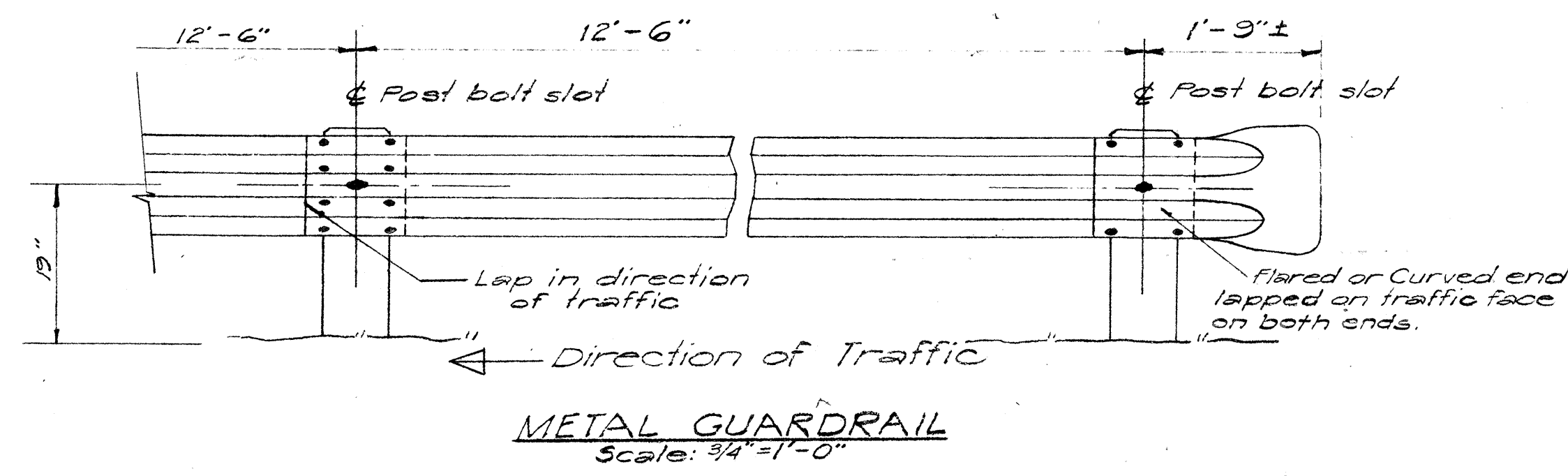
SECTION

LAYOUT SHOWING HURDLE PLACED BELOW CULVERT IN A POSITION WHICH WILL BE CATTLE TIGHT

DETAILS OF HURDLE



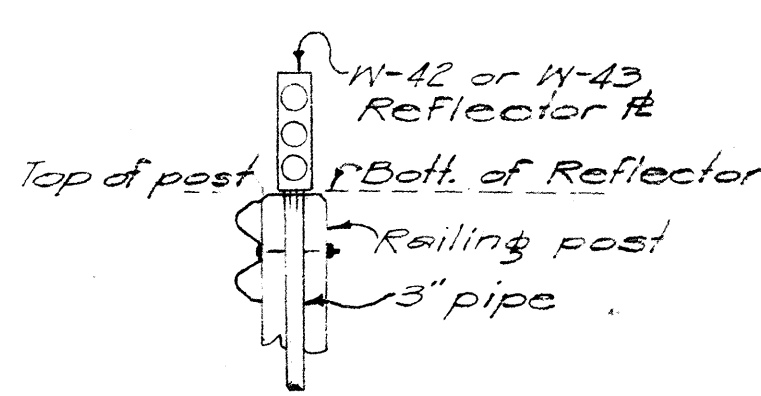
DEPARTMENT OF TRANSPORTATION
DIVISION OF HIGHWAYS
STATE OF HAWAII
STANDARD DETAILS
FENCES, GATES, GUARD RAILS,
GUIDE POSTS, CATTLE GUARD
SCALES AS NOTED



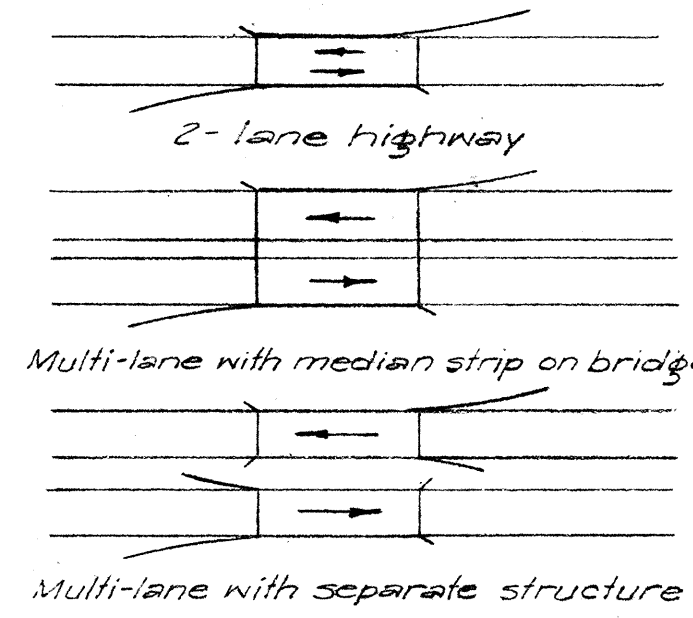
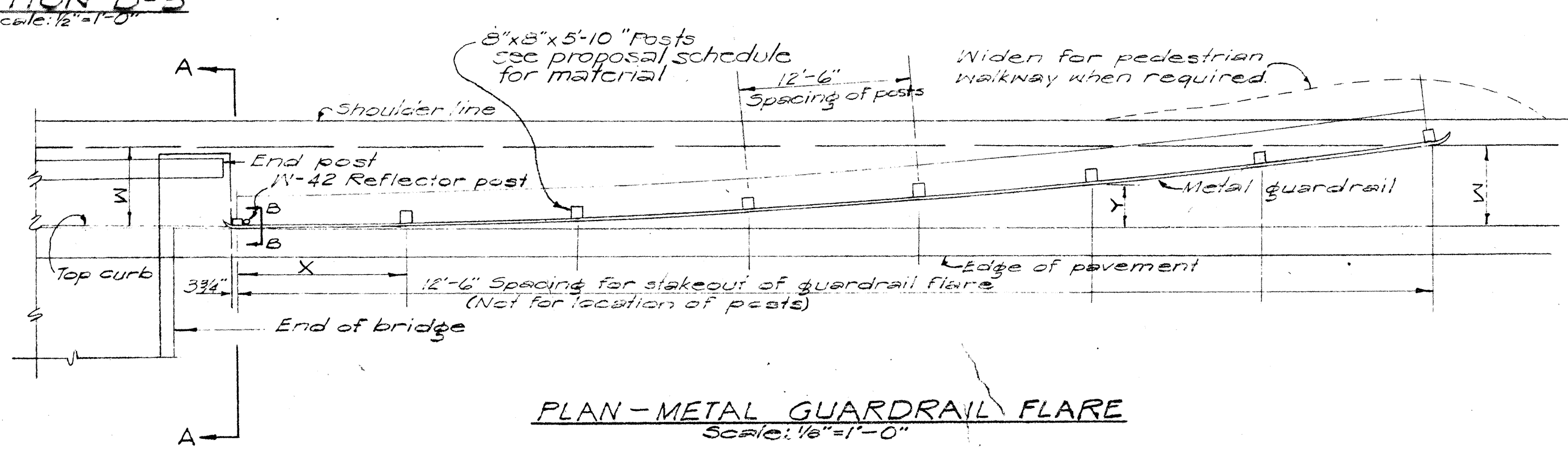
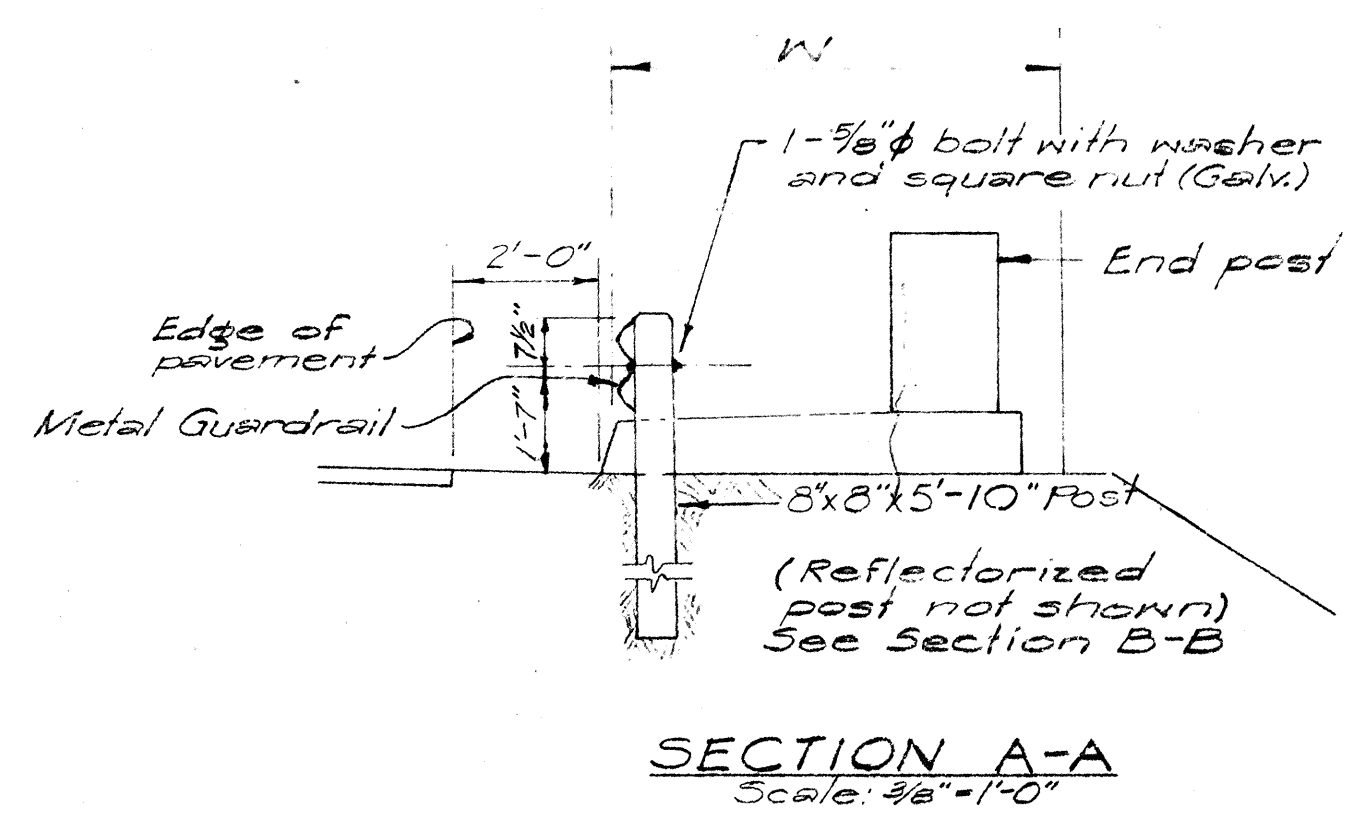
GUARDRAIL OFFSET

X	W=3'	W=4'	W=5'	W=6'	W=7'	W=8'
12.5	0.19	0.16	0.14	0.12	0.09	0.08
25.0	0.75	0.64	0.55	0.49	0.35	0.32
37.5	1.69	1.44	1.25	1.10	0.78	0.72
50.0	3.00	2.56	2.22	1.96	1.38	1.28
62.5		4.00	3.47	3.06	2.16	2.00
75.0			5.00	4.41	3.11	2.88
87.5				6.00	4.23	3.92
100.0					5.53	5.12
112.5					7.00	6.48
125.0						8.00

W = Guardrail Flare.
X = Distance from post at bridge to offset points.
Y = Guardrail Flare offset.



NOTE: See Regulatory & Warning Signs Sheet for details of W-42, W-43, and railing posts.



HAWAII STATE HIGHWAY DEPARTMENT
STATE OF HAWAII
DETAILS OF
METAL GUARD RAIL
HAWAII BELT ROAD
PROJ. No. F-017-1(1) UNIT 2
Scale: As Noted Jan. 1961

2/17/59
4/6/59
4/28/59

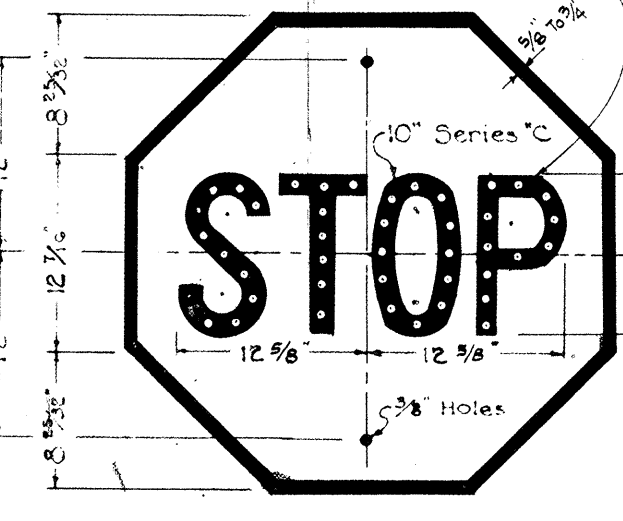
White Letters and Border on Red Background (background may be of red reflective sheeting). Letters to be reflectorized with buttons or reflective sheeting.

Note: All Regulatory and Warning Signs shall have 5/8" Bolt Holes.

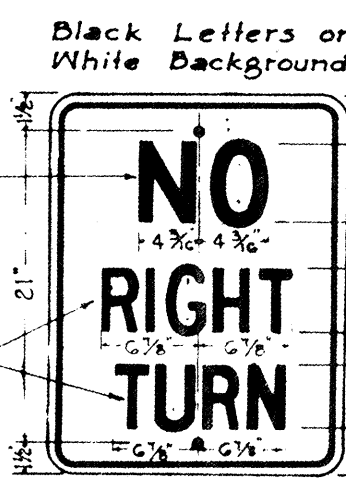
NOTE: Signs noted with an (R) designation indicate reflectorization with either buttons or reflective sheeting.

FED. ROAD DIST. NO.	STATE	FED. AID PROJ. NO.	FISCAL YEAR	SHEET NO.	TOTAL SHEETS
HAWAII	HAW.	101	1961	49	127

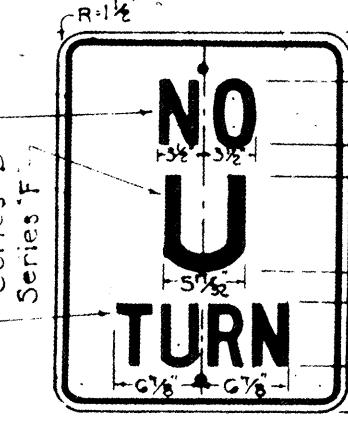
JULY 3, 1957



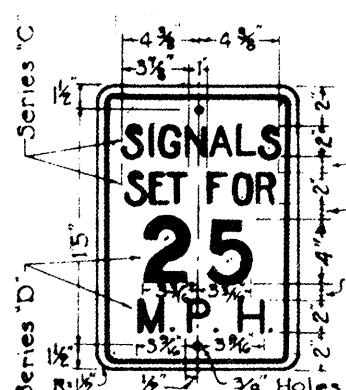
R-1
30" x 30"



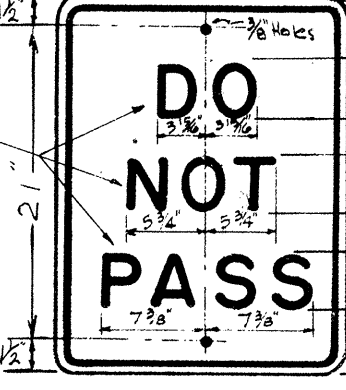
R-6
18" x 24"



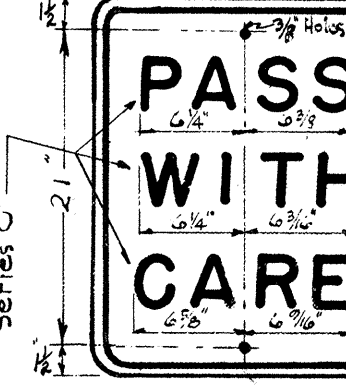
R-8
18" x 24"



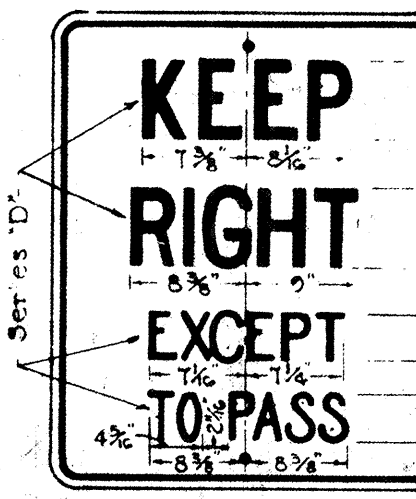
R-10
12" x 18"



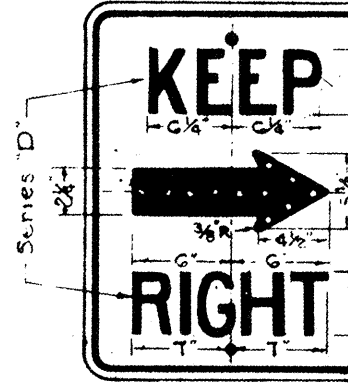
R-11
18" x 24"



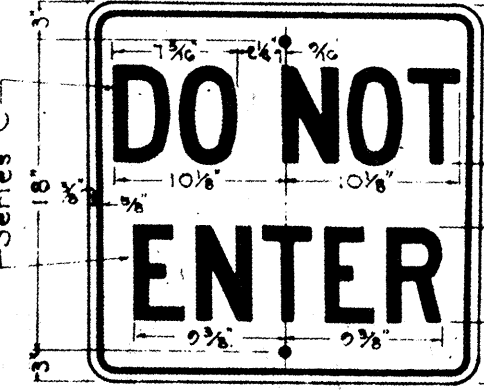
R-12
18" x 24"



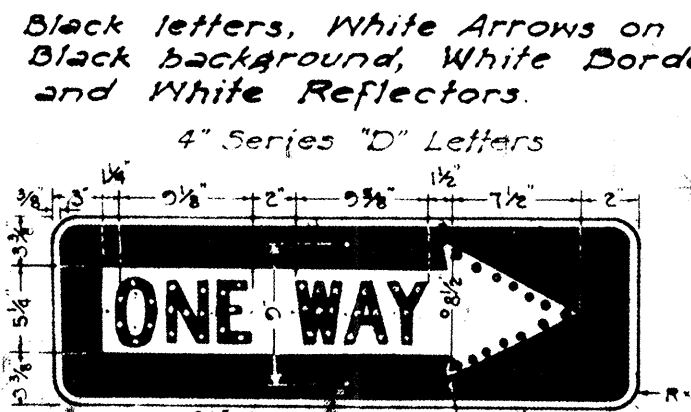
R-13
24" x 30"



R-14 (R)
18" x 24"



R-15
24" x 24"



R-16-R (R)
R-16-L (R)
36" x 12"



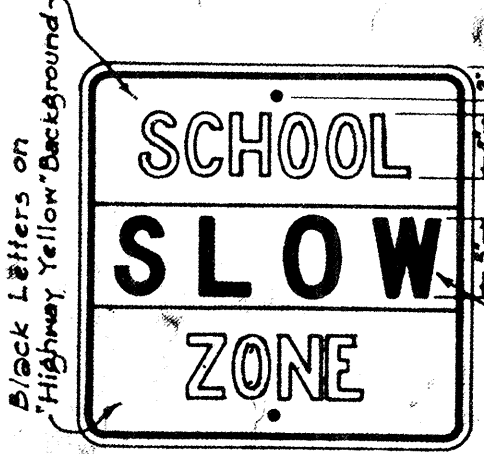
R-18
12" x 18"



R-26
12" x 18"



R-29
24" x 30"



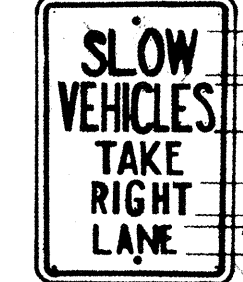
R-41-S
24" x 24"



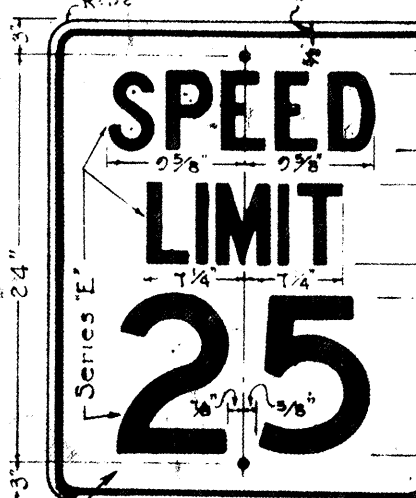
R-42-S
12" x 18"



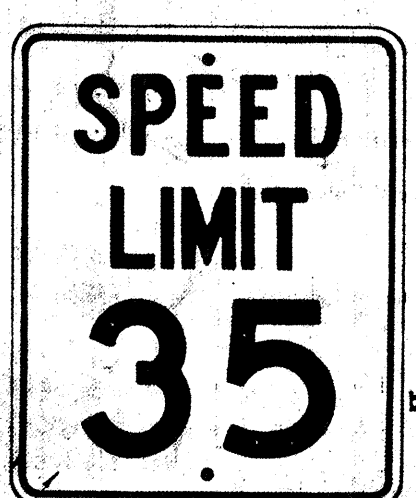
R-43-S
12" x 18"



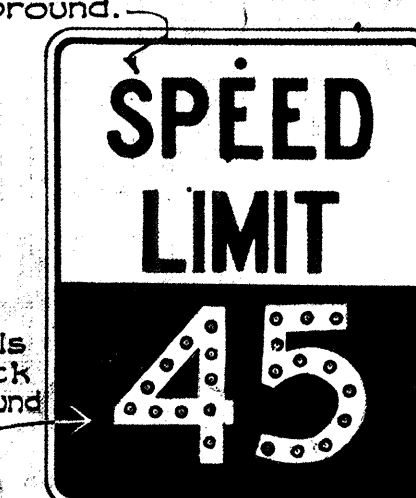
R-44-S
12" x 18"



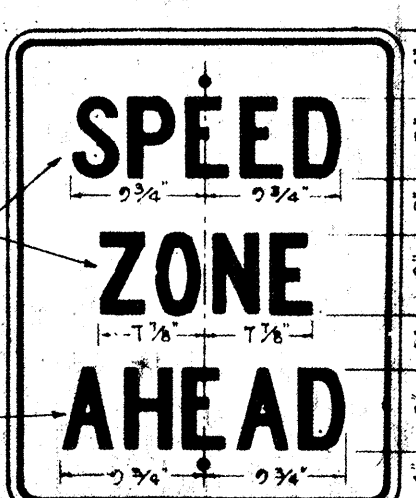
R-102-A
24" x 30"



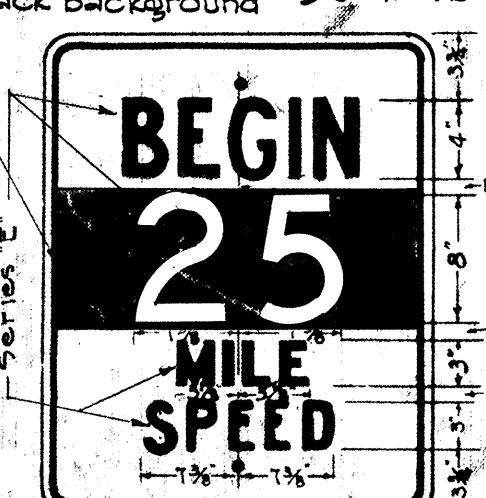
R-102-B
24" x 30"



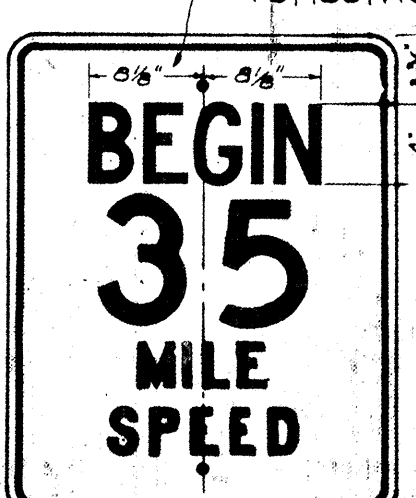
R-102-C (R)
24" x 30"



R-104
24" x 30"



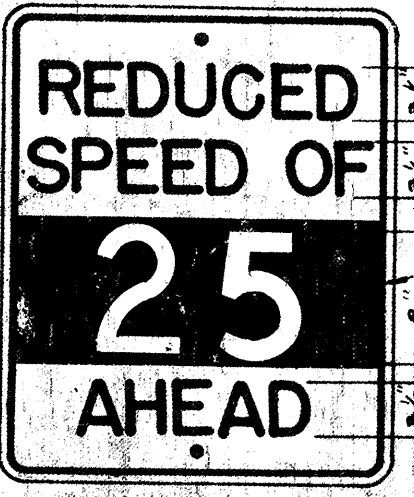
R-105-A (R)
24" x 30"



R-105-B
24" x 30"



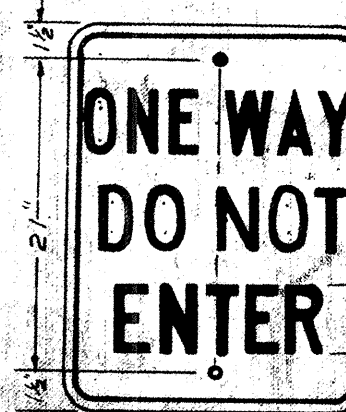
R-105-C
24" x 30"



R-104-A
24" x 30"



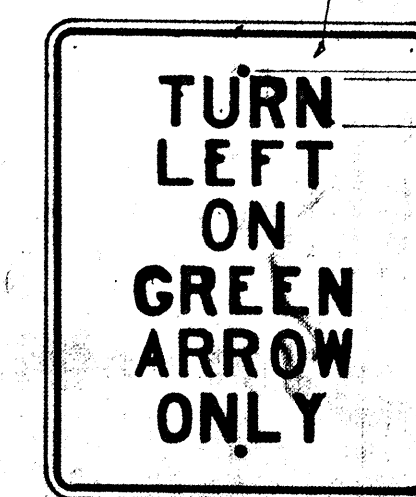
R-7
18" x 24"



R-66
18" x 24"



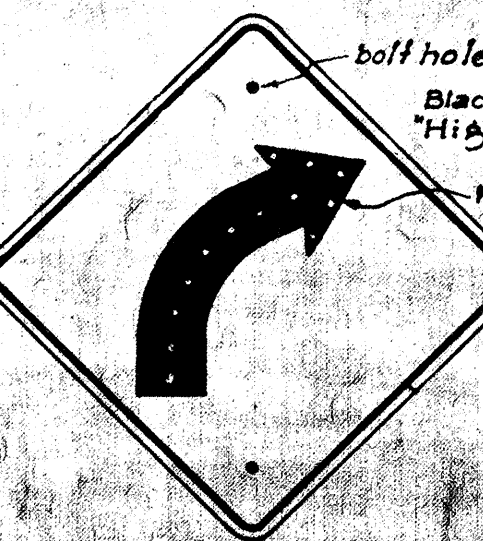
R-106
24" x 30"



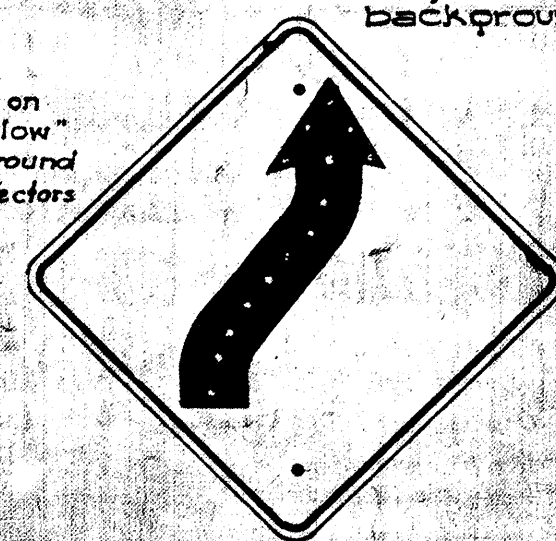
R-107-A
24" x 30"



R-14-A
24" x 24"



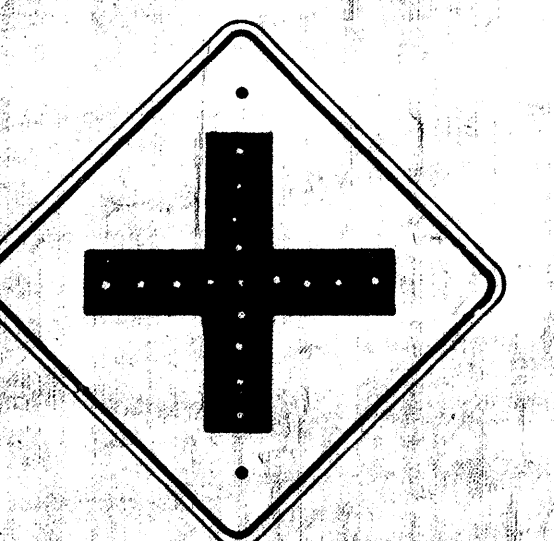
W-2-R
W-2-L
24" x 24"



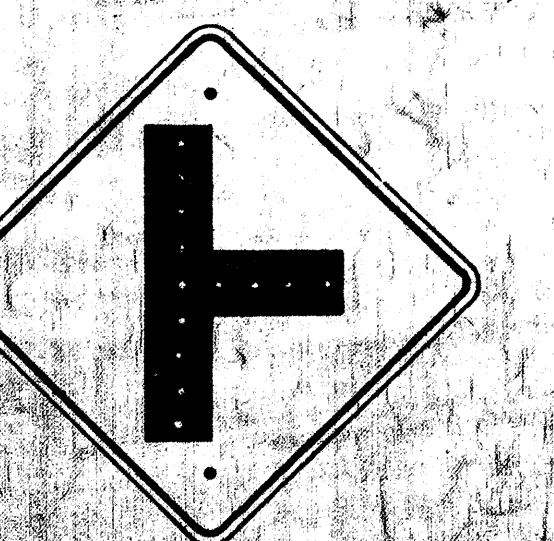
W-4-R
W-4-L
24" x 24"



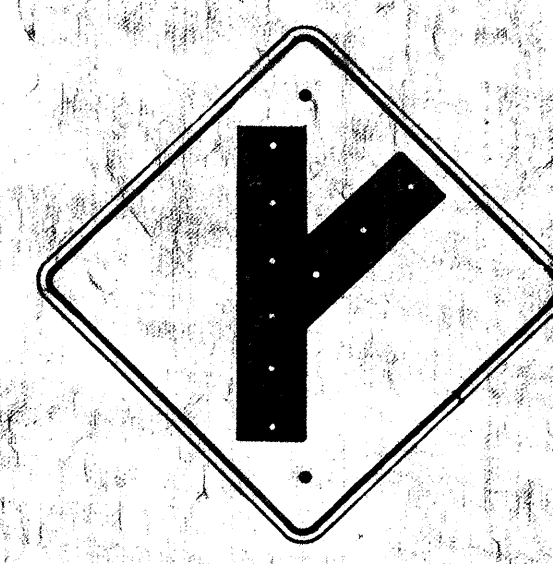
W-5-R
W-5-L
24" x 24"



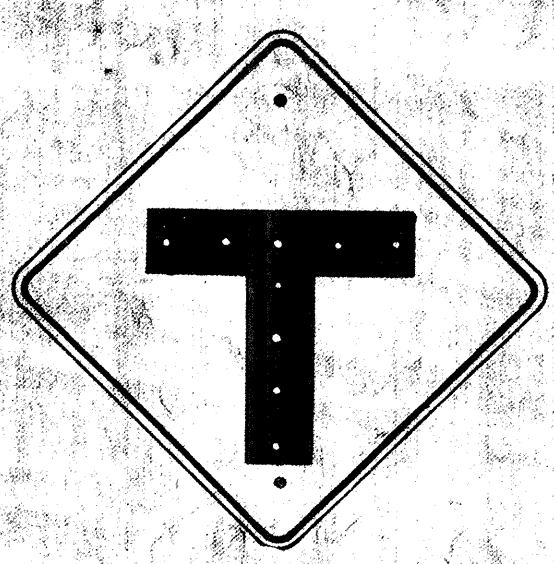
W-6
30" x 30"



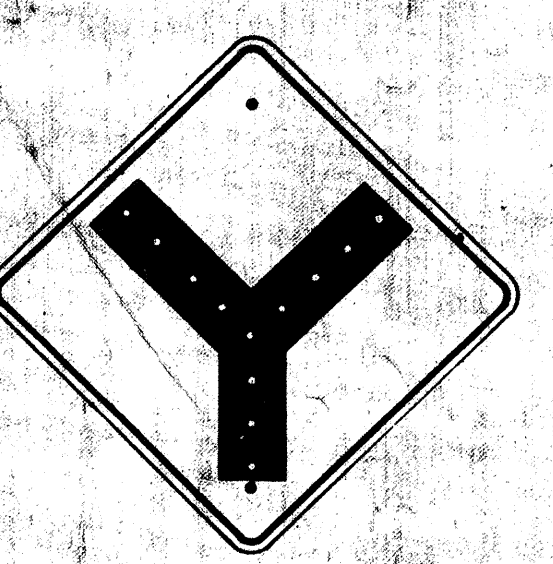
W-7
24" x 24"



W-8-R
W-8-L
24" x 24"



W-9
24" x 24"



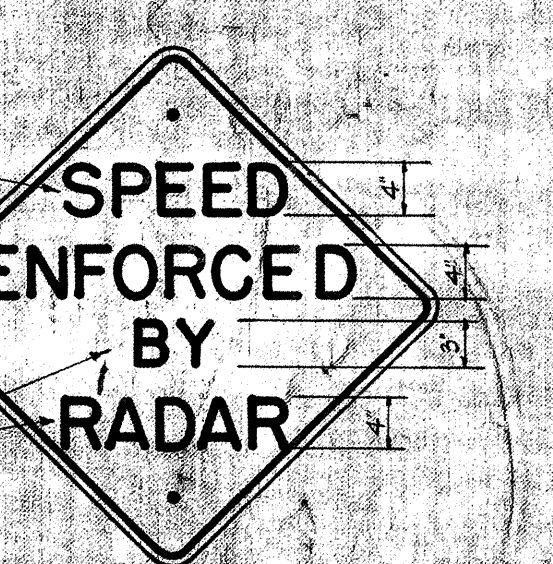
W-10
24" x 24"



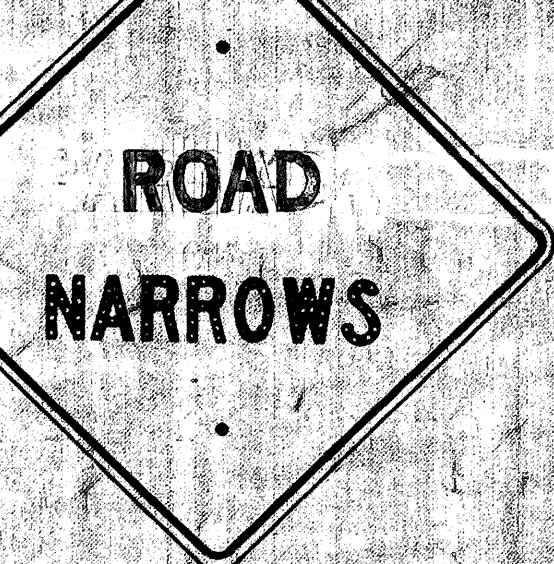
W-13
24" x 24"



W-14
24" x 24"



W-40
24" x 24"



W-19
36" x 36"



W-20
30" x 30"



W-21
30" x 30"



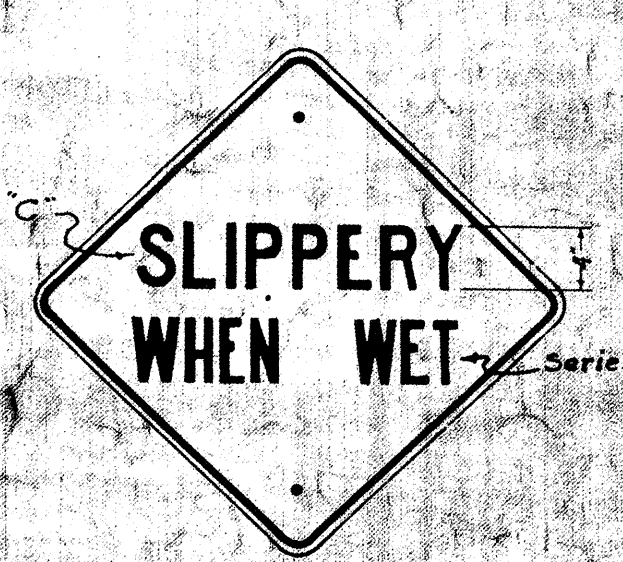
W-22
24" x 24"



W-24
30" x 30"



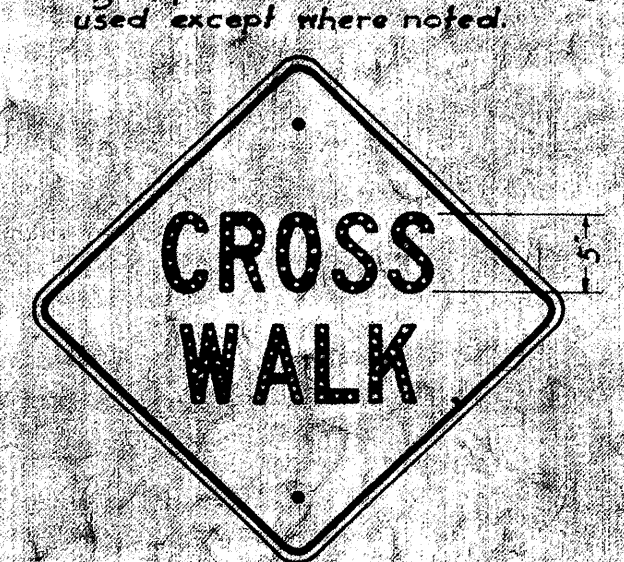
W-25
24" x 24"



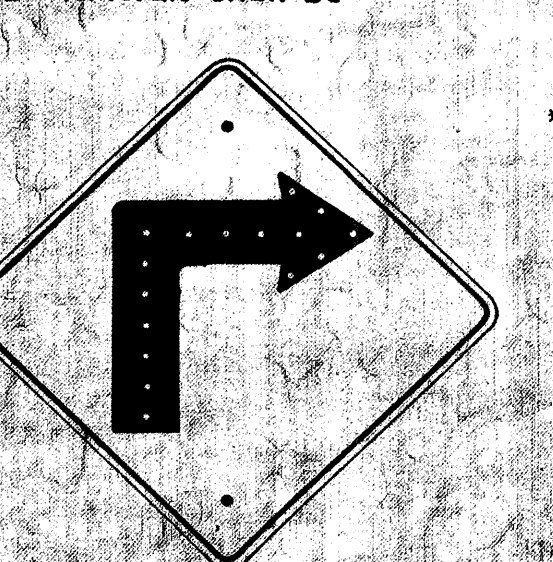
W-29
24" x 24"



W-59
24" x 24"



W-39
24" x 24"



W-1-R
W-1-L
24" x 24"

NOTE: R-104 A,B,C signs with (R) designation shall have white numerals reflectorized with buttons or reflective sheeting on a black background.

NOTE: R-102, A,B,C signs with (R) designation: Lower half with white numerals, reflectorized with buttons or reflective sheeting, on black background.

NOTE: R-105, A,B,C signs with (R) designation shall have white numerals, reflectorized with buttons or reflective sheeting on a black background.

Background may be made of Yellow Reflective sheeting.

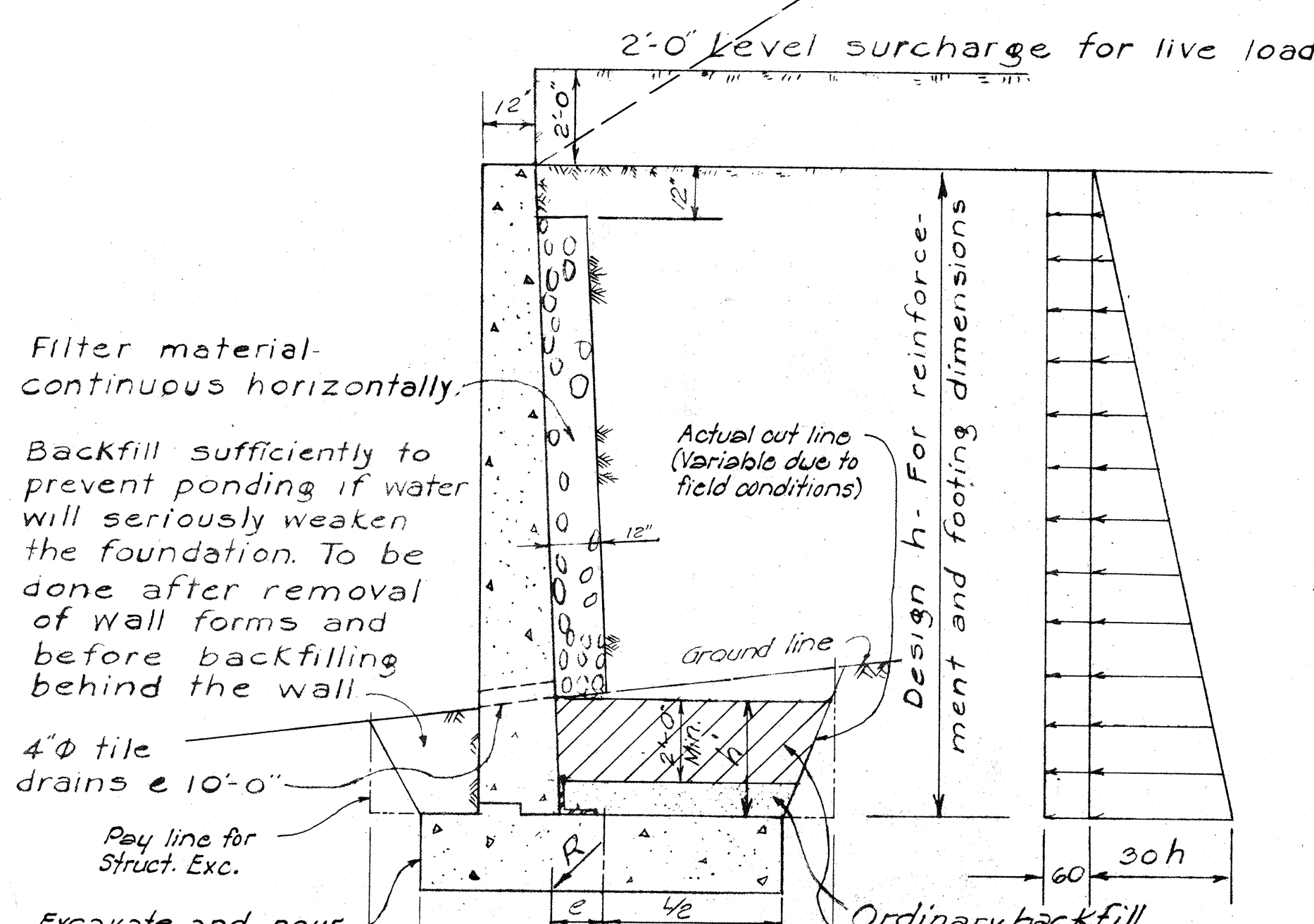
Unless otherwise specified, all signs shall conform with requirements of "Manual on Uniform Traffic Control Devices for Streets and Highways."

All letters and figures shall be of size and design shown and shall conform with "Standard Alphabets for Highway Signs" as set forth by the Public Roads Administration, Federal Works Agency. Series "C" letters and Series "D" numerals shall be used except where noted.

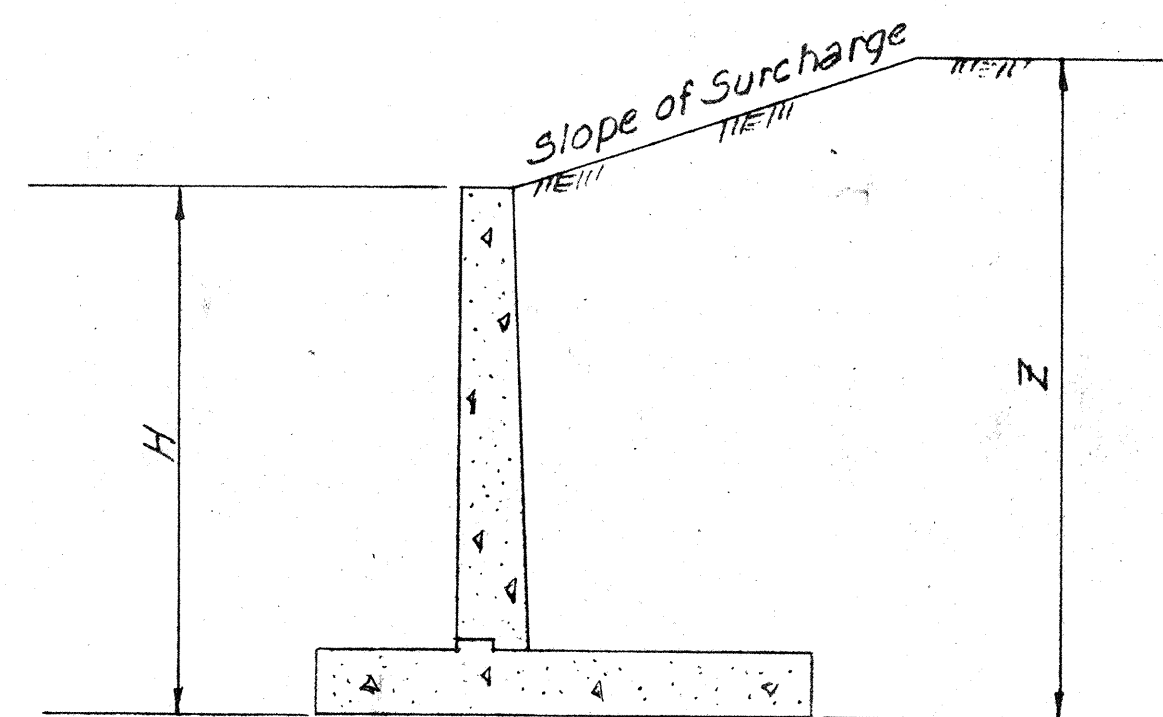
Note: All Regulatory signs shall have black letters on a white background except where noted. All Warning (W) signs shall have black letters or figures on a "Highway Yellow" background. *Signs shall be similar but opposite in direction. See Specifications for Materials and Finish.

DEPARTMENT OF TRANSPORTATION
DIVISION OF HIGHWAYS
STATE OF HAWAII
REGULATORY & WARNING SIGNS
Scale: 1" = 1' DATE: JAN. 29, 1959
APPROVED: _____
STATE HIGHWAY ENGINEER

May 1959
July 1960
Sept. 1960



DESIGN AND DRAINAGE



SPECIAL CASES:

Retaining walls shown are also applicable for the following conditions of loading:

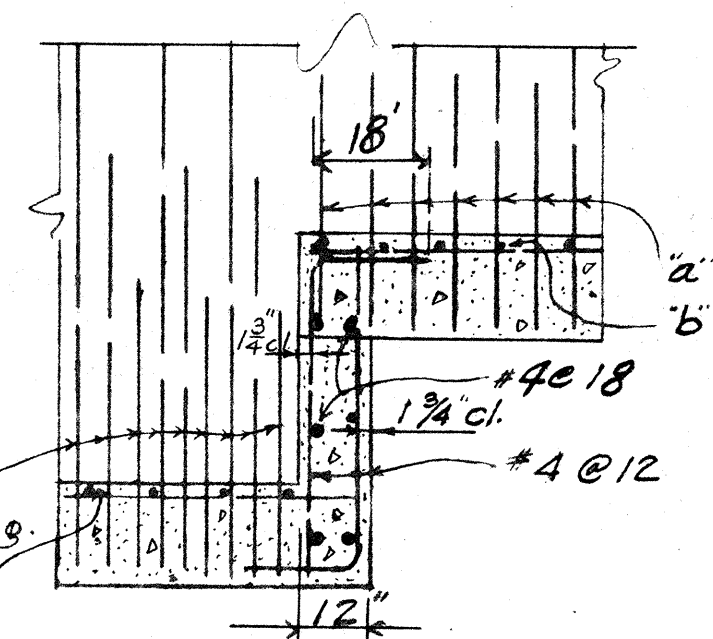
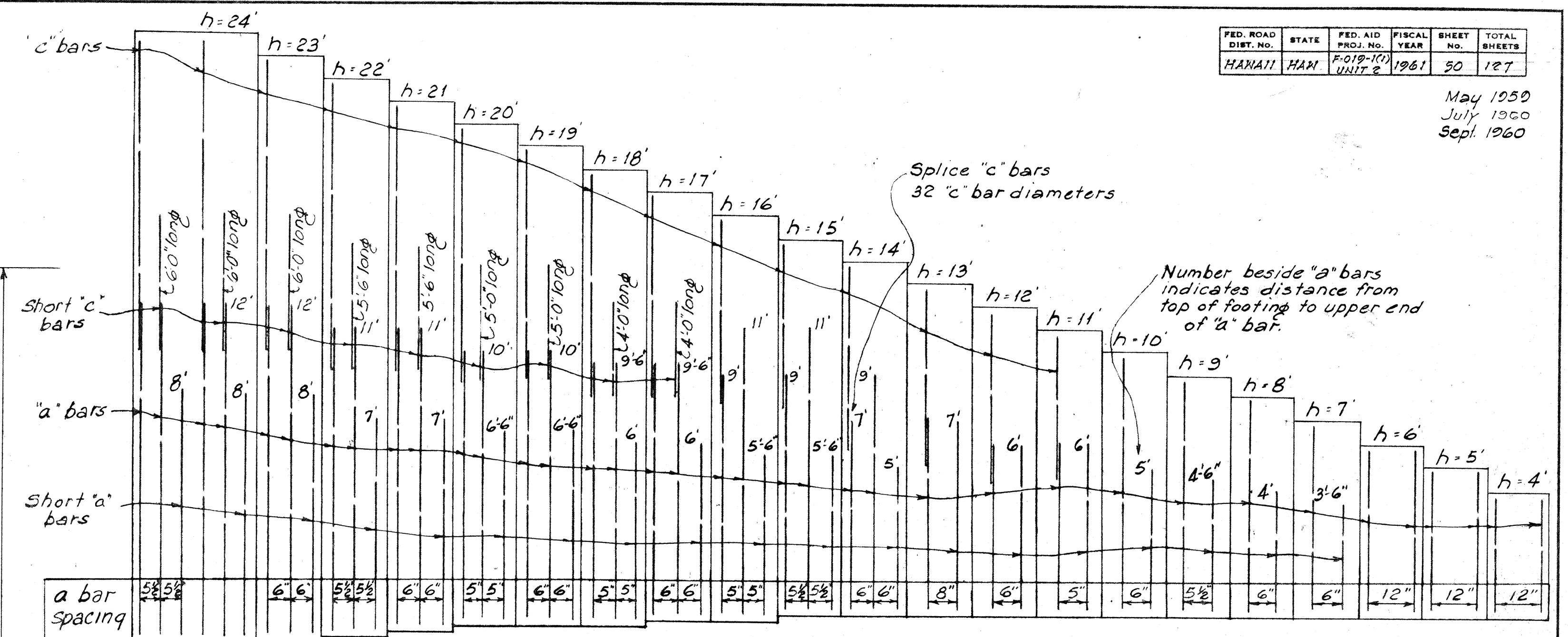
- For h = 4' to 7'
1.5:1 or less sloping surcharge unlimited.
- For h of 8 and 9'
1.5:1 sloping surcharge limited to $\frac{H}{h} = 2.3$
- For h of 10 and 11'
1.5:1 sloping surcharge unlimited.
- For h of 12 and 13'
1.5:1 sloping surcharge limited to $\frac{H}{h} = 1.8$
- For h of 14 and 15'
1.5:1 sloping surcharge unlimited.
- For h of 16 and 17'
1.5:1 sloping surcharge limited to $\frac{H}{h} = 1.4$
- For h of 18 to 21'
2.7:1 or less sloping surcharge unlimited.
- For h of 22 to 24'
3:1 sloping surcharge unlimited

* Special cases are not applicable if traffic can come within a distance from the top of the stem equal to one-half its height.

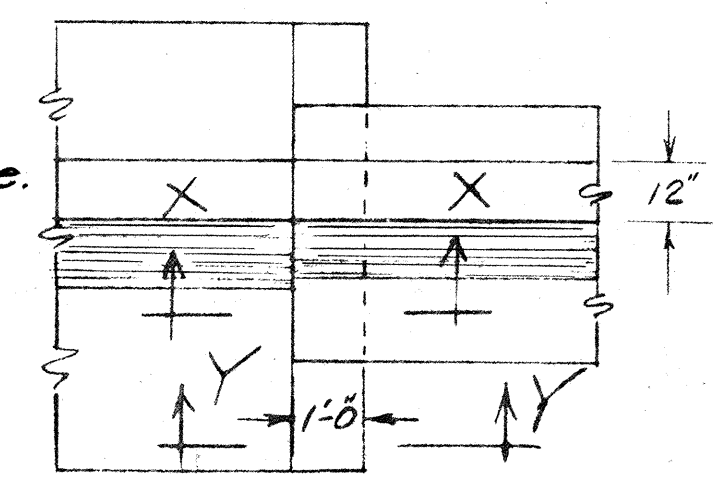
** When footing is on rock, L shall be reduced to $L_p = 0.4(h+t+2')$ to increase footing pressure. L_p shall be measured from the toe. Adjust footing design accordingly.

TABLE OF DIMENSIONS AND REINFORCING STEEL																							
h	4'	5'	6'	7'	8'	9'	10'	11'	12'	13'	14'	15'	16'	17'	18'	19'	20'	21'	22'	23'	24'		
a	6"	6"	6"	12"	12"	12"	12"	12"	12"	12"	15"	18"	21"	24"	24"	24"	27"	30"	33"	36"	39"		
* * L	2.5'	3.0'	3.5'	4.0'	4.5'	5.0'	5.5'	6.0'	6.5'	7.0'	7.75'	8.25'	9.0'	9.75'	10.5'	11.5'	12.5'	13.5'	14.5'	15.25'	16.0'		
t	14"	14"	14"	14"	14"	14"	14"	18"	18"	18"	18"	18"	21"	21"	24"	24"	24"	27"	30"	31"	33"		
"a" bars	#3 @ 12	#3 @ 12	#4 @ 12	#3 @ 6	#4 @ 6	#4 @ 5½	#5 @ 6	#5 @ 5	#6 @ 6	#6 @ 8	#6 @ 6	#6 @ 5½	#6 @ 5	#7 @ 6	#7 @ 5	#8 @ 6	#8 @ 5	#9 @ 6	#9 @ 5½	#10 @ 6	#10 @ 5½		
"b" bars	#3 @ 12	#3 @ 12	#3 @ 12	#3 @ 12	#3 @ 12	#4 @ 11	#5 @ 12	#5 @ 10	#5 @ 6	#6 @ 8	#6 @ 6	#6 @ 5½	#6 @ 5	#7 @ 6	#7 @ 5	#9 @ 6	#9 @ 5	#10 @ 6	#10 @ 5½	#11 @ 6	#11 @ 5½		
"c" bars	—	—	—	—	—	—	—	#4	#4	#4	#4	#4	#4	#4	#4	#5	#5	#6	#6	#7	#7		
F.S. Sliding *	1.30	1.29	1.28	1.16	1.17	1.18	1.17	1.17	1.20	1.23	1.25	1.21	1.25	1.26	1.33	1.39	1.42	1.48	1.53	1.53	1.54		
F.S. Overturning	1.38	1.45	1.50	1.54	1.61	1.64	1.63	1.71	1.76	1.81	1.96	1.97	2.05	2.19	2.47	2.49	2.70	2.85	3.02	3.06	3.11		
Concr. c.y./ft	0.26	0.32	0.37	0.43	0.49	0.55	0.61	0.74	0.81	1.00	1.10	1.19	1.37	1.49	1.69	1.83	1.97	2.26	2.53	2.72	2.97		
Steel lbs./ft	11.1	13.3	17.7	20.0	27.3	32.8	43.8	51.0	67.7	52.6	76.2	87.8	103.7	125.8	145.4	178.3	222.7	249.2	278.4	339.0	376.6		
Eccentricity e	0.88'	1.01'	1.14	1.21	1.20	1.42	1.63	1.63	1.74	1.83	1.83	1.89	1.93	1.89	1.98	1.94	1.86	2.00	1.75	1.82	1.82		
Toe Pressure	2800	2600	3200	2800	2900	3200	3700	3600	3800	4100	3800	3900	3900	3800	3800	4000	3900	4100	3900	4100	4100		

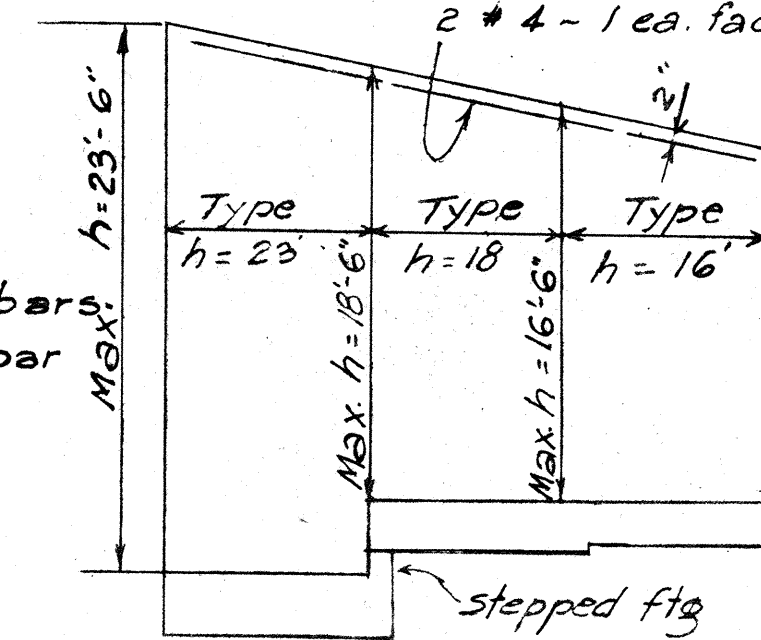
* F.S. Against Sliding based on friction factor of 0.40



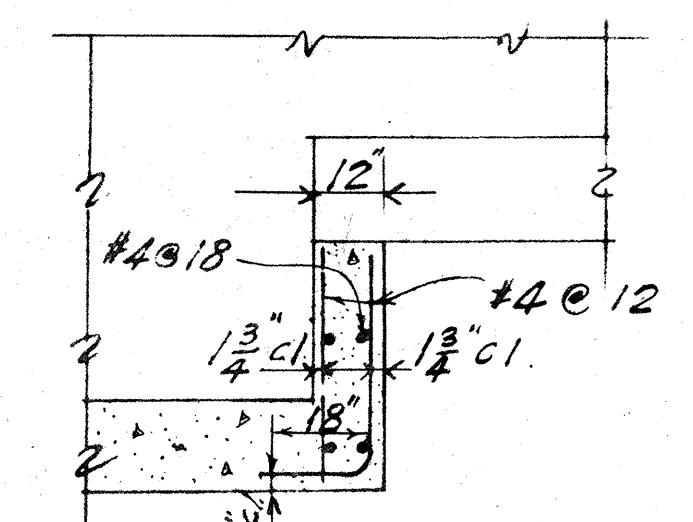
SECTION X-X
 $\frac{3}{8}" = 1'-0"$



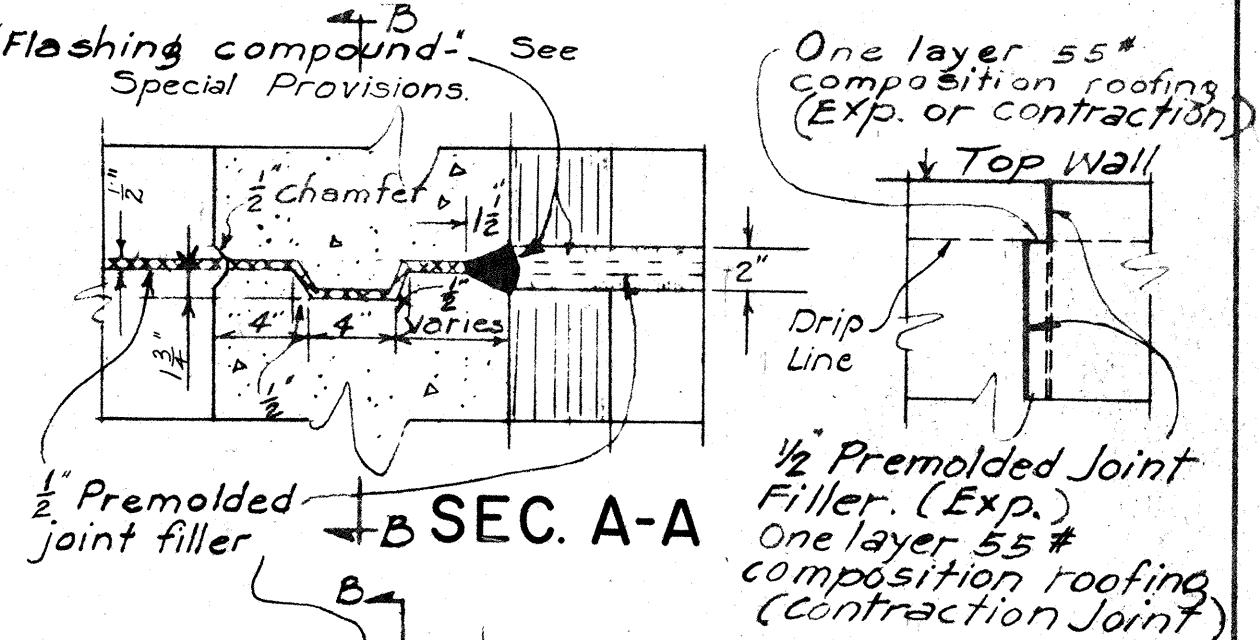
FOOTING STEP



TYPICAL ARRANGEMENT FOR SLOPING WALLS



SECTION Y-Y
 $\frac{3}{8}" = 1'-0"$



JOINT DETAIL

(Spacing of Joints)
Contraction Joint - 30'-0" Max.
Expansion Joint - 20'-0" Max.

GENERAL NOTE

Except where detailed otherwise in the plans, all details on this sheet govern.

APPROVED: DATE: Aug. 26, 1959
DIRECTOR

STATE OF HAWAII
DEPARTMENT OF TRANSPORTATION
DIVISION OF HIGHWAYS

RETAINING WALL STANDARDS

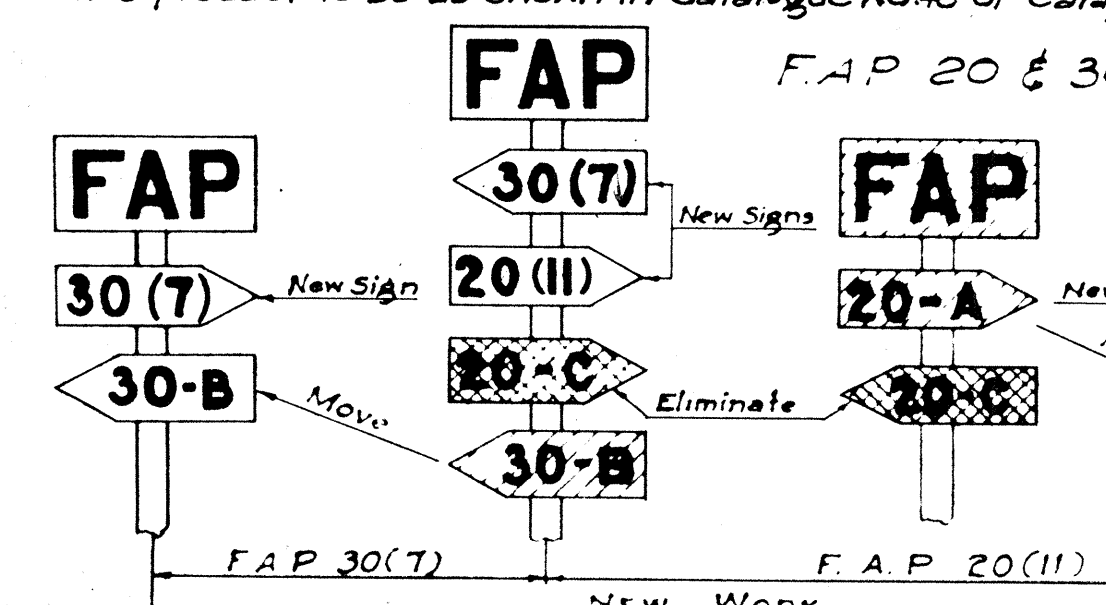
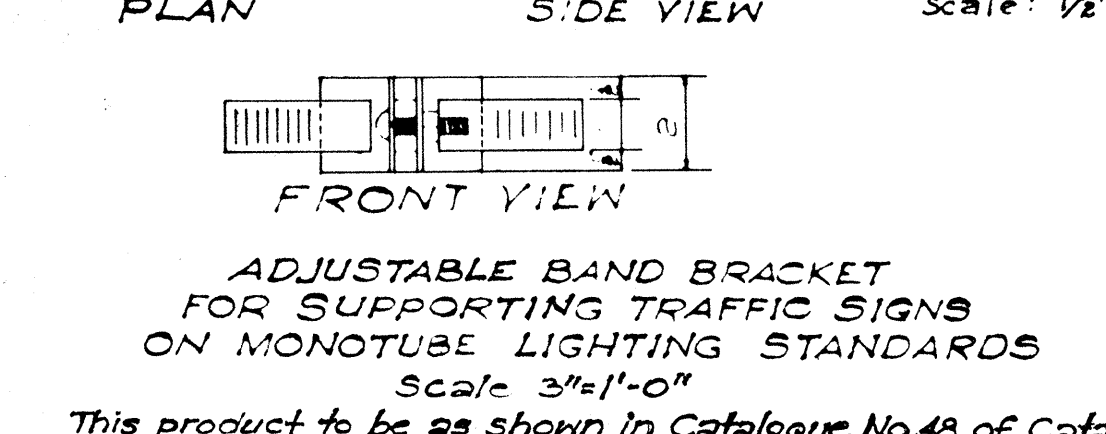
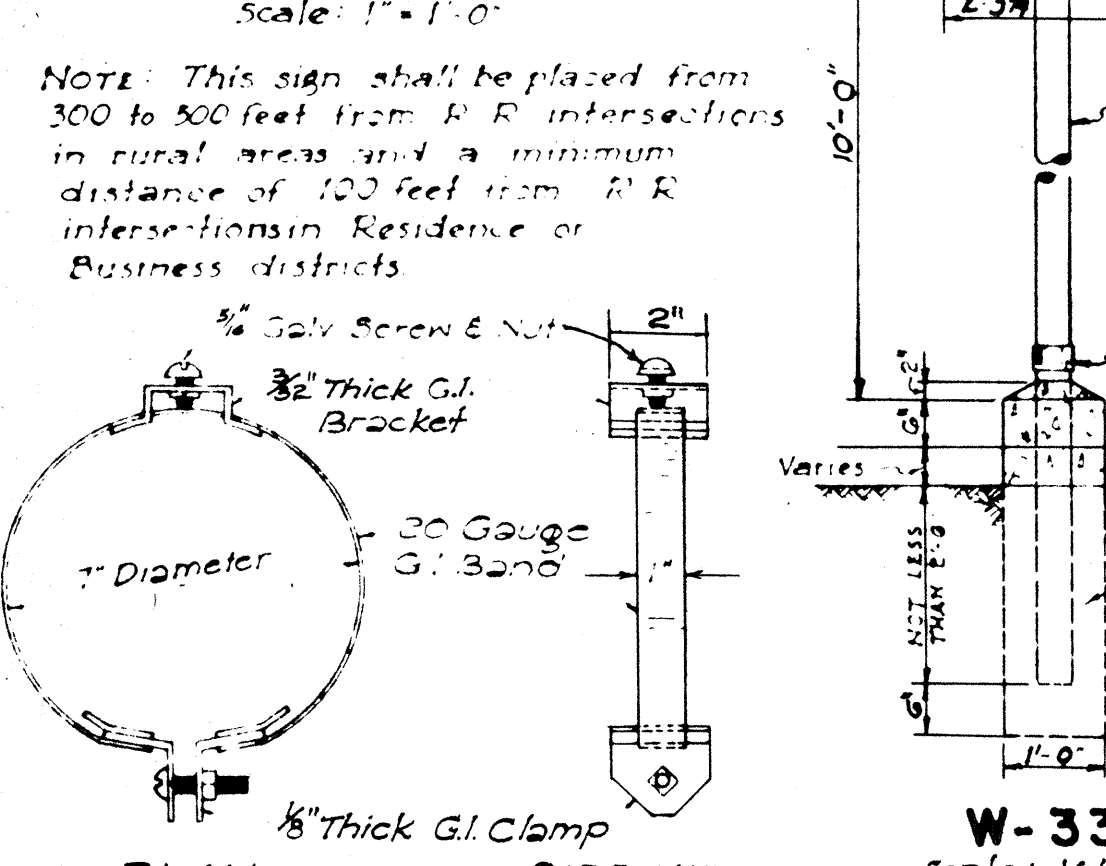
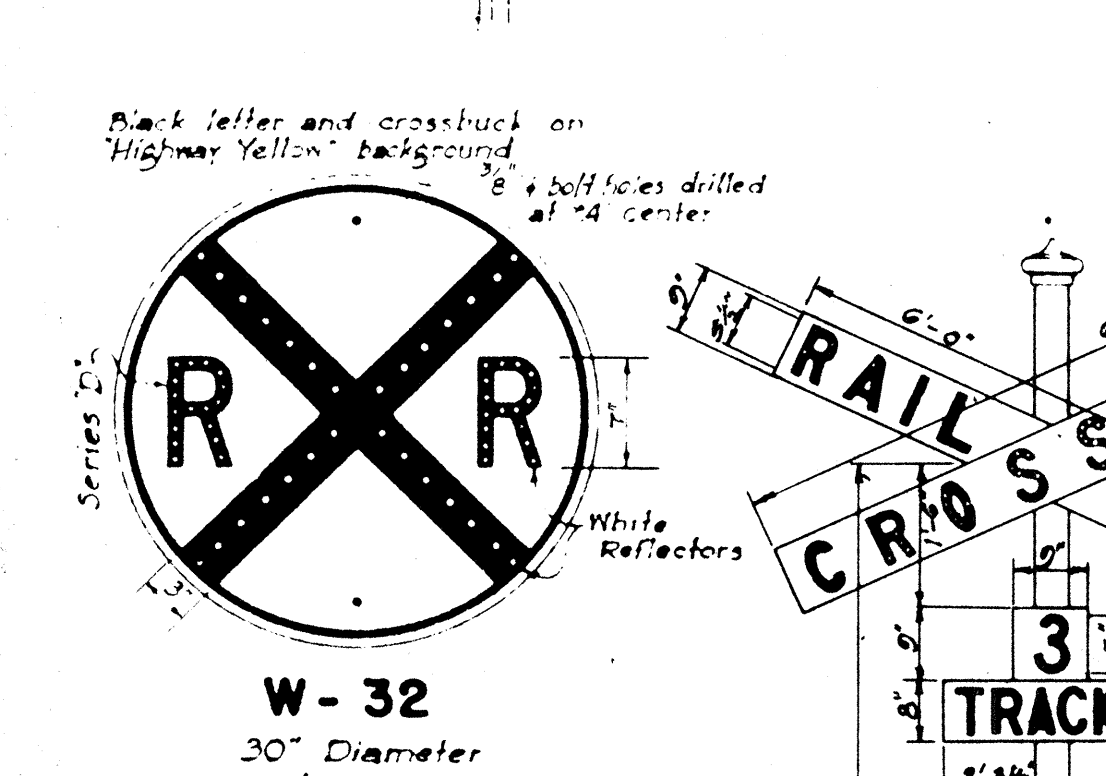
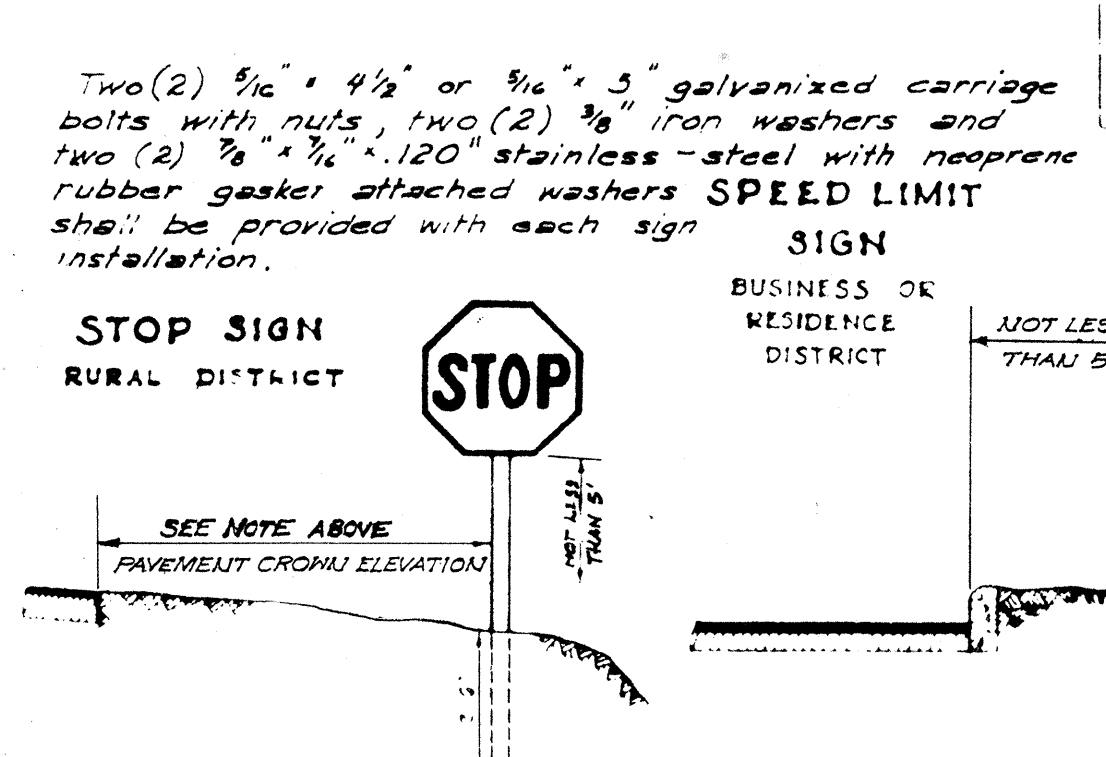
SCALES AS NOTED MAY 1956

SHEET No. OF SHEETS

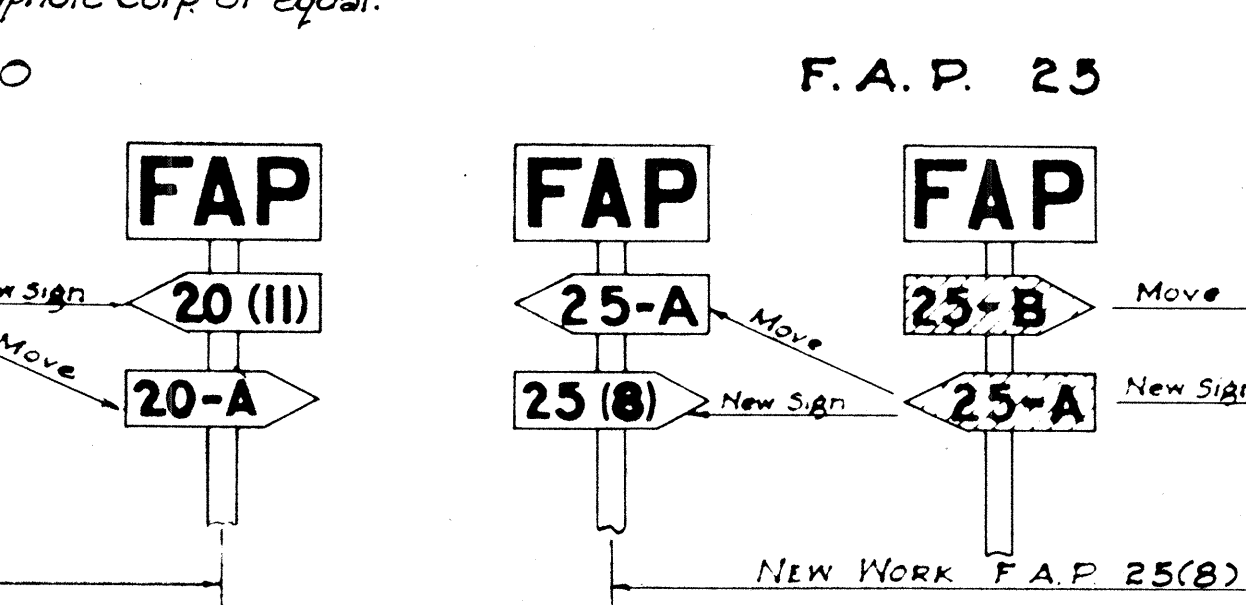
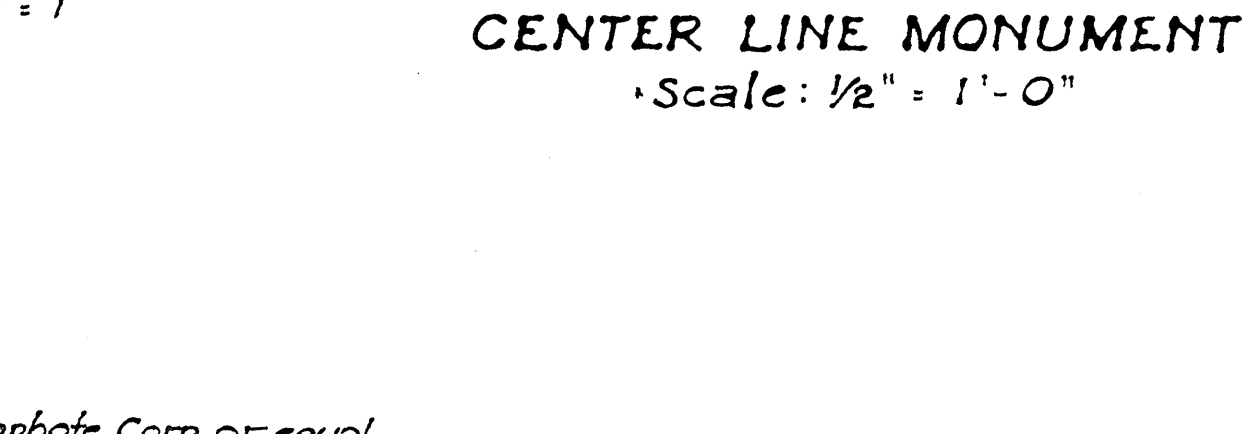
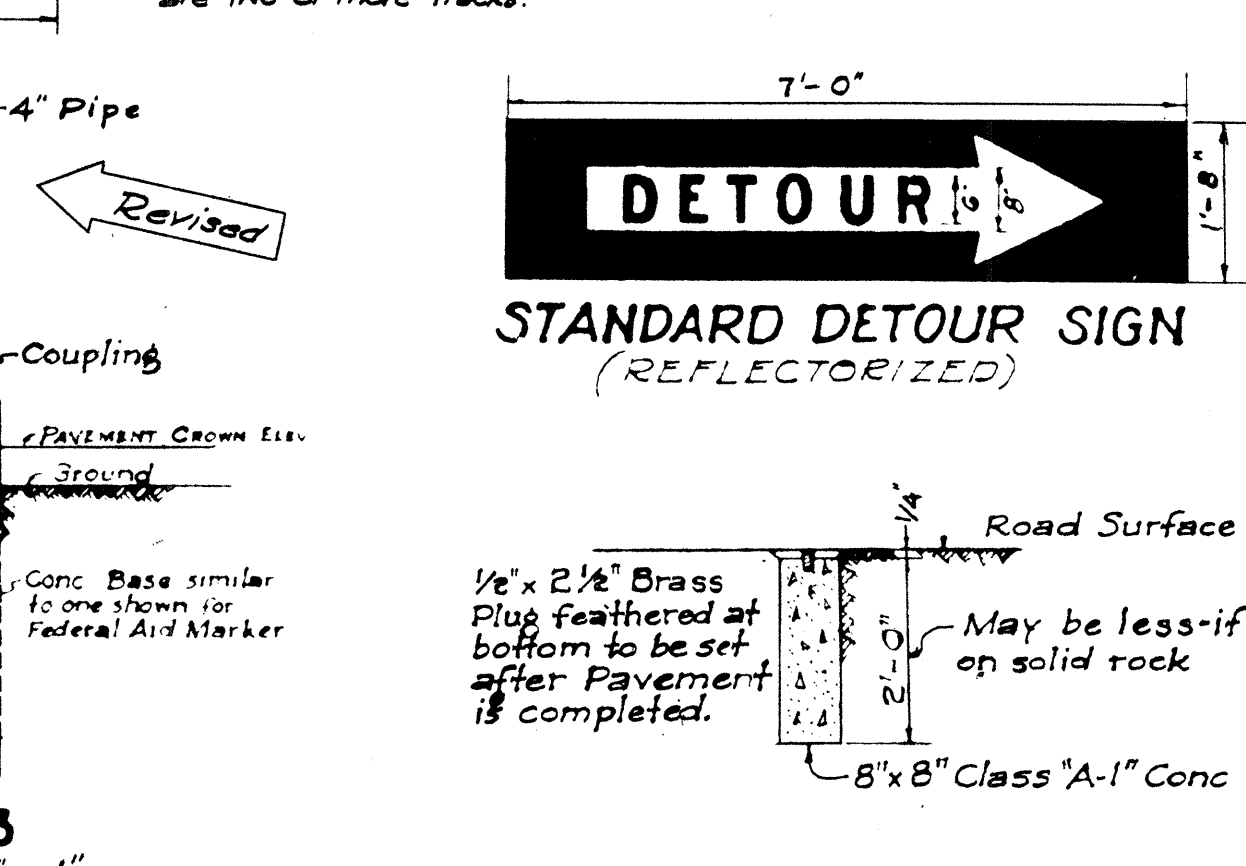
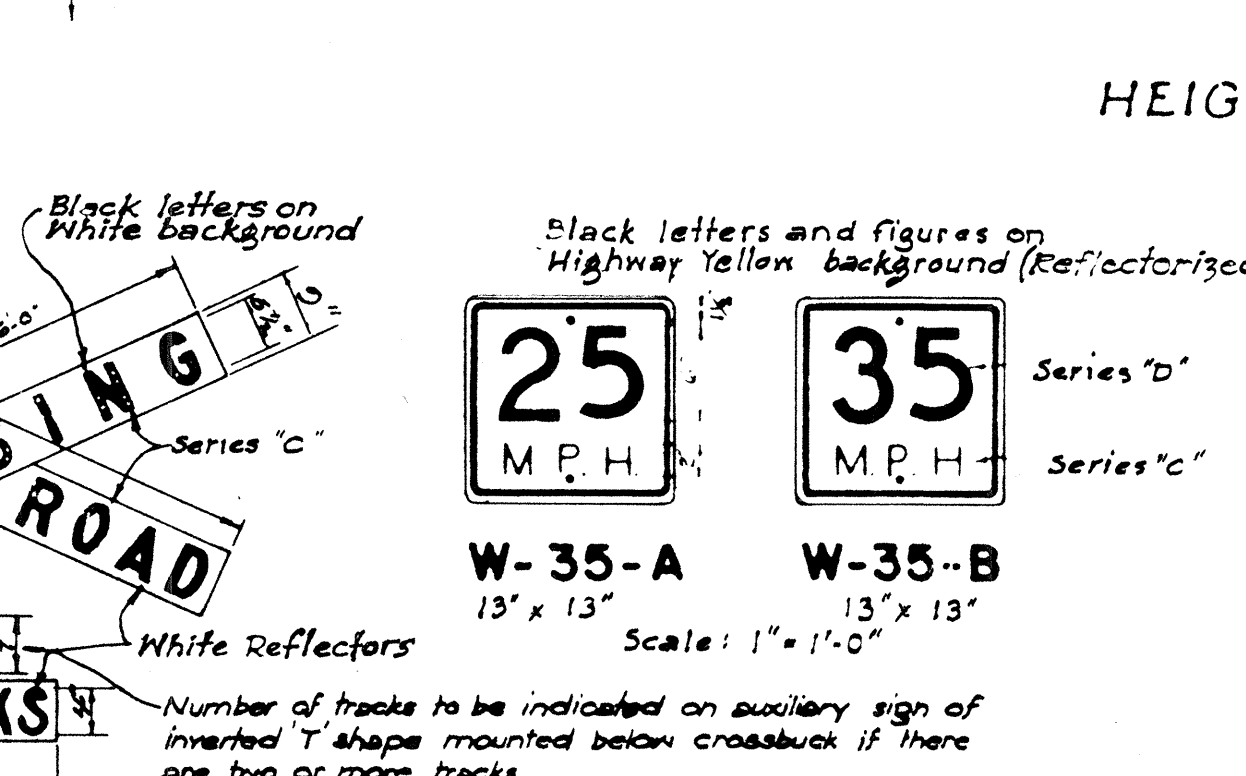
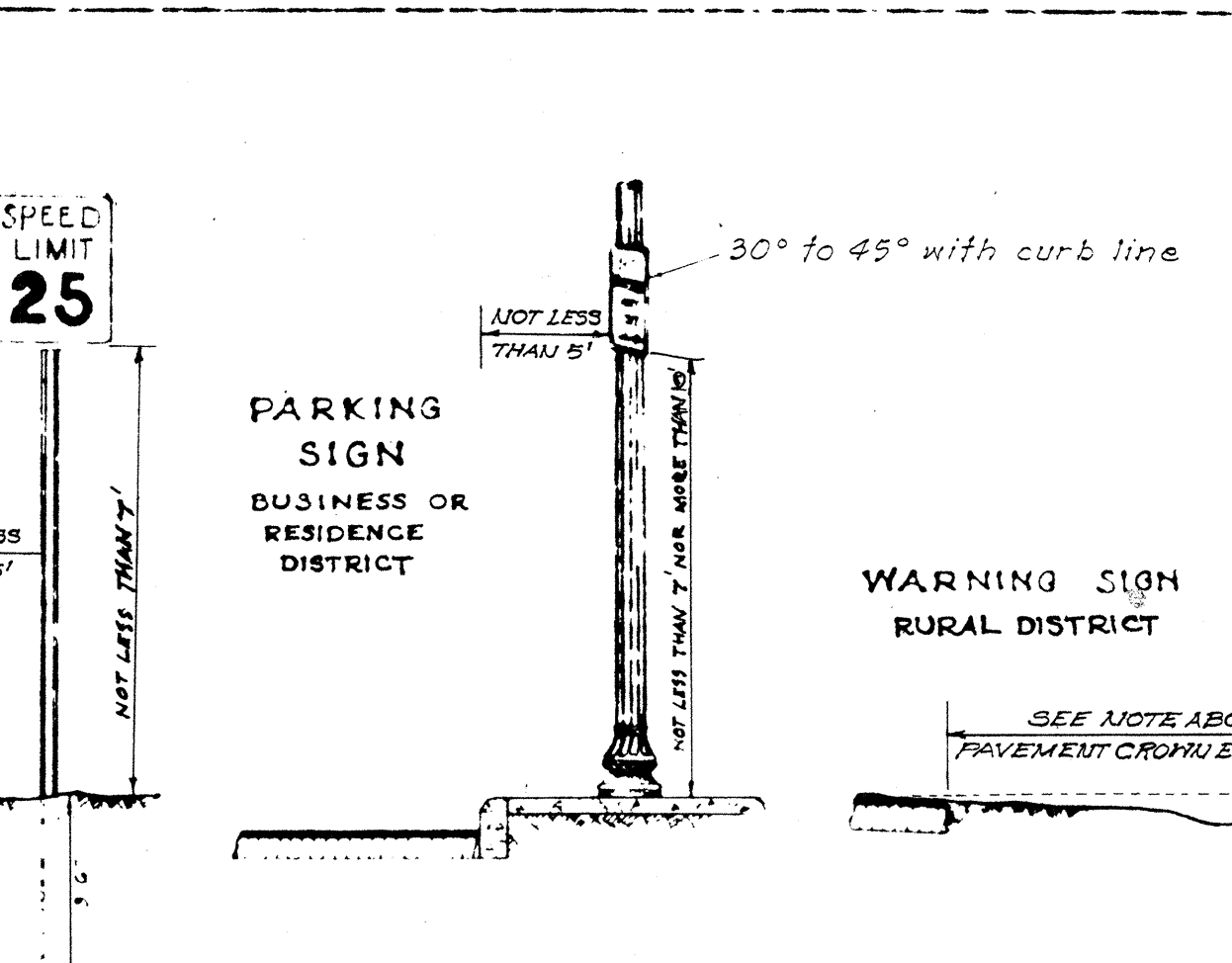
2/17/52
4/6/59
4/28/59
7/30/59
12/22/59

Notes: Yield sign has been revised 5/13/55
Note: Stop sign has been revised 6/2/56
Note: Stop sign has been revised 6/2/56
DATE
SURVEY PLOTTED BY
DESIGNED BY
CHECKED BY
QUANTITIES CHECKED BY
CUTTING CHECKED BY

NOTE:
Sign Posts shall be 3 galv std pipe for signs larger than 24" in any dimension and 2 galv std pipe for signs not over 24" in any dimension
Two (2) 3/8" bolt holes drilled at location shown

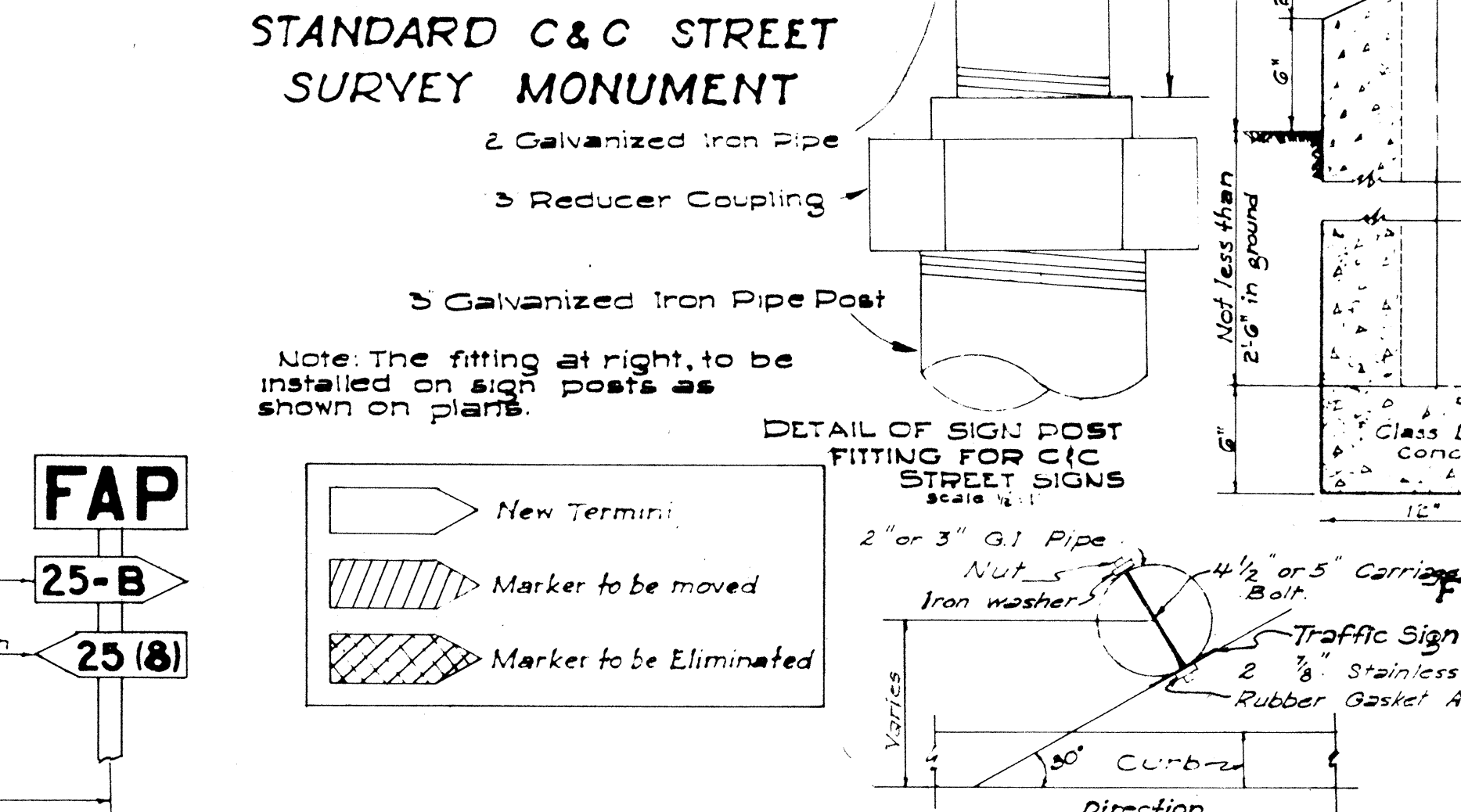
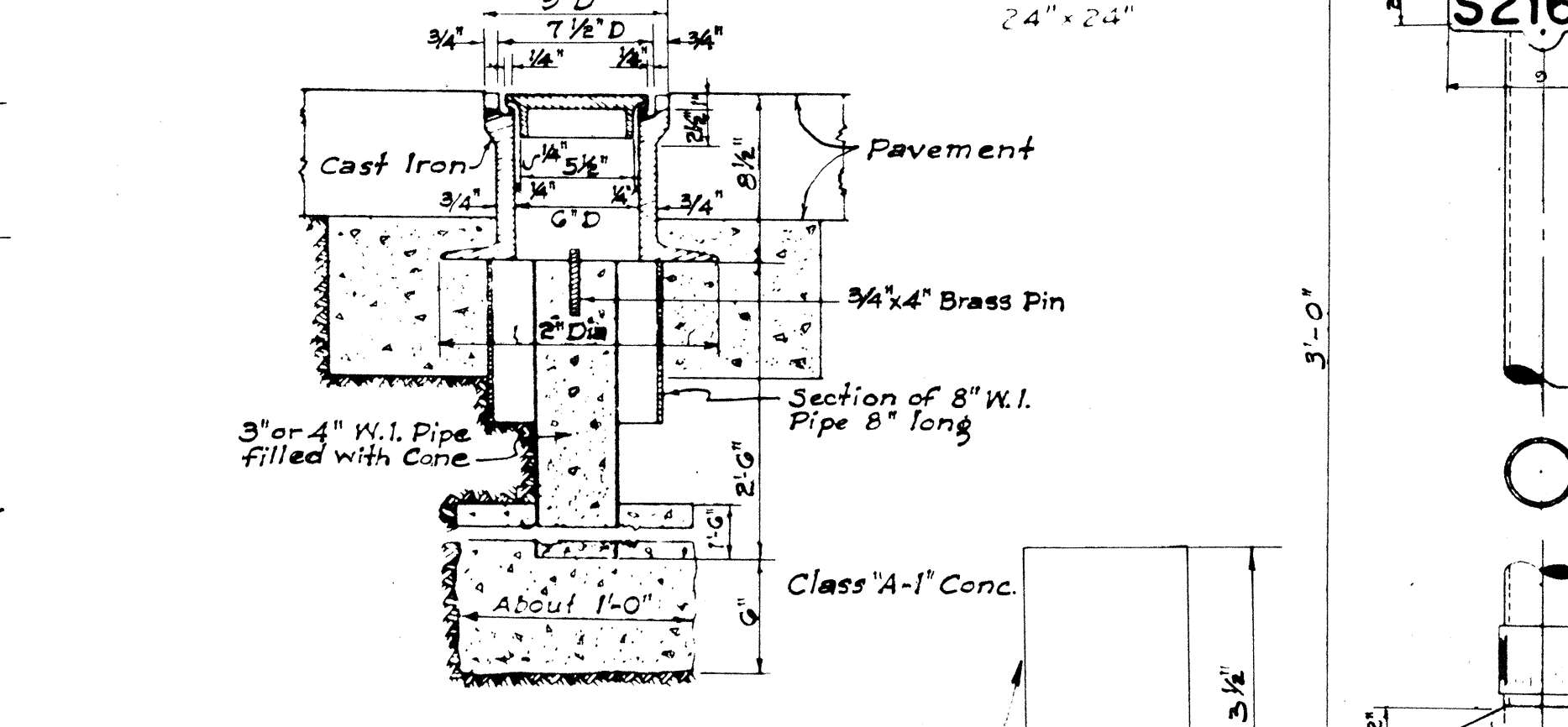
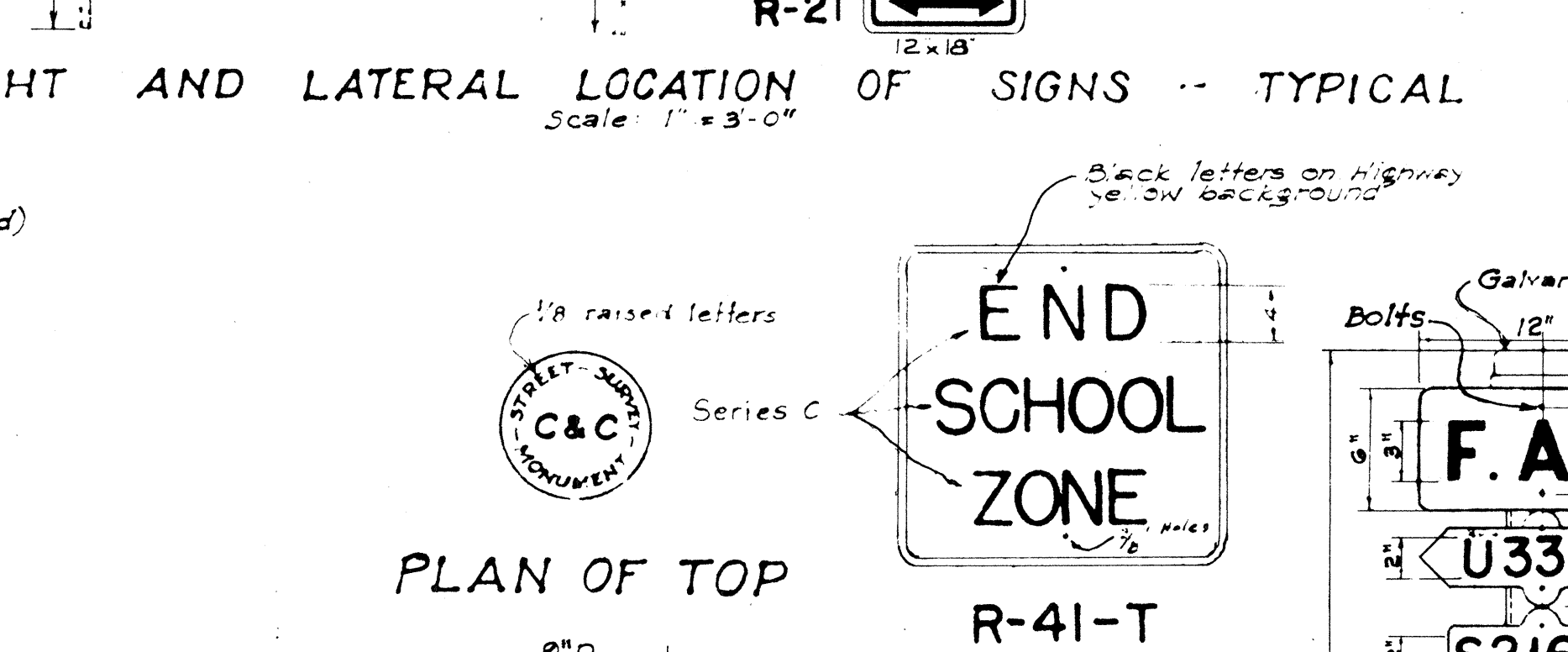
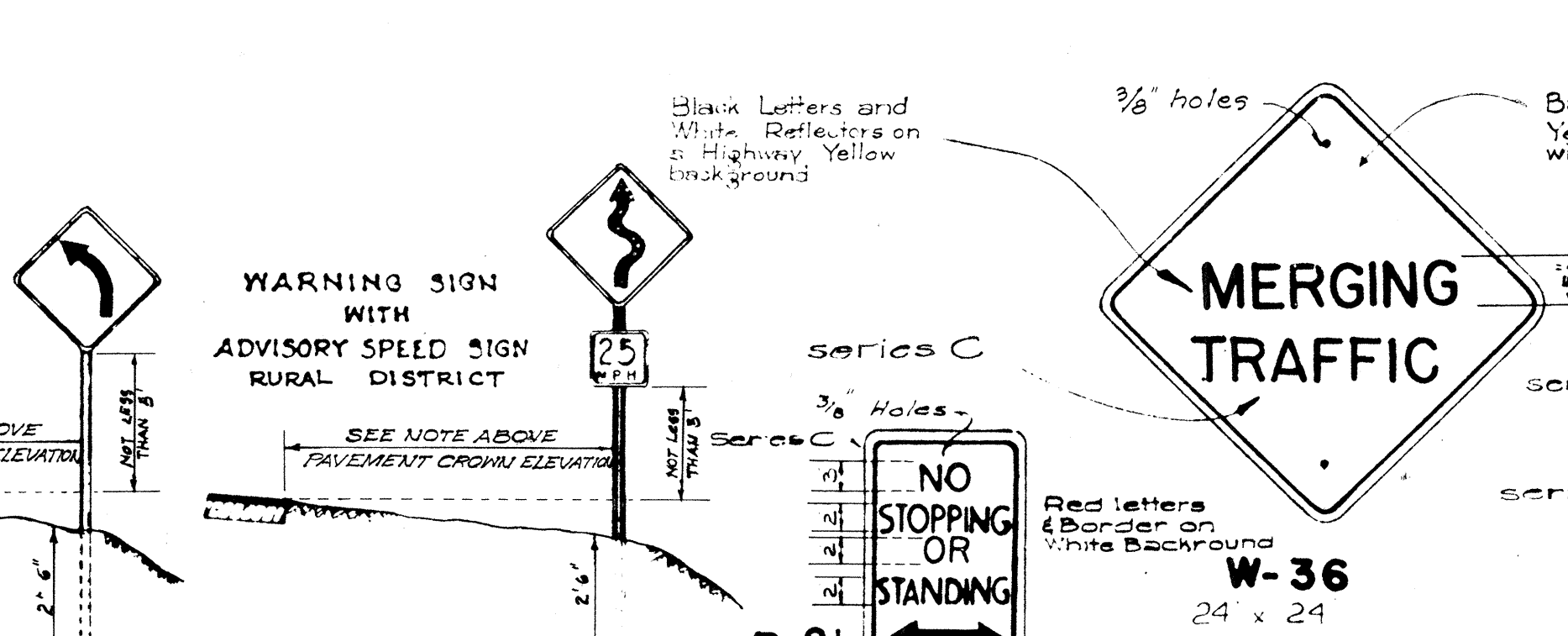


NOTE: Federal Aid Markers should be placed at the termini of suffix designated sections. Intermediate letter designated markers of adjacent sections located within the limits of new improvements should be moved to the termini of the new work.



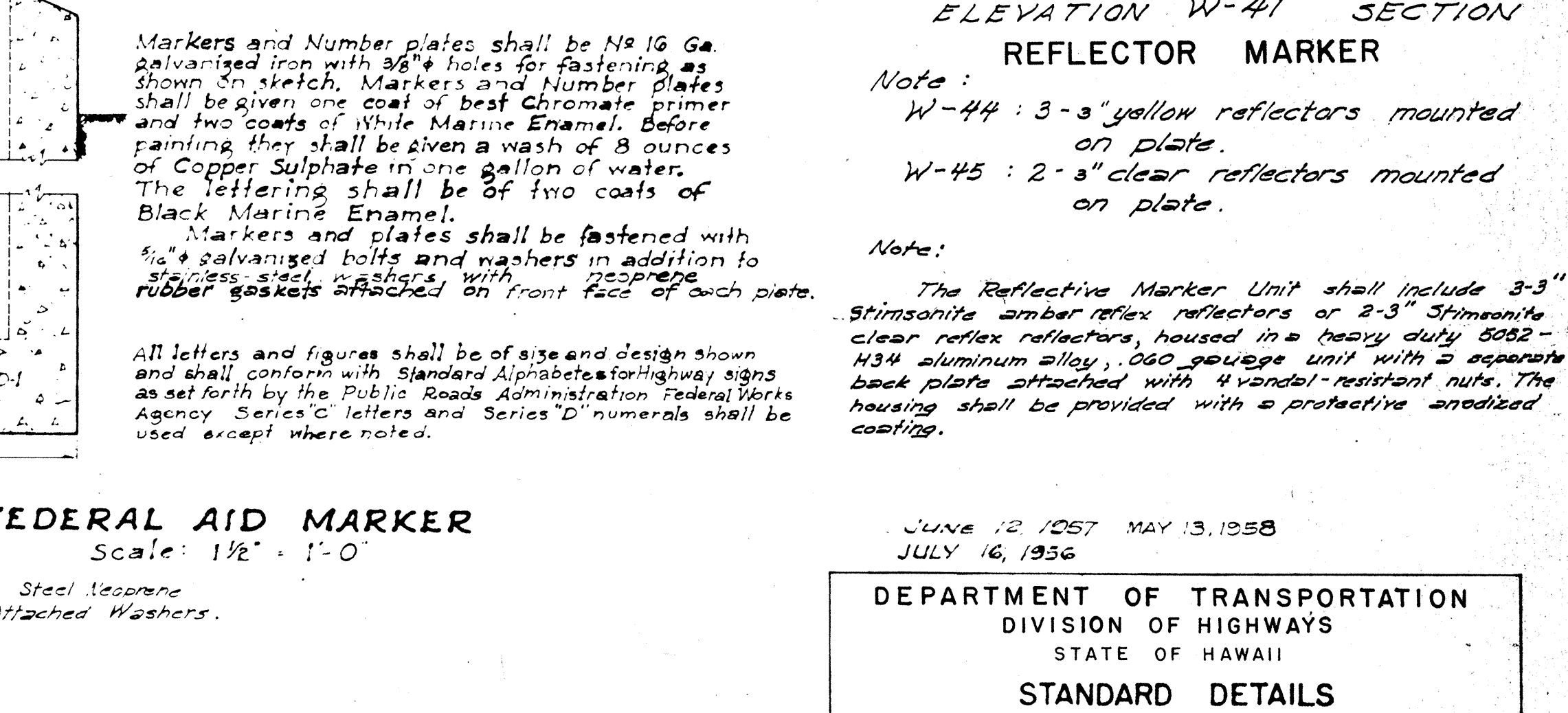
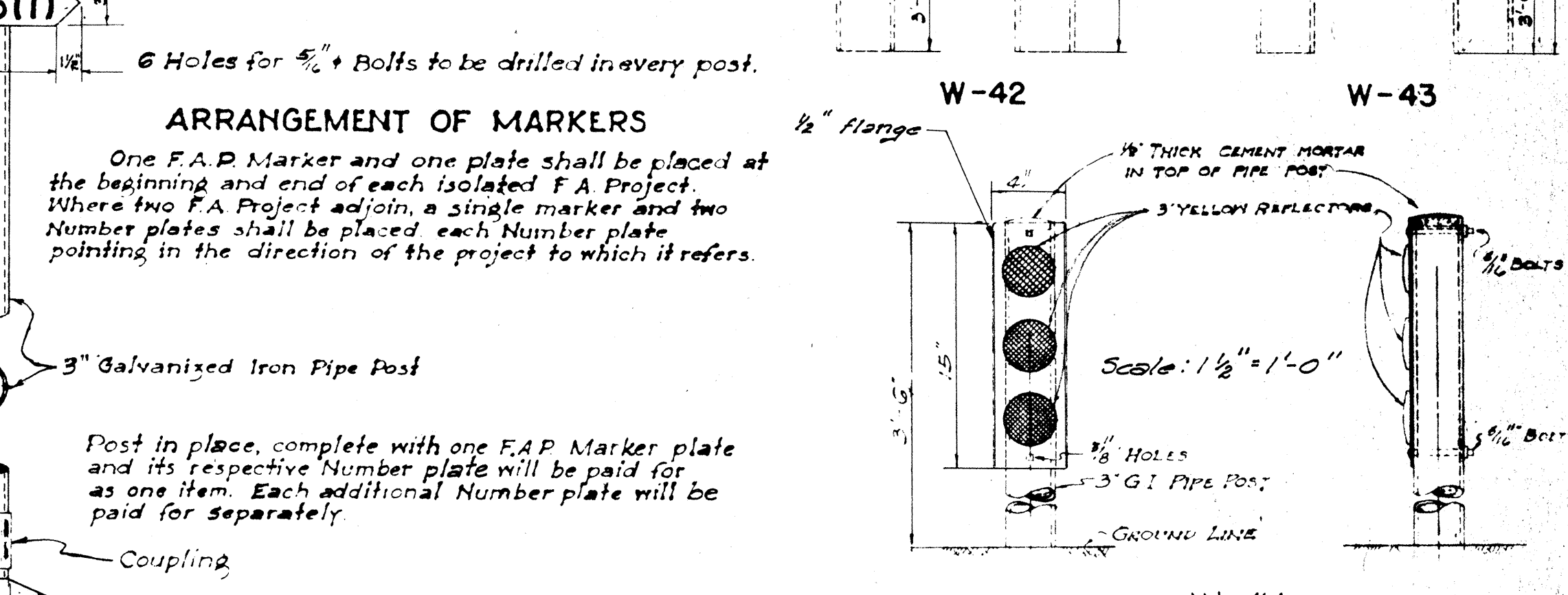
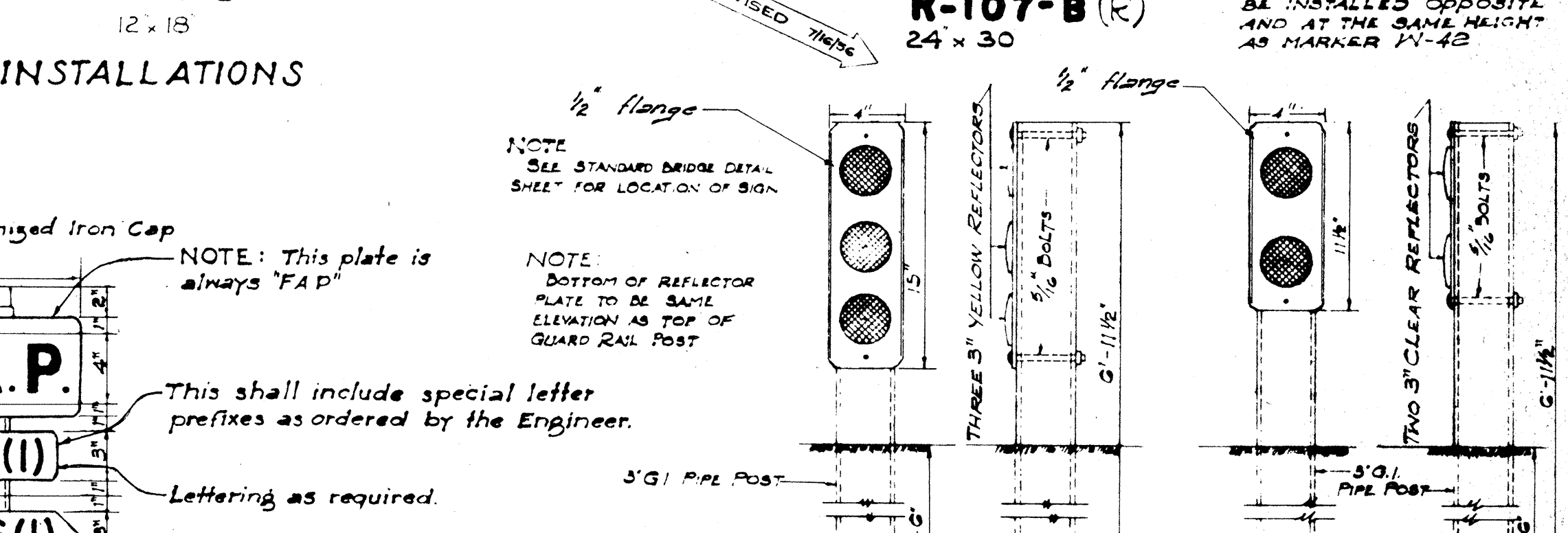
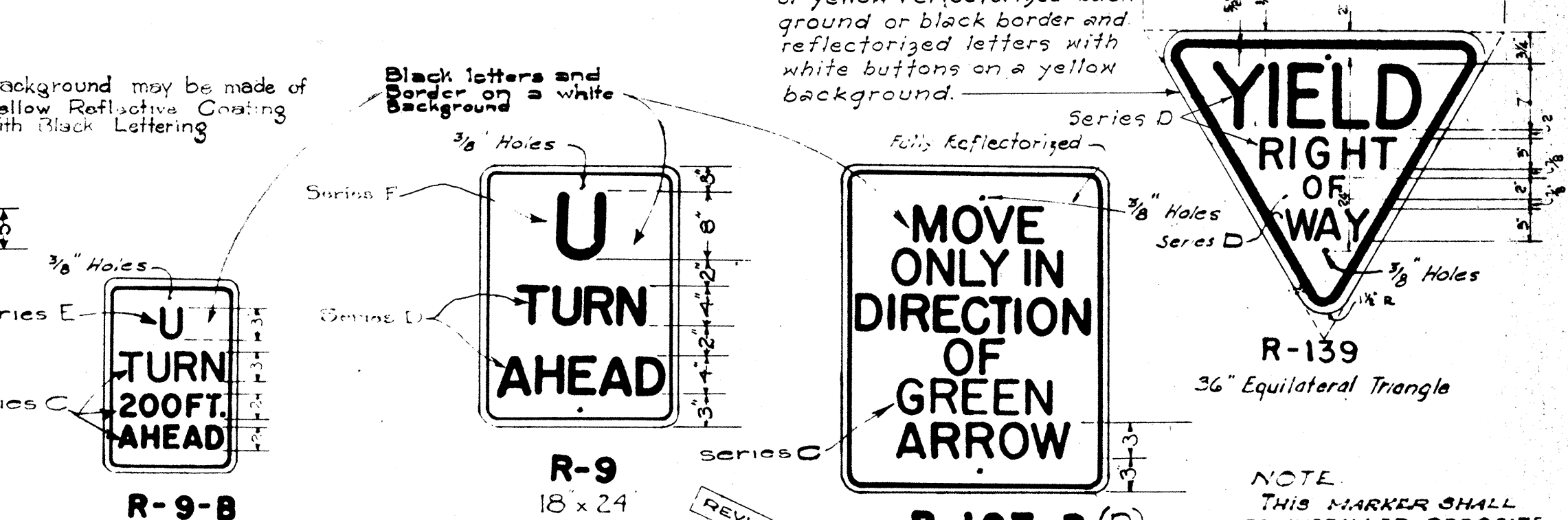
NOTE: The fitting at right, to be installed on sign posts as shown on plans.

NOTE: All signs shall be placed 10' from edge of pavement except where the shoulder width is less than 10'; in which case, signs shall be placed at the edge of shoulder.



NOTE: The fitting at right, to be installed on sign posts as shown on plans.

Note: All Regulatory and Warning Signs shall have 3/8" bolt holes.



NOTE: The Reflective Marker Unit shall include 3-3" Stimsonite amber reflex reflectors or 2-3" Stimsonite clear reflex reflectors, housed in a heavy duty 8082-H34 aluminum alloy, .060 gauge unit with a separate back plate attached with 4 stainless steel nuts. The housing shall be provided with a protective anodized coating.

METHOD OF MARKING F.A. PROJECTS AT OVERLAPS
(USING NUMBER SUFFIX ON NEW WORK)