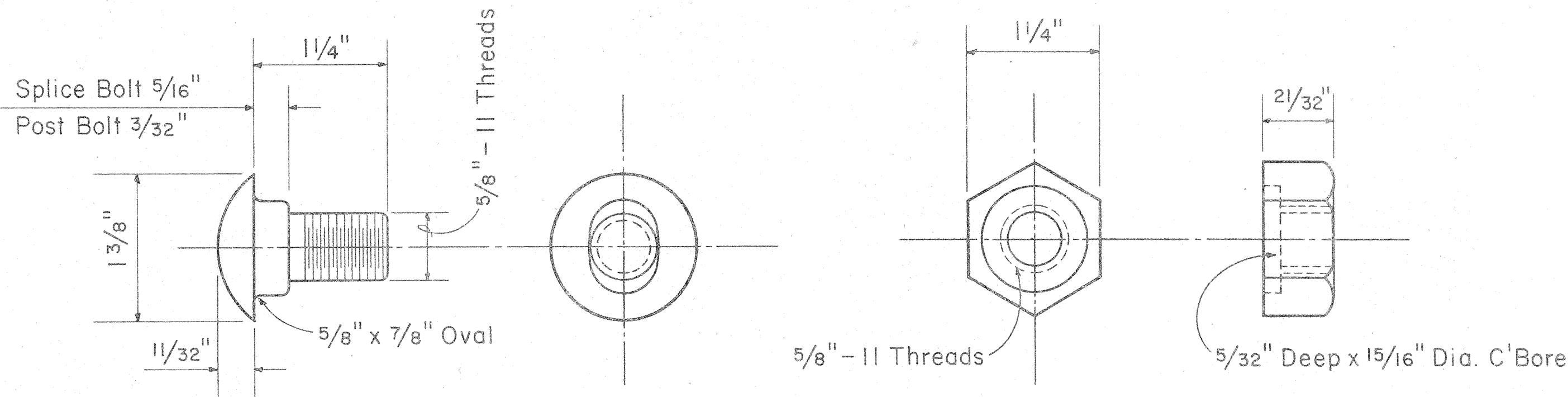
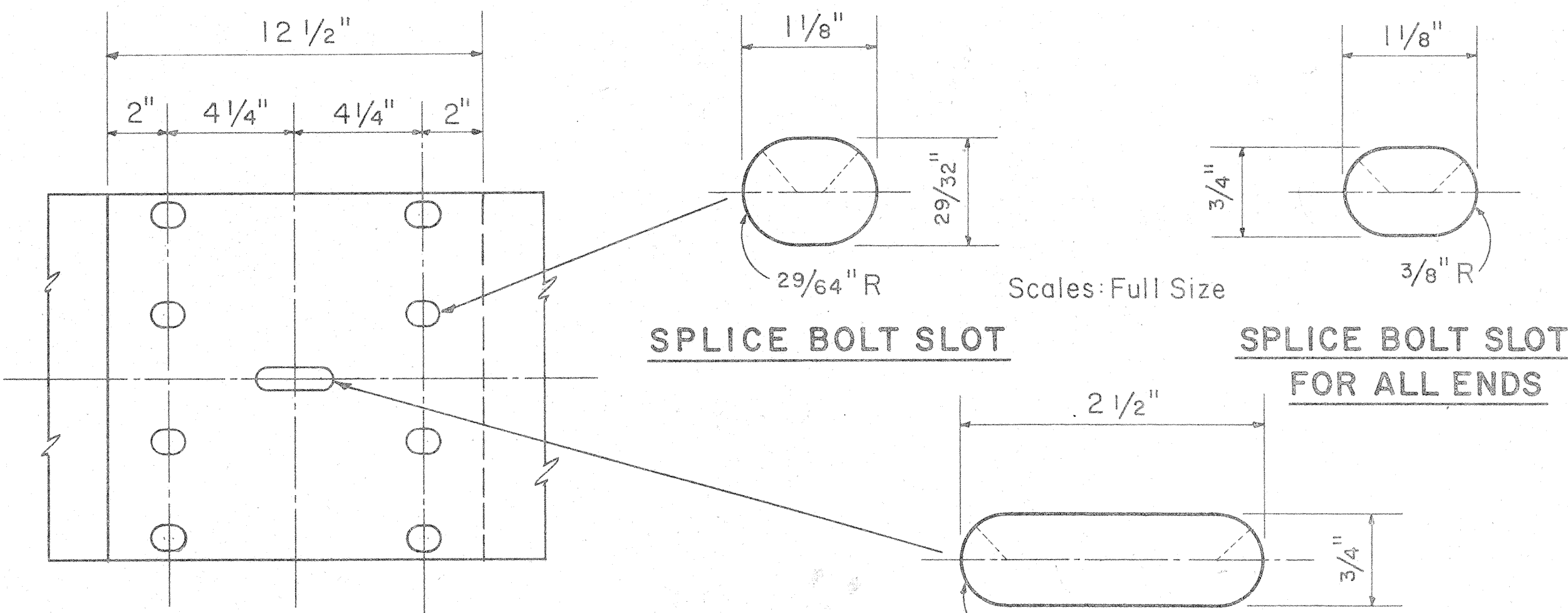


FED. AID DIST. NO.	STATE	FED. AID PROJ. NO.	FISCAL YEAR	SHEET NO.	TOTAL SHEETS
HAWAII	HAWAII	5-0160 (2) UNIT 1	1965	8	31



SPLICE BOLT
POST BOLT (Same except for length)
Scale: Full Size

HEXAGON NUT
Scale: Full Size

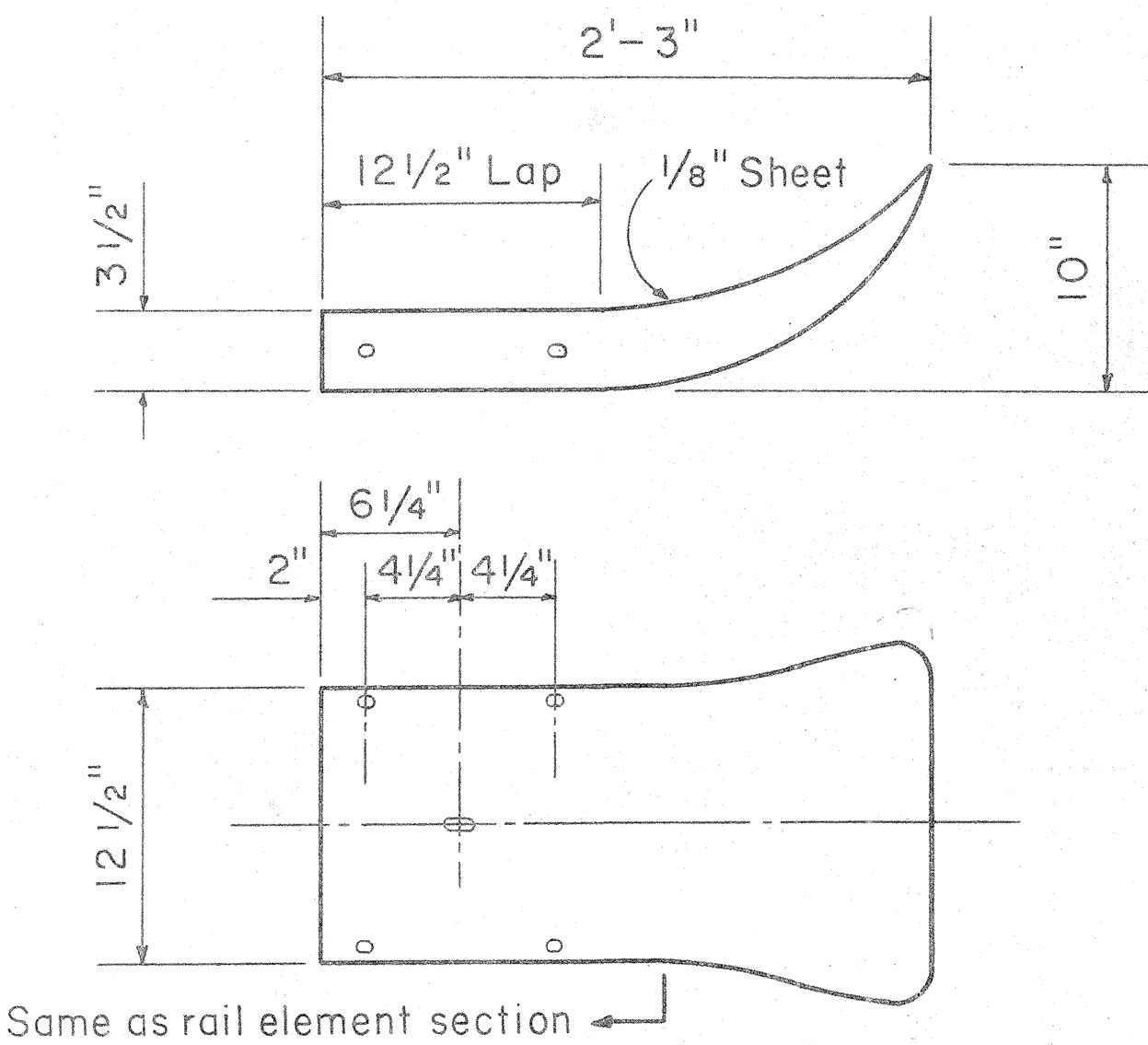


SPLICE BOLT SLOT

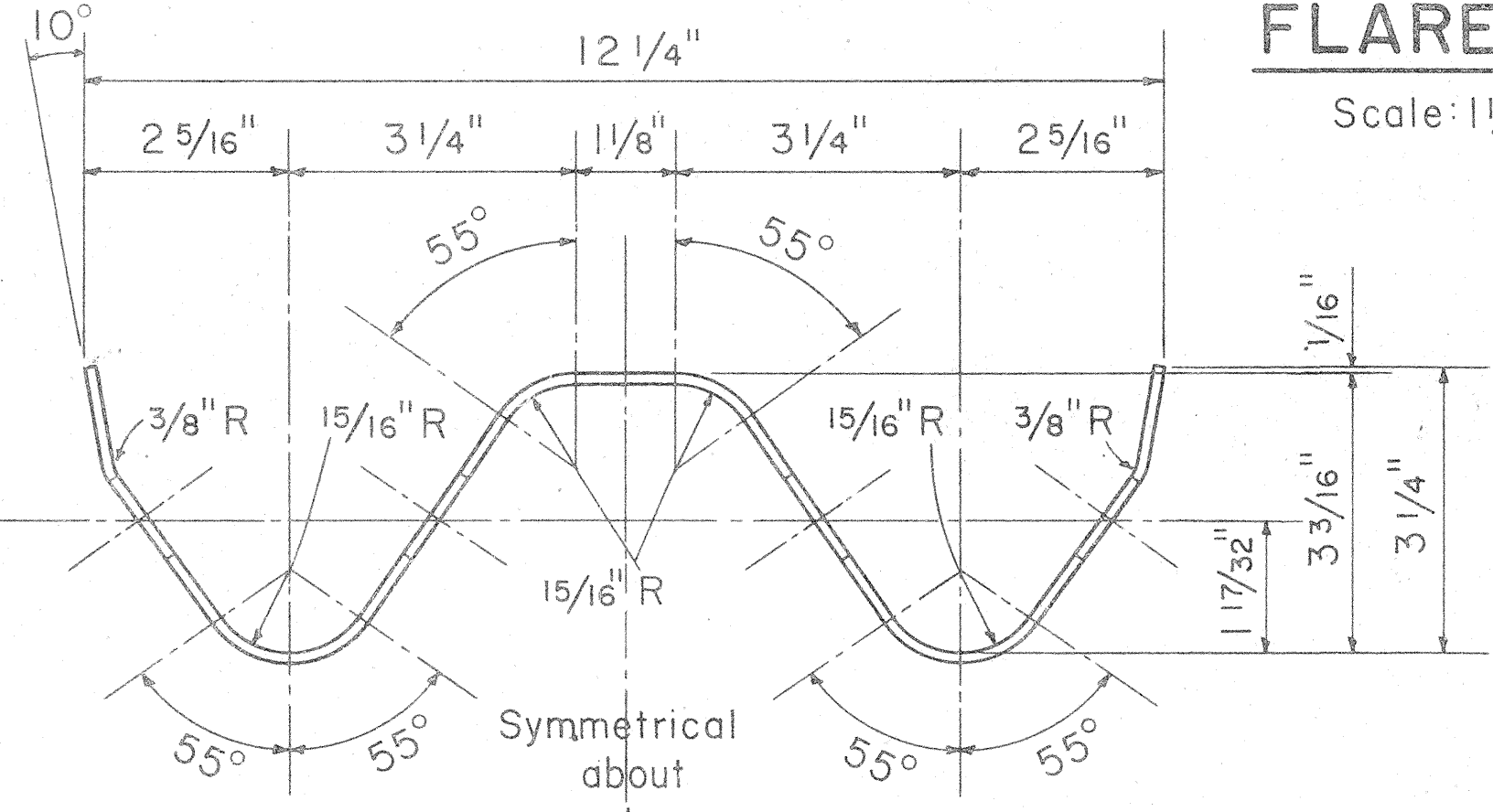
SPLICE BOLT SLOT FOR ALL ENDS

RAIL SPLICE
Scale: 3" = 1' - 0"

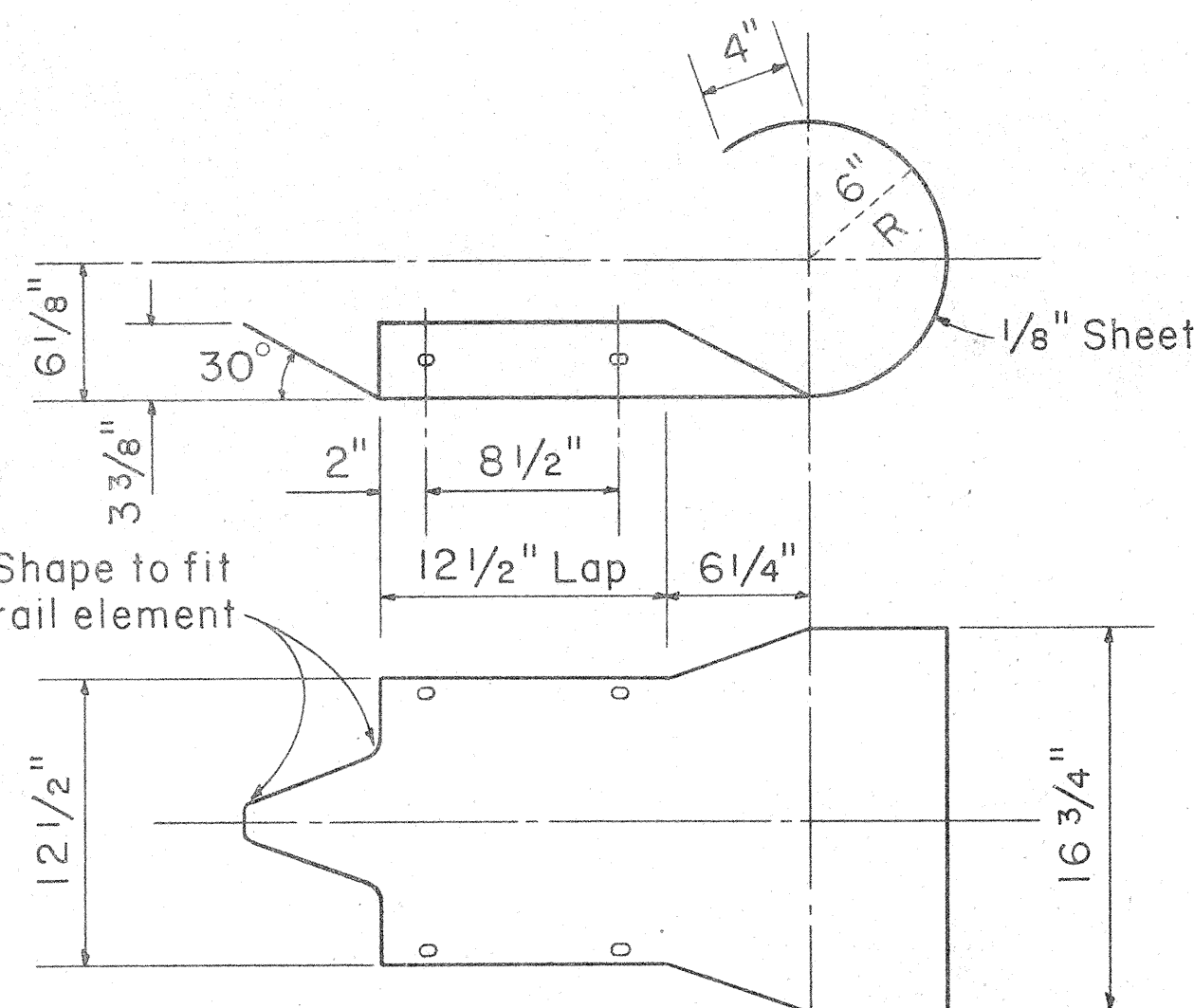
POST BOLT SLOT
Scale: Full Size



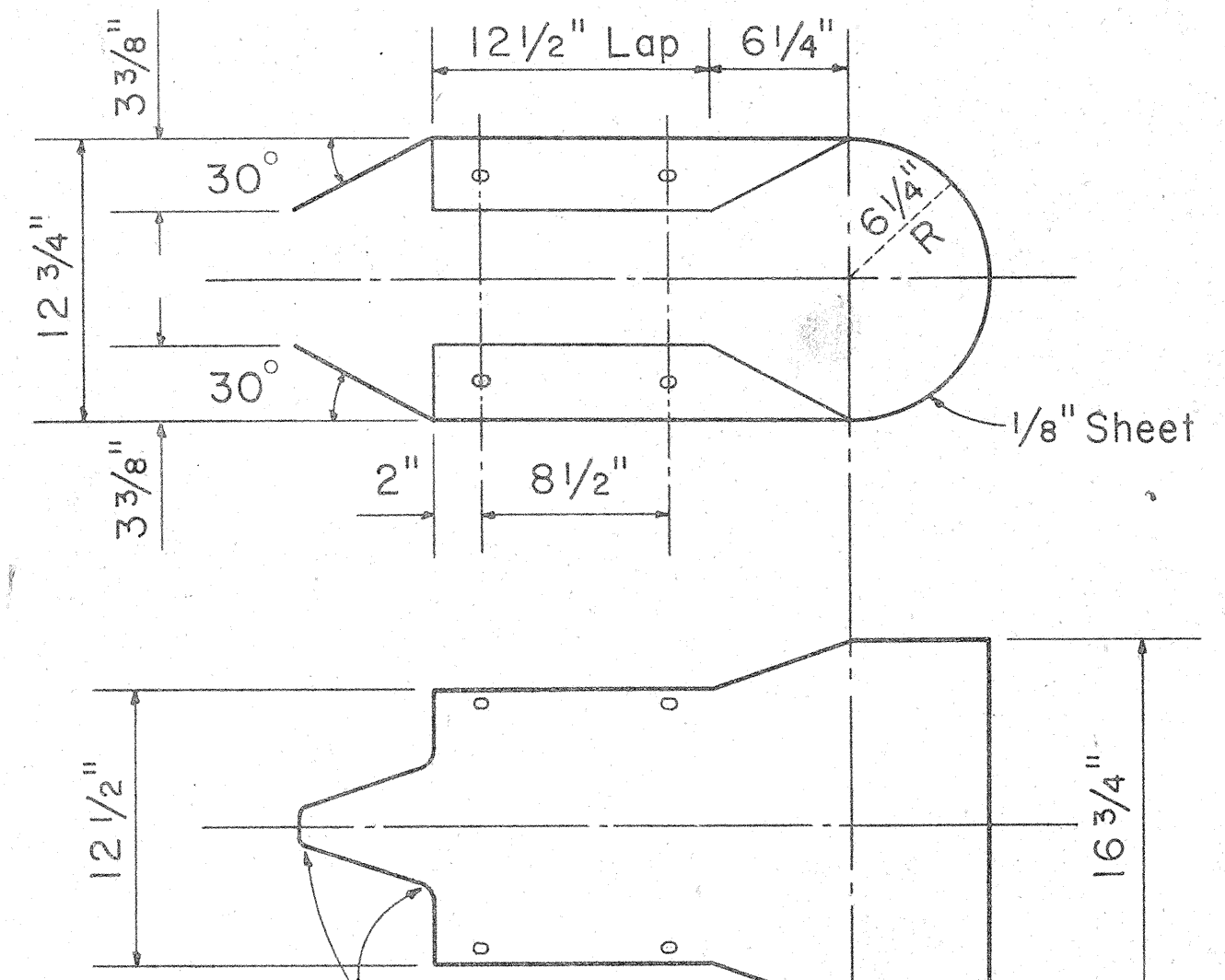
FLARED END
Scale: 1 1/2" = 1' - 0"



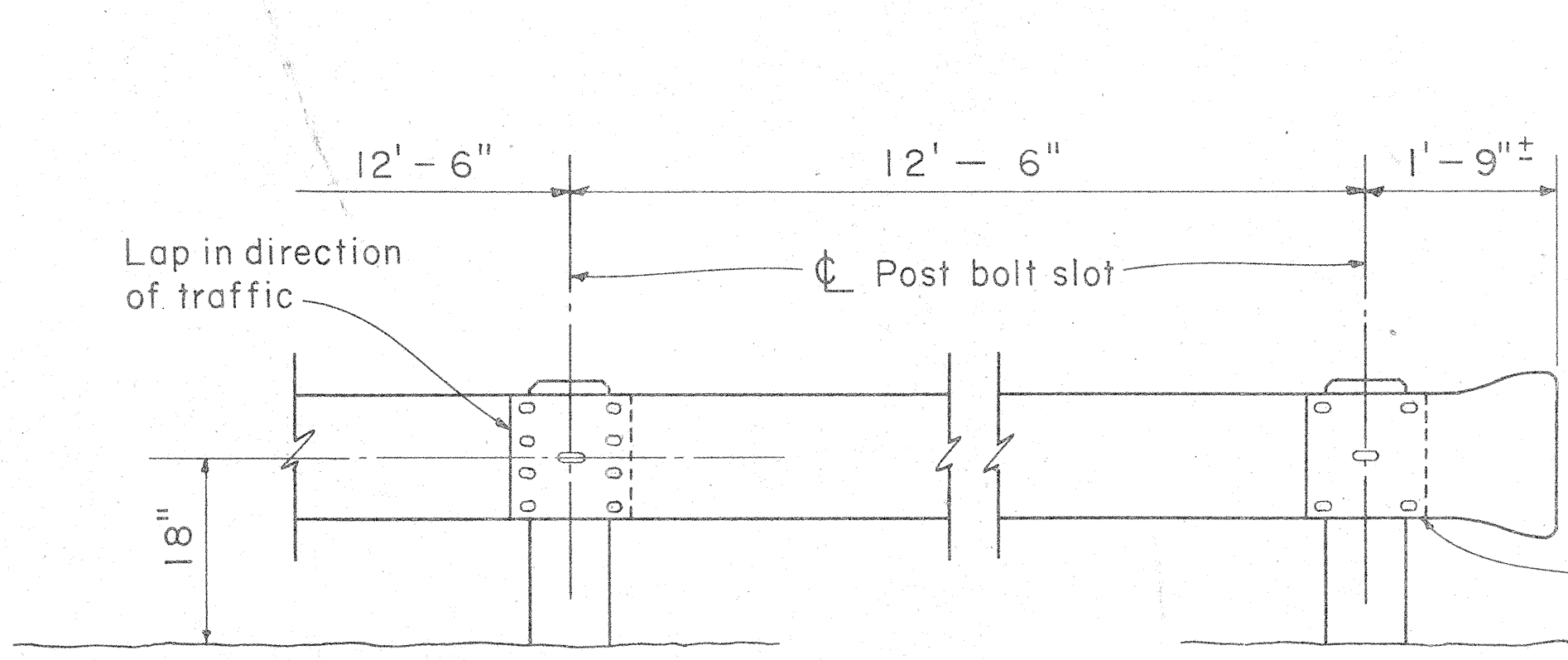
RAIL ELEMENT SECTION
Scale: Half Full Size



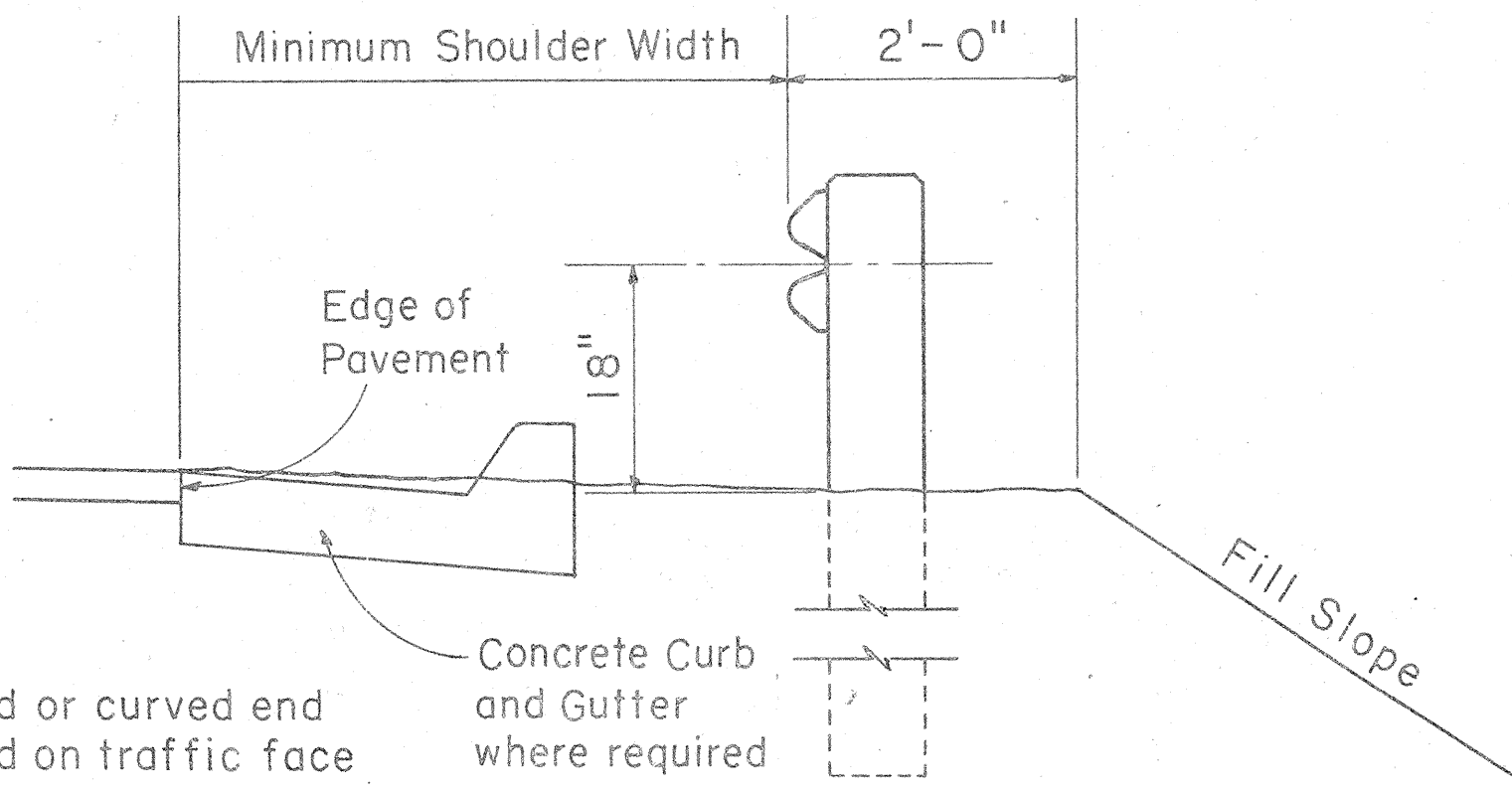
CURVED END
Scale: 1 1/2" = 1' - 0"



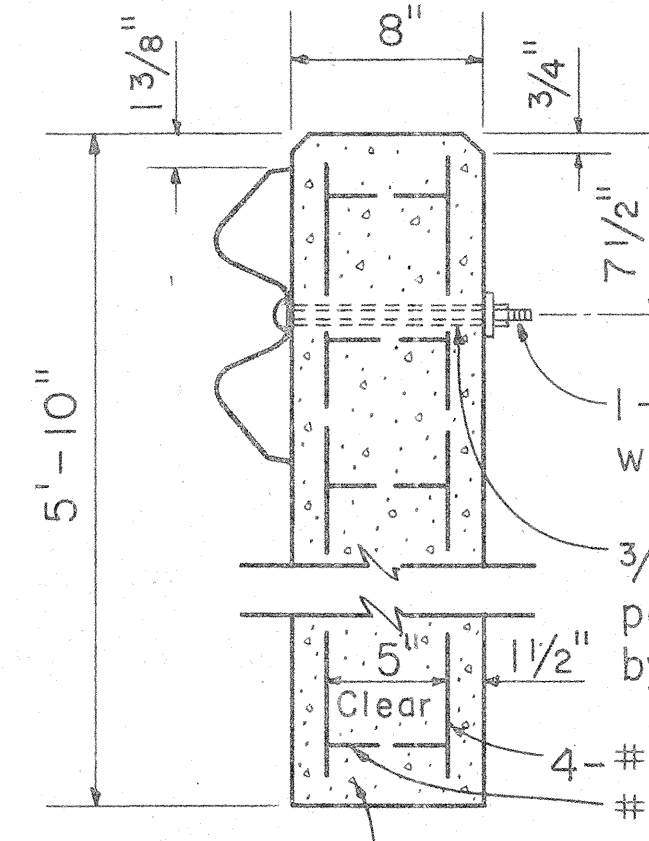
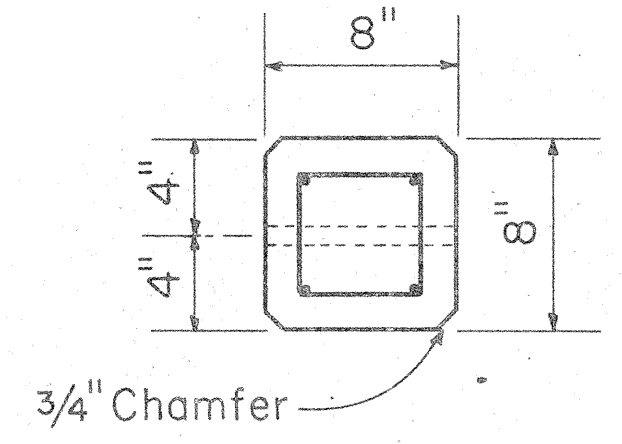
MEDIAN END
Scale: 1 1/2" = 1' - 0"



METAL GUARD RAIL
Scale: 3/4" = 1' - 0"



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



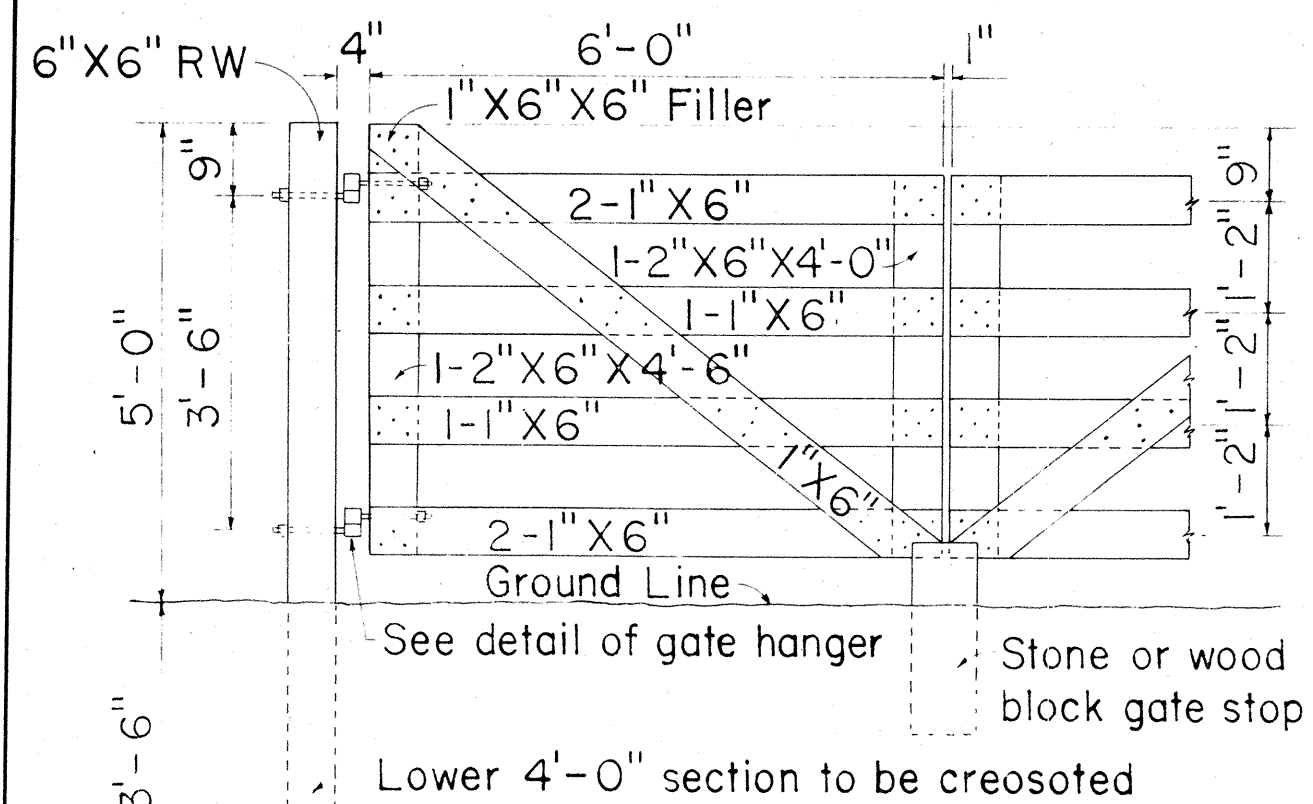
DETAIL OF CONCRETE POST
Scale: 1 1/2" = 1' - 0"

NOTE:
All concrete posts shall be precast.

STATE OF HAWAII
DEPARTMENT OF TRANSPORTATION
HIGHWAYS DIVISION
STANDARD DETAILS
METAL GUARD RAIL

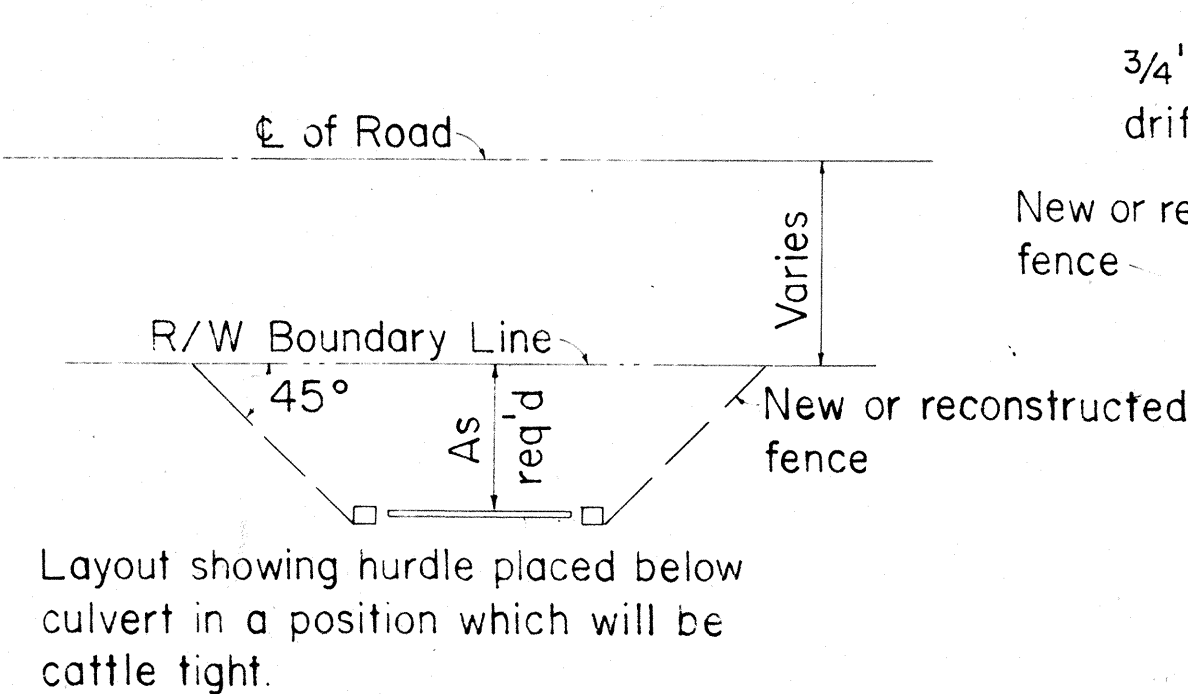
Scales: As Noted. Date: Aug. 1965
SHEET NO. 1 OF 6 SHEETS

SURVEY PLOTTED BY	DATE
DESIGNED BY	
TRACED BY	
QUANTITIES BY	
CHECKED BY	
ORIGINAL PLAN	
NOTE BOOK	
NO.	



DETAIL OF DOUBLE HUNG GATE

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



Layout showing hurdle placed below culvert in a position which will be cattle tight.

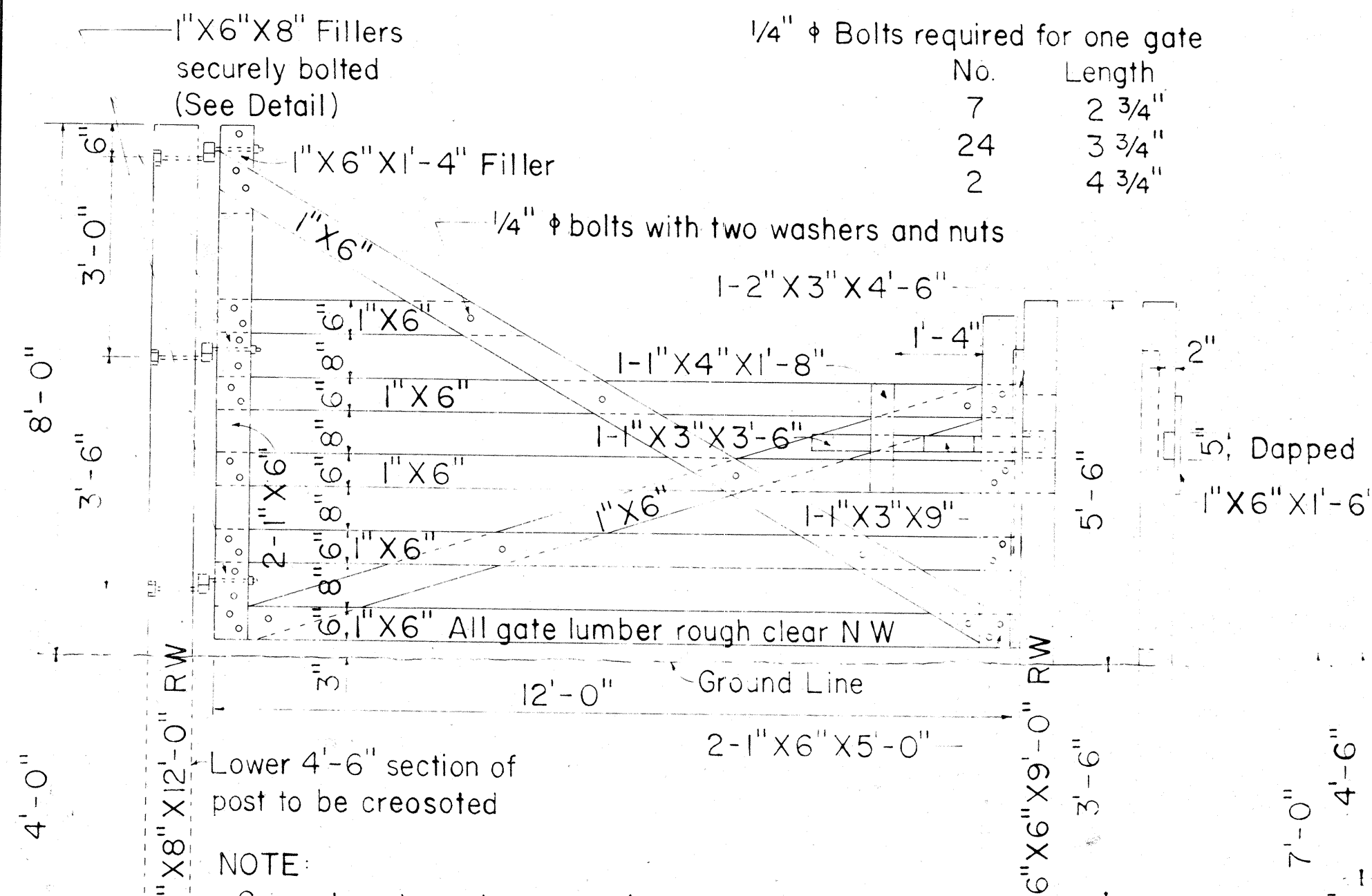
Grade surface so gate will swing clear. Lower 3'-6" section of post to be creosoted.

NOTE: Except posts, all timber of rough fir.

DETAILS OF HURDLE

ELEVATION

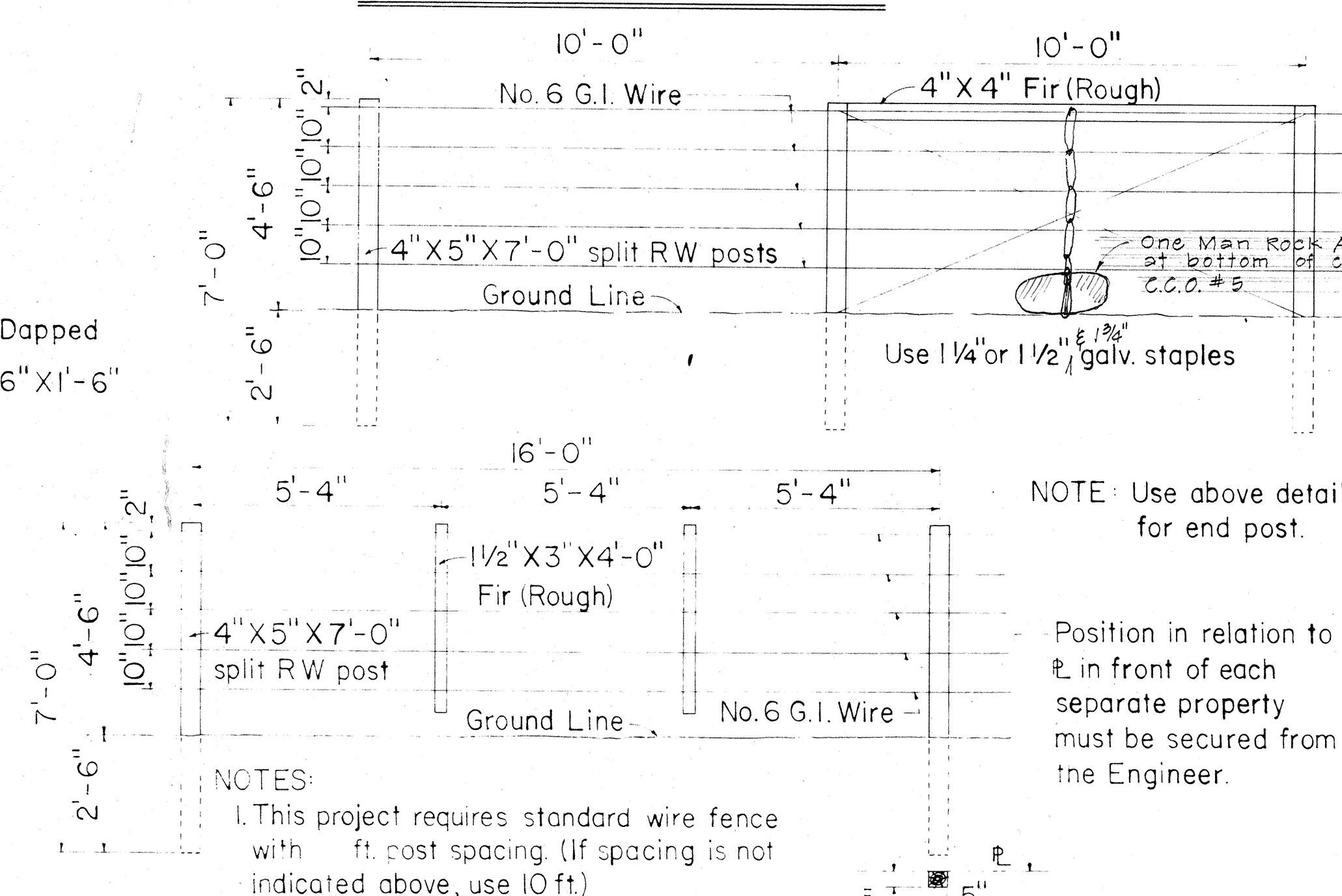
Scale: 1/2" = 1'-0"



DETAIL OF CATTLE GATE

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

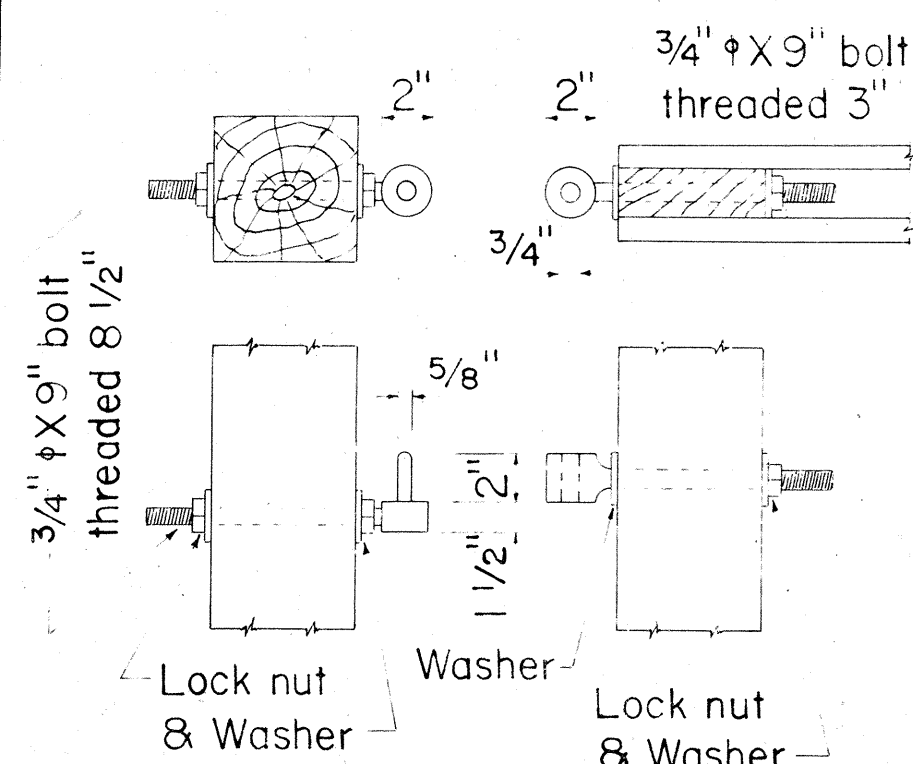
SIDE ELEV. PLAN SECT.



DETAILS OF STANDARD WIRE FENCE WITH WOOD POSTS

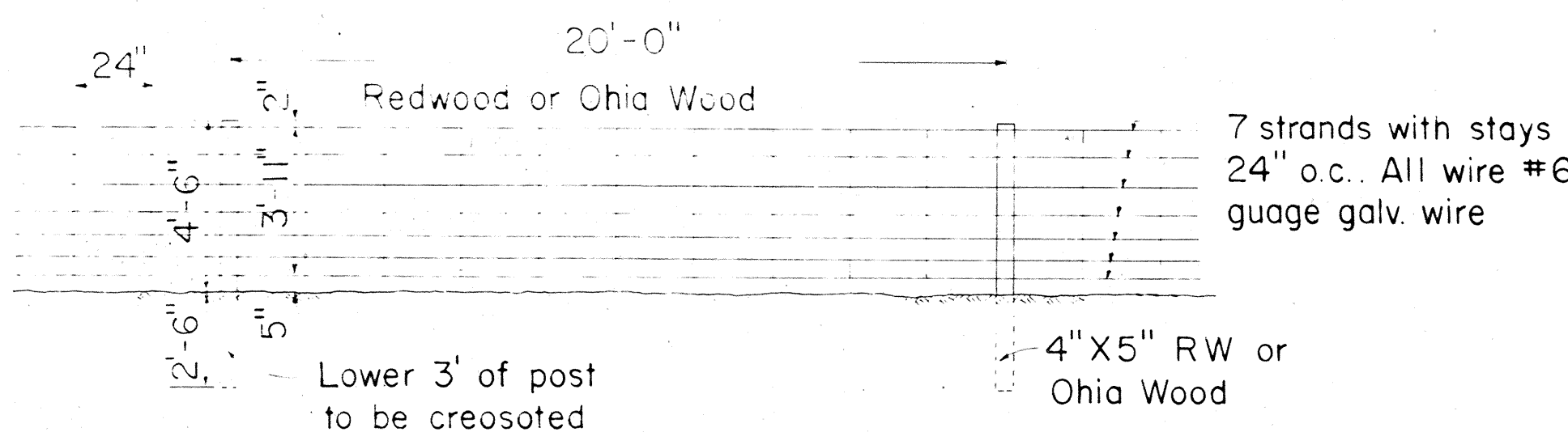
Scale: 3/8" = 1'-0"

NOTE: Use 3/4" x 11" bolts for Cattle Gate



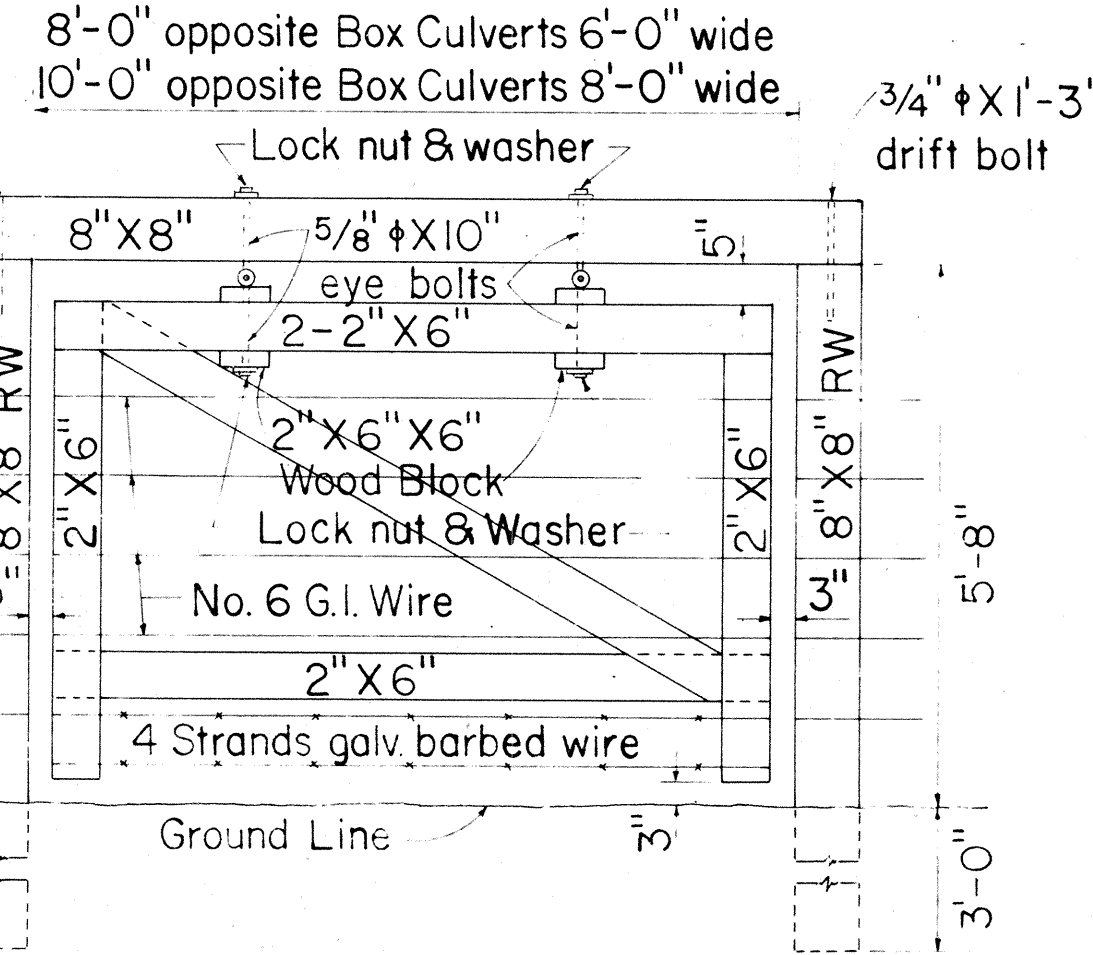
DETAIL OF GATE HANGER

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



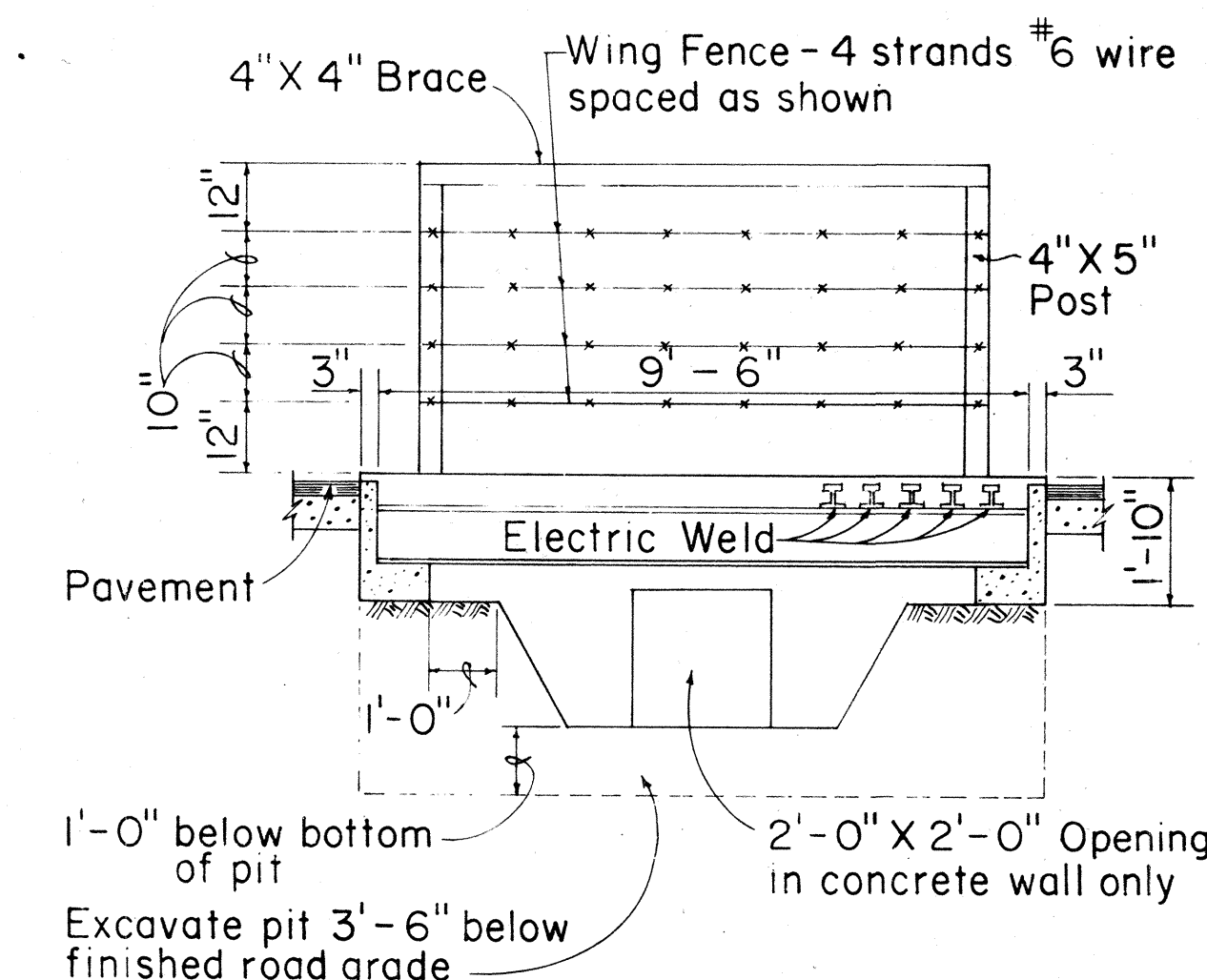
DETAIL OF WOVEN WIRE FENCE

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



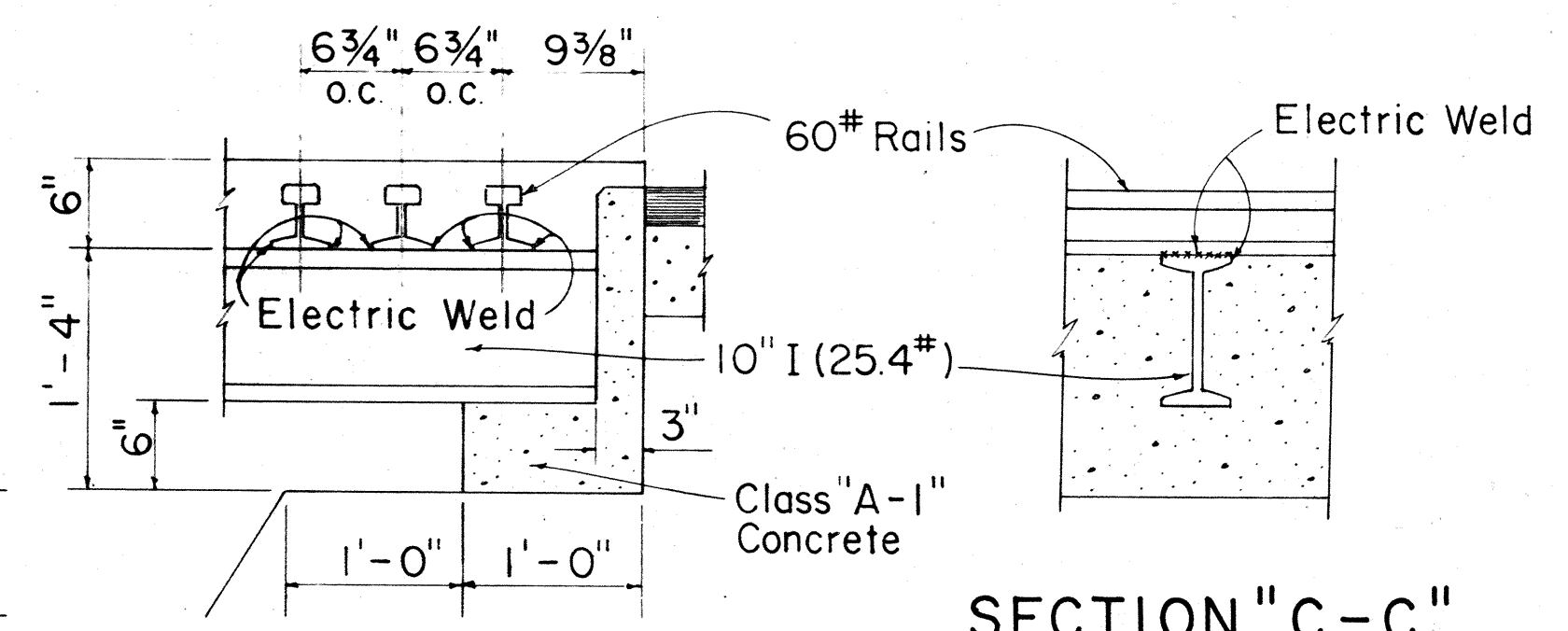
NOTE: Use above detail for end post.

Position in relation to ϕ in front of each separate property must be secured from the Engineer.



SECTION "A-A"

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



SECTION "B-B"

Scale: 1" = 1'-0"

SECTION "C-C"

Scale: 1" = 1'-0"

Scales: As Noted

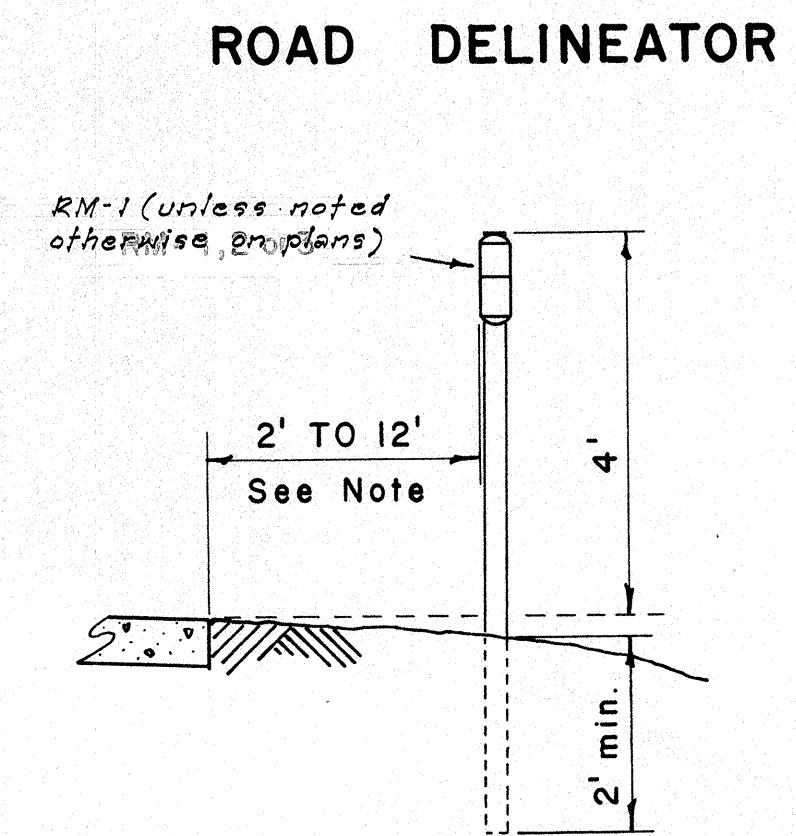
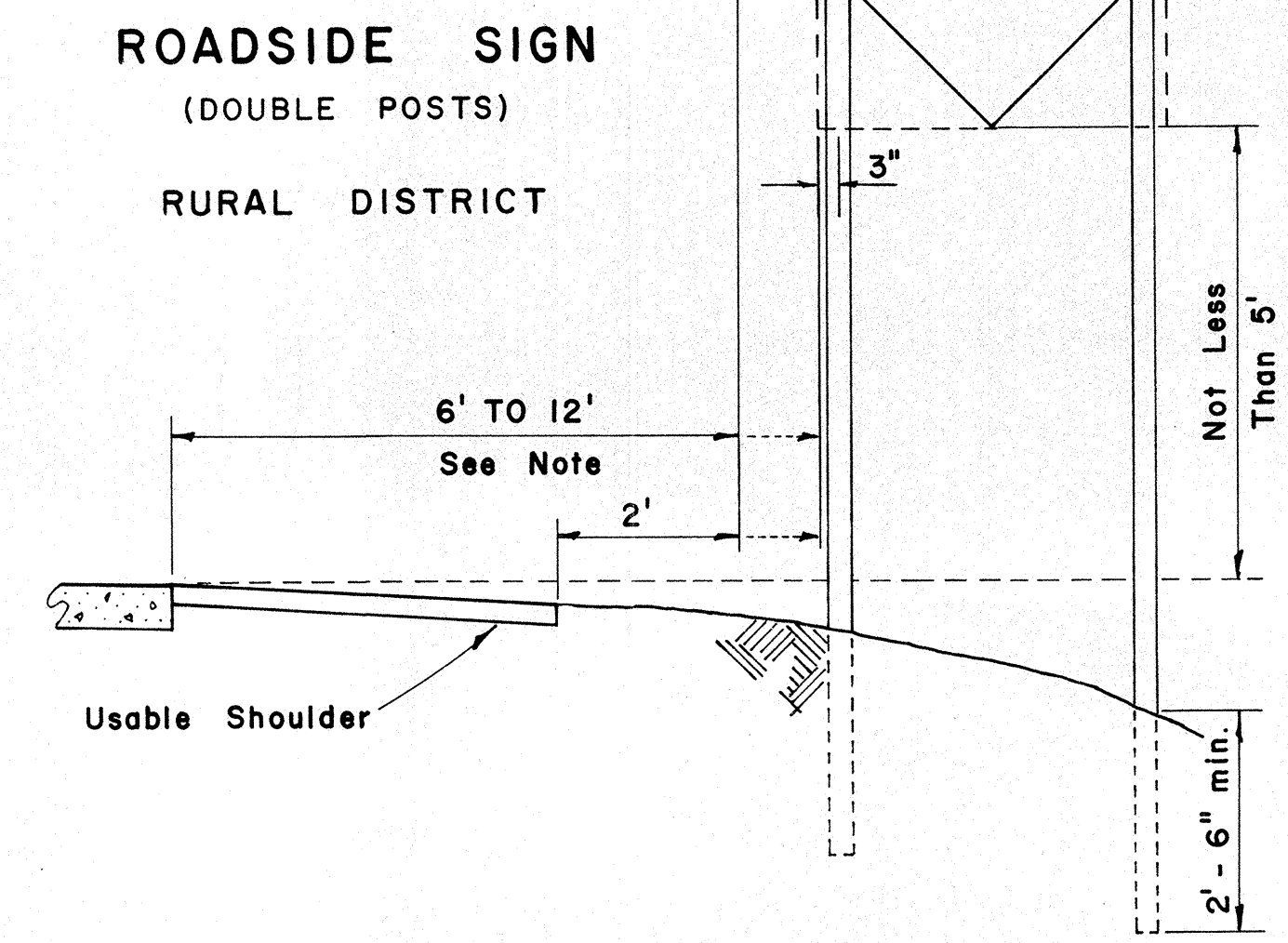
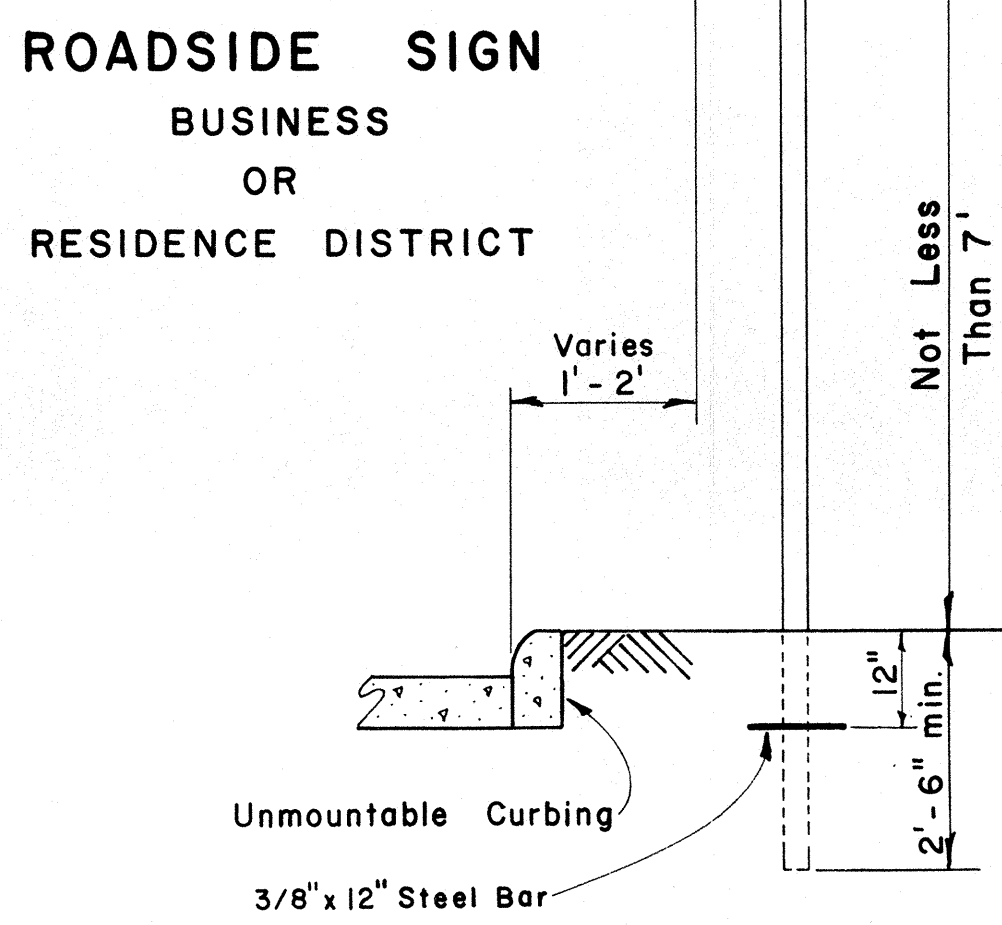
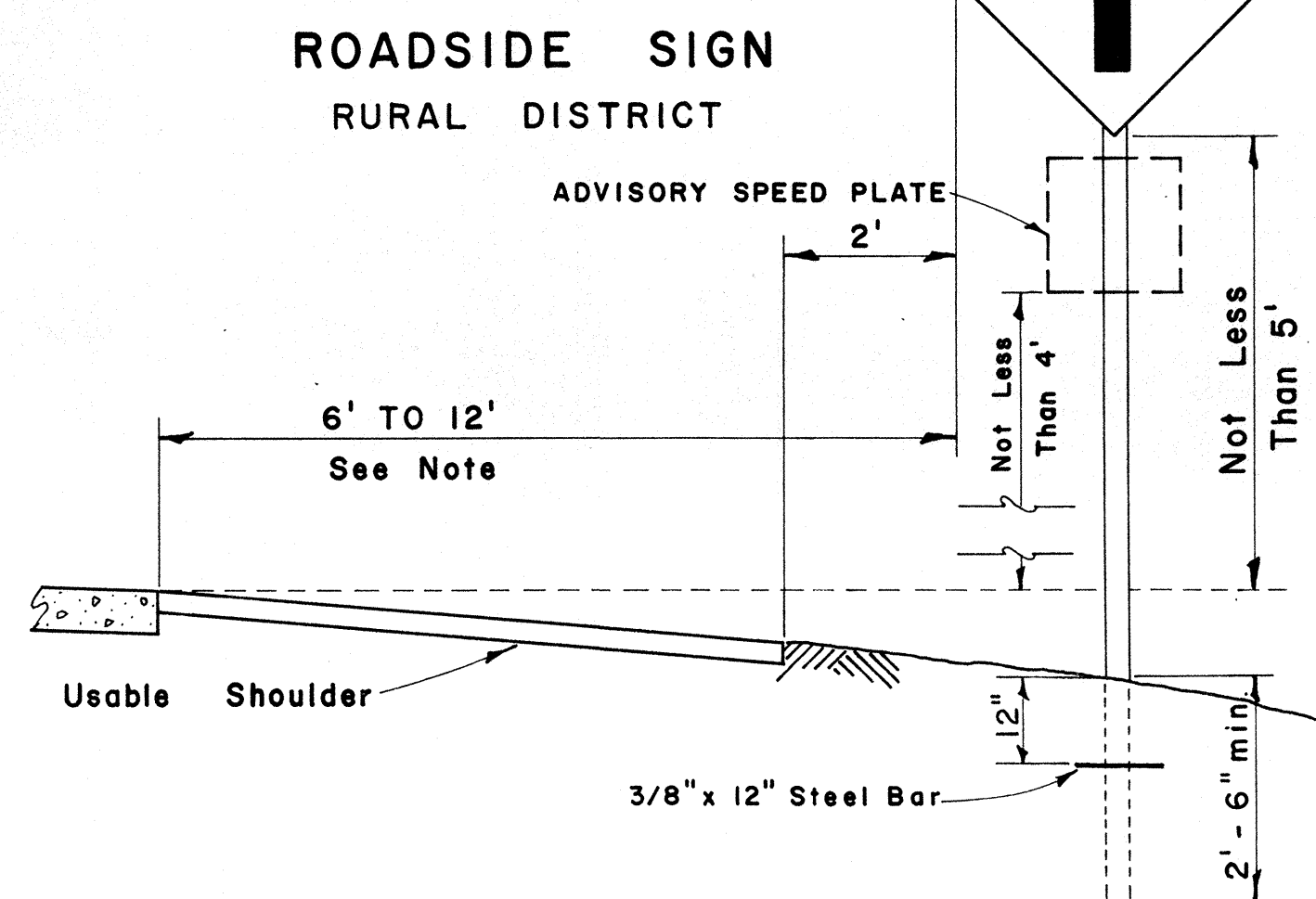
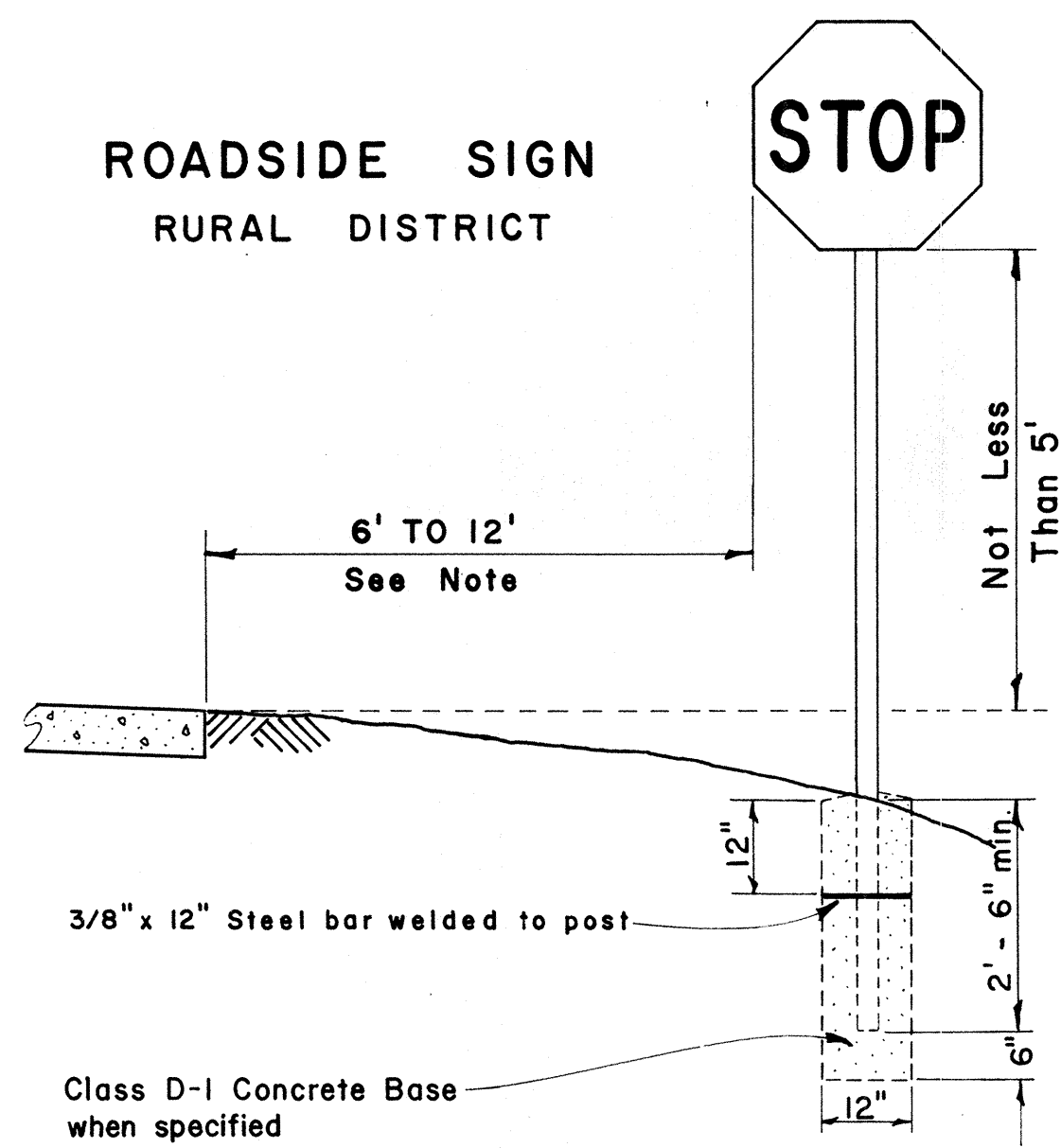
Scales: As Noted

Date: Aug. 1965

SHEET No. 9 OF 6 SHEETS

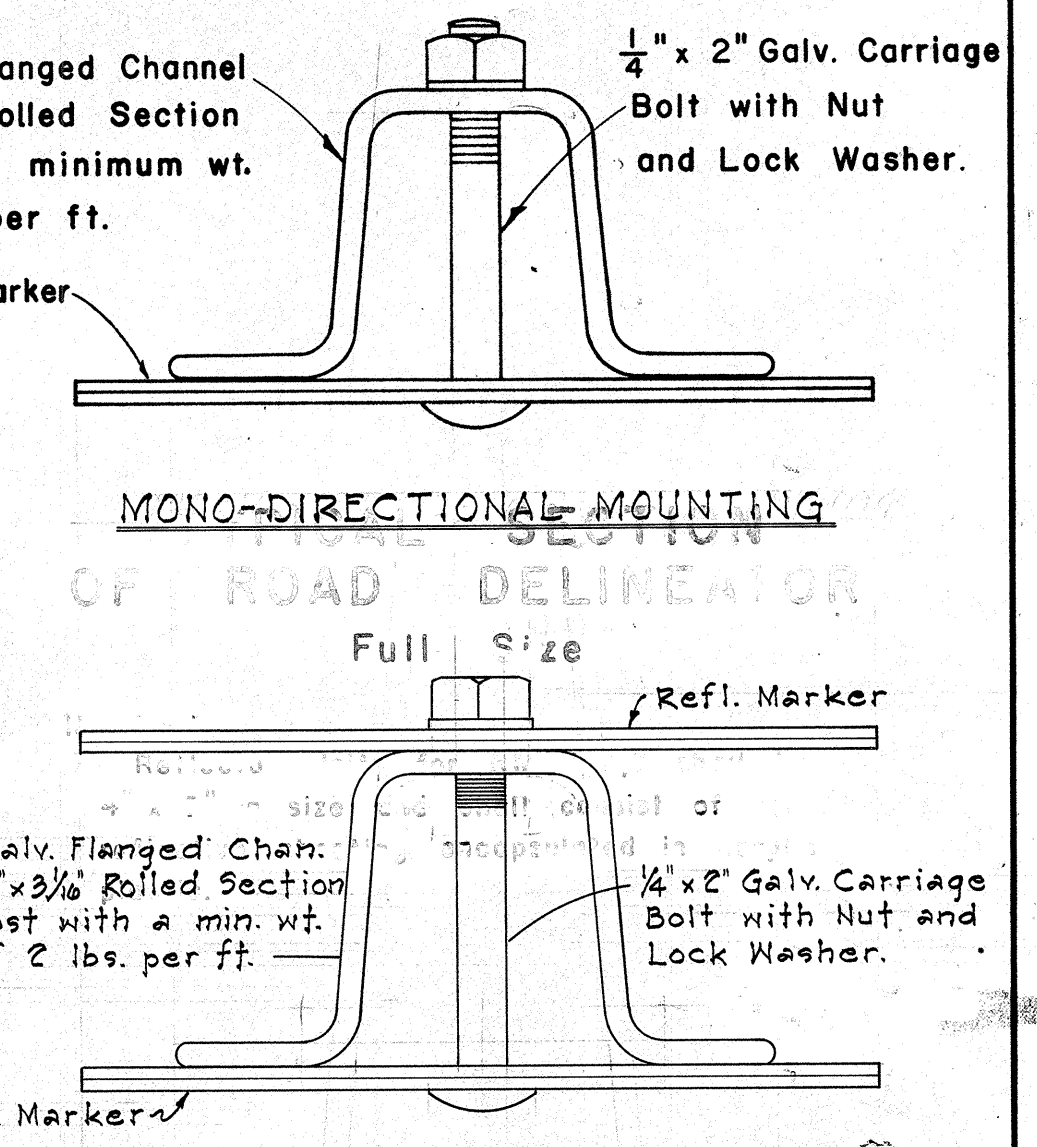
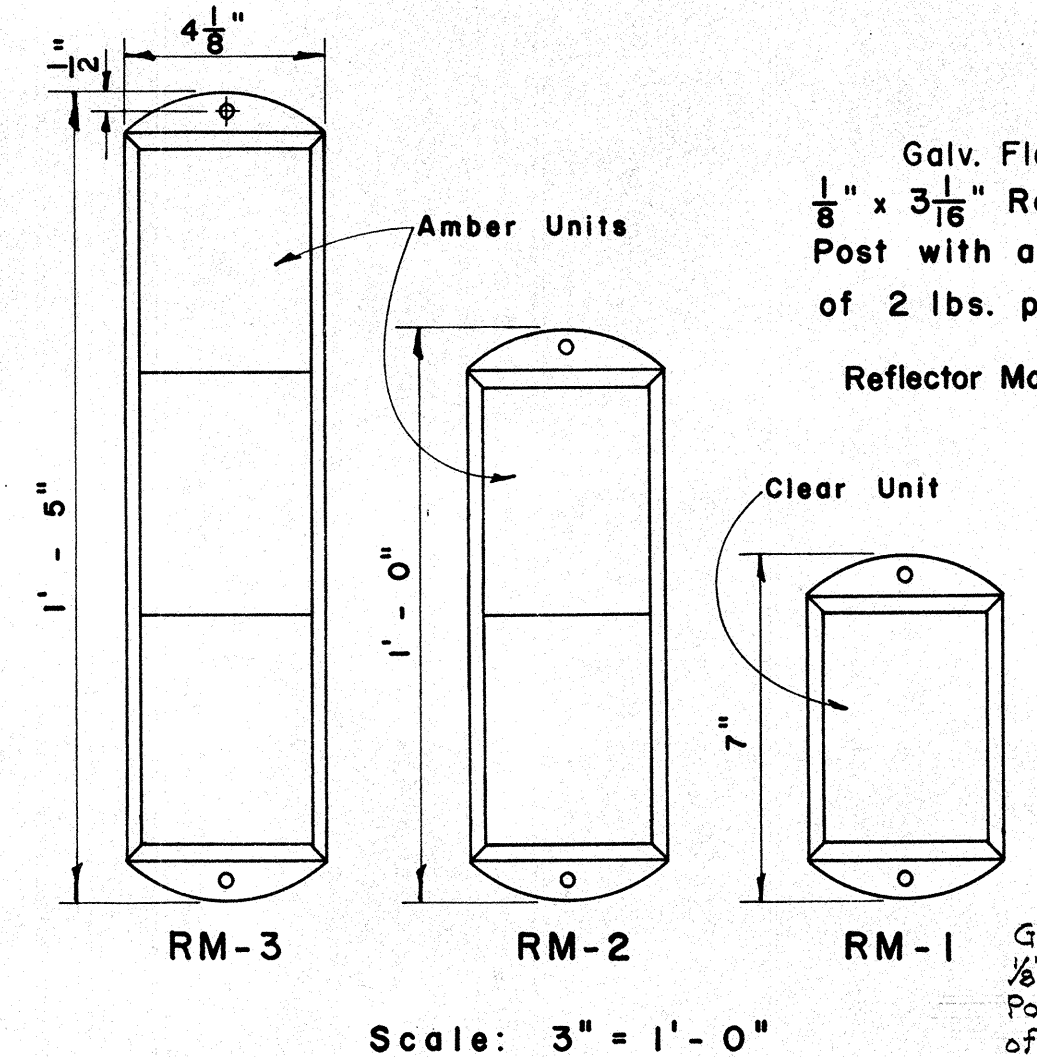
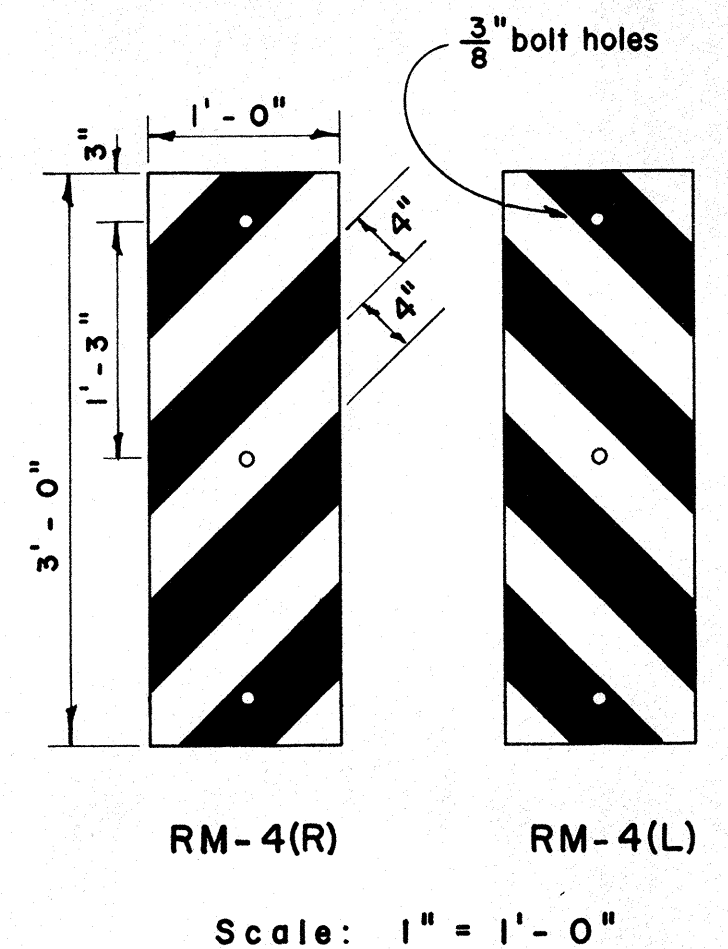
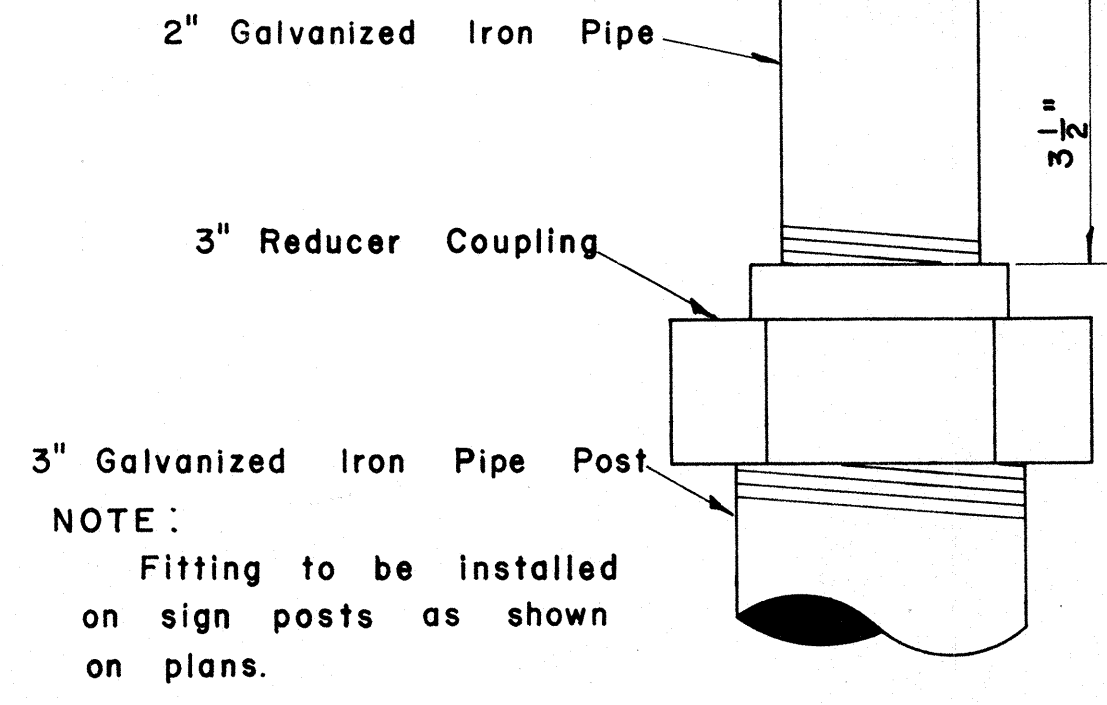
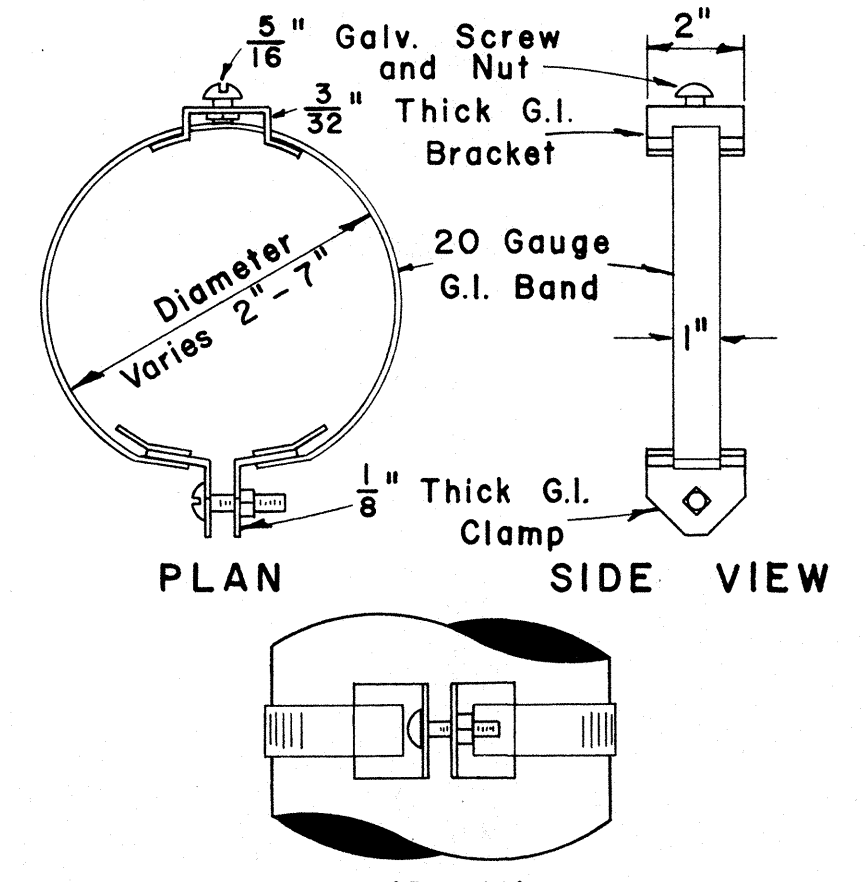
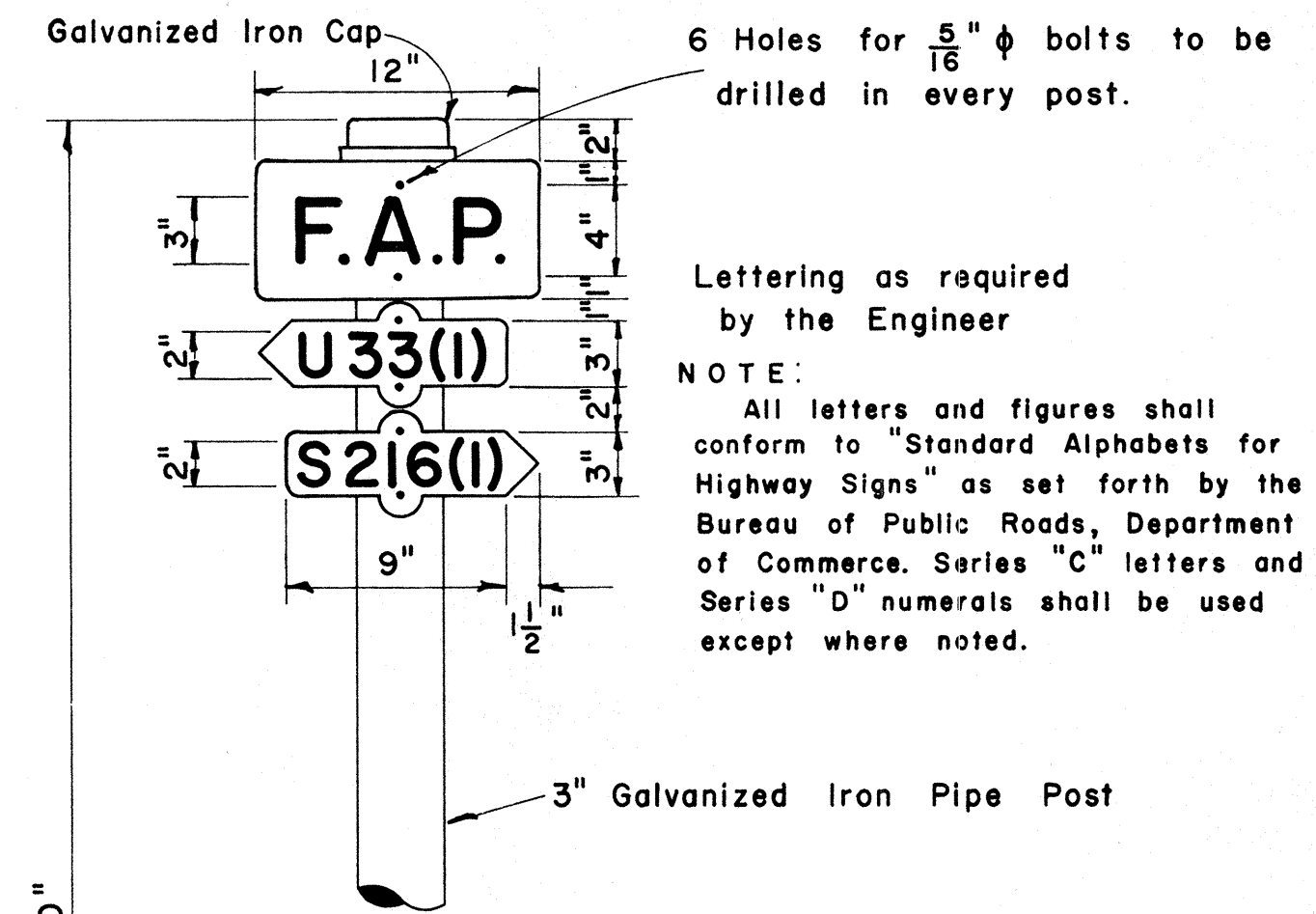
NOTE:

1. All signs and road delineators shall be placed 2' outside the usable roadway shoulder or 1' outside unmountable curbing present and within the limits shown below.
2. Except as noted below, 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, with two $\frac{3}{8}$ " ϕ bolt holes or adjustable band brackets.
3. Sign shall be attached to post with $\frac{5}{16}$ " galvanized carriage bolts with nuts and $\frac{7}{8}$ " x $\frac{7}{16}$ " x .120 stainless-steel washers with neoprene rubber gasket.
4. Clearance Markers (RM-4, RM-3) shall be installed with the inside edge of the marker in line with the inner edge of the obstruction.
5. Signs 48" and wider or larger than 10 sq. ft. in area shall be mounted on two 3" galv. std. pipe with appropriate $\frac{3}{8}$ " bolt holes.



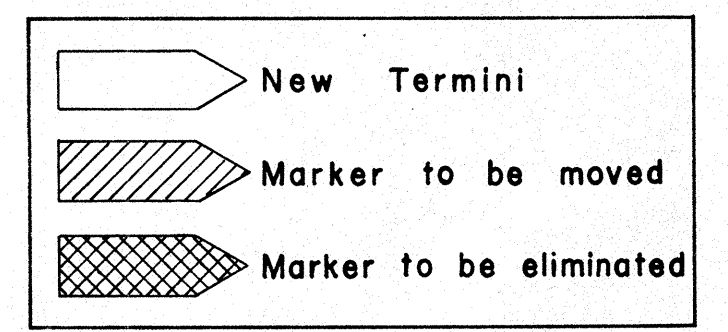
HEIGHT AND LATERAL LOCATION OF SIGNS - TYPICAL INSTALLATIONS

Scale: $\frac{1}{2}$ " = 1' - 0"



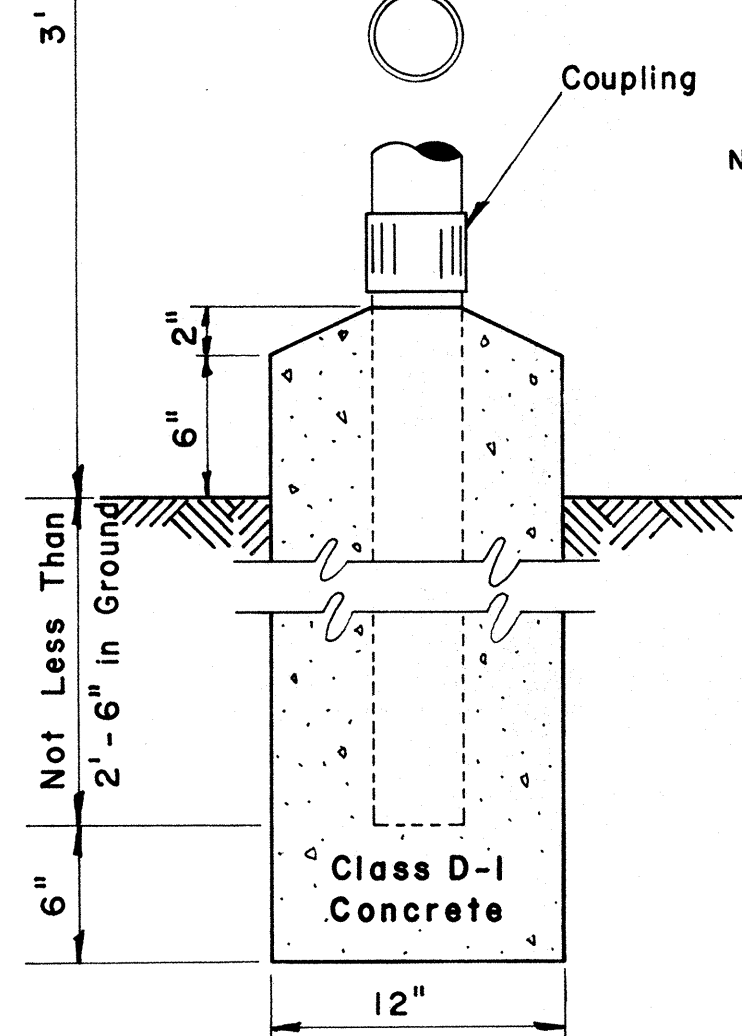
REFLECTOR MARKERS

Scale: As Shown

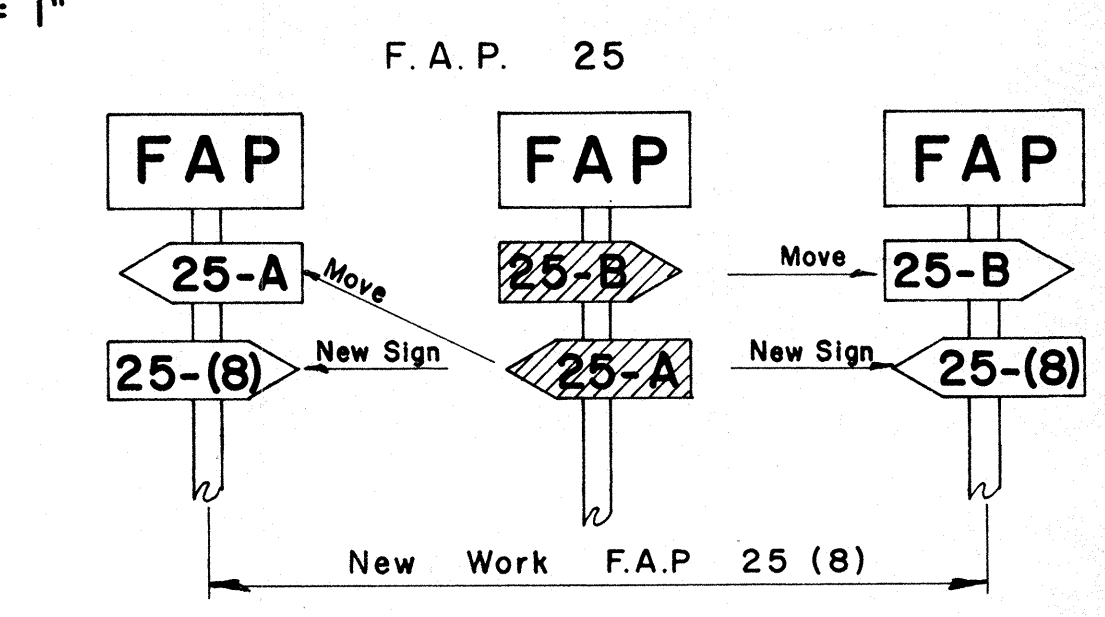
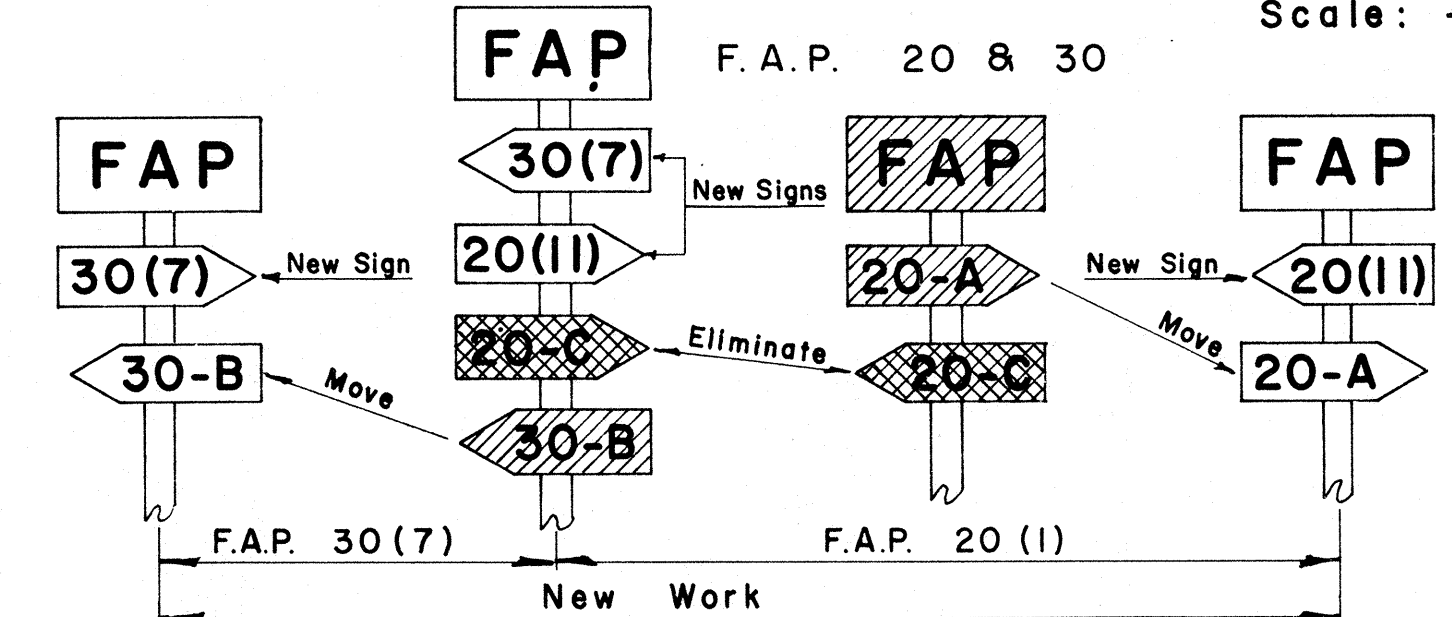


TYPICAL SECTIONS OF REFLECTOR MARKER ON POST

Note: Reflector Units for RM-1, 2, 3 shall be 4'x5' in size and shall consist of reflective sheeting encapsulated in acrylic plastic.



NOTE: Markers and number plates shall be 0.081" thick with $\frac{3}{8}$ " ϕ holes for fastening as shown on sketch. Markers and number plates shall be given one coat of best Zinc Chromate primer and two coats of White Marine Enamel. Before painting, the Aluminum blank shall be treated as specified in the Standard Specifications. Markers and plates shall be fastened with $\frac{5}{16}$ " ϕ galvanized bolts and washers in addition to Stainless-Steel washers with Neoprene rubber gaskets attached on front face of each plate. Letters and numbers shall be of two coats of Black Marine Enamel.

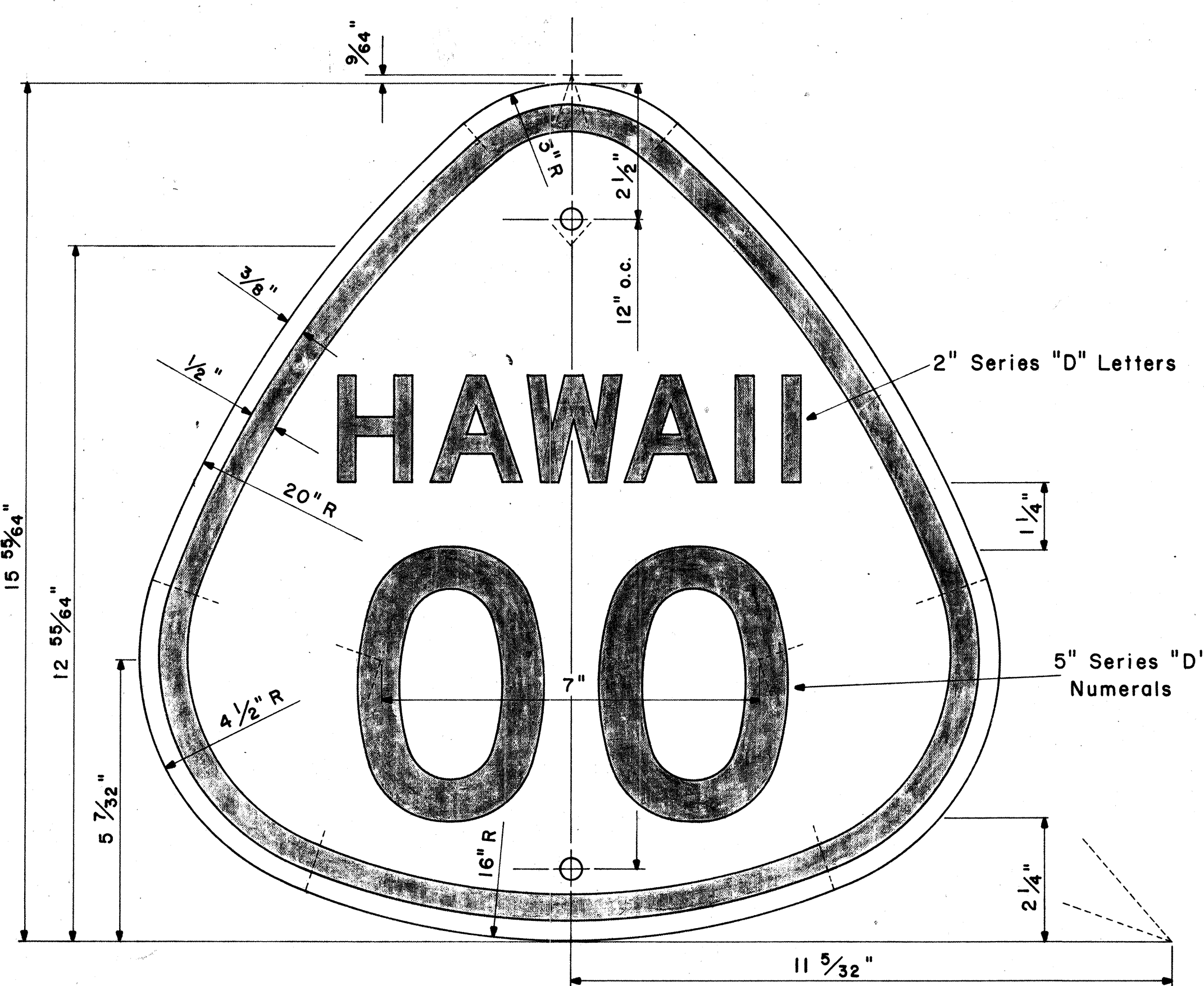


METHOD OF MARKING F.A. PROJECTS AT OVERLAPS (USING NUMBER SUFFIX ON NEW WORK)

APPROVED: DATE: 1/30/61

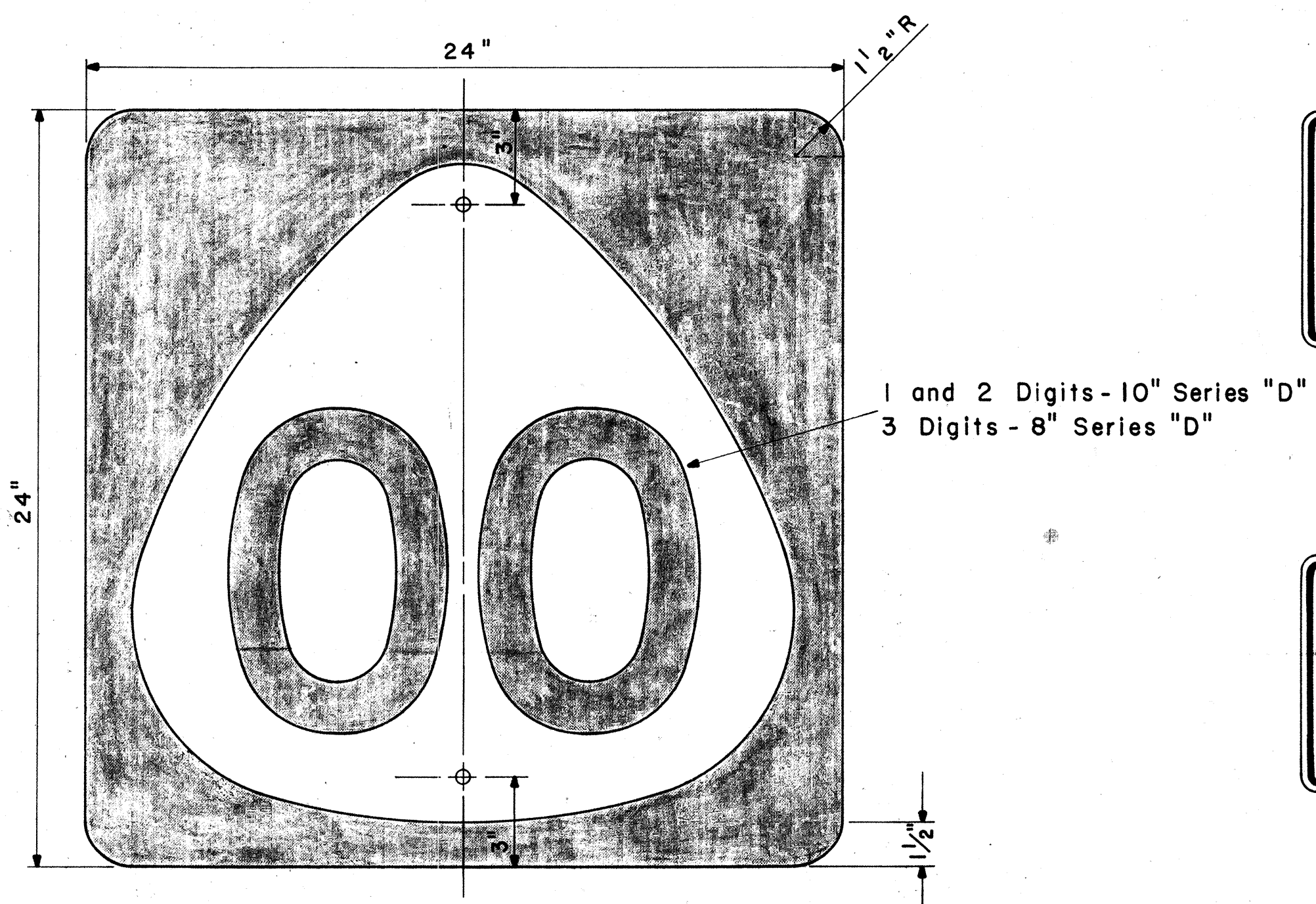
DIRECTOR OF TRANSPORTATION

STATE OF HAWAII
DEPARTMENT OF TRANSPORTATION
DIVISION
STANDARD DETAILS
F. A. MARKER
AND
MISCELLANEOUS SIGN
DETAILS
Scale: As Shown



STATE ROUTE MARKER
M1-3(00)

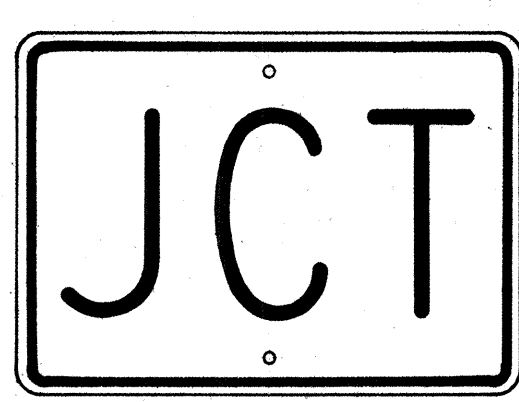
Scale: 1/2" = 1"



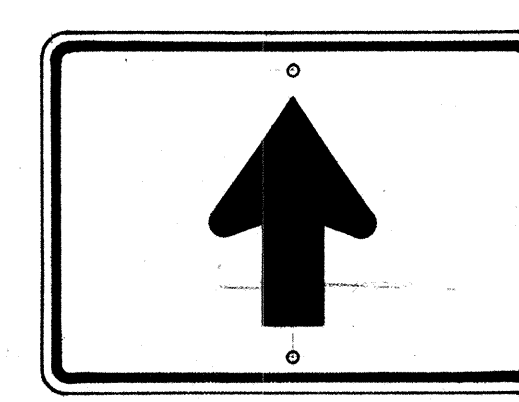
STATE ROUTE MARKER
M1-4(00)

Scale: 1/4" = 1"

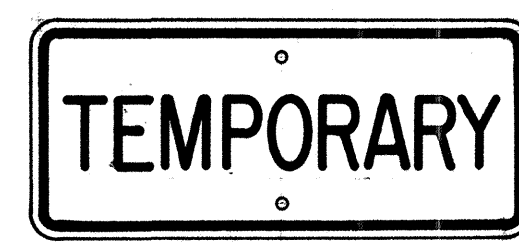
NOTE: Multiply all dimensions of State Route Marker M1-3 by 1.3 for the dimensions of the shield for M1-4.



M2-1
21" x 15"



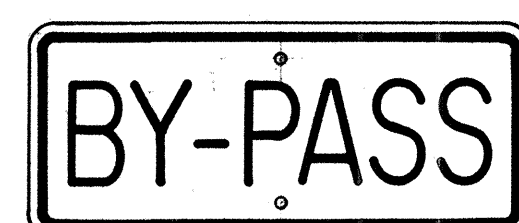
M4-3
21" x 15"



M5-1
21" x 9"



M5-2
21" x 9"



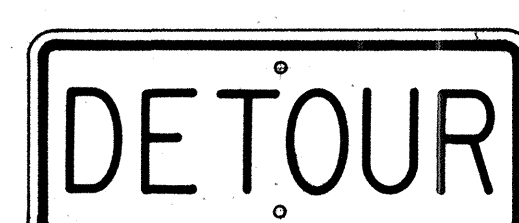
M5-3
21" x 9"



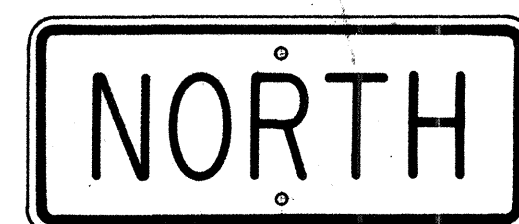
M5-4
21" x 9"



M5-5
21" x 9"



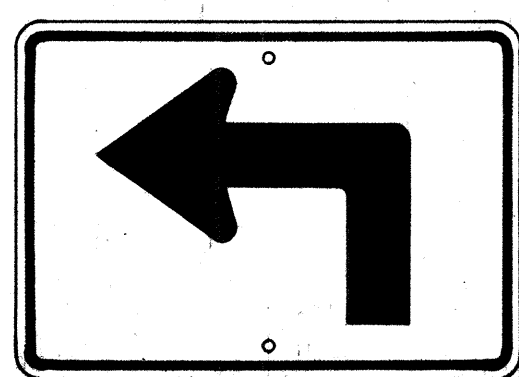
M5-6
21" x 9"



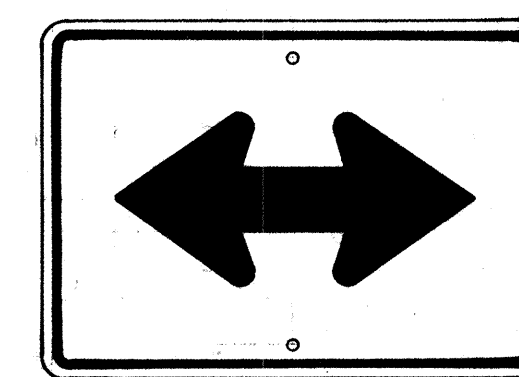
M6-1-N
21" x 9"
(See Note 6)



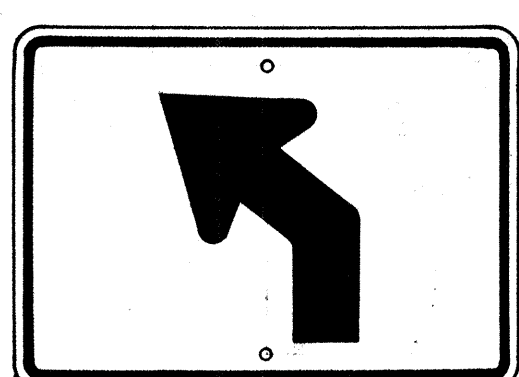
M7-1
18" x 12"



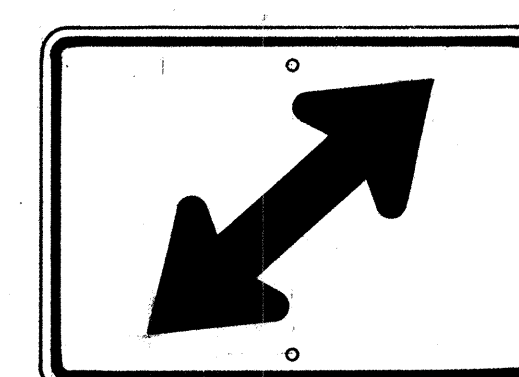
M3-1-L
* M3-1-R
21" x 15"



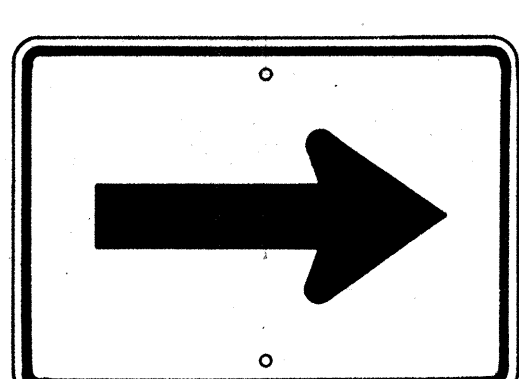
M4-4
21" x 15"



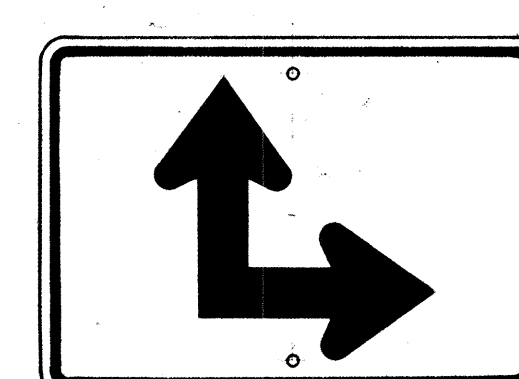
M3-2-L
* M3-2-R
21" x 15"



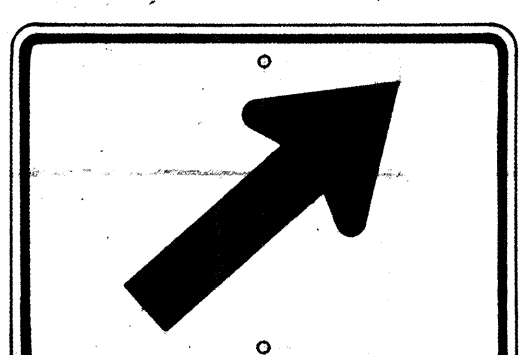
M4-5-R
* M4-5-L
21" x 15"



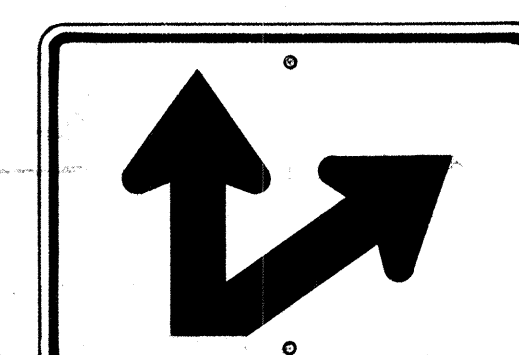
M4-1
21" x 15"



M4-6-R
* M4-6-L
21" x 15"



M4-2-R
* M4-2-L
21" x 15"



M4-7-R
* M4-7-L
21" x 15"

AUXILIARY MARKERS

Scale: 1/8" = 1"

* NOTE: Signs shall be similar but opposite in direction.

GENERAL NOTES

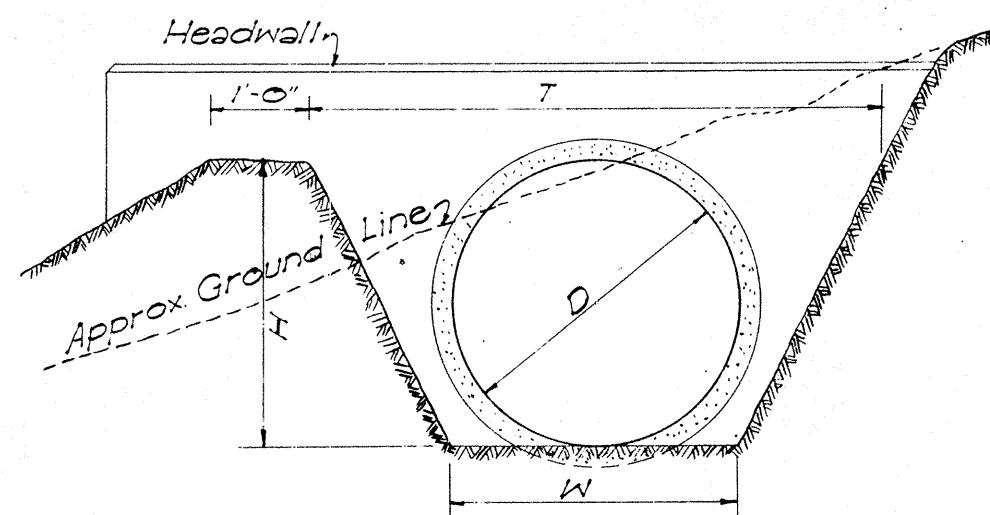
- The shape, color, dimensions, symbols, wording, lettering and reflectorizing of all signs shall be in accordance with the "Manual on Uniform Traffic Control Devices for Streets and Highways," dated June 1961 and the BPR manual "Standard Highway Signs," dated September 1961, unless otherwise specified.
- All letters and figures shall conform to the manual "Standard Alphabets for Highway Signs," Dept. of Commerce, Bureau of Public Roads, 1952.
- All markers shall be reflectorized unless otherwise specified.
- All markers shall have 3/8" bolt holes drilled at appropriate locations unless otherwise specified.
- All markers shall have a black legend on a white background unless otherwise specified.
- Sign message of Cardinal Direction Marker (M6-1) shall be denoted by the following suffixes:
M6-1-N : NORTH
M6-1-E : EAST
M6-1-S : SOUTH
M6-1-W : WEST
- Auxiliary markers denoted with the suffix "I": (M4-1-I) shall have a white legend on a blue background.
- Cardinal Direction Marker (M6-1) with suffix I (3) shall have a white legend on a blue background and shall be 30" x 15" in size.
- For M1-3, and M1-4 signs, number in () indicates route number and shall be as shown on the plan.

APPROVED: _____ DATE: _____
DIRECTOR OF TRANSPORTATION

STATE OF HAWAII
DEPARTMENT OF TRANSPORTATION
HIGHWAYS DIVISION
STANDARD DETAILS
STATE ROUTE MARKERS
AND
AUXILIARY MARKERS
Scale: As Noted
SHEET NO. 4 OF 6 SHEETS

DATE: _____
DRAWN BY: _____
CHECKED BY: _____
DESIGNED BY: _____
QUANTITIES BY: _____
NO. _____

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



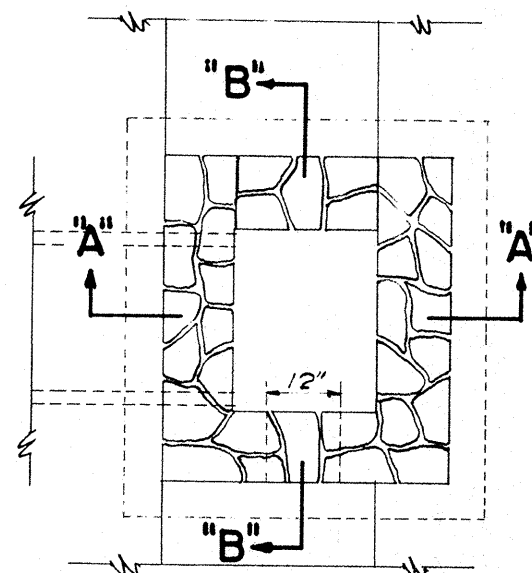
DETAIL OF OUTLET DITCH

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

DATA FOR MASONRY DROP INTAKE					Where Variables Equal
D	D	L=D+6"	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:

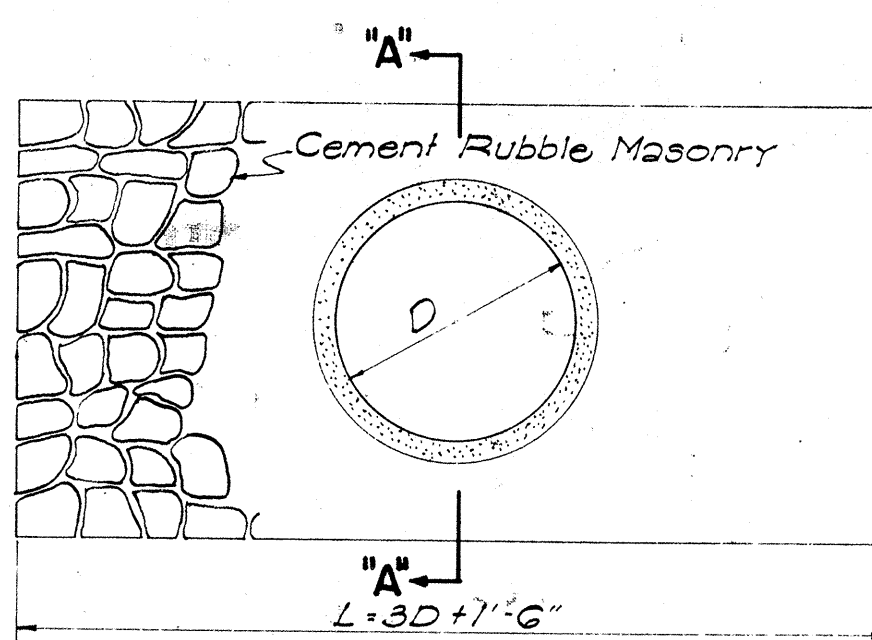
Dimension "X" is assumed as 2'-4" in figuring the above quantities.



DETAIL OF MASONRY DROP INTAKE

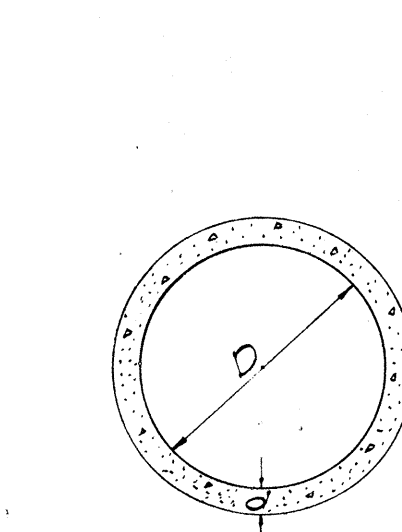
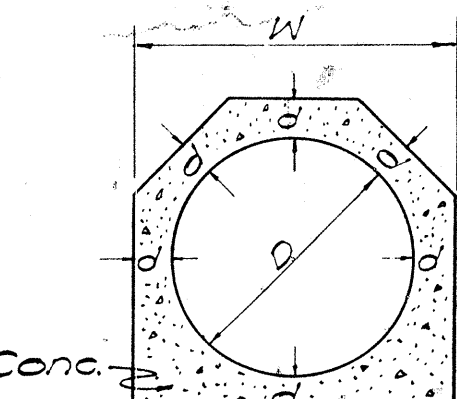
Scale: 3/8" = 1'-0"

DATA-MASONRY HEADWALL					Cast-in-Place Conc. Culvert	Conc. Pipe Culvert	Corrugated Pipe Culvert
D	H	B	L		Cu Yds.	Cu Yds.	Cu Yds.
18"	3'-6"	1'-0"	6'-0"		0.85	0.95	0.93
24"	4'-0"	2'-0"	7'-6"		1.28	1.42	1.41
30"	4'-6"	2'-6"	9'-0"		1.83	2.06	2.00
36"	5'-0"	3'-0"	10'-6"		2.40	2.84	2.72

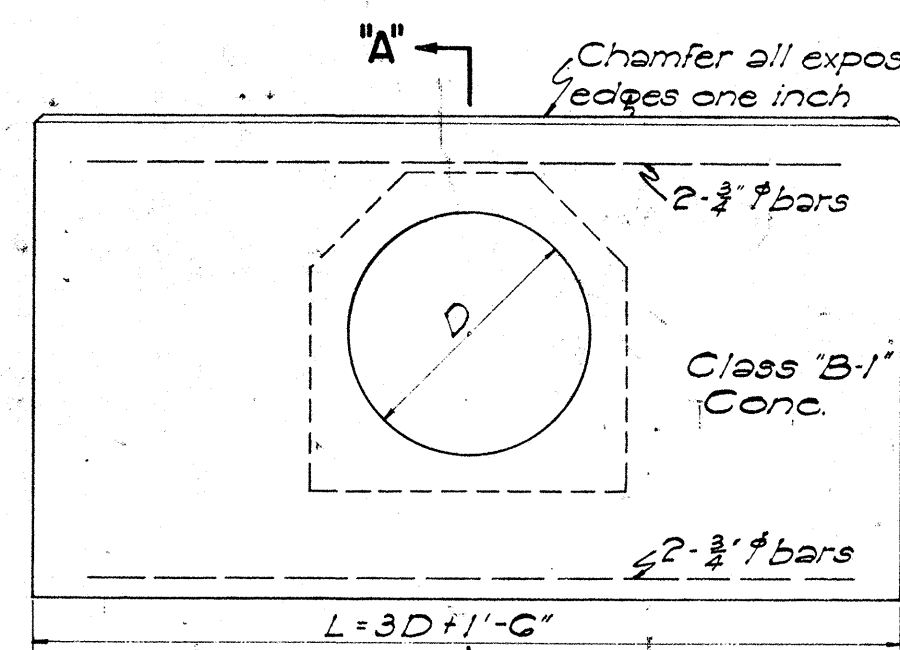


DETAIL OF MASONRY HEADWALL

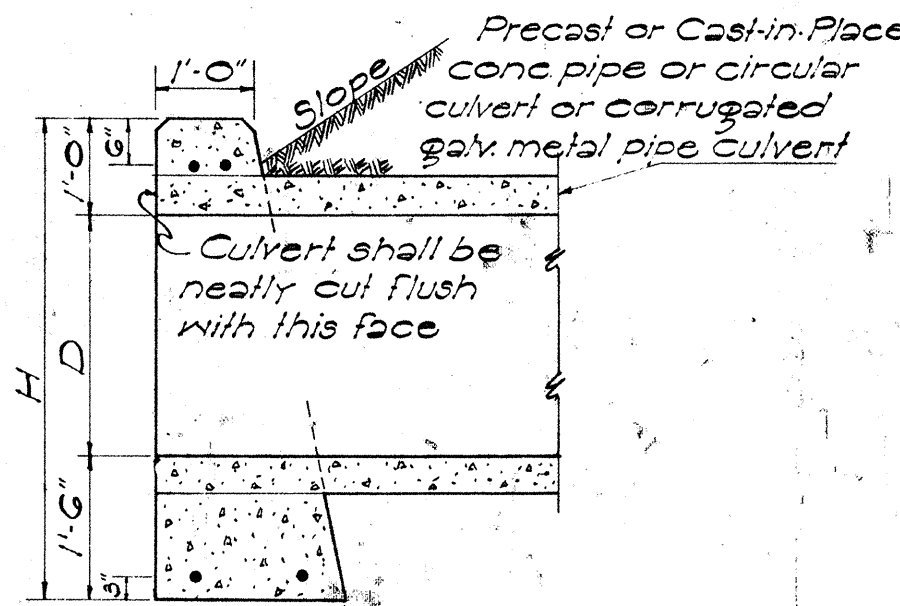
Scale: 1/2" = 1'-0"

SECTION
CONC. PIPE CULVERTNOTE:
Thickness "d", reinforcing, and concrete used, are to conform with the approved design as provided by the Specifications.SECTION
CAST-IN-PLACE
CONC. CULVERT

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	



ELEVATION

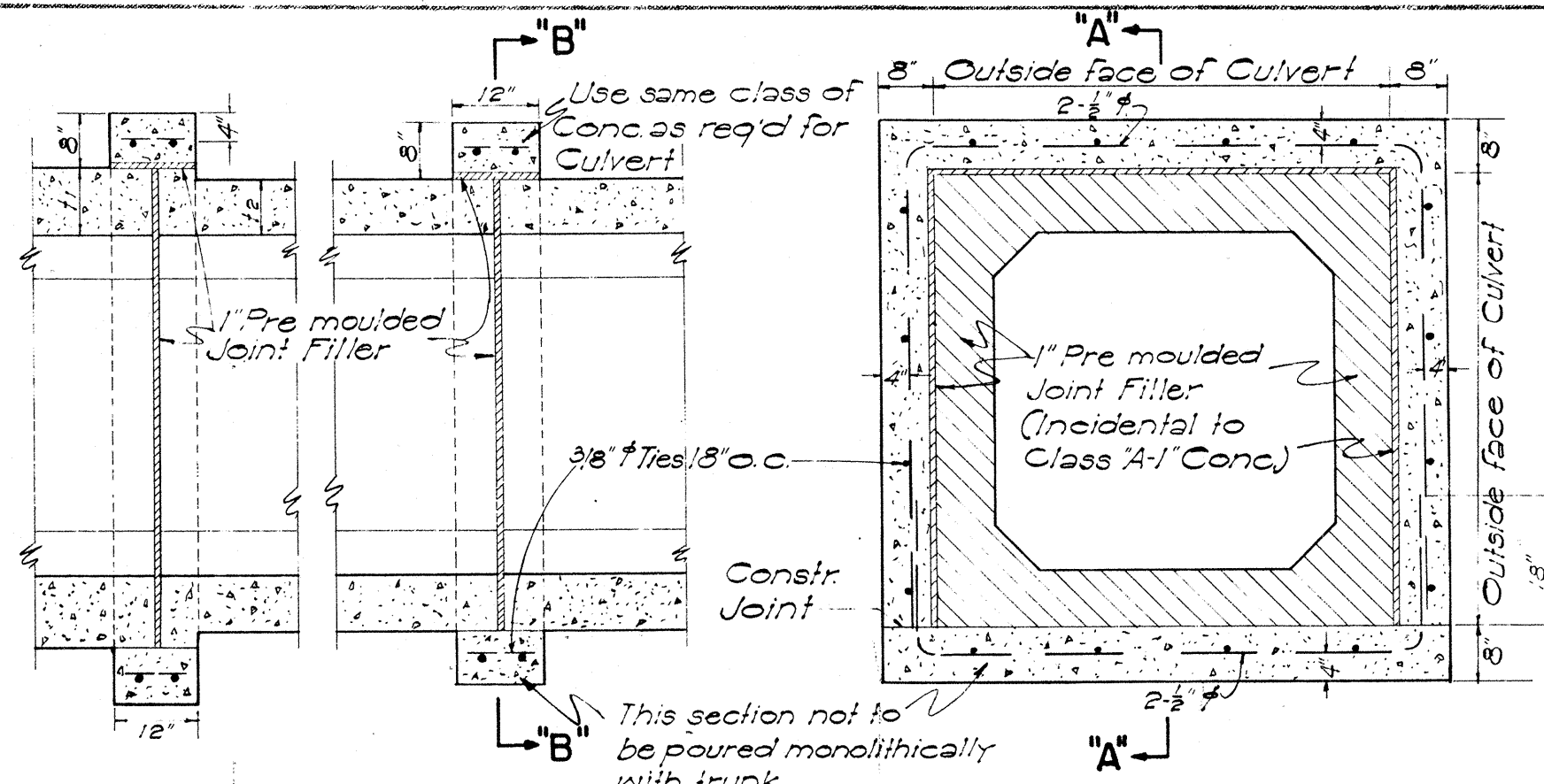


SECTION "A-A"

DATA FOR CONC. HEADWALL					Cast-in-Place Conc. Culvert	Conc. Pipe Culvert	Steel For One Headwall
D	B	L	H		Cu Yds.	Cu Yds.	No. of Bars Size Length Lbs.
18"	1'-6"	6'-0"	4'-0"		0.92	1.00	4 3/4" 5'-3" 33
24"	1'-6"	7'-6"	4'-6"		1.25	1.38	4 3/4" 7'-0" 42
30"	2'-0"	9'-0"	5'-0"		1.95	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	4.26	4 3/4" 11'-6" 69
48"	2'-6"	13'-6"	6'-6"		4.66	5.11	4 3/4" 13'-0" 78

DETAIL OF CONCRETE HEADWALL

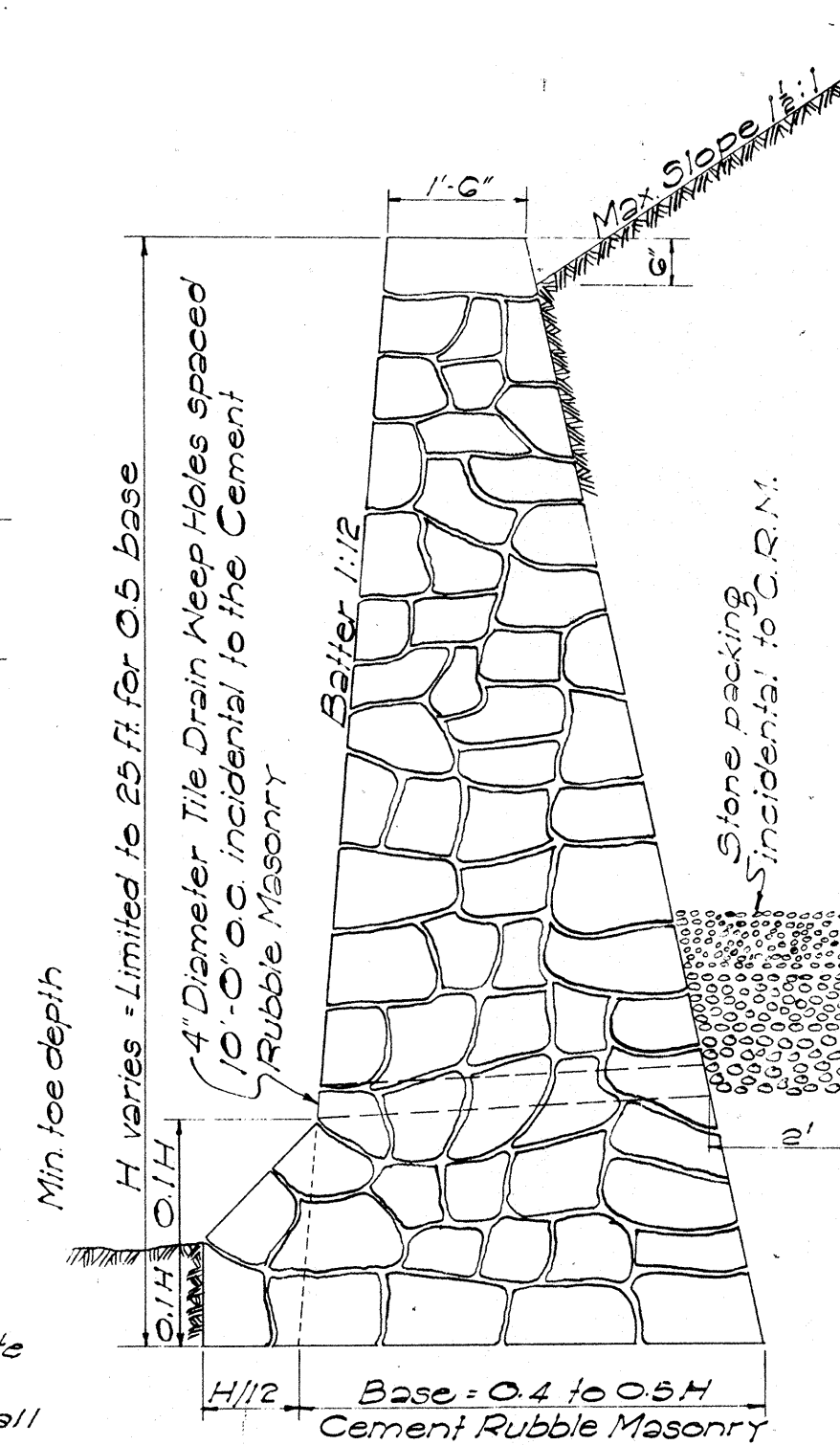
Scale: 1/2" = 1'-0"

SECTION "A-A"
CONC. COLLAR FOR CONC. BOX CULVERT

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

REINFORCING BARS

All reinforcing bars for concrete shall be Billet Steel bars, ASTM A15, intermediate grade. Steel shall be made by the open-hearth process. All bars shall be deformed type conforming to ASTM A-305.

SECTION OF HIGH CEMENT
RUBBLE MASONRY RETAINING
WALL OR SEAWALL

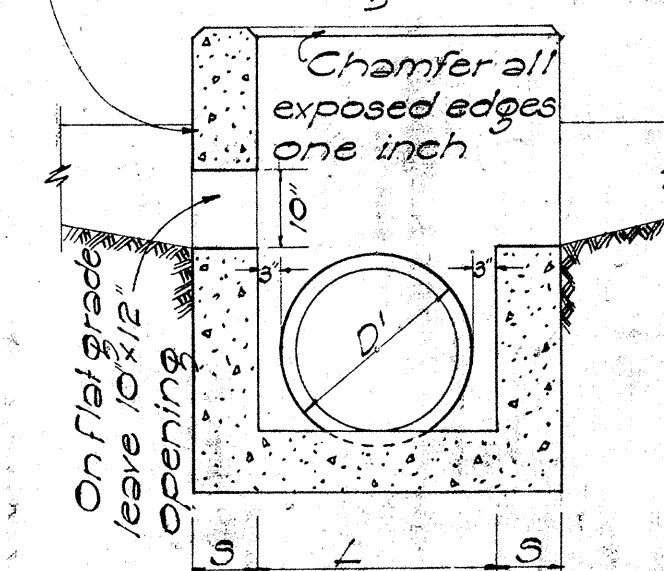
Note: To Resident Engineer
1) Consider economy of reinf. conc. for high retaining walls which did not originate on plan layout.
2) Elevation of weep holes to be determined by Resident Engineer. Holes to be placed as close to the existing ground line as local conditions permit.

SECTION OF LOW
MASONRY RETAINING
WALL OR SEAWALL

DATA-CONC. DROP INTAKE					Where Variables Equal
D	D	L=D+6"	Cu Yds.		
23"	18"	2'-5"	1.41	4'-6"	
30"	24"	3'-0"	1.72	5'-0"	
37"	30"	3'-7"	2.32	5'-6"	
44"	36"	4'-2"	2.73	6'-0"	
51"	42"	4'-9"	3.54	6'-6"	
58"	48"	5'-4"	4.01	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 Siphons connected with Irrigation Ditches or Flumes with appropriate changes to dimensions. In this case all joints must be made water tight.

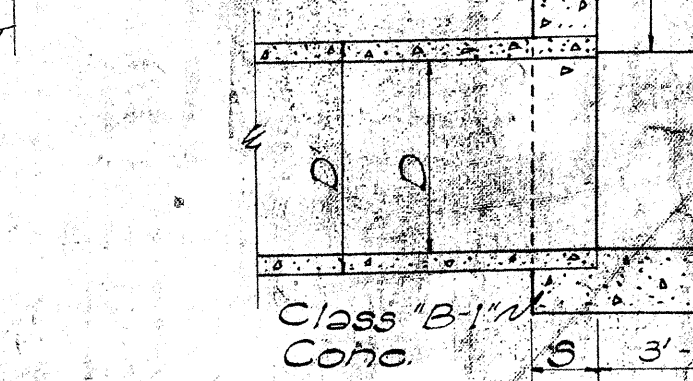


SECTION "B-B"

Where drainage comes from both sides lower to this wall to same elevation as shown for opposite wall.

Excavate recess in roadway excavation slope for inlet to dimensions and form designated by Engineer. This is Unclassified Excavation.

Top limit of structure excavation other than at bridges.



SECTION "A-A"

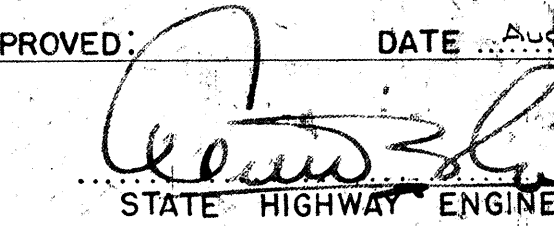
DETAIL OF CONCRETE DROP INTAKE

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

SECT. OF CULVERT WITH CONC. PROTECTION

Scale: 1" = 1'-0"

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		
10" " 42" D		
11" " 48" D		
12" " 54" D		
	$\frac{D}{2} + T$	Minimum = X
		Maximum pay quantity will be Z = 12"

APPROVED:  DATE: AUG. 25, 1959
STATE HIGHWAY ENGINEER

DEPARTMENT OF TRANSPORTATION
DIVISION OF HIGHWAYS
STATE OF HAWAII

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

SHEET NO 5 OF 6 SHEETS

