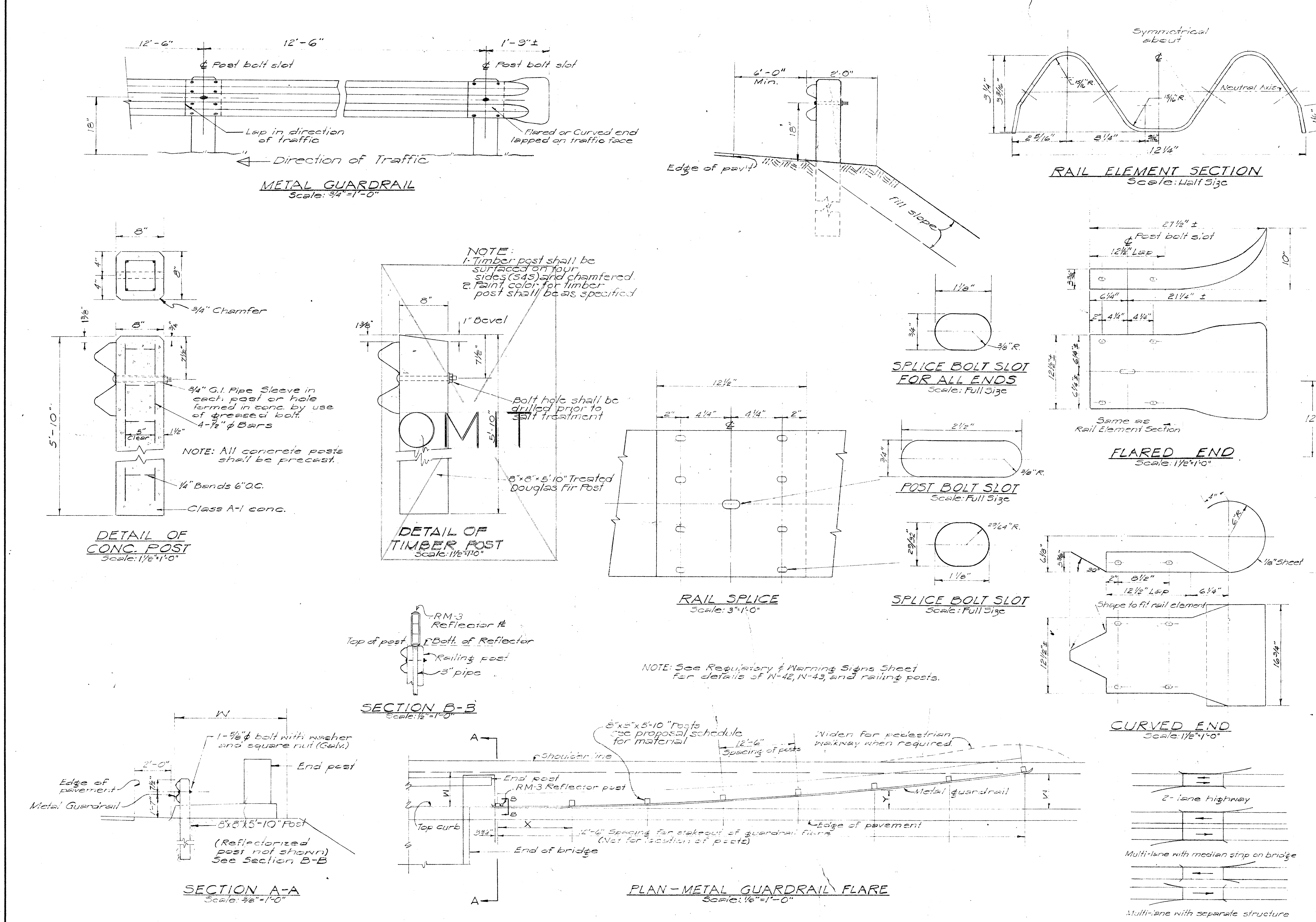
FED. ROAD DIST. No.	STATE	FED. AID PROJ. No.	FISCAL YEAR	SHEET No.	TOTAL SHEETS
HAWAII	HAW.	S0480(1)	1965	16	31



GUARDRAIL OFFSET

X	Y: 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.

DEPARTMENT OF TRANSPORTATION
HIGHWAYS DIVISION
STATE OF HAWAII

GUARDRAIL DETAILS

PROJECT NO S-0480(1)

SHEET No. 1 OF 5 SHEETS

ORIGINAL PLAN	SURVEY PLOTTED BY / DESIGNED BY / DRAWN BY / TRACED BY / QUANTITIES BY / QUANTITIES CHECKED BY / CHECKED BY	DATE
NOTE BOOK No.		

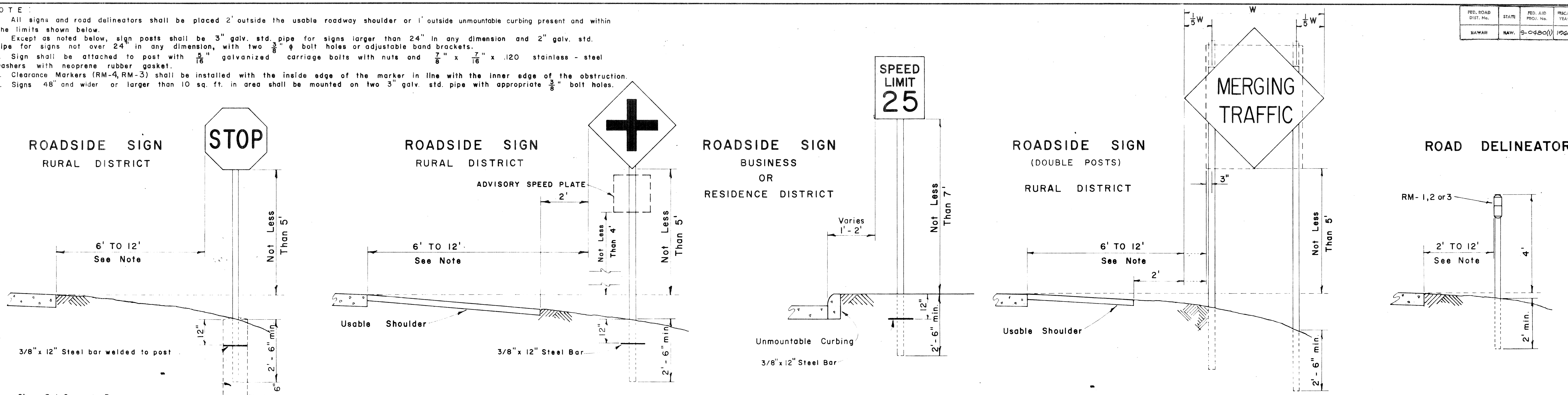
16


2/17/59
FED. ROAD DIST. NO. | STATE | FED. AID PROJ. NO. | FISCAL YEAR | SHEET NO. | TOTAL SHEETS
HAWAII | HAW. | S-0450(1) | 1958 | 17 | 31
AUG. 1957
1"×6"×1'-4" Filler
1/4" ϕ BOLTS REQ'D FOR ONE GATE
NOTE:
Conc Gate Posts are required wherever gates are installed in or at the end of Std Wire Fence with Conc. Posts
1/4" ϕ bolts with two washers and nuts
All Gate Lumber Rough Clear N.W.
Ground Line
Lower 4'-6" Section of Post to be creosoted
DETAIL OF CATTLE GATE
Scale: 1/2" = 1'-0"
PLAN SECT.
SIDE ELEV.
Class "F-1" Concrete
3/4" ϕ Holes as shown on Gate Details
1/2" Round Grooves
6-#13 Wire Hoops spaced 1'-0" O.C.
ELEV.
PLAN SECT.
SIDE ELEV.
CONC. GATE POST
Scale: 1-1/2" = 1'-0"
NOTE:
Contractor may either cast holes for fastening fence wire or cast post with 3/4" - 1/2 round grooves on 2 sides.
Class "F-1" Concrete
3/4" ϕ Holes spaced to fit wire spacing
7-#13 wire Hoops spaced 1'-0" o.c.
1/2" Round Grooves
PLAN SECT.
ELEV.
SIDE ELEV.
CONC. FENCE POST
Scale: 1-1/2" = 1'-0"
Note: Fence must be anchored against pull at least every 500 ft and also at top of rise and bottom of dip.
4"×4" Fir (Rough)
No. 6 G.I. Wire
4"×5"×7'-0" split R.W. posts
Use 1 1/4" or 1 1/2" galv. staples
Ground Line
Lower 3'-0" section of post to be creosoted
POST SPACING = 10'-0"
NOTE:
Detail of fence with concrete post is the same. See detail of Conc. Fence Post.
No. 6 G.I. wire
4"×3"×4'-0" Fir (Rough)
4"×5"×7'-0" split R.W. post
Ground Line
Lower 3'-0" section of post to be creosoted
POST SPACING = 16'-0"
NOTE: Use above detail for end post.
NOTE: This Project requires Std Wire Fence with ___ ft. post spacing (If spacing is not indicated above use 10 ft)
Position in relation to ℄ in front of each separate property must be secured from the Engineer.
DETAILS OF STANDARD WIRE FENCE WITH WOOD POSTS
Scale: 3/8" = 1'-0"
8'-0" opposite Box Culverts 6'-0" wide
5/8" ϕ×1'-3" Drift Bolt
Lock nut & washers
5/8" ϕ×10" Eye Bolts
2-2"×6"
2"×6" Wood Blocks
Lock nut & washers
No. 6 G.I. Wire
4 Strands galv. barbed wire
Ground Line
Grade surface so gate will swing clear
Lower 3'-6" section of post to be creo.
NOTE: Except posts, all timber of rough fir
New or reconstructed fence
ELEVATION
Scale: 1/2" = 1'-0"
℄ of Road
R/W Boundary Line
New or reconstructed fence
LAYOUT SHOWING HURDLE PLACED BELOW CULVERT IN A POSITION WHICH WILL BE CATTLE TIGHT
DETAILS OF HURDLE
1"×6"×6" Filler
Ground Line
Stone or wood block gate stop
See detail of gate hanger
Lower 4'-0" section to be creosoted
DETAIL OF DOUBLE HUNG GATE
Scale: 1/2" = 1'-0"
See note regarding use of Conc. Posts
3/4" ϕ × 9" bolt threaded 3"
3/4" ϕ × 10" bolt threaded 8 1/2"
Washer
Lock nut & Washer
DETAIL OF GATE HANGER
Scale: 1-1/2" = 1'-0"
Note: Use 3/4" ϕ × 11" bolts for Cattle Gate
Elec. Weld
16-60# Rails @ 3 3/4" o.c.
6-10" I 35.0 9'-6" long
8" Tile Drain Drain to Ditch
LONGITUDINAL SECTION
Class "A-1" Conc.
10'-0" Max.
Ball Top
Plug
Safeguard Top
Top Rail
End Post
2" Mesh Chain Link Fabric
1/4"×3/4" Stretcher Bar
Line Post (H-Column or Pipe)
For Horizontal Brace, see Specifications.
Stretcher Bar Bands
3/8" ϕ Tension Rod with Turnbuckle
6'-0" Max. Height of Fence
Class "D-1" Conc. Footing
Neat excavation from 6" below top of footing
Width at Top of Footing
Class "D-1" Conc. Footing
Depth of Footing
No. 7 Tension Wire
END POST ELEV.
TYPICAL SECTION
LINE POST ELEV.
DETAIL OF CHAIN LINK FENCE
Scale: 1/2" = 1'-0"
Butt Joints to be left open approx. 1/8" spaced every other post except on sharp curves.
4"×8"×18'-0" S4S railing painted 3 coats of white paint. Contact surfaces between posts and rails and all butt joints shall be painted 3 coats before assembly
NOTES:
All bolt holes in posts shall be drilled before being salt treated. Posts shall be painted the same as called for in the railing.
Edge of pavt
1/2" ϕ Galv. Carriage bolts spaced as shown. Countersunk on front face.
8"×8" S4S salt treated Douglas Fir Posts 9'-0" O.C.
WOOD GUARD RAIL WITH WOOD POSTS
Scale: 3/8" = 1'-0"
NOTE: For Conc. Post see detail at right
8"×8"×8'-0" S4S salt treated Douglas Fir or 8"×8"×8'-0" precast Concrete Posts shall be used where shoulders are less than 8'-0" wide.
GUIDE POSTS: Wood or Conc. Guide Posts are the same as those used for Wood Guard Rail spaced as shown on plans.
3/4" Chamfer
PLAN SECT.
Class "A-1" Conc.
4-1/2" ϕ Bars
4-3/4" G.I. Pipe Sleeves in each post or holes formed in conc. by use of greased bolts
1/4" Bands 6" O.C.
NOTE: All concrete posts shall be precast
DETAIL OF CONC. POST
Scale: 1-1/2" = 1'-0"
7 strands with stays 24" O.C. All wire #6 Gauge Galv. Wire
Redwood or Ohia Wood
Bottom 3' of post to be Creosoted
4"×5" R.W. or Ohia Wood
DETAIL OF WOVEN WIRE FENCE
Scale: 1/4" = 1'-0"
1/2 Pavement Width
4"×5"×7'-0" Split Redwood Post
Parallel to edge of Pavement
HALF SECTION
Wing fence 5 strands 6 wire spaced the same as Std Wire Fence
Elec. Weld
Excavate pit 5'-6" width of opening 3'-6" below road gr.
SECTION
DETAIL OF CATTLE GUARD
Scale: 3/8" = 1'-0"
APPROVED:
DATE: Aug. 29, 1958
STATE HIGHWAY ENGINEER
DEPARTMENT OF TRANSPORTATION
DIVISION OF HIGHWAYS
STATE OF HAWAII
STANDARD DETAILS
FENCES, GATES, GUARD RAILS, GUIDE POSTS, CATTLE GUARD
SCALES AS NOTED
SHEET No 2 OF 5 SHEETS
ORIGINAL PLAN
NOTE BOOK No.
SURVEY PLOTTED BY
DESIGNED BY
DRAWN BY
TRACED BY L. Calistro
QUANTITIES CHECKED BY
CHECKED BY
DATE
15

FED. ROAD DIST. No.	STATE	FED. AID PROJ. No.	FISCAL YEAR	SHEET No.	TOTAL SHEETS
HAWAII	HAW.	S-0480(1)	1965	18	31

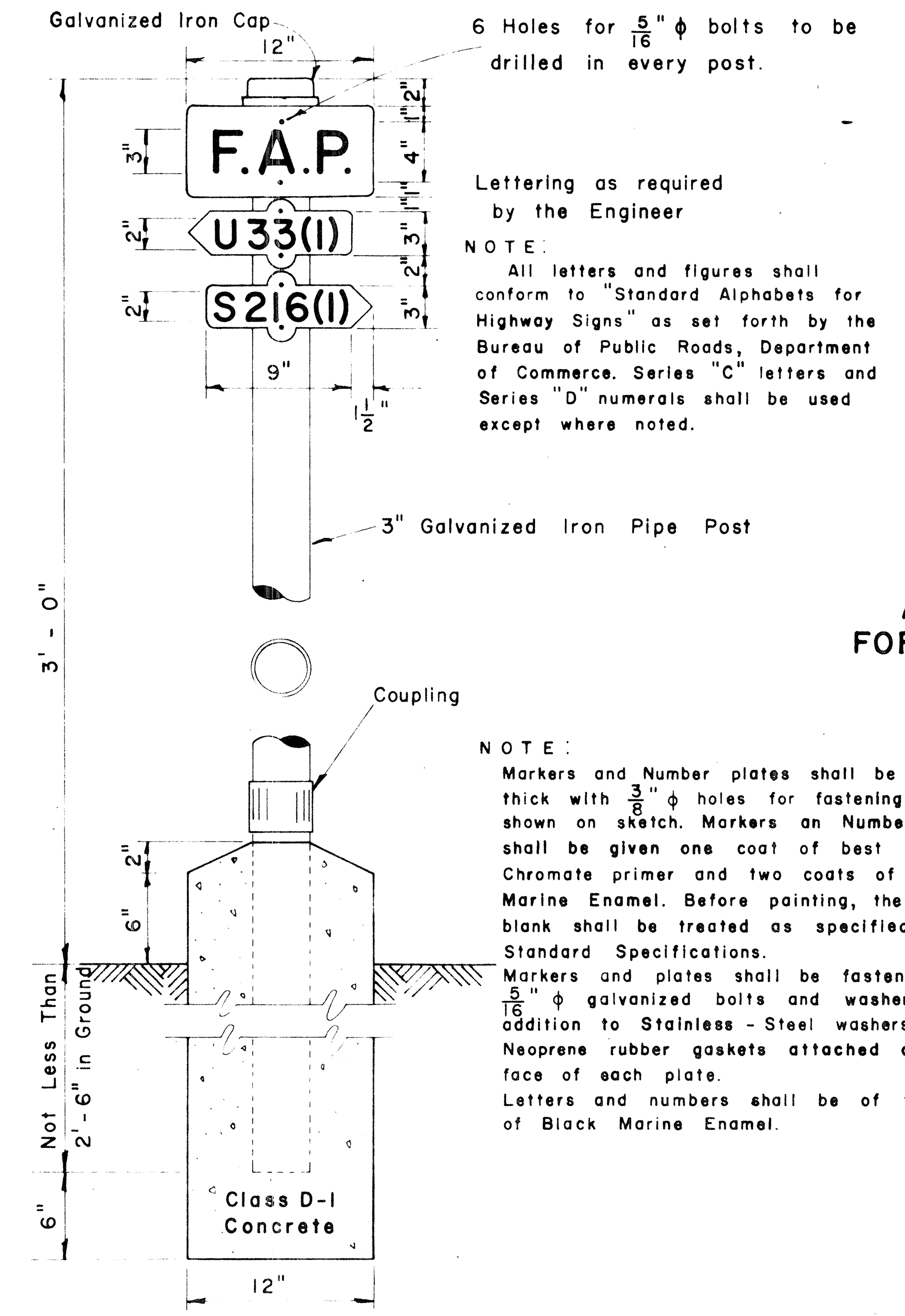
NOTE:

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"



NOTE:

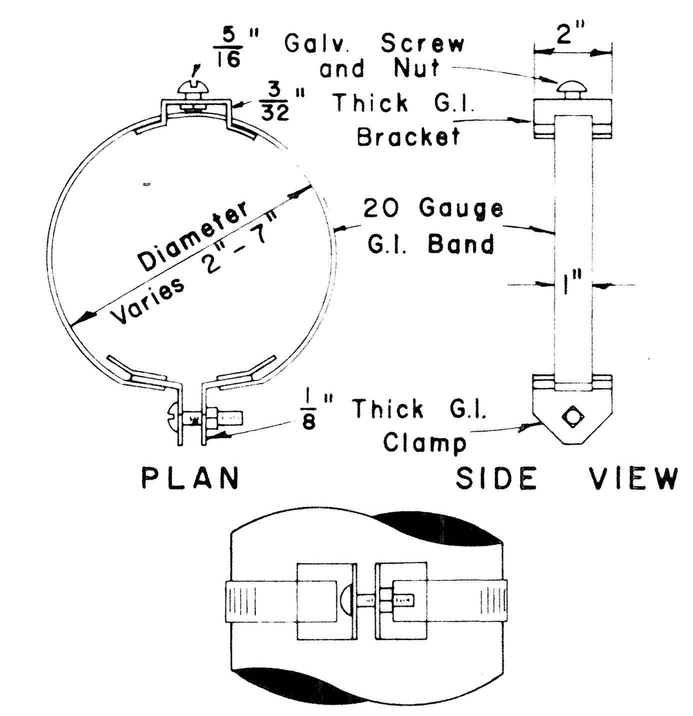
Markers and Number plates shall be 0.081" thick with $\frac{3}{8}$" ϕ holes for fastening as shown on sketch. Markers an Number plates shall be given one coat of best Zinc Chromate primer and two coats of White Marine Enamel. Before painting, the Aluminum blank shall be treated as specified in the Standard 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.

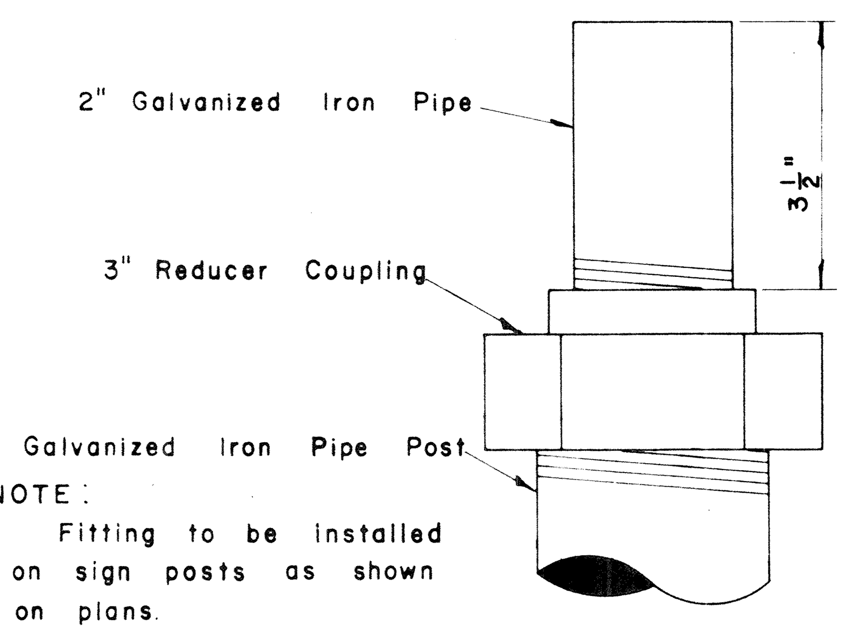
FEDERAL AID MARKER

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



ADJUSTABLE BAND BRACKET FOR MOUNTING TRAFFIC SIGNS

Scale: 3" = 1' - 0"

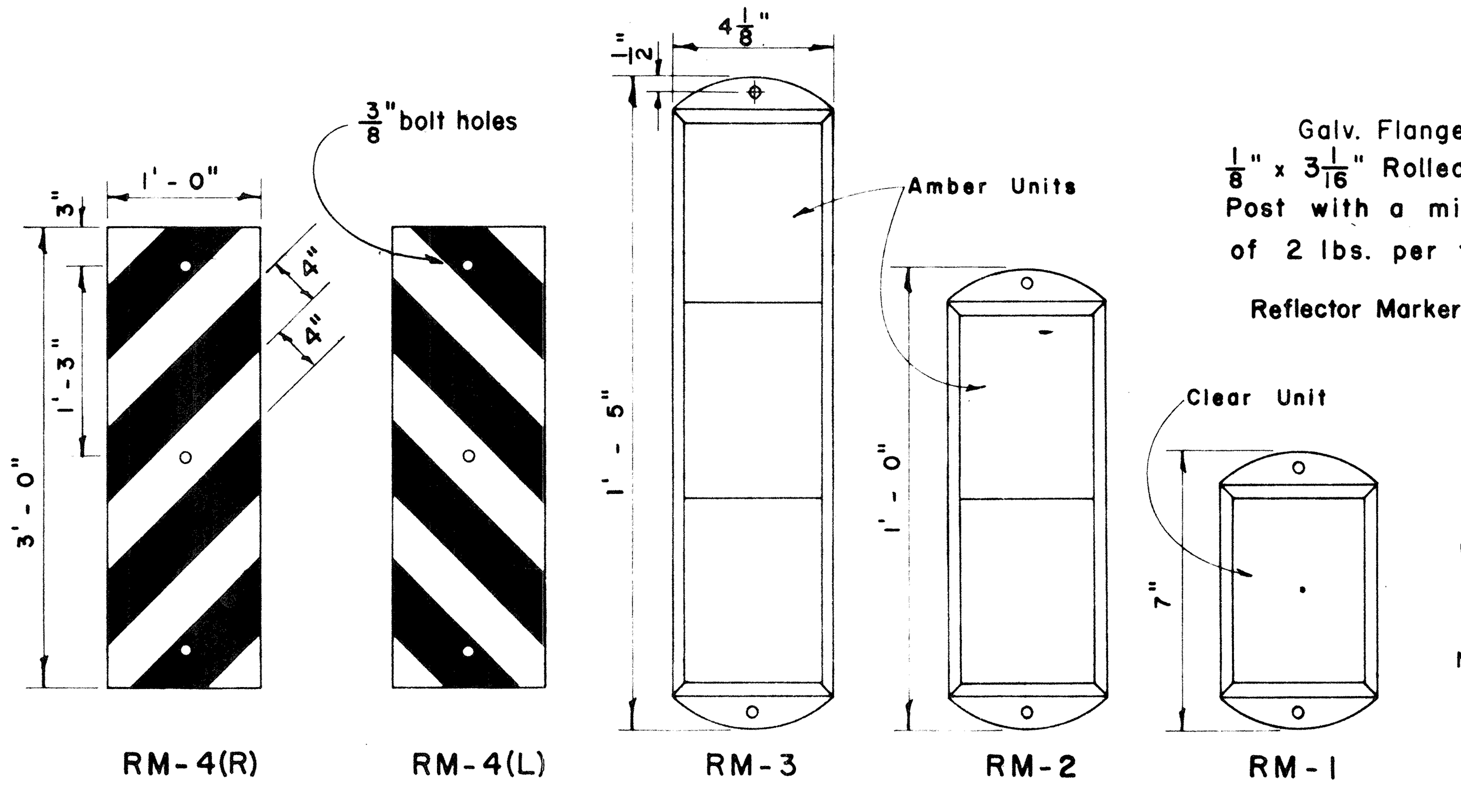


NOTE:

Fitting to be installed on sign posts as shown on plans.

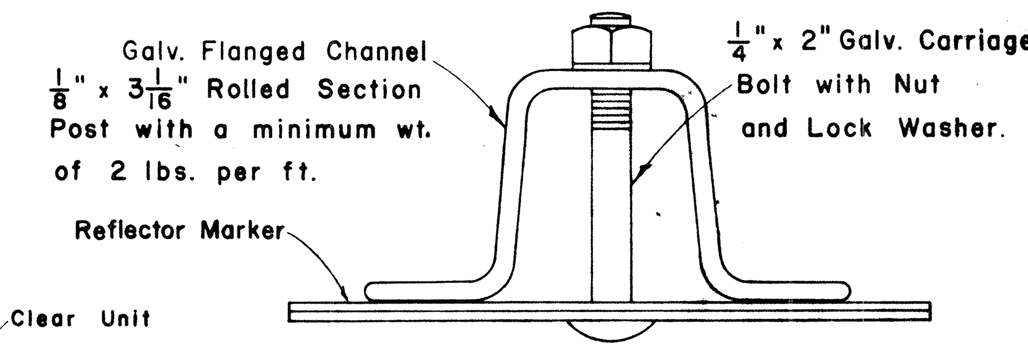
DETAIL OF SIGN POST FITTING FOR CITY & COUNTY STREET NAME SIGNS

Scale: $\frac{1}{2}$" = 1"



REFLECTOR MARKERS

Scale: As Shown

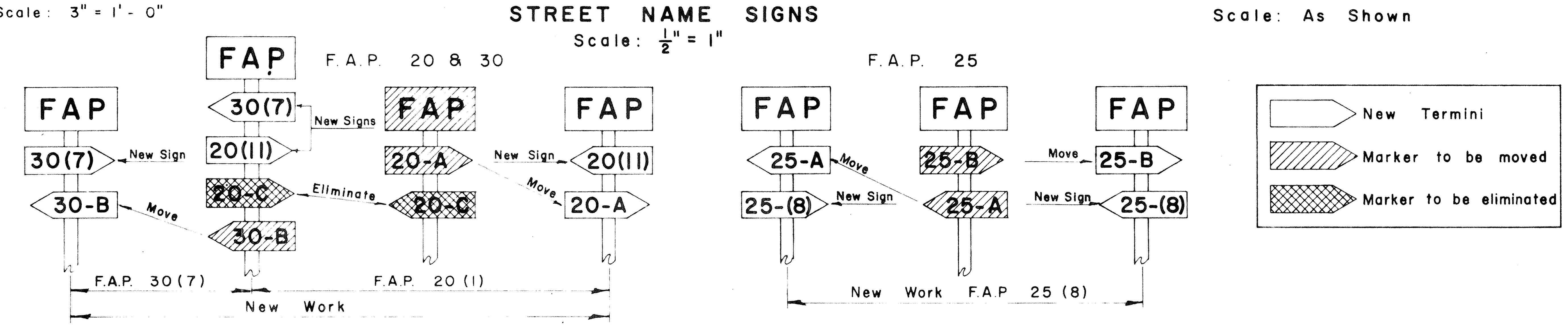


TYPICAL SECTION OF ROAD DELINEATOR

Full Size

NOTE:

Reflector Units for RM - 1,2,3 shall be 4" x 5" in size and shall consist of reflective sheeting encapsulated in acrylic plastic.



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. The same procedure should be followed on each successive improvement until all markers for letter designated sections are eventually eliminated.

METHOD OF MARKING F.A. PROJECTS AT OVERLAPS

(USING NUMBER SUFFIX ON NEW WORK)

APPROVED: DATE: [illegible]

DIRECTOR OF TRANSPORTATION

STATE OF HAWAII
DEPARTMENT OF TRANSPORTATION
HIGHWAYS DIVISION

STANDARD DETAILS
F. A. MARKER
AND
MISCELLANEOUS SIGN
DETAILS

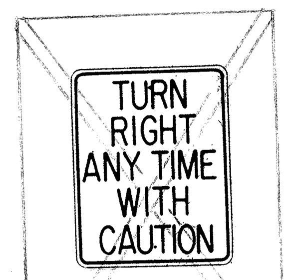
Scale: As Shown

FED. ROAD DIST. NO.	STATE	FED. AID PROJ. NO.	FISCAL YEAR	SHEET NO.	TOTAL SHEETS
HAWAII	HAW.	S-0480(1)	1965	19	31

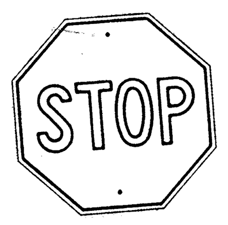
R2-1(35)
24" x 30"

R5-1
24" x 24"

W9-1
30" x 30"

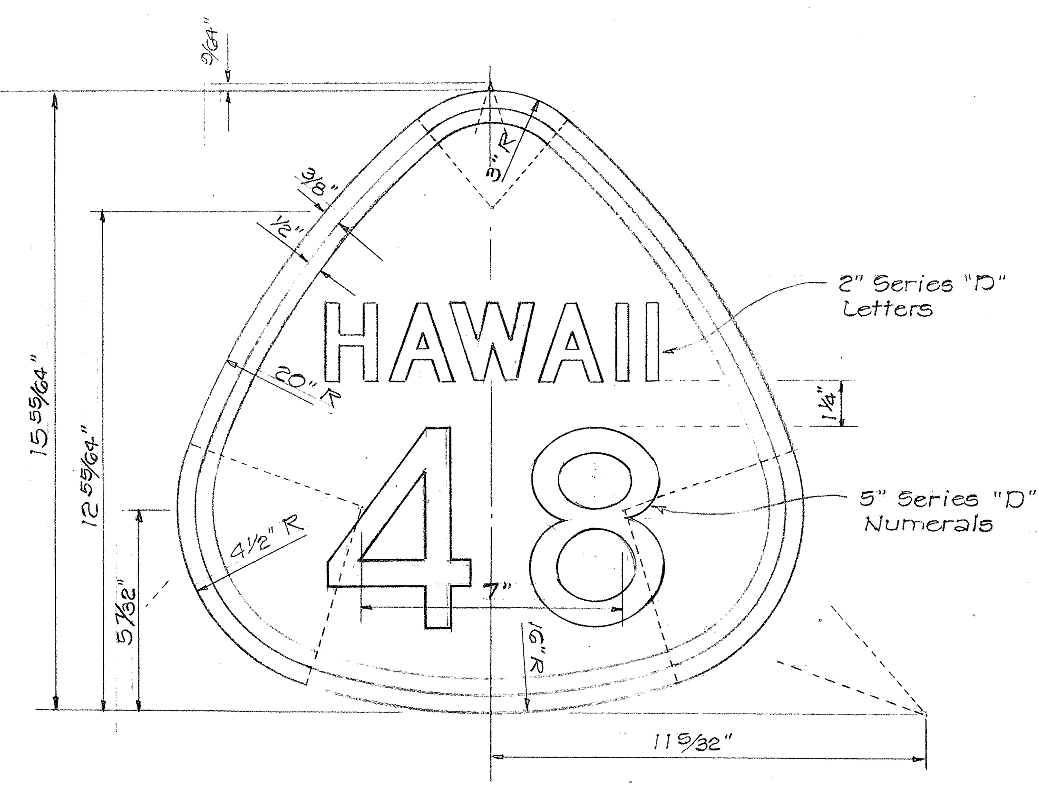


R15-1
24" x 30"

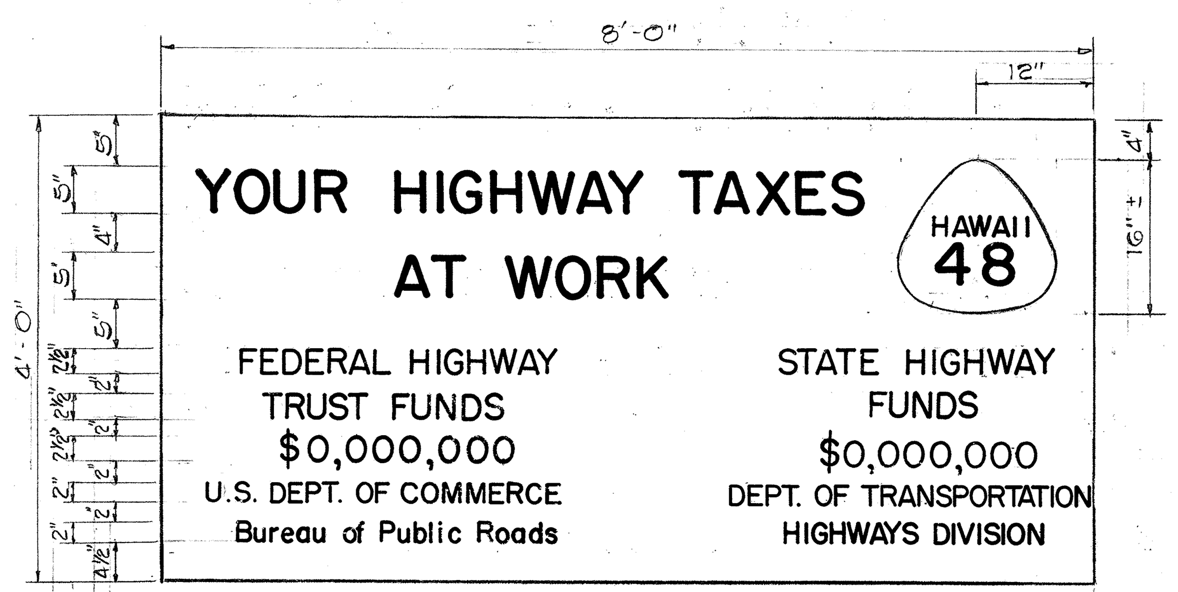


R1-1
30" x 30"

W5-1
30" x 30"

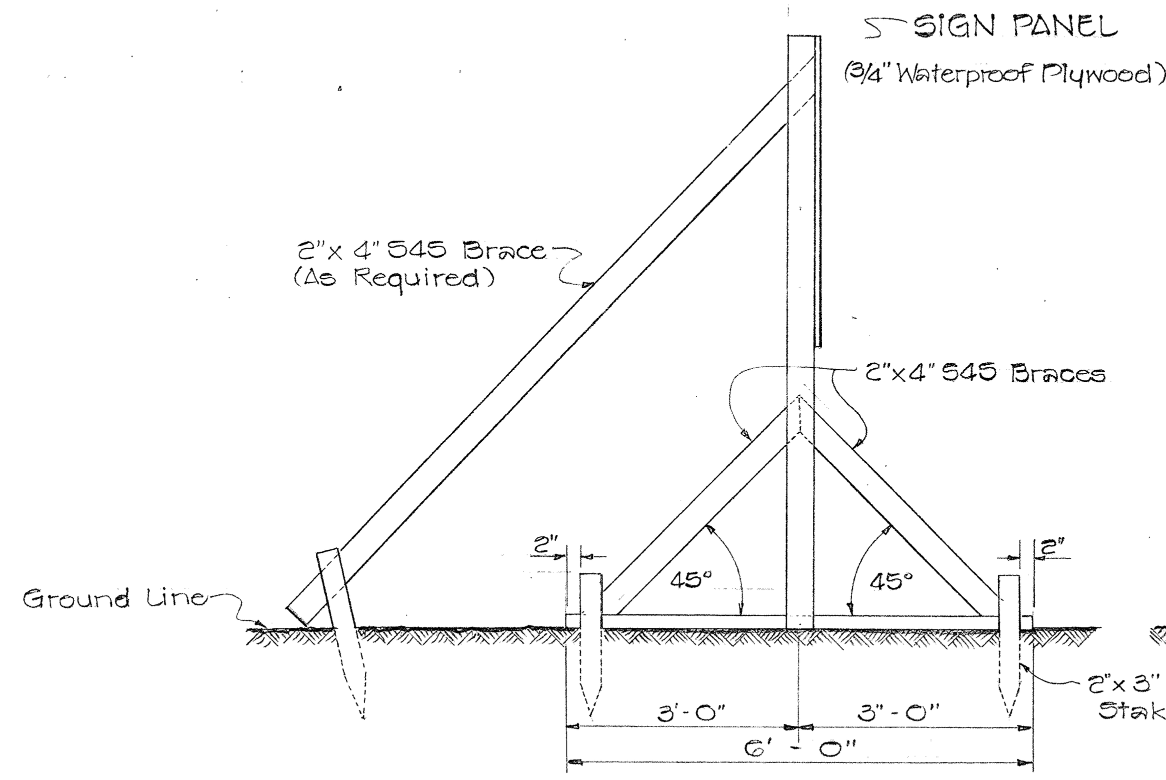


SHIELD DETAIL

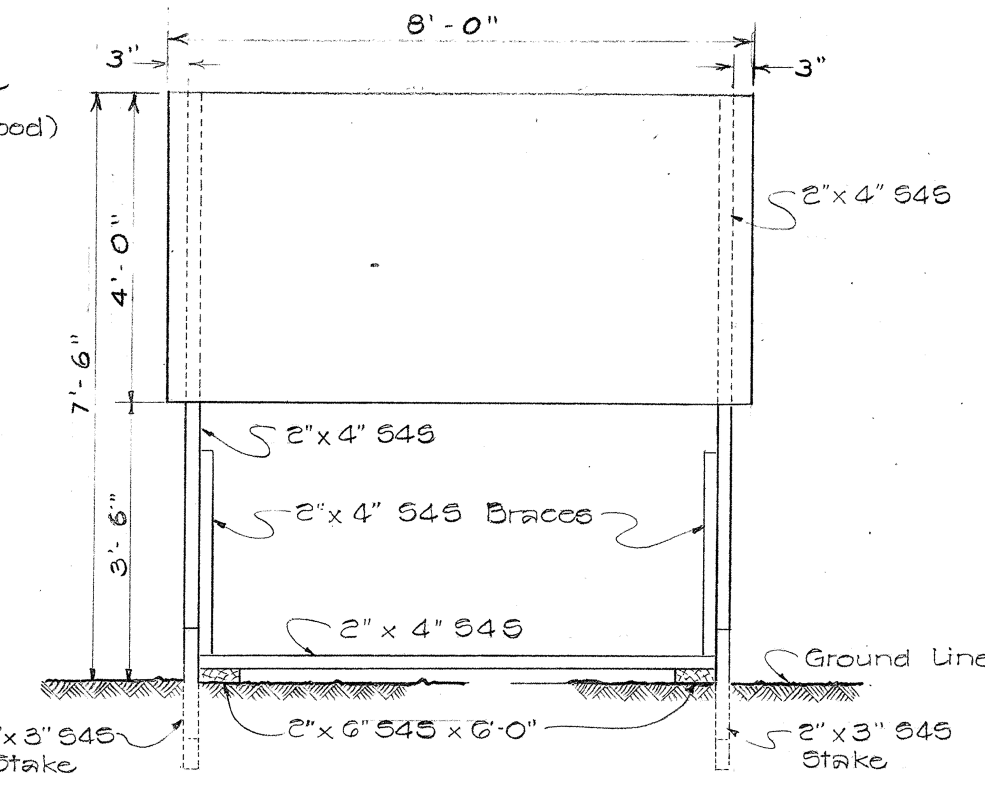


CONSTRUCTION IDENTIFICATION SIGN

NOT TO SCALE



SIDE VIEW



FRONT VIEW

E L E V A T I O N S

NOT TO SCALE

SUMMARY OF DIRECTIONAL REGULATORY & WARNING SIGNS	
DESCRIPTION	QUANTITY
Speed Limit 35, R2-1(35)	2
Stop, R1-1	9
Do Not Enter, R5-1	1
School, W9-1	2
Road Narrows, W5-1	1
TOTAL	15

NOTE:

1. The shape, color, plate details, lettering and reflectorization of Regulatory Signs (Prefix R) and Warning Signs (Prefix W) shall be in accordance with the "Manual of Uniform Traffic Control Devices for Streets and Highways", dated June, 1961 and the BPR Manual "Standard Highway Signs", dated September, 1961 unless otherwise specified.
2. All regulatory and warning signs shall be reflectorized unless otherwise specified.
3. All regulatory and warning signs shall have 3/8" bolt holes drilled at appropriate locations unless otherwise noted.
4. For R2 Signs, number in ( ) indicates speed and shall be shown on the plans.

CONSTRUCTION PROJECT IDENTIFICATION SIGN NOTES

1. The legend shall be black on white background.
2. All letters shall be of size and design shown and conform with "Standard Alphabets for Highway Signs" as set forth by the Public Roads Administration, Federal Works Agency.
3. Letters shall be Series "D" sizes as shown, except where shown otherwise on the Plan.
4. Contractor shall be responsible for maintenance of sign.
5. Contractor shall insert amount of Contract in place of ciphers.

STATE OF HAWAII
DEPARTMENT OF TRANSPORTATION
HIGHWAYS DIVISION

STANDARD DETAILS

REGULATORY & WARNING SIGNS AND MISCELLANEOUS DETAILS

Not to scale

SHEET No. 4 OF 5 SHEETS

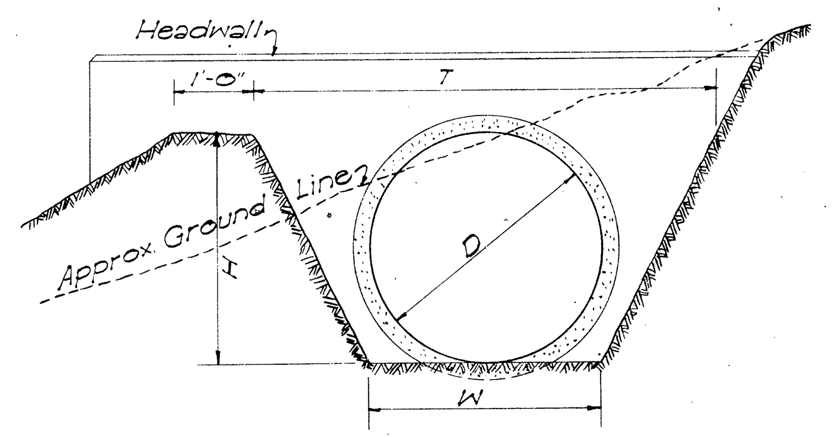
ORIGINAL PLAN	SURVEY PLOTTED BY	DATE
	DRAWN BY	
	TRACED BY	
NOTE BOOK	DESIGNED BY	
	QUANTITIES BY	
No.	CHECKED BY	

PRINTED ON CLEARPRINT 1000-H

2/17/59

HAWAII HAW. S0480(1) 1959 20 31

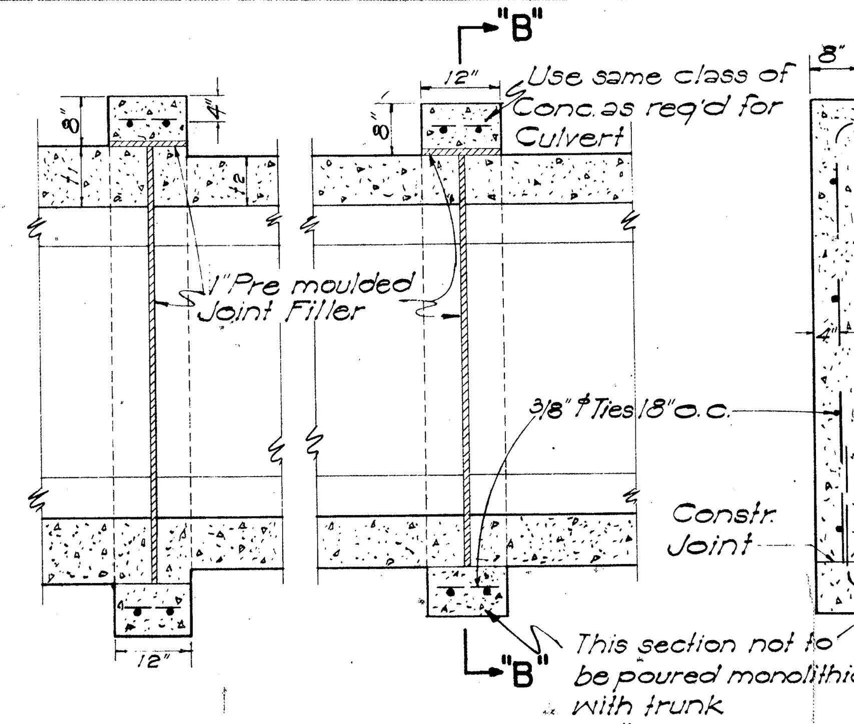
AUG. 1957



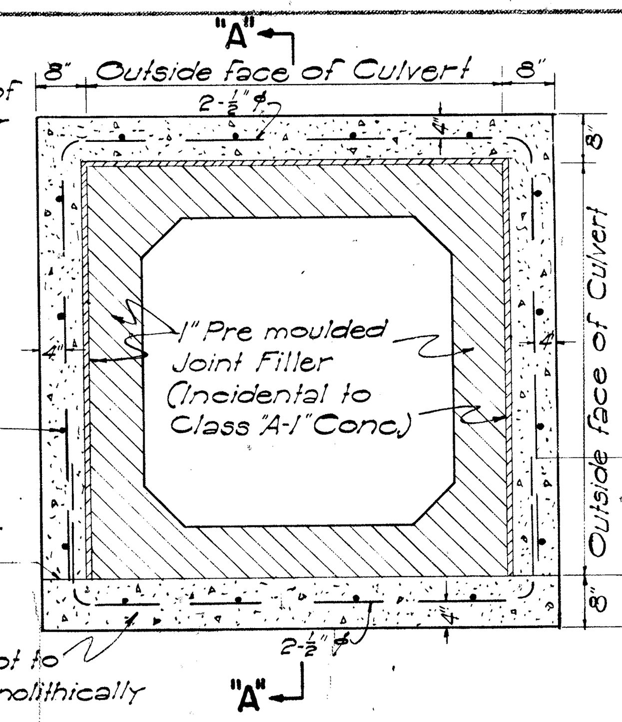
DATA FOR OUTLET DITCH			
D	W	H	T=W+H
18"	24"	2'-0"	4'-0"
24"	30"	2'-0"	4'-6"
30"	30"	2'-6"	5'-0"
36"	36"	3'-0"	6'-0"

DETAIL OF OUTLET DITCH

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



SECTION "A-A"



SECTION "B-B"

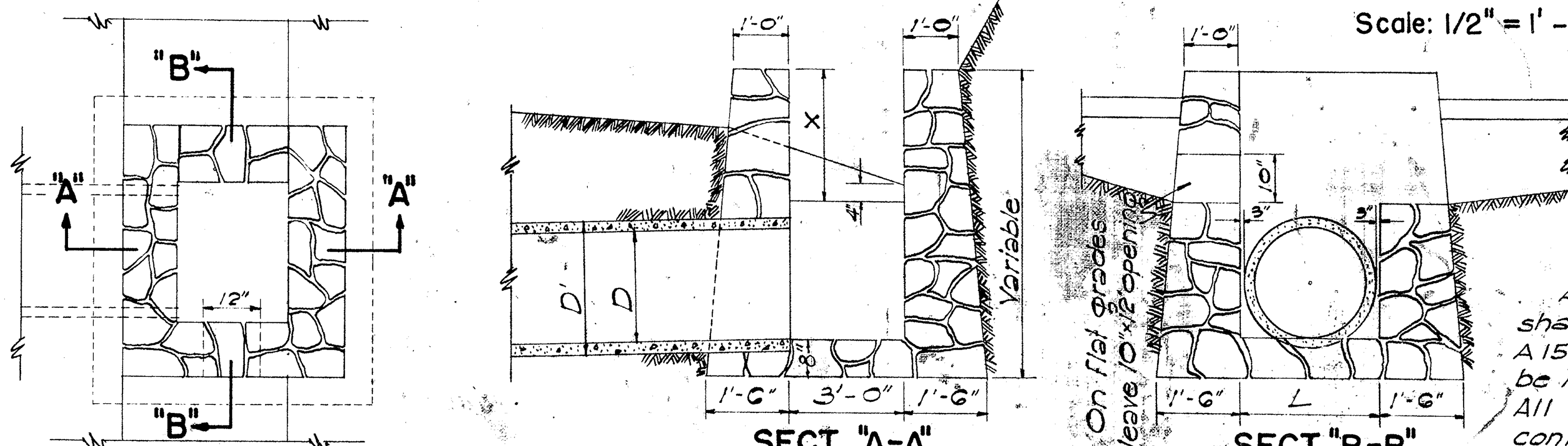
CONC. COLLAR FOR CONC. BOX CULVERT

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"

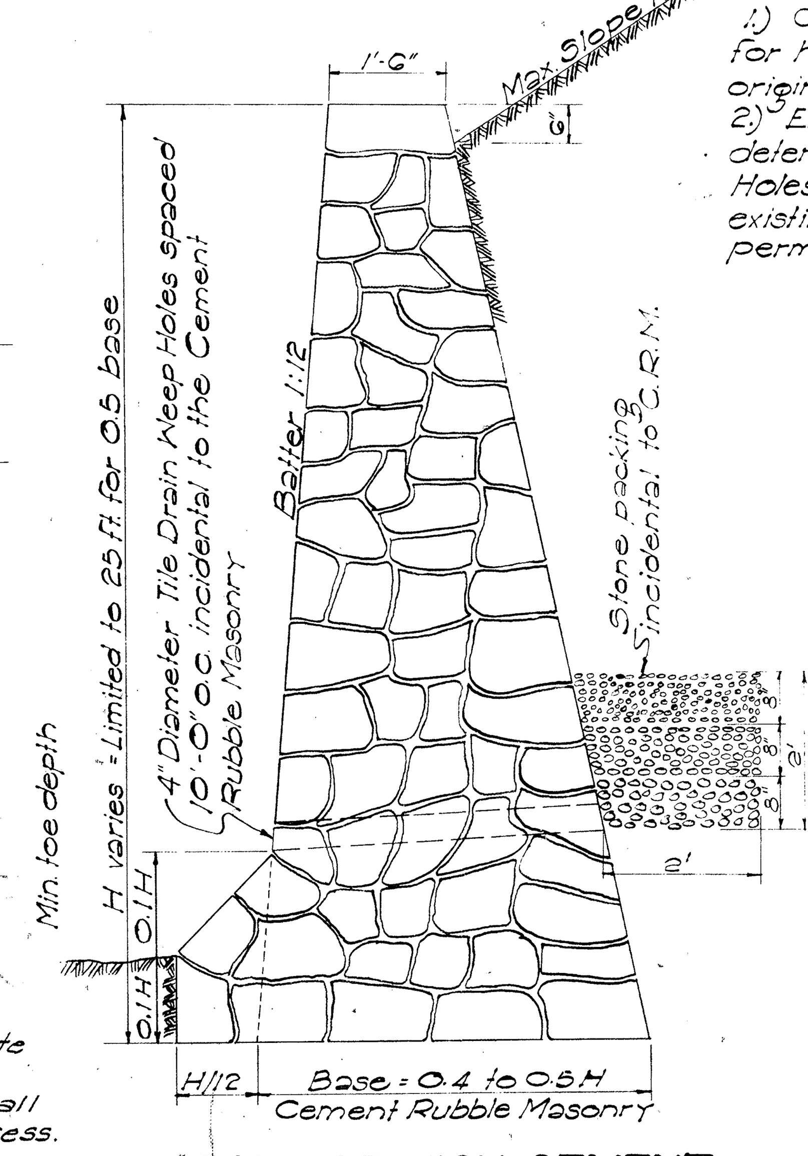
REINFORCING BARS

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.

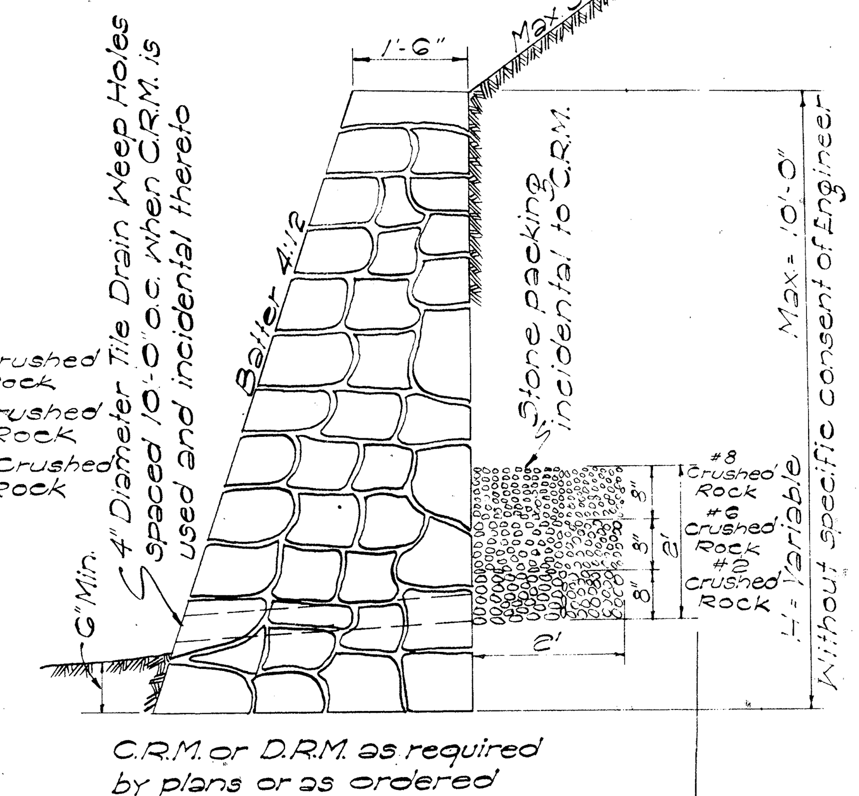
Note: To Resident Engineer

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.

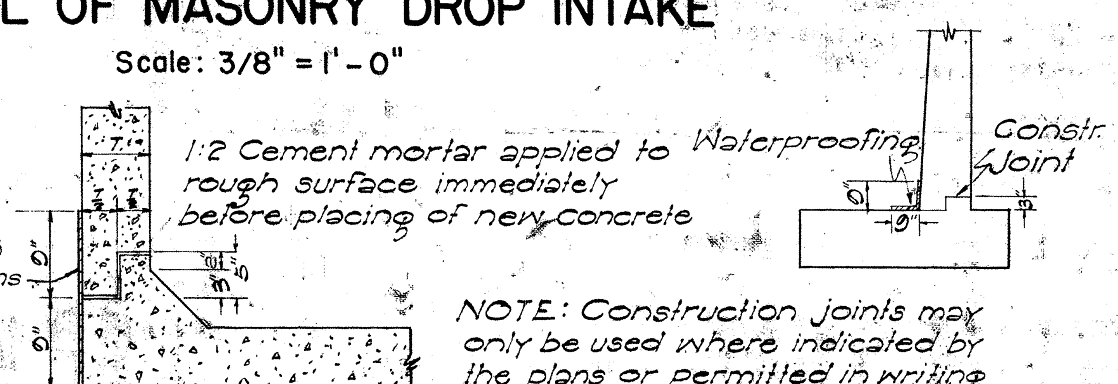


SECTION OF HIGH CEMENT RUBBLE MASONRY RETAINING WALL OR SEAWALL



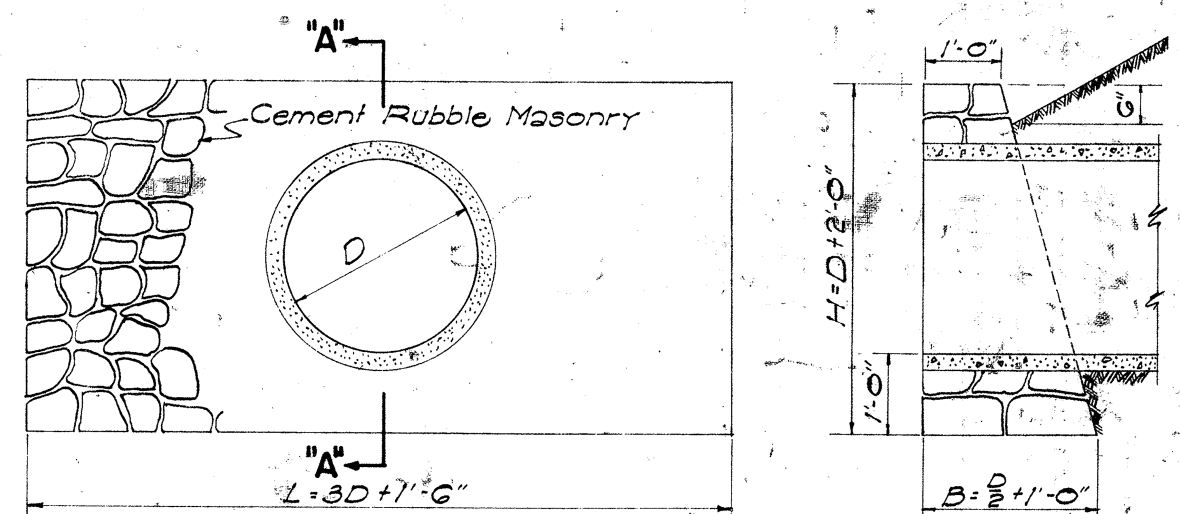
SECTION OF LOW MASONRY RETAINING WALL OR SEAWALL

DATA-MASONRY HEADWALL				Cast-in-Place Conc. Culv't	Conc. Pipe Culvert	Corrugated Pipe Culv't
D	H	B	L	Cu. Yds.	Cu. Yds.	Cu. Yds.
18"	3'-6"	1'-9"	6'-0"	0.85	0.95	0.93
24"	4'-0"	2'-0"	7'-6"	1.28	1.45	1.41
30"	4'-6"	2'-3"	9'-0"	1.83	2.06	2.00
36"	5'-0"	2'-6"	10'-6"	2.49	2.84	2.72



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

CONSTR. JOINT DETAILS

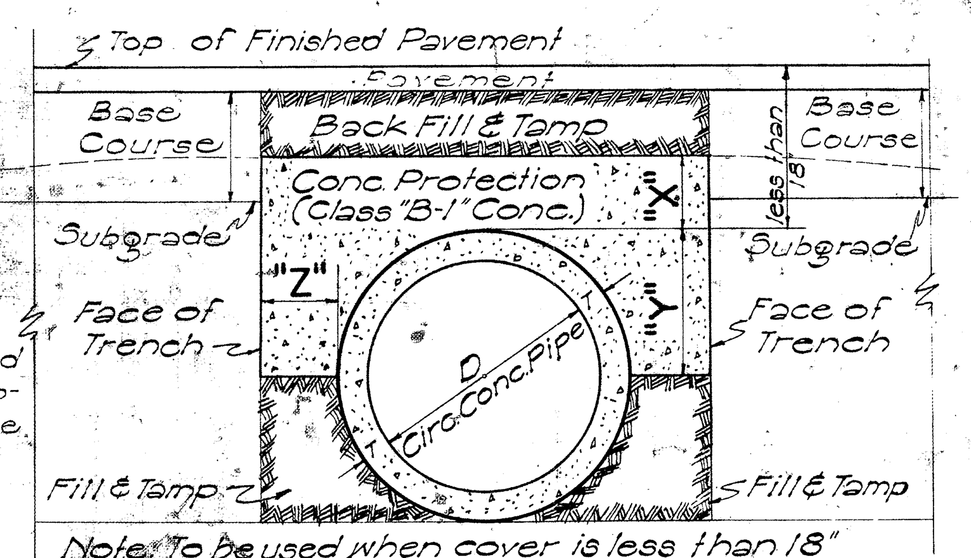


DETAIL OF MASONRY HEADWALL

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

Note:

When subgrade is below top of jacket, it shall be fully compacted to this line and then re-excavated (struc. exc.) to proper subgrade. This surface shall be rolled again.



DATA FOR CONCRETE PROTECTION OVER CULVERTS		
X	Y	Z
6" for 18"D	D/2+T	Z must be from pipe to face of trench
7" " 24"D		Minimum = X
8" " 30"D		Maximum pay quantity will be Z = 12"
9" " 36"D		
10" " 42"D		
11" " 48"D		
12" " 54"D		

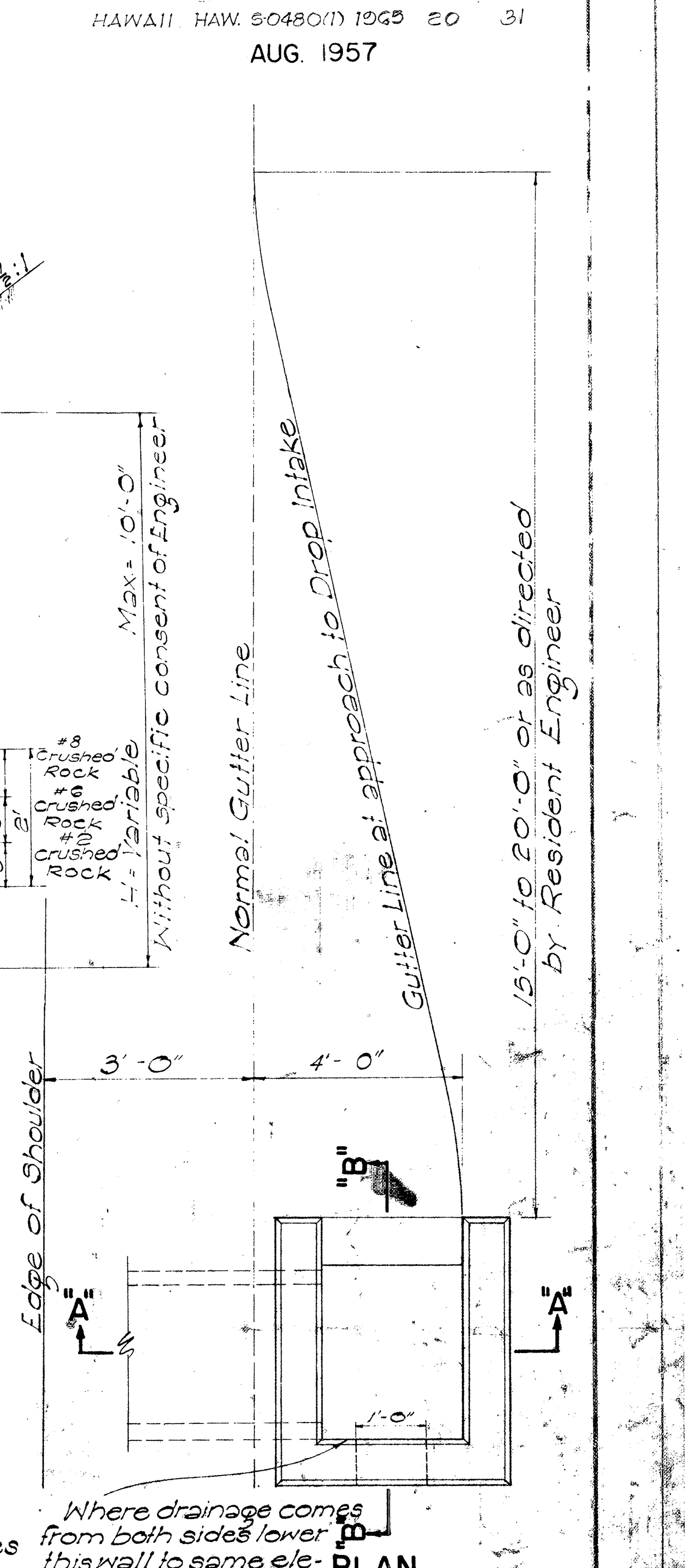
SECT. OF CULVERT WITH CONC. PROTECTION

Scale: 1" = 1'-0"

DATA-CONC. DROP INTAKE					Where Variable Equals
D'	D	L=D'+6"	S	Cu. Yds.	
23"	18"	2'-5"	8"	1.41	4'-6"
30"	24"	3'-0"	8"	1.72	5'-0"
37"	30"	3'-7"	9"	2.32	5'-6"
44"	36"	4'-2"	9"	2.73	6'-0"
51"	42"	4'-9"	10"	3.54	6'-6"
58"	48"	5'-4"	10"	4.01	7'-0"

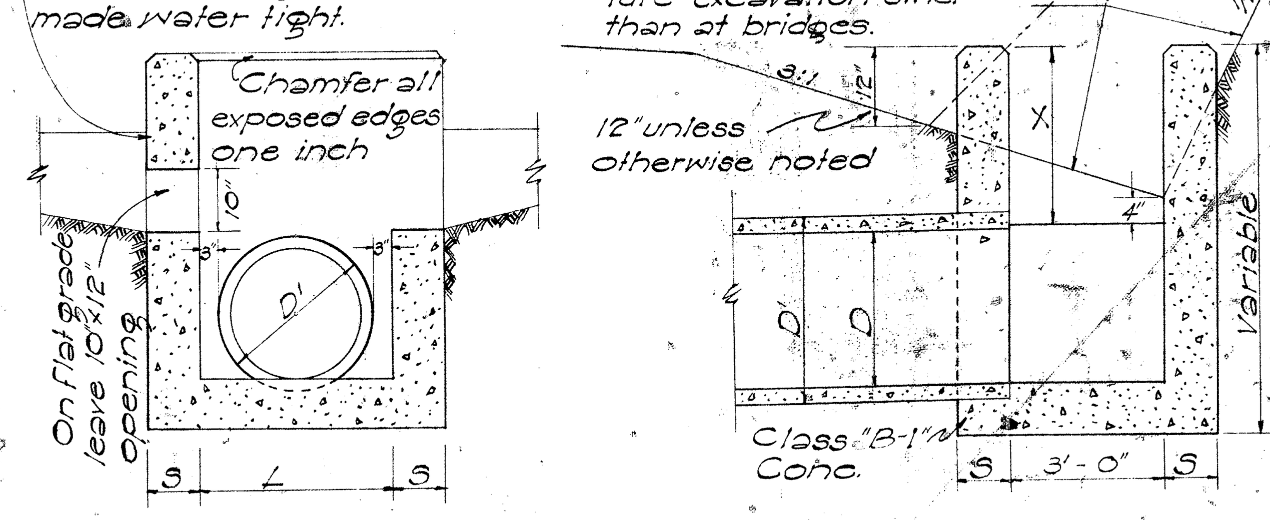
Note: Dimension "X" is assumed as 2'-4" in figuring the above quantities.

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



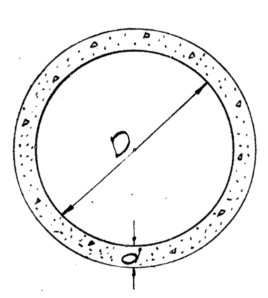
Excavate recess in roadway excavation slope for inlet to dimensions and form designated by Engineer. This is "Unclassified Excavation."

Top limits of structure excavation other than at bridges.



DETAIL OF CONCRETE DROP INTAKE

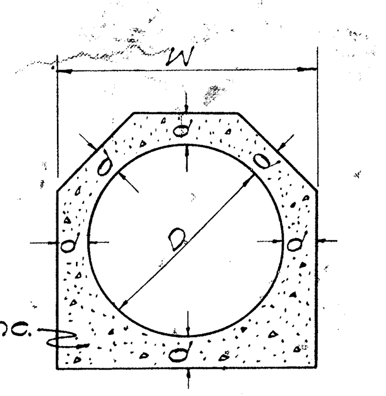
Scale: 1/2" = 1'-0"



CONC. PIPE CULVERT

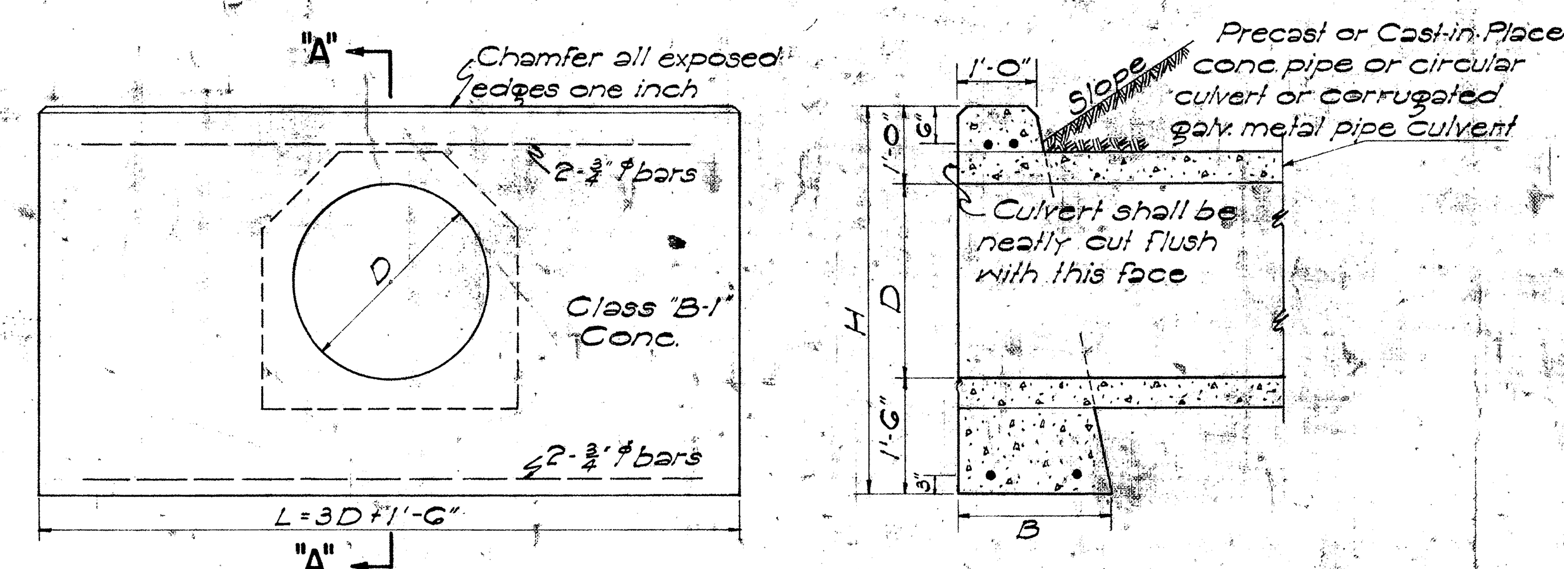
NOTE:

Thickness 'd', reinforcing and Concrete used, are to conform with the approved design as provided by the Specifications.



DATA-CAST-IN-PLACE CONC. CULV'T			
D	d	W	Cu. Yd. per Ft.
18"	4"	2'-2"	0.11
24"	4½"	2'-9"	0.14
30"	5"	3'-4"	0.19
36"	5½"	3'-11"	0.26

CAST-IN-PLACE CONC. CULVERT



DATA FOR CONC. HEADWALL				Cast-in-Place Conc. Culvert	Conc. Pipe Culvert	Steel For One Headwall			
D	B	L	H	Cu. Yd.	Cu. Yd.	No. of Bars	Size	Length	Lbs.
18"	1'-6"	6'-0"	4'-0"	0.92	1.00	4	3/4" ϕ	5'-6"	33
24"	1'-6"	7'-6"	4'-6"	1.25	1.38	4	3/4" ϕ	7'-0"	42
30"	2'-0"	9'-0"	5'-0"	1.95	2.17	4	3/4" ϕ	8'-6"	51
36"	2'-0"	10'-6"	5'-6"	2.45	2.74	4	3/4" ϕ	10'-0"	60
42"	2'-6"	12'-0"	6'-0		3.87	4	3/4" ϕ	11'-6"	69
48"	2'-6"	13'-6"	6'-6"		4.66	4	3/4" ϕ	13'-0"	78

DETAIL OF CONCRETE HEADWALL

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

ORIGINAL PLAN
NOTE BOOK No.
SURVEY PLOTTED BY
DESIGNED BY
DRAWN BY
TRACED BY L. Calistro
QUANTITIES BY
QUANTITIES CHECKED BY
CHECKED BY
DATE

APPROVED: DATE Aug. 26, 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 5 SHEETS

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