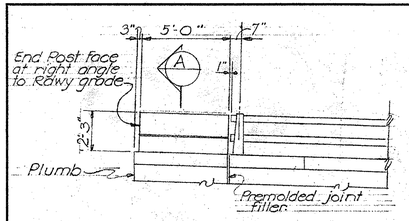
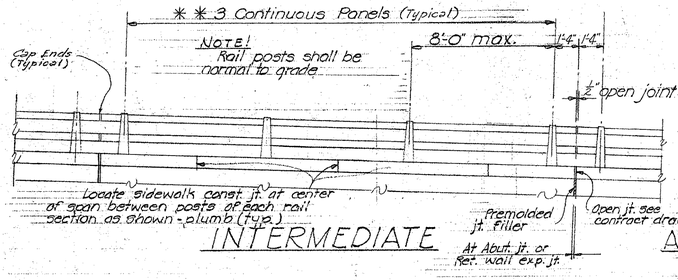
FED. ROAD DIST. NO.	STATE	FED. AID PROJ. NO.	FISCAL YEAR	SHEET NO.	TOTAL SHEETS
HAWAII	HAW.	S-301-1(8)-84 Unit 6	1965	7	12

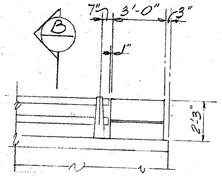
2/9/65
3/23/65
4/1/65



AT BRIDGE END POST



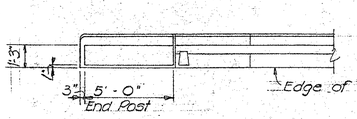
INTERMEDIATE



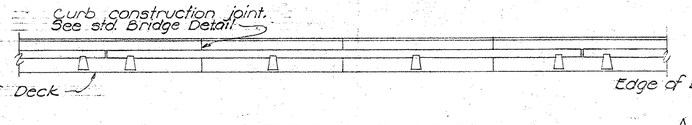
AT RETAINING WALL END POST

EXTERIOR RAILING ELEVATION

* * NOTE:
4 continuous panels (Max.) will be permitted at ends of railing layout to avoid single panel.



AT BRIDGE END POST



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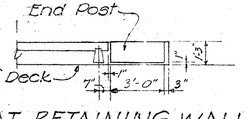
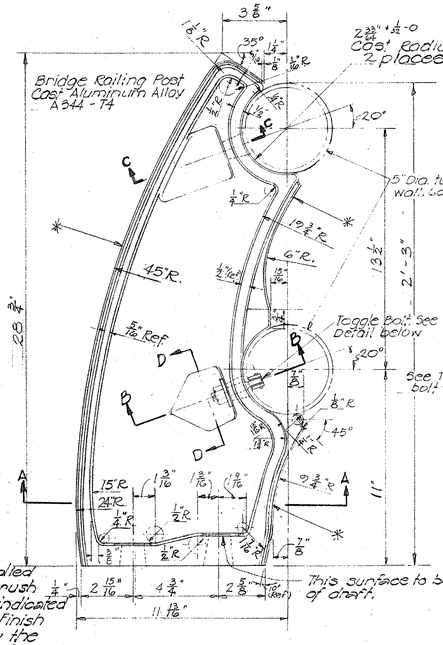
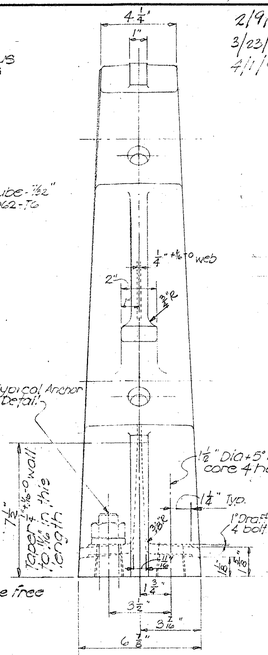


AT RETAINING WALL END POST

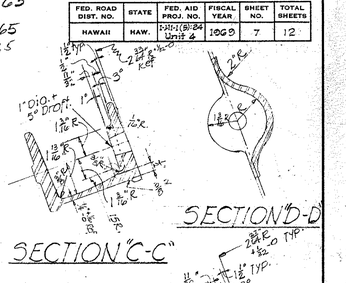
PLAN OF RAILING

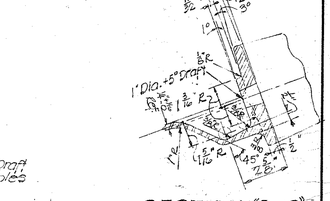


SIDE ELEVATION



END ELEVATION

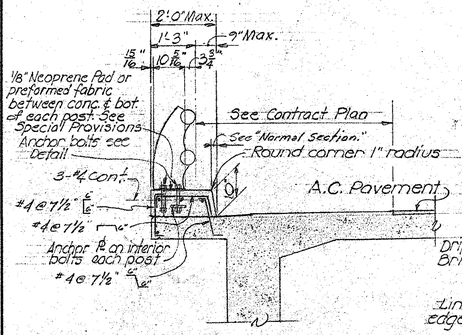




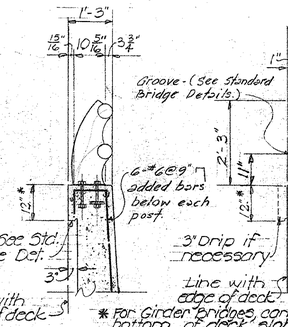
ELEVATION

NOTE !!
Casting to be supplied with a std. scratch brush finish on surfaces indicated by an asterisk (*). Finish shall be approved by the Engineer.
Cast Post mechanical properties must meet AASHO Specifications.

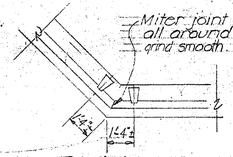
TYPICAL RAIL POST DETAILS Scale: 3"=1'-0"



TYPICAL SECTION
Scale: ½"=1'-0"



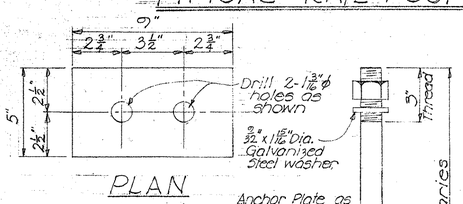
SECTION (D) AT BRIDGE
Scale: ½"=1'-0"



PLAN

SECTION (A)
Scale: ½"=1'-0"

TREATMENT OF RAILING AT SKEWED ENDS



PLAN

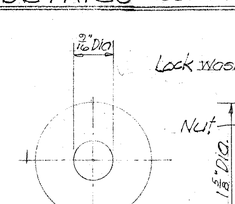
BOLT

SIDE ELEVATION

ANCHOR PLATE

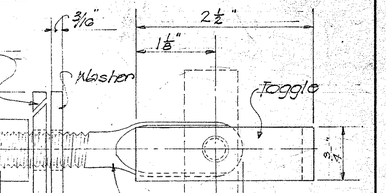
NOTE: 1⅛"-7 N.C. Galvanized steel ASTM-A325 Anchor Bolts

TYPICAL ANCHOR BOLT ASSEMBLY FOR RAIL POST



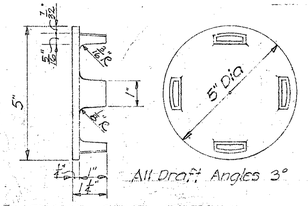
WASHER

NOTE!
Toggle Bolt Mat'l - ½"-13 N.C. 1335 Cr. - steel heat treated RC 32-38 ASTM-A 354
Toggle Mat'l - 1015, H.R. Steel Pickled and oiled. Round edge ASTM A 308
Washer Mat'l - SAE 1020 H.R. STL. PL. ASTM-A7. Break sharp edges.
Nut ½"-13 Amer. hex. nut - Heavy Mat'l - 1035 C.R. STL. - Heat treated ASTM-A325
Cadmium plating on stl. Type NS. .0005" thick - ASTM-A165 (All parts)

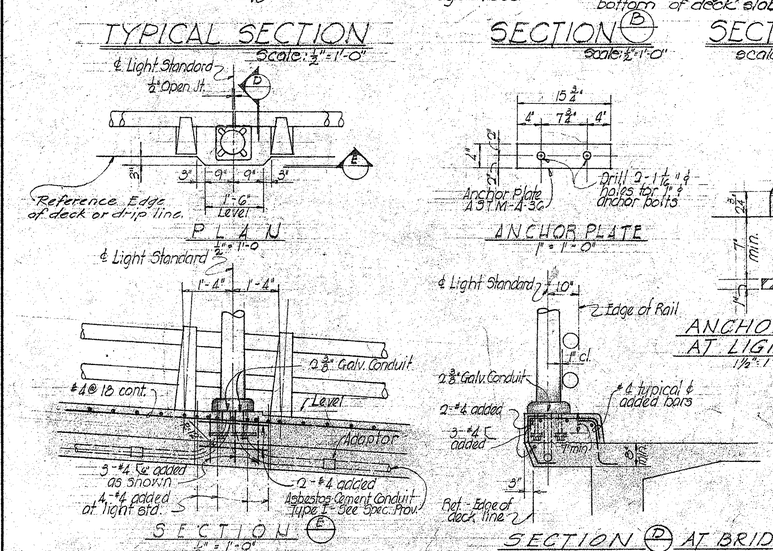


TOP PLAN

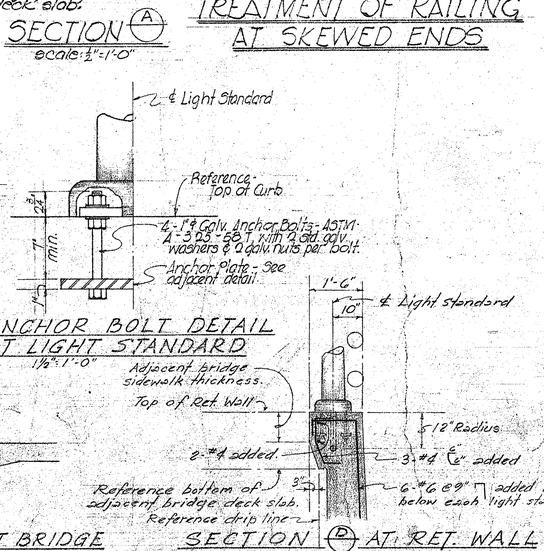
TOGGLE BOLT DETAILS
Full Scale



RAIL CAP DETAIL Scale: ⅜"=1"



SECTION (D) AT BRIDGE



SECTION (D) AT RET. WALL

DETAILS OF RAILING AT LIGHT STANDARD ON BRIDGE

ORIGINAL PLAN	SURVEY PLOTTED BY	
	DRAWN BY	G.K.
	TRACED BY	
NOTE BOOK	DESIGNED BY	H.N.
No.	QUANTITIES BY	
	CHECKED BY	K.T.A. & T.T.C.
	DATE	" " "

STATE OF HAWAII
DEPARTMENT OF TRANSPORTATION
HIGHWAYS DIVISION

STANDARD DETAILS
METAL BRIDGE RAILING
(ALUMINUM TRAFFIC TYPE)

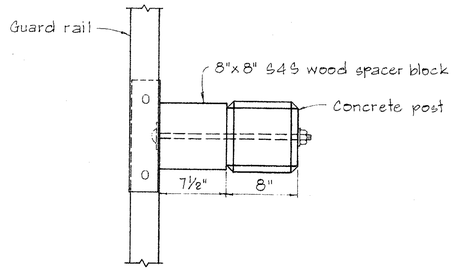
Scale: As Noted

SHEET No. OF SHEETS

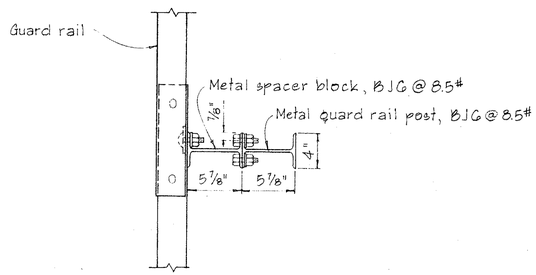
PRINTED ON CLEARPRINT 1000-H

FED. ROAD DIST. NO.	STATE	FED. AID PROJ. NO.	FISCAL YEAR	SHEET NO.	TOTAL SHEETS
HAWAII	HAW.	I-HI-1(5):24 Unit 4	1969	8	12

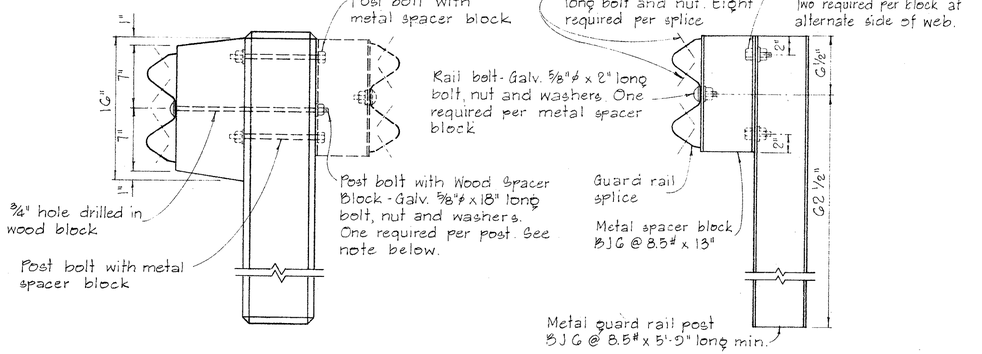
REVISED: 12-11-68



PLAN

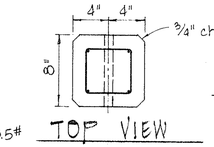


PLAN



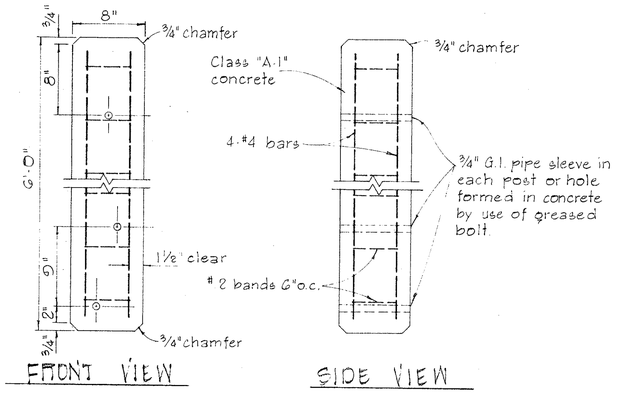
SINGLE METAL GUARD RAIL ON PRECAST CONCRETE POST WITH WOOD OR METAL SPACER BLOCK

SCALE: 1½" = 1'-0"



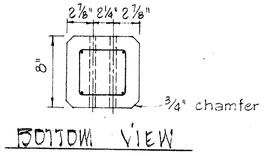
TOP VIEW

NOTE:
Concrete post shall be precast



FRONT VIEW

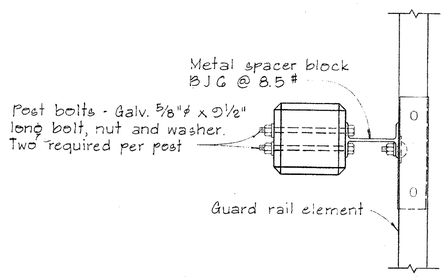
SIDE VIEW



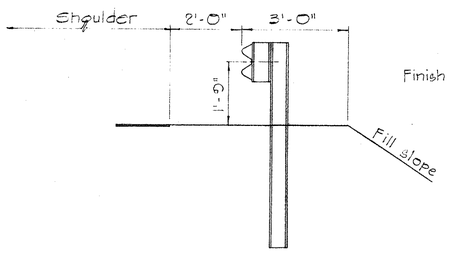
BOTTOM VIEW

DETAIL OF CONCRETE POST

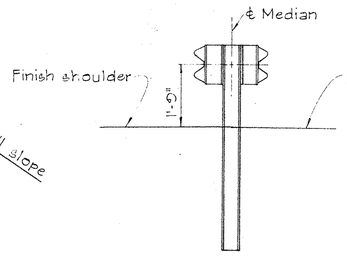
SCALE: 1½" = 1'-0"



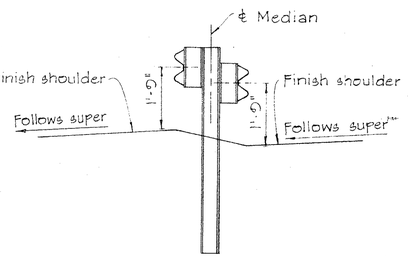
PLAN



AT SHOULDER SECTION



AT TANGENT SECTION



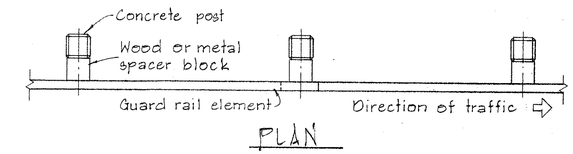
AT SUPER SECTION

SINGLE METAL GUARD RAIL ON METAL POST WITH METAL SPACER BLOCK

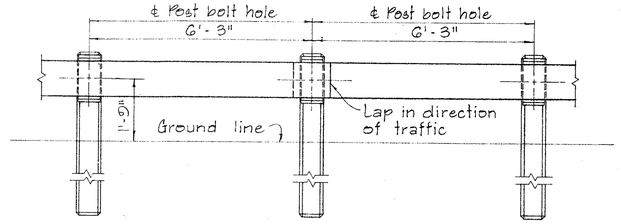
SCALE: 1½" = 1'-0"

TYPICAL METAL GUARD RAIL DETAIL

SCALE: ½" = 1'-0"



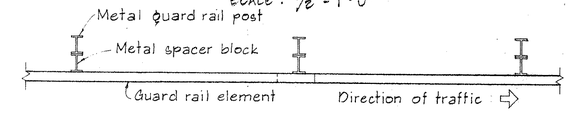
PLAN



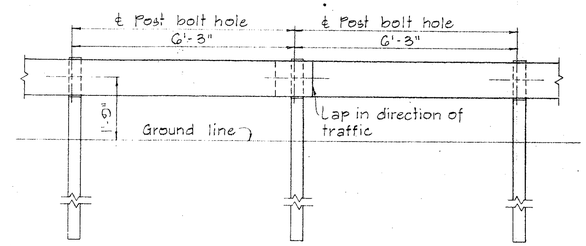
ELEVATION

METAL GUARD RAIL ON CONCRETE POST WITH WOOD OR METAL SPACER BLOCK

SCALE: ½" = 1'-0"



PLAN



ELEVATION

METAL GUARD RAIL ON METAL POST WITH METAL SPACER BLOCK

SCALE: ½" = 1'-0"

STATE OF HAWAII
DEPARTMENT OF TRANSPORTATION
HIGHWAYS DIVISION

STANDARD DETAILS

METAL GUARD RAIL

SCALE: AS SHOWN NOV. 1968

SHEET No. OF SHEETS DT 500

ORIGINAL PLAN | SURVEY PLOTTED BY | DRAWN BY | TRACED BY | DESIGNED BY | QUANTITIES BY | CHECKED BY | DATE

NOTE BOOK | No.

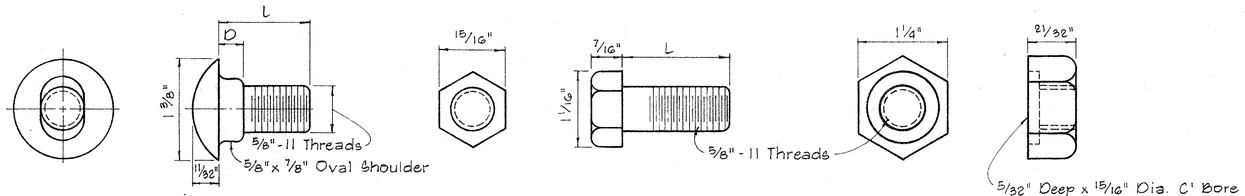
PRINTED ON NO. 1000H CLEARPRINT

FED. ROAD DIST. NO.	STATE	FED. AID PROJ. NO.	FISCAL YEAR	SHEET NO.	TOTAL SHEETS
HAWAII	HAW.	I-HI-1(5):24 Unit 4	1969	0	12

Revised: Dec. 11, 1968

BOLT DIMENSIONS		
TYPE A BOLT	D	L
Splice Bolt	5/16"	1 1/4"
Post Bolt for Conc. Post w/ Double Wood Blocks	3/32"	24"
Post Bolt for Conc. Post w/ Single Wood Block	3/32"	18"
Rail Bolt for Metal Block	3/32"	2"

BOLT DIMENSIONS	
TYPE B BOLT	L
Post Bolt for Conc. Post w/ Metal Blocks	9 1/2"
Post Bolt for Metal Post w/ Metal Block	13 3/4"



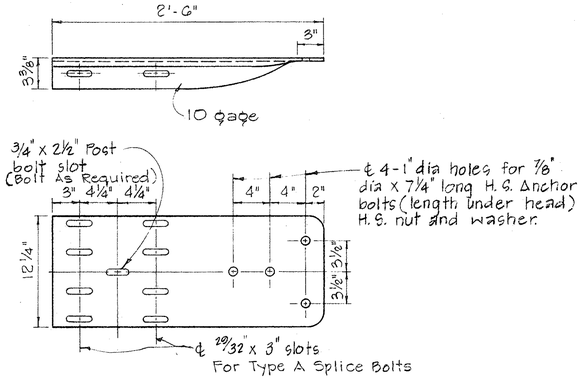
TYPE A BOLT TYPE B BOLT

SPLICE RAIL AND POST BOLTS

Scale : Full Size

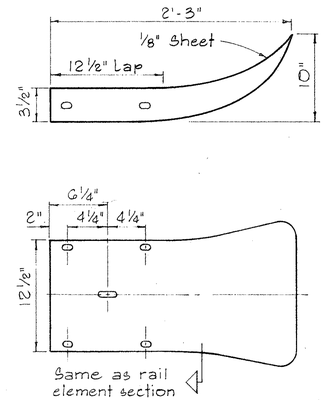
HEXAGON NUT

Scale: Full Size



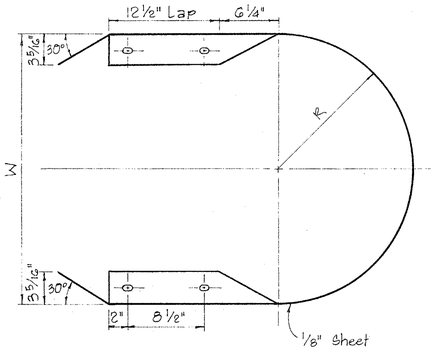
SPECIAL END SHOE

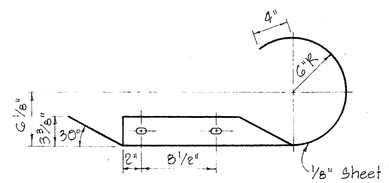
Scale : 1 1/2" = 1'-0"

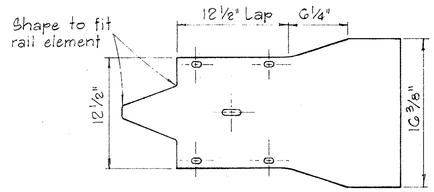


FLARED END

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

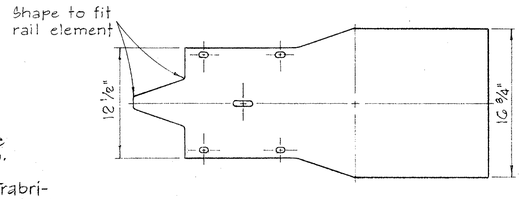






CURVED END

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

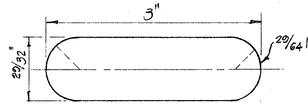


MEDIAN END

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

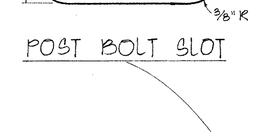
SPLICE BOLT SLOT

SPLICE BOLT SLOT FOR ALL ENDS

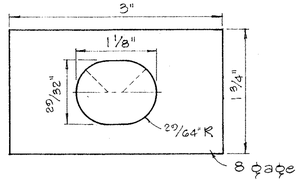


SPLICE BOLT SLOT FOR SPECIAL END SHOE

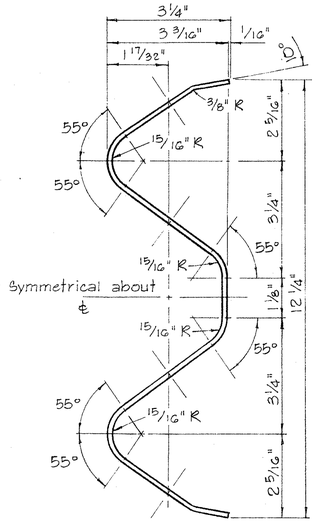
Scale: Full Size



POST BOLT SLOT

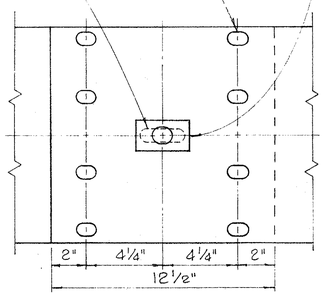


RAIL WASHER



RAIL ELEMENT SECTION

Scale: 6" = 1'-0"



RAIL SPLICE

Scale: 3" = 1'-0"

NOTES:

1. H.S. Bolts shall conform to the requirements of ASTM A-325.
2. Special End Shoe shall be frabricated from 10 Gage steel conforming to the requirements of AASHO M80.

MEDIAN END DIMENSIONS		
TYPE OF POST AND BLOCK	W	R
Double Metal Guard Rail on Concrete Post with Wood Blocks	29 3/4"	14 7/8"
Double Metal Guard Rail on Concrete Post with Metal Blocks (BJG)	26 1/2"	13 1/4"
Double Metal Guard Rail on Metal Post with Metal Blocks (BJG)	24 3/8"	12 3/16"

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

STATE OF HAWAII
DEPARTMENT OF TRANSPORTATION
HIGHWAYS DIVISION

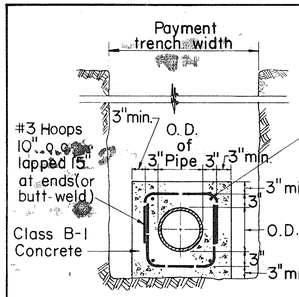
STANDARD DETAILS
METAL GUARD RAIL

Scale: As Noted August, 1968

SHEET No. OF SHEETS DT 501

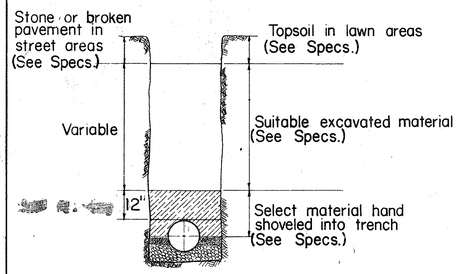
PRINTED ON NO. 1000H CLEARPRINT

FED. ROAD DIST. NO.	STATE	FED AID PROJ NO	FISCAL YEAR	SHEET NO.	TOTAL SHEETS
HAWAII	HAWAII	I-HI-1(5):24 Unit 4	1963	10	12



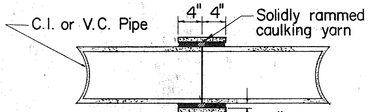
DETAIL OF CONCRETE JACKET

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



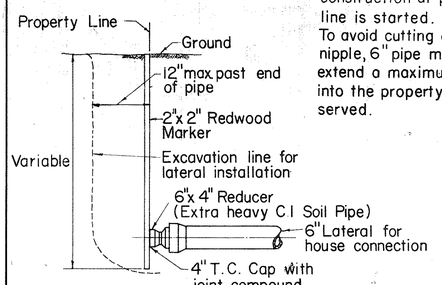
METHOD OF BACKFILL

Not To Scale



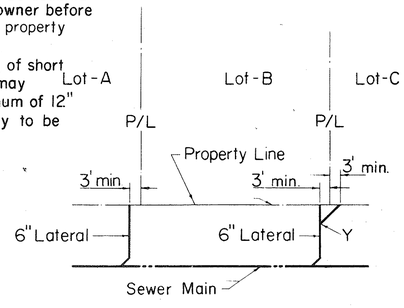
BUTT JOINT DETAIL

Scale: 1" = 1'-0"



NOTE: Permission is to be secured from property owner before construction at property line is started. To avoid cutting of short nipple, 6" pipe may extend a maximum of 12" into the property to be served.

DETAIL AT PROPERTY LINE

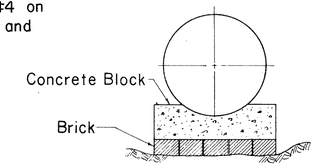


LAYOUT

CONSTRUCTION OF LATERALS

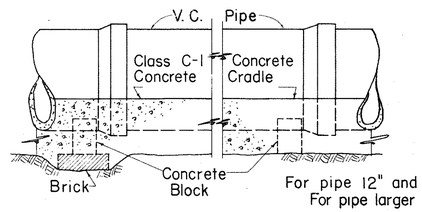
Not To Scale

Contractor shall set Concrete Blocks on undisturbed ground. Where ground is too low, the contractor shall not heap up dirt under the Concrete Block but use Concrete Bricks to take up the deficiency, scraping away beneath Concrete Block to give sufficient room for Brick.



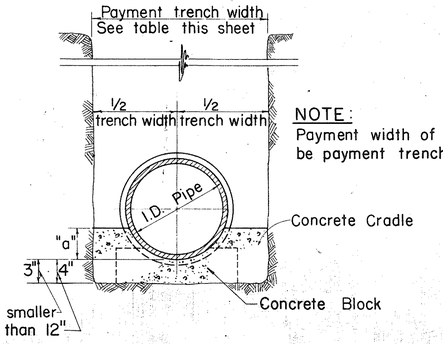
METHOD OF USING BRICKS UNDER CONCRETE BLOCKS

Not To Scale



ELEVATION SHOWING METHOD OF LAYING PIPE

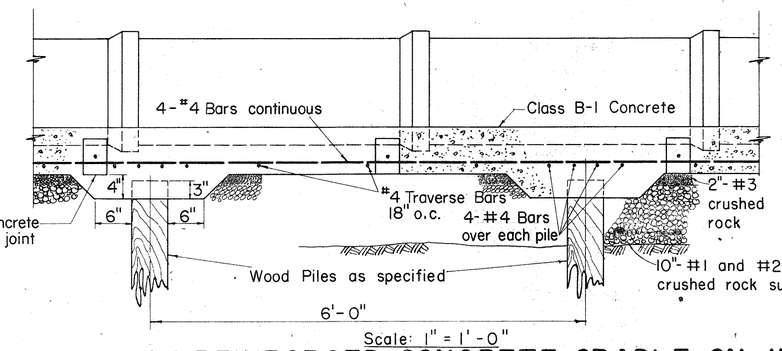
Not To Scale



NOTE: Payment width of cradle shall be payment trench width.

CONCRETE CRADLE FOR VITRIFIED CLAY PIPE

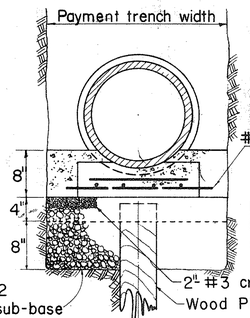
Not To Scale



Scale: 1" = 1'-0"

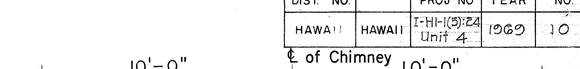
DETAIL OF REINFORCED CONCRETE CRADLE ON WOOD PILES (FOR 6, 8, 10 & 12 IN. V.C. PIPE)

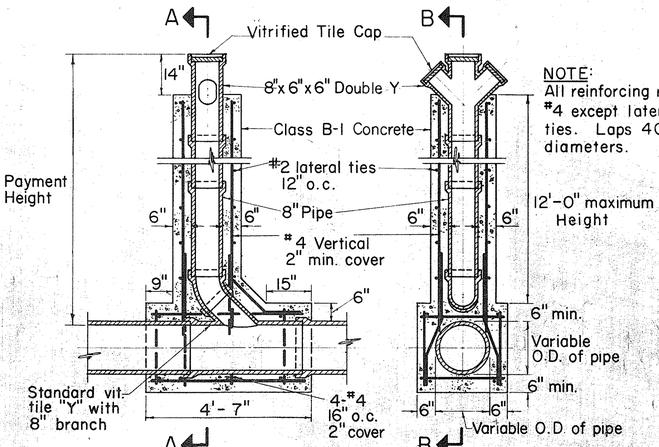
DETAIL OF REINFORCED CONCRETE CRADLE WITHOUT PILES SIMILAR EXCEPT FOR WOOD PILES AND PILE CAPS



NOTE: Reinforcing bars of laterals shall be lapped 40 dia. to reinf. bars of mains.

SECTION





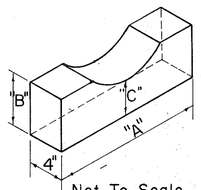
NOTE: All reinforcing rods #4 except lateral ties. Laps 40 diameters.

SECTION B-B SECTION A-A

DETAILS OF CHIMNEY

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

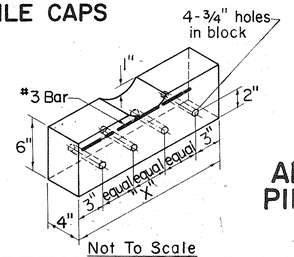
Payment quantities for trench excavation, crushed rock fill, crushed rock cradle, and crushed rock sub-base shall be computed using payment trench widths as shown in the table of "Trench Widths". No payment shall be made for excess quantities resulting from trench widths greater than the payment trench widths shown.



Not To Scale

DETAIL OF PRECAST CONC. PIPE BLOCK

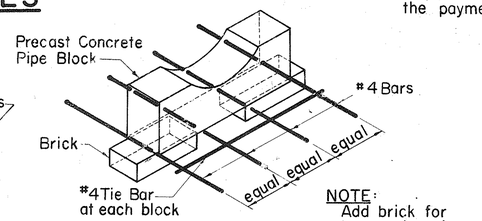
CONCRETE BLOCK DIMENSIONS			
PIPE SIZE	"A"	"B"	"C"
6"	1'-2"	6"	3"
8"	1'-5"	6"	3"
10"	1'-7"	6"	3"
12"	1'-7"	6"	3"
15"	1'-8"	6"	4"
18"	1'-9"	6"	4"
21"	1'-10"	6"	4"
24"	1'-11"	6"	4"
27"	2'-0"	6"	4"
30"	2'-3"	6"	4"



Not To Scale

DETAIL OF CONC. PIPE BLOCK FOR REINF. CRADLE

DIM. OF REINF. CONC. BLOCK	
PIPE SIZE	"X"
6"	1'-6"
8"	1'-6"
10"	1'-8"
12"	1'-8"
15"	1'-10"
18"	1'-10"
21"	1'-10"
24"	2'-0"
27"	2'-0"
30"	2'-0"



NOTE: Add brick for larger size pipe

Not To Scale

ALTERNATE DETAIL OF CONC. PIPE BLOCK FOR REINF. CRADLE

VITRIFIED CLAY PIPE TABLE

TRENCH WIDTHS		DIM. OF CONC. CRADLE		
PIPE SIZE	PAY. WIDTH	PIPE SIZE	"a"	WIDTH
6"	24"	6"	3"	24"
8"	24"	8"	3"	24"
10"	24"	10"	3"	24"
12"	30"	12"	3"	30"
15"	38"	15"	4"	38"
18"	41"	18"	5"	41"
21"	45"	21"	5"	45"
24"	50"	24"	6"	50"
27"	53"	27"	7"	53"
30"	57"	30"	7"	57"

APPROVED:

SEWER SYSTEM DIRECTOR, DIVISION OF SEWERS — DATE

STATE OF HAWAII
DEPARTMENT OF TRANSPORTATION
HIGHWAYS DIVISION
DIVISION OF SEWERS
CITY & COUNTY OF HONOLULU

STANDARD DETAILS

SEWERS - CONCRETE JACKET & MISCELLANEOUS DETAILS

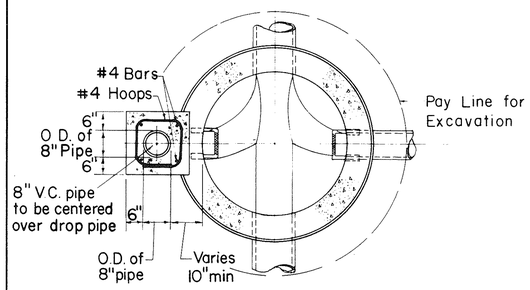
Scales: As Noted — Date: Dec. 16, 1963

SHEET NO. 10 OF SHEETS

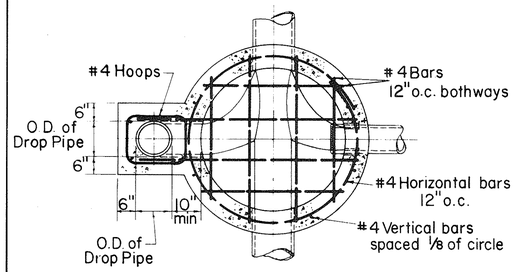
Revised Oct. 1965

IMPERIAL 156 K & E CO., N.Y. TRADE MARK

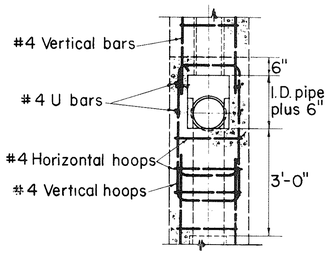
FED. ROAD DIST. NO.	STATE	FED. AID PROJ. NO.	FISCAL YEAR	SHEET NO.	TOTAL SHEETS
HAWAII	HAWAII	I-HI-1(5):24 Unit 4	1969	11	12



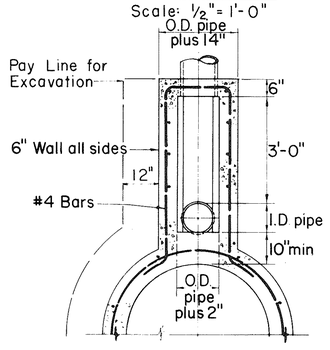
SECTION A-A
Scale: ½"=1'-0"



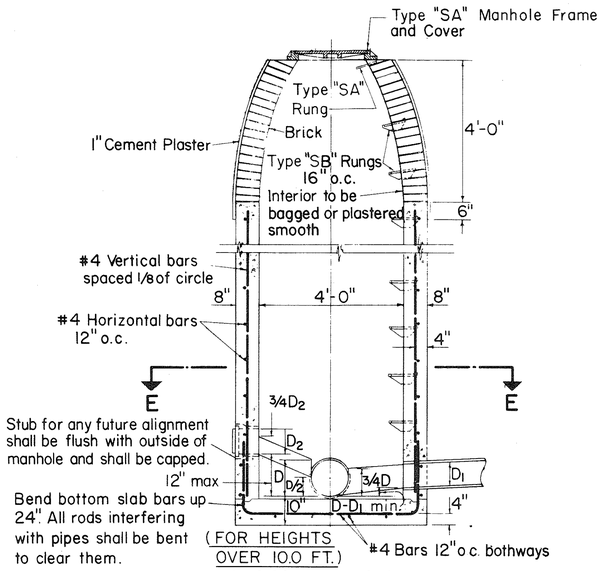
SECTION B-B
Scale: ½"=1'-0"



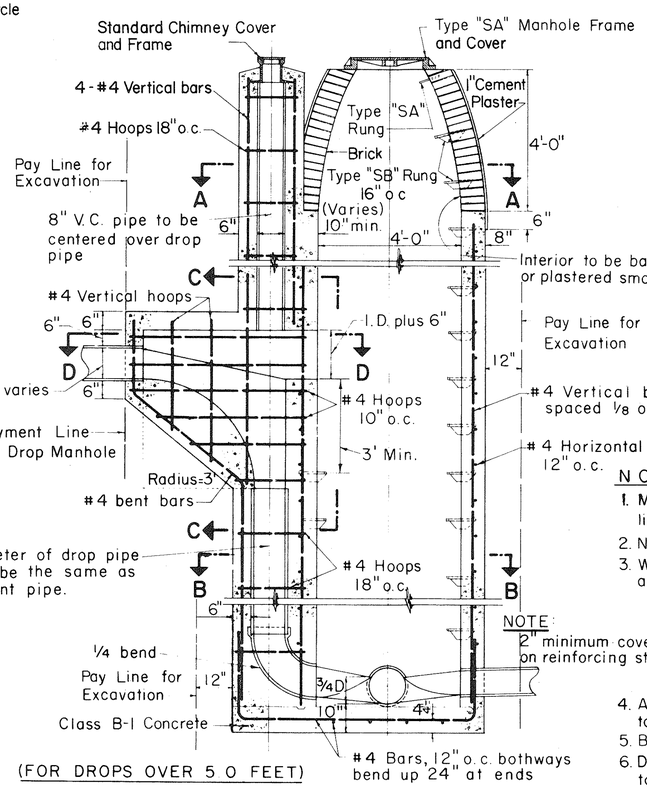
SECTION C-C
Scale: ½"=1'-0"



SECTION D-D
Scale: ½"=1'-0"

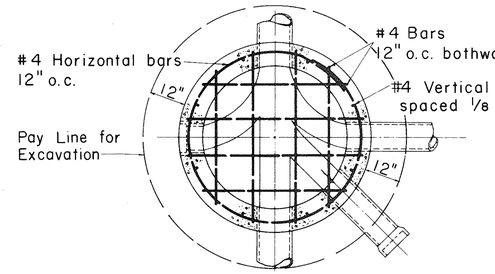


PLAIN MANHOLE
Scale: ½"=1'-0"

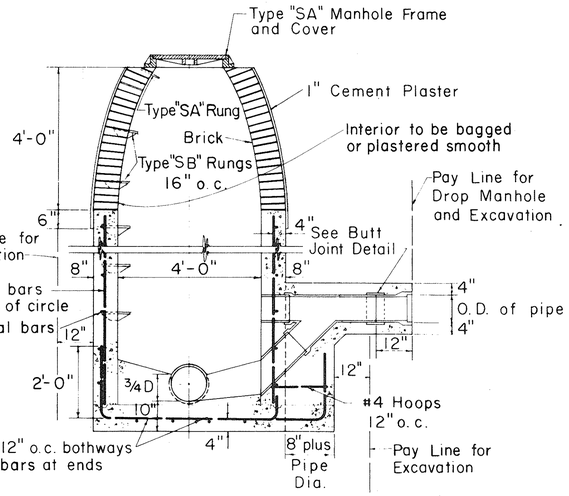


(FOR DROPS OVER 5.0 FEET)

DROP MANHOLE
Scale: ½"=1'-0"



SECTION E-E
Scale: ½"=1'-0"



(FOR DROPS UNDER 5.0 FEET)

SHALLOW DROP MANHOLE
Scale: ½"=1'-0"

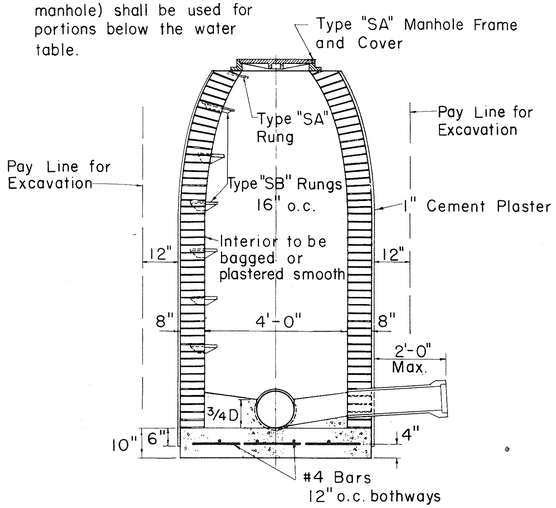
NOTE:

1. Manhole rungs shall not be aligned above any flow line except in drop manhole.
2. No rungs shall be installed in manholes less than 3' high.
3. When not otherwise noted, manhole stubs shall be sloped as follows:

Pipe Size	Rise Per Foot
6"	⅛"
8"	3/32"
10"	1/16"
12"	1/16"

4. All reinforcing rods interfering with pipes shall be bent to clear them.
5. Bar lap to be 40 diameters in length.
6. Data for special manholes not shown shall be similar to that for plain manholes.
7. Size of drop pipe in all Drop Manholes shall be same as influent line.
8. Manhole wall to be of reinforced concrete to height 1' above normal ground water table.
9. All pipes entering or leaving manholes shall have a joint within 2'-0" of the manhole wall.

NOTE:
Reinforced concrete manhole walls (See detail of plain manhole) shall be used for portions below the water table.



(MAXIMUM HEIGHT - 10.0 FEET)

BRICK MANHOLE
Scale: ½"=1'-0"

Payment for excavation for manholes shall be made under unit price for trench excavation and shall be measured to one foot outside of walls from original ground elevation to authorized bottom elevation.

Payment for manhole walls (brick, or cast-in-place concrete) shall include brick, mortar, concrete, reinforcing steel, cast-iron steps, galvanized wrought iron rungs, and plastering.

APPROVED:

SEWER SYSTEM DIRECTOR, DIVISION OF SEWERS — DATE

STATE OF HAWAII
DEPARTMENT OF TRANSPORTATION
HIGHWAYS DIVISION
DIVISION OF SEWERS
CITY & COUNTY OF HONOLULU

STANDARD DETAILS

SEWERS - DROP MANHOLE AND BRICK MANHOLE DETAILS

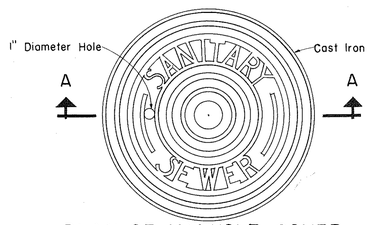
Scales: As Noted — Date: Dec. 16, 1968

SHEET NO. 11 OF 12 SHEETS

Revised Oct. 1965

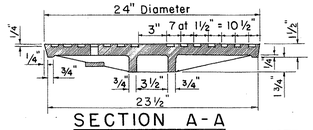
IMPERIAL TM K & E CO., N.Y. ® TRADE MARK

FED. ROAD DIST. NO.	STATE	FED. AID PROJ. NO.	FISCAL YEAR	SHEET NO	TOTAL SHEETS
HAWAII	HAWAII	I-HI-1(5):24 Unit 4	1969	12	12



PLAN OF MANHOLE COVER

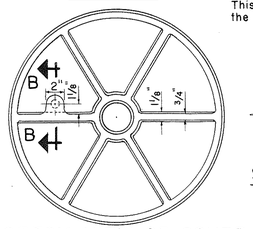
Scale: 1 1/2" = 1'-0"



SECTION A-A

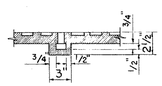
Scale: 1 1/2" = 1'-0"

NOTE:
This cover is used with the "SA" or "SD" frame

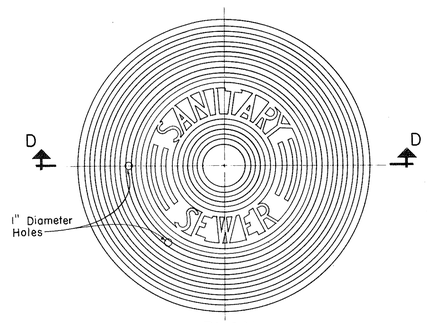


BOTTOM VIEW OF COVER

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



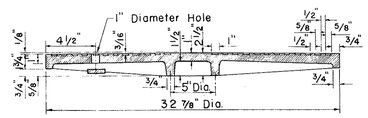
SECTION B-B



PLAN

SPECIAL MANHOLE COVER

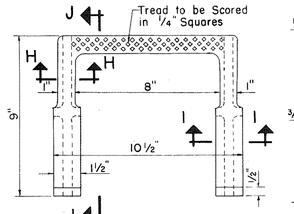
Scale: 1 1/2" = 1'-0"

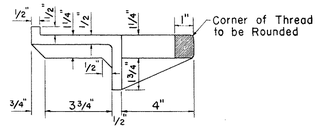


SECTION D-D

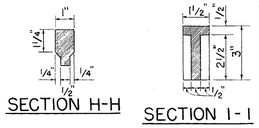
Scale: 1 1/2" = 1' 0"

Approx. Weight 260 Pounds



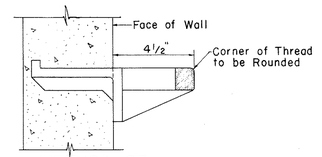


SECTION J - J



SECTION H-H

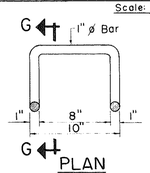
SECTION I-I

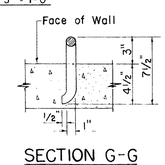


METHOD OF INSTALLATION

TYPE "SB" MANHOLE RUNGS (CAST IRON)

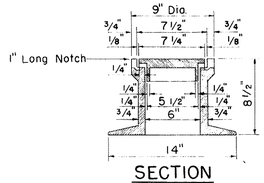
Scale: 3" = 1'-0"





TYPE "SA" MANHOLE RUNGS (WROUGHT IRON)

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

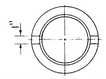


SECTION

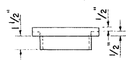
DROP MANHOLE CHIMNEY CASTINGS

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

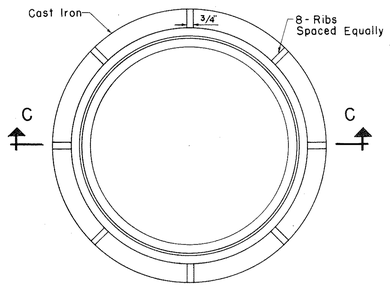
PLAN OF COVER



BOTTOM OF COVER

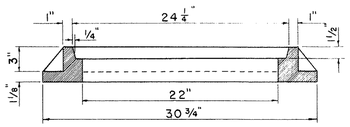


ELEVATION



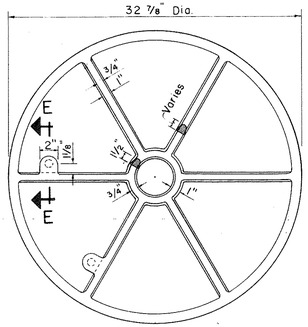
PLAN OF MANHOLE FRAME

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



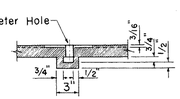
SECTION C-C

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



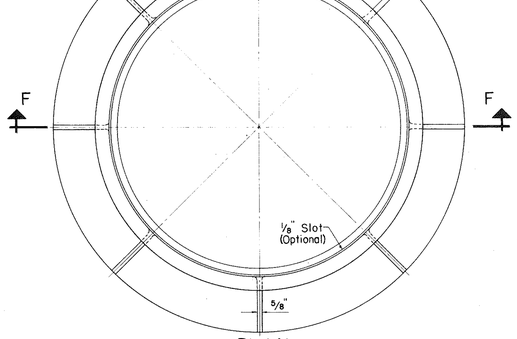
BOTTOM VIEW OF COVER

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



SECTION E-E

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

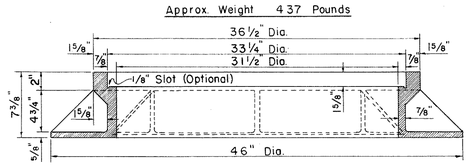


PLAN

SPECIAL MANHOLE FRAME

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

Approx. Weight 437 Pounds



SECTION F-F

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

TYPE "SA" SEWER MANHOLE FRAME AND COVER

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

TYPE "SB" SEWER MANHOLE FRAME AND COVER

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

APPROVED:

SEWER SYSTEM DIRECTOR, DIVISION OF SEWERS — DATE

STATE OF HAWAII
DEPARTMENT OF TRANSPORTATION
HIGHWAYS DIVISION
DIVISION OF SEWERS
CITY & COUNTY OF HONOLULU

STANDARD DETAILS

SEWERS - MANHOLE RUNGS, CHIMNEY CASTINGS AND FRAME AND COVER DETAILS

Scales: As Noted — Date: Dec. 16, 1968

SHEET NO. 12 OF SHEETS

		DATE
ORIGINAL PLAN	SURVEY PLOTTED BY	11-5-68
	DRAWN BY	11-5-68
	TRACED BY	
NOTE BOOK	DESIGNED BY	
	QUANTITIES BY	
No.	CHECKED BY	

DIETZGEN IMPERIAL TRACING CLOTH 10-62