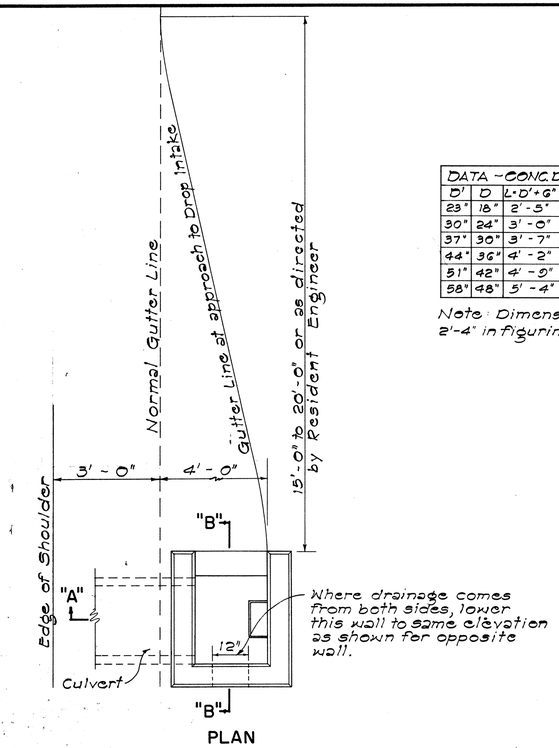
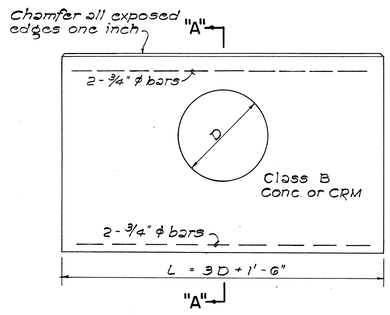
FED. ROAD DIST. NO.	STATE	PROJ. NO.	FISCAL YEAR	SHEET NO.	TOTAL SHEETS
HAWAII	HAW.	377A-01-70	1971	G	20



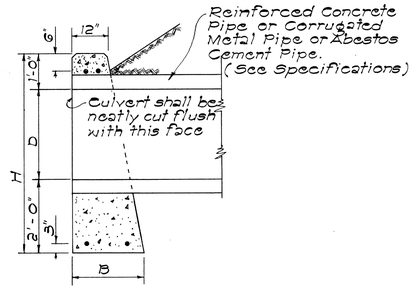
PLAN

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"

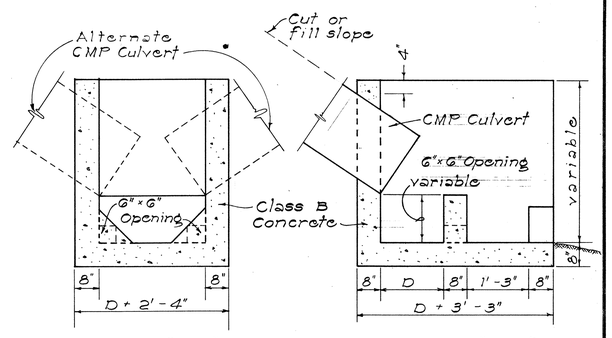
Note: Dimension "X" is assumed as 2'-4" in figuring the above quantities.



ELEVATION



SECTION "A-A"

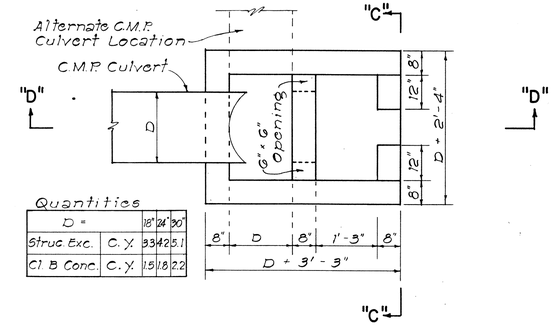


SECTION "C-C" SECTION "D-D"

DATA FOR CONC. HEADWALL				Cl. B CONC. FOR R.C.P.	Cl. B CONC. FOR C.M.P.	Steel For One Headwall			
D	B	L	H	Cu. Yd.	Cu. Yd.	No. of Bars	Size	Length	Lbs.
18"	1'-6"	6'-0"	4'-6"	1.12	1.17	4	3/4" ϕ	5'-6"	33
24"	1'-6"	7'-6"	5'-0"	1.52	1.60	4	3/4" ϕ	7'-0"	42
30"	2'-0"	9'-0"	5'-6"	2.36	2.49	4	3/4" ϕ	8'-6"	51
36"	2'-0"	10'-6"	6'-0"	2.94	3.13	4	3/4" ϕ	10'-0"	60
42"	2'-6"	12'-0"	6'-6"	4.19	4.47	4	3/4" ϕ	11'-6"	69
48"	2'-6"	13'-6"	7'-0"	5.01	5.36	4	3/4" ϕ	13'-0"	78

DATA - MASONRY HEADWALL				CRM FOR R.C.P.	CRM FOR C.M.P.
D	B	L	H	Cu. Yd.	Cu. Yd.
18"	1'-9"	6'-0"	4'-6"	1.24	1.29
24"	2'-0"	7'-6"	5'-0"	1.83	1.92
30"	2'-3"	9'-0"	5'-6"	2.56	2.70
36"	2'-6"	10'-6"	6'-0"	3.45	3.66

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



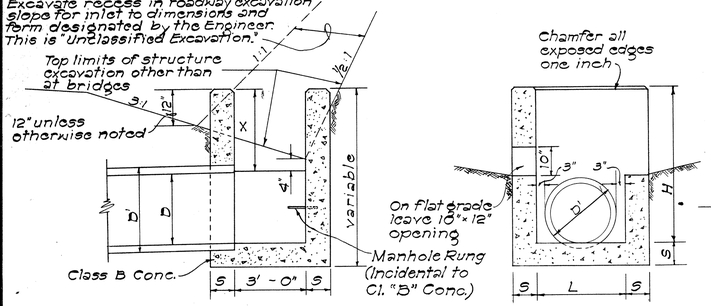
Quantities

D =		18"	24"	30"
Struc Exc.	C.Y.	33	42	51
Cl B Conc.	C.Y.	1.5	1.8	2.2

PLAN

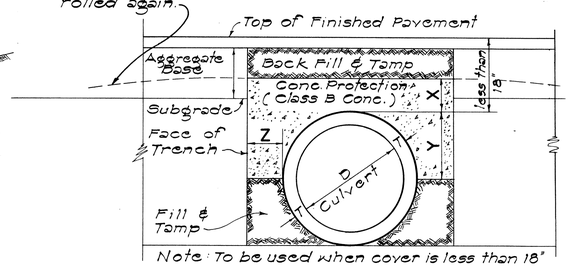
DETAILS OF CONC. DROP BOX AT OUTLET OF CULVERT PIPE

NOT TO SCALE



SECTION "A-A"

SECTION "B-B"



Note: To be used when cover is less than 18"

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

GENERAL NOTES

1. Culvert shall enter and leave Drop Intake from any position and in the direction indicated by the plans or ordered by the Engineer.
2. 'D' shall be the maximum outside dimension of the culvert at the Drop Intake wall.
3. Manhole Rungs (16" o.c.) are required when "H" is greater than 4 feet 6 inches. Only one rung (12 inches from the bottom) is required if "H" is 4 feet 6 inches or less. Manhole Rungs maybe placed at any location as ordered by the Engineer.

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. Minimum = X. Maximum pay quantity will be Z = 12"
7" for 24" D		
8" for 30" D		
9" for 36" D		
10" for 42" D		
11" for 48" D		
12 for 54" D		

SECT. OF CULVERT WITH CONC. PROTECTION
Scale: 1" = 1'-0"

APPROVAL RECOMMENDED:
G. Takano — 12-17-69
HYDRAULIC DESIGN ENGINEER — DATE

APPROVED:
Wesley S. Dalel — 12-17-69
ASSISTANT CHIEF, ENGINEERING — DATE

NO.	REVISION	APPROVED BY	DATE

STATE OF HAWAII
DEPARTMENT OF TRANSPORTATION
HIGHWAYS DIVISION

STANDARD DETAILS

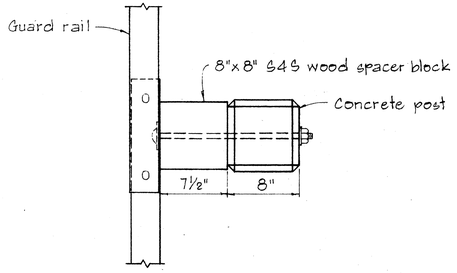
DROP INTAKE, HEADWALL & CONCRETE PROTECTION

Scale: As Noted — Date: Aug. 1967

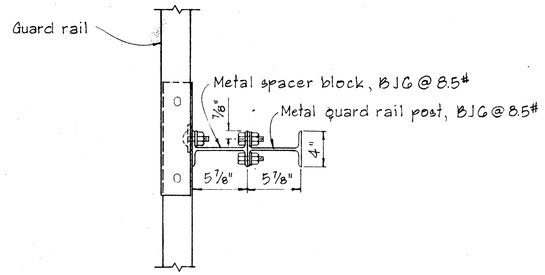
SHEET No: 1 OF 7 SHEETS DH 10

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

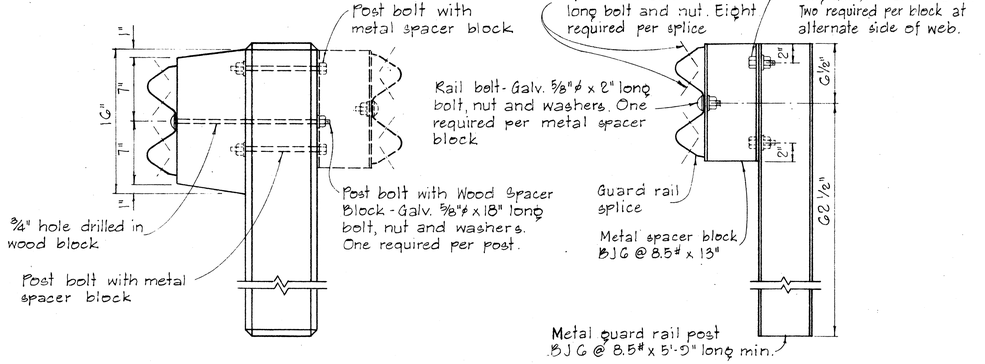
FED. ROAD DIST. NO.	STATE	PROJ. NO.	FISCAL YEAR	SHEET NO.	TOTAL SHEETS
HAWAII	HAW.	377A-01-70	1971	7	20



PLAN

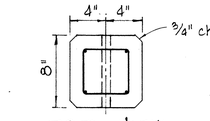


PLAN



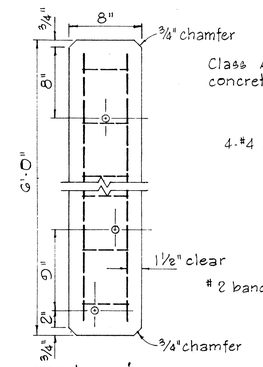
SINGLE METAL GUARD RAIL ON PRECAST CONCRETE POST WITH WOOD OR METAL SPACER BLOCK

SCALE: 1½" = 1'-0"

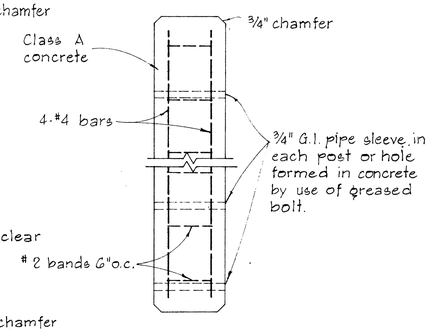


TOP VIEW

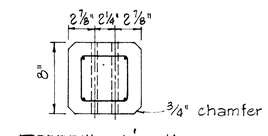
NOTE:
Concrete post shall be precast



FRONT VIEW



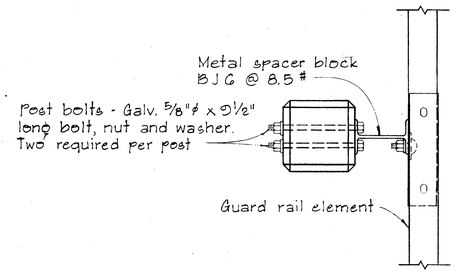
SIDE VIEW



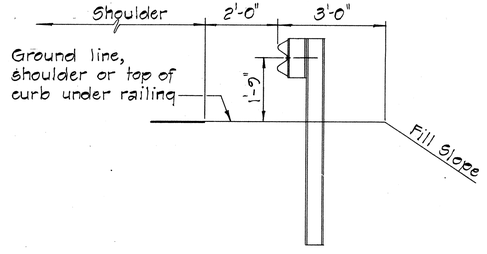
BOTTOM VIEW

DETAIL OF CONCRETE POST

SCALE: 1½" = 1'-0"



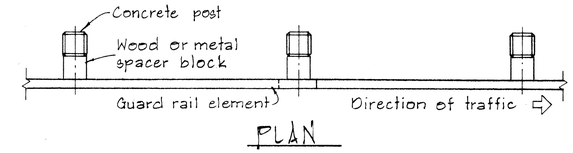
PLAN



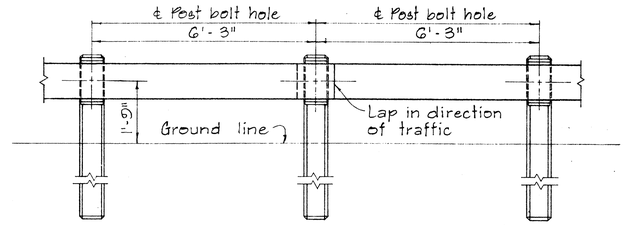
AT SHOULDER SECTION

TYPICAL METAL GUARD RAIL DETAIL

SCALE: ½" = 1'-0"



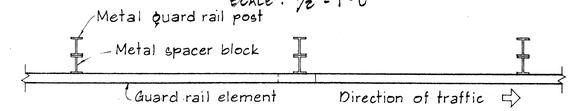
PLAN



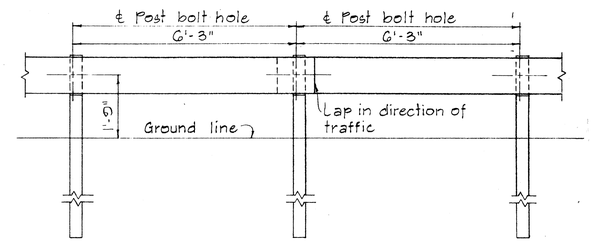
ELEVATION

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"

NO.	REVISION	APPROVED BY	DATE

APPROVAL RECOMMENDED:
Eiichi Tanaka — TRAFFIC ENGINEER — 12/29/69 DATE

APPROVED:
Herbert S. Segal — ASSISTANT CHIEF, ENGINEERING — 12-30-69 DATE

STATE OF HAWAII
DEPARTMENT OF TRANSPORTATION
HIGHWAYS DIVISION

STANDARD DETAILS

METAL GUARD RAIL

SCALE: AS SHOWN — NOV. 1968

SHEET No. 2 OF 7 SHEETS | DT 500

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

PRINTED ON NO. 1000H CLEARPRINT

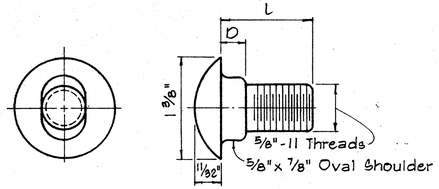
FED. ROAD DIST. NO.	STATE	PF NO.	FISCAL YEAR	SHEET NO.	TOTAL SHEETS
HAWAII	HAW.	377A-01-70	1971	8	20

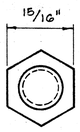
BOLT DIMENSIONS

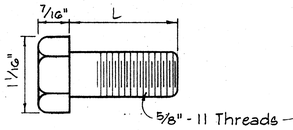
TYPE A BOLT	D	L
Splice Bolt	5/16"	1 1/4"
Post Bolt for Conc. Post w/ Double Wood Blocks	3/32"	24"
Post Bolt for Conc. Post w/ Single Wood Block	3/32"	18"
Rail Bolt for Metal Block	3/32"	2"

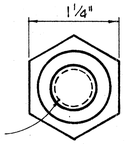
BOLT DIMENSIONS

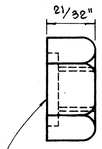
TYPE B BOLT	L
Post Bolt for Conc. Post w/ Metal Blocks	20 1/2"
Post Bolt for Metal Post w/ Metal Block	1 3/4"











5/32" Deep x 15/16" Dia. C' Bore for Type A Bolt only. Plain nut for Type B Bolt.

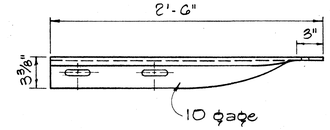
TYPE A BOLT TYPE B BOLT

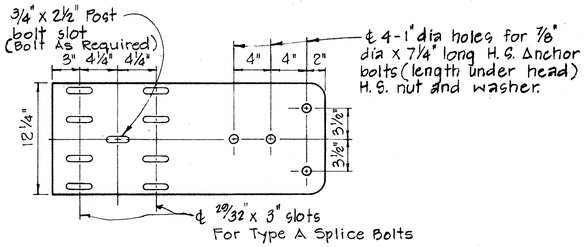
SPLICE RAIL AND POST BOLTS

Scale : Full Size

HEXAGON NUT

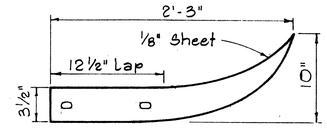
Scale: Full Size

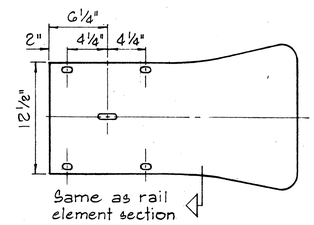




SPECIAL END SHOE

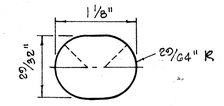
Scale : 1 1/2" = 1'-0"



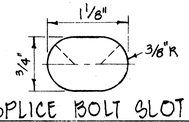


FLARED END

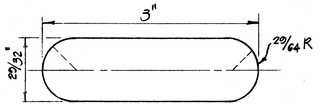
Scale: 1 1/2" = 1'-0"



SPLICE BOLT SLOT

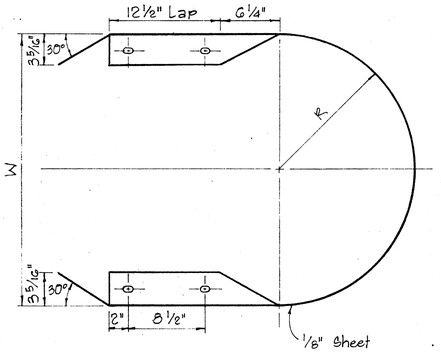


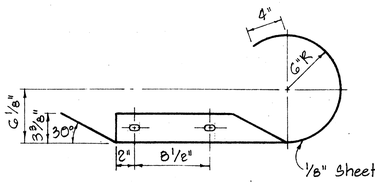
SPLICE BOLT SLOT FOR ALL ENDS

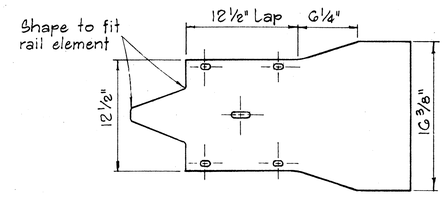


SPLICE BOLT SLOT FOR SPECIAL END SHOE

Scale: Full Size

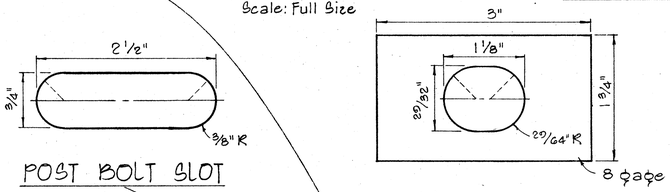






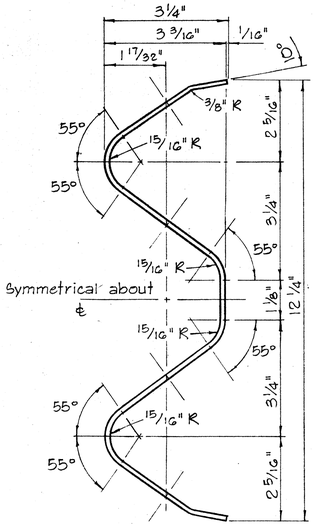
CURVED END

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



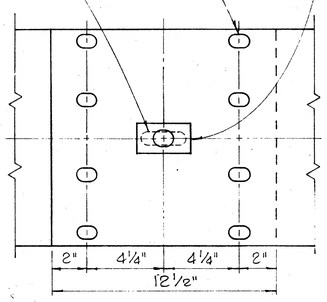
POST BOLT SLOT

RAIL WASHER



RAIL ELEMENT SECTION

Scale: 6" = 1'-0"

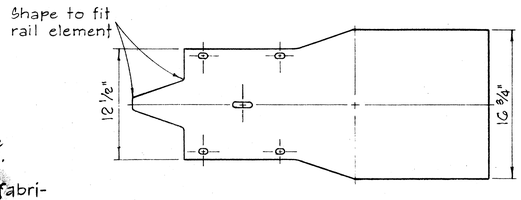


RAIL SPLICE

Scale: 3" = 1'-0"

NOTES:

1. H.S. Bolts shall conform to the requirements of ASTM A 325.
2. Special End Shoe shall be fabricated from 10 Gage steel conforming to the requirements of AASHO M180.



MEDIAN END

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

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"

NO.	REVISION	APPROVED BY	DATE

APPROVAL RECOMMENDED:
Eiichi Tanaka — TRAFFIC ENGINEER — 12/29/69 DATE

APPROVED:
Alvin O Adel — ASSISTANT CHIEF, ENGINEERING — 12-30-69 DATE

STATE OF HAWAII
DEPARTMENT OF TRANSPORTATION
HIGHWAYS DIVISION

STANDARD DETAILS
METAL GUARD RAIL

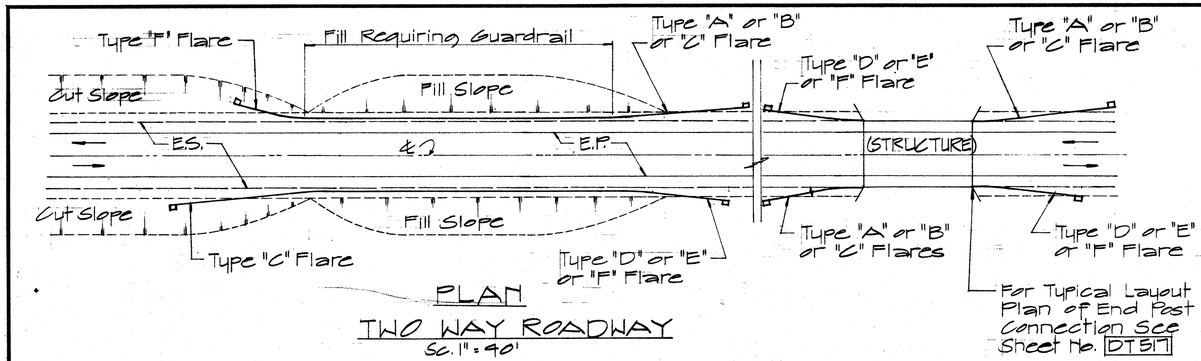
Scale: As Noted August, 1968

SHEET No. 3 OF 7 SHEETS | DT 501

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	PROJ. NO.	FISCAL YEAR	SHEET NO.	TOTAL SHEETS
HAWAII	HAW.	377A-01-70	1971	9	25

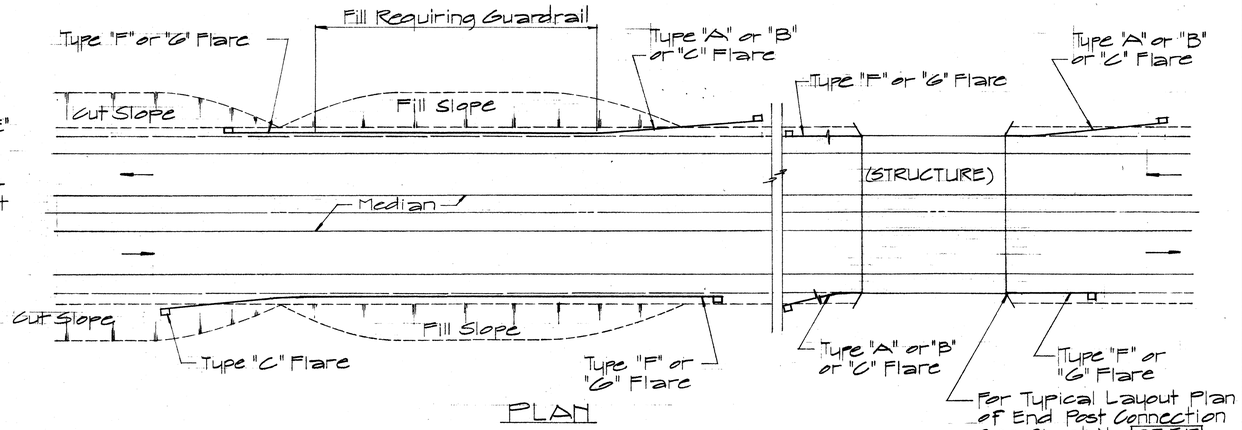


PLAN

TWO WAY ROADWAY

Sc. 1" = 40'

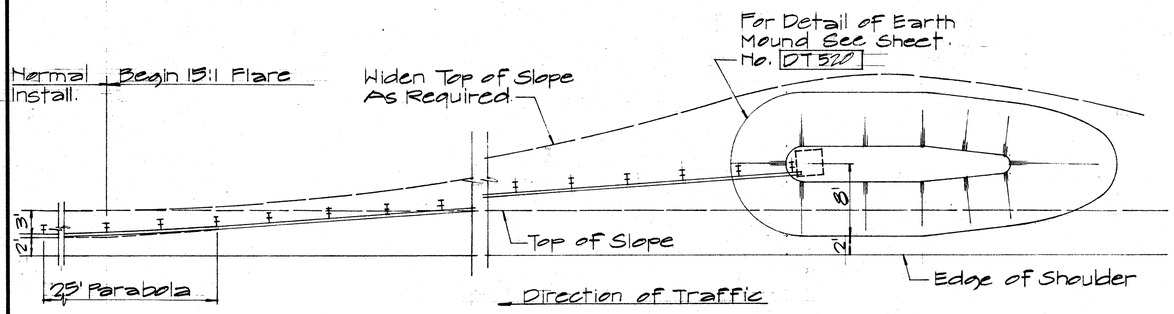
NOTE:
Metal guard rail connection to structures requires End Post Connection. See structure plans.



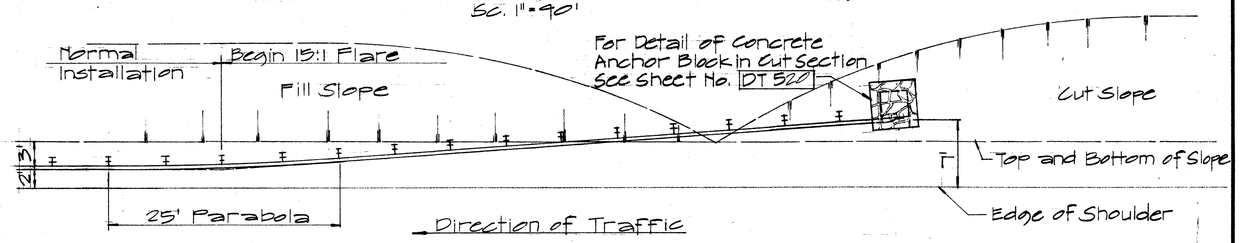
PLAN

ONE WAY ROADWAY (DIVIDED HIGHWAY)

Sc. 1" = 40'



PLAN



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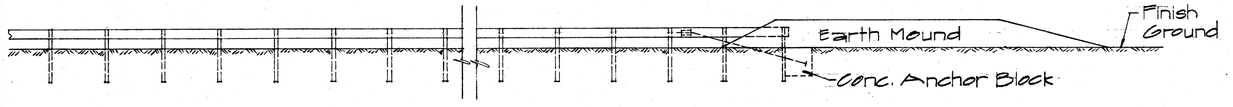
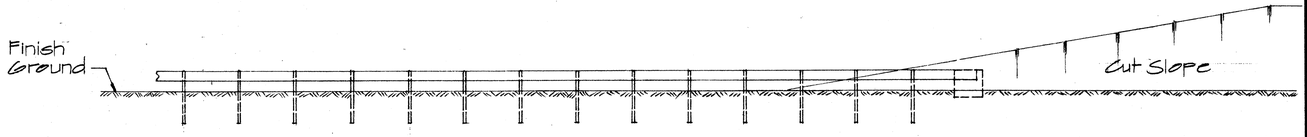
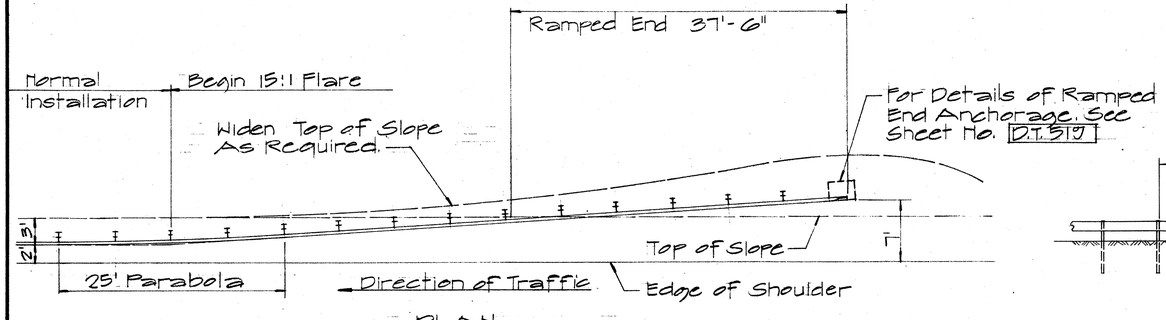


ELEVATION

TYPE "A" FLARE

Sc. 1/8" = 1'-0"





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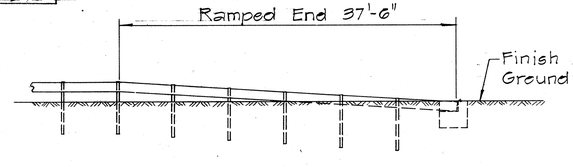


ELEVATION

TYPE "B" FLARE

Sc. 1/8" = 1'-0"

ELEVATION

TYPE "C" FLARE

Sc. 1/8" = 1'-0"

APPROVAL RECOMMENDED:
Eiichi Tanaka — TRAFFIC ENGINEER — 12/29/69 DATE

APPROVED:
[signature] — ASSISTANT CHIEF, ENGINEERING — 12-30-69 DATE

NO.	REVISION	APPROVED BY	DATE

STATE OF HAWAII
DEPARTMENT OF TRANSPORTATION
HIGHWAYS DIVISION

STANDARD DETAILS OF APPROACH END FLARE - ONE & TWO WAY ROADWAY

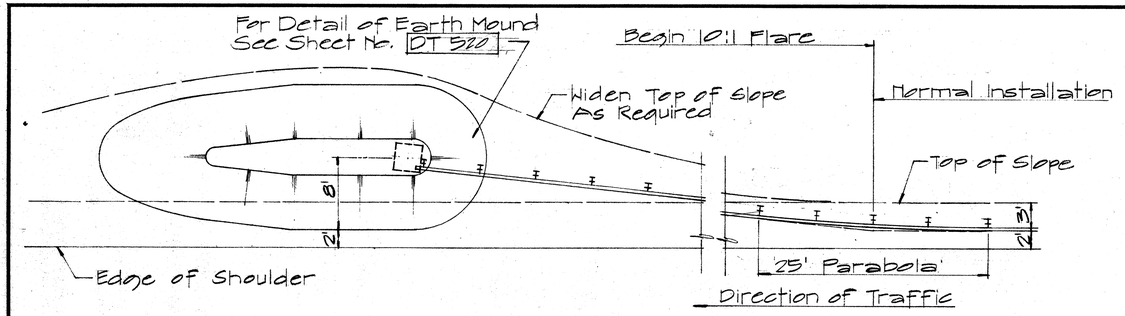
Sc. As Noted April 1960

SHEET No. 4 OF 7 SHEETS DT 516

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

PRINTED ON NO. 1000H CLEARPRINT

FED. ROAD DIST. NO.	STATE	PROJ. NO.	FISCAL YEAR	SHEET NO.	TOTAL SHEETS
HAWAII	HAW.	377A-01-70	1971	10	20



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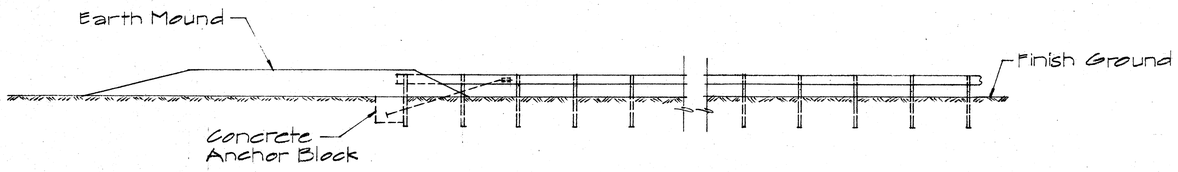
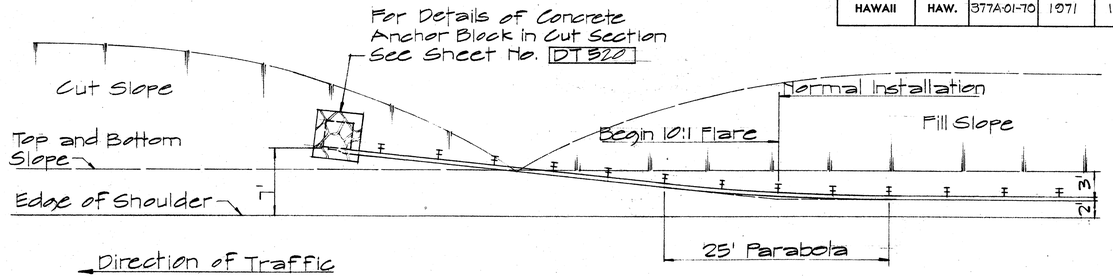


ELEVATION

TYPE "D" FLARE

Sc. 1/8" = 1'-0"



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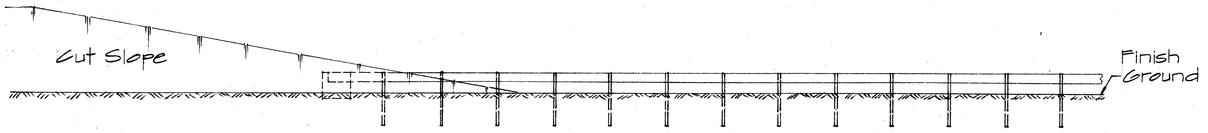
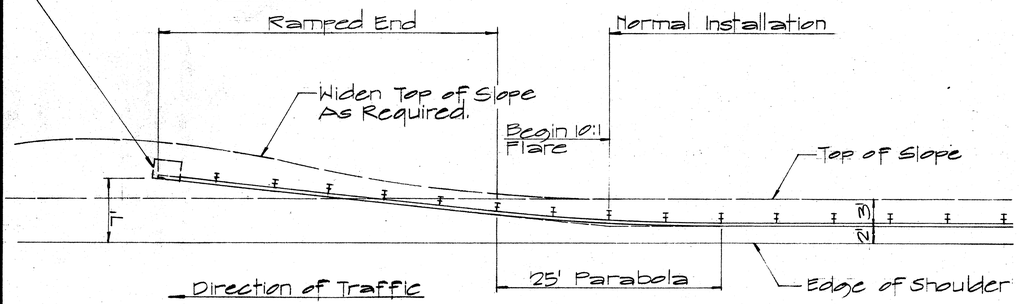


ELEVATION

TYPE "F" FLARE

Sc. 1/8" = 1'-0"



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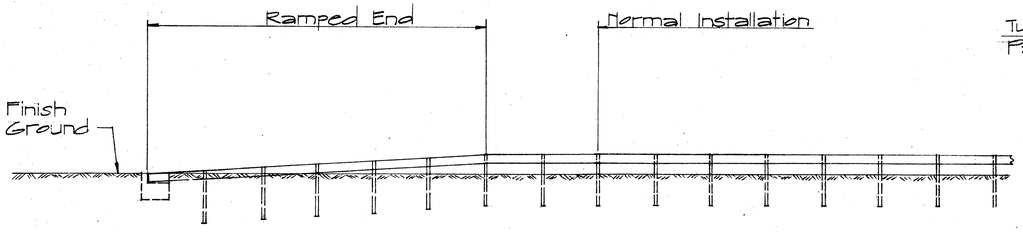
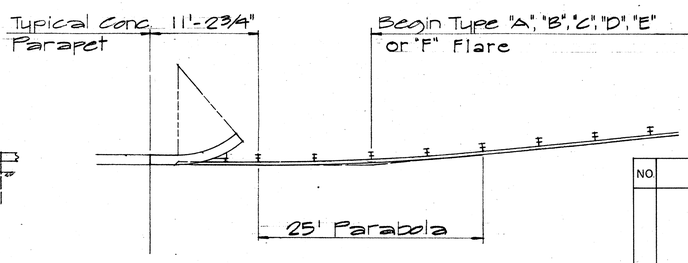


ELEVATION

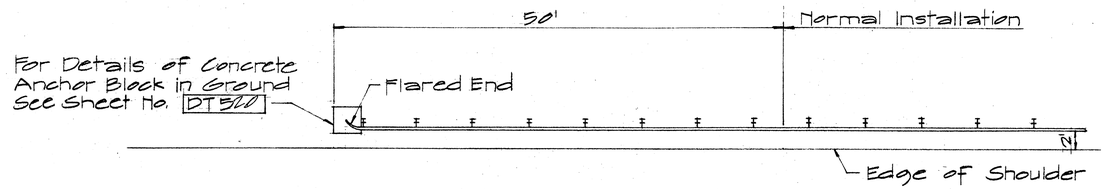
TYPE "E" FLARE

Sc. 1/8" = 1'-0"

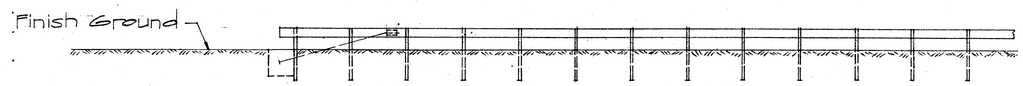


TYPICAL LAYOUT PLAN OF END POST CONNECTION

Sc. 1/8" = 1'-0"



PLAN



ELEVATION

TYPE "G" FLARE

Sc. 1/8" = 1'-0"

APPROVAL RECOMMENDED:
Eiichi Tanaka — TRAFFIC ENGINEER — 12/29/69 DATE

APPROVED:
[signature] — ASSISTANT CHIEF, ENGINEERING — 12-30-69 DATE

NO.	REVISION	APPROVED BY	DATE

STATE OF HAWAII
DEPARTMENT OF TRANSPORTATION
HIGHWAYS DIVISION

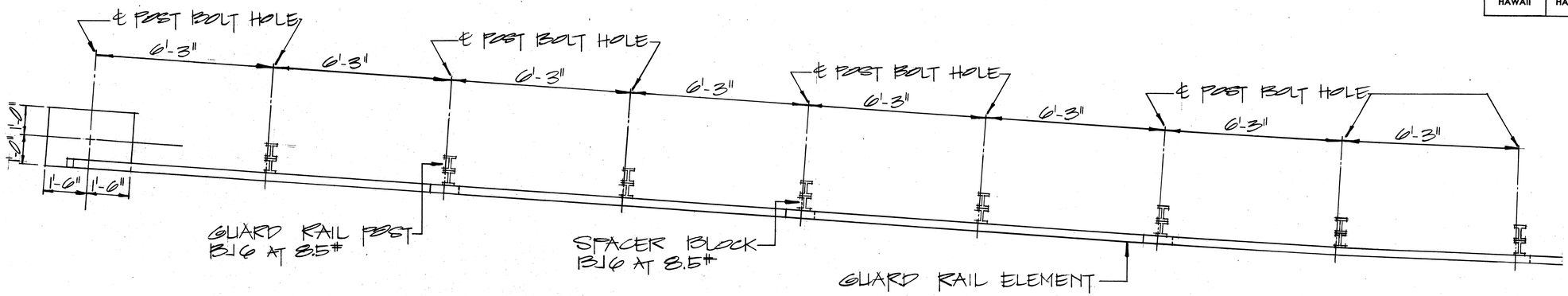
STANDARD DETAILS OF TRAILING END FLARE - ONE & TWO WAY ROADWAY

Sc. As Noted — April 1960

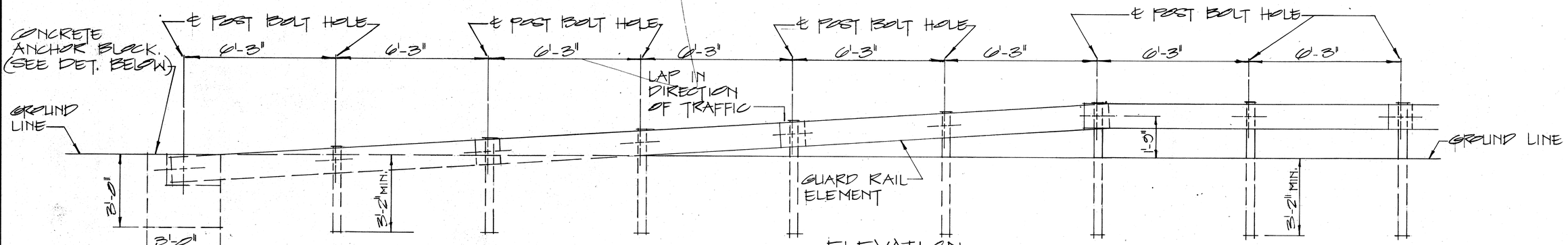
SHEET No. 5 OF 7 SHEETS | DT 517

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

FED. ROAD DIST. NO.	STATE	PROJ. NO.	FISCAL YEAR	SHEET NO.	TOTAL SHEETS
HAWAII	HAW.	377A-01-70	1971	11	29



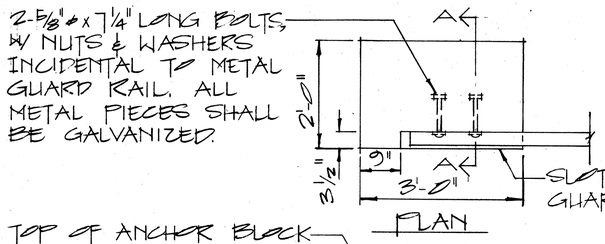
PLAN



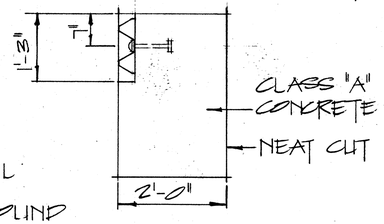
ELEVATION

RAMP END ANCHORAGE

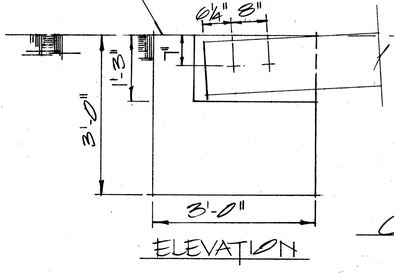
SCALE: 1/2" = 1'-0"



PLAN



SECTION "A-A"



ELEVATION

NOTE:
CONCRETE, EXCAVATION AND MISCELLANEOUS APPURTENANCES NECESSARY TO ANCHOR THE GUARD RAIL ENDS, SHALL BE INCIDENTAL TO THE METAL GUARD RAIL.

CONCRETE ANCHOR BLOCK

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

APPROVAL RECOMMENDED:
Eiichi Tanaka — 12/23/69
TRAFFIC ENGINEER — DATE

APPROVED:
[signature] — 12-30-69
ASSISTANT CHIEF, ENGINEERING — DATE

NO.	REVISION	APPROVED BY	DATE

STATE OF HAWAII
DEPARTMENT OF TRANSPORTATION
HIGHWAYS DIVISION

STANDARD DETAILS

GUARD RAIL, TYPE 3
RAMP END ANCHORAGE

SCALE: AS SHOWN

SHEET No. 6 OF 7 SHEETS | DT-512

ORIGINAL PLAN | NOTE BOOK | No. | DATE
SURVEY PLOTTED BY
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TRACED BY
DESIGNED BY
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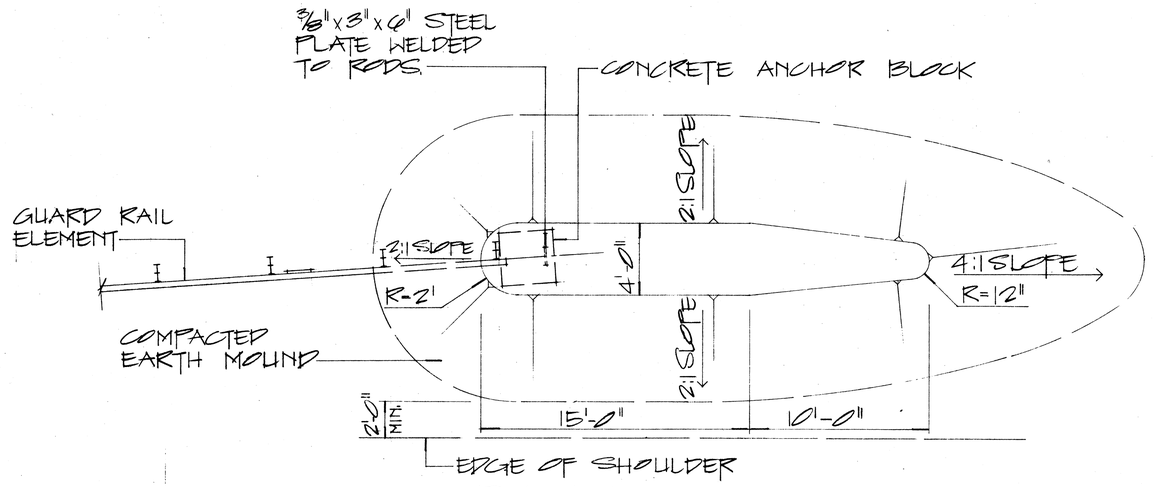
11

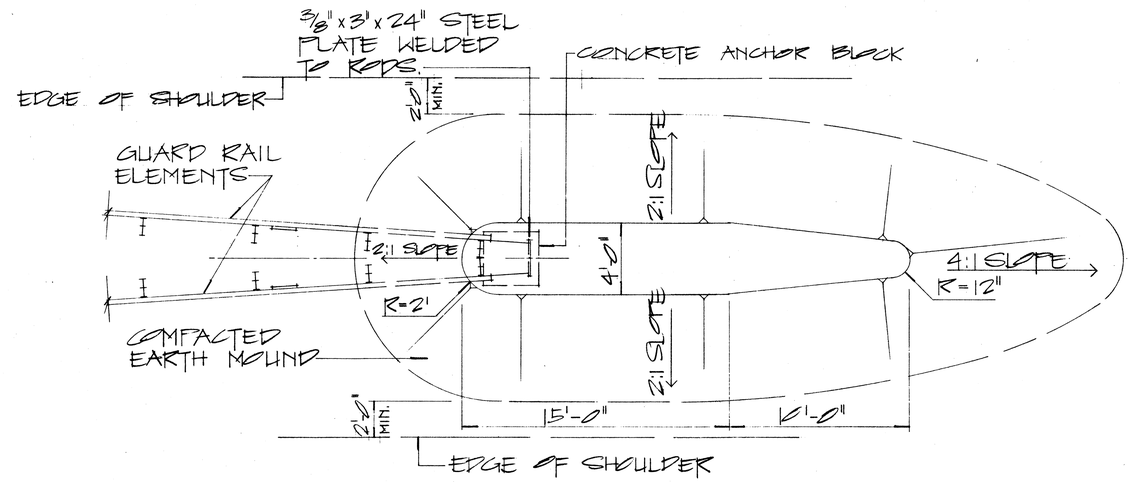
FED. ROAD DIST. NO.	STATE	PROJ. NO.	FISCAL YEAR	SHEET NO.	TOTAL SHEETS
HAWAII	HAW.	877A-01-70	1971	12	20



PLAN

EARTH MOUND DETAIL (SINGLE GUARD RAIL)

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

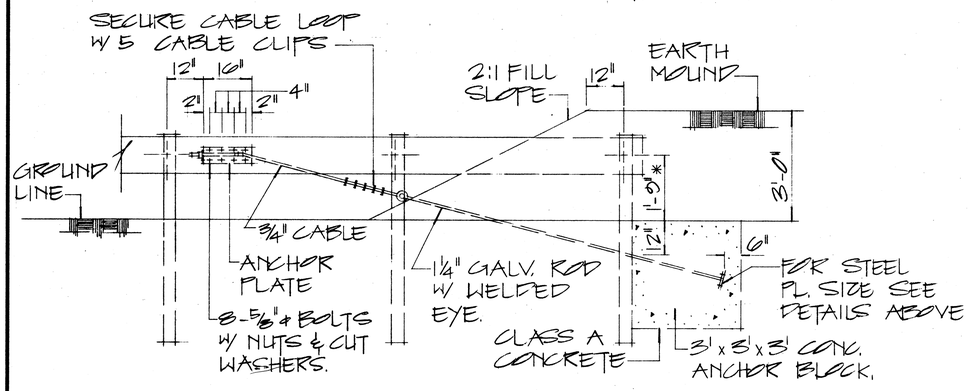


PLAN

EARTH MOUND DETAIL (DOUBLE GUARD RAIL)

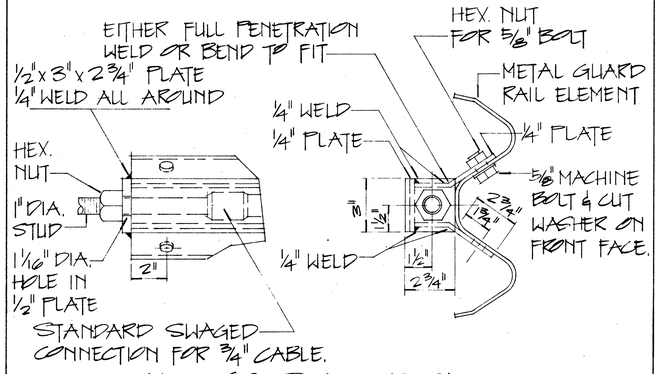
SCALE: 1/4" = 1'-0"

*NOTE: 2'-0" WHEN INSTALLED WITH RUB RAIL.



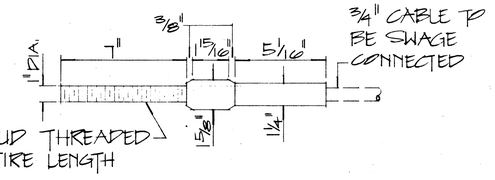
ANCHOR BLOCK DETAIL IN EARTH MOUND

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



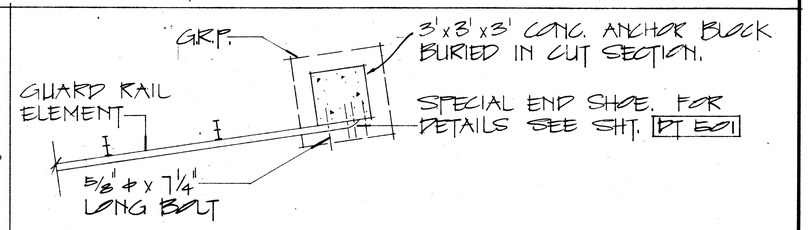
ANCHOR PLATE DETAILS

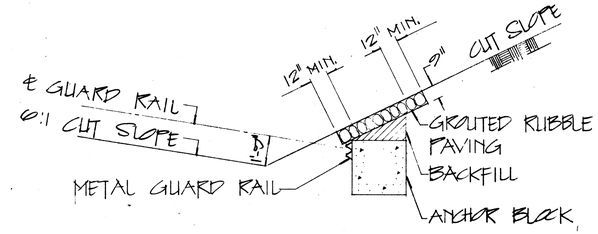
SCALE: 1" = 3"



STANDARD SWAGED FITTING AND STUD

SCALE: 1" = 3"





ANCHOR BLOCK IN CUT SECTION

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

NOTE:

1. GALVANIZED ANCHOR ROD, METAL GUARD RAIL AND POST BURIED IN GROUND SHALL BE COVERED WITH a Min. 20-Mil Thickness of Coal TAR ENAMEL. Conforming to AWWA Standard: C 203
2. CONCRETE, GRP., EXCAVATION, EARTH MOUND, ANCHOR RODS AND MISCELLANEOUS APPURTENANCES NECESSARY TO ANCHOR THE GUARD RAIL ENDS SHALL BE INCIDENTAL TO THE METAL GUARD RAIL.

APPROVAL RECOMMENDED:

Eiichi Tanaka — 12/29/69
TRAFFIC ENGINEER — DATE

APPROVED:

[signature] — 12-30-69
ASSISTANT CHIEF, ENGINEERING — DATE

NO.	REVISION	APPROVED BY	DATE

STATE OF HAWAII
DEPARTMENT OF TRANSPORTATION
HIGHWAYS DIVISION

STANDARD DETAILS

EARTH MOUND AND ANCHOR BLOCK DETAILS

SCALE: AS SHOWN — OCT 1969

SHEET No. 7 OF 7 SHEETS | PT 520

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

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