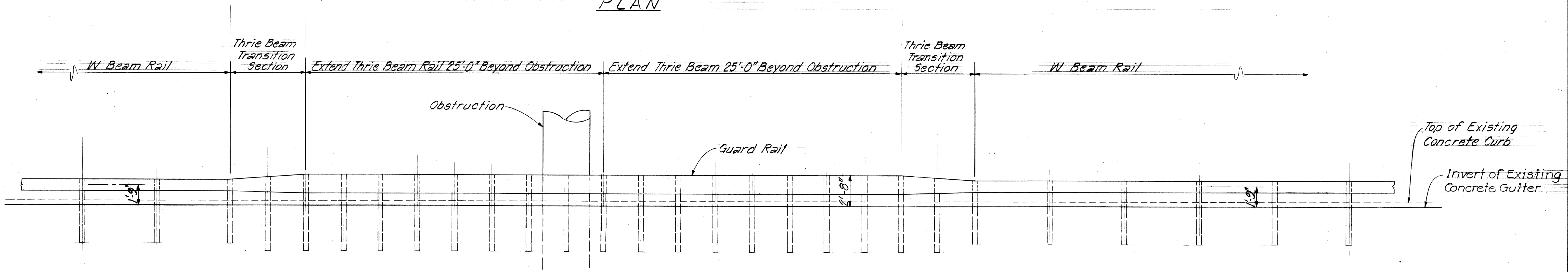
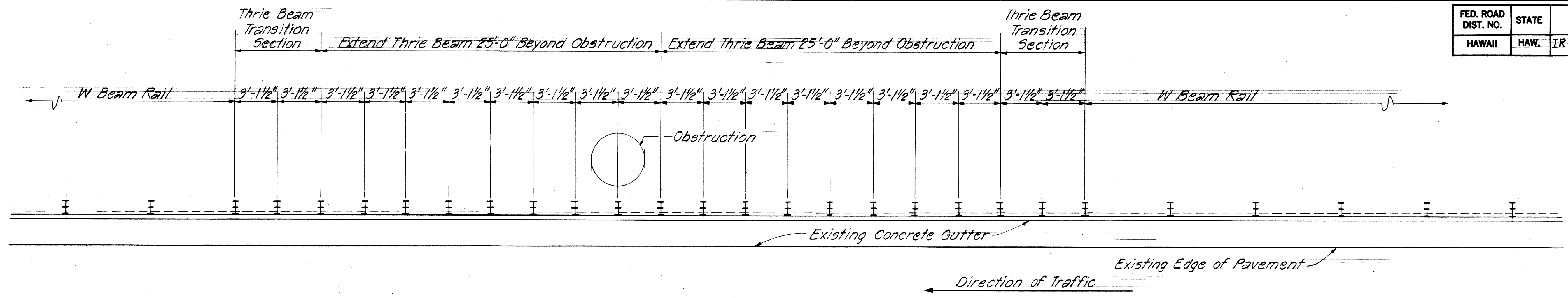
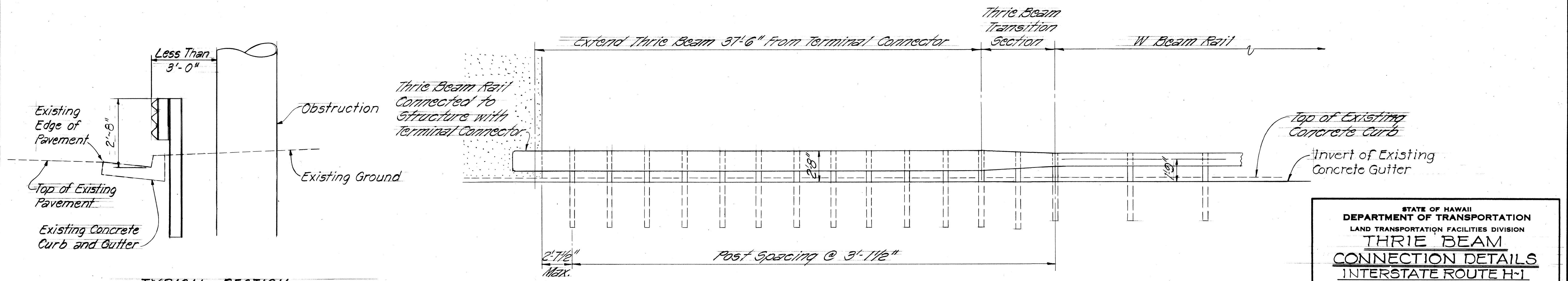


K-F CRYSTALINE

FED. ROAD DIST. NO.	STATE	FED. AID PROJ. NO.	FISCAL YEAR	SHEET NO.	TOTAL SHEETS
HAWAII	HAW.	IR-HI-1(197)	1986	12	38



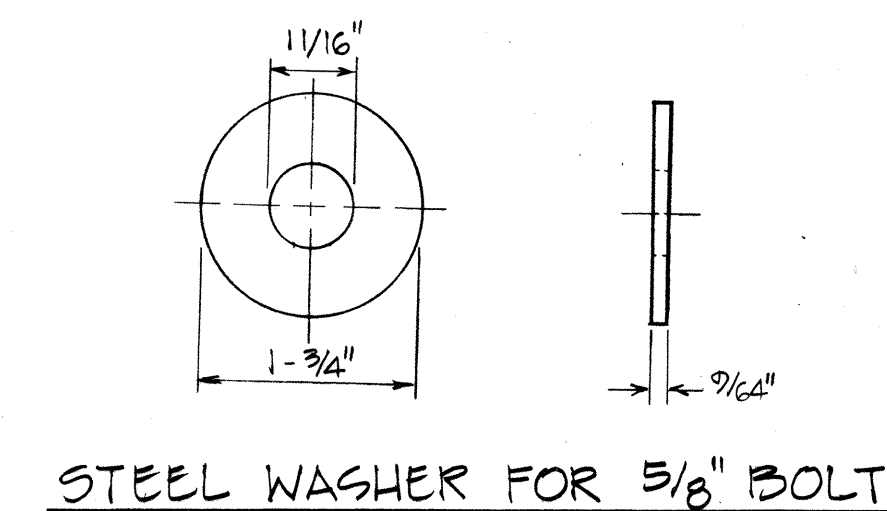
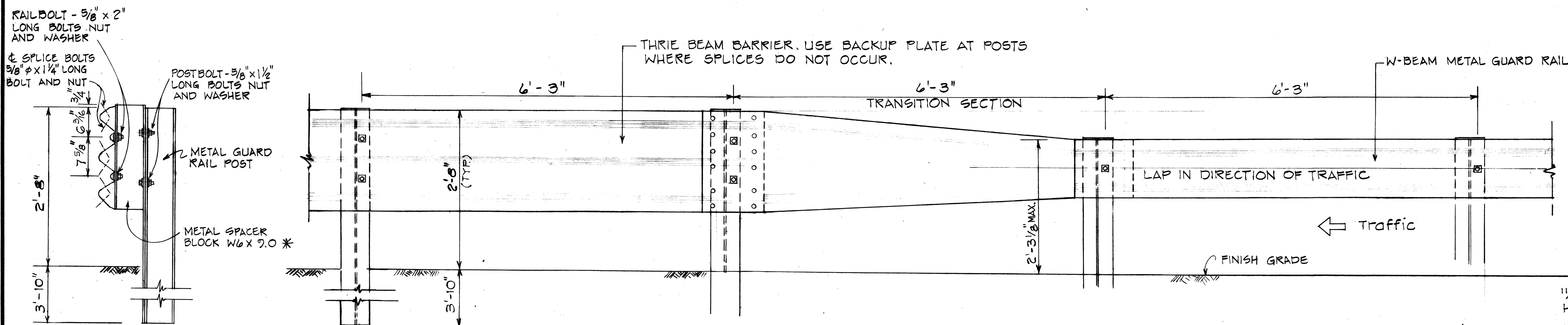
DETAIL OF THRIE BEAM TYPE GUARD RAIL AT OBSTRUCTION
Scale: 1/4" = 1'-0"



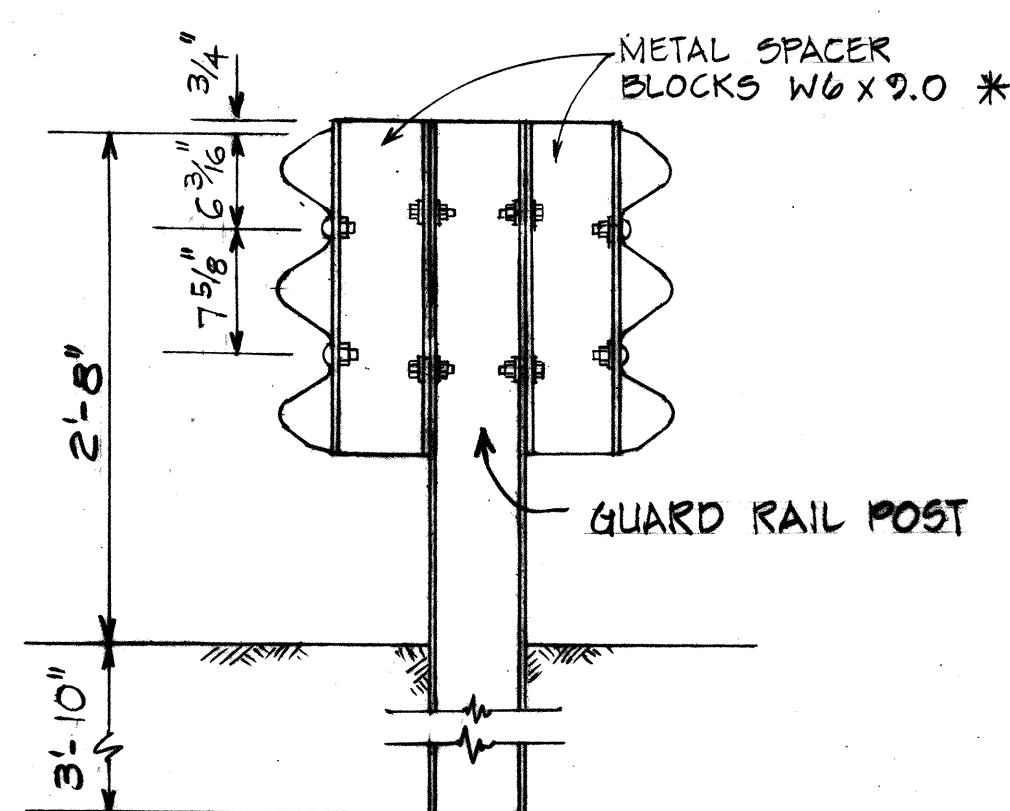
STATE OF HAWAII
DEPARTMENT OF TRANSPORTATION
LAND TRANSPORTATION FACILITIES DIVISION
THRIE BEAM
CONNECTION DETAILS
INTERSTATE ROUTE H-1
SAFETY IMPROVEMENTS
Koko Head Ave. to Waiialae Viaduct
F.A.I. PROJECT No. IR-HI-1(197)
Scale: As shown Date: July 1985
SHEET NO. 12 OF 38

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

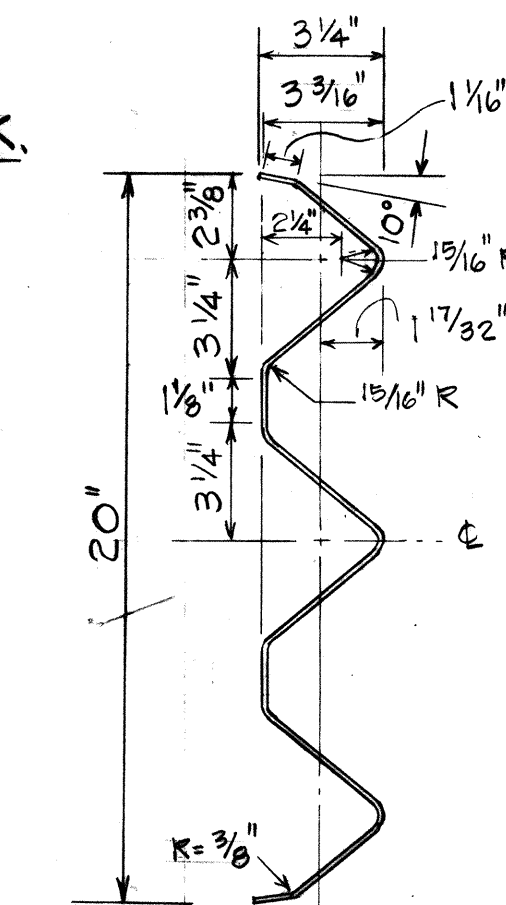
FED. ROAD DIST. NO.	STATE	FED. AID PROJ. NO.	FISCAL YEAR	SHEET NO.	TOTAL SHEETS
HAWAII	HAW.	IR-HI-1107	1980	13	38



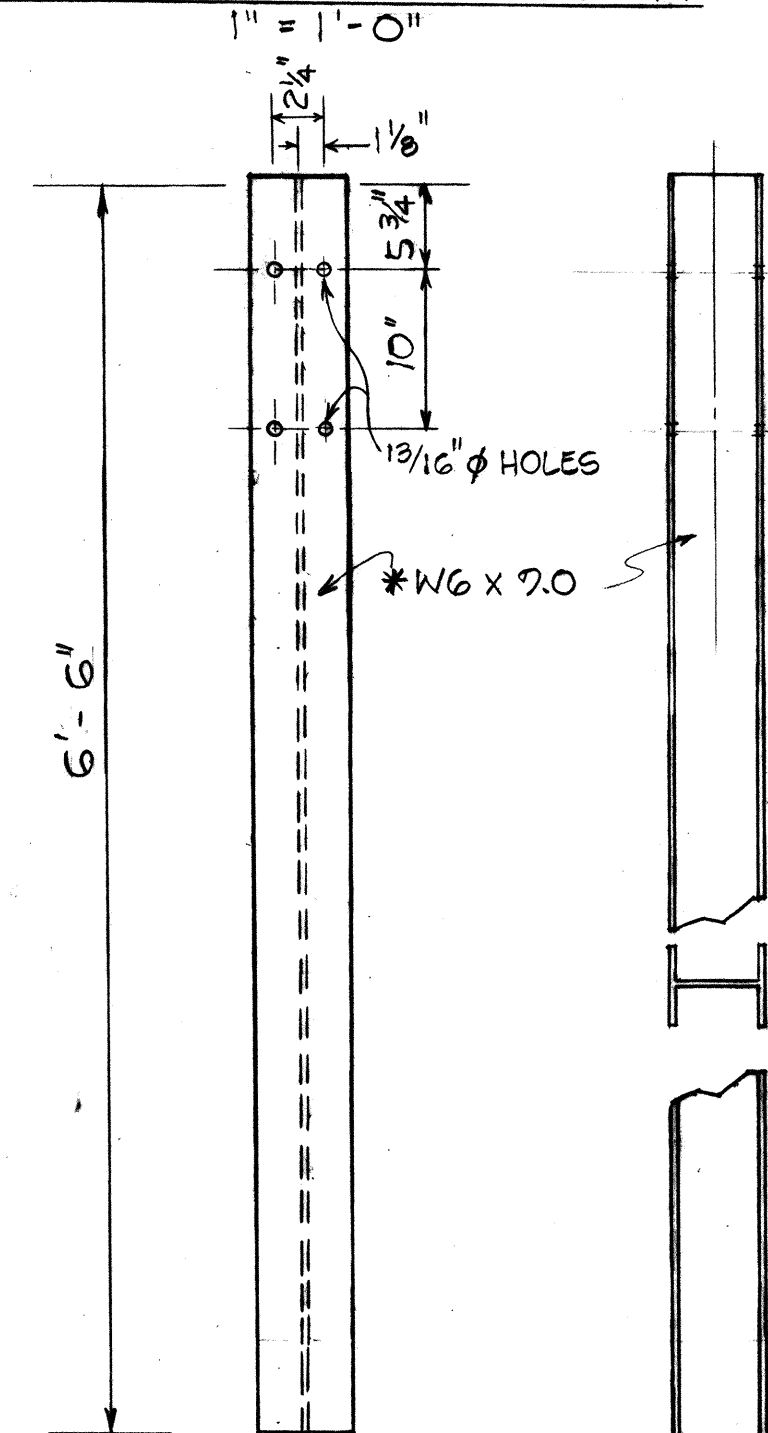
SINGLE METAL GUARD RAIL ON METAL POST W/METAL SPACER BLK.



SECTION THRU RAIL ELEMENT
Not to Scale

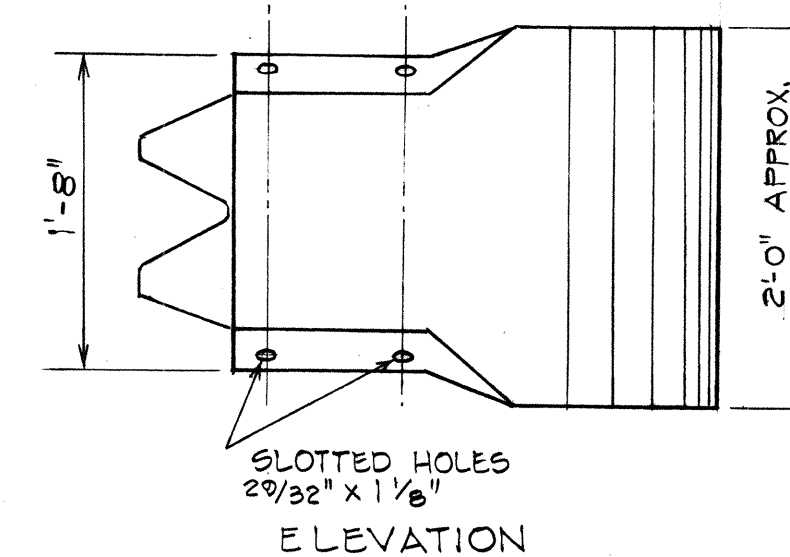
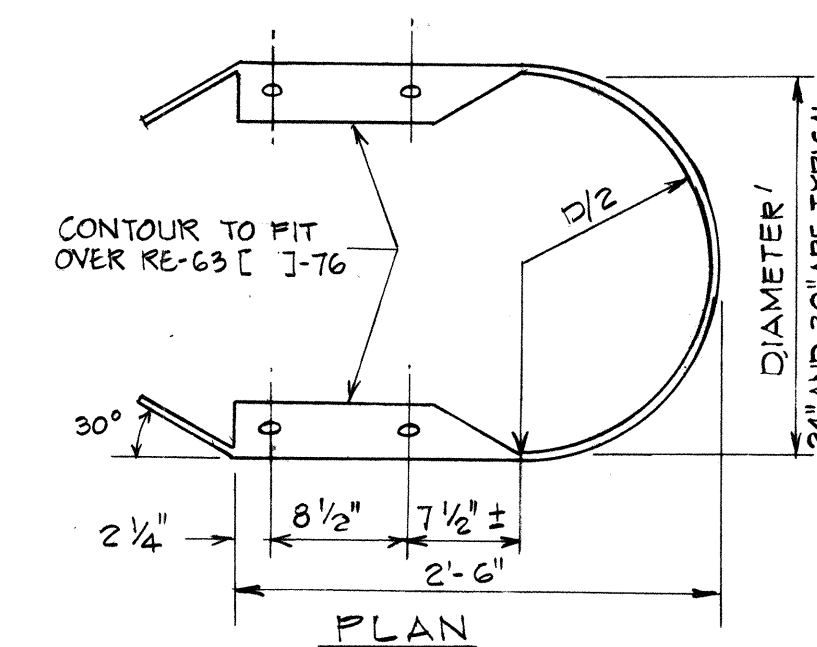
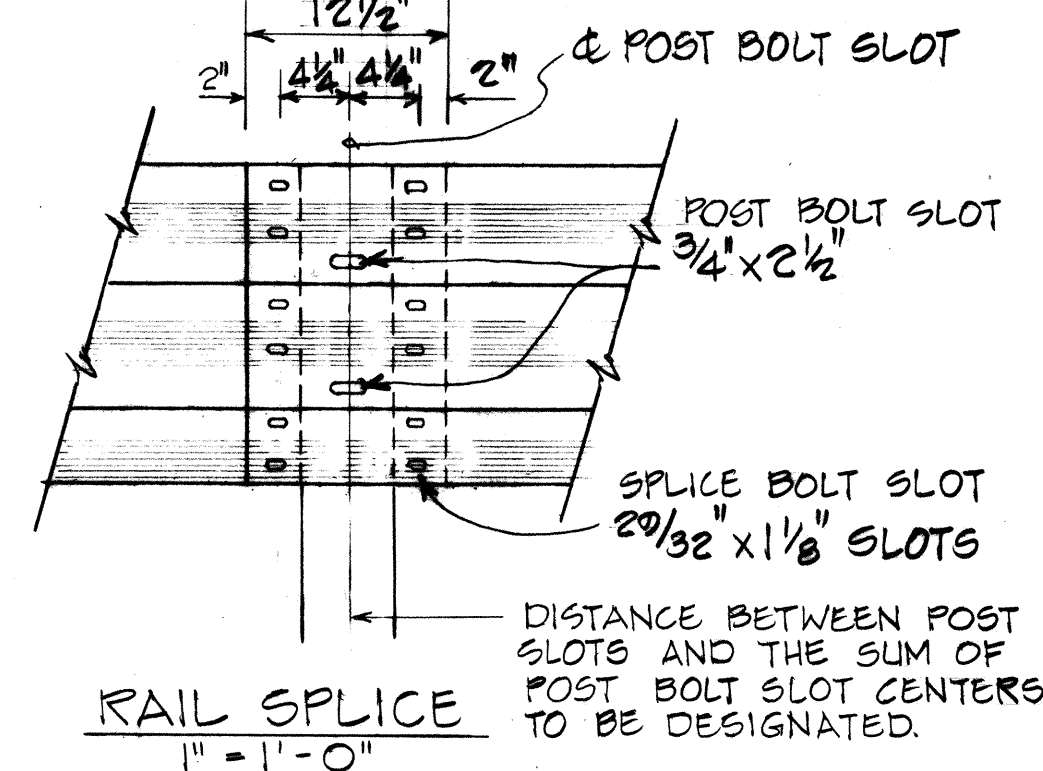


DOUBLE METAL GUARD RAIL ON METAL POST WITH METAL SPACER BLOCK

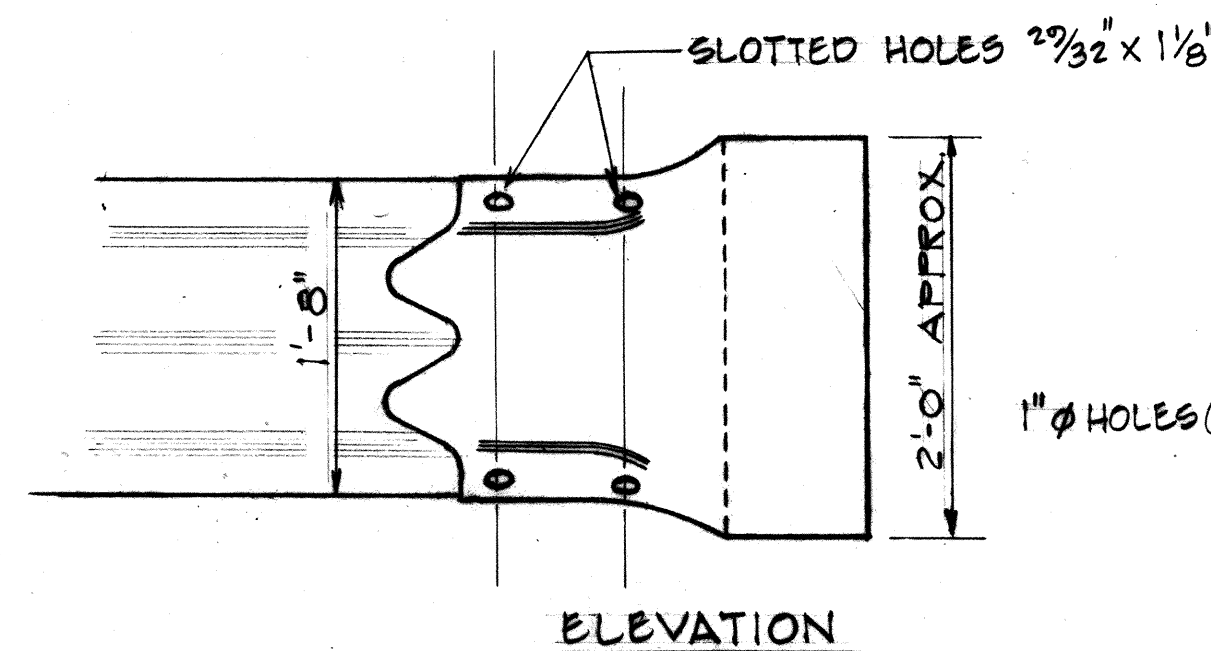
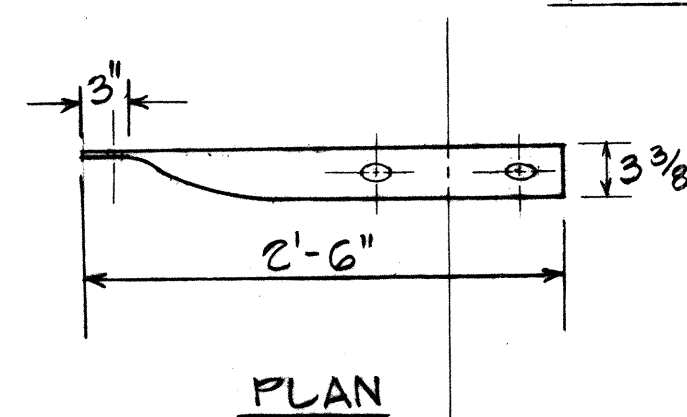


POST DETAILS
1" = 1'-0"

TRANSITION SECTION
Scale: 1" = 1'-0"

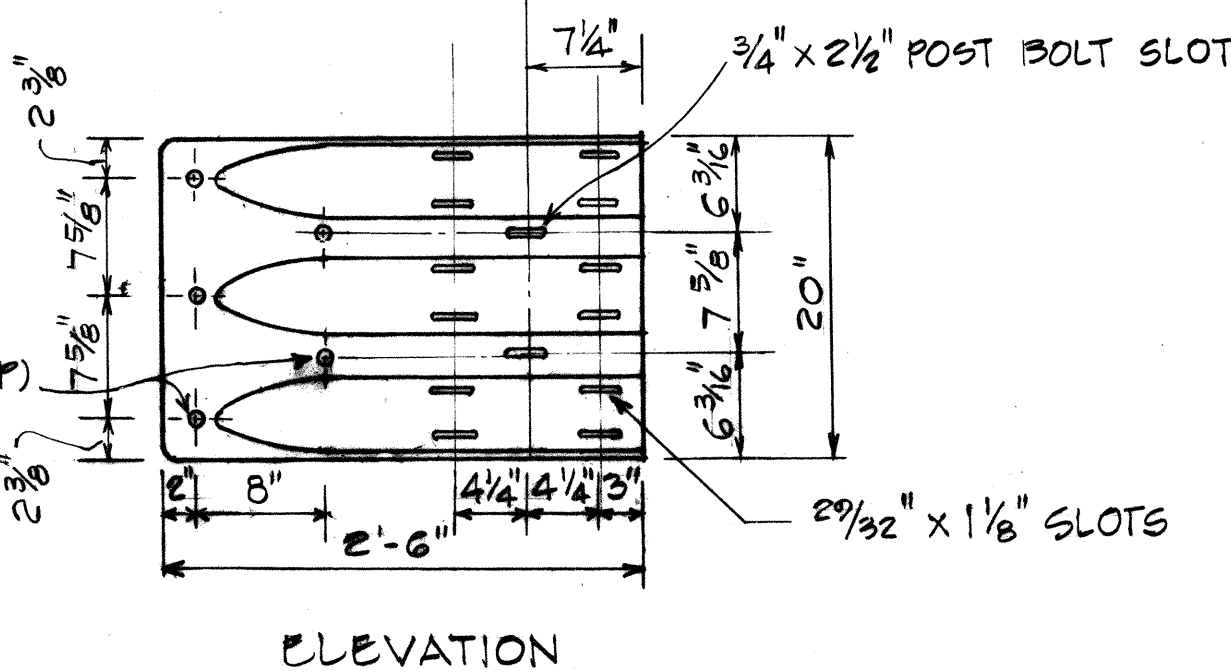


END SECTION (BUFFER)
Scale: 1" = 1'-0"

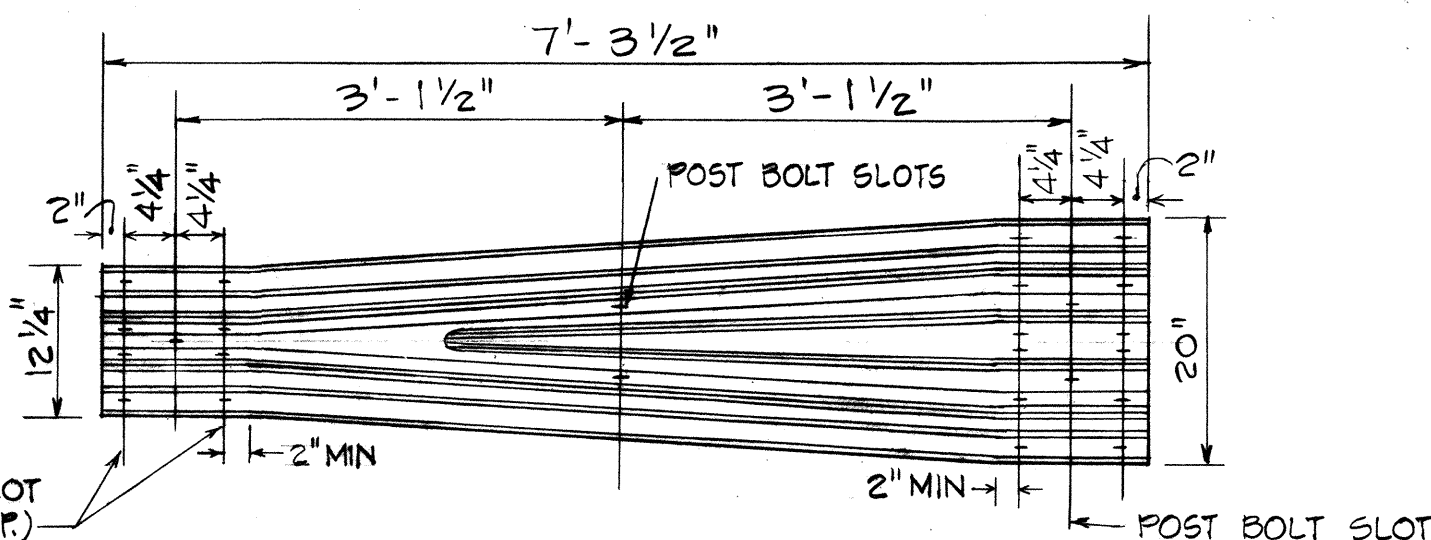


END SECTION (ROUNDED)
1" = 1'-0"

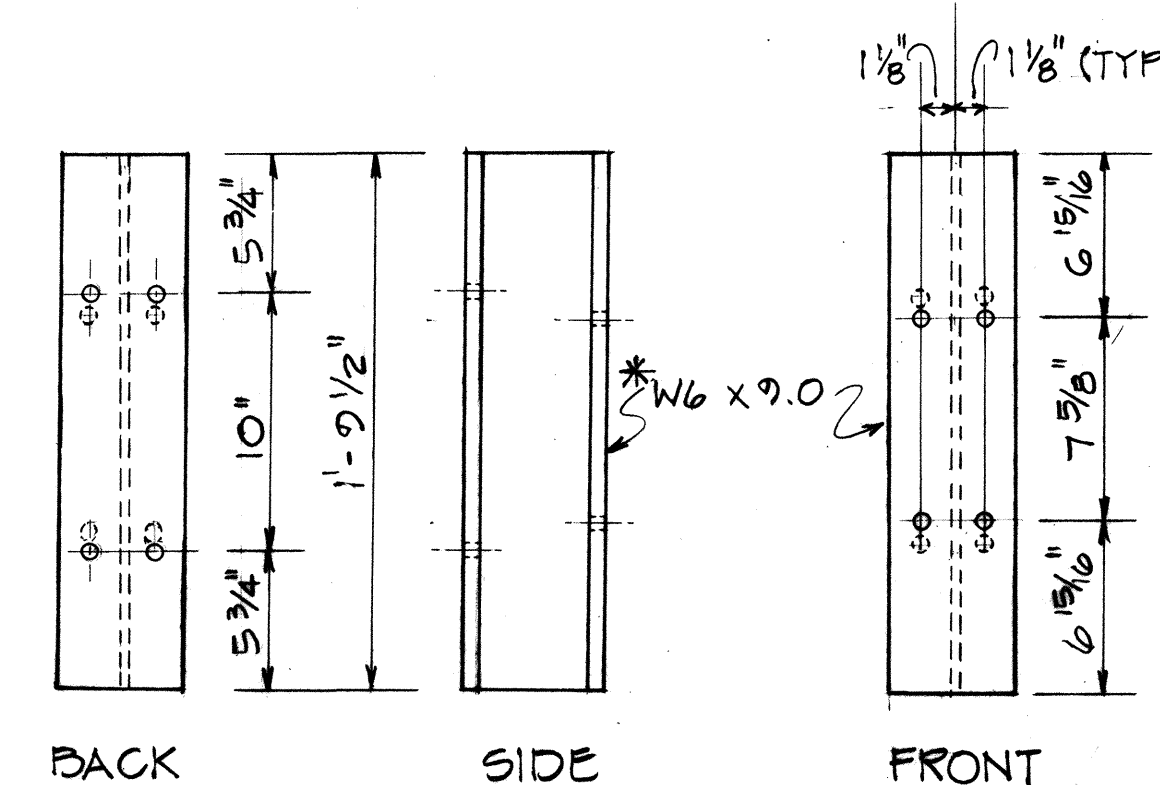
TERMINAL CONNECTOR
1" = 1'-0"



BACKUP PLATE

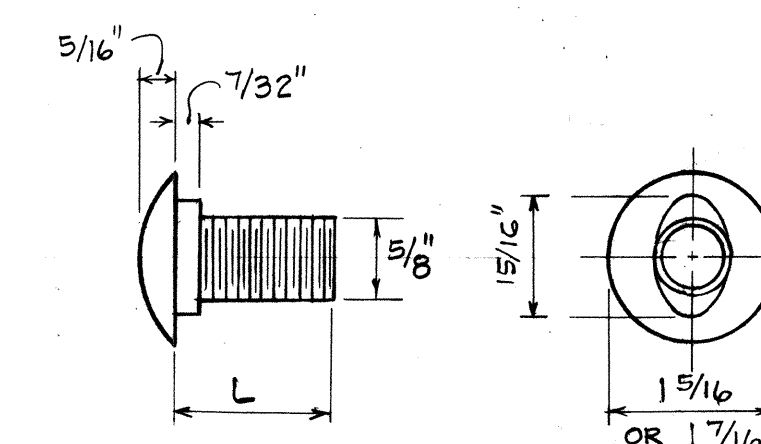
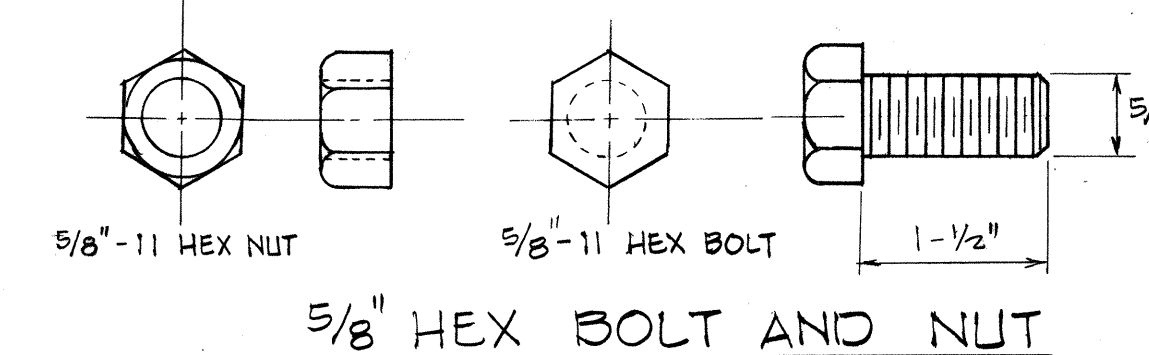
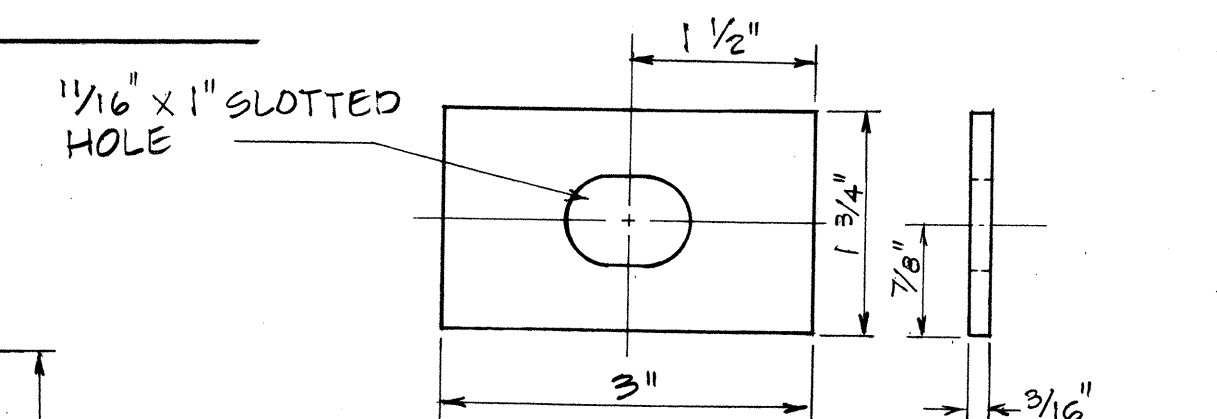


TRANSITION SECTION



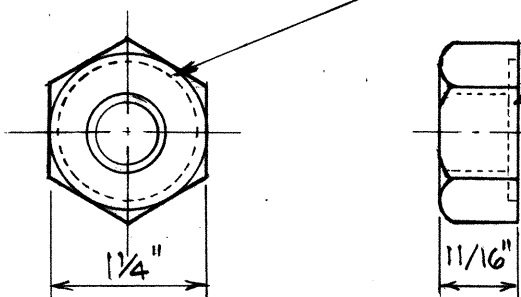
SPACER BLOCK

RECTANGULAR PLATE WASHER



L	THREAD LENGTH
1 1/4"	FULL THREAD
2"	1/2" MIN THREAD LENGTH

1" DIA. x 1/16" DEEP RECESS ONE OR BOTH SIDES



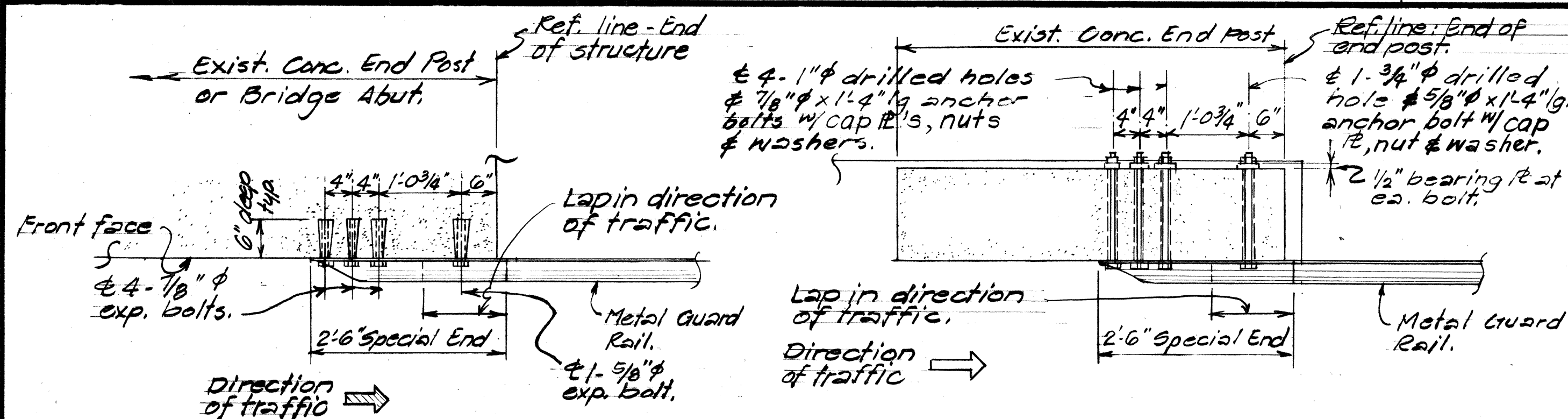
* REPLACED W6 x 8.5, WHICH IS ACCEPTABLE AS AN ALTERNATE.

STATE OF HAWAII
DEPARTMENT OF TRANSPORTATION
LAND TRANSPORTATION FACILITIES DIVISION

TYPICAL DETAIL
GUARD RAIL TYPE 3
THRE BEAM

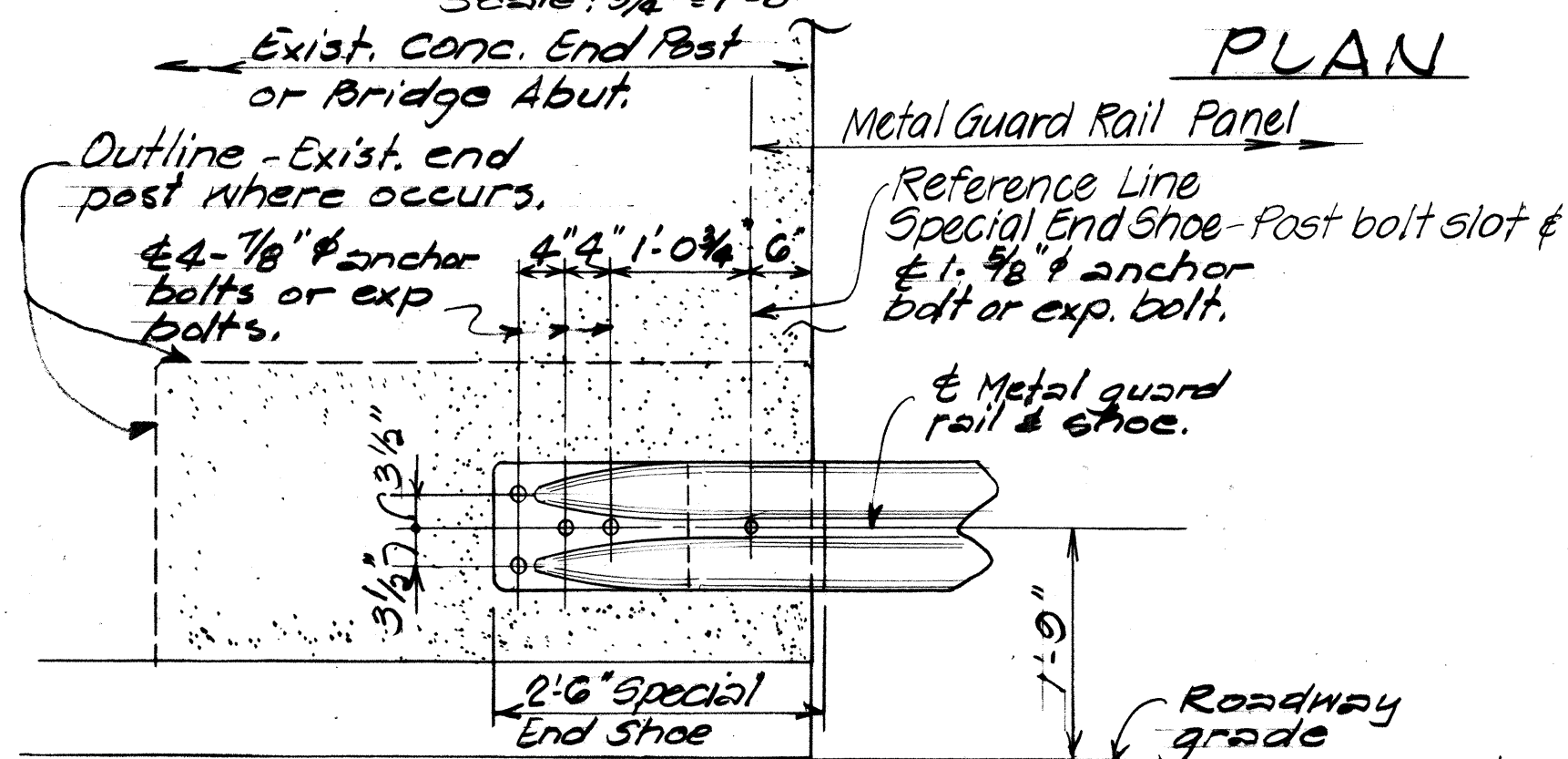
Scale: As Shown Date: April, 1980
SHEET NO. 1 OF 1 SHEETS

FED. ROAD DIST. NO.	STATE	FED. AID PROJ. NO.	FISCAL YEAR	SHEET NO.	TOTAL SHEETS
HAWAII	HAW.	IR-HI-1(197)	1986	14	38



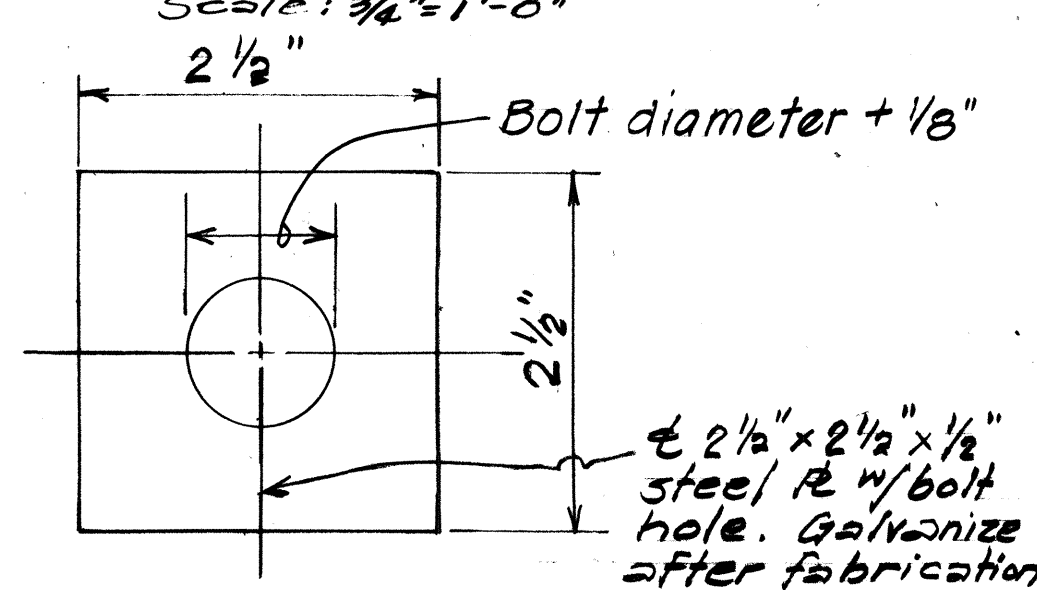
TYPE "X" CONNECTION DETAIL

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



TYPE "Y" CONNECTION DETAIL

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

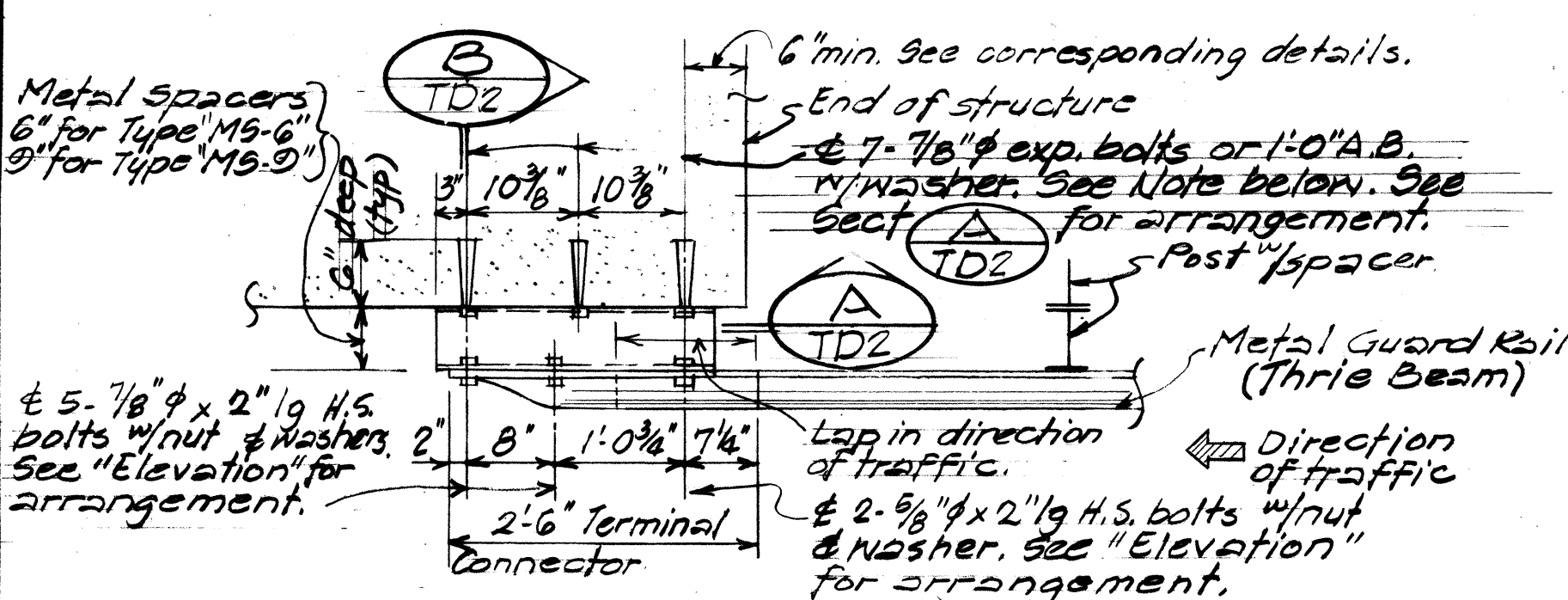


CAP IR DETAIL

No scale

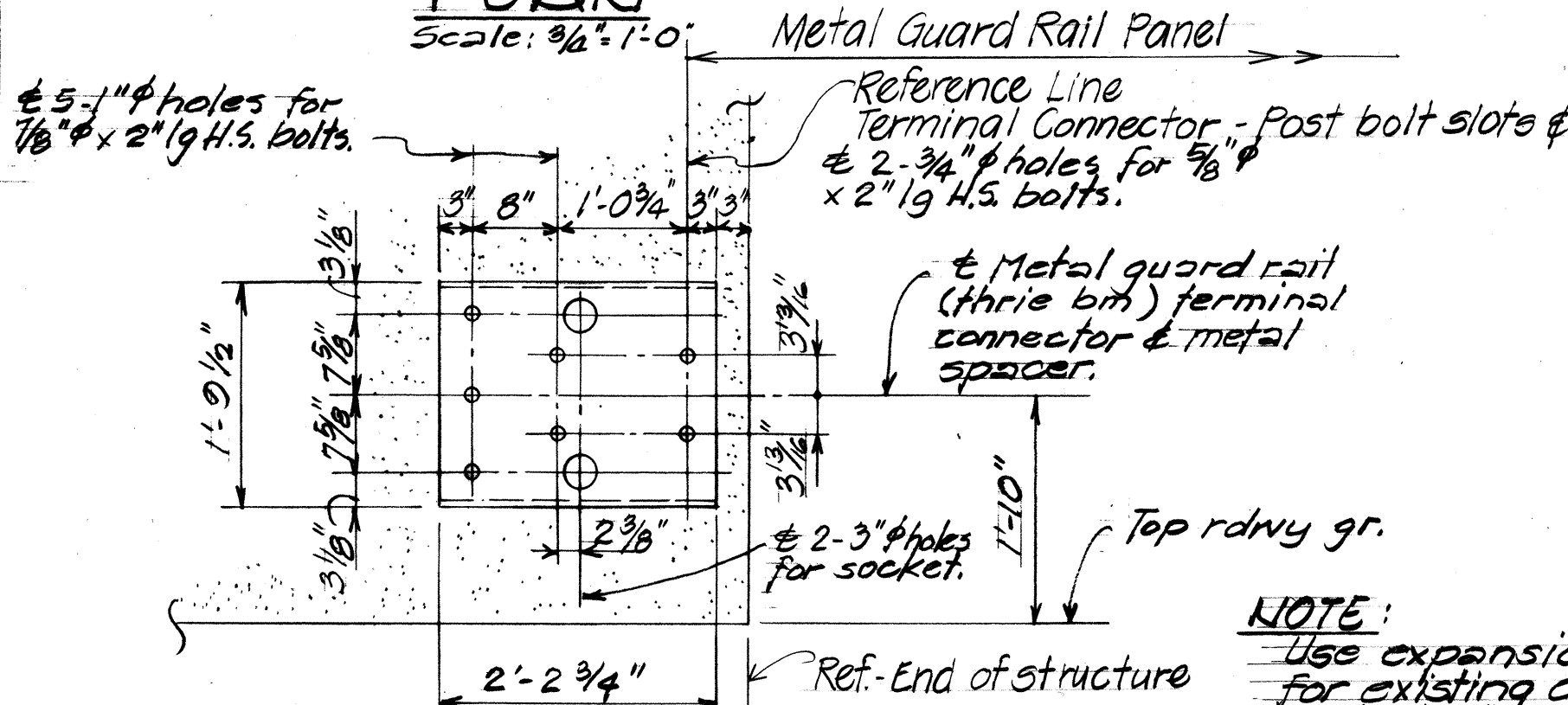
TYPICAL ELEVATION

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



PLAN

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



ELEVATION

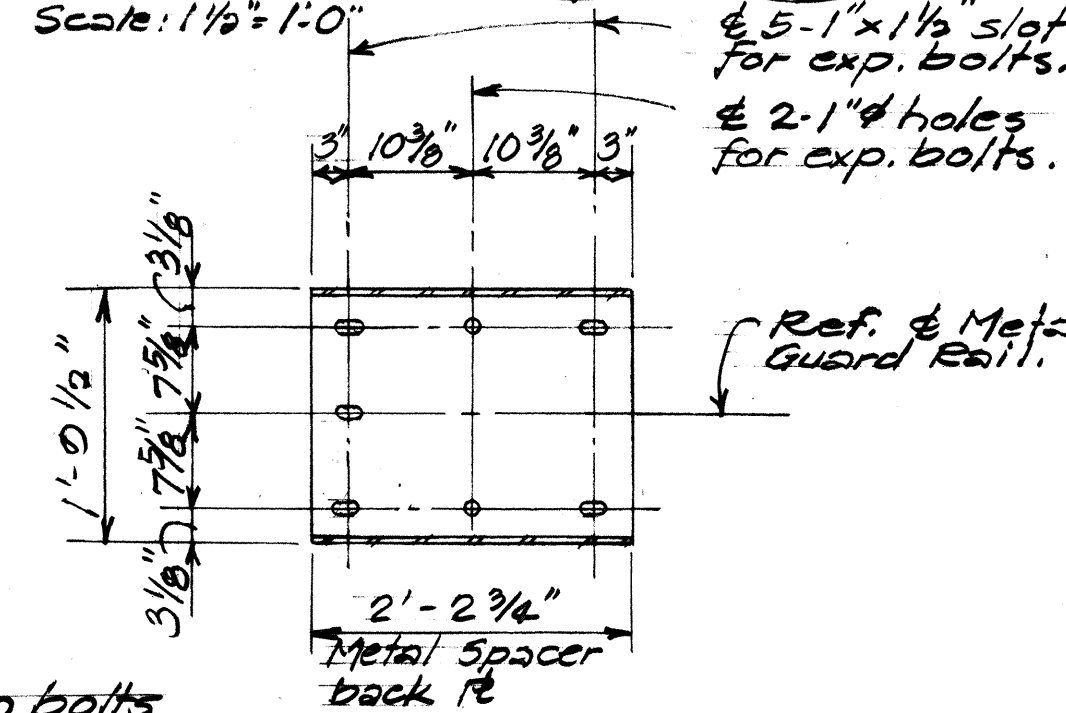
Scale: 3/4" = 1'-0"

TYPICAL TYPE "MS-6" & "MS-9" CONNECTION DETAIL

NOTE:
Use expansion bolts for existing concrete end blocks & 1'-0" long anchor bolts for new concrete end blocks.

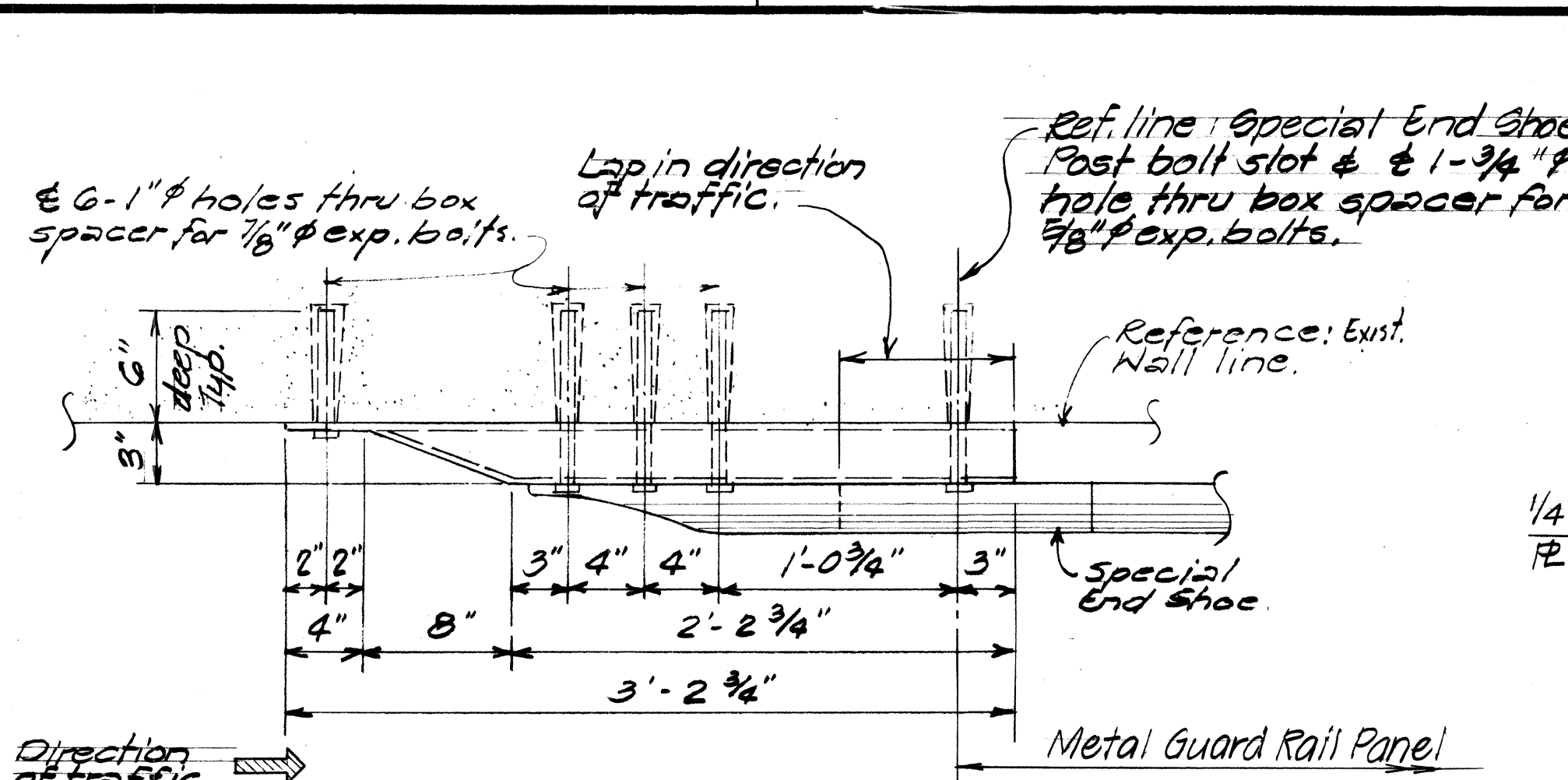
SECTION

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



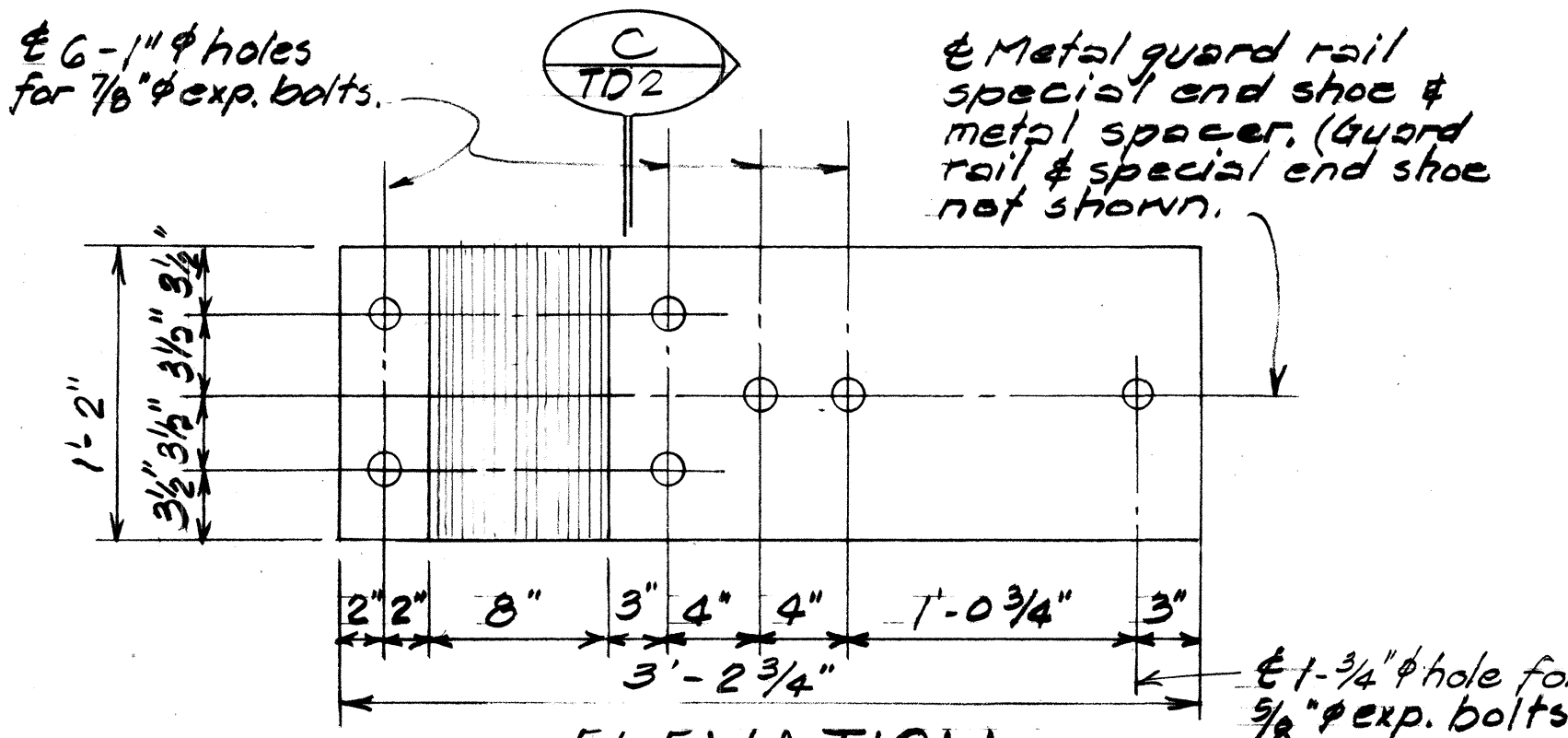
SECTION

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



PLAN

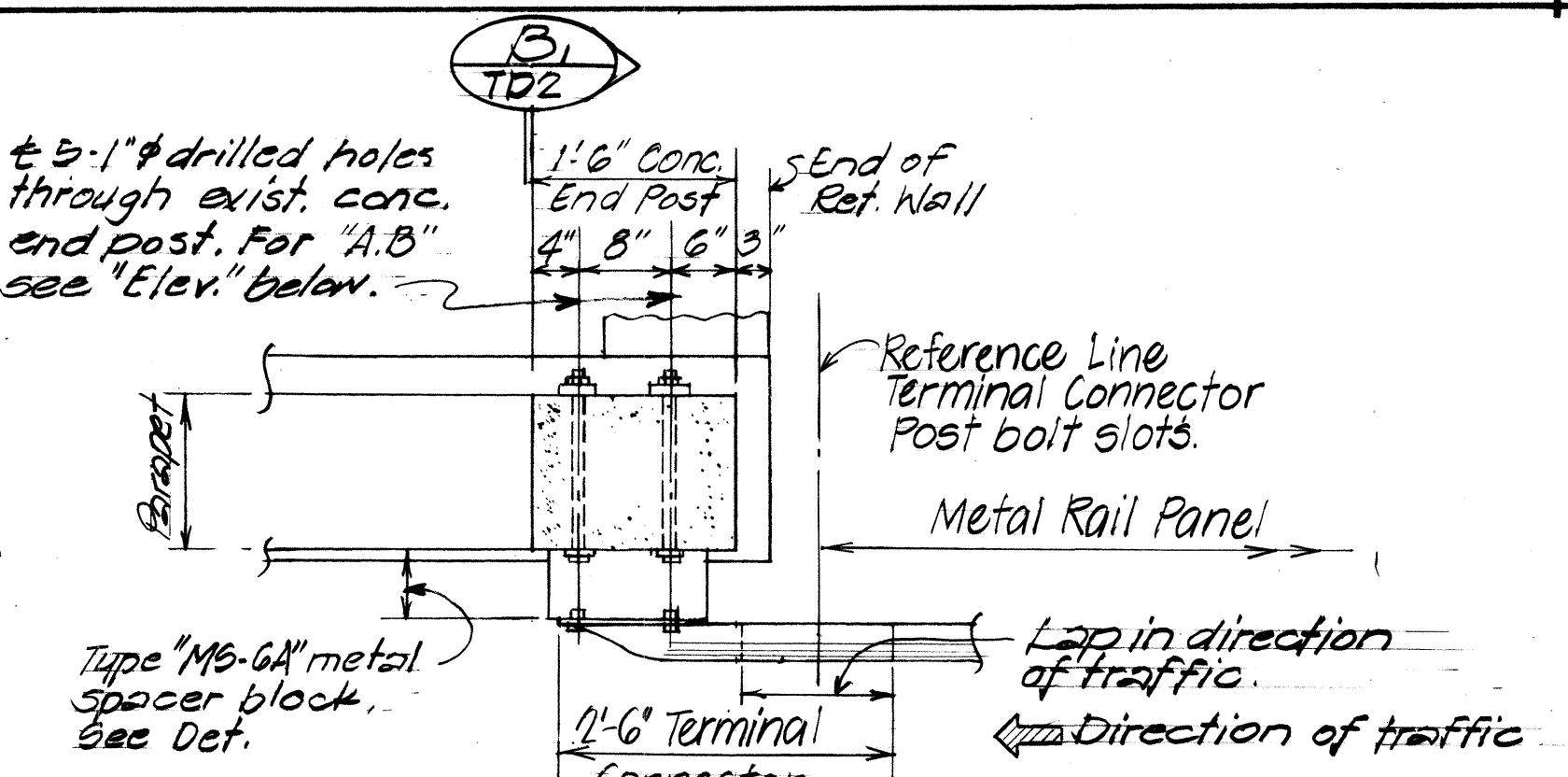
Scale: 1 1/2" = 1'-0"



ELEVATION

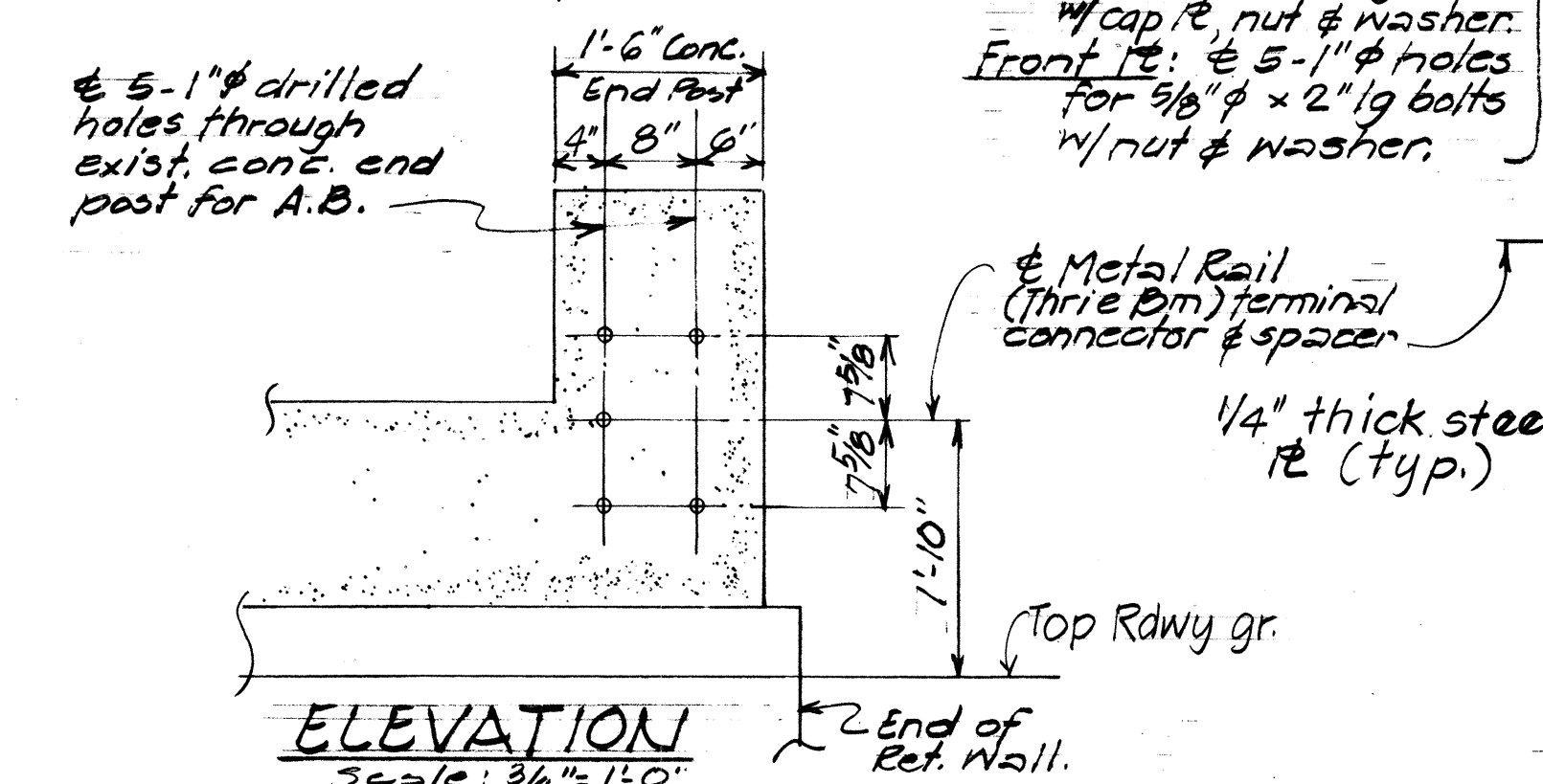
Scale: 1 1/2" = 1'-0"

TYPICAL TYPE "MS-3" CONNECTION DETAIL



PLAN

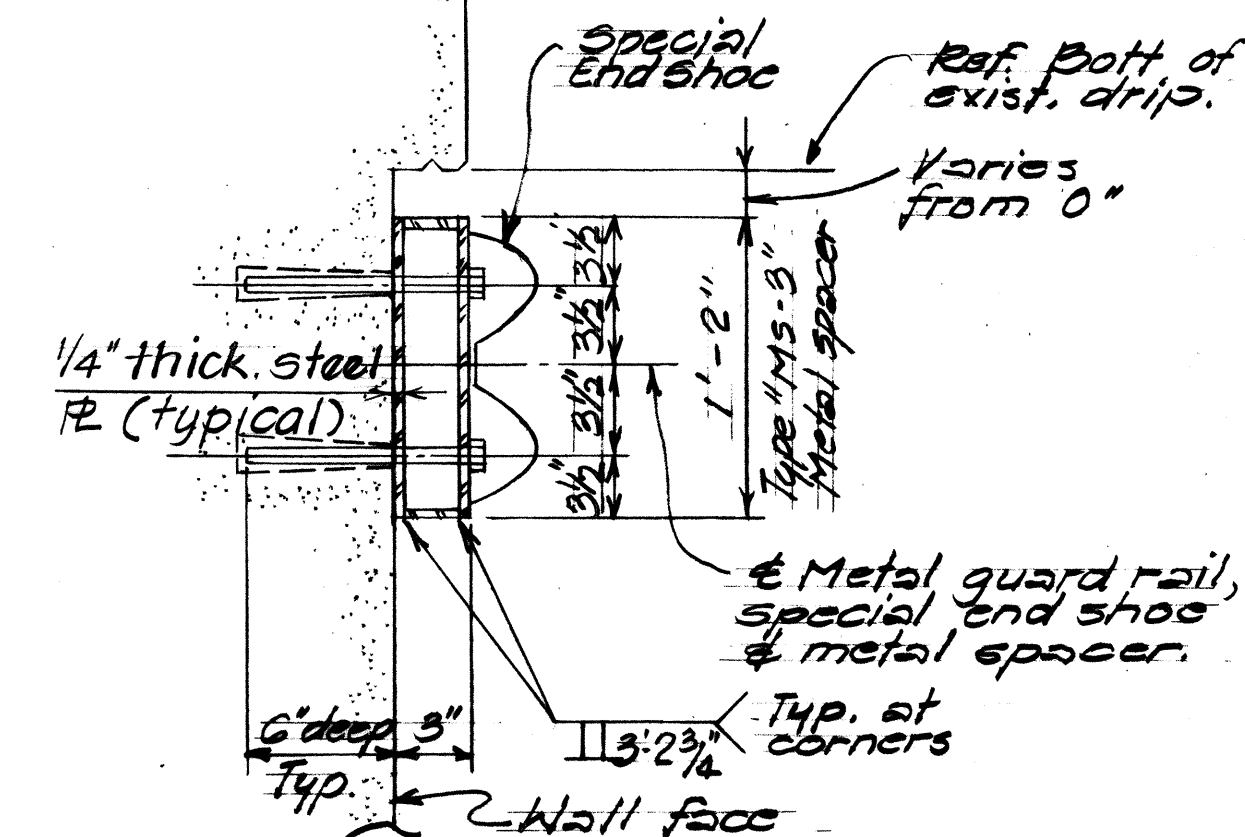
Scale: 3/4" = 1'-0"



ELEVATION

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

TYPICAL TYPE "MS-6A" CONNECTION DETAIL



SECTION

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

GENERAL NOTES

1. All metal box spacers, anchor bolts & accessories involved in the connection details shall be incidental to the respective connections and will not be paid for separately.
2. Anchor bolt length given under bolt head.
3. Special end shoe, structural steel shapes, plates, metal supports, and all anchor bolts, nuts and washers shall be hot dip galvanized after fabrication.
4. All welding shall conform to the latest Specifications for Welded Highway and Railway Bridge Design Construction and Repair of the American Welding Society.

STATE OF HAWAII
DEPARTMENT OF TRANSPORTATION
LAND TRANSPORTATION FACILITIES DIVISION

TYPICAL DETAILS

GUARD RAIL CONNECTION DETAILS

Interstate Route H-1

Safety Improvements

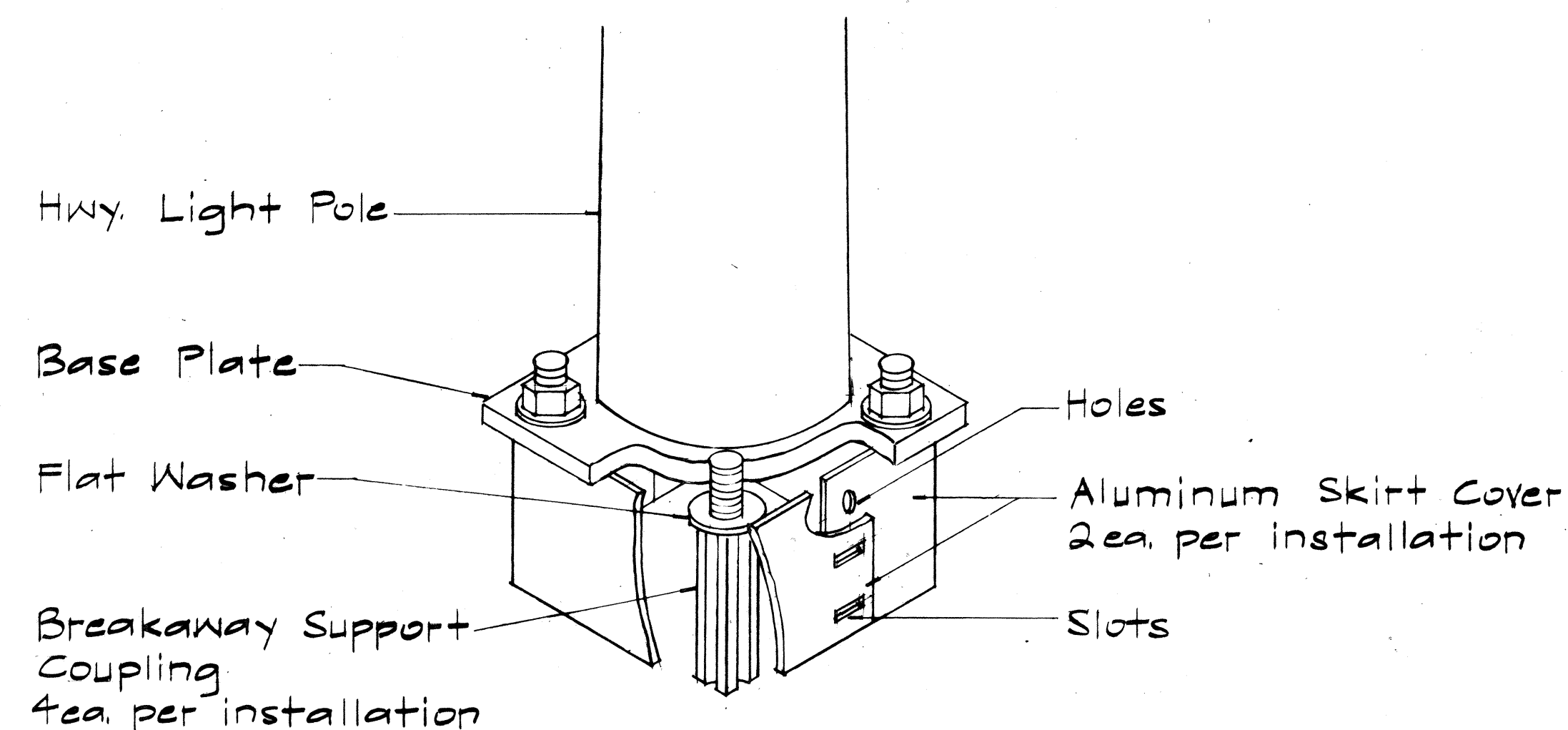
Koko Head Ave. to Waiialae Viaduct

FAI Proj. No. IR-HI-1(197)

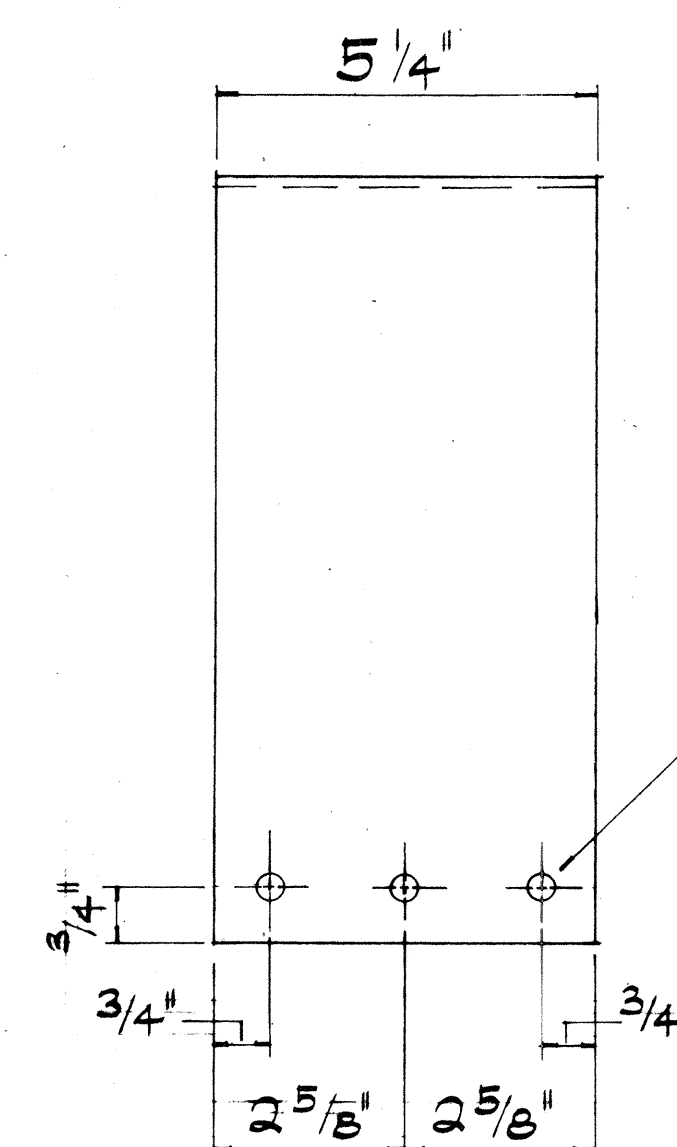
Scale: As Shown Date: Sept. 1983

SHEET No. OF SHEETS

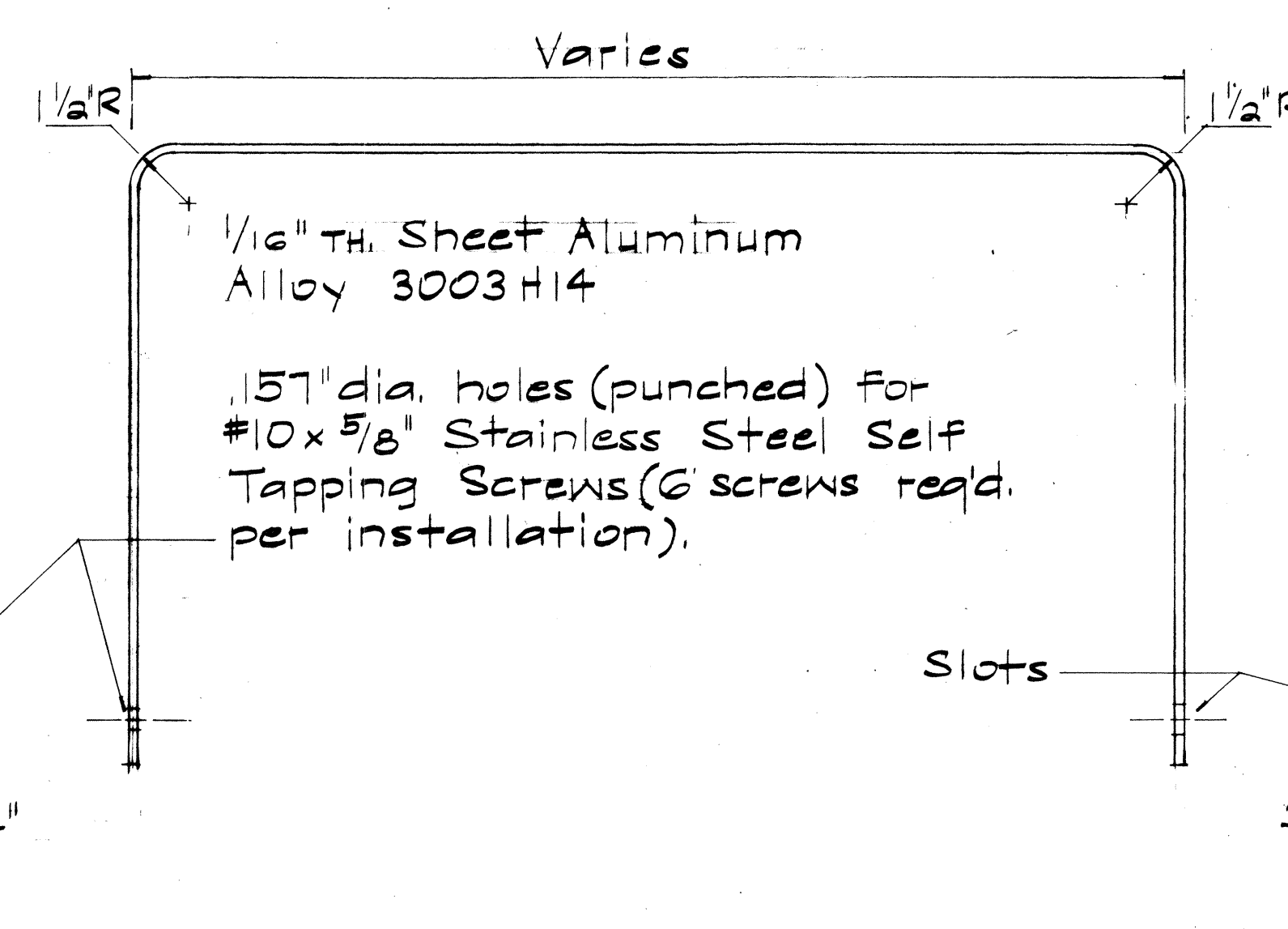
FED. ROAD DIST. NO.	STATE	FED. AID PROJ. NO.	ISCAL YEAR	SHEET NO.	TOTAL SHEETS
HAWAII	HAW.	IR-HI-1(197)	1986	15	38



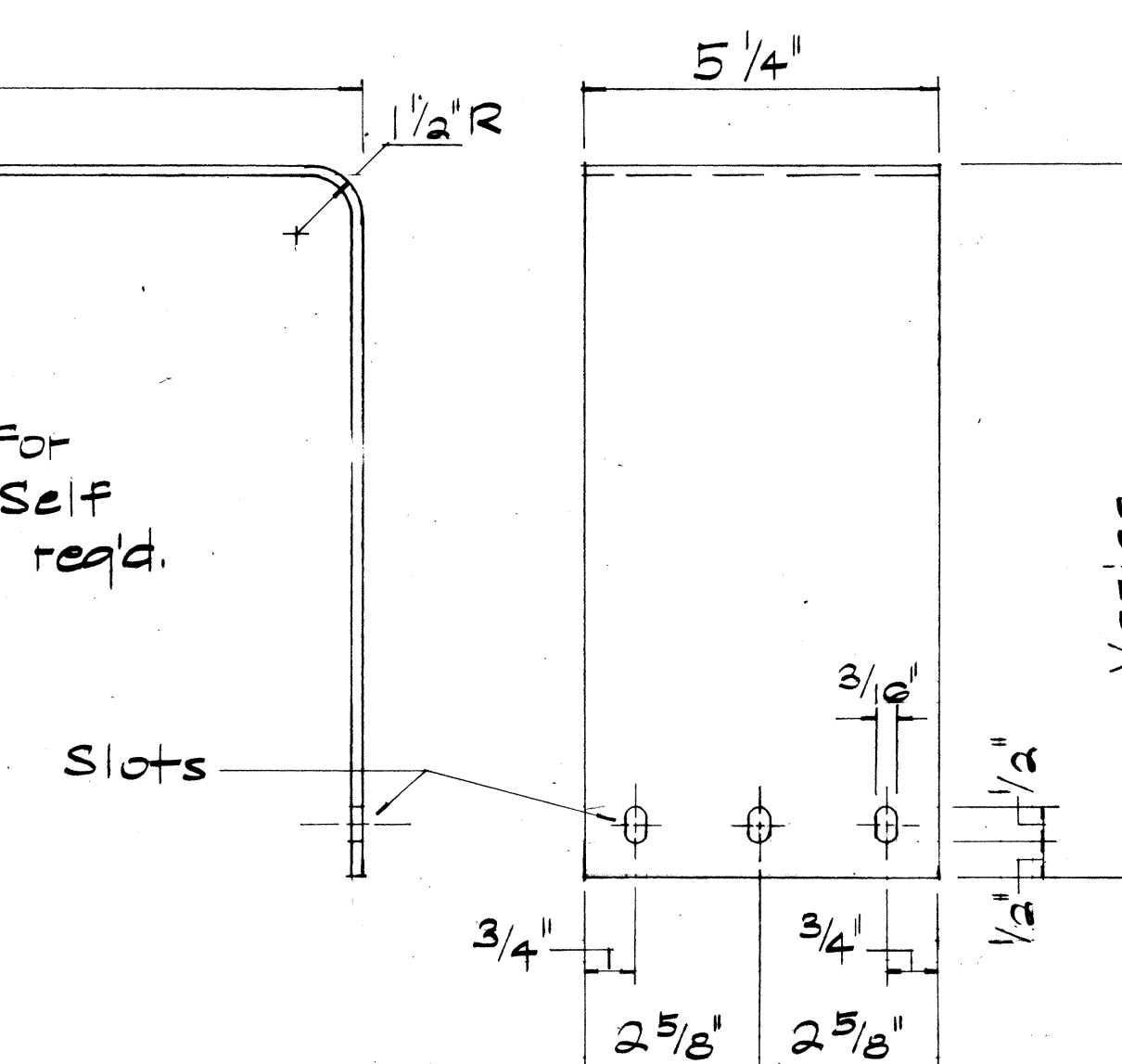
SKIRT COVER DETAIL



LEFT SIDE VIEW



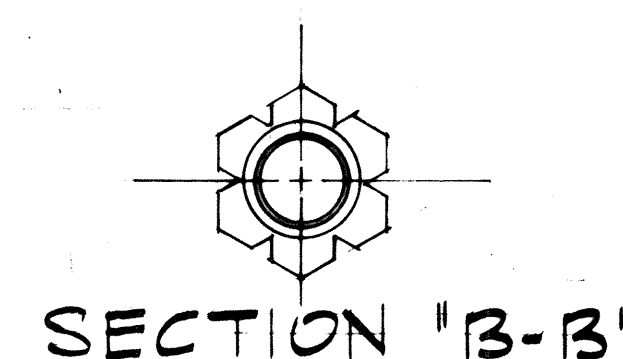
TOP VIEW



RIGHT SIDE VIEW

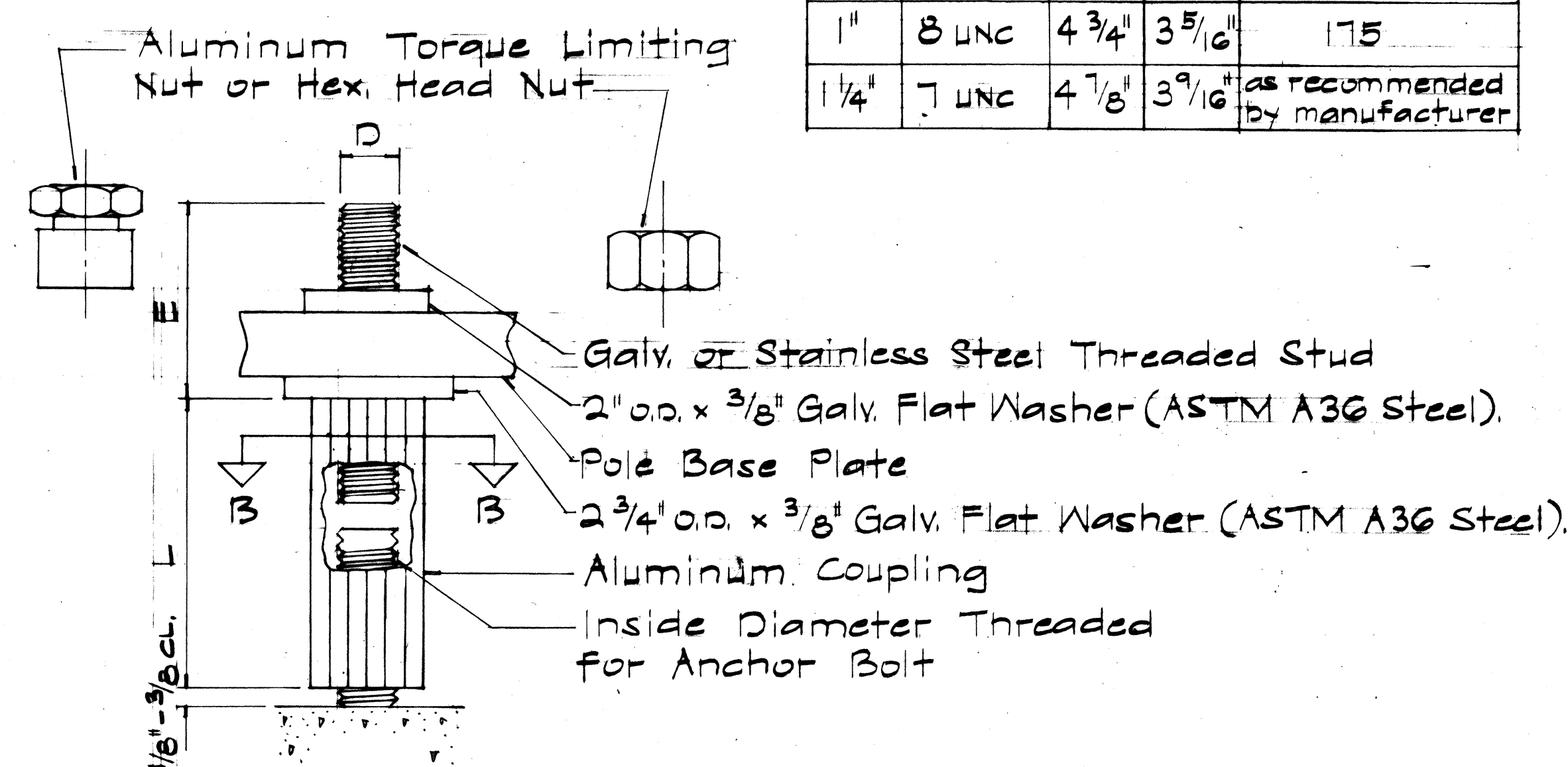
SKIRT COVER FOR BREAKAWAY SUPPORT COUPLING

Not to Scale

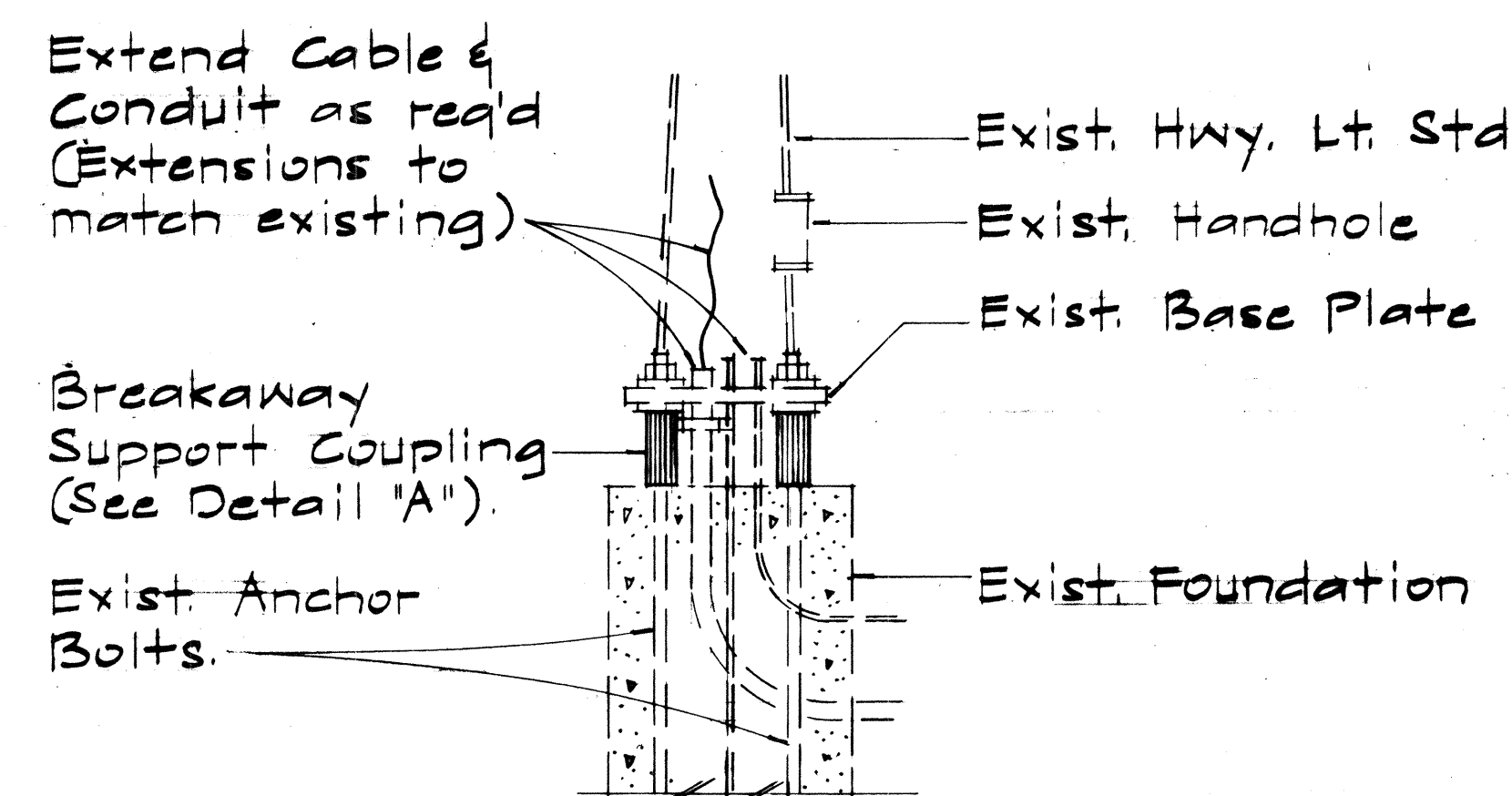


SECTION "B-B"

D	THREAD	L	E	NUT TORQUE ± 25 FT. LBS.
1"	8 UNC	4 3/4"	3 5/16"	175
1 1/4"	7 UNC	4 7/8"	3 9/16"	as recommended by manufacturer



DETAIL "A"
Not to Scale



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

BREAKAWAY SUPPORT COUPLING

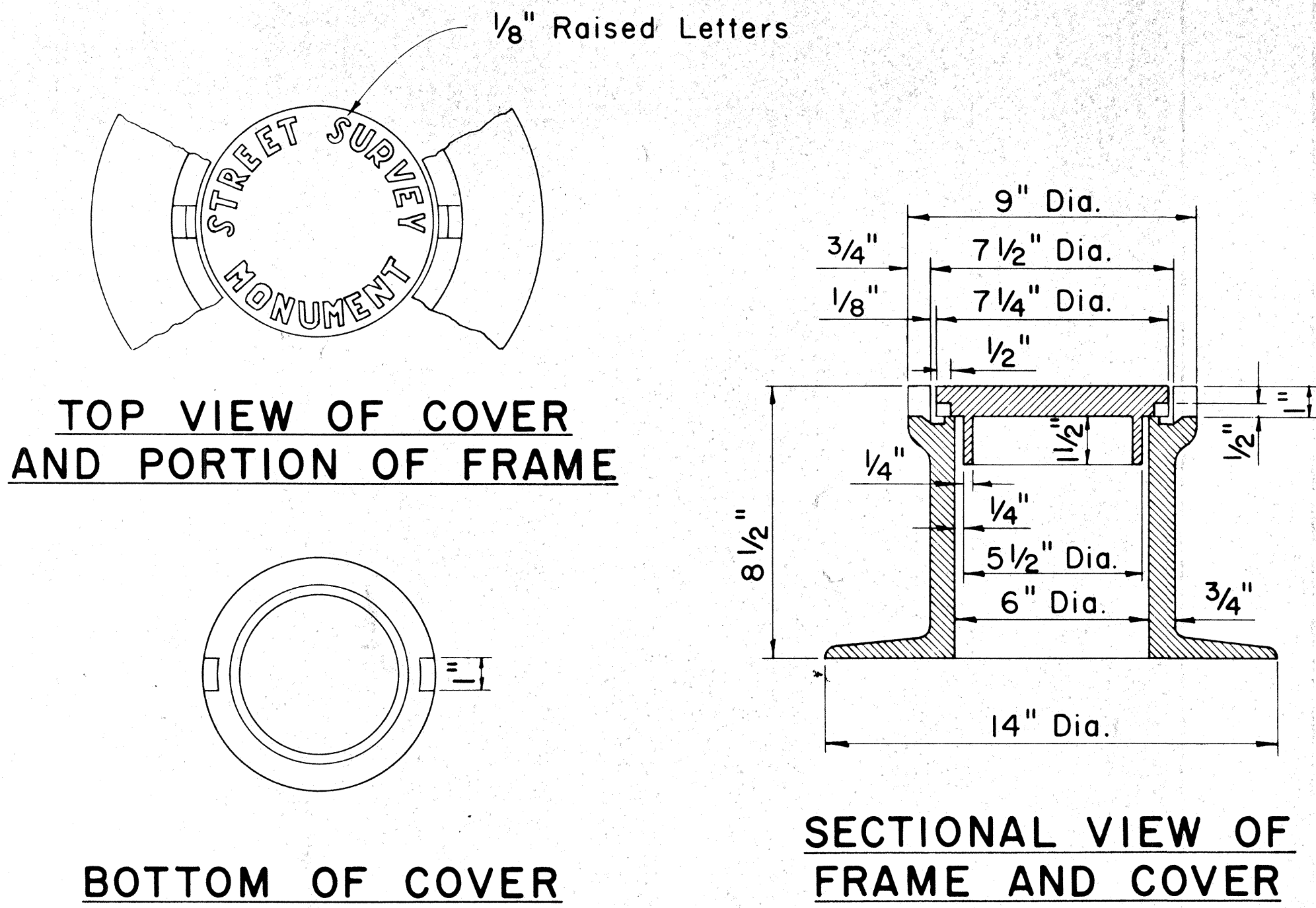
Scale: As Shown

GENERAL NOTES:

- Contractor shall verify size of exist. anchor bolts & base plates prior to ordering couplings & skirt covers.
- Breakaway support coupling shall conform to the applicable requirements of AASHTO standards & shall be fabricated from either die cast aluminum alloy 380 according to ASTM B85, or extruded from alloy 2024-T8511 according to ASTM B221.
- Hex. nut shall meet the requirements of ASTM A563 grade A, and ANSI B18.2.2.
- Torque nut shall be fabricated from aluminum alloy and grooved to separate at the specified torque.
- Threaded stud shall meet the requirements of ASTM A 675 grade 90 or AISI stainless steel.

STATE OF HAWAII
DEPARTMENT OF TRANSPORTATION
LAND TRANSPORTATION FACILITIES DIVISION
TYPICAL DETAILS
BREAKAWAY SUPPORT
COUPLING & SKIRT COVER
INTERSTATE ROUTE H-1
SAFETY IMPROVEMENTS
F.A.I. PROJECT NO. IR-HI-1(197)
Scale: As Shown Date: July, 1985
SHEET NO. 15 OF 38 SHEETS

FED. ROAD DIST. NO.	STATE	FED. AID PROJ. NO.	FISCAL YEAR	SHEET NO.	TOTAL SHEETS
HAWAII	HAW.	IR-HI-1 (197)	1986	16	38

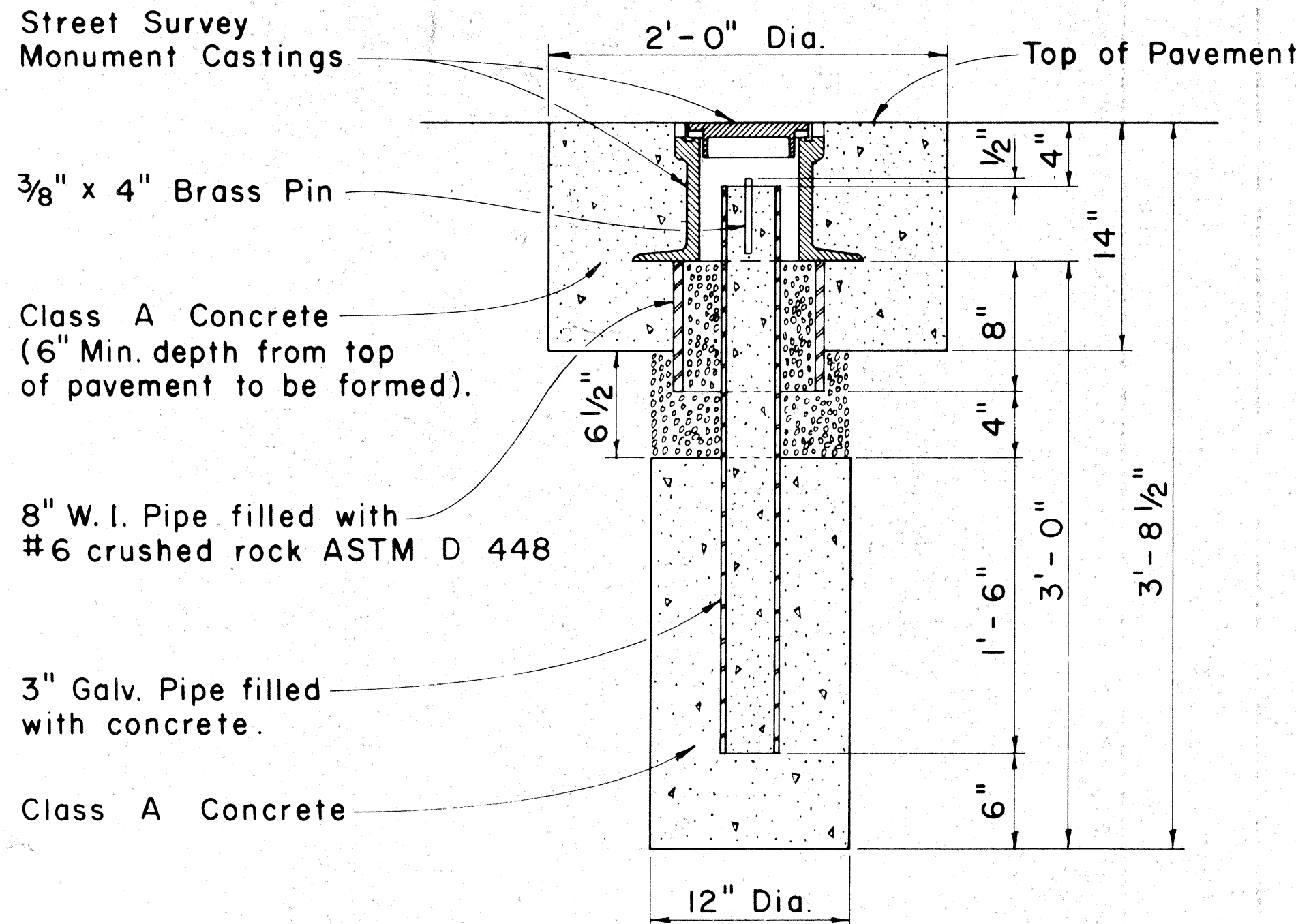
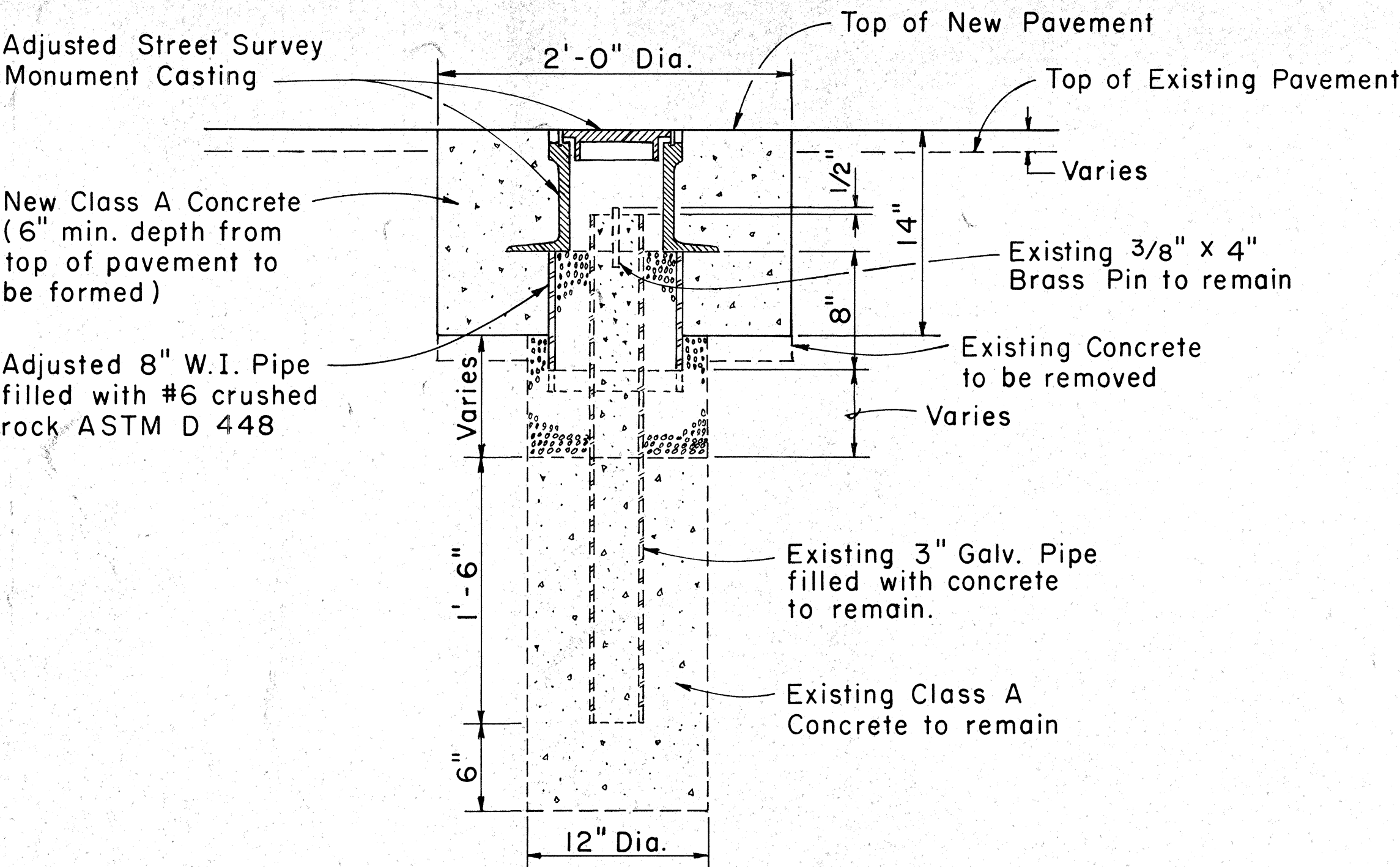


STREET SURVEY MONUMENT CASTINGS

Scale: 3" = 1'-0"

DETAILS FOR ADJUSTED STREET SURVEY MONUMENT

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



NOTE:

Where the excavation extends into solid rock the depth may be decreased if approved by the Engineer.

STREET SURVEY MONUMENT

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

APPROVAL RECOMMENDED:

M. Hirozawa 12-4-69
HIGHWAY DESIGN ENGINEER DATE

APPROVED:

W. J. S. S. S. 12-10-69
ASSISTANT CHIEF, ENGINEERING DATE

NO.	REVISION	APPROVED BY	DATE
1	Deleted "Detail For Centerline & Reference Survey Monument," added "Detail For Adjusted Street Survey Monument" and deleted "C & C" inscription on Cover.	<i>[Signature]</i>	6-22-83

STATE OF HAWAII
DEPARTMENT OF TRANSPORTATION
HIGHWAYS DIVISION

STANDARD DETAILS
STREET SURVEY MONUMENT

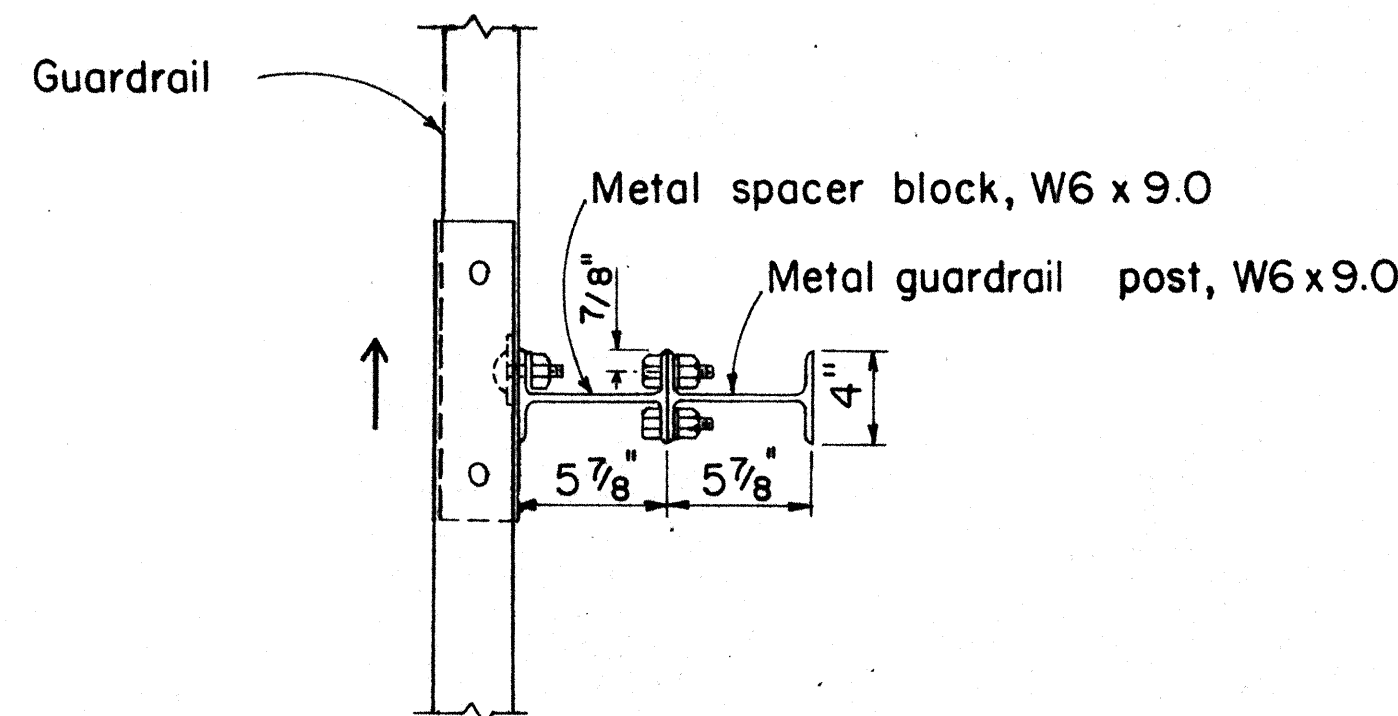
SCALE: AS SHOWN
SHEET No. 16 OF 38 SHEETS DD 614.1

DATE	DESIGNED BY	CHECKED BY
PLN	DESIGNED BY	CHECKED BY
NOTE BOOK	DESIGNED BY	CHECKED BY
No.	DESIGNED BY	CHECKED BY

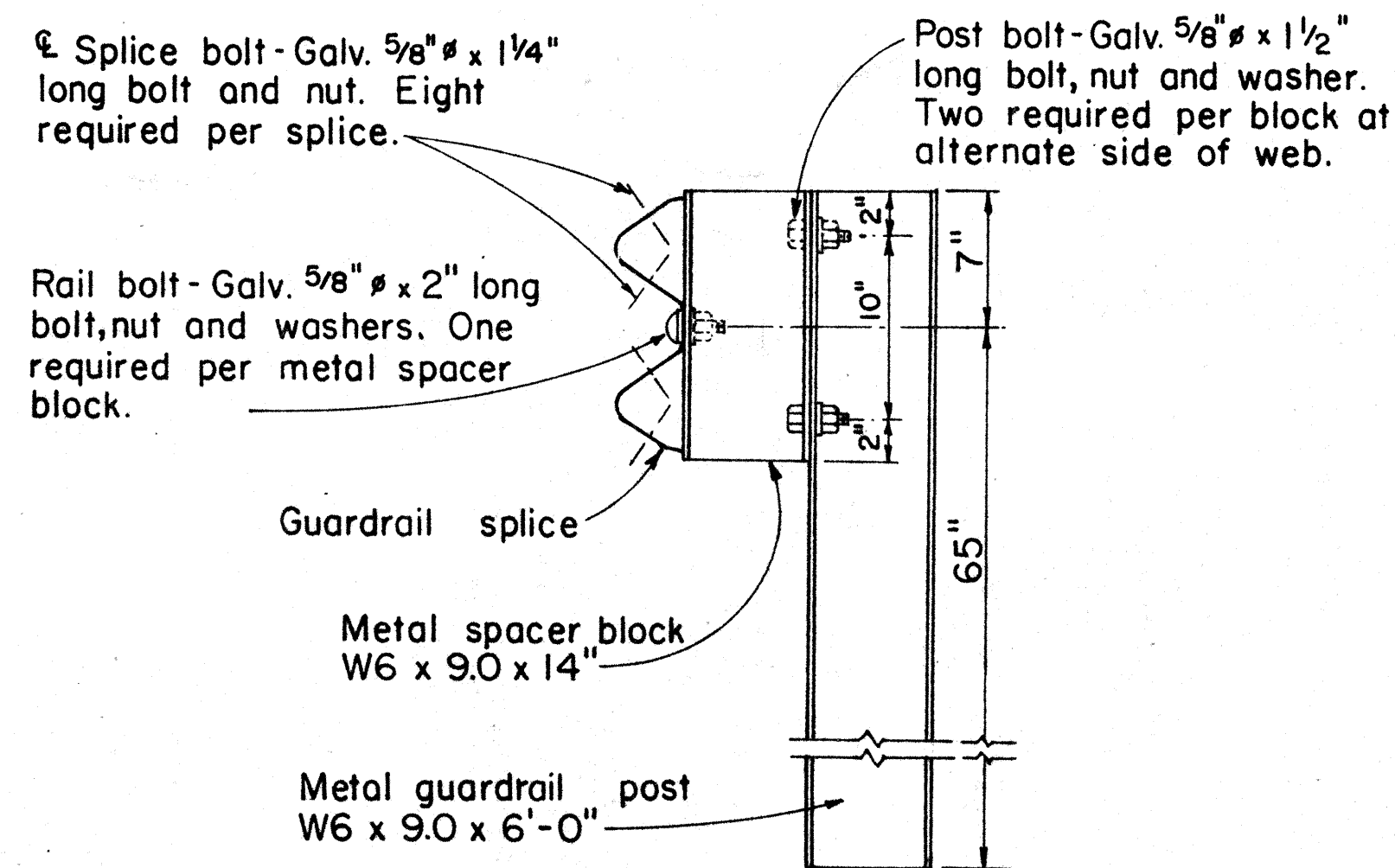
FED. ROAD DIST. NO.	STATE	FED. AID PROJ. NO.	FISCAL YEAR	SHEET NO.	TOTAL SHEETS
HAWAII	HAW.	IR-HI-1(197)	1986	17	38

GENERAL NOTES

- Both of the alternate type posts may be used on any one project however, only one type of post shall be used in any single run of guardrail.
- All hardware, posts and blocks shall be galvanized. No punching, drilling or cutting will be permitted after galvanizing.
- Connection details for bent plate post and block shall be similar to the details shown for structural shape post, and block.
- Where conditions require, special post lengths in increments of 6 inches may be specified.
- For details of rail elements, bolts and nuts, see sheet DT 501.
- All fasteners, posts, blocks and rail elements shall conform to the latest edition and amendments of "A Guide to Standardized Highway Barrier Rail Hardware," a report prepared and approved by the AASHTO-AGC-ARTBA Joint Cooperative Committee.



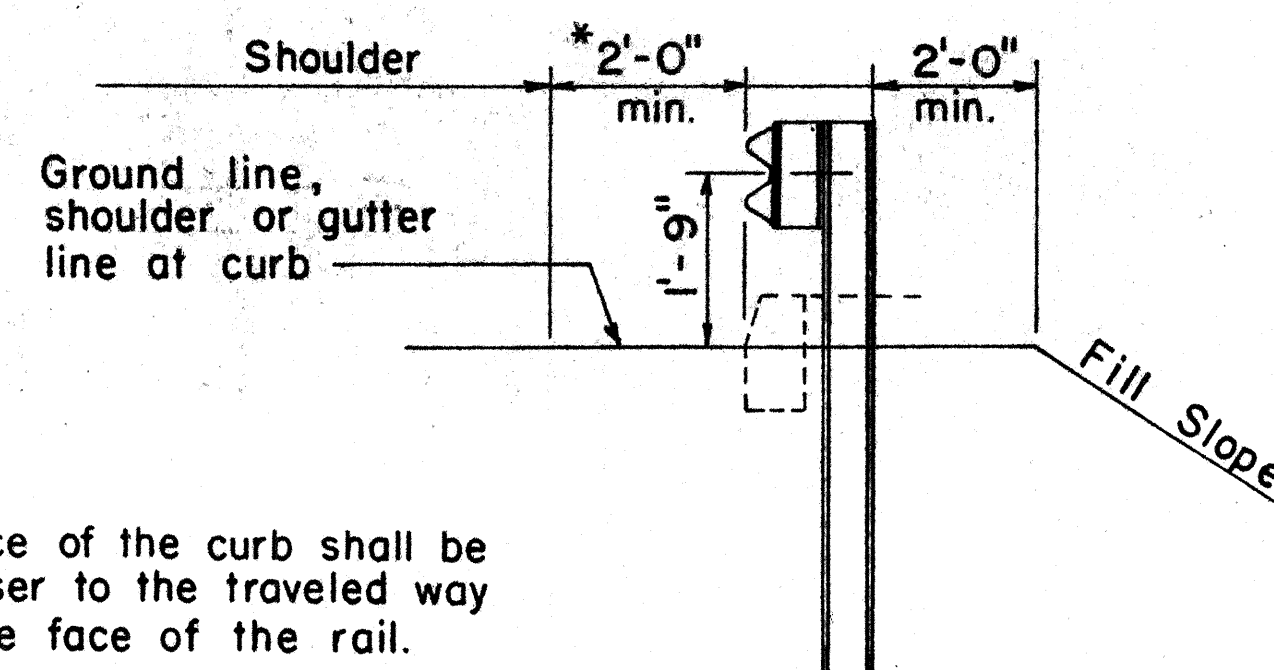
PLAN



ELEVATION

SINGLE METAL GUARDRAIL ON METAL POST WITH METAL SPACER BLOCK

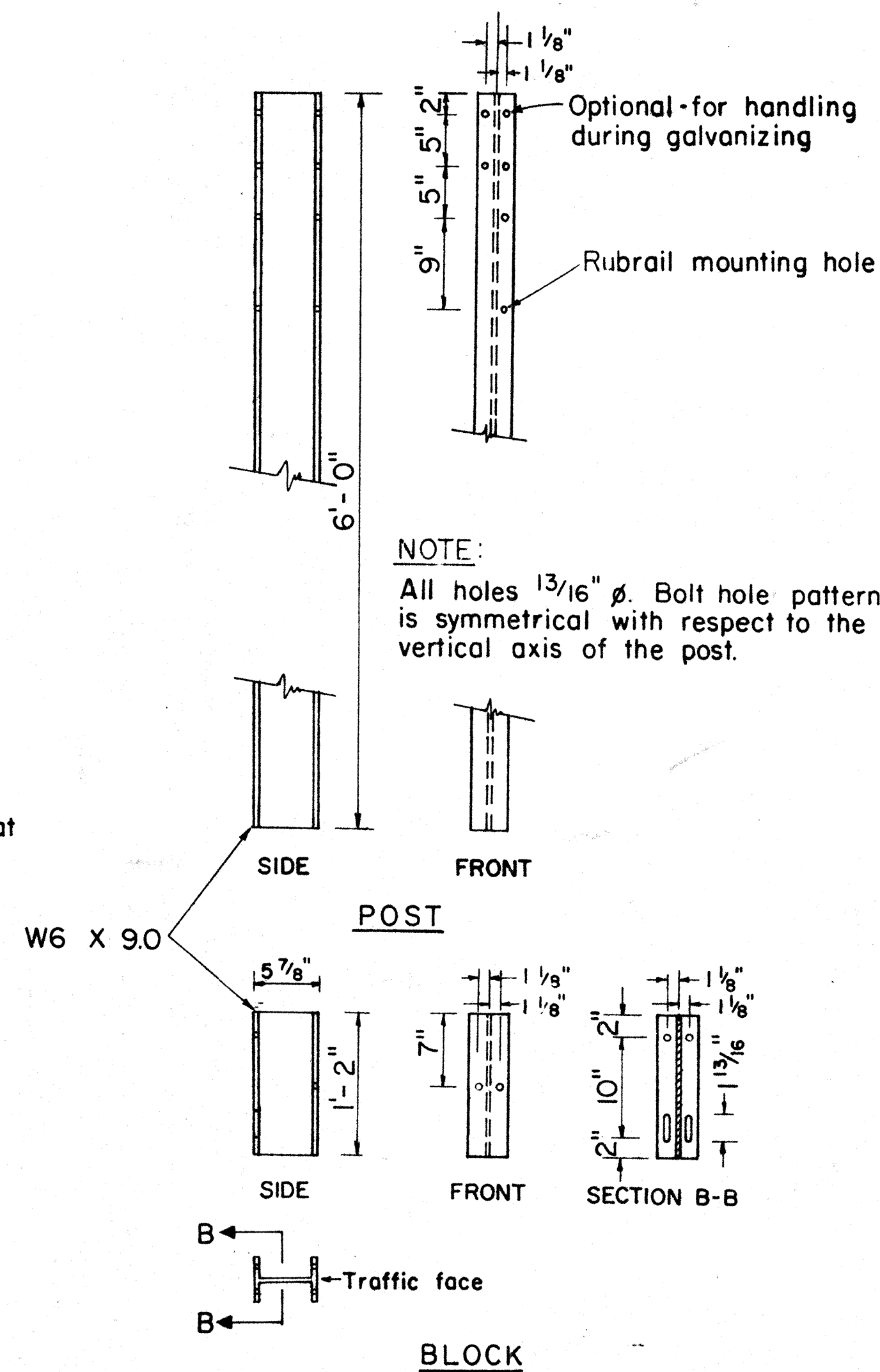
SCALE: 1 1/2" = 1'-0"



AT SHOULDER SECTION

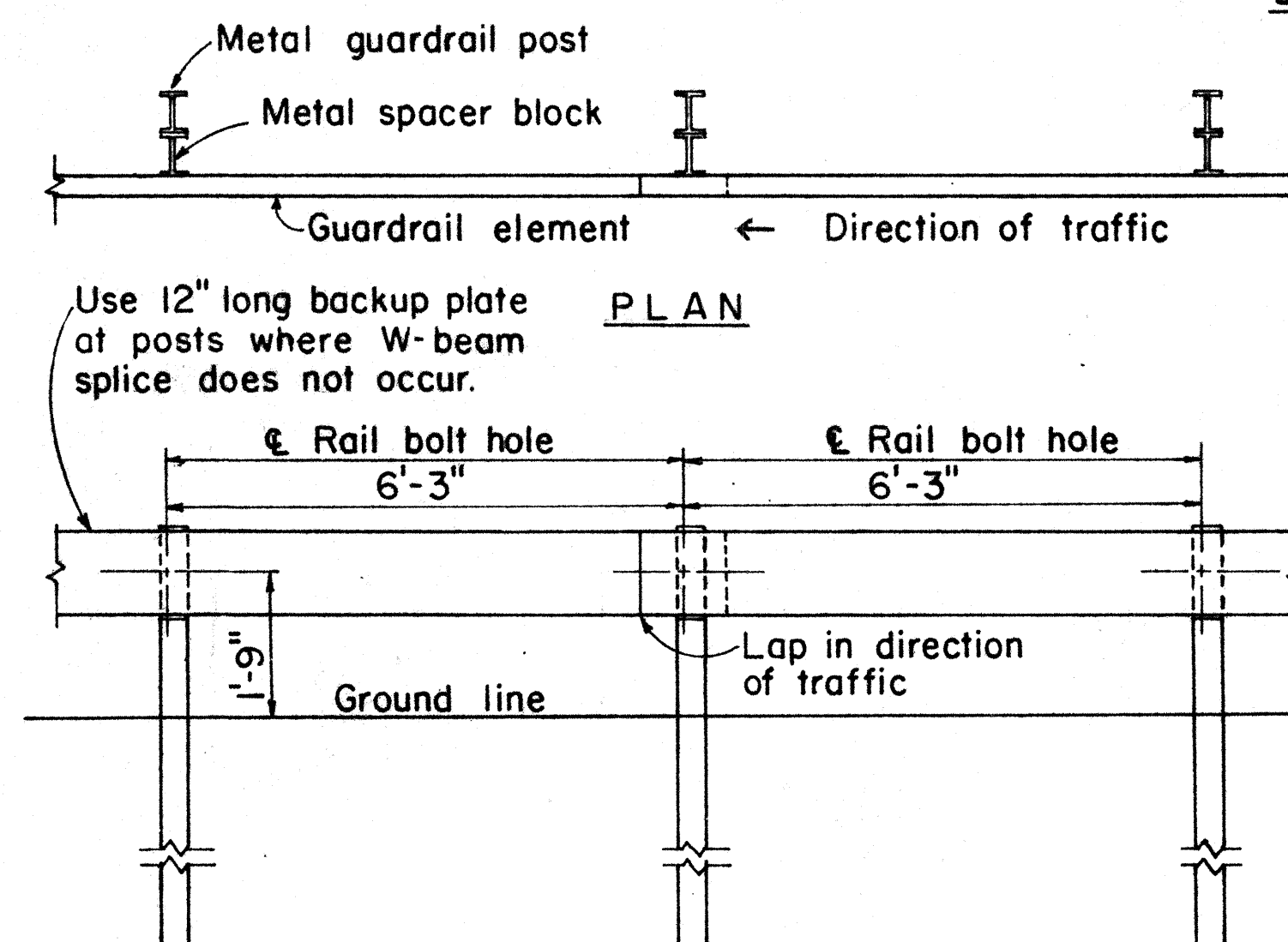
TYPICAL METAL GUARDRAIL DETAIL

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



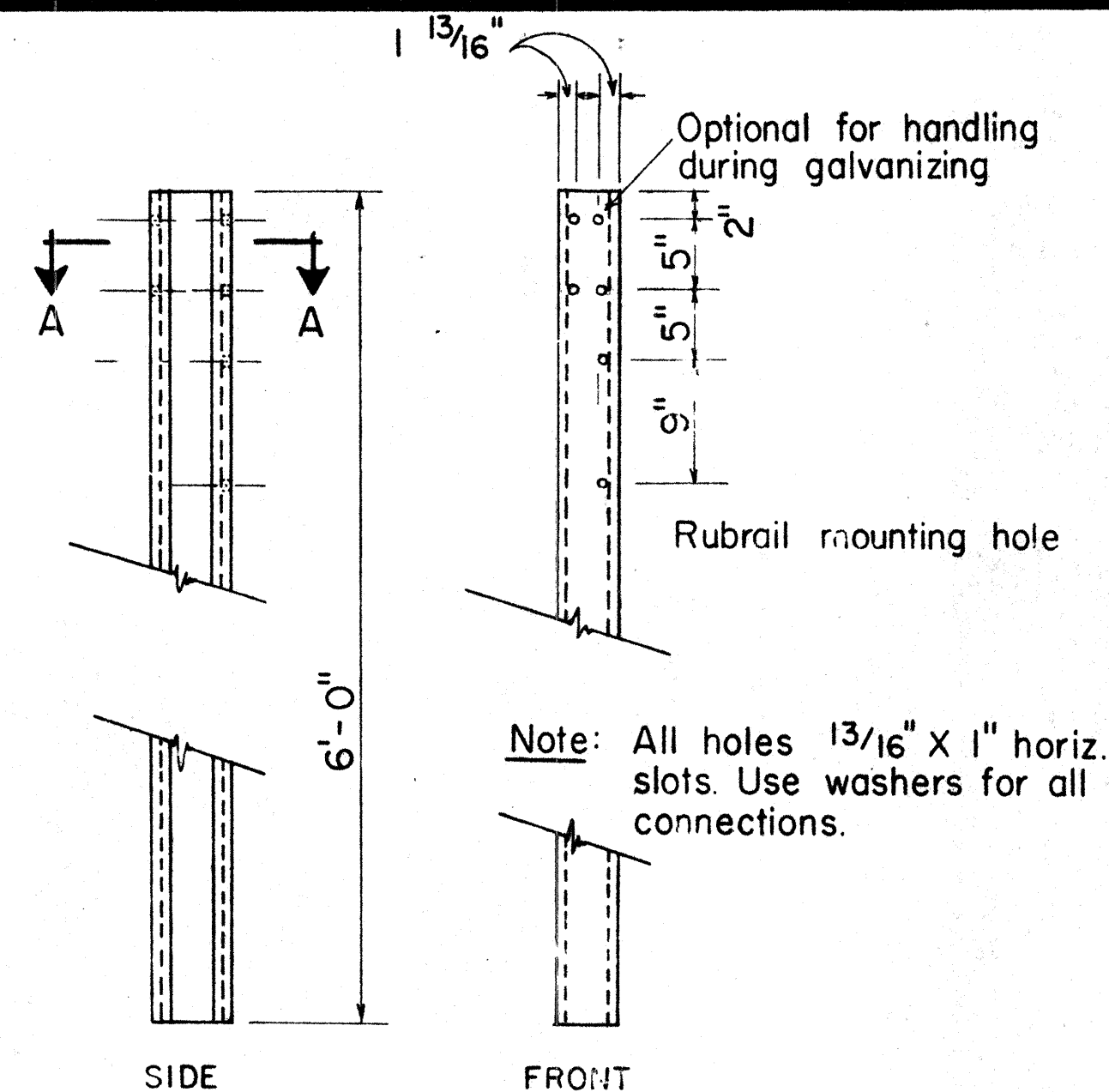
STRUCTURAL SHAPE POST AND BLOCK

SCALE: 1" = 1'-0"

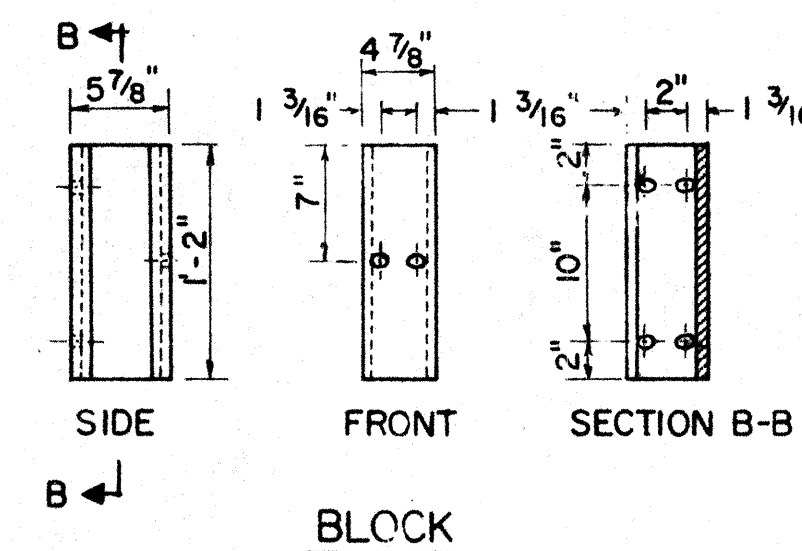


METAL GUARDRAIL ON METAL POST WITH METAL SPACER BLOCK

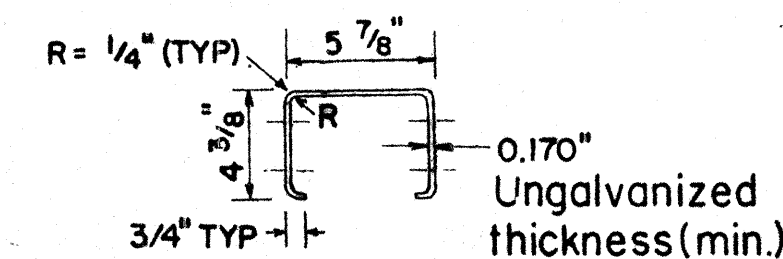
SCALE: 1/2" = 1'-0"



POST



BLOCK



SECTION A-A N.T.S.

BENT PLATE POST AND BLOCK

SCALE: 1" = 1'-0"

APPROVAL RECOMMENDED:

Enrico Tanaka
TRAFFIC ENGINEER

9/1/82
DATE

APPROVED:

Hubert Salschi
ASSISTANT CHIEF, ENGINEERING

9/22/82
DATE

NO.	REVISION	APPROVED BY	DATE
1	Supersedes sht. DT 500 approved 12/30/69.	<i>K.F.</i>	9/22/82
2	Added General Notes No. 6	<i>P.D.</i>	9-28-83

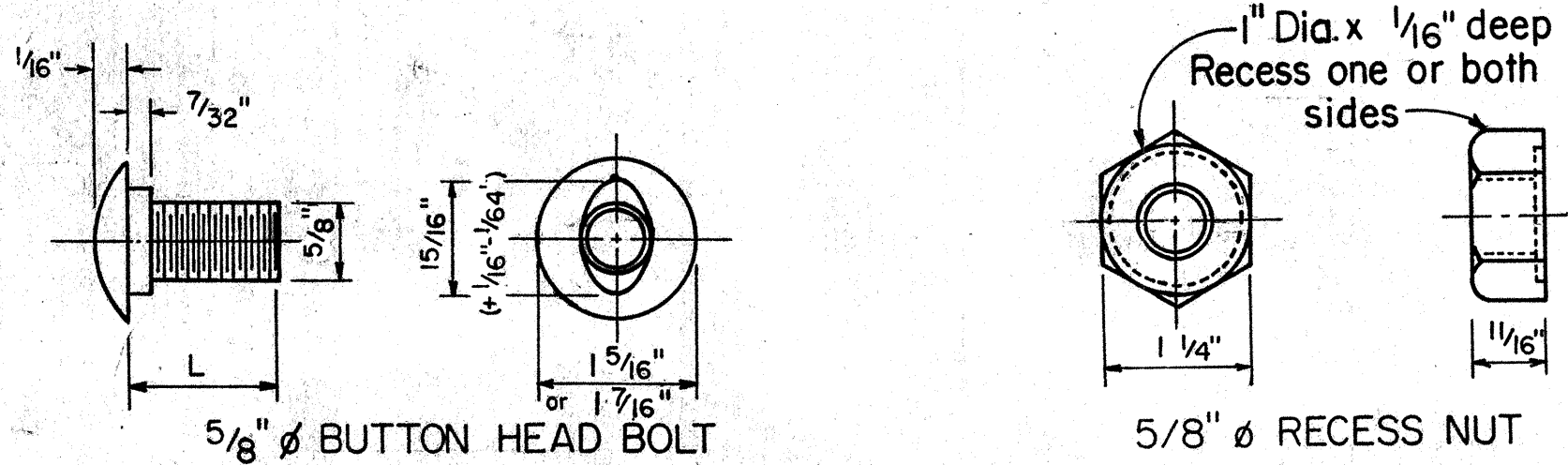
STATE OF HAWAII
DEPARTMENT OF TRANSPORTATION
HIGHWAYS DIVISION

STANDARD DETAILS METAL GUARDRAIL

Scale: As Shown July, 1982

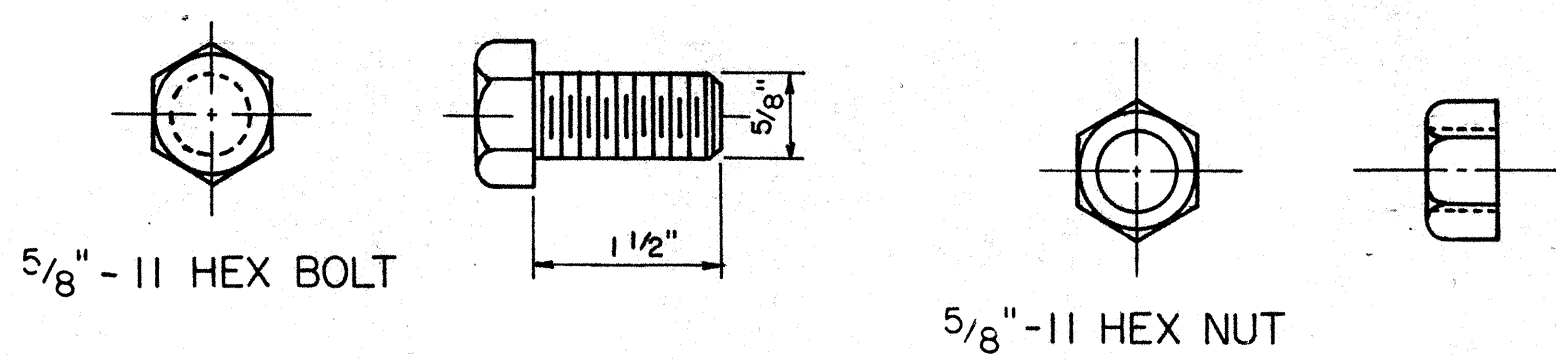
SHEET No. OF SHEETS DT 500

FED. ROAD DIST. NO.	STATE	FED. AID PROJ. NO.	FISCAL YEAR	SHEET NO.	TOTAL SHEETS
HAWAII	HAW.	IR-HI-1(197)	1986	18	38

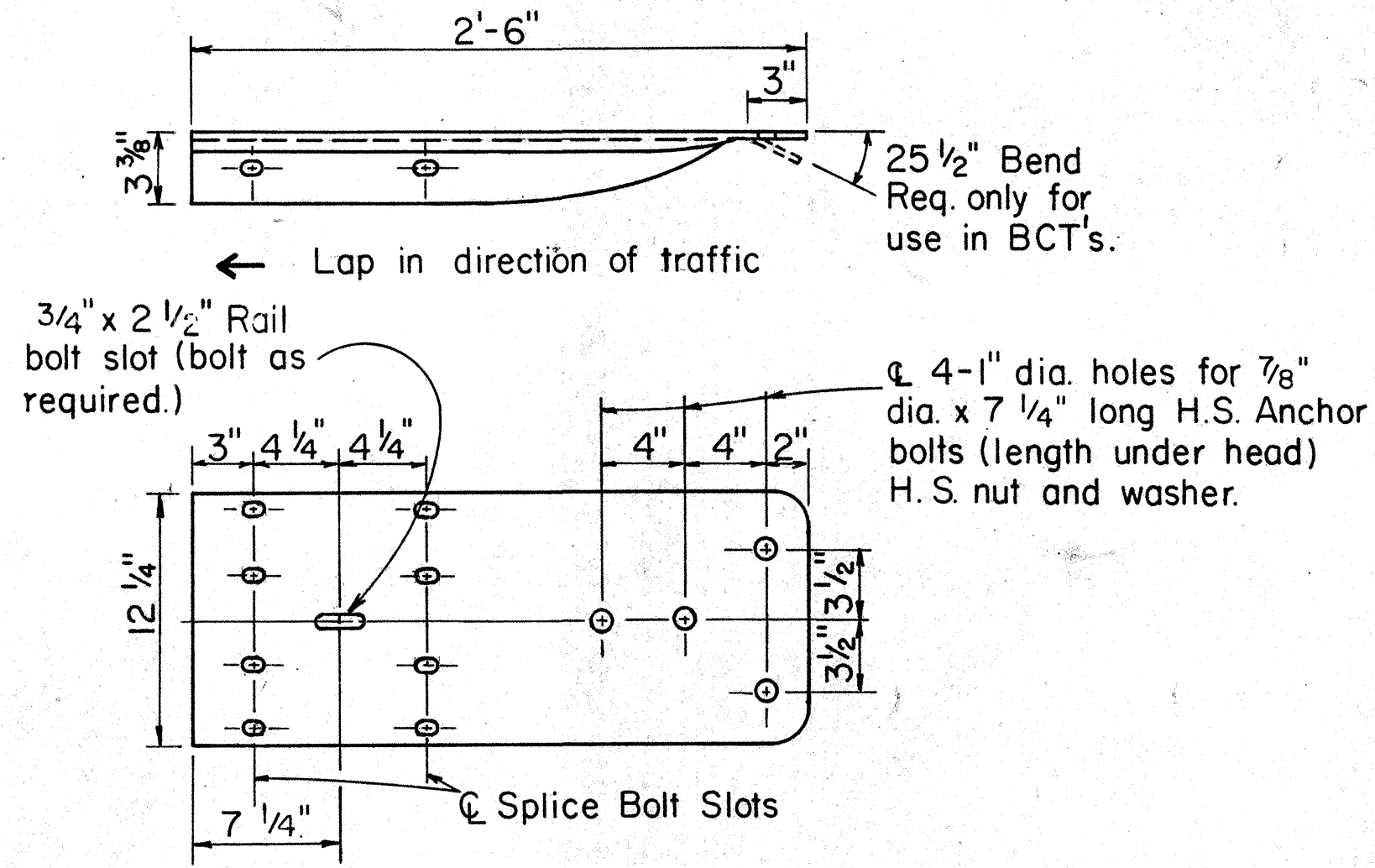


L	Thread Length	Intended Use
1 1/4"	Full length thread	Splice rail elements
2"	1 1/2" min. thread len.	Fasten rails to posts

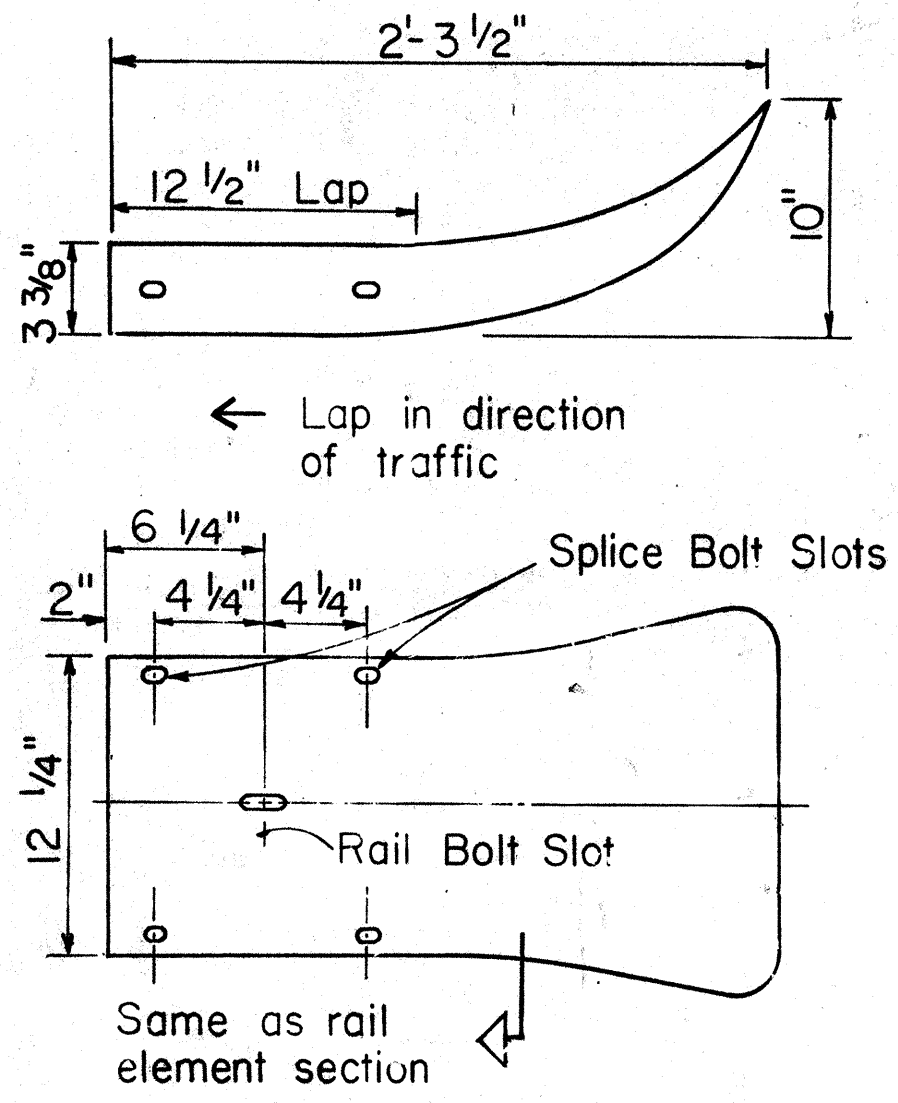
**5/8" BUTTON HEAD BOLT
AND RECESS NUT**
Scale: NTS



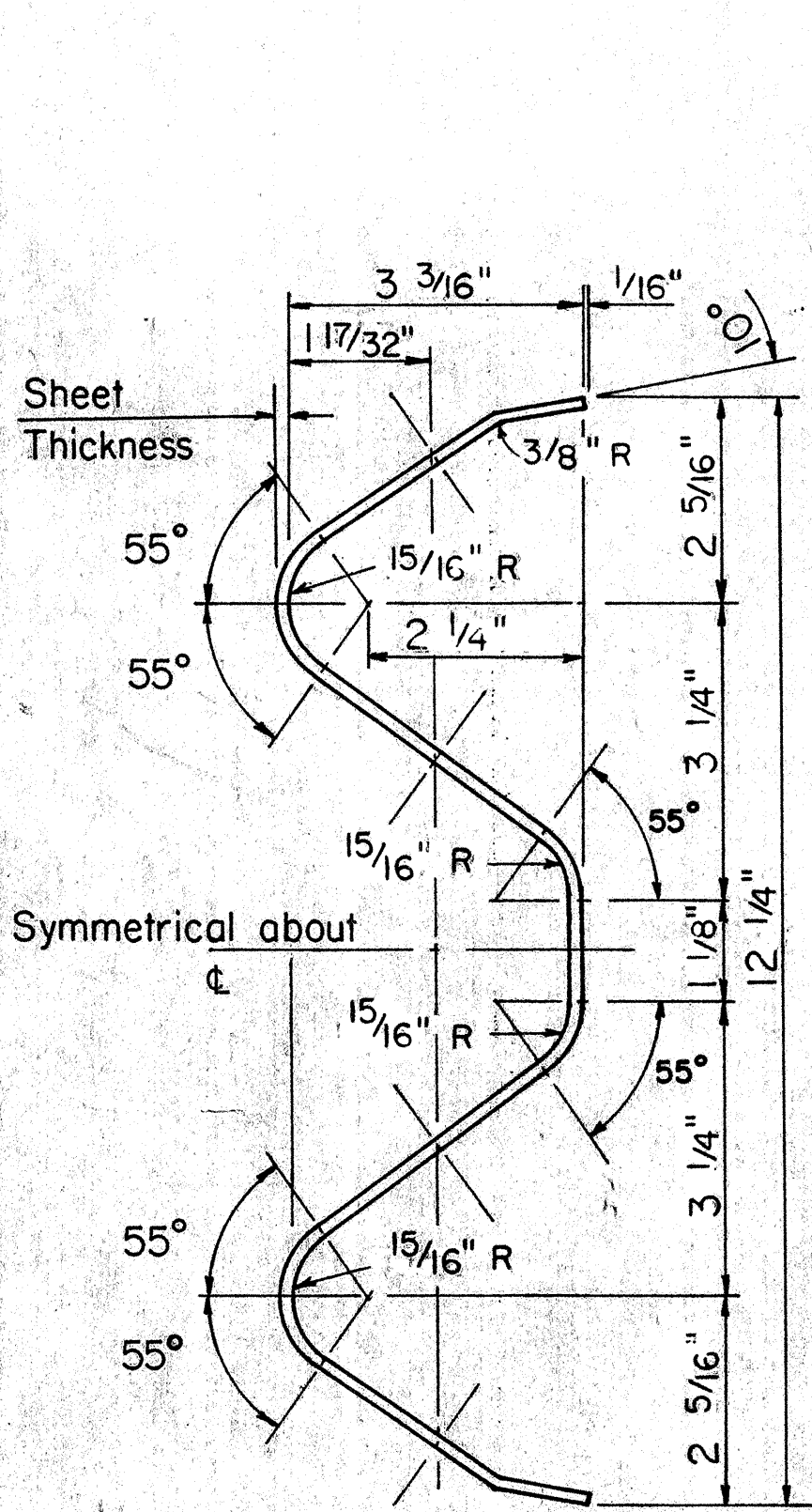
5/8" HEX POST BOLT AND NUT
Scale: N.T.S.



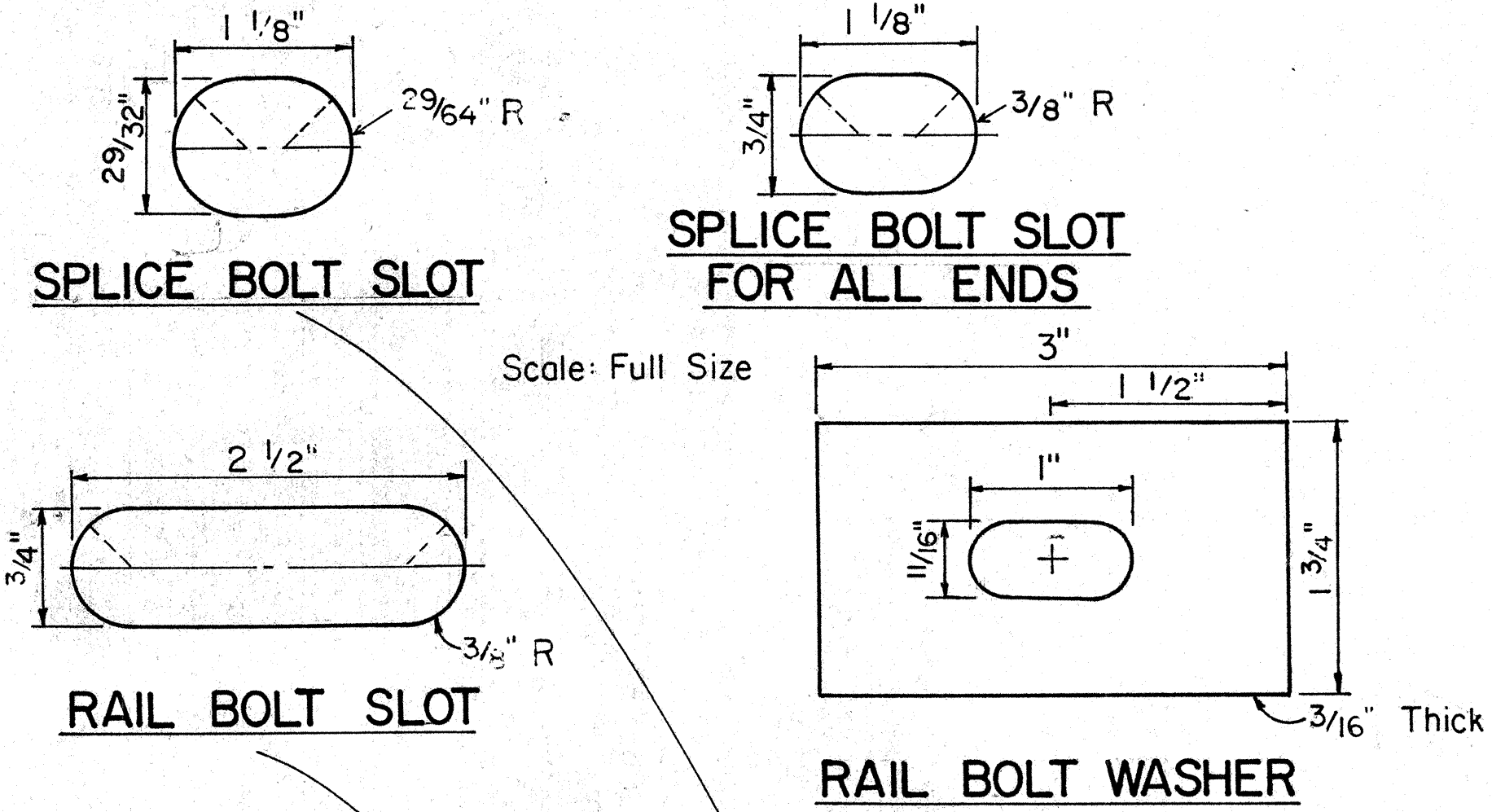
W BEAM TERMINAL CONNECTOR
Scale: 1 1/2" = 1'-0"
Lap in direction of traffic



W BEAM END SECTION (FLARED)
Scale: 1 1/2" = 1'-0"



RAIL ELEMENT SECTION
Scale: 6" = 1'-0"

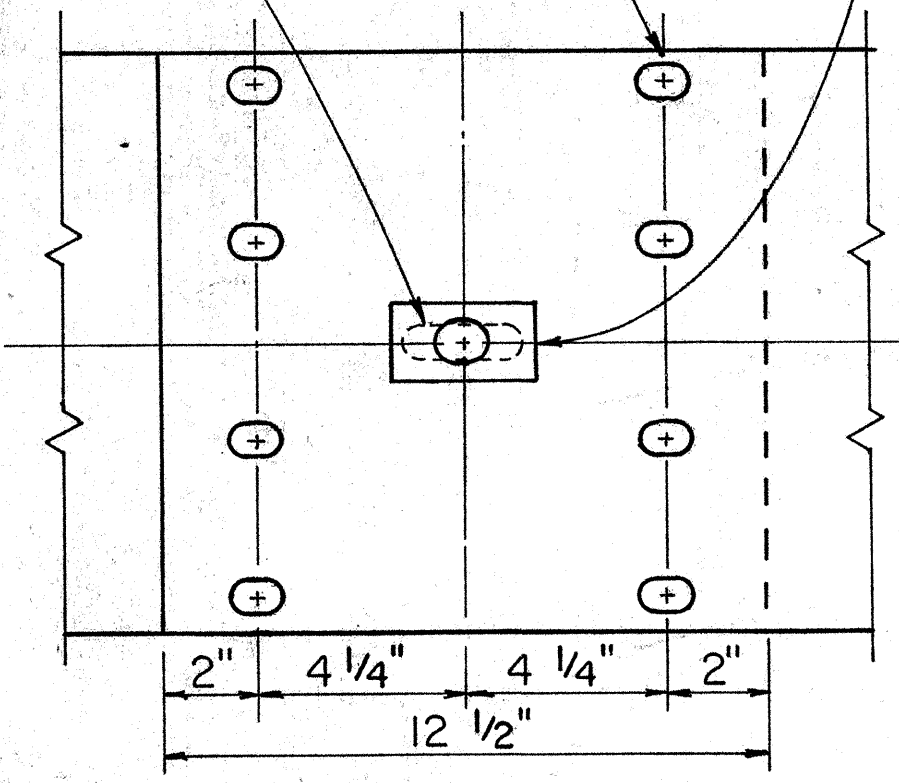


SPLICE BOLT SLOT

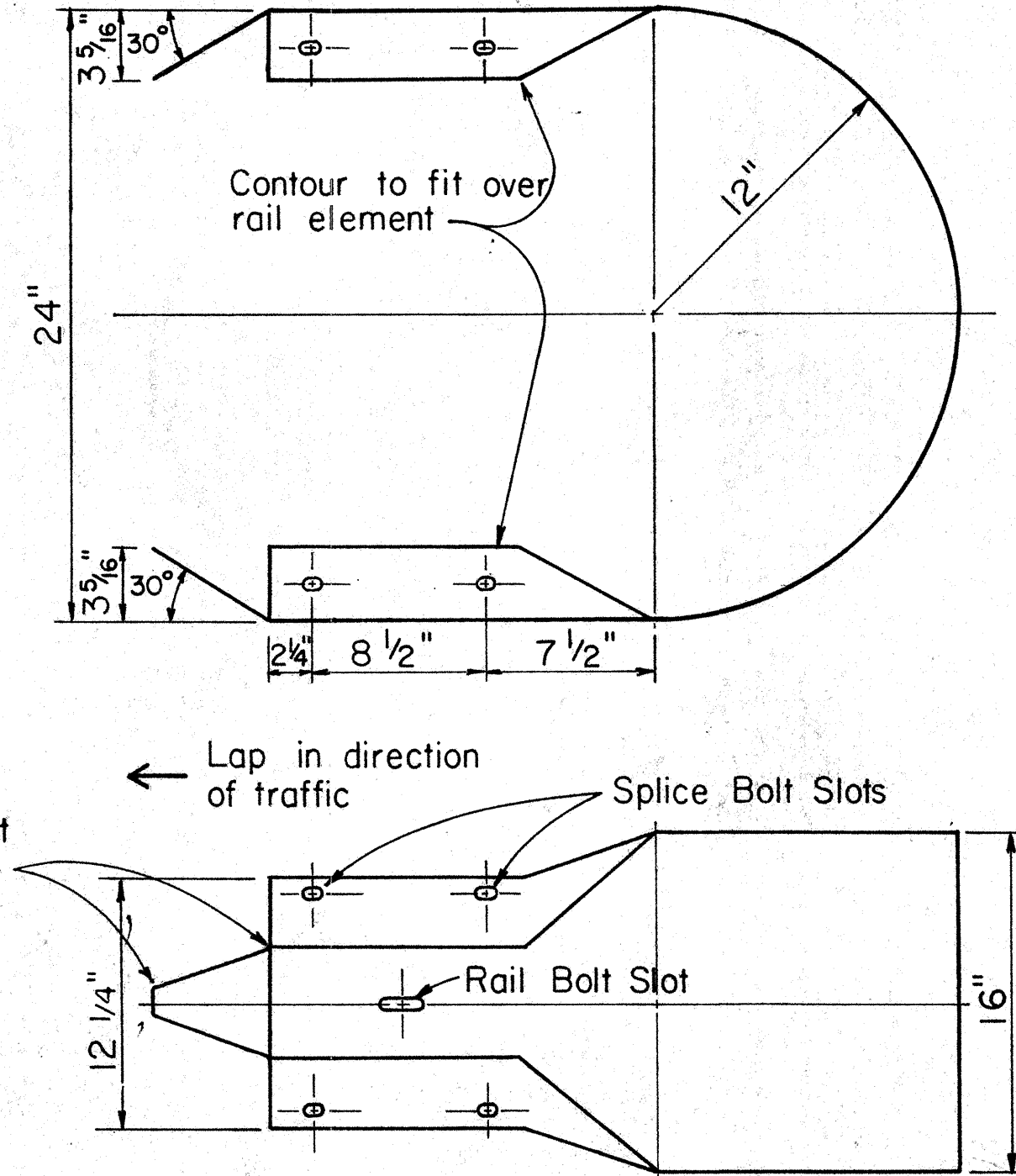
**SPLICE BOLT SLOT
FOR ALL ENDS**

RAIL BOLT SLOT

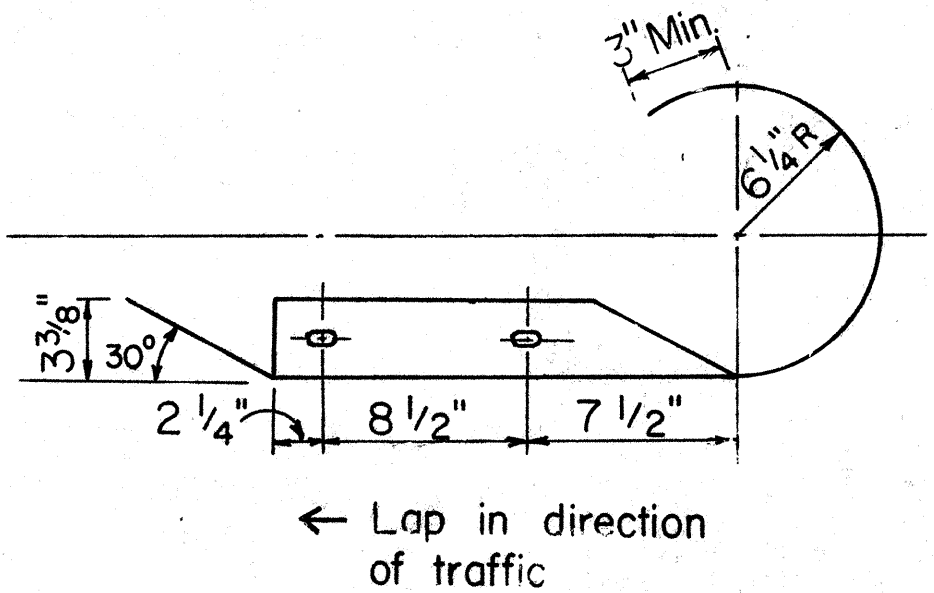
RAIL BOLT WASHER



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



W BEAM END SECTION (BUFFER)
Scale: 1 1/2" = 1'-0"



W BEAM END SECTION (ROUNDED)
Scale: 1 1/2" = 1'-0"

APPROVAL RECOMMENDED:
Eishi Tanaka
TRAFFIC ENGINEER
9/20/82
DATE

APPROVED:
Shelton S. S. S.
ASSISTANT CHIEF, ENGINEERING
9/22/82
DATE

NO.	REVISION	APPROVED BY	DATE
1	Supersedes sht. DT 501 approved 12/30/69	H.T.	9/22/82

STATE OF HAWAII
DEPARTMENT OF TRANSPORTATION
HIGHWAYS DIVISION

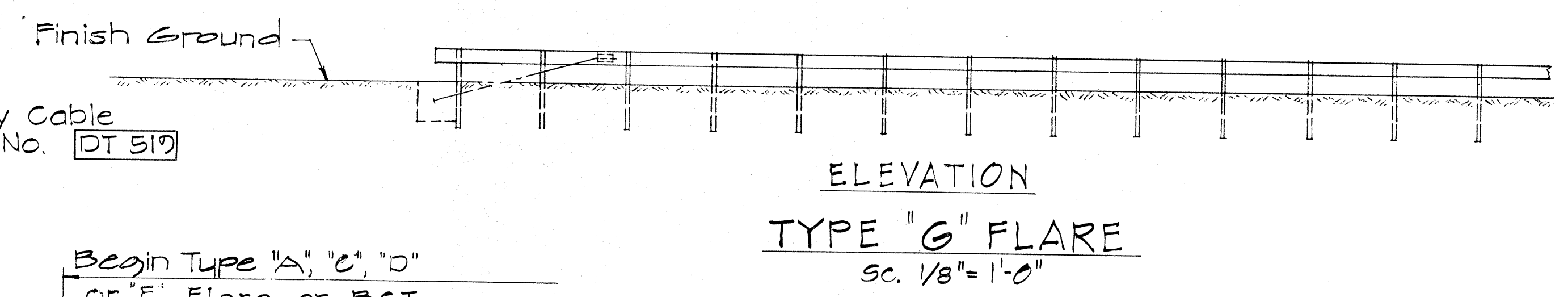
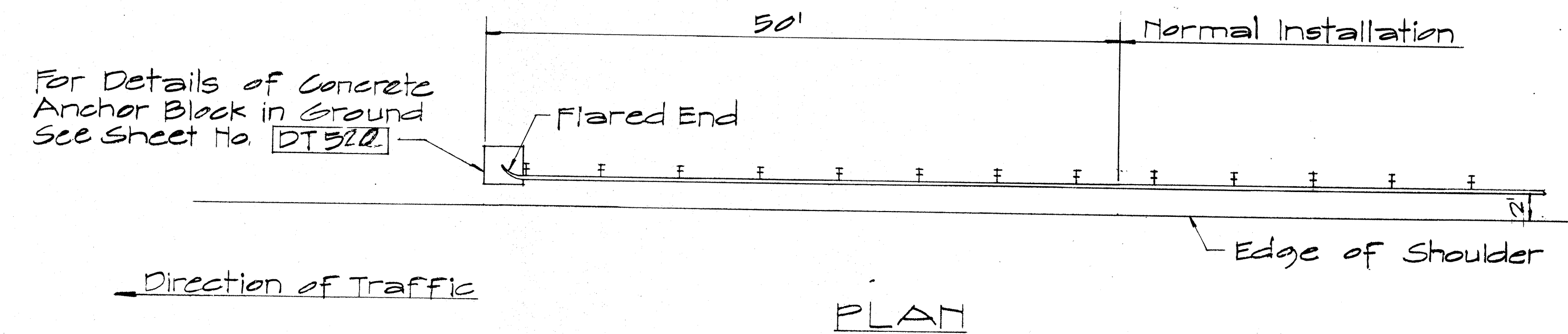
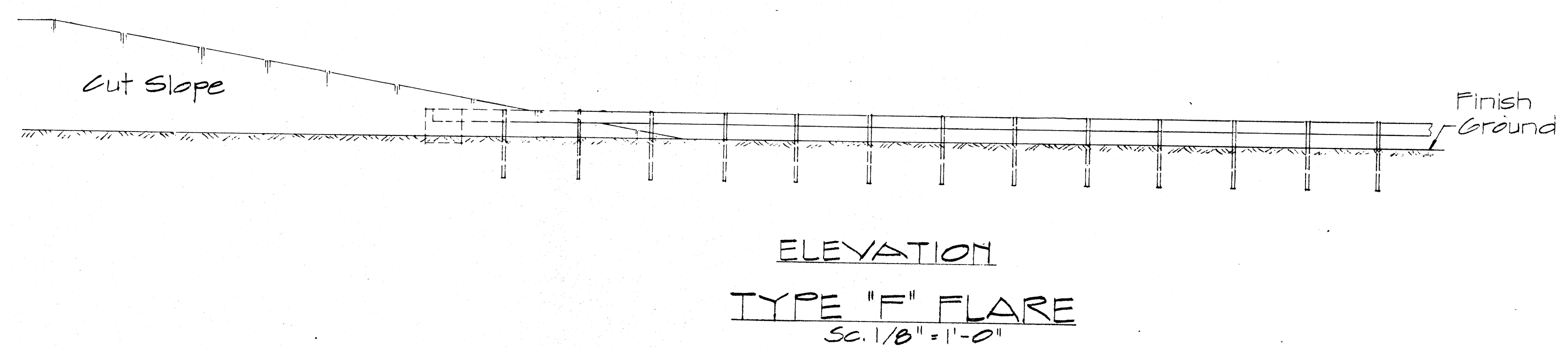
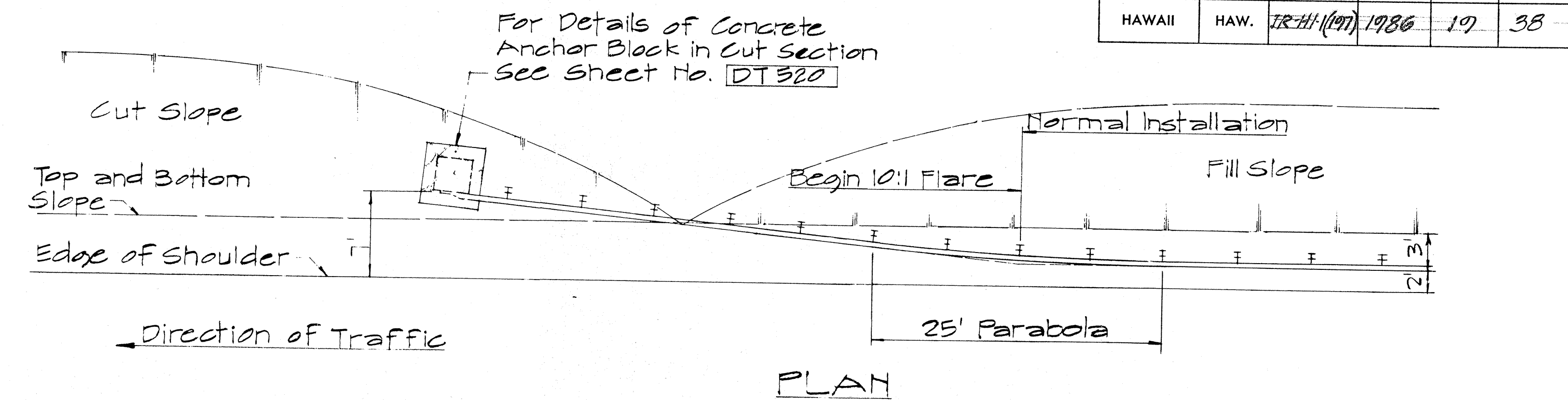
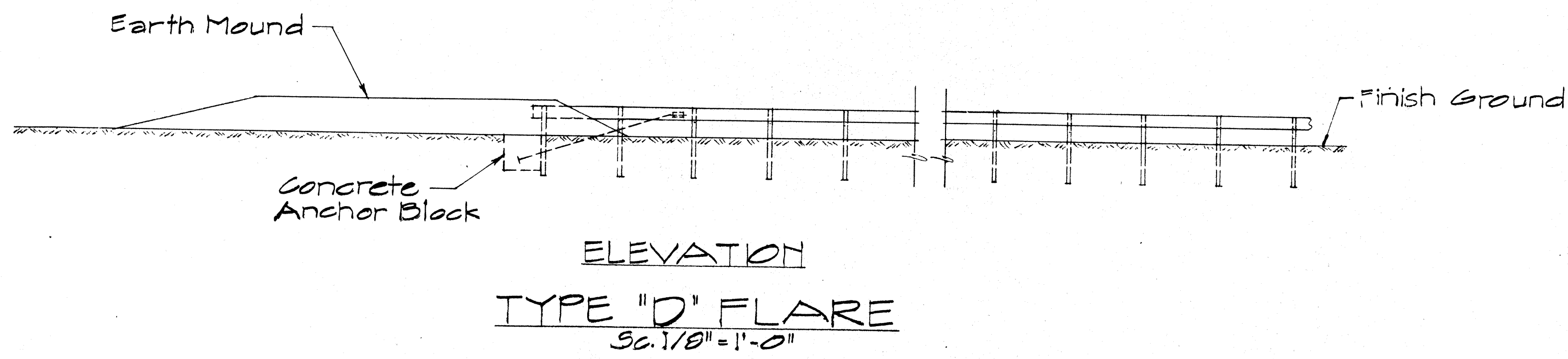
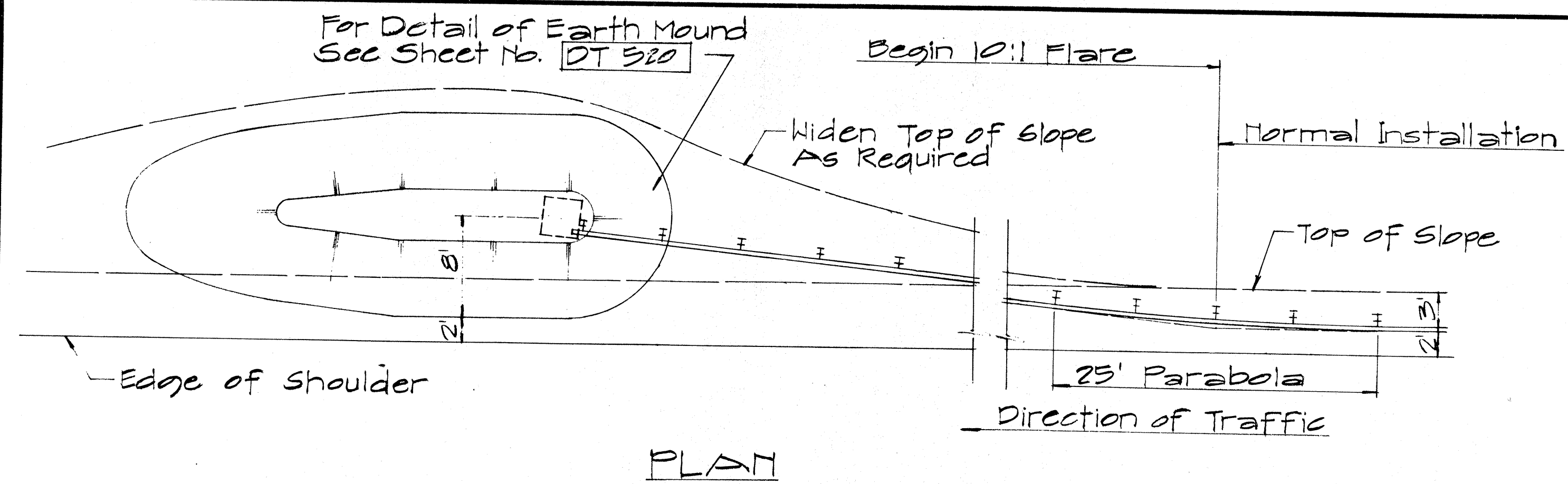
STANDARD DETAILS

METAL GUARDRAIL

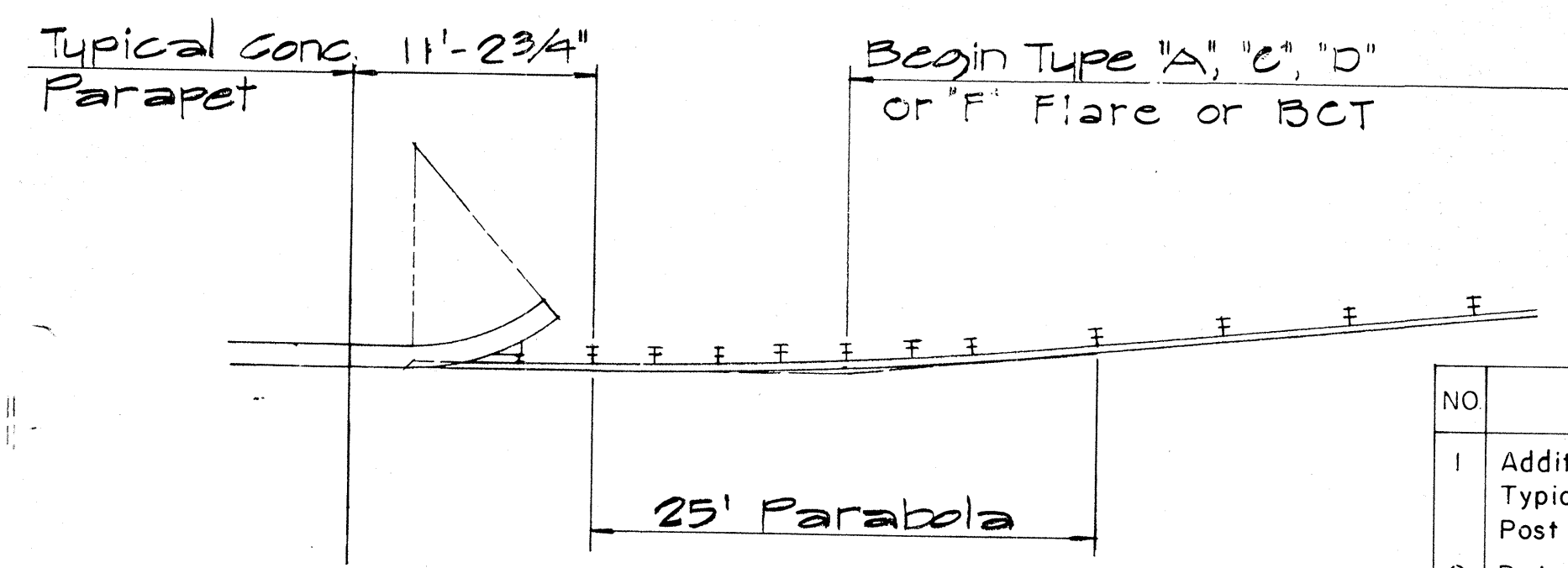
Scale: As Noted
July, 1982
SHEET NO. OF SHEETS DT 501

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

FED. ROAD DIST. NO.	STATE	FED. AID PROJ. NO.	FISCAL YEAR	SHEET NO.	TOTAL SHEETS
HAWAII	HAW.	IR-111 (197)	1986	19	38



NOTE:
For detail of Breakaway Cable Terminal (BCT) See Sheet No. DT 510



TYPICAL LAYOUT PLAN OF END POST CONNECTION

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

NO	REVISION	APPROVED BY	DATE
1	Additional Posts Added to Typical Layout Plan Of End Post Connection	H.C.	4-12-72
2	Delete Type "B" Flare and Type "E" Flare	H.C.	6-15-78

APPROVAL RECOMMENDED:
Euschi Tanaka
TRAFFIC ENGINEER
DATE 12/29/69

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

STATE OF HAWAII
DEPARTMENT OF TRANSPORTATION
HIGHWAYS DIVISION

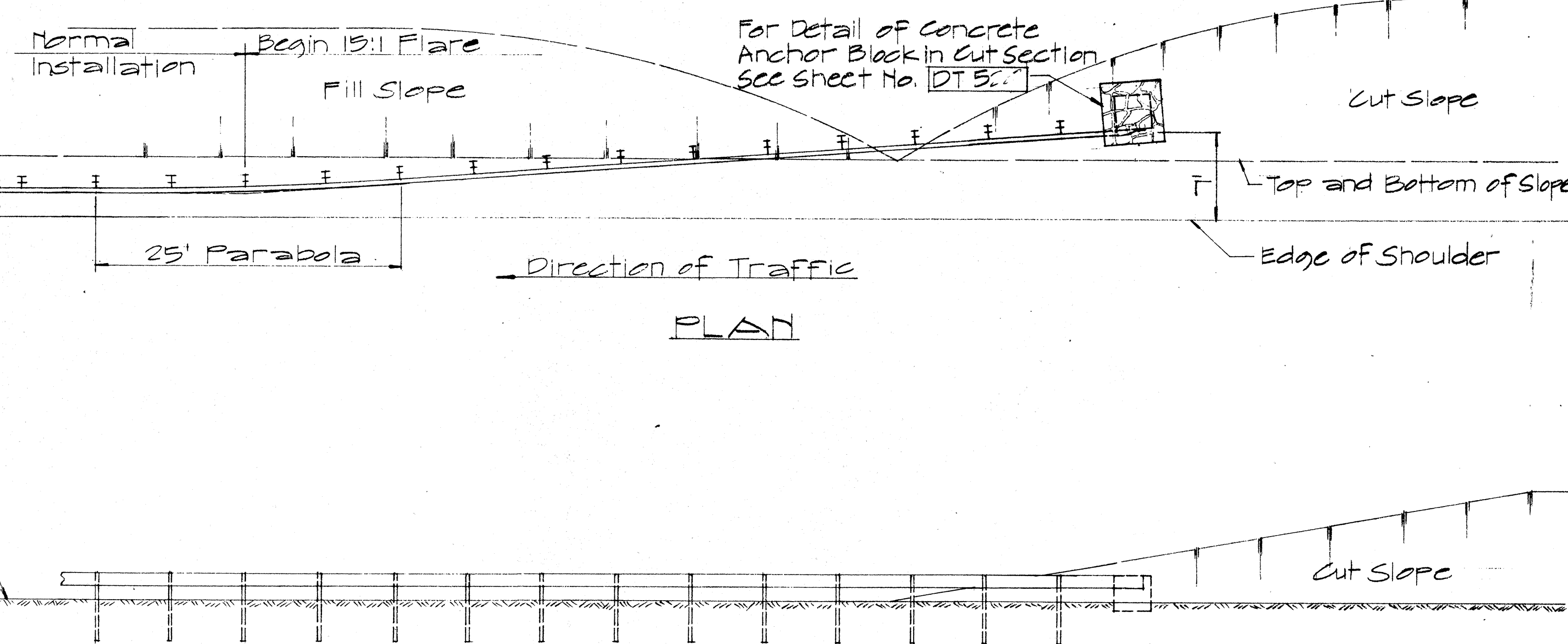
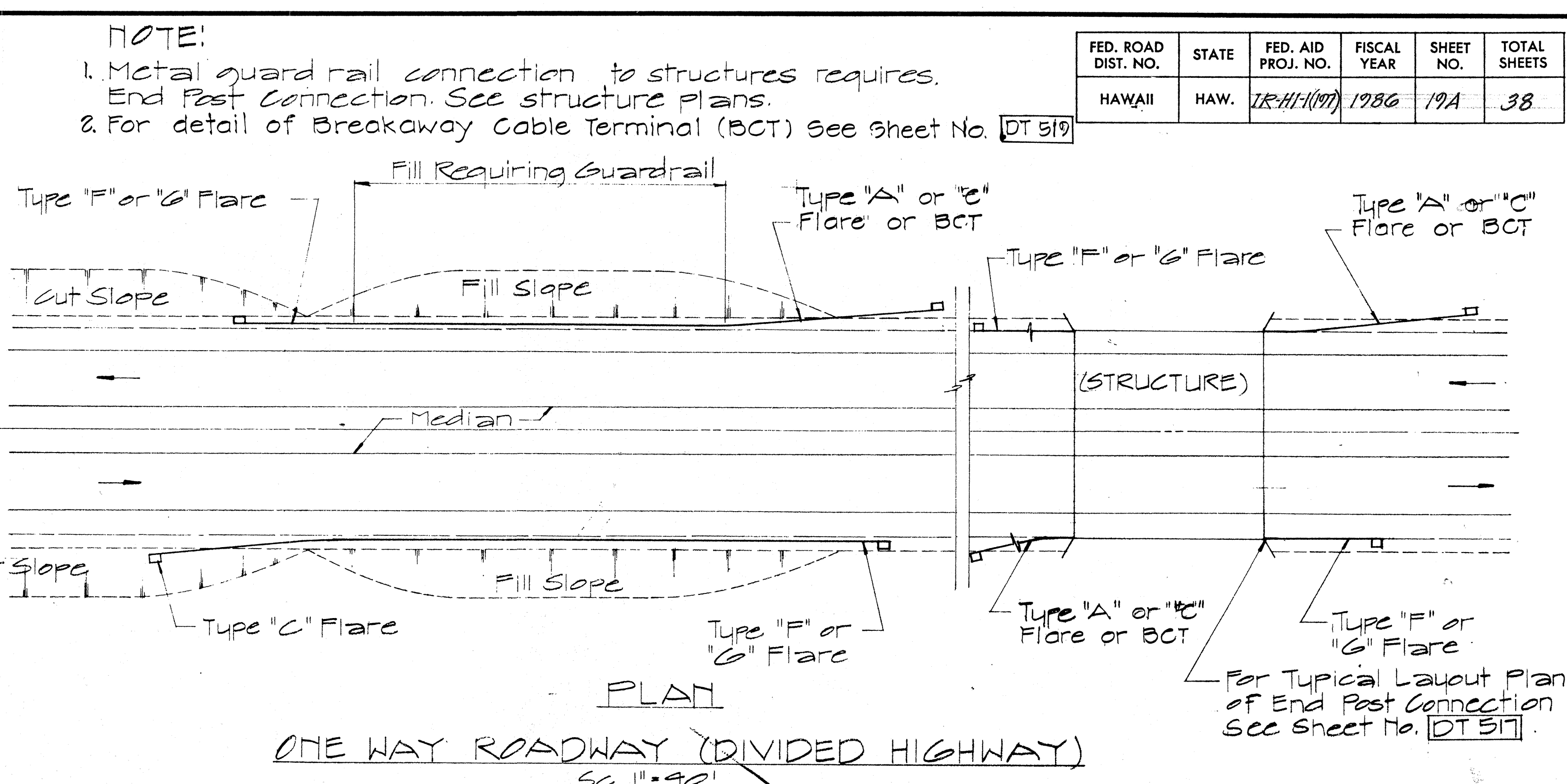
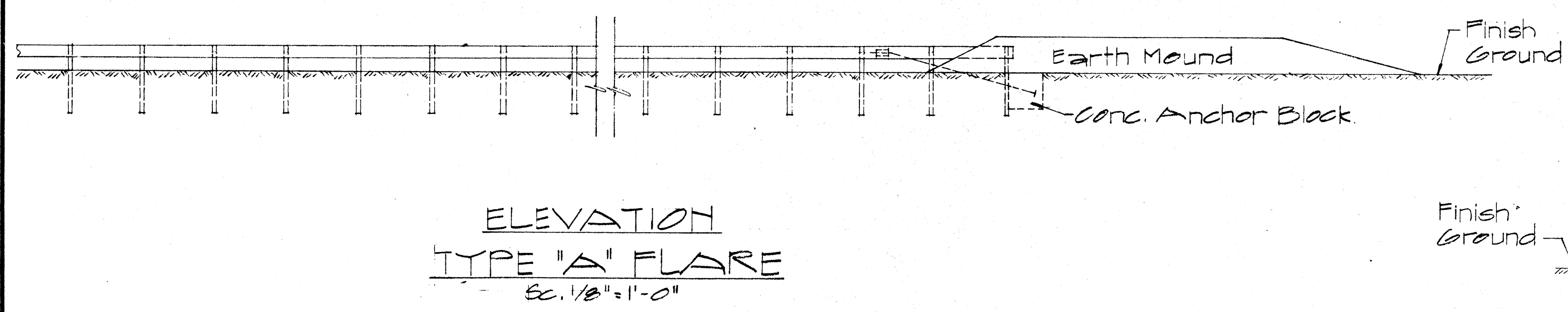
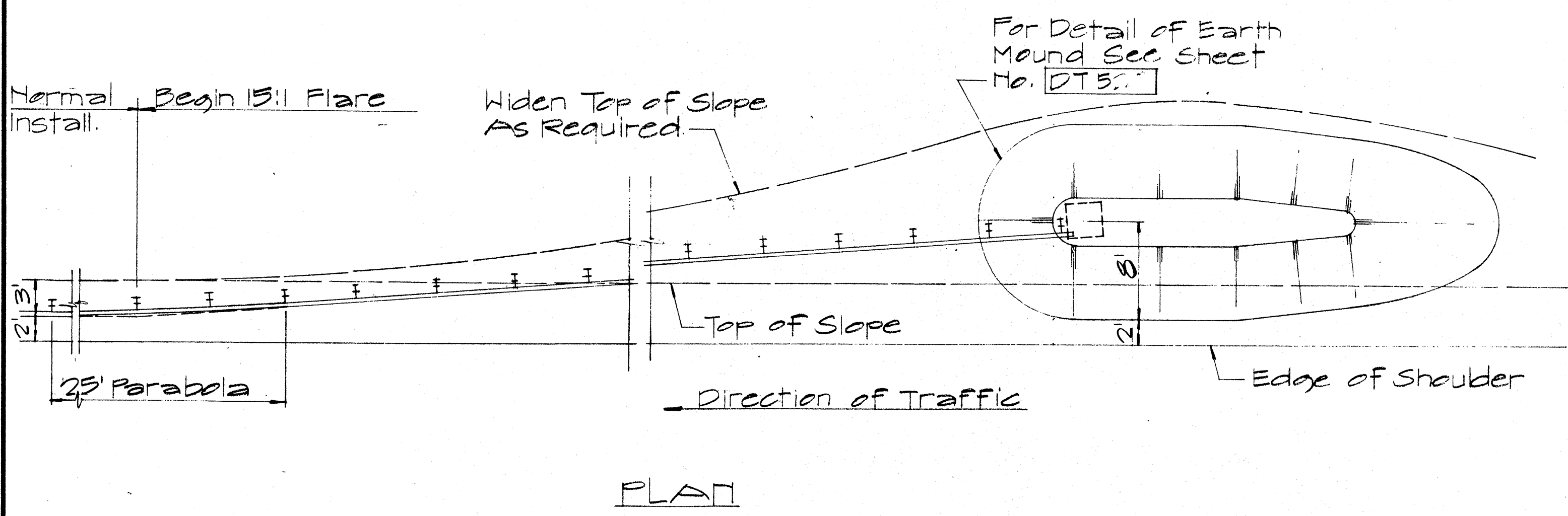
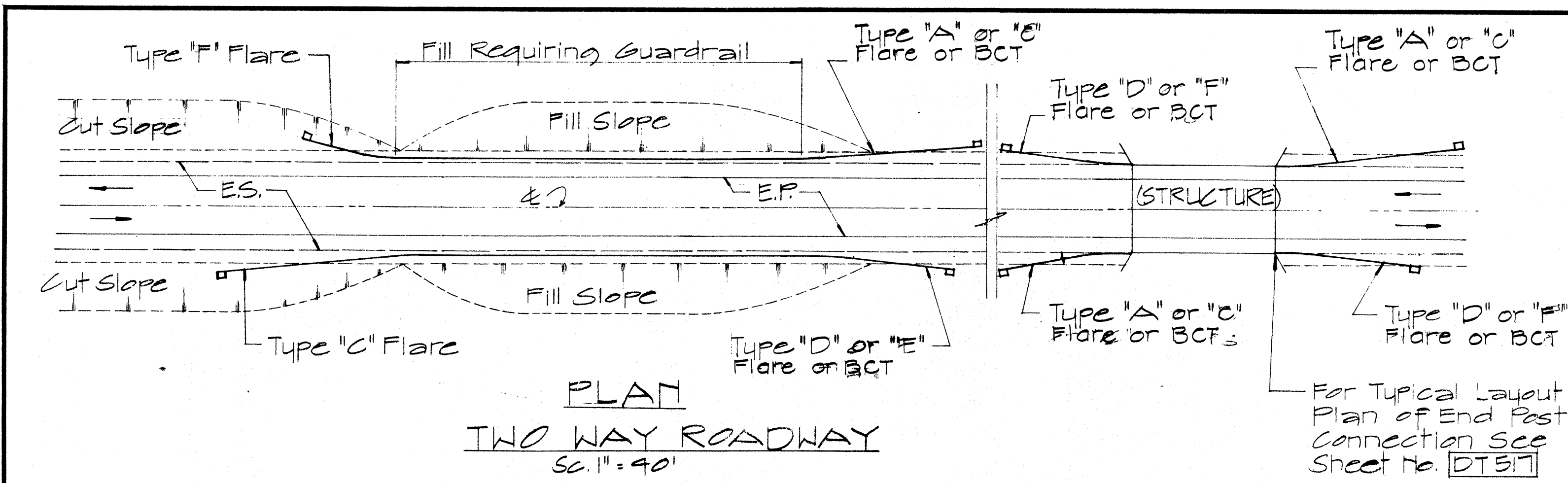
STANDARD DETAILS
TRAILING END
FLARE - ONE & TWO
WAY ROADWAY

Scale: As Noted April 1969

SHEET No. OF SHEETS DT 517

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

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



NOTE:
1. Metal guard rail connection to structures requires End Post Connection. See structure plans.
2. For detail of Breakaway Cable Terminal (BCT) See Sheet No. DT 519

FED. ROAD DIST. NO.	STATE	FED. AID PROJ. NO.	FISCAL YEAR	SHEET NO.	TOTAL SHEETS
HAWAII	HAW.	12-HI-11(197)	1986	19A	38

APPROVAL RECOMMENDED:
Traffic Engineer
DATE 12/23/69

APPROVED
Assistant Chief, Engineering
DATE 12-30-69

NO.	REVISION	APPROVED BY	DATE
1	Delete Type "B" Flare and Type "E" Flare	H.J.	6/15/82

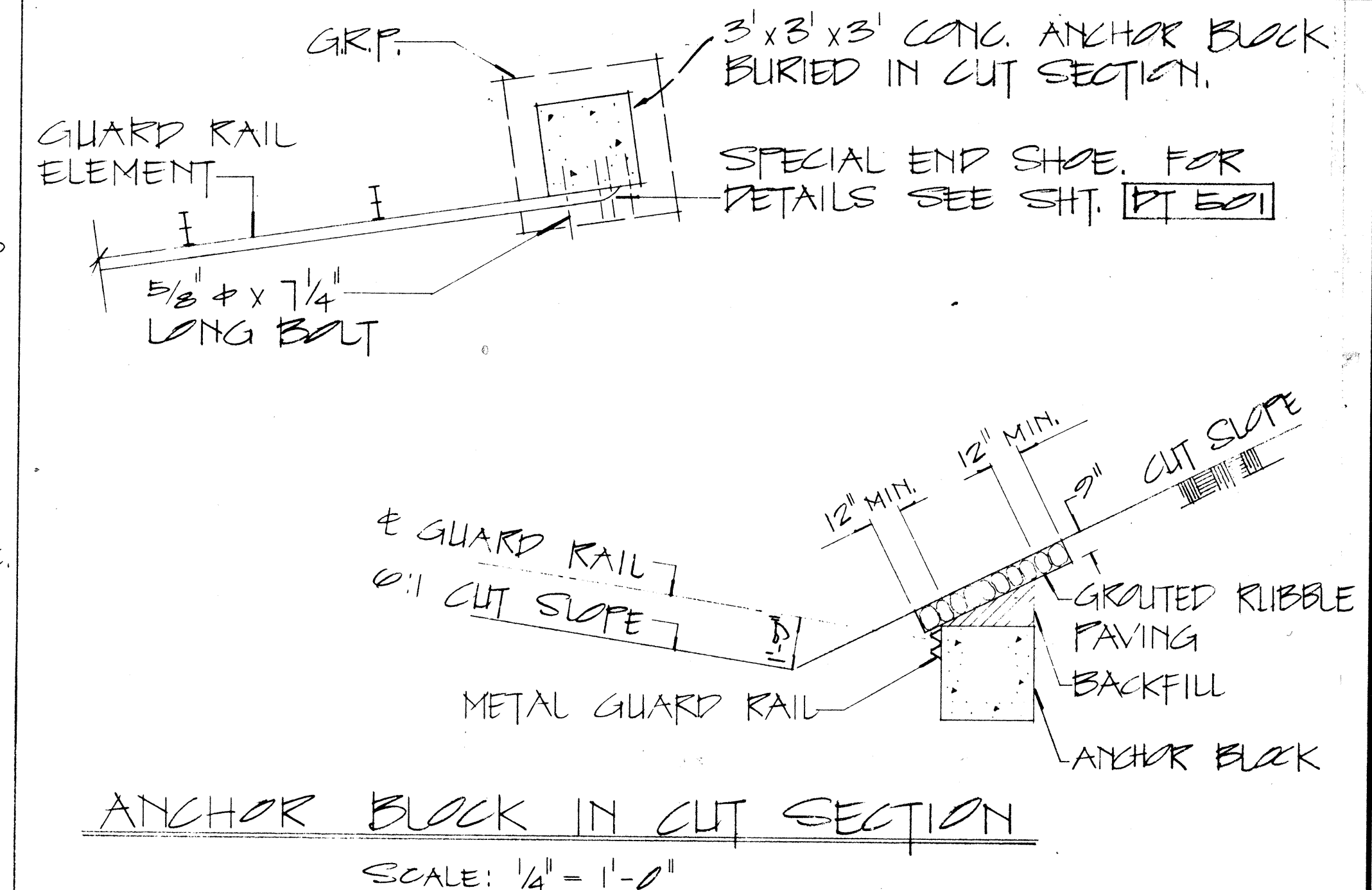
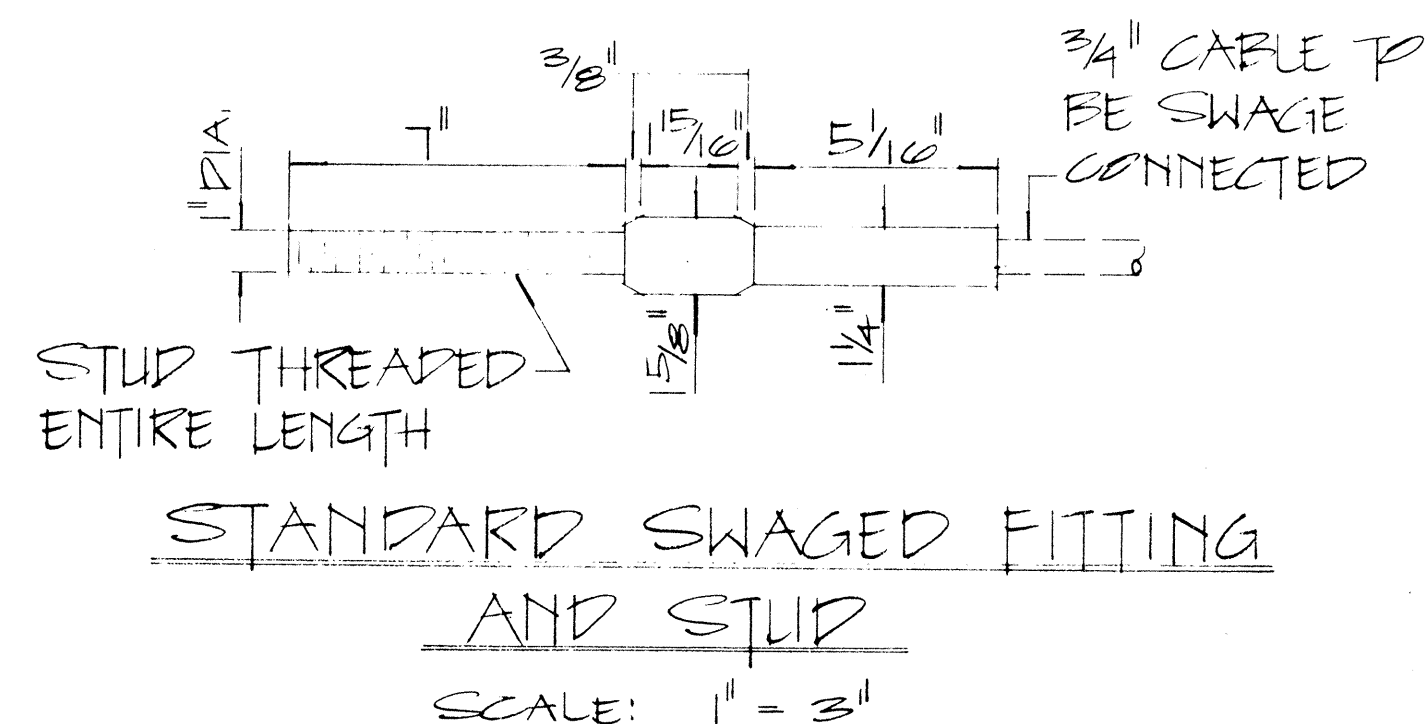
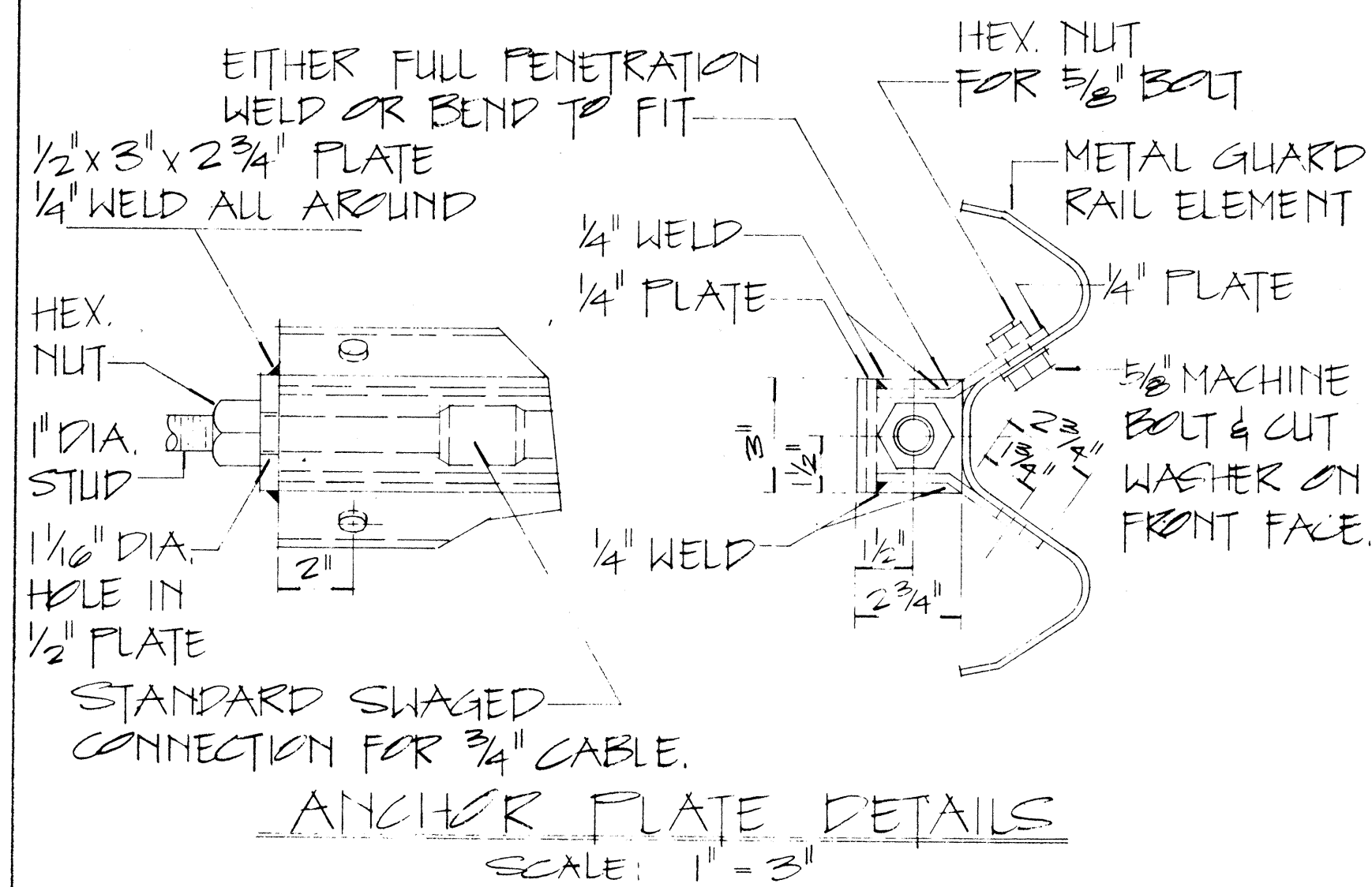
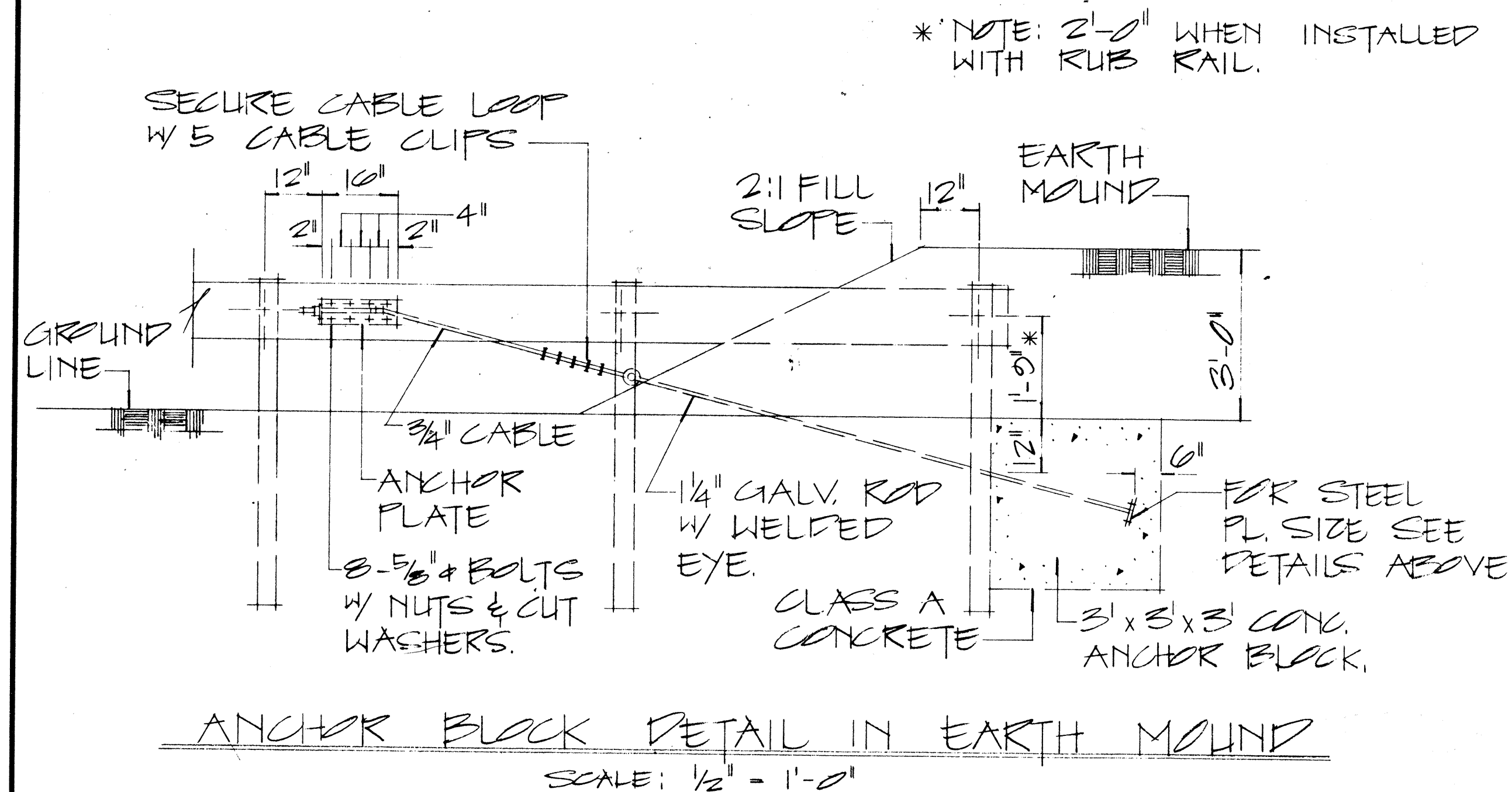
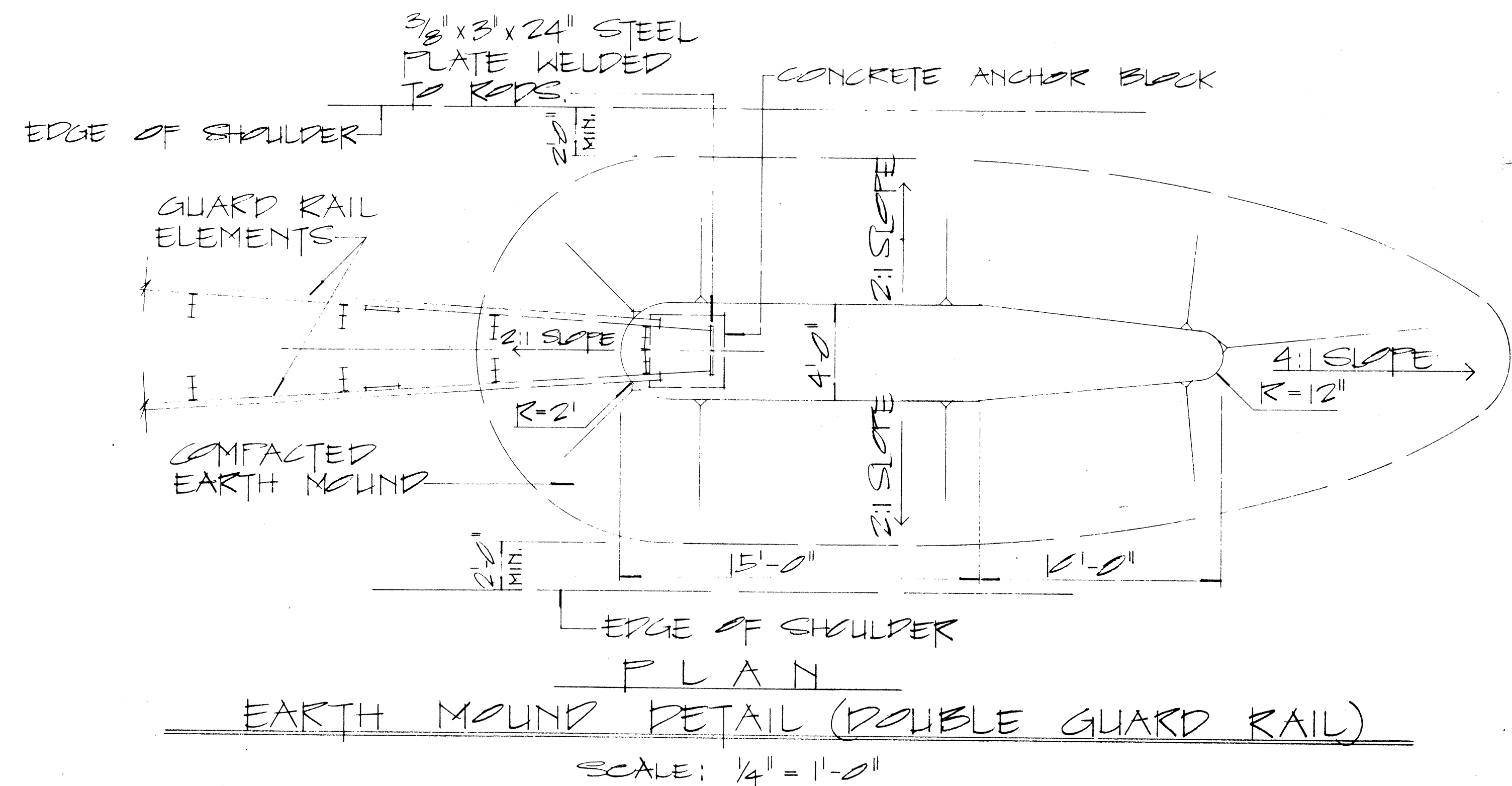
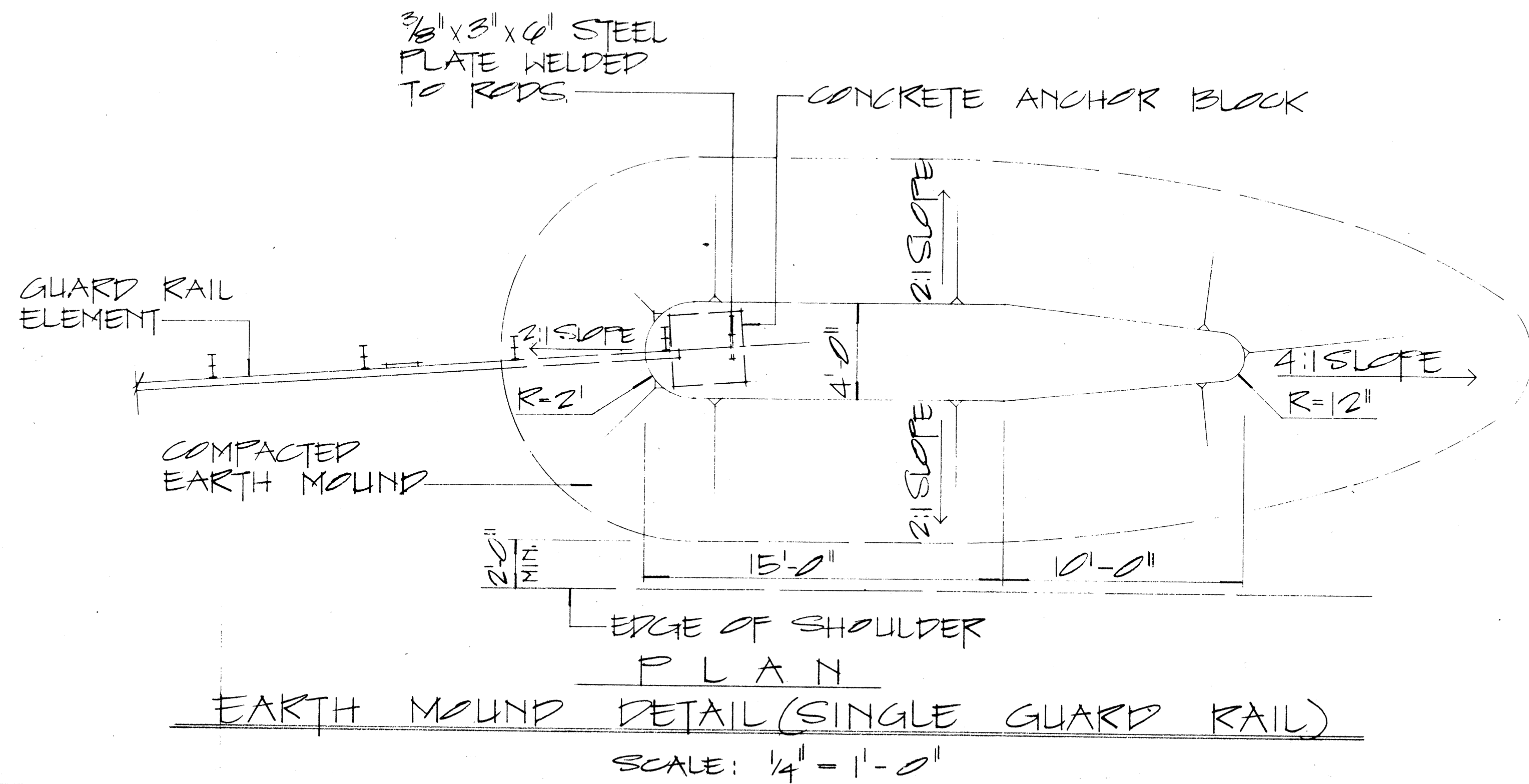
STATE OF HAWAII
DEPARTMENT OF TRANSPORTATION
HIGHWAYS DIVISION

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

SC. As Noted
April 1969

SHEET No. 19A OF SHEETS DT 516

FED. ROAD DIST. NO.	STATE	FED. AID PROJ. NO.	FISCAL YEAR	SHEET NO.	TOTAL SHEETS
HAWAII	HAW.	JR111(197)	1986	20	38



APPROVAL RECOMMENDED: E. Tanaka 12/29/69 DATE

TRAFFIC ENGINEER

APPROVED: A. J. J. J. 12-30-69 DATE

ASSISTANT CHIEF, ENGINEERING

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. OF SHEETS 20 520

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 ANWA 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 RAIL ENDS RAIL.