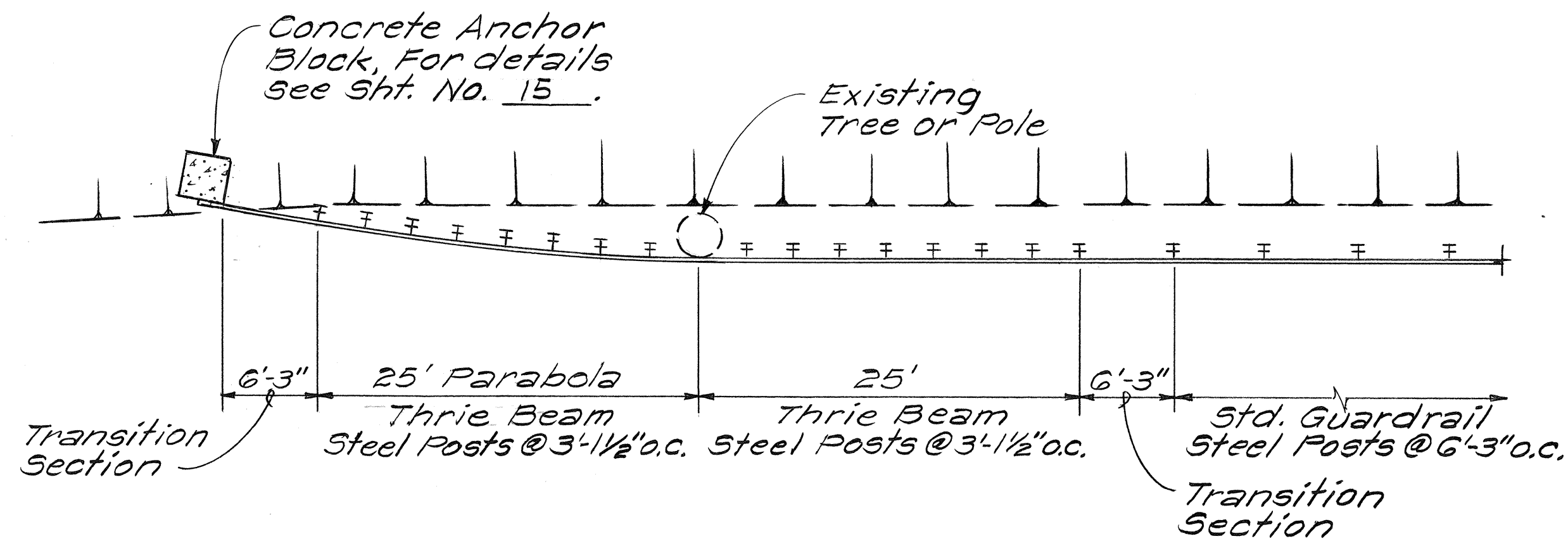
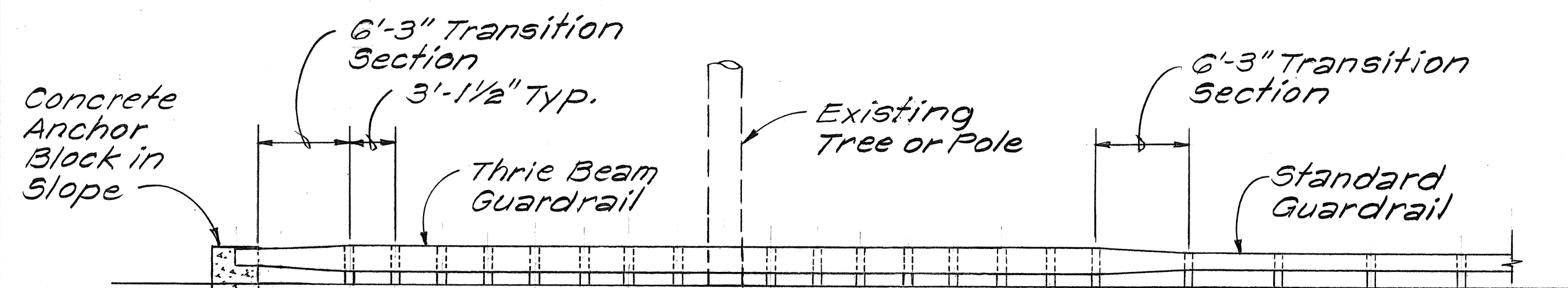


FED. ROAD DIST. NO.	STATE	PROJ. NO.	FISCAL YEAR	SHEET NO.	TOTAL SHEETS
HAWAII	HAW.	360B-01-80	1980	8	28



PLAN



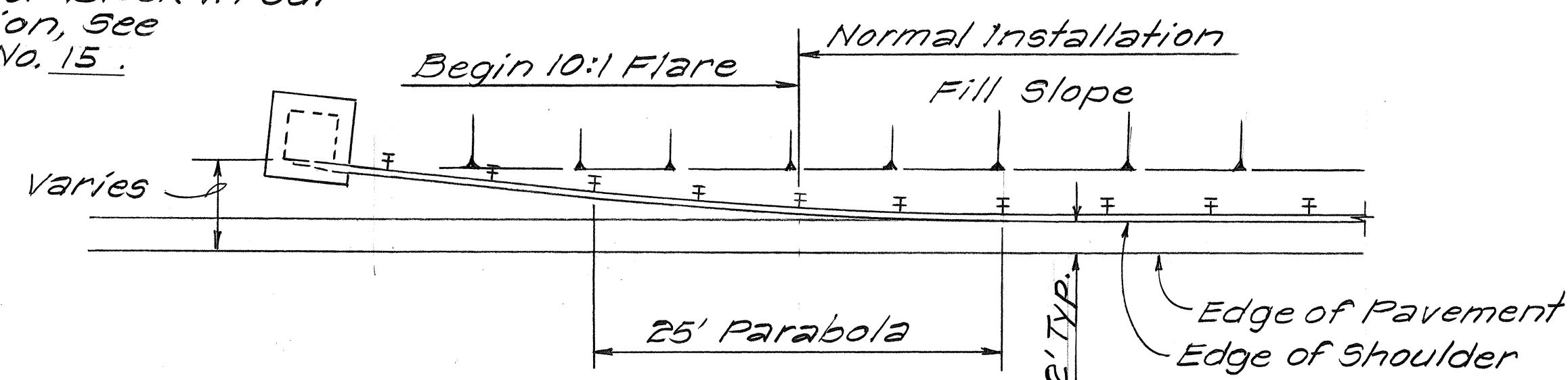
ELEVATION

TYPICAL GUARDRAIL DETAIL

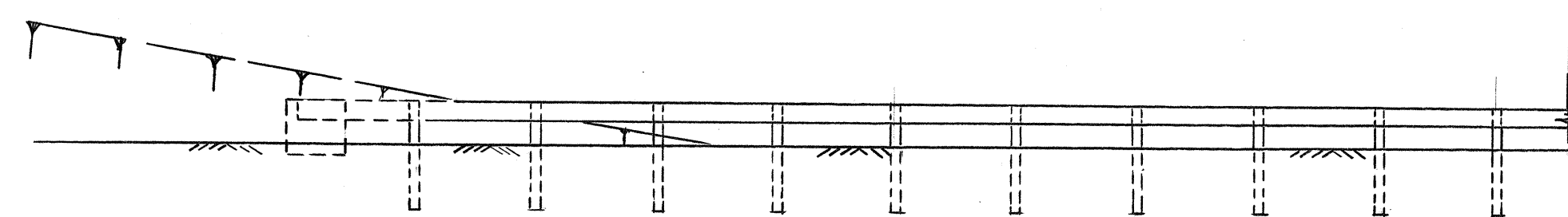
EXISTING TREES OR POLES AT NARROW PAVEMENT WIDTHS

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

For details of Concrete Anchor Block in Cut Section, See Sht. No. 15.



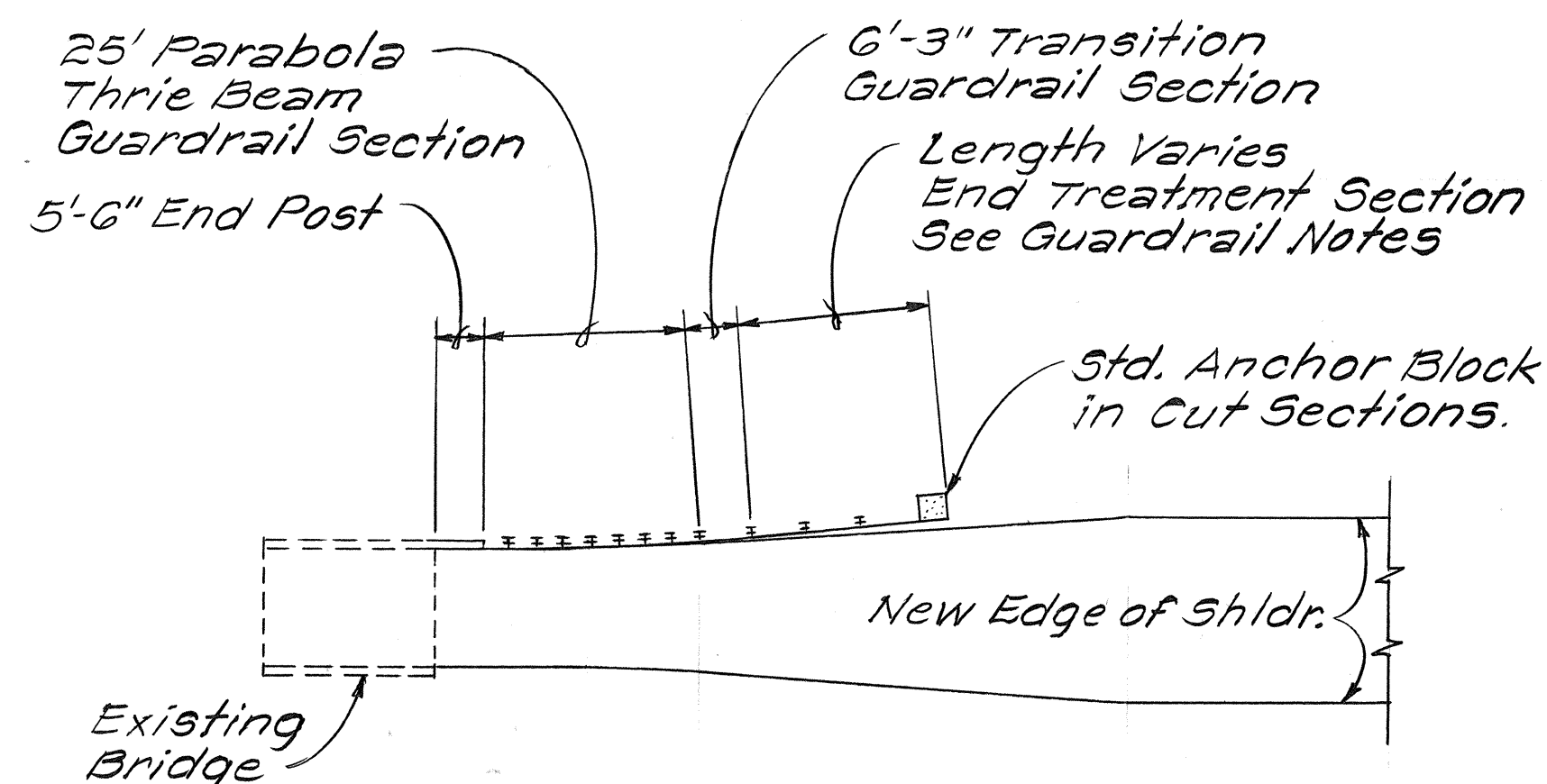
PLAN



ELEVATION

TYPICAL 10:1 GUARDRAIL FLARE

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



TYPICAL GUARDRAIL END TREATMENT

Scale: 1" = 20'

GUARDRAIL NOTES:

1. For End Treatment in Cut Sections, use Anchor Block. Exact length for End Treatment using Anchor Block to be determined in the field by the Engineer. See 10:1 Flare with Anchor Block Detail this sheet for Typical Length.
2. At other End Treatment locations, use BCT End Treatment. Length is 25 feet.
3. End Treatment Section, BCT or 10:1 Flare with Anchor Block, will be paid for as Guardrail, Type 3-Single with Steel Post by the linear foot.
4. Transition Guardrail Section will be paid for as Guardrail, Type 3-Single Thrie Beam with Steel Post by the linear foot.
5. Thrie Beam Guardrail Section will be paid for as Guardrail, Type 3-Single Thrie Beam with Steel Post by the linear foot.
6. Concrete End Post will be paid for per each.
7. 1'-6" Concrete Base required around Steel Post at DRM wall locations is considered incidental to New Guardrail. See Sht. No. 2 for details.
8. Removal of Existing Guardrails and Guardrail Posts shall be incidental to New Guardrail.

STATE OF HAWAII
DEPARTMENT OF TRANSPORTATION
LAND TRANSPORTATION FACILITIES DIVISION

GUARDRAIL DETAILS

HANA HWY. IMPROVEMENTS

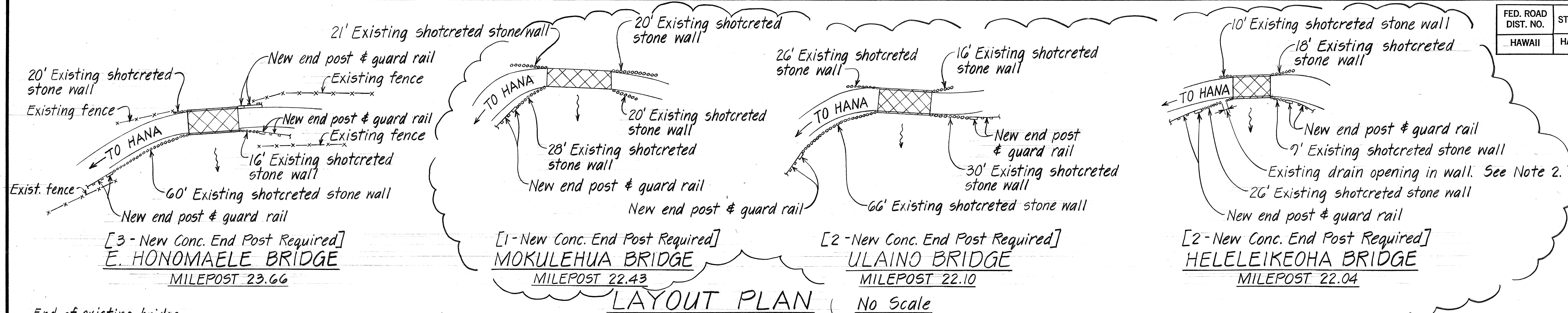
Hana towards Wailua, P.H.I

Project No. 360B-01-80

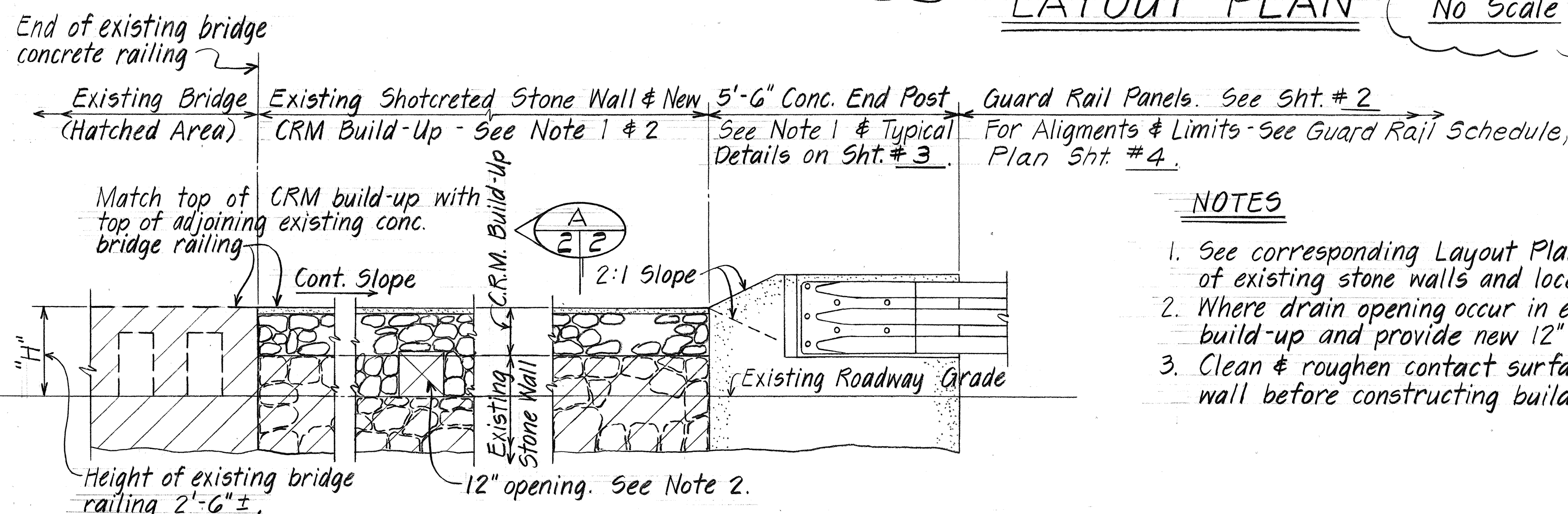
Scale: As Shown Date: May, 1980

SHEET NO. 1 OF 8 SHEETS

FED. ROAD DIST. NO.	STATE	PROJ. NO.	FISCAL YEAR	SHEET NO.	TOTAL SHEETS
HAWAII	HAW.	360B-01-80	1980	9	28



(NOT IN CONTRACT)

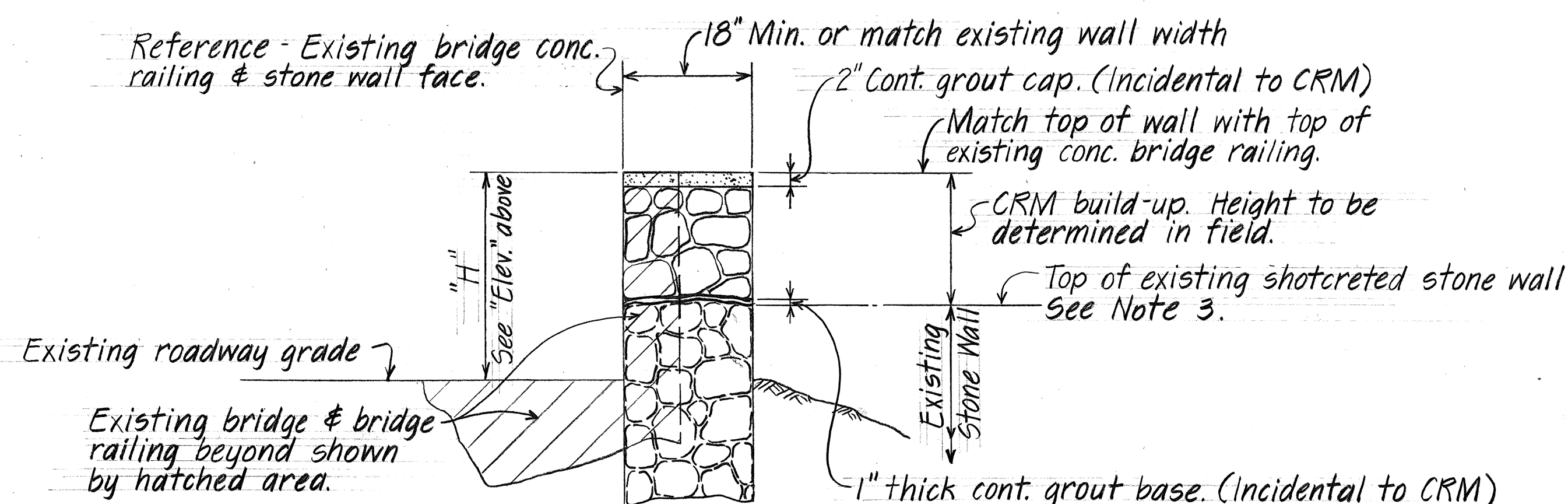


NOTES

1. See corresponding Layout Plan above for location & length of existing stone walls and location of new end post.
2. Where drain opening occur in existing stone wall, continue CRM build-up and provide new 12" x 12" drain opening thru wall in its place.
3. Clean & roughen contact surface area of existing shotcreted stone wall before constructing build-up. (Incidental to CRM)

ESTIMATED QUANTITIES

ITEM NO.	ITEM	UNIT	QUANTITIES
507.7501	NEW CONCRETE END POST	Each	23
508.0100	C.R.M.	Cu. Yd.	12



*For Details see Sht. # 2

LOCATION SCHEDULE OF EXISTING BRIDGES FOR CONSTRUCTION OF *NEW CONC. END POST

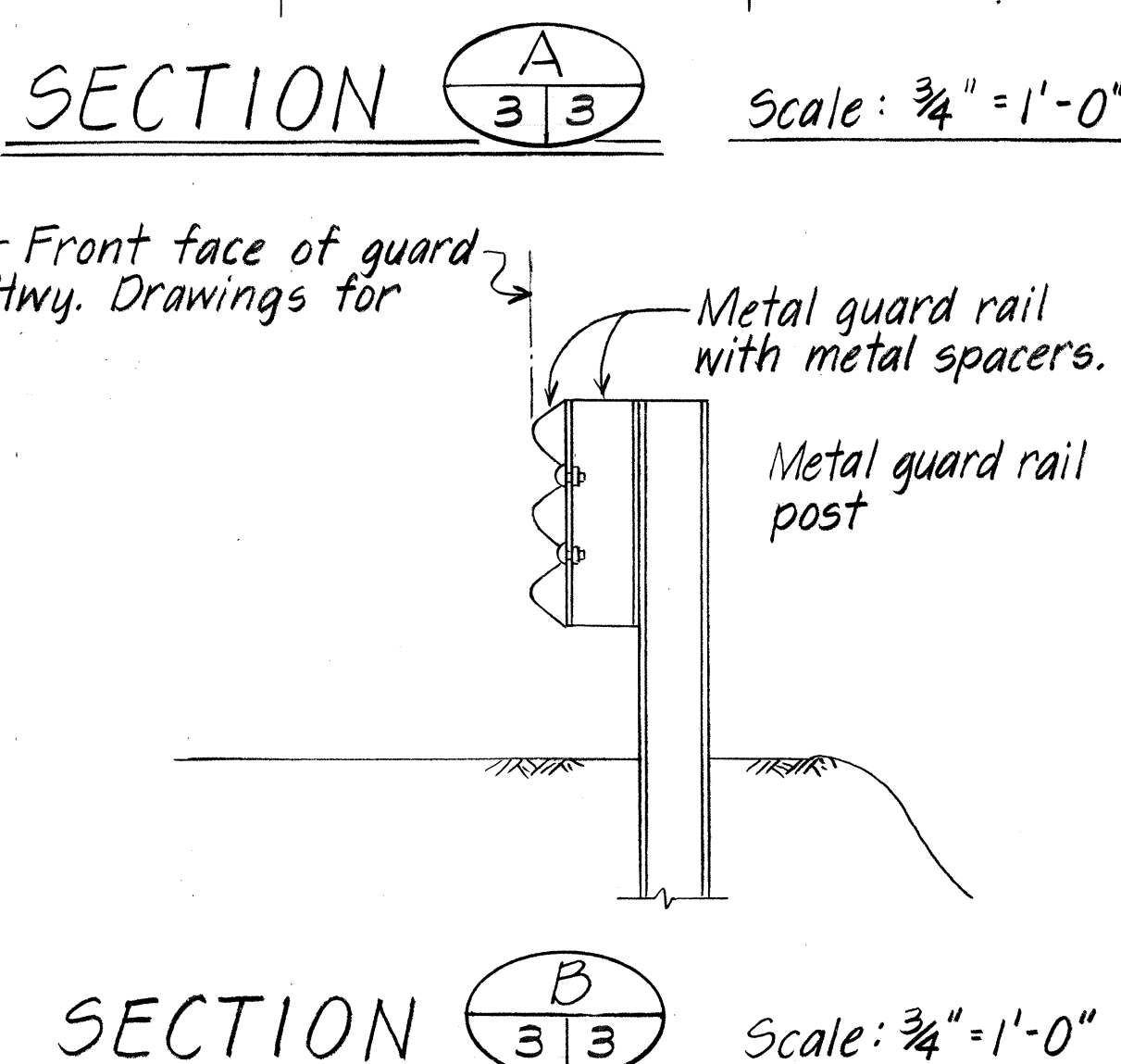
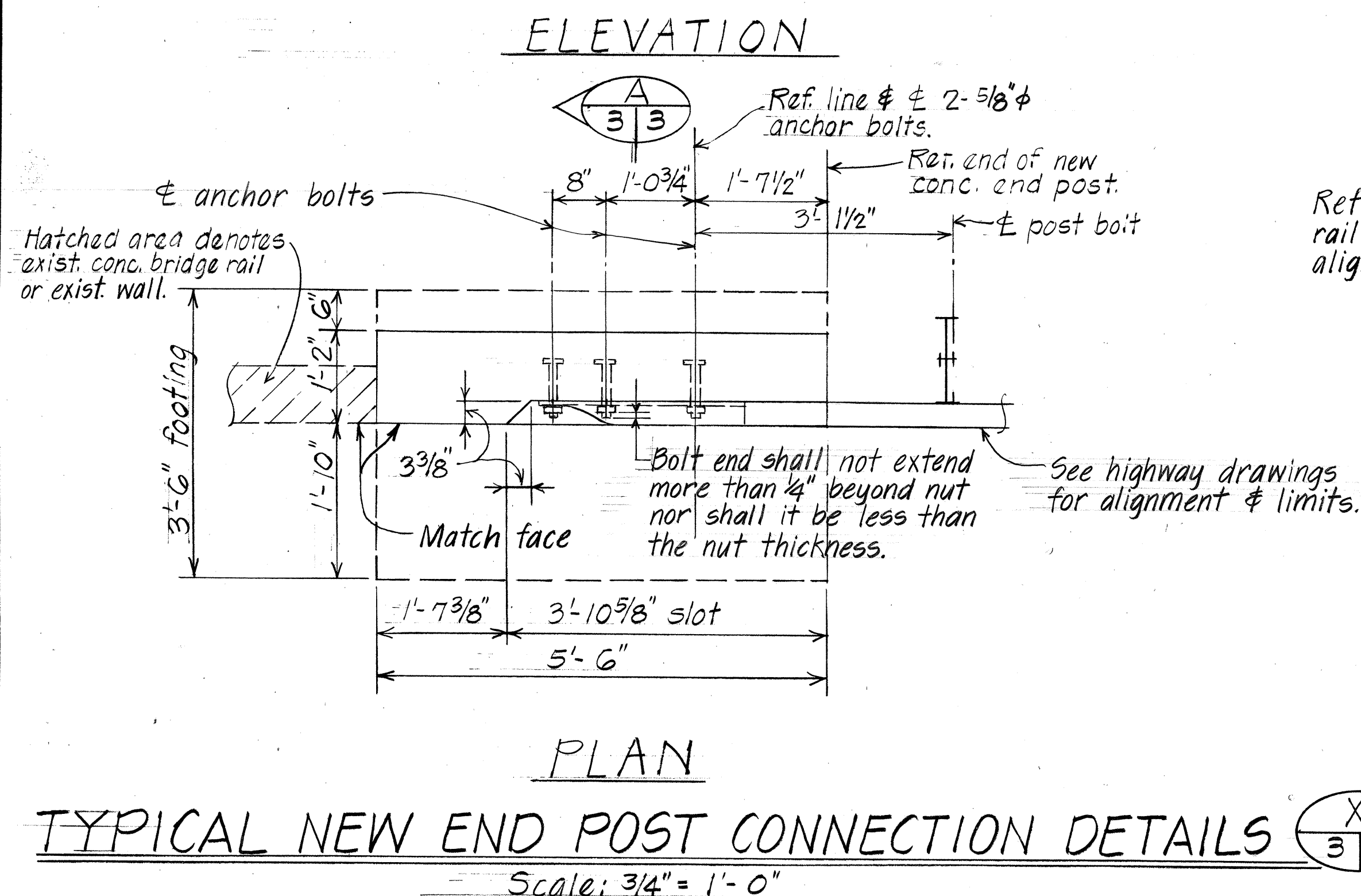
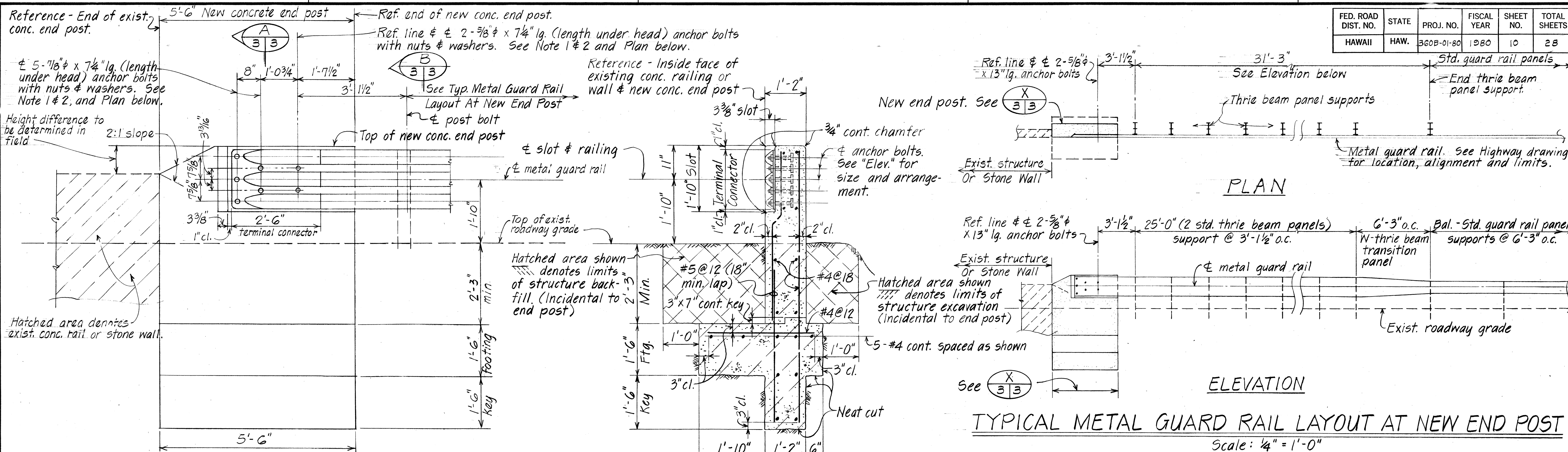
NAME OF BRIDGE	ROUTE MILEPOST	NUMBER OF END POST REQUIRED
BRIDGE No 1	MP 24.62	1 @ EA. END OF EXIST'G BR. RAILING
BRIDGE No 2	MP 24.32	Do.
BRIDGE No 3	MP 24.21	Do.
BRIDGE No 4	MP 23.97	Do.
OILINAI BRIDGE	MP 23.30	Do.
TOTAL NUMBER REQUIRED = 20		

7/22/80 Revised Estimated Quantities & Deleted Work at Mokulehua Bridge

DATE REVISION

STATE OF HAWAII
DEPARTMENT OF TRANSPORTATION
LAND TRANSPORTATION FACILITIES DIVISION
GUARD RAIL
STRUCTURE CONNECTION DETAIL
HANA HIGHWAY IMPROVEMENTS
HANA TOWARDS WAILUA, PHASE I
PROJECT NO. 360B-01-80
Scale: As Shown Date: May, 1980
SHEET No. 2 OF 8 SHEETS

FED. ROAD DIST. NO.	STATE	PROJ. NO.	FISCAL YEAR	SHEET NO.	TOTAL SHEETS
HAWAII	HAW.	360B-01-80	1980	10	28



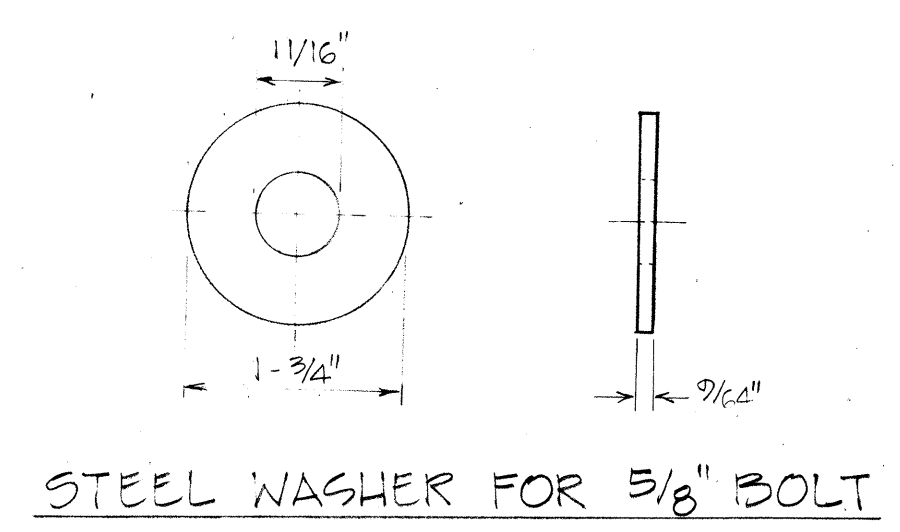
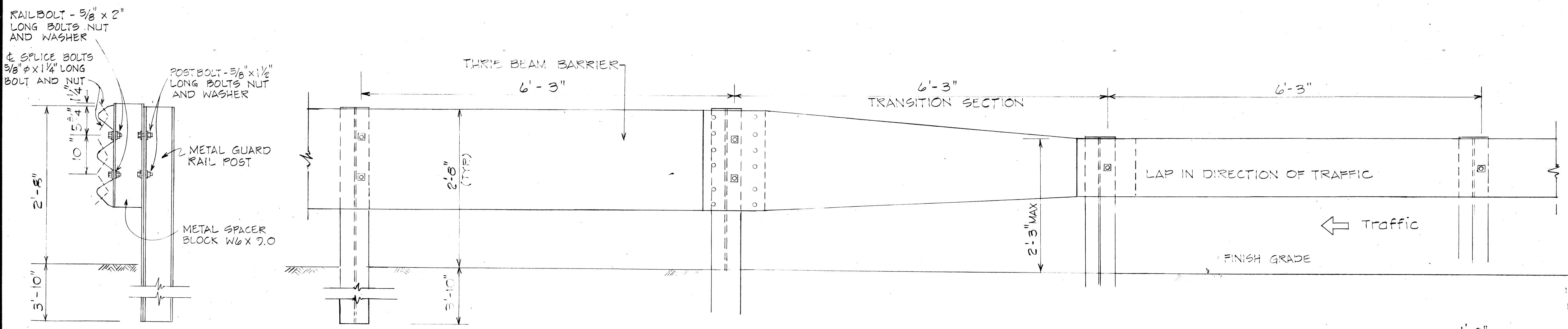
- NOTES:**
- All anchor bolts shall be high strength bolts conforming to the requirements of ASTM A-325.
 - All anchor bolts, nuts, and washers shall be hot dip galvanized after fabrication.
 - First 2 elements (25'-0") of thrie beam guard rail, adjoining terminal connector, shall be of galvanized steel.
 - Any damage to the existing structures due to the Contractor's operation shall be repaired, at his expense, to the satisfaction of the Engineer.
 - The work necessary to connect guard rails to new end posts shall include all labor, materials, tools, equipment and incidentals necessary to complete the work. This work will be measured and paid for in units of one for each guard rail to end post connection.
- SYMBOL:**
- Sht. no. section is cut or detail location Sht. no. detail is drawn

STATE OF HAWAII
DEPARTMENT OF TRANSPORTATION
LAND TRANSPORTATION FACILITIES DIVISION

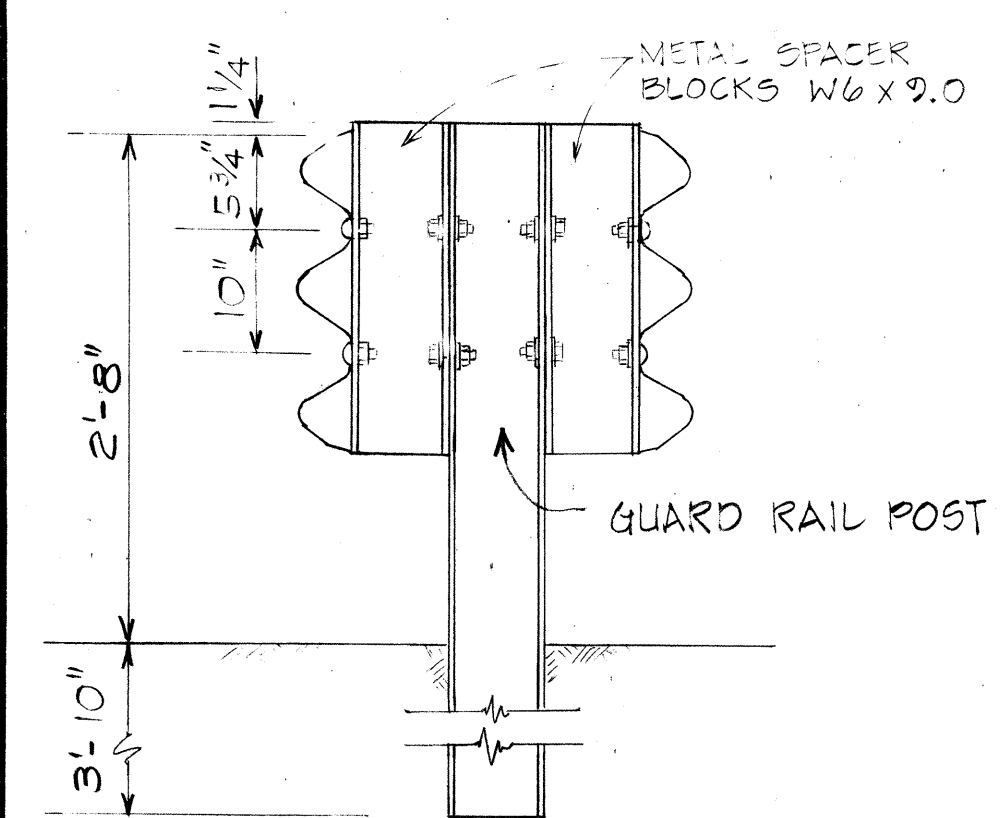
GUARD RAIL
STRUCTURE CONNECTION DETAIL

HANA HIGHWAY IMPROVEMENTS
HANA TOWARDS WAILUA, PHASE I
PROJECT NO. 360B-01-80
Scale: As Shown Date: May, 1980
SHEET No. 3 OF 8 SHEETS

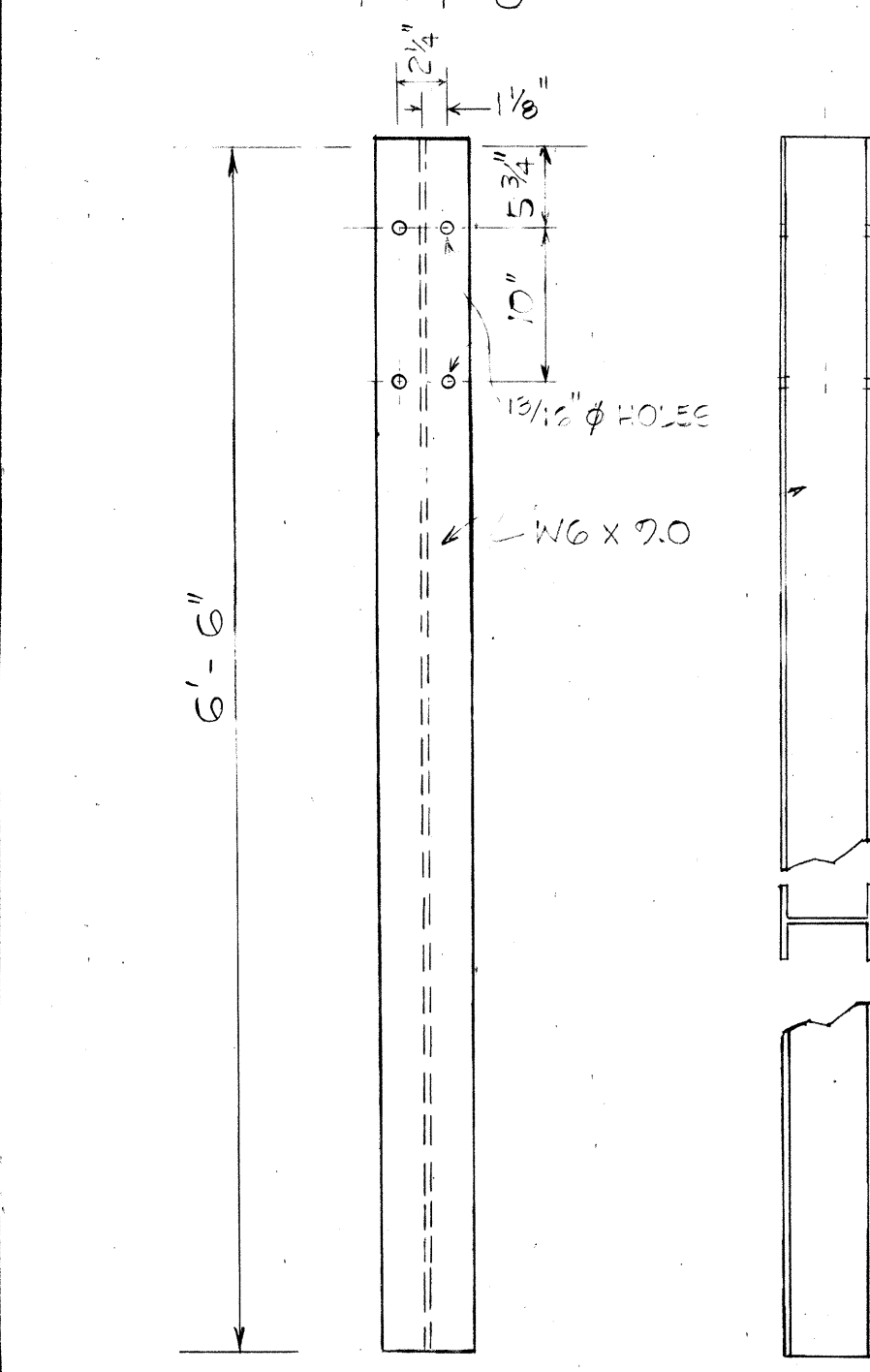
FED. ROAD DIST. NO.	STATE	PROJ. NO.	FISCAL YEAR	SHEET NO.	TOTAL SHEETS
HAWAII	HAW.	360B-01-80	1980	11	28



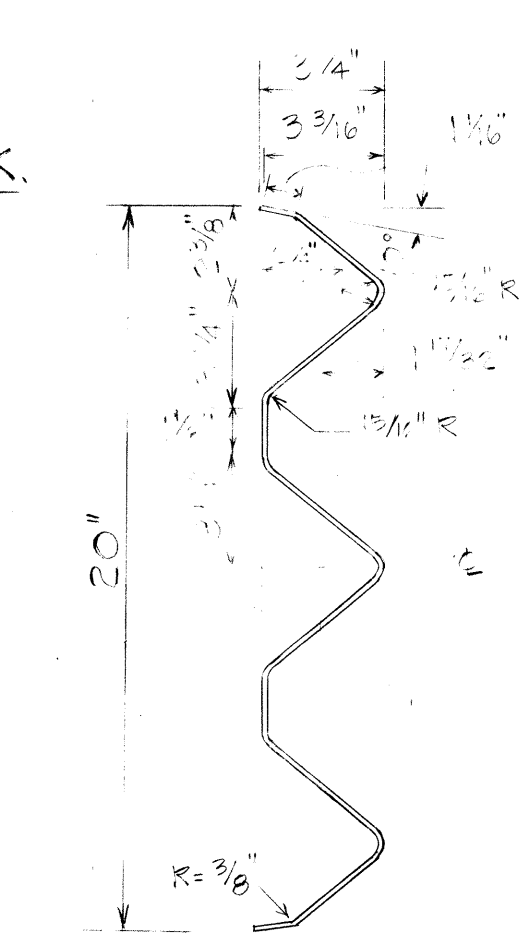
SINGLE METAL GUARD RAIL ON METAL POST W/METAL SPACER BLK.



DOUBLE METAL GUARD RAIL ON METAL POST WITH METAL SPACER BLOCK

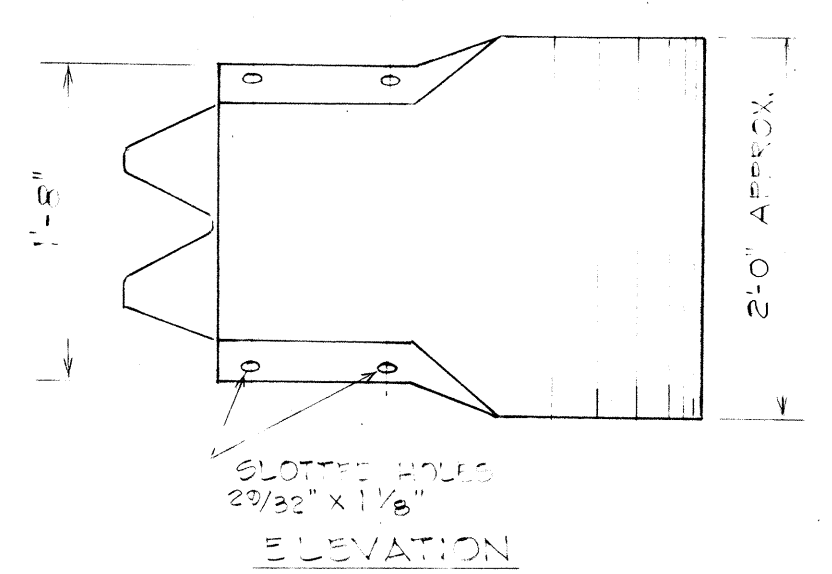
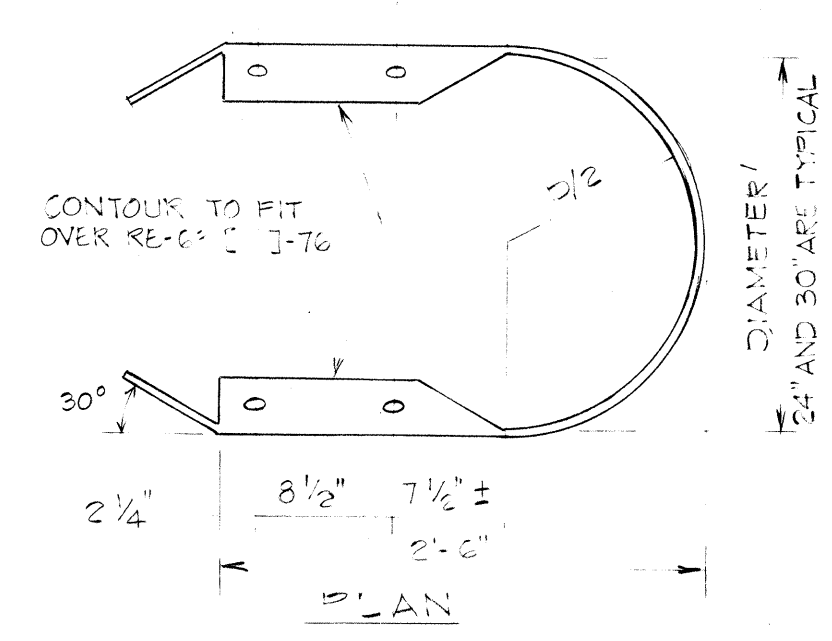
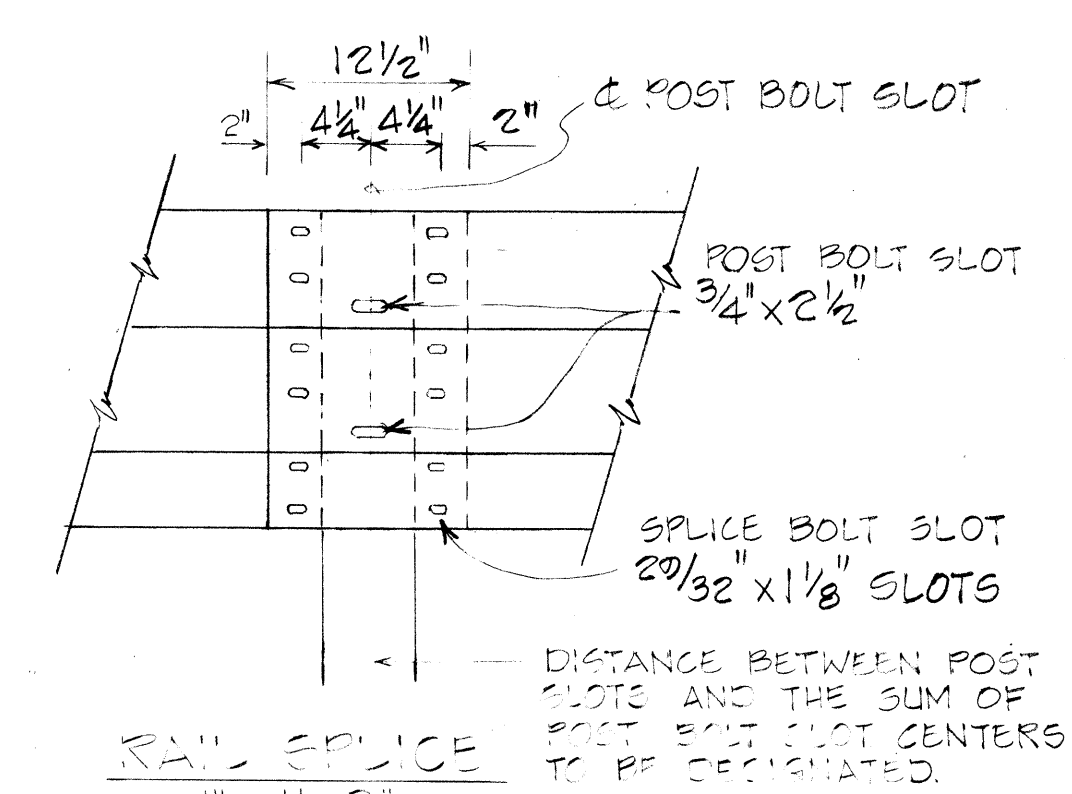


POST DETAILS

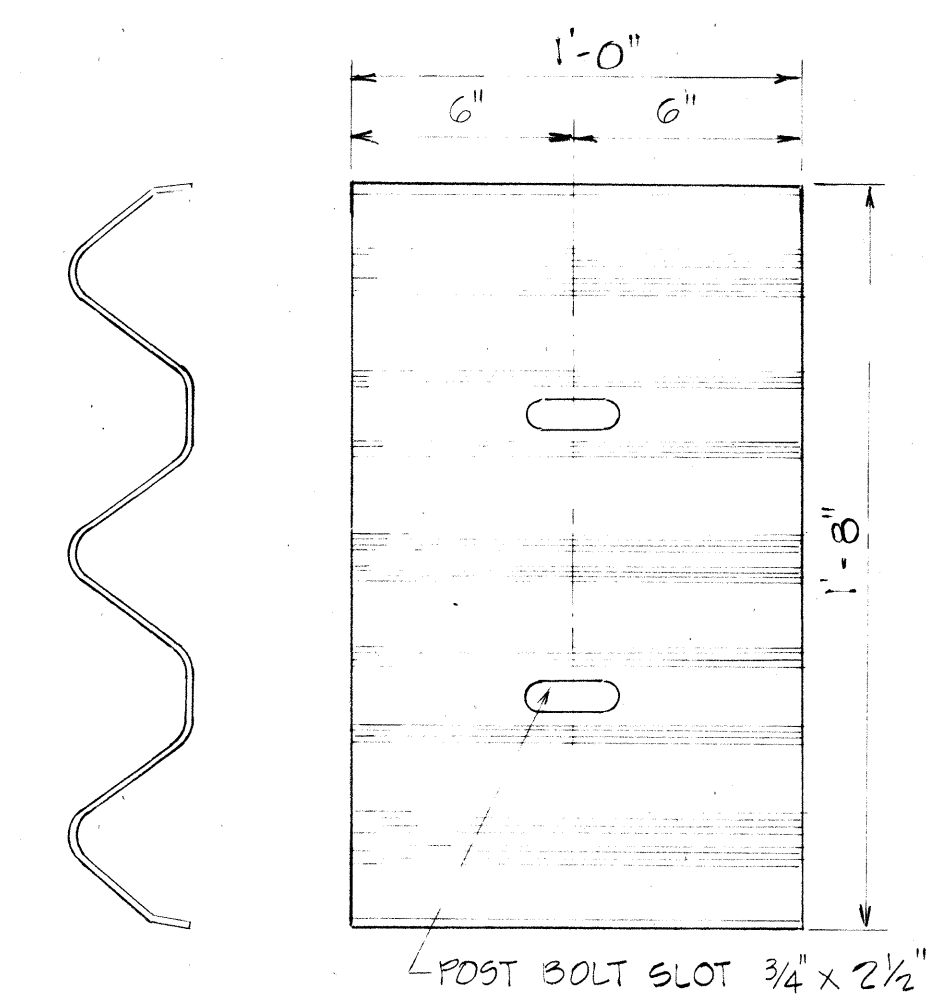


SECTION THRU RAIL ELEMENT

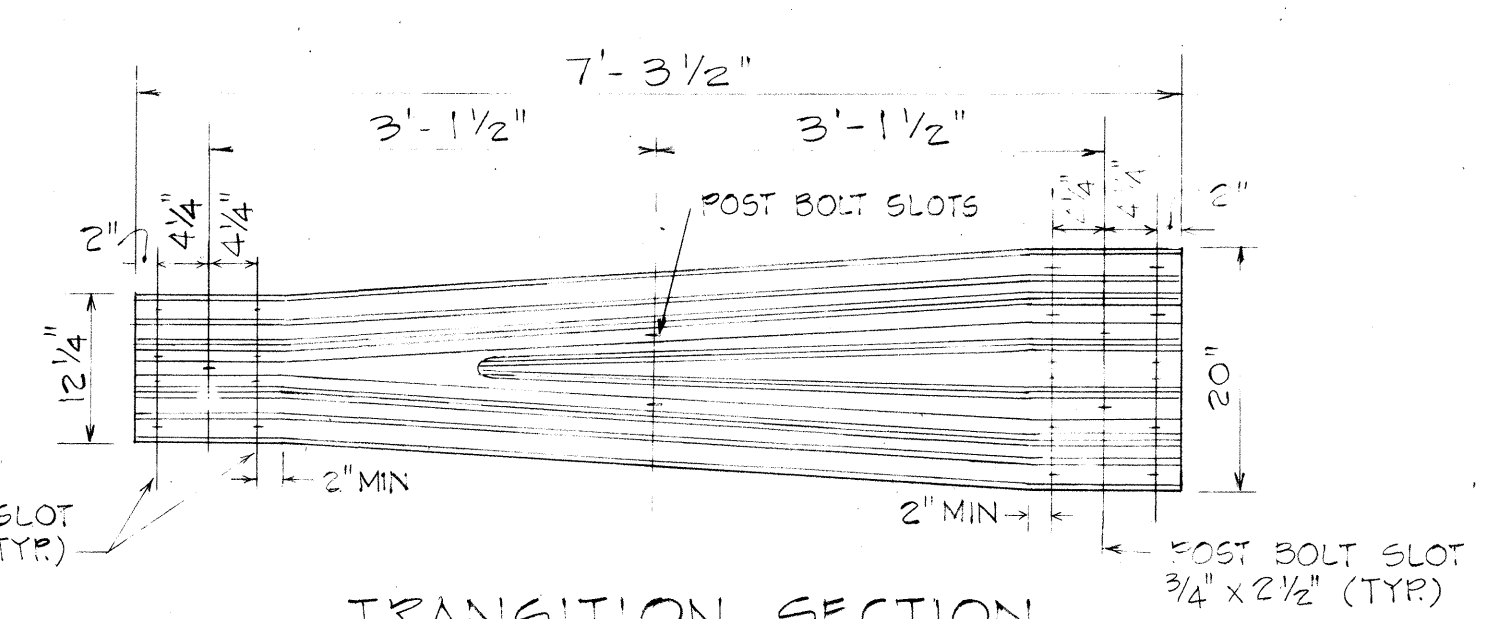
TRANSITION SECTION



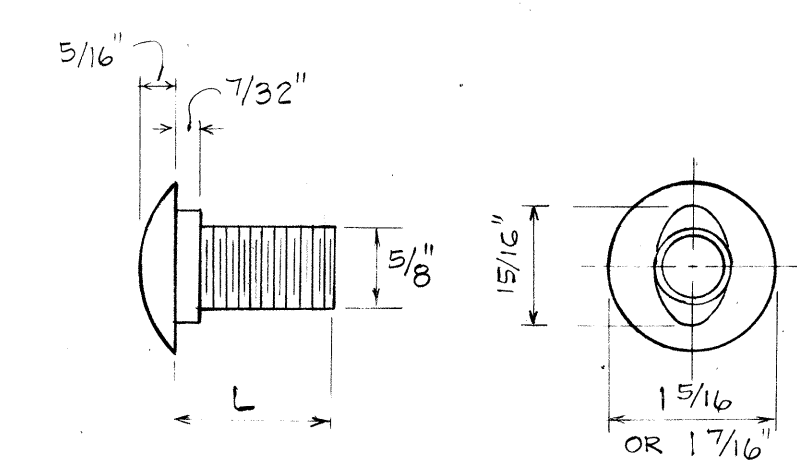
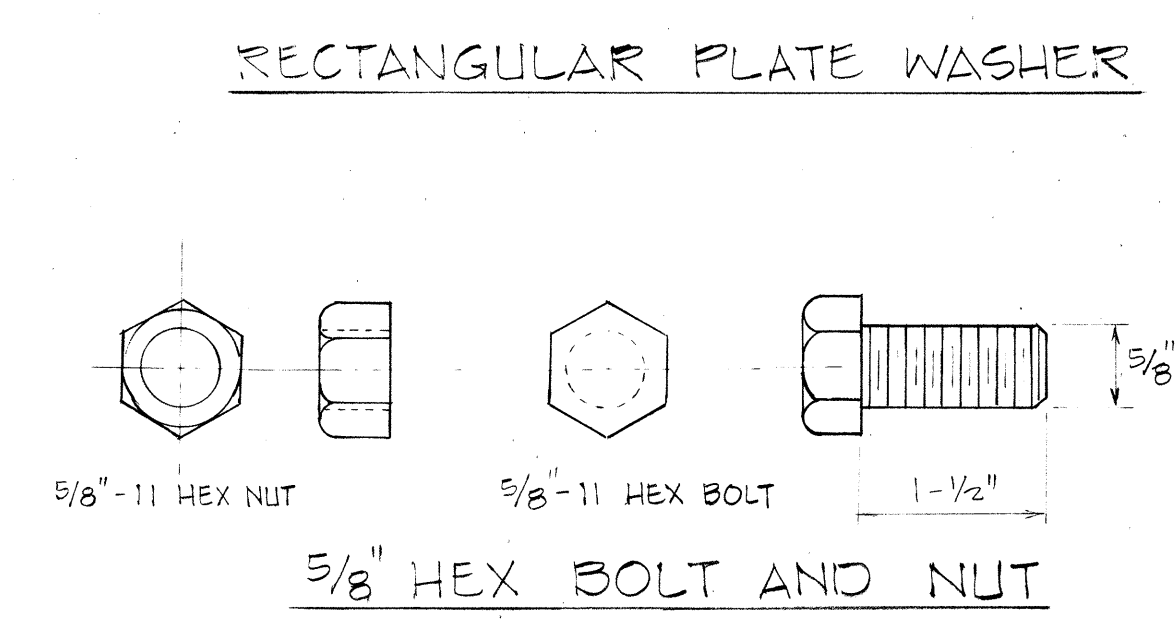
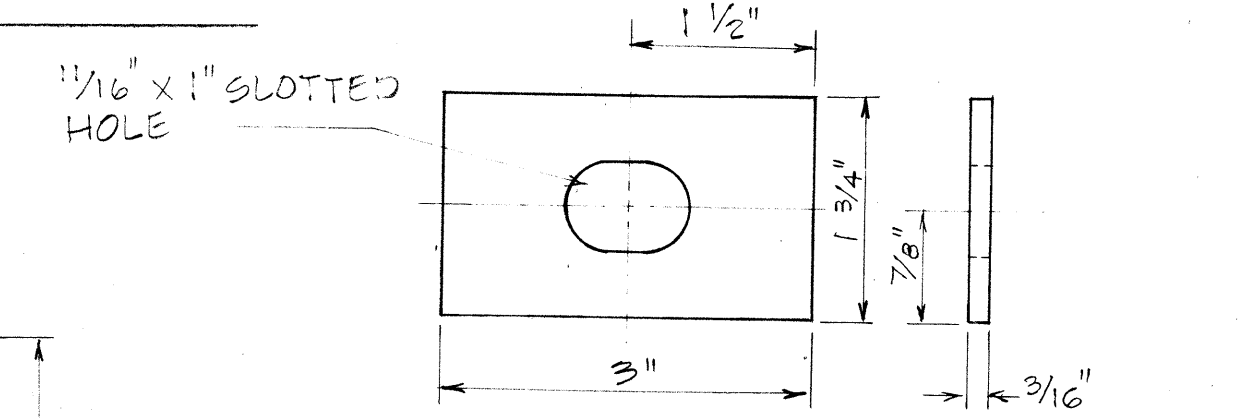
END SECTION (BUFFER)



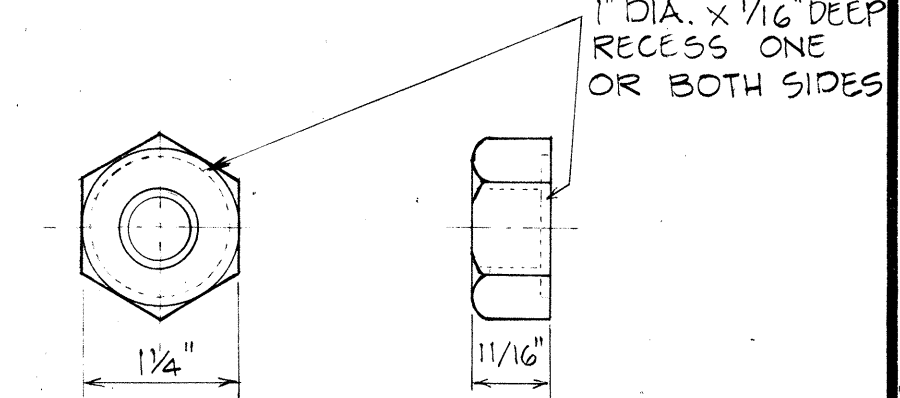
BACK UP PLATE



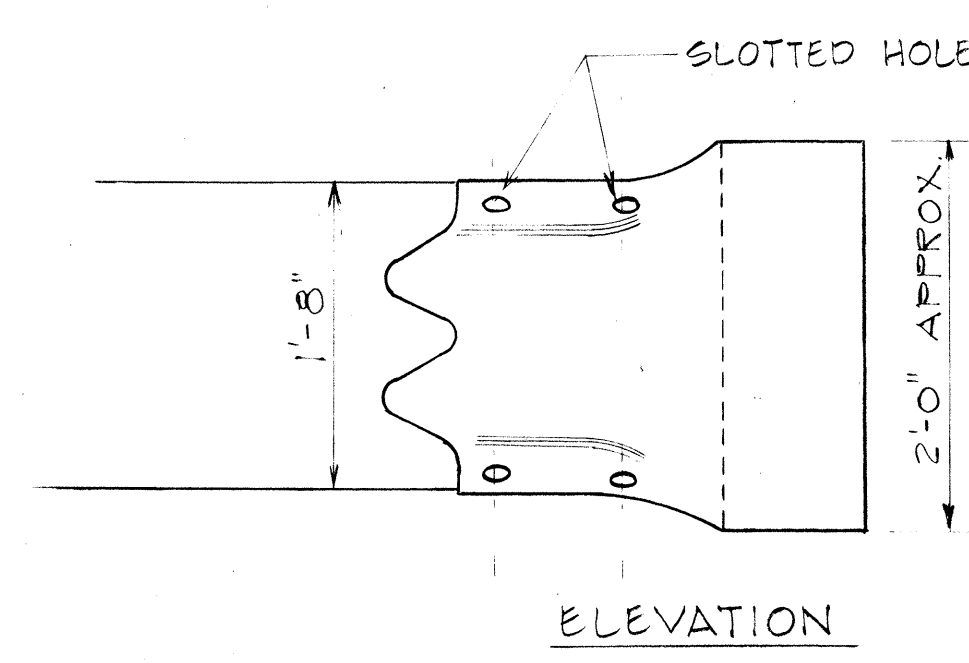
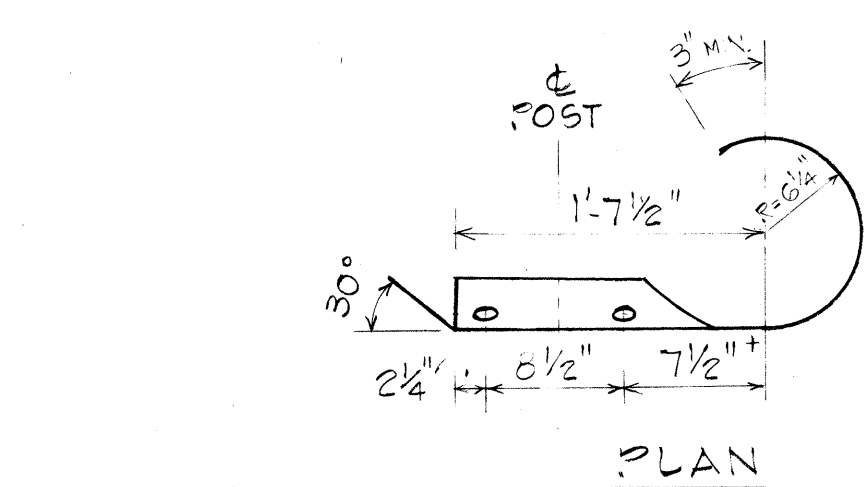
TRANSITION SECTION



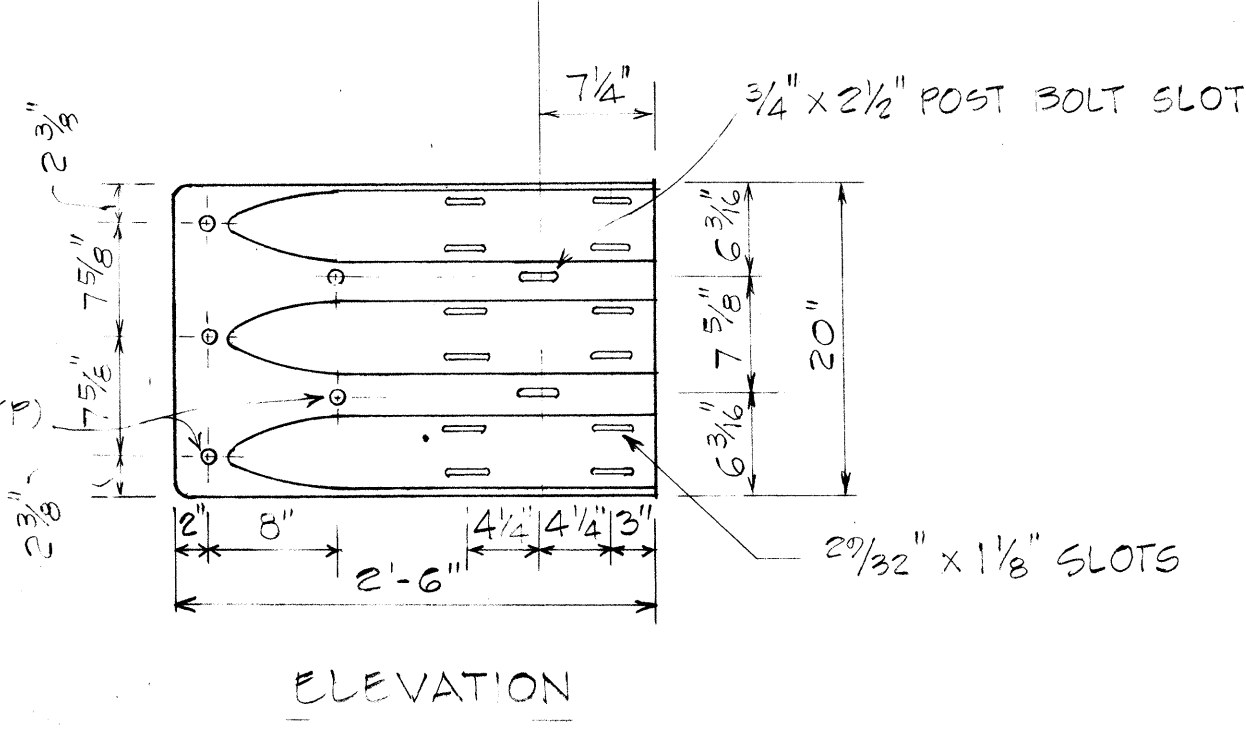
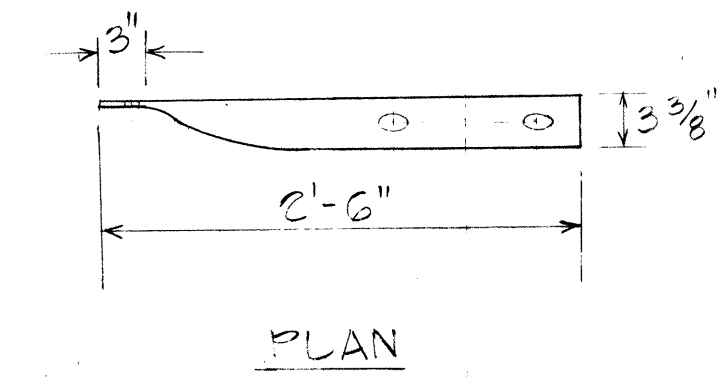
L	THREAD LENGTH
1 1/4"	FULL THREAD
2"	1/2" MIN THREAD LENGTH



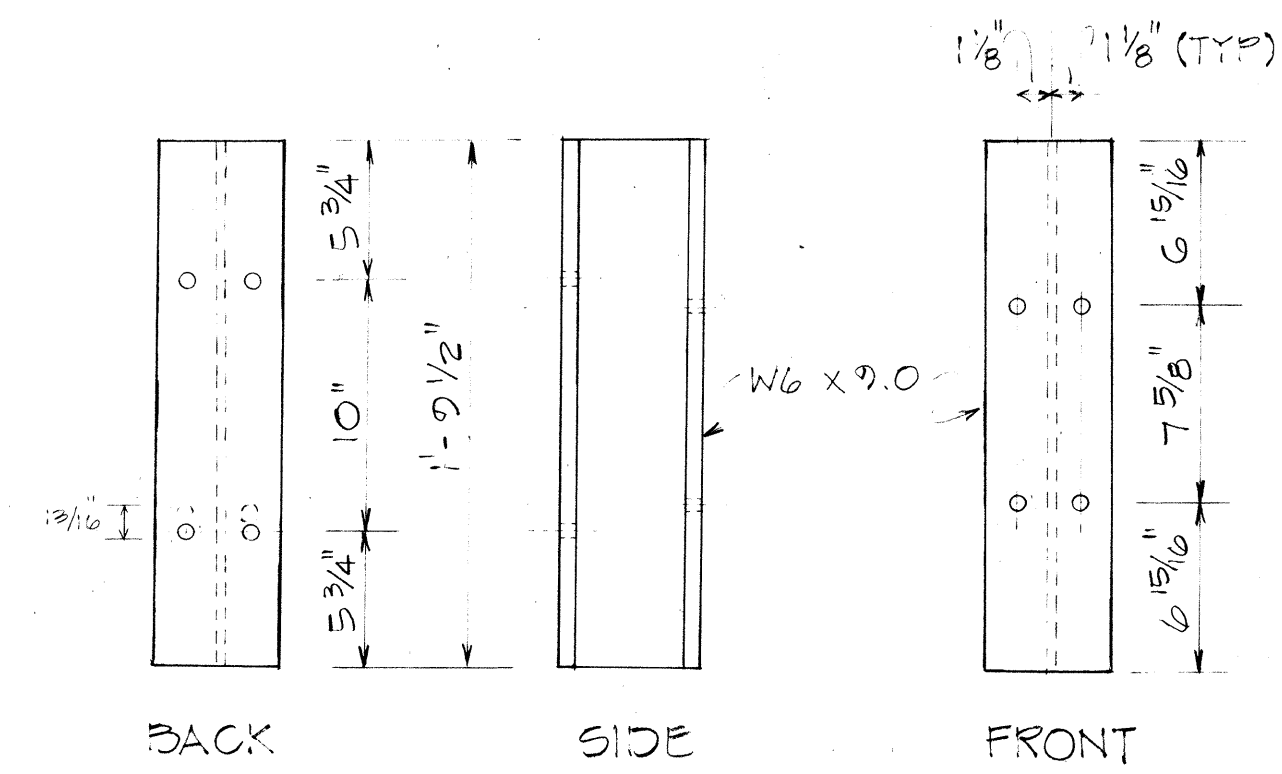
5/8" BUTTON HEAD BOLTS AND RECESS NUT



END SECTION (ROUNDED)



TERMINAL CONNECTOR



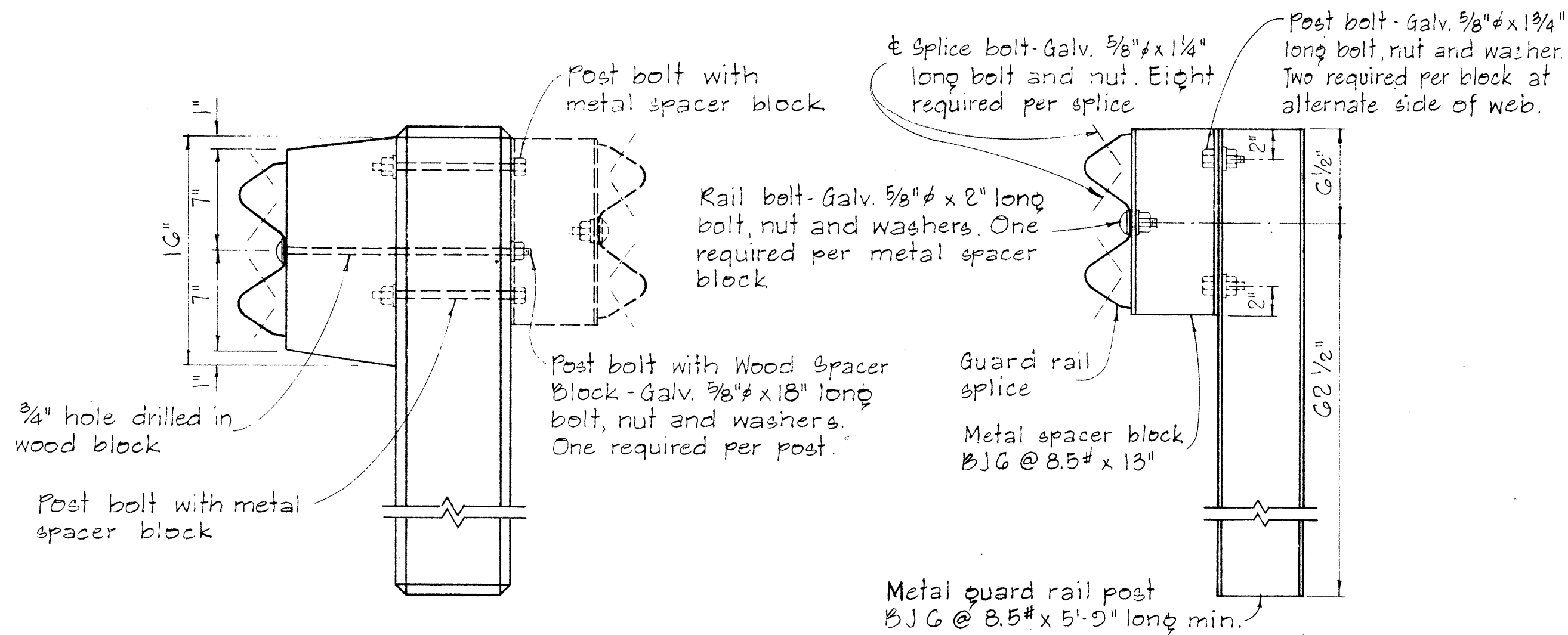
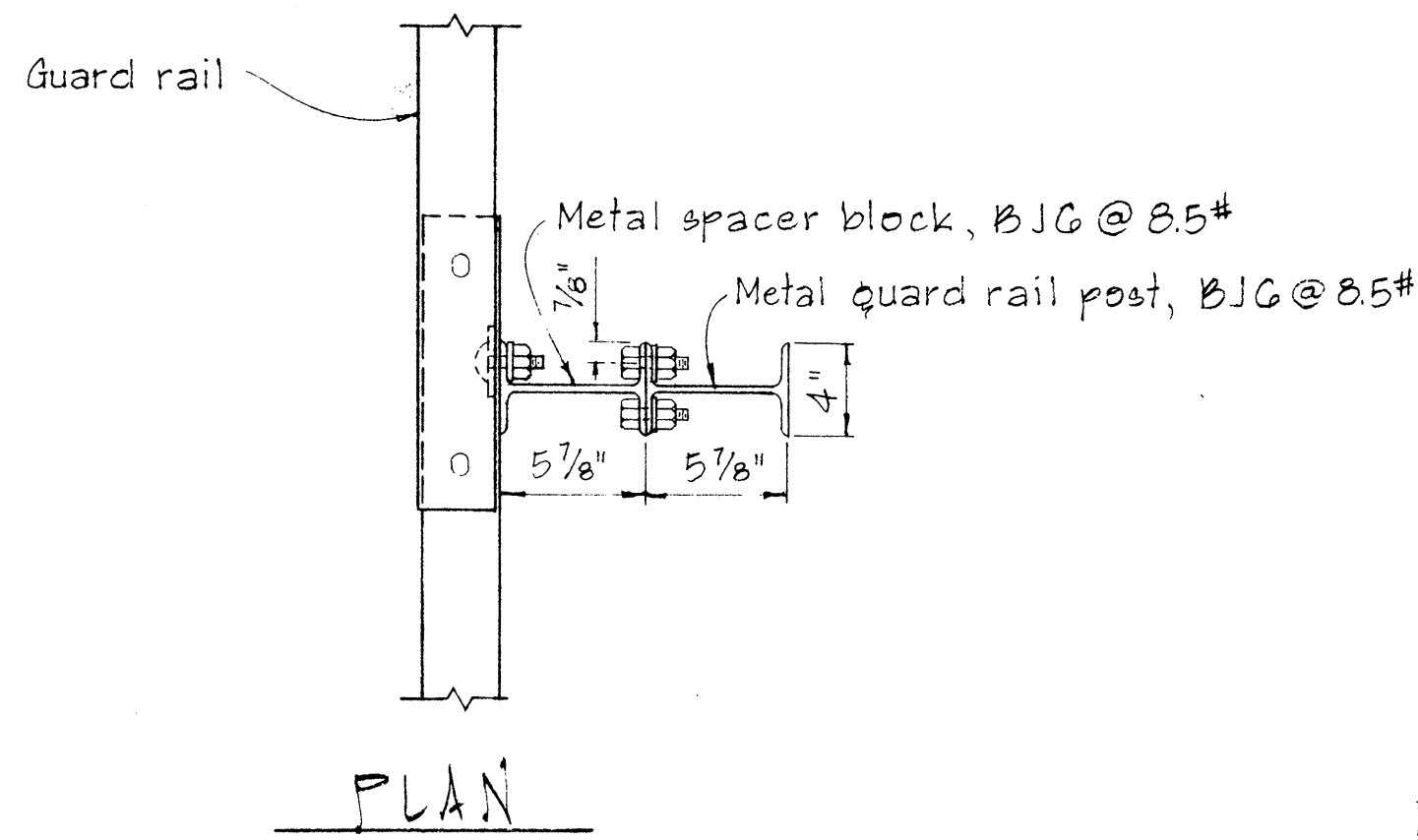
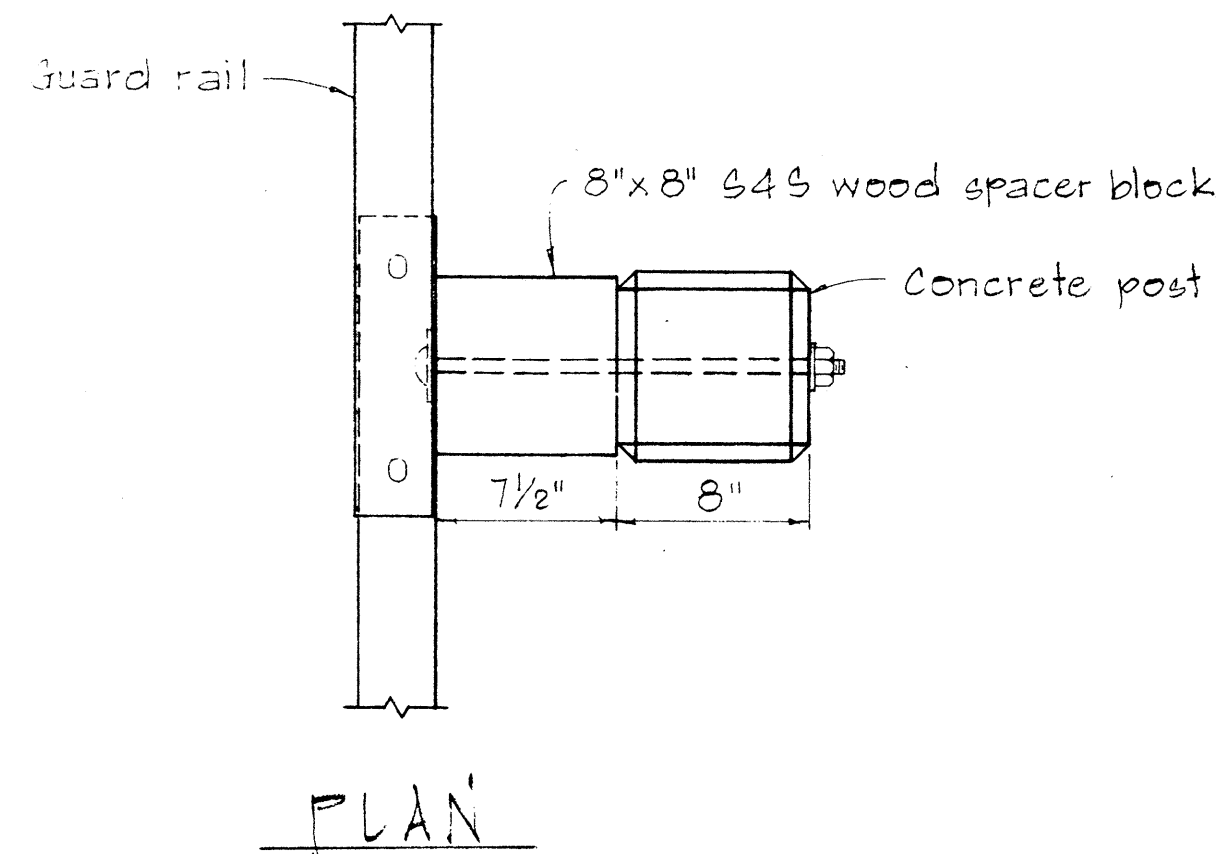
SPACER BLOCK

STATE OF HAWAII
DEPARTMENT OF TRANSPORTATION
LAND TRANSPORTATION FACILITIES DIVISION

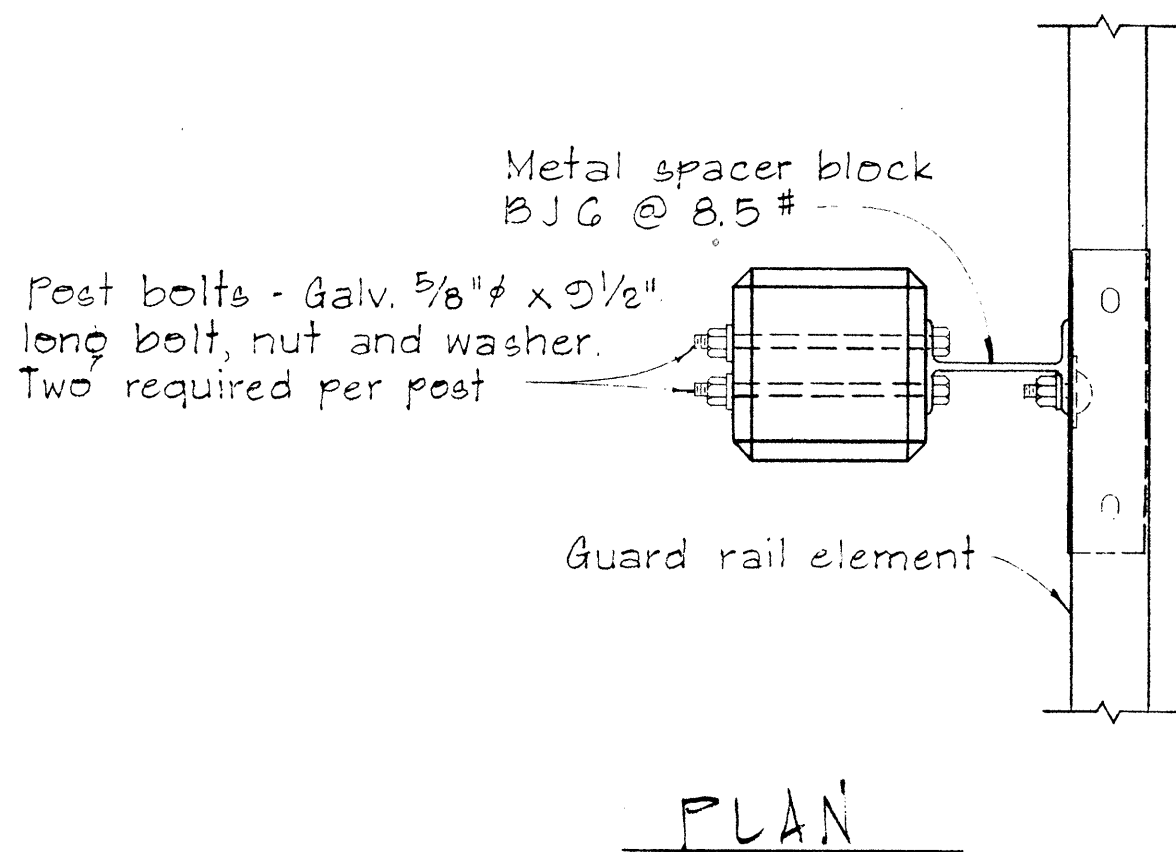
TYPICAL DETAIL
GUARD RAIL TYPE 3
THREE BEAM

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

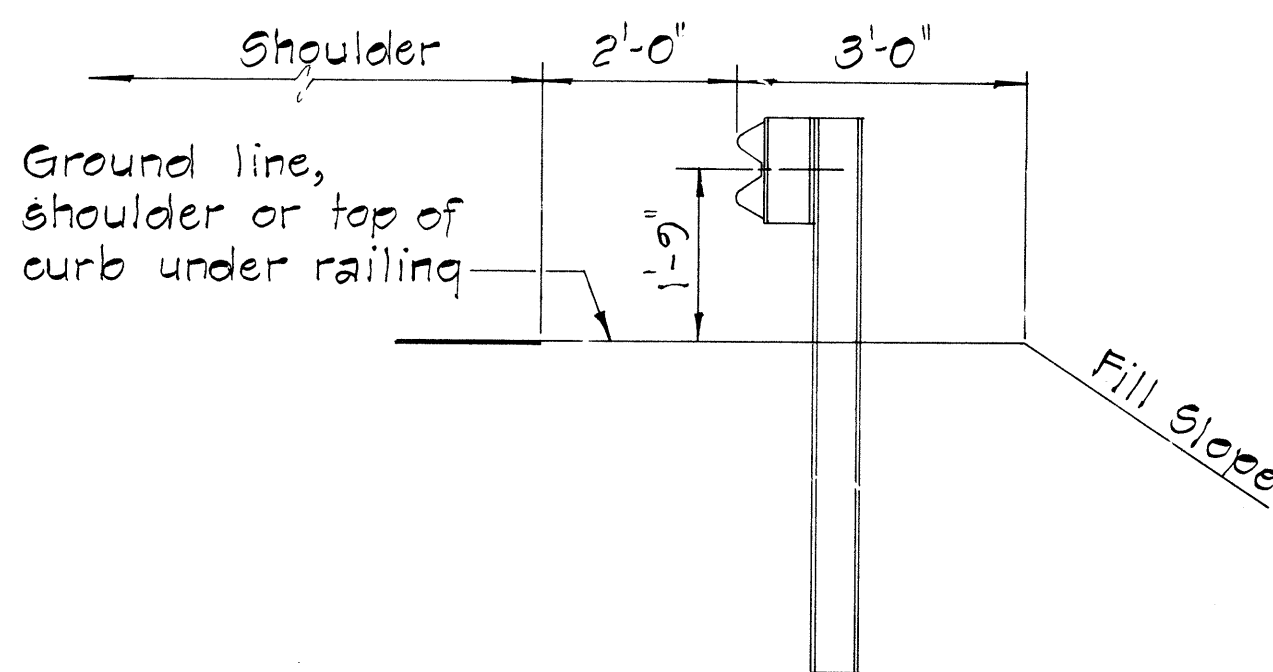
FED. ROAD DIST. NO.	STATE	PROJ. NO.	FISCAL YEAR	SHEET NO.	TOTAL SHEETS
HAWAII	HAW.	360B-01-80	1980	12	28



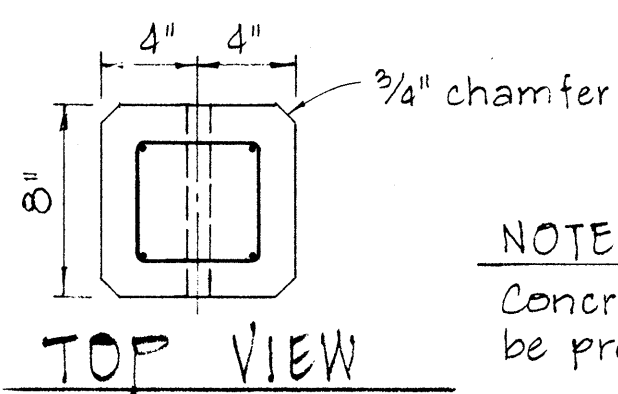
SINGLE METAL GUARD RAIL ON METAL POST WITH METAL SPACER BLOCK
SCALE: 1 1/2" = 1'-0"



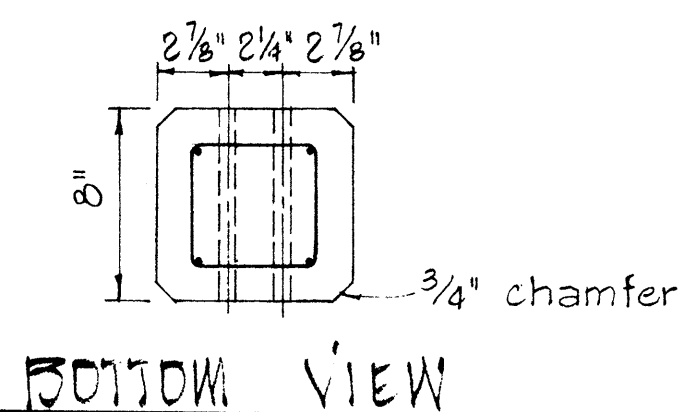
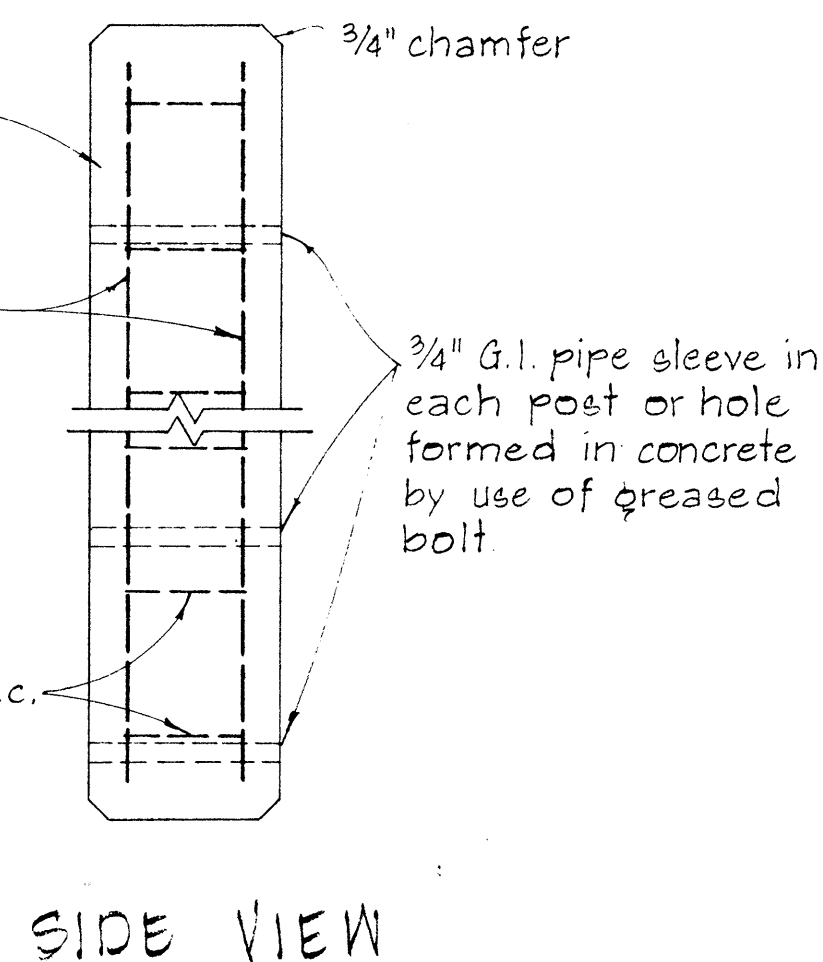
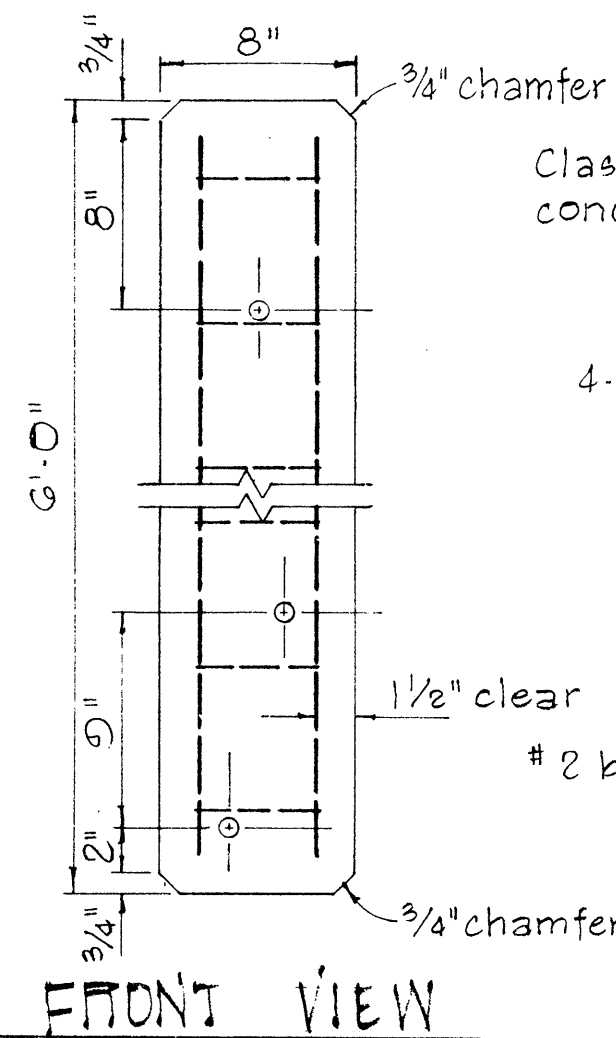
SINGLE METAL GUARD RAIL ON PRECAST CONCRETE POST WITH WOOD OR METAL SPACER BLOCK
SCALE: 1 1/2" = 1'-0"



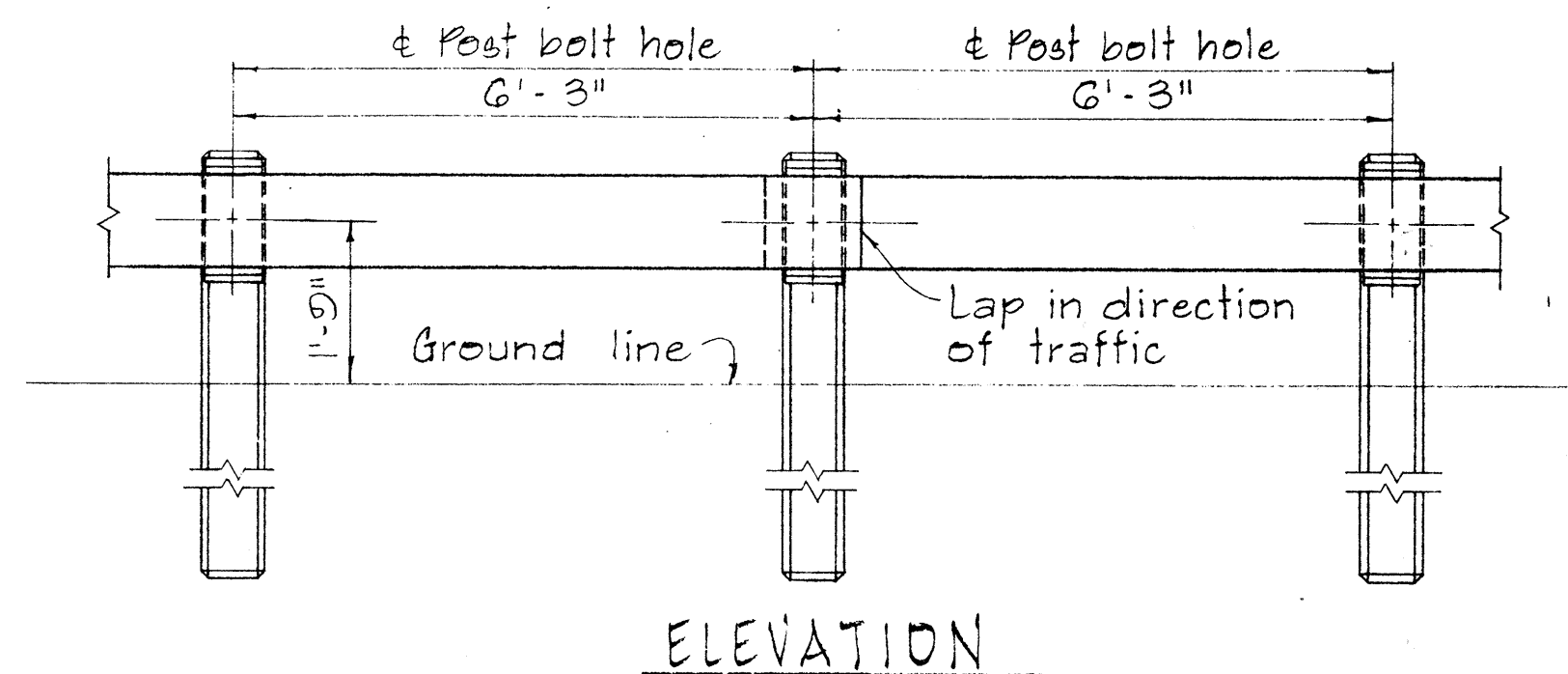
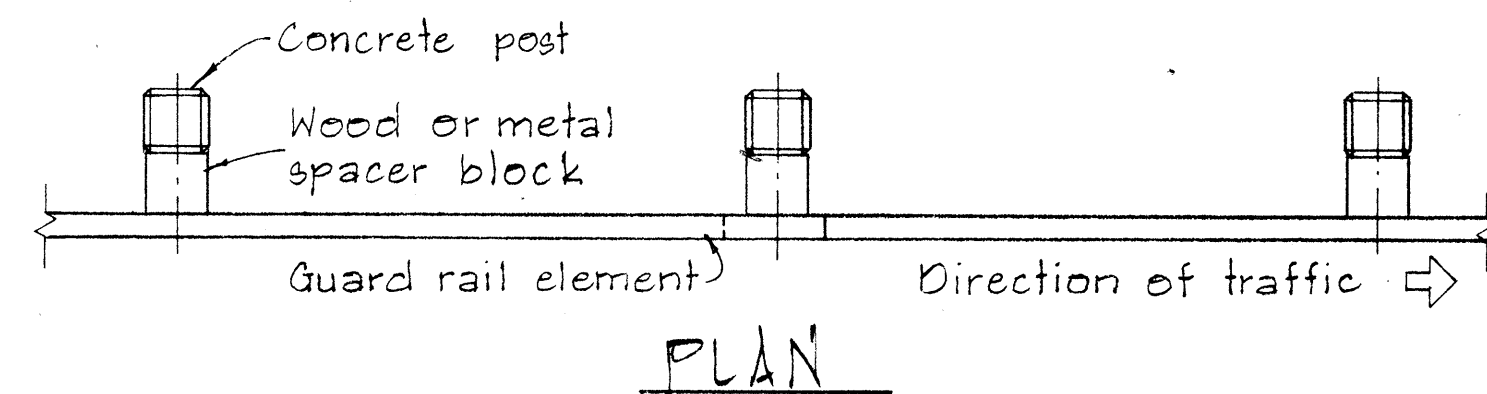
TYPICAL METAL GUARD RAIL DETAIL
SCALE: 1/2" = 1'-0"



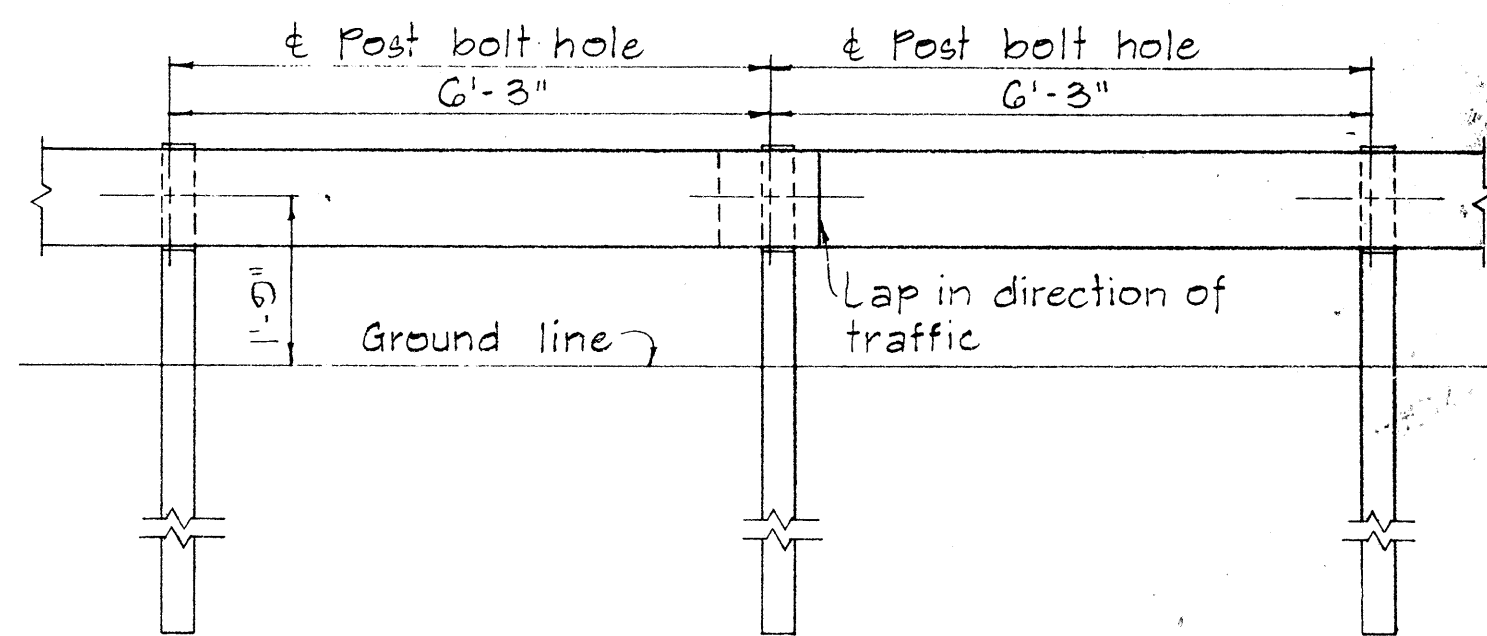
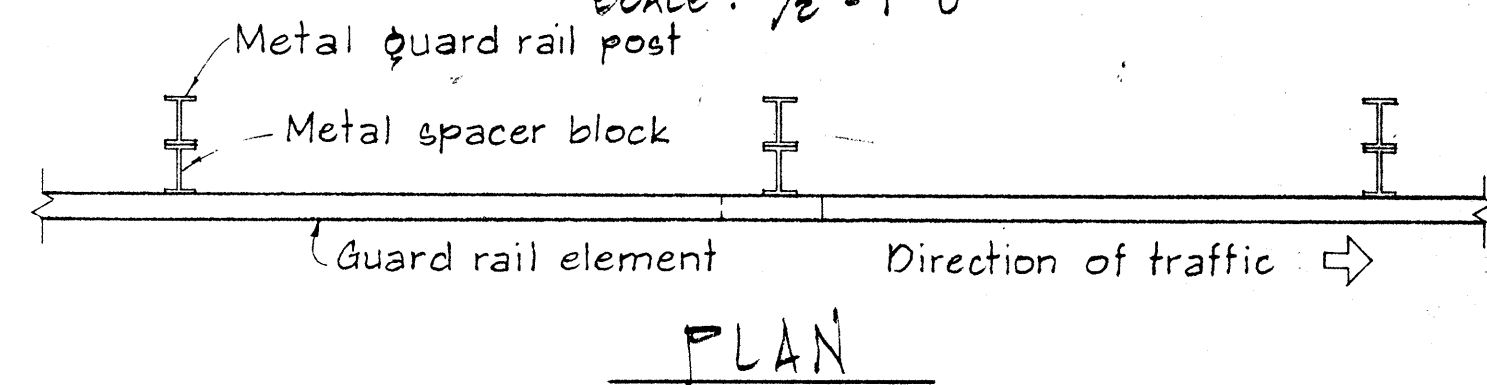
NOTE:
Concrete post shall be precast



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



METAL GUARD RAIL ON CONCRETE POST WITH WOOD OR METAL SPACER BLOCK
SCALE: 1/2" = 1'-0"



METAL GUARD RAIL ON METAL POST WITH METAL SPACER BLOCK
SCALE: 1/2" = 1'-0"

NO.	REVISION	APPROVED BY	DATE

APPROVAL RECOMMENDED:
Erich Tanaka
TRAFFIC ENGINEER
12/23/69
DATE

APPROVED:
Hubert J. Schell
ASSISTANT CHIEF, ENGINEERING
12-30-69
DATE

STATE OF HAWAII
DEPARTMENT OF TRANSPORTATION
HIGHWAYS DIVISION

STANDARD DETAILS
METAL GUARD RAIL

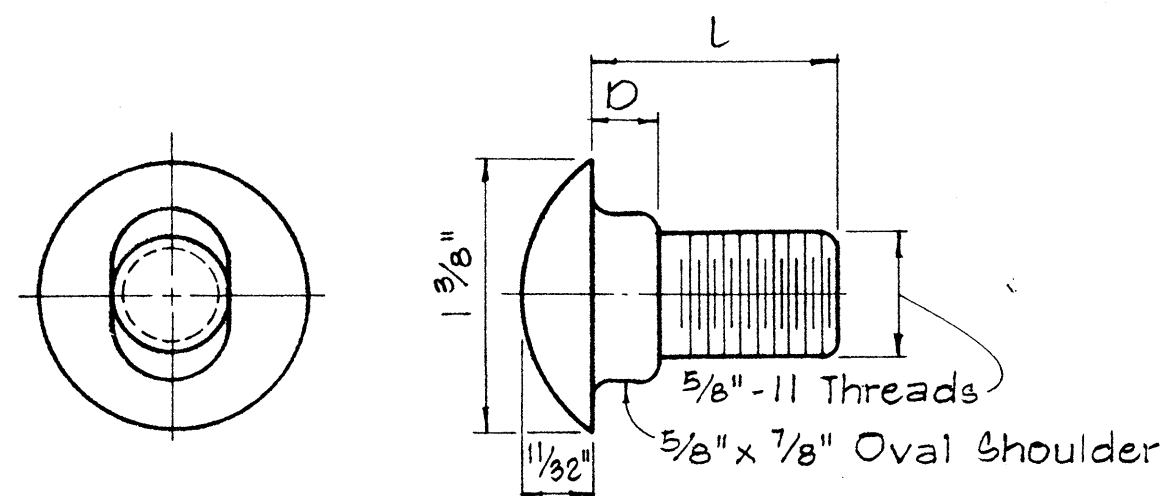
SCALE: AS SHOWN
NOV. 1968

SHEET No. 5 OF 8 SHEETS DT 500

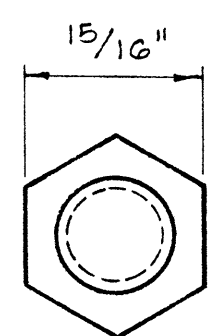
BOLT DIMENSIONS		
TYPE A BOLT		
Splice Bolt	D	L
Post Bolt for Conc. Post w/ Double Wood Blocks	5/16"	1 1/4"
Post Bolt for Conc. Post w/ Single Wood Block	3/32"	24"
Rail Bolt for Metal Block	3/32"	2"

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

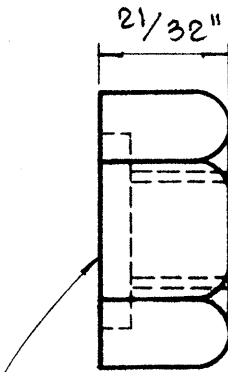
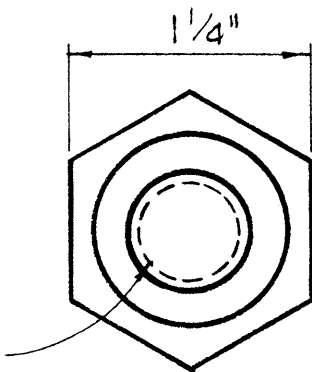
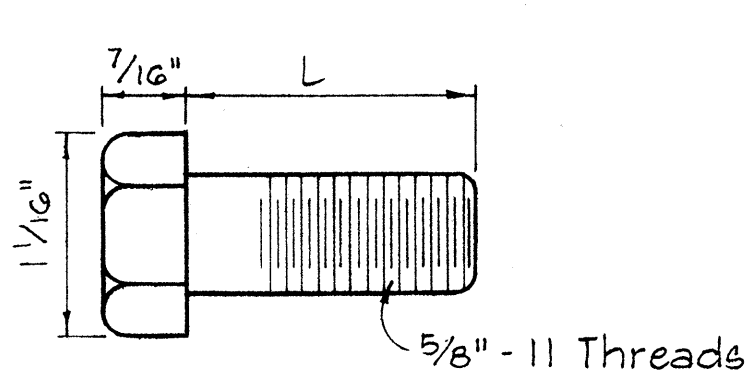
FED. ROAD DIST. NO.	STATE	PROJ. NO.	FISCAL YEAR	SHEET NO.	TOTAL SHEETS
HAWAII	HAW.	360B-01-80	1980	13	28



TYPE A BOLT



TYPE B BOLT



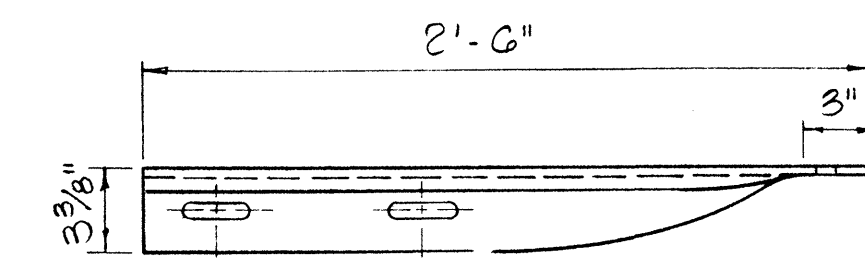
5/32" Deep x 15/16" Dia. C' Bore for Type A Bolt only.
Plain nut for Type B Bolt.

SPlice RAIL AND POST BOLTS

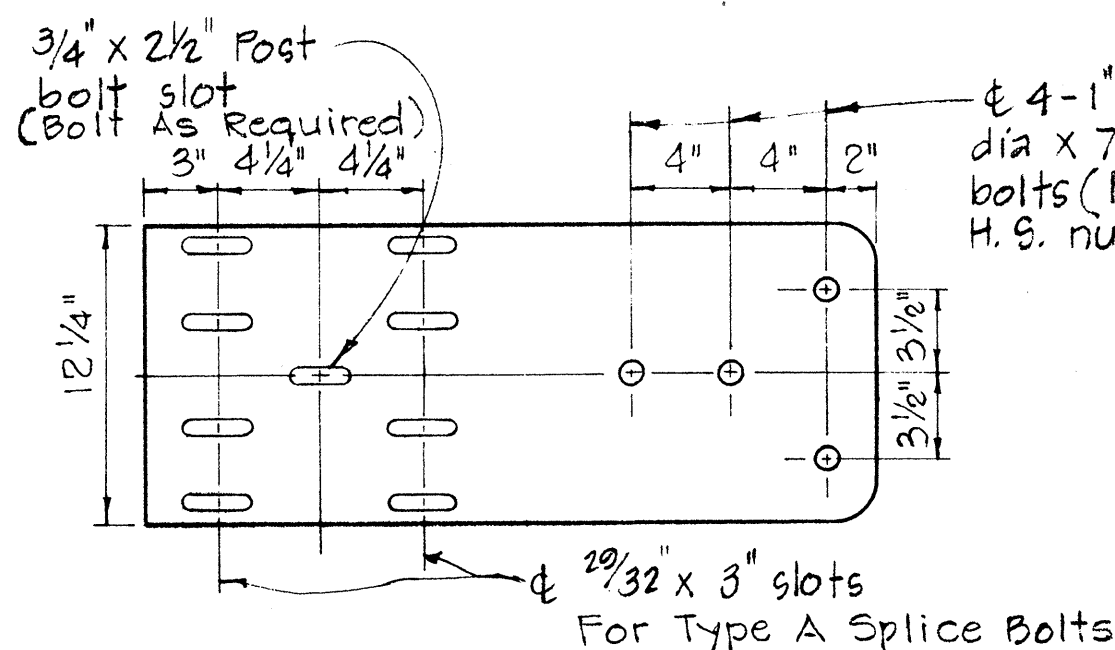
Scale: Full Size

HEXAGON NUT

Scale: Full Size



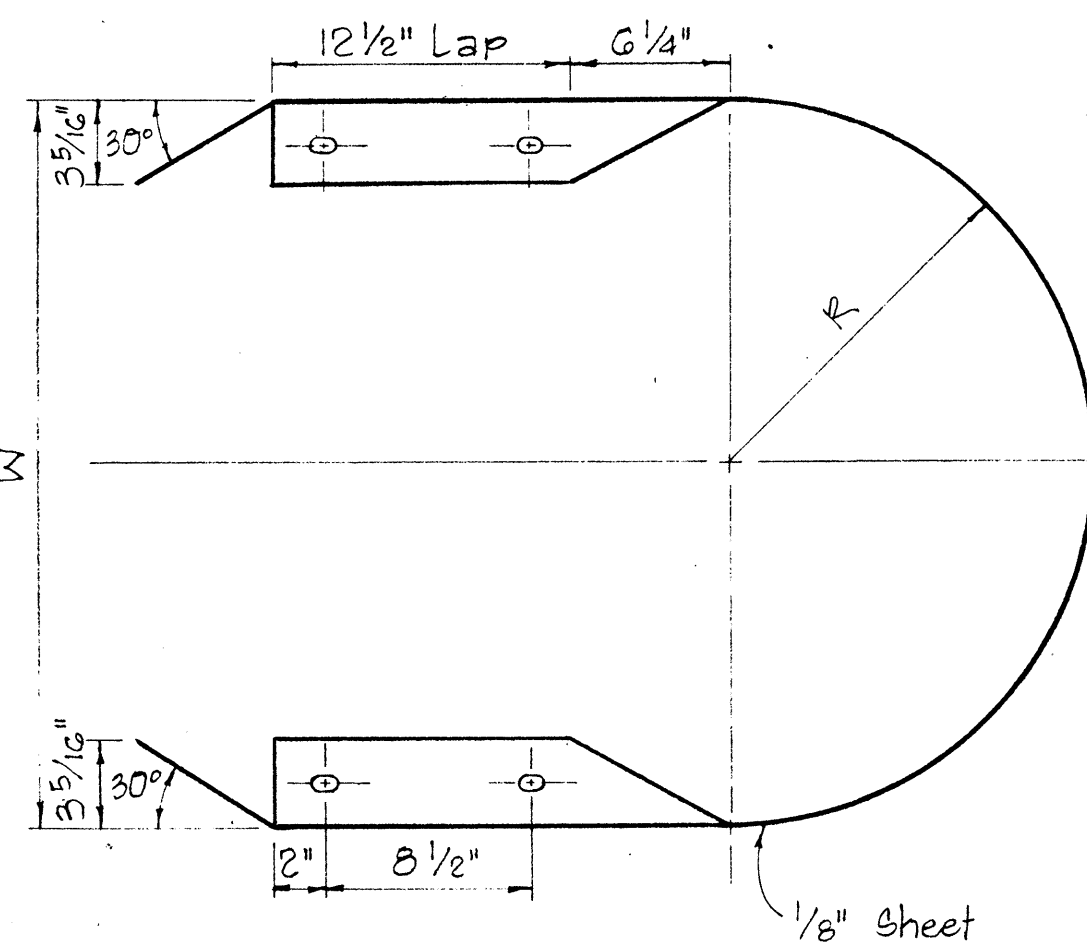
← Lap in direction of traffic



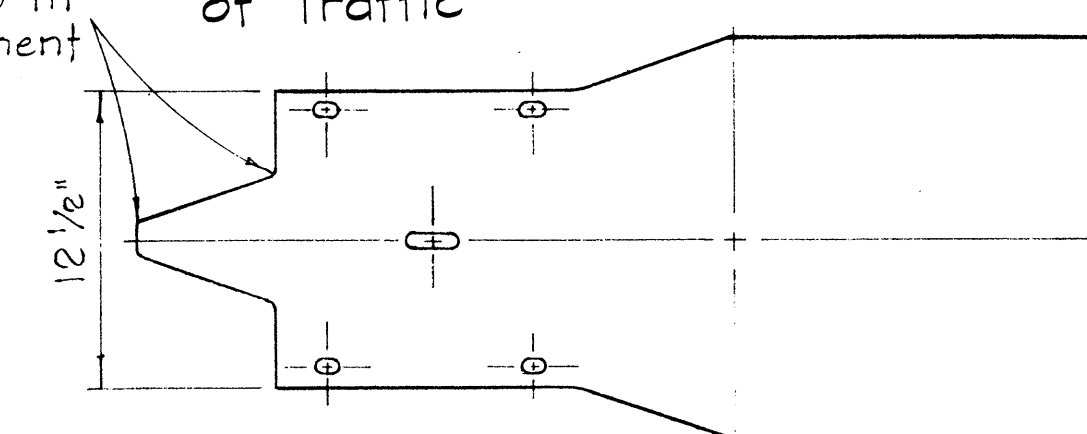
SPECIAL END SHOE

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

← Lap in direction of traffic

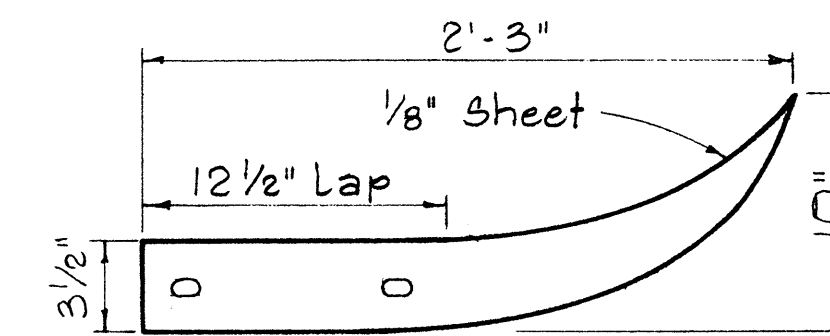


Shape to fit rail element
Lap in direction of traffic

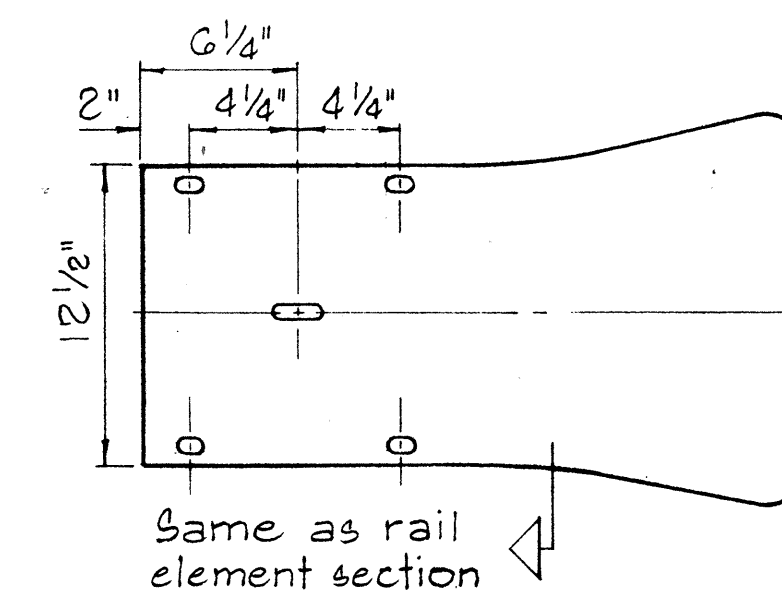


MEDIAN END

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

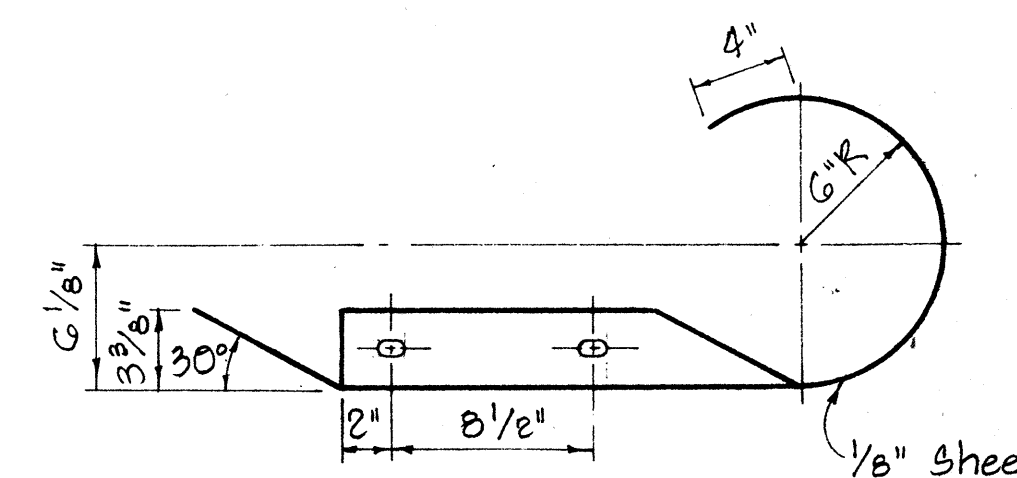


← Lap in direction of traffic

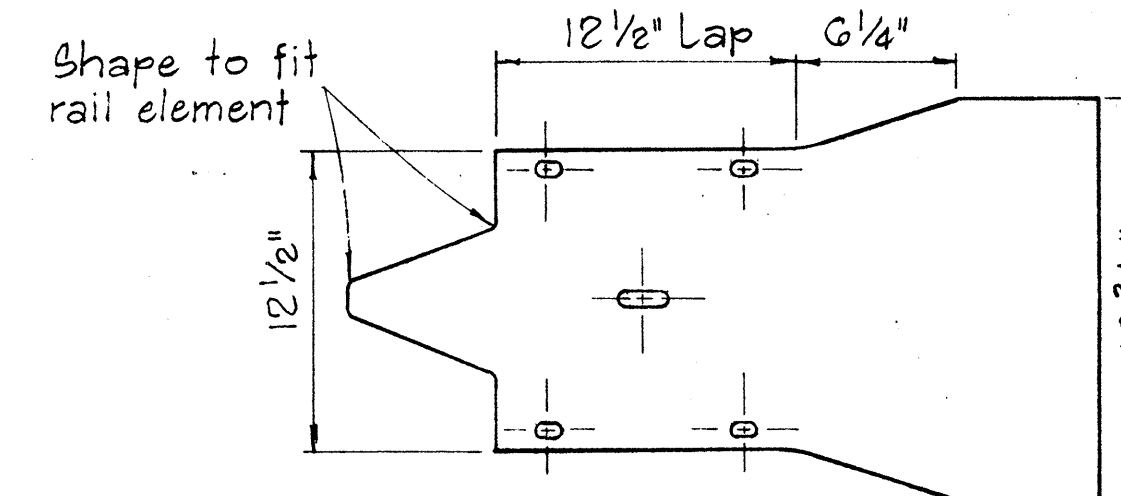


FLARED END

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



← Lap in direction of traffic



CURVED END

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

APPROVAL RECOMMENDED:

TRAFFIC ENGINEER

APPROVED:

ASSISTANT CHIEF, ENGINEERING

12/23/69
DATE

12-20-69
DATE

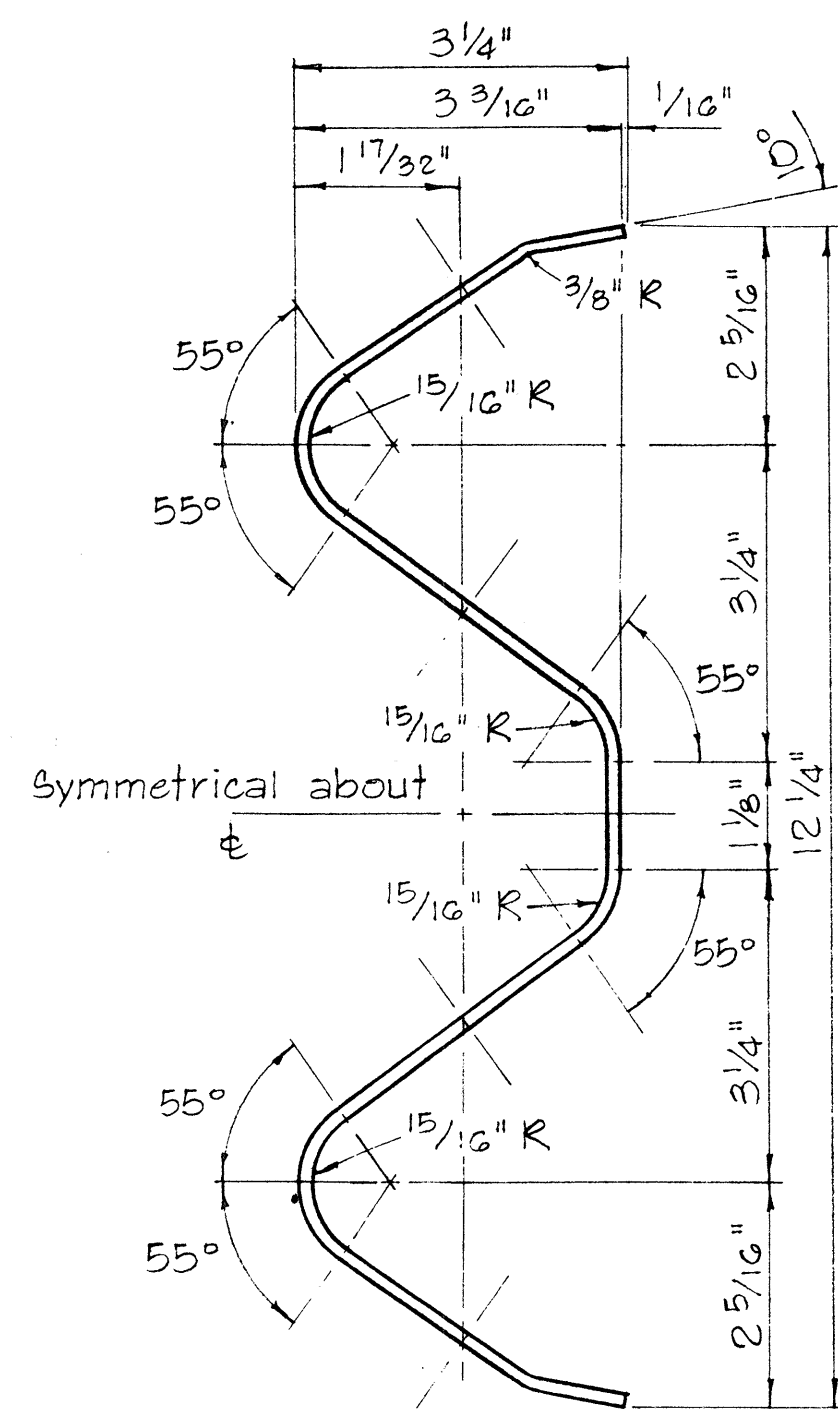
STATE OF HAWAII
DEPARTMENT OF TRANSPORTATION
HIGHWAYS DIVISION

STANDARD DETAILS METAL GUARD RAIL

Scale: As Noted

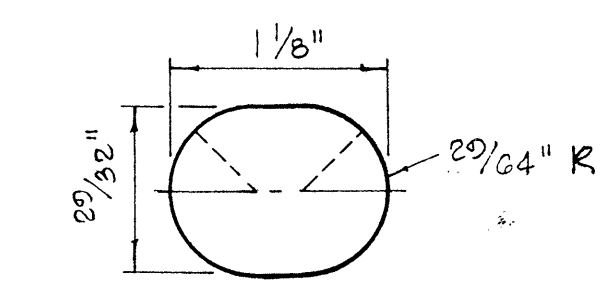
August, 1968

SHEET No. 6 OF 8 SHEETS DT 501



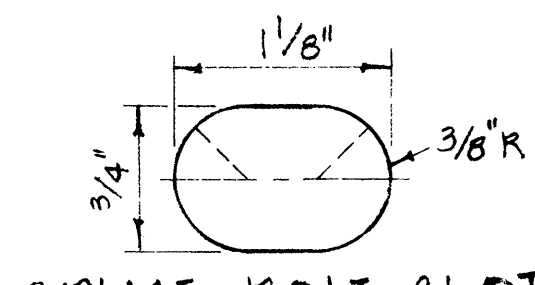
RAIL ELEMENT SECTION

Scale: 6" = 1'-0"

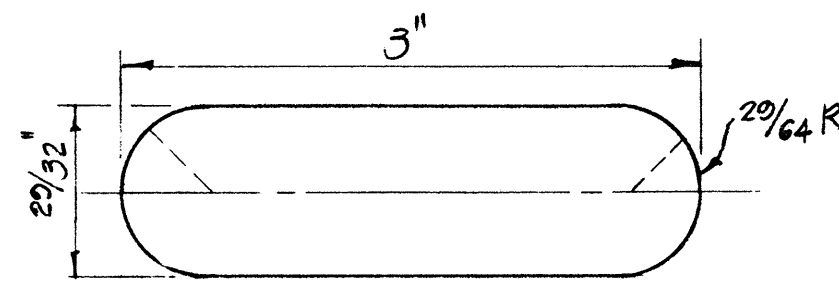


SPlice BOLT SLOT FOR ALL ENDS

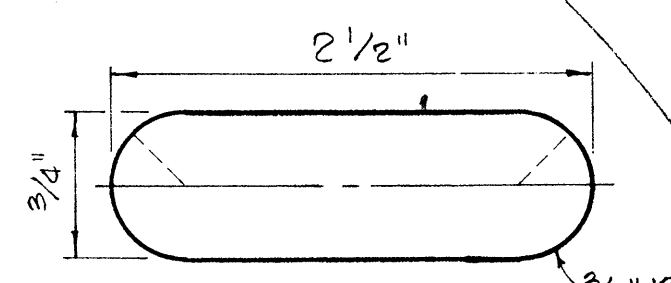
Scale: Full Size



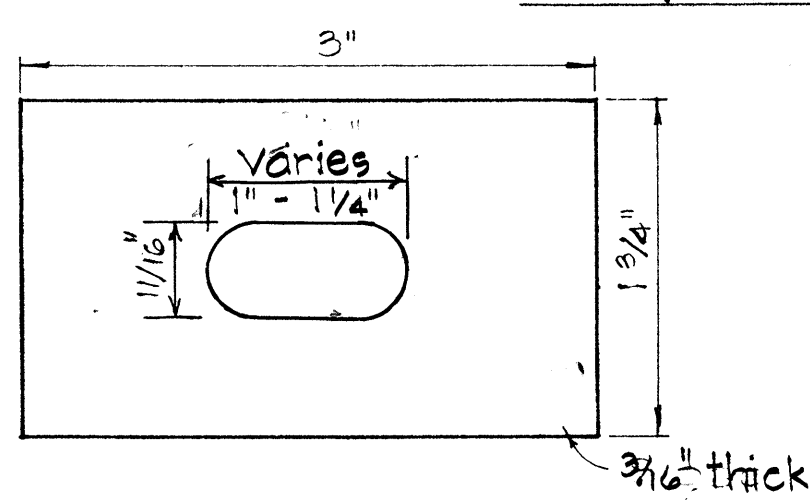
SPlice BOLT SLOT FOR SPECIAL END SHOE



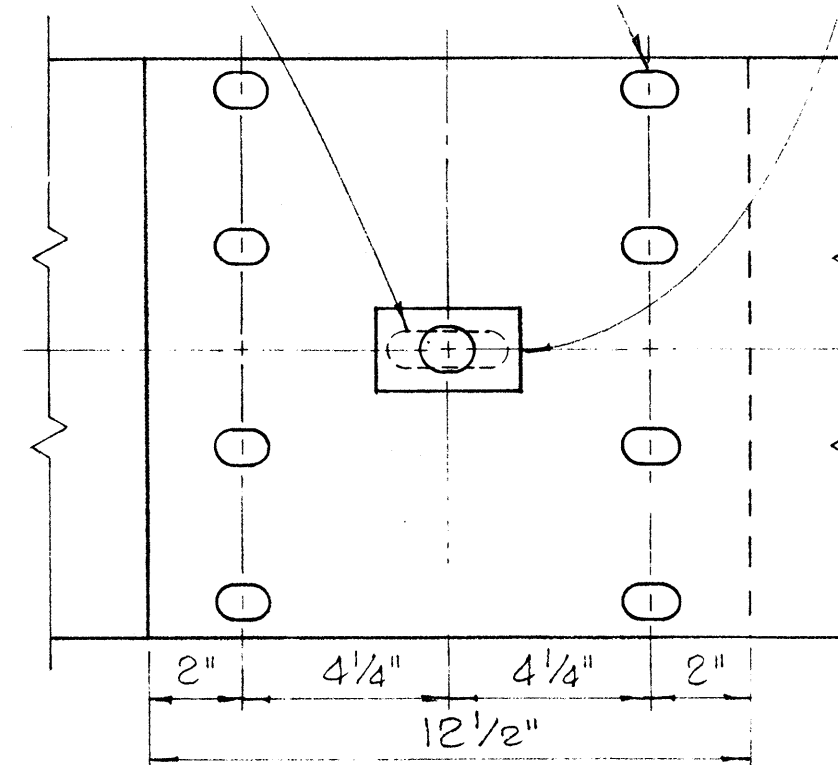
SPlice BOLT SLOT FOR SPECIAL END SHOE



POST BOLT SLOT



RAIL WASHER



RAIL SPLICE

Scale: 3" = 1'-0"

NOTES:

- H.S. Bolts shall conform to the requirements of ASTM A 325.
- Special End Shoe shall be fabricated from 10 Gage steel conforming to the requirements of AASHO 180.

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"

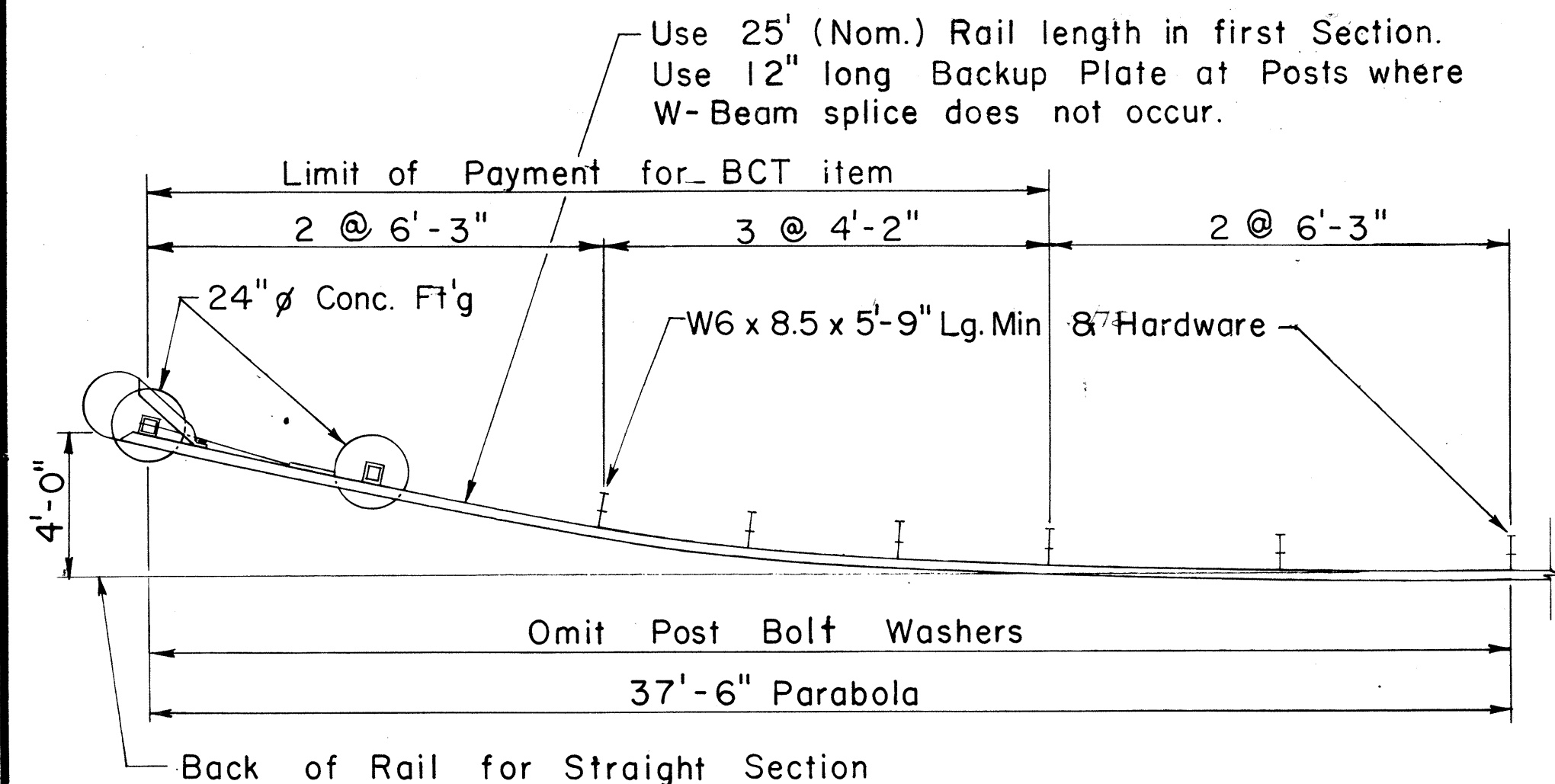
NO	REVISION	APPROVED BY	DATE
1	Revised Hole Size for Rectangular Rail Washer	H.R.	8/15/69

DATE	12/23/69
SURVEY PLOTTED BY	...
DRAWN BY	...
TRACED BY	...
CHECKED BY	...
NOTE BOOK	...
NO.	...

FED. ROAD DIST. NO.	STATE	PROJ. NO.	FISCAL YEAR	SHEET NO.	TOTAL SHEETS
HAWAII	HAW.	300B-01-80	1980	14	28

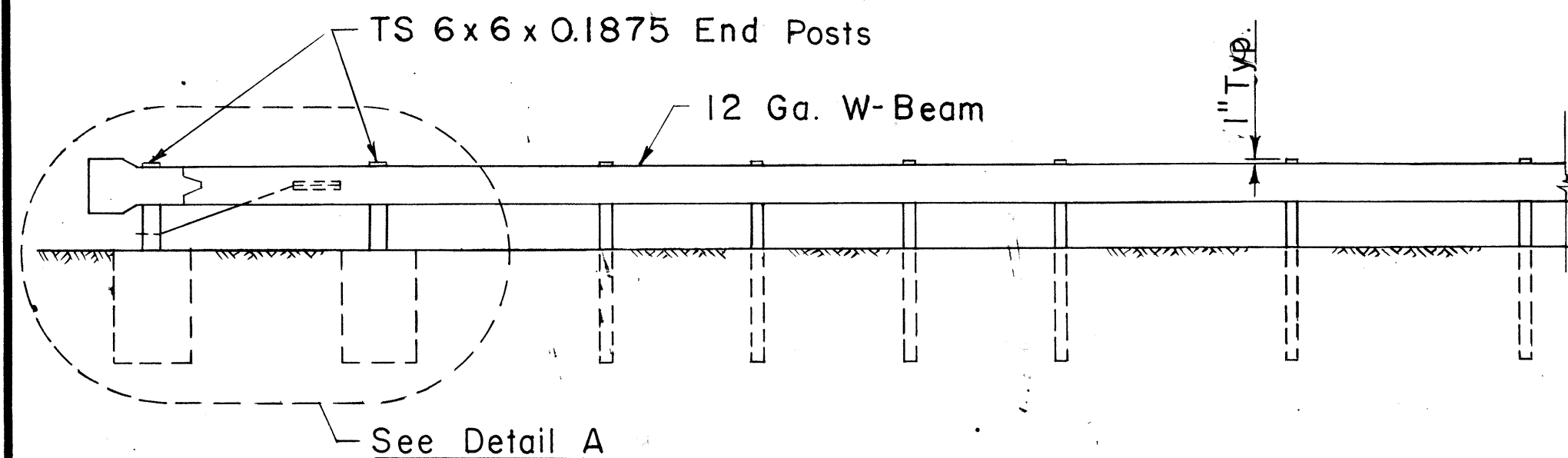
NOTES:

- Anchor Plate and Anchor Cable Assembly (Standard Swaged Fitting and Stud). See Standard Detail Sheet No. DT 520.
- Other Anchor Cable Assemblies may be used. Minimum breaking strength of assembly should be 40,000 lbs.
- Second Terminal Post does not require holes to accomodate Anchor Cable.
- Slip Base Load shall be controlled with a Calibrated Torque Wrench - Torque 155 - 170 ft. lbs.
- Concrete shall be Class A.



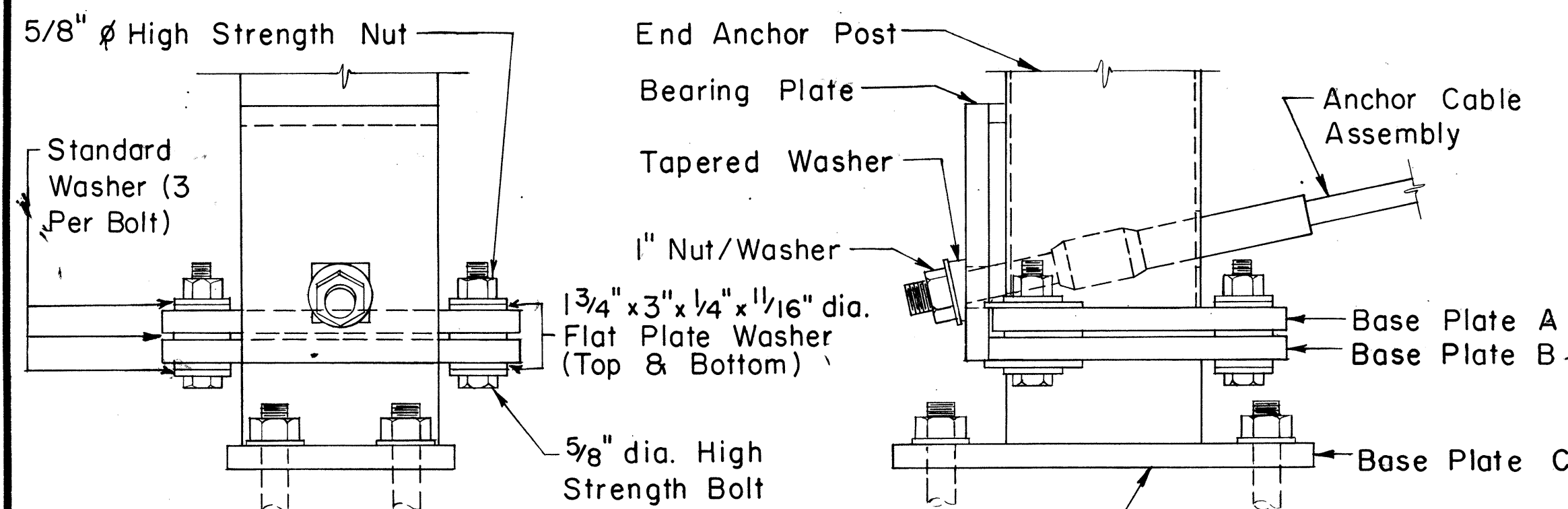
PLAN

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



ELEVATION

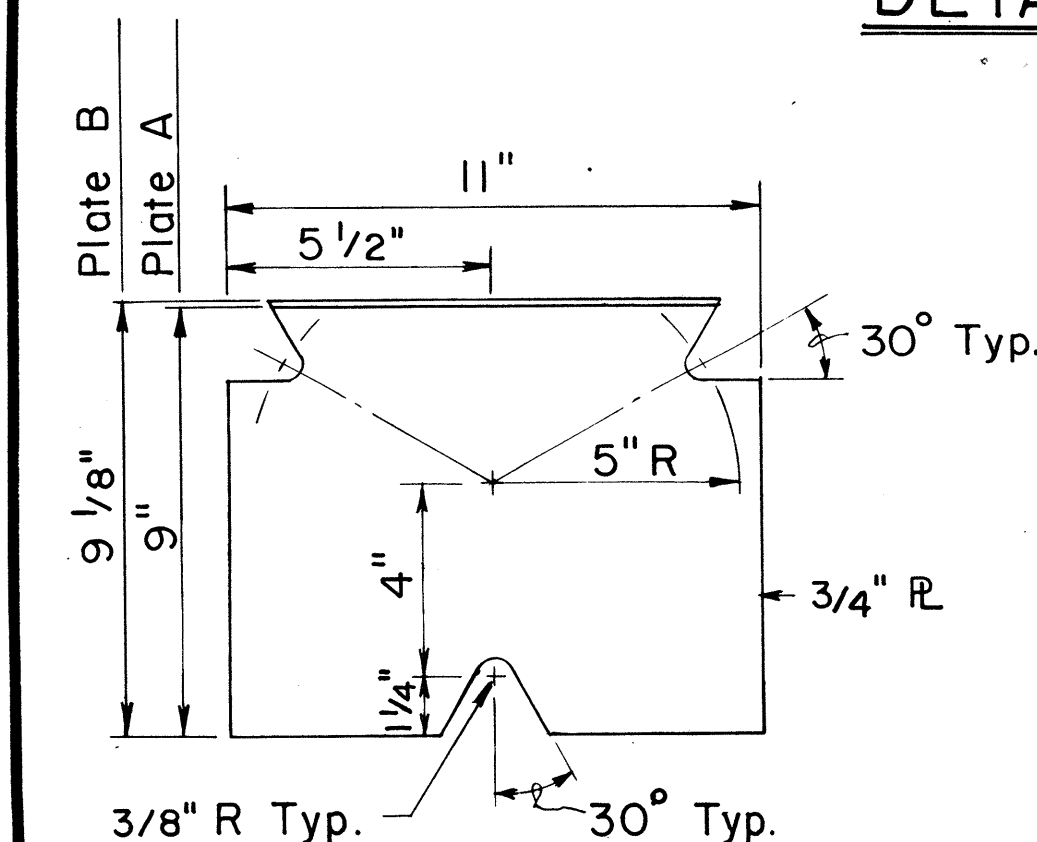
Scale: 1/4" = 1'-0"



SIDE ELEVATION

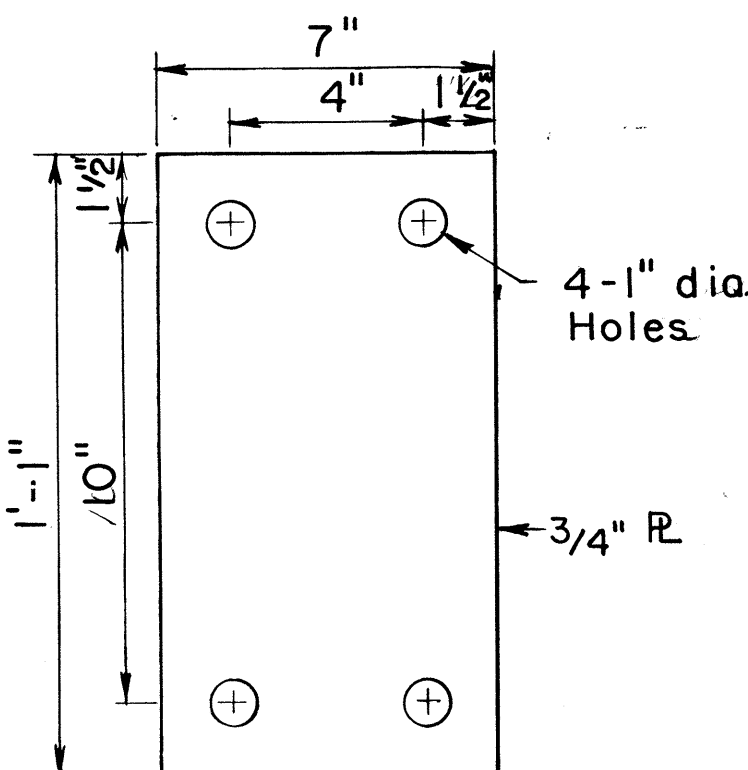
DETAIL B

FRONT ELEVATION



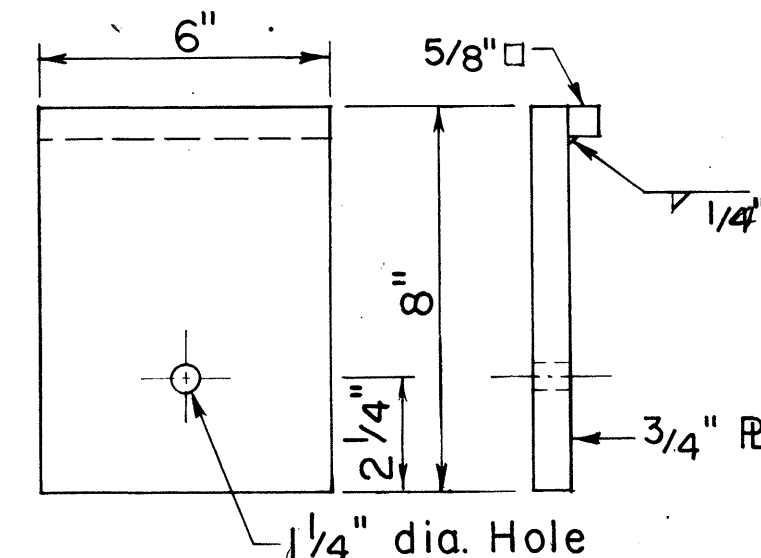
BASE PLATES A & B

Scale: 3" = 1'-0"



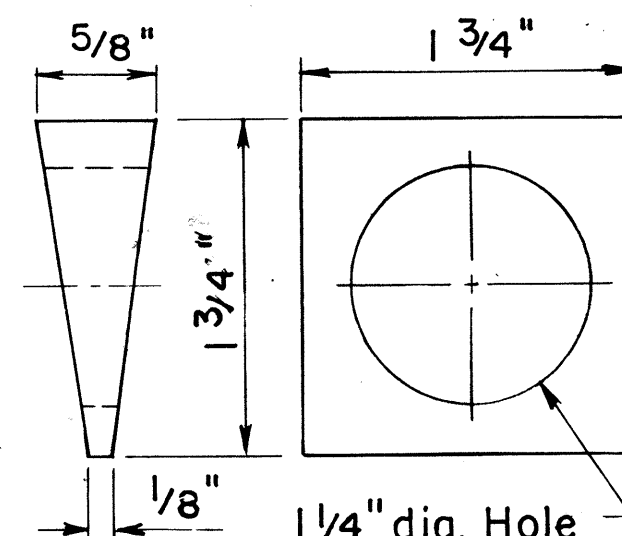
BASE PLATE C

Scale: 3" = 1'-0"



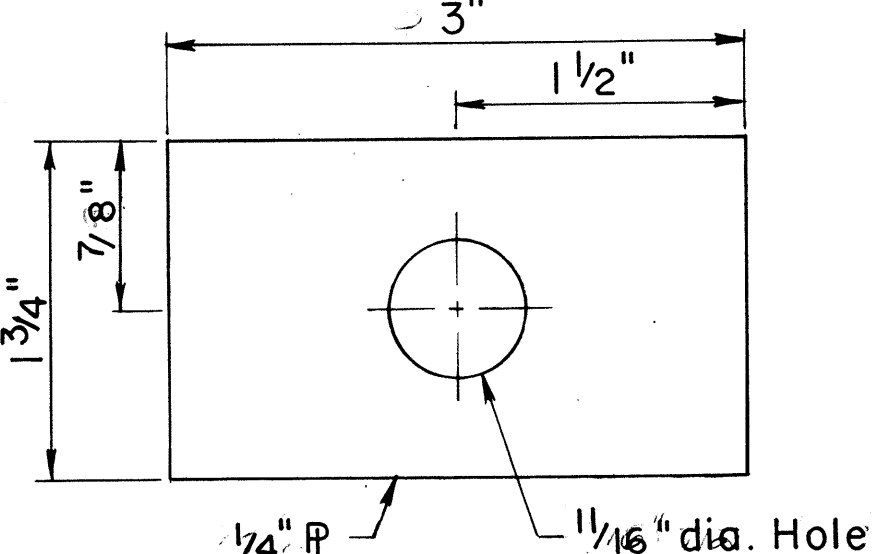
BEARING PLATE

Scale: 3" = 1'-0"



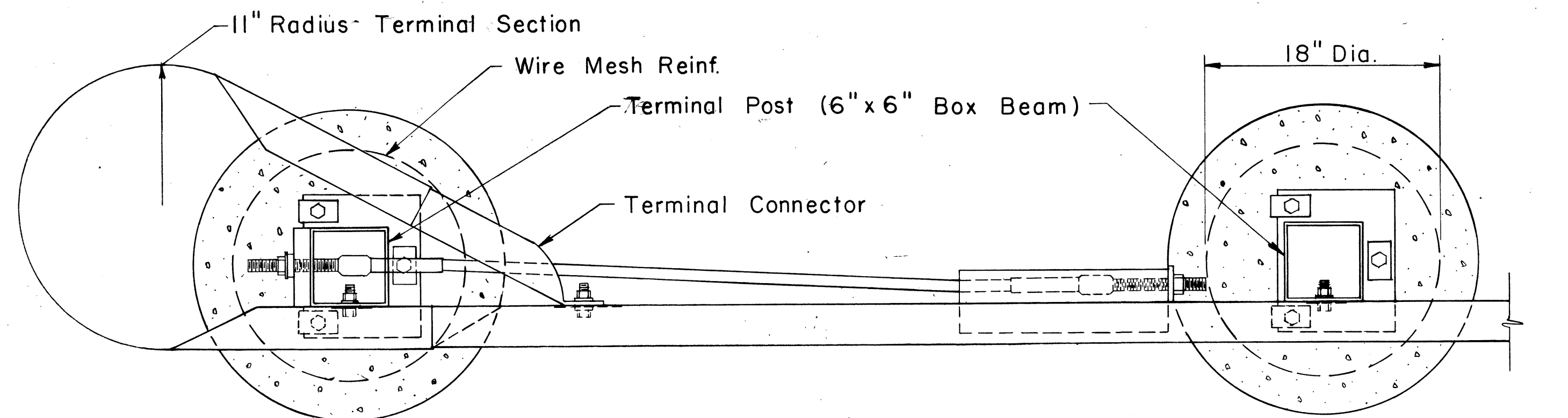
TAPERED WASHER

Scale: Full Size

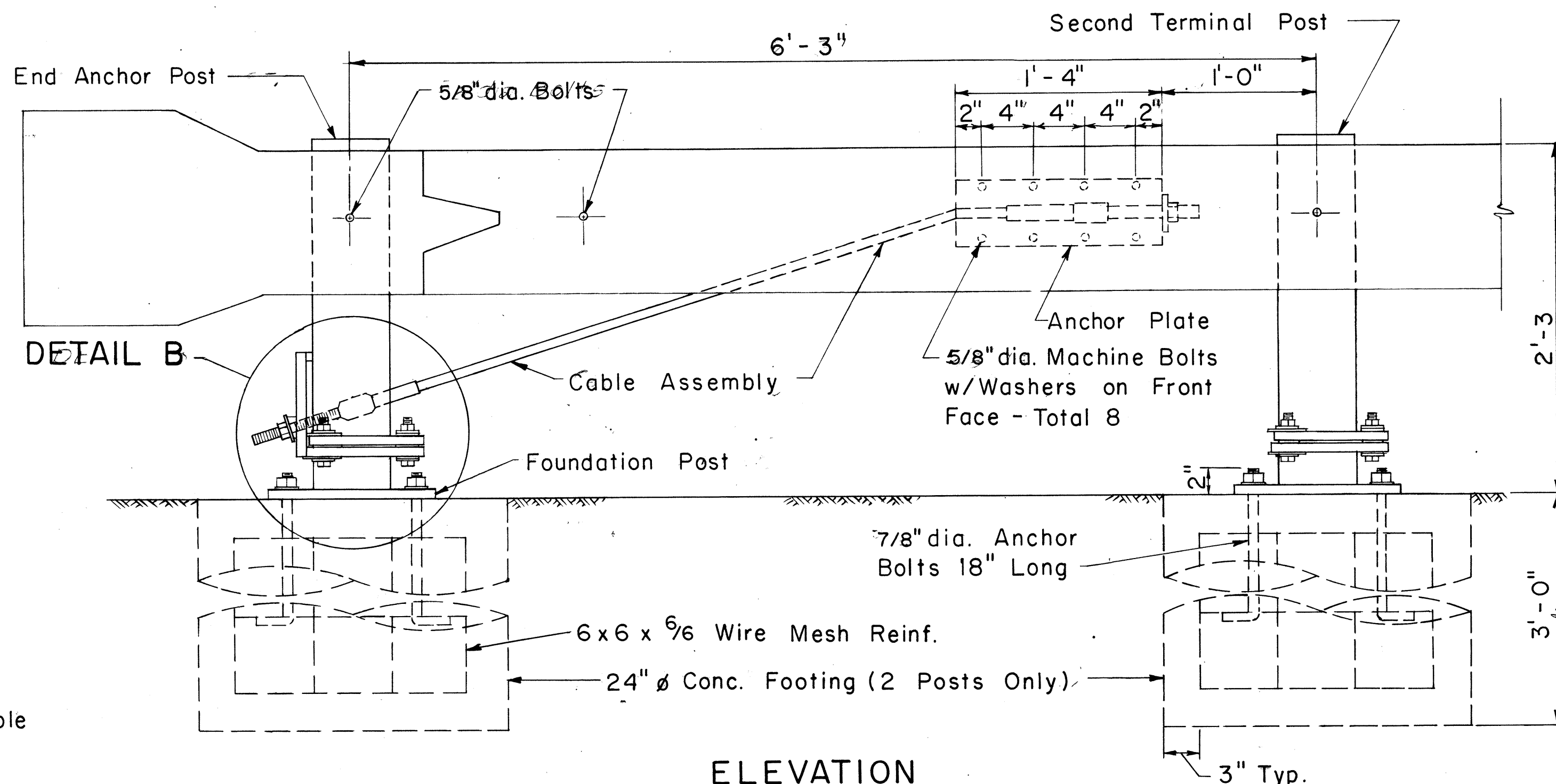


FLAT PLATE WASHER

Scale: Full Size



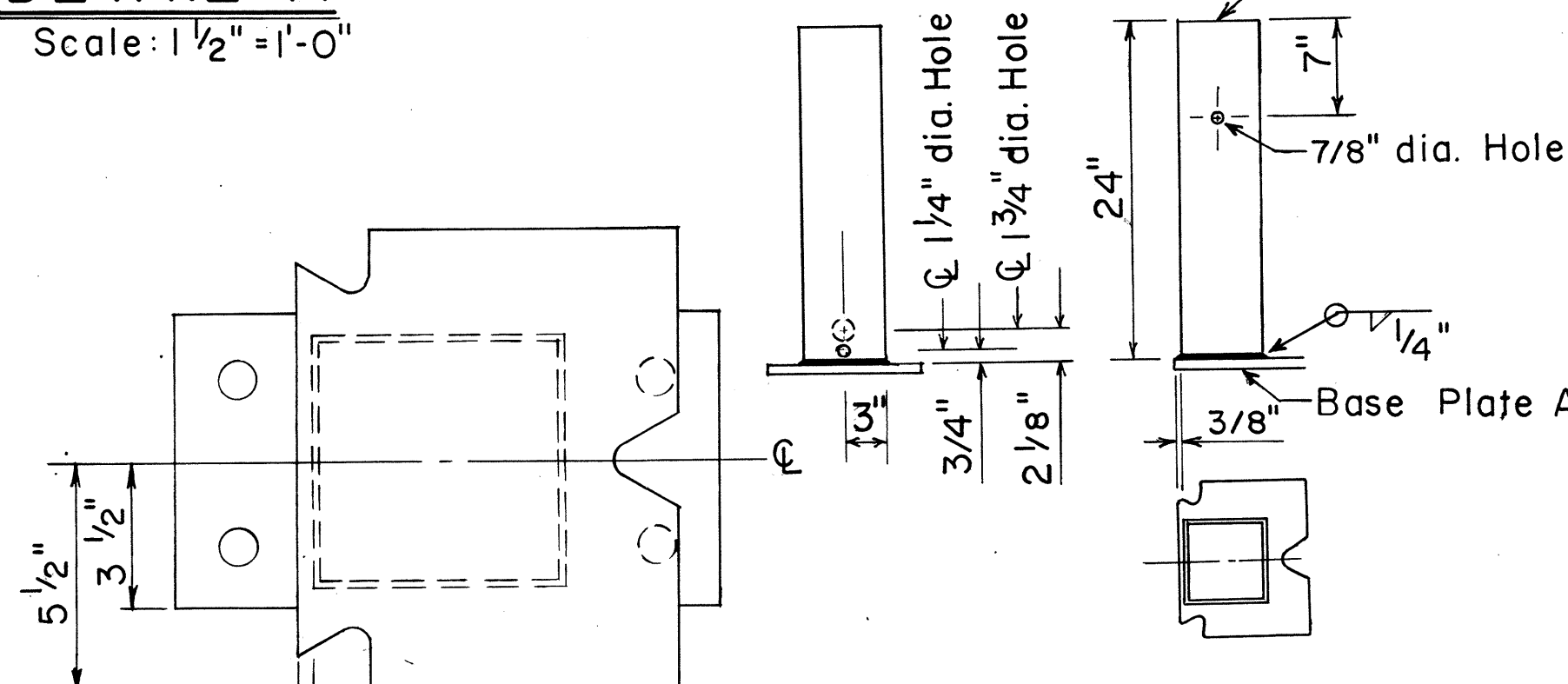
PLAN



ELEVATION

DETAIL A

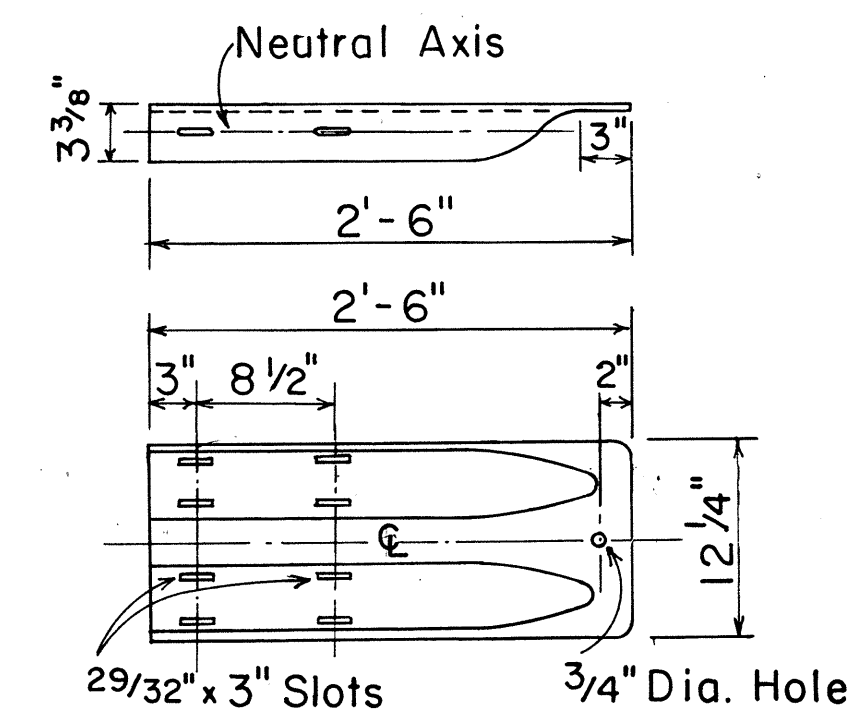
Scale: 1 1/2" = 1'-0"



TERMINAL POST

Scale: 1" = 1'-0"

NO.	REVISION	APPROVED BY	DATE
1	Supersedes Sht. DT 519 Approved 12/30/69	H.T.	6/15/78



TERMINAL CONNECTOR

Scale: 1" = 1'-0"

APPROVAL RECOMMENDED:

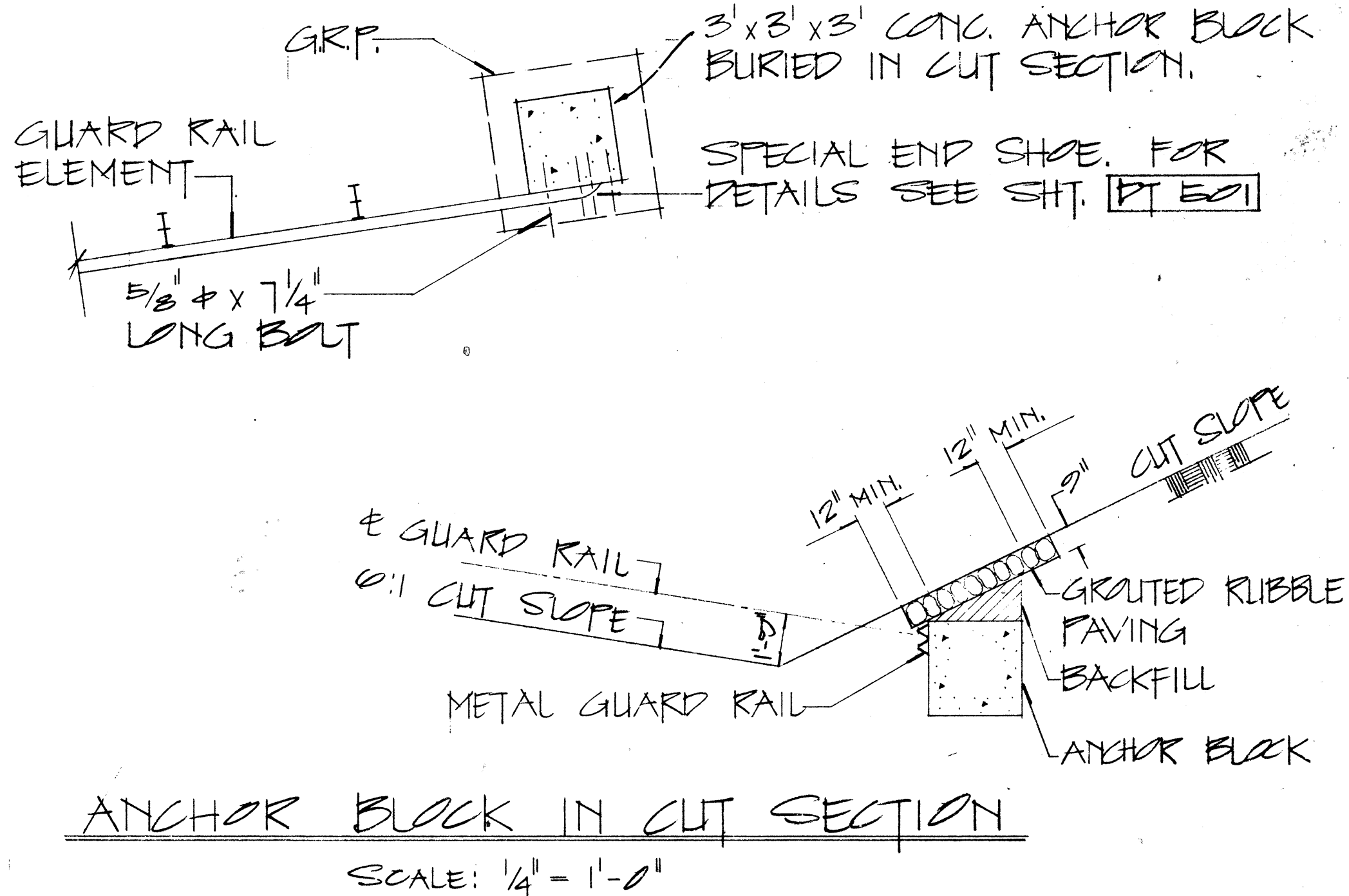
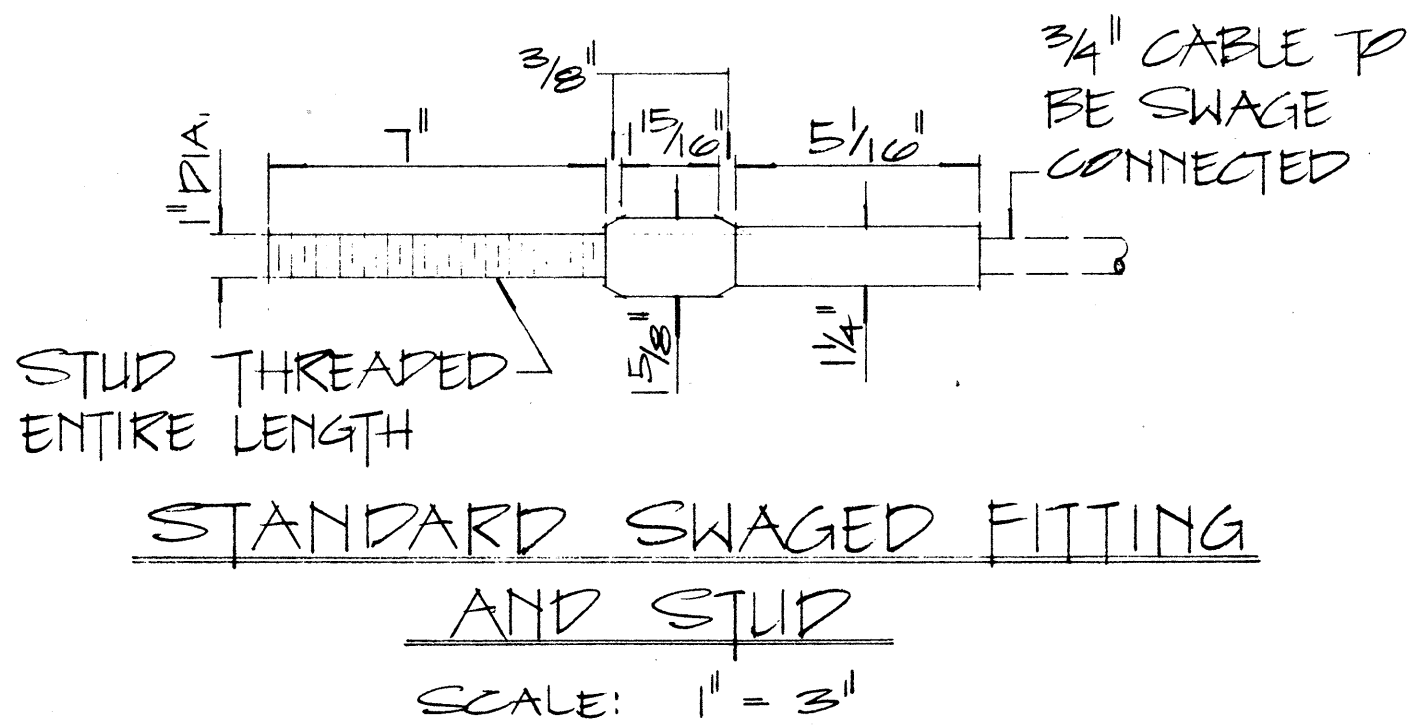
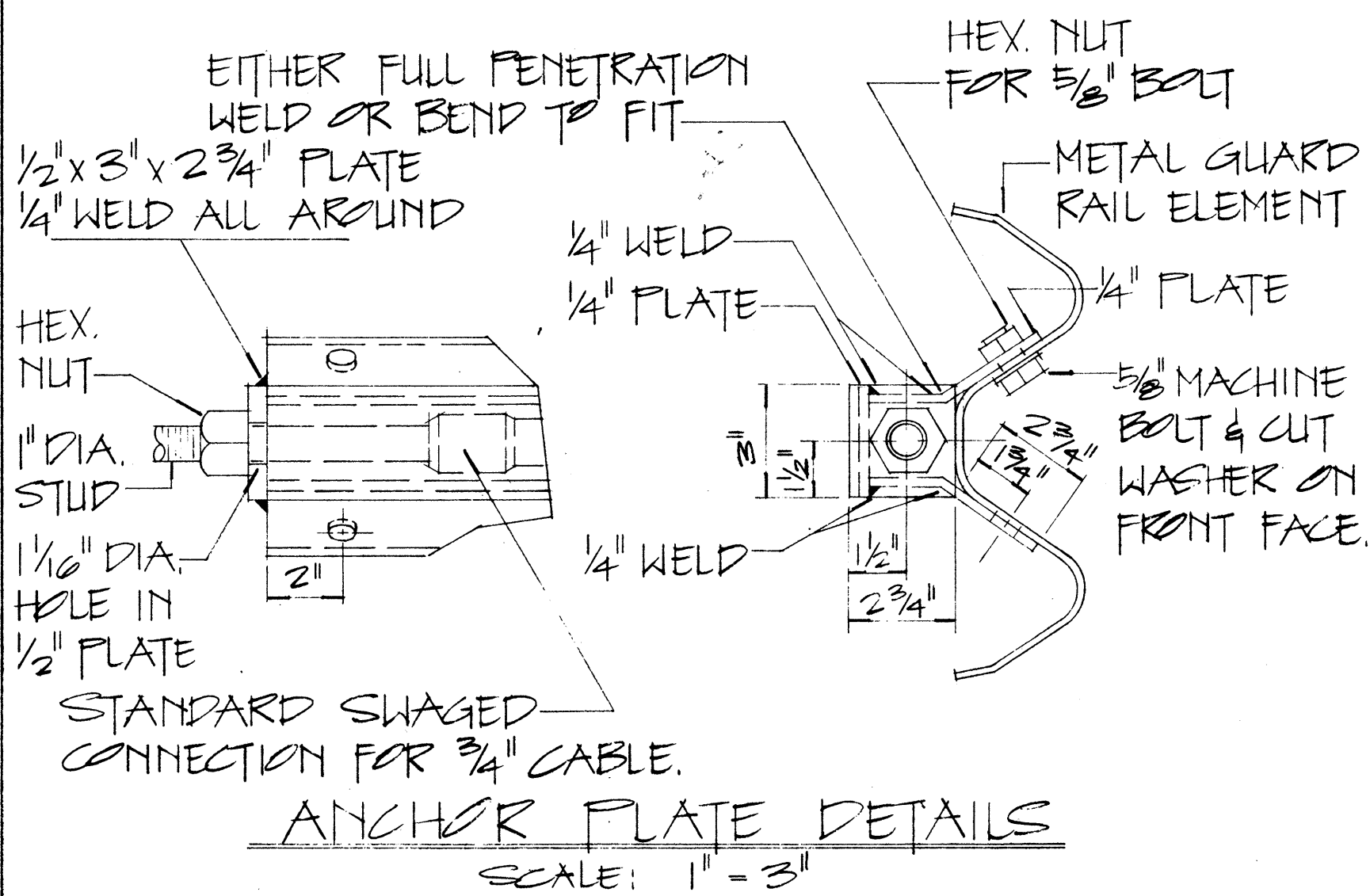
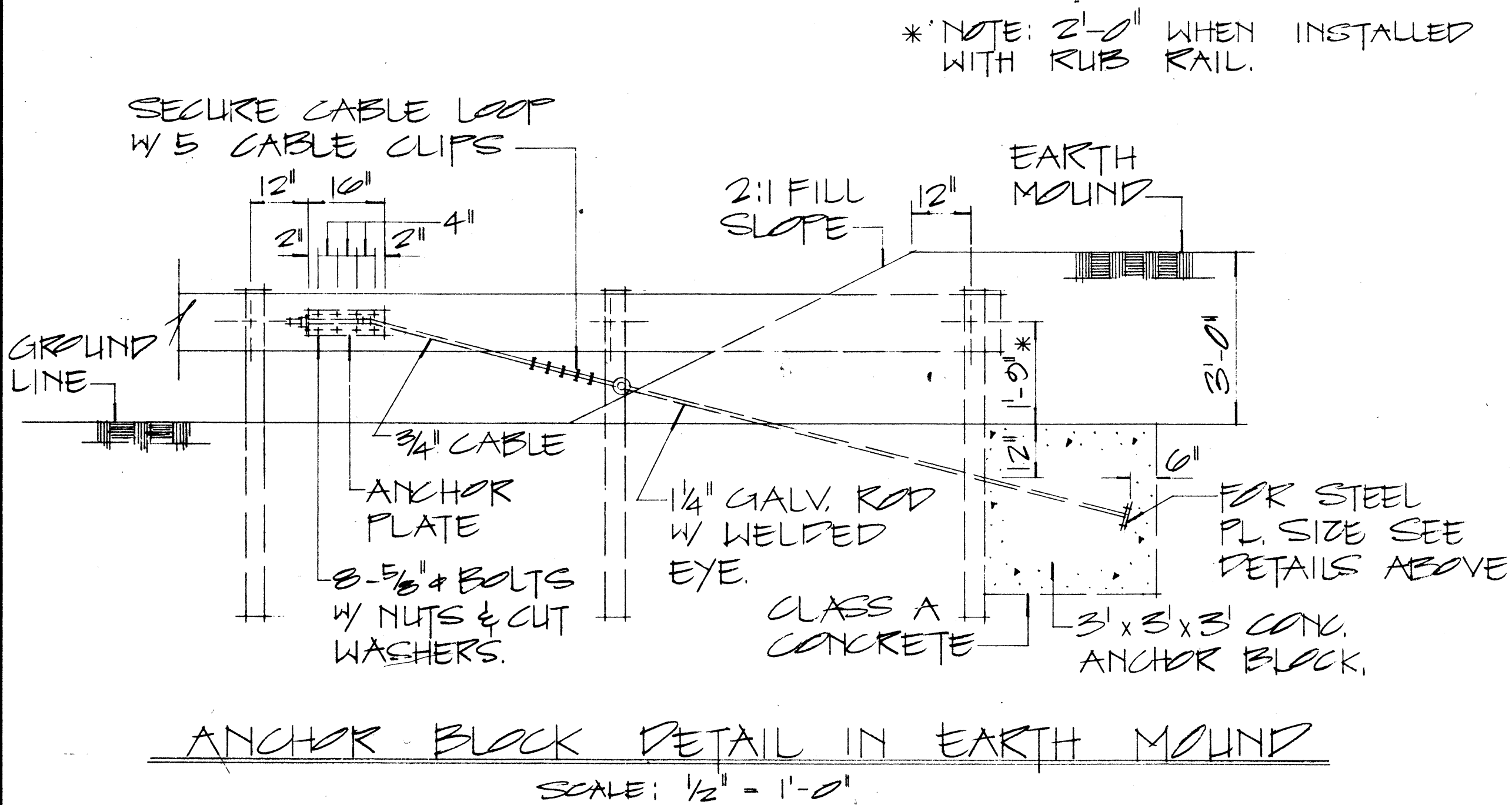
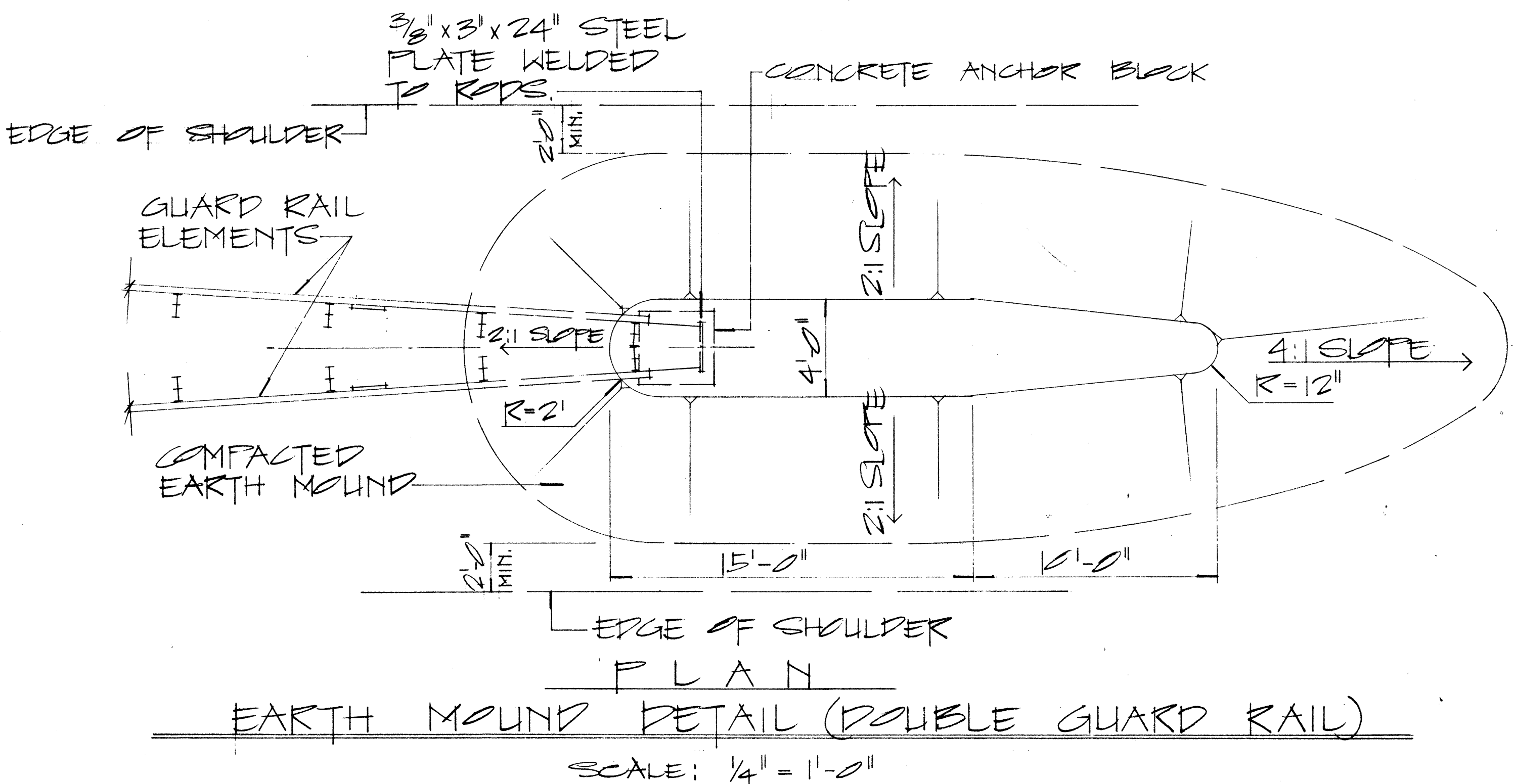
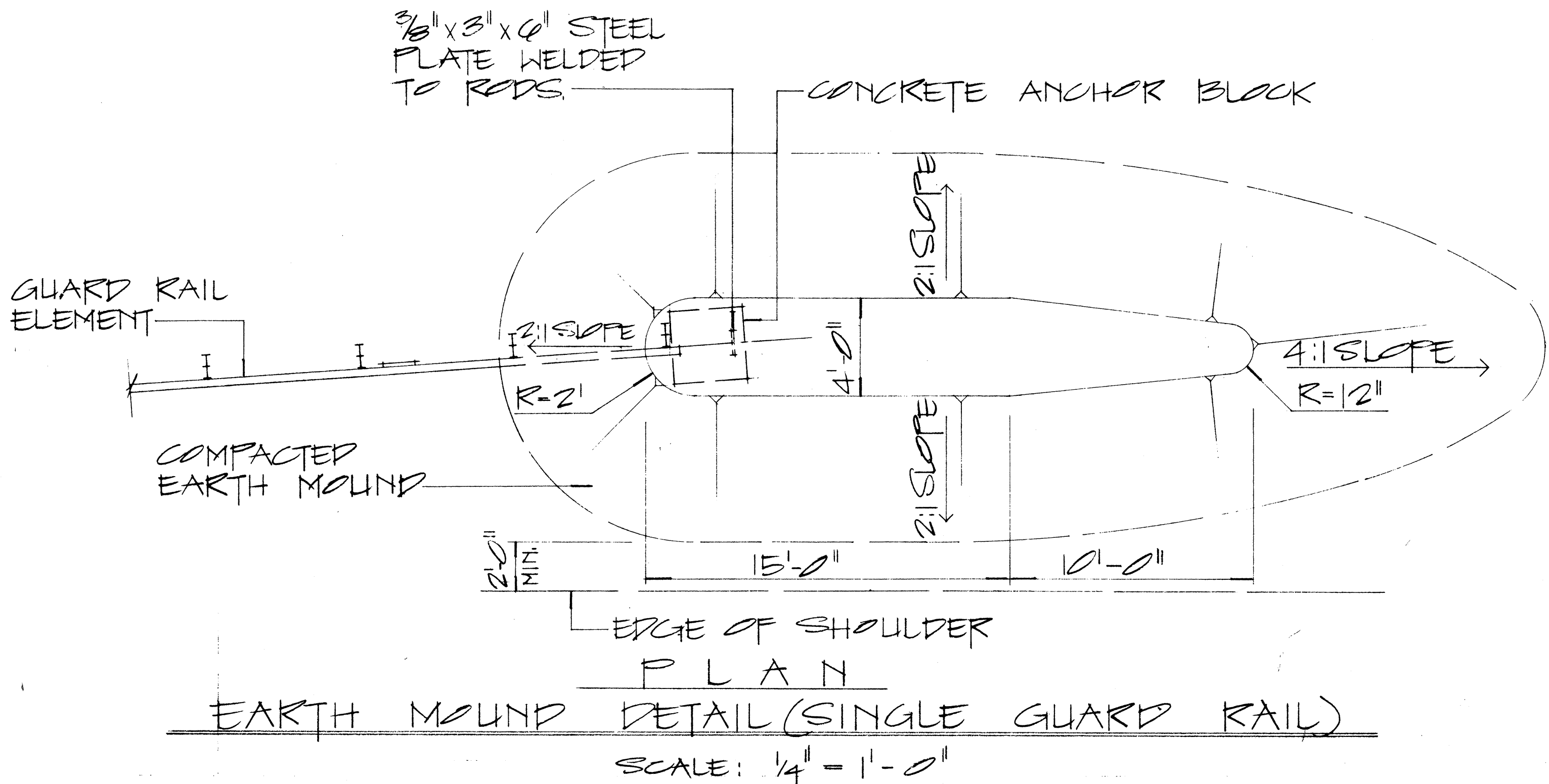
Eishi Tanaka
TRAFFIC ENGINEER
6/14/78
DATE

APPROVED:

Harbor Zafish
ASSISTANT CHIEF, ENGINEERING
6/15/78
DATE

STATE OF HAWAII DEPARTMENT OF TRANSPORTATION HIGHWAYS DIVISION	
STANDARD DETAIL	
BREAKAWAY CABLE TERMINAL (BCT)	
Scale: As Shown	Date: June 1978
SHEET No. 7 OF 8 SHEETS DT 519	

FED. ROAD DIST. NO.	STATE	PROJ. NO.	FISCAL YEAR	SHEET NO.	TOTAL SHEETS
HAWAII	HAW.	360B-01-80	1980	15	28



APPROVAL RECOMMENDED: *Euske Tanaka* 12/29/62 DATE

TRAFFIC ENGINEER

APPROVED: *W. J. ...* 12-30-69 DATE

ASSISTANT CHIEF, ENGINEERING

NO.	REVISION	APPROVED BY	DATE

STATE OF HAWAII
DEPARTMENT OF TRANSPORTATION
LAND TRANSPORTATION FACILITIES DIVISION

STANDARD DETAILS

EARTH MOUND AND ANCHOR BLOCK DETAILS

SCALE: AS SHOWN AT 1960

SHEET No. 8 OF 8 SHEETS PT 520

DATE	
DESIGNED BY	
CHECKED BY	
NOTED BY	
ORIGINAL PLAN	

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.