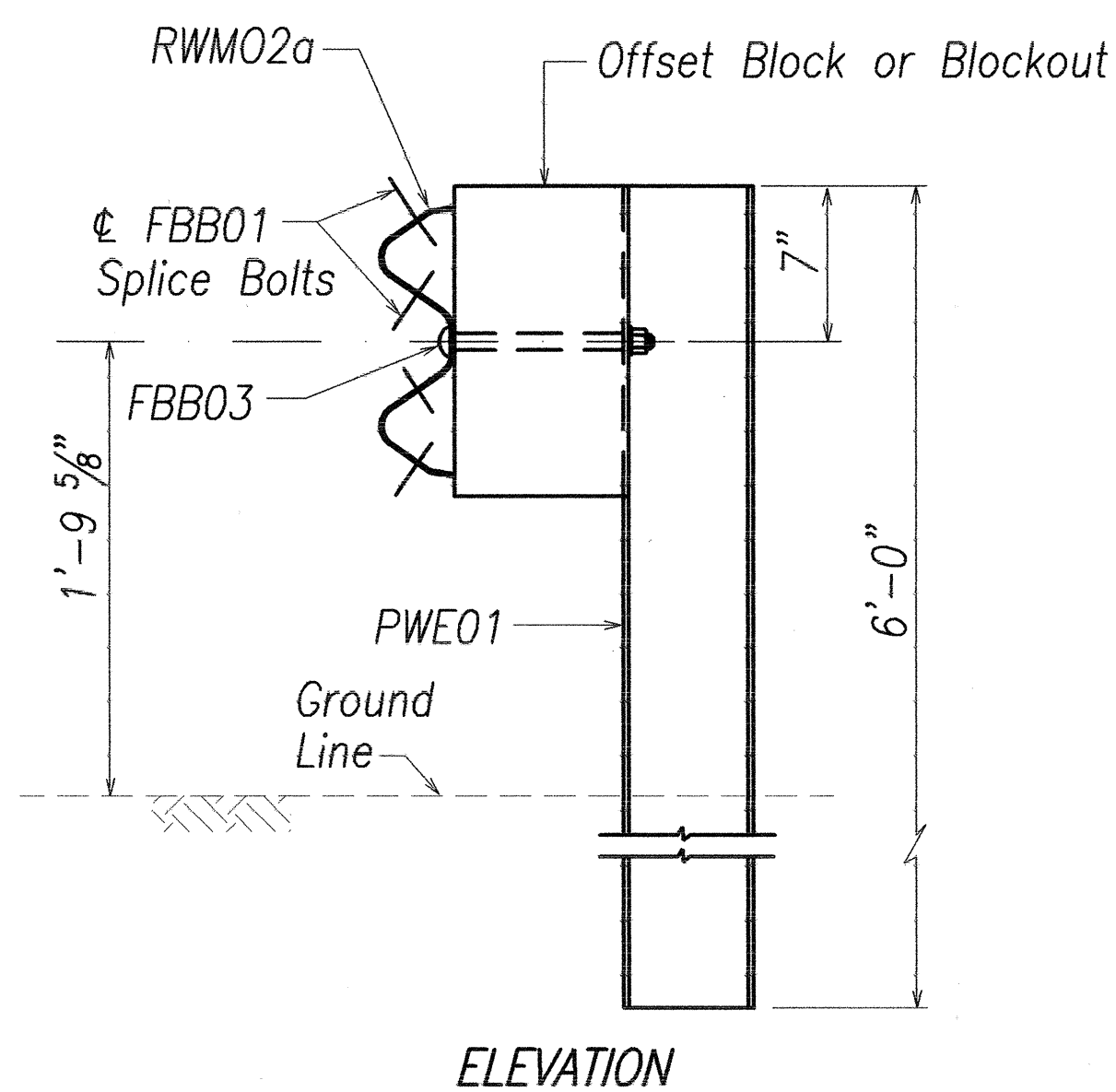
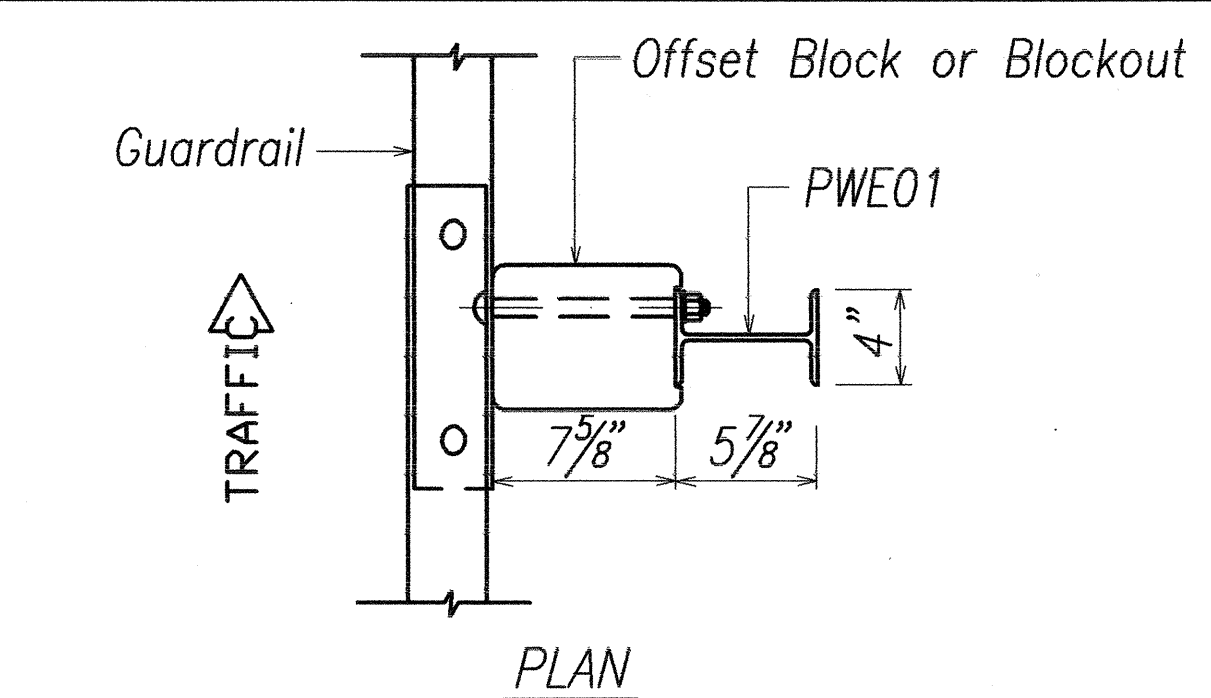
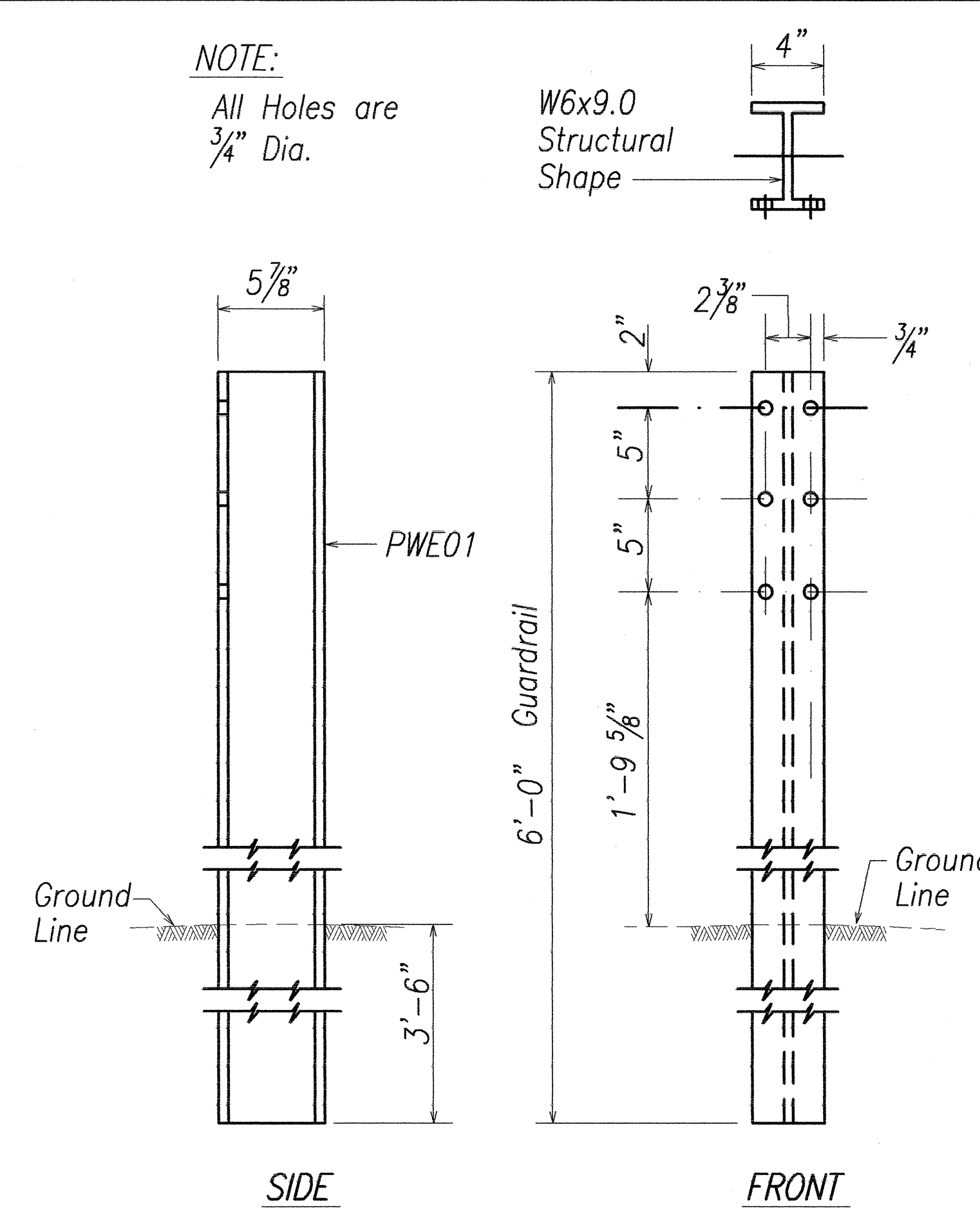


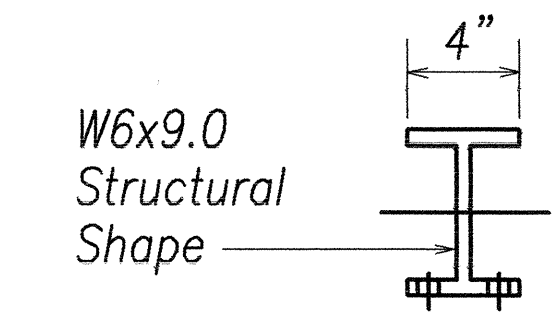
FED. ROAD DIST. NO.	STATE	FED. AID PROJ. NO.	FISCAL YEAR	SHEET NO.	TOTAL SHEETS
HAWAII	HAW.	NH-051-1(10)	2001	12	34



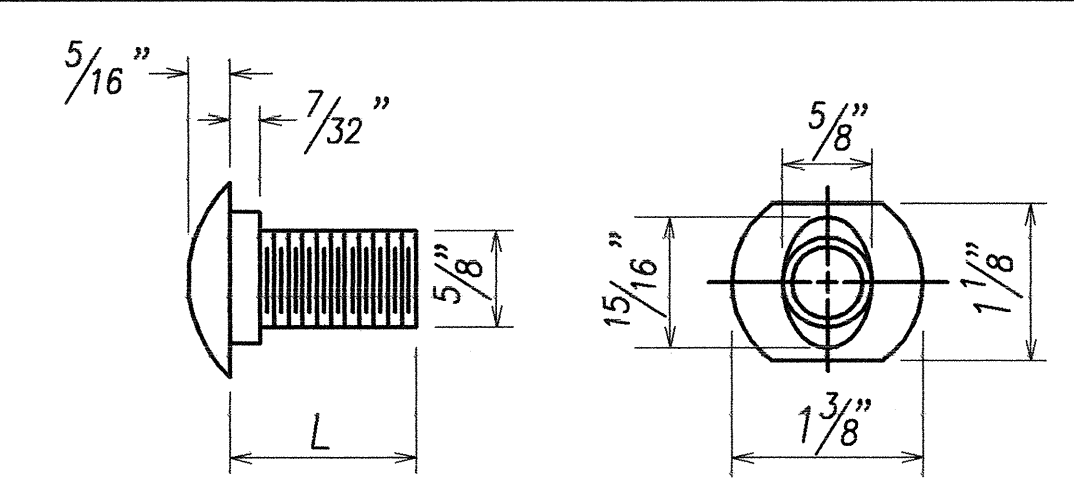
STRONG POST W-BEAM GUARDRAIL (SGR04a)



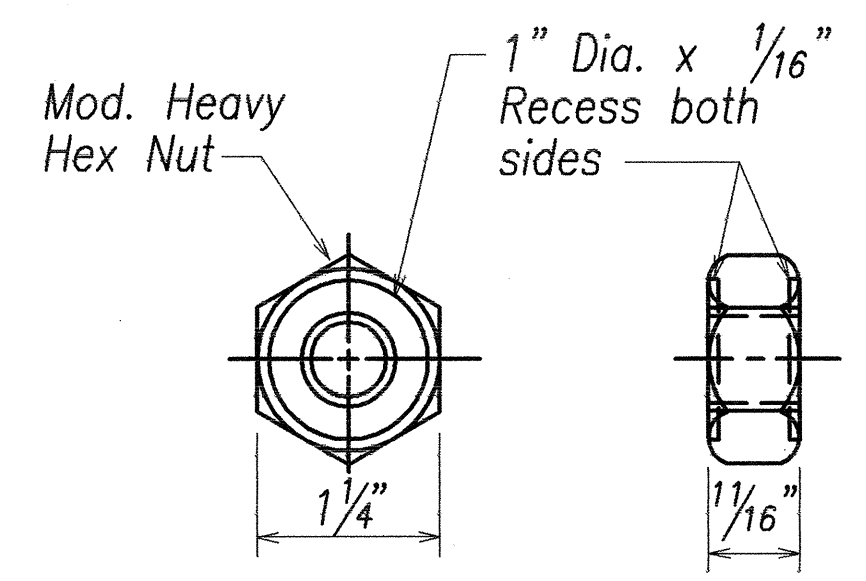
NOTE:  
All Holes are 3/4" Dia.



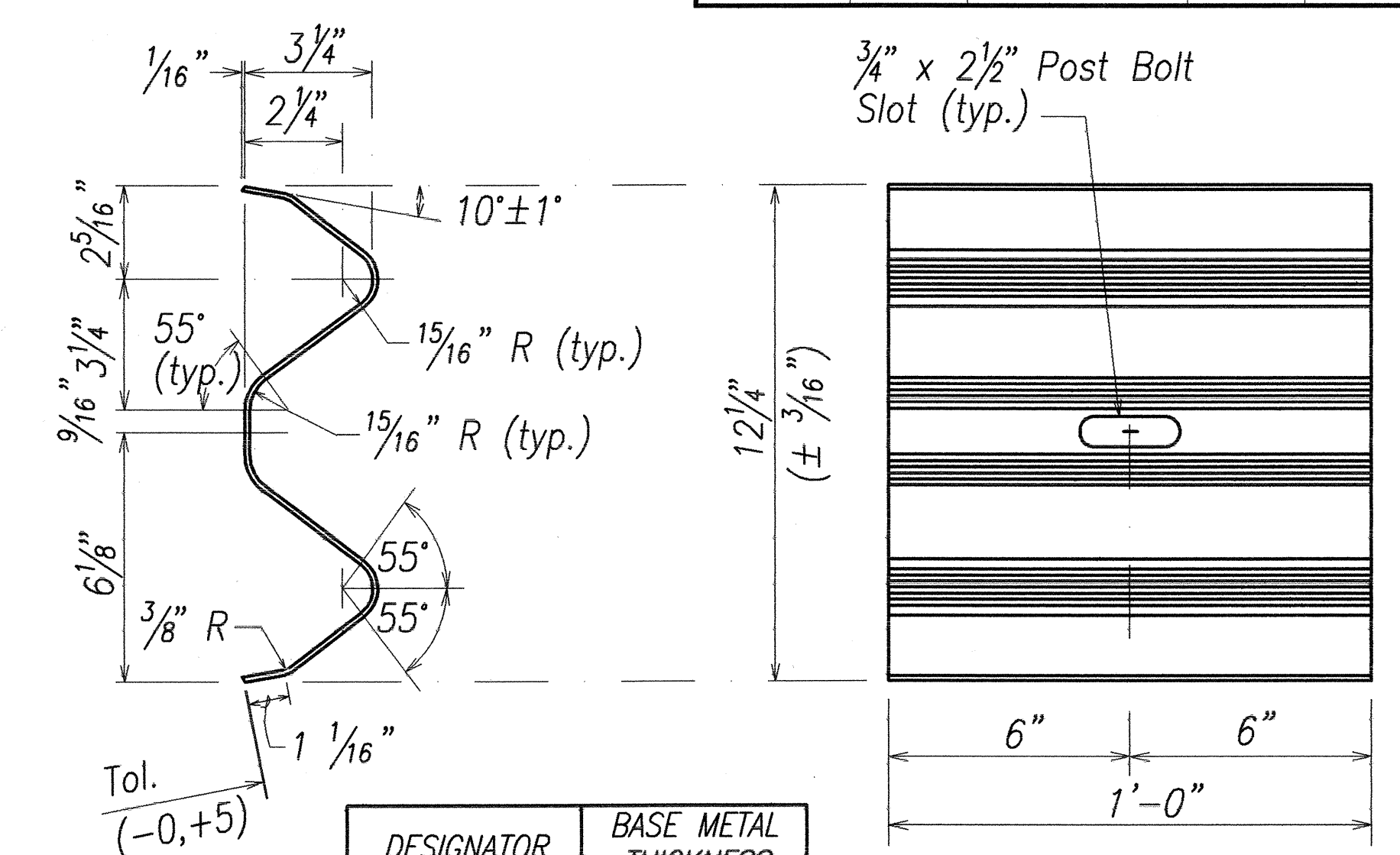
W-BEAM STRONG POST (PWE01)



DESIGNATOR	L
FBB01	1 3/8"
FBB02	2"
FBB03	10"

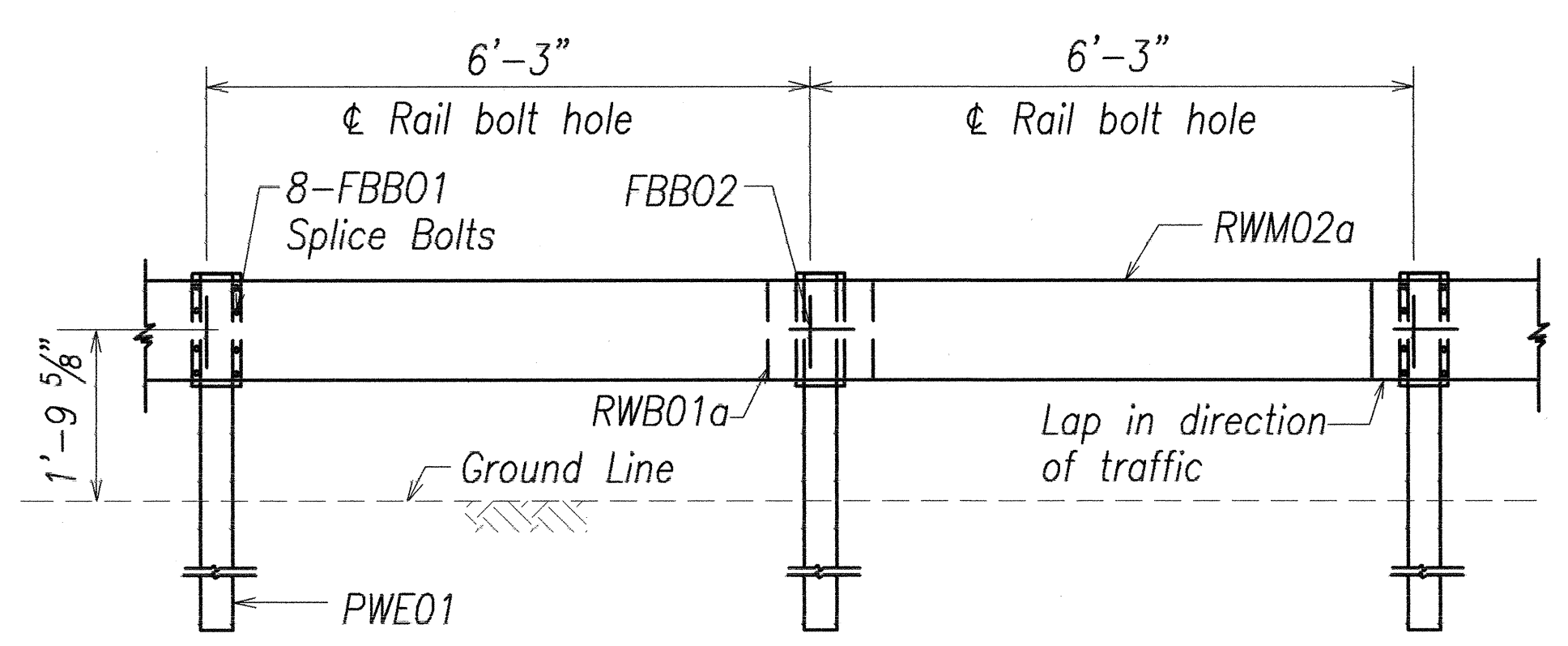


GUARDRAIL BOLTS AND RECESSED NUT

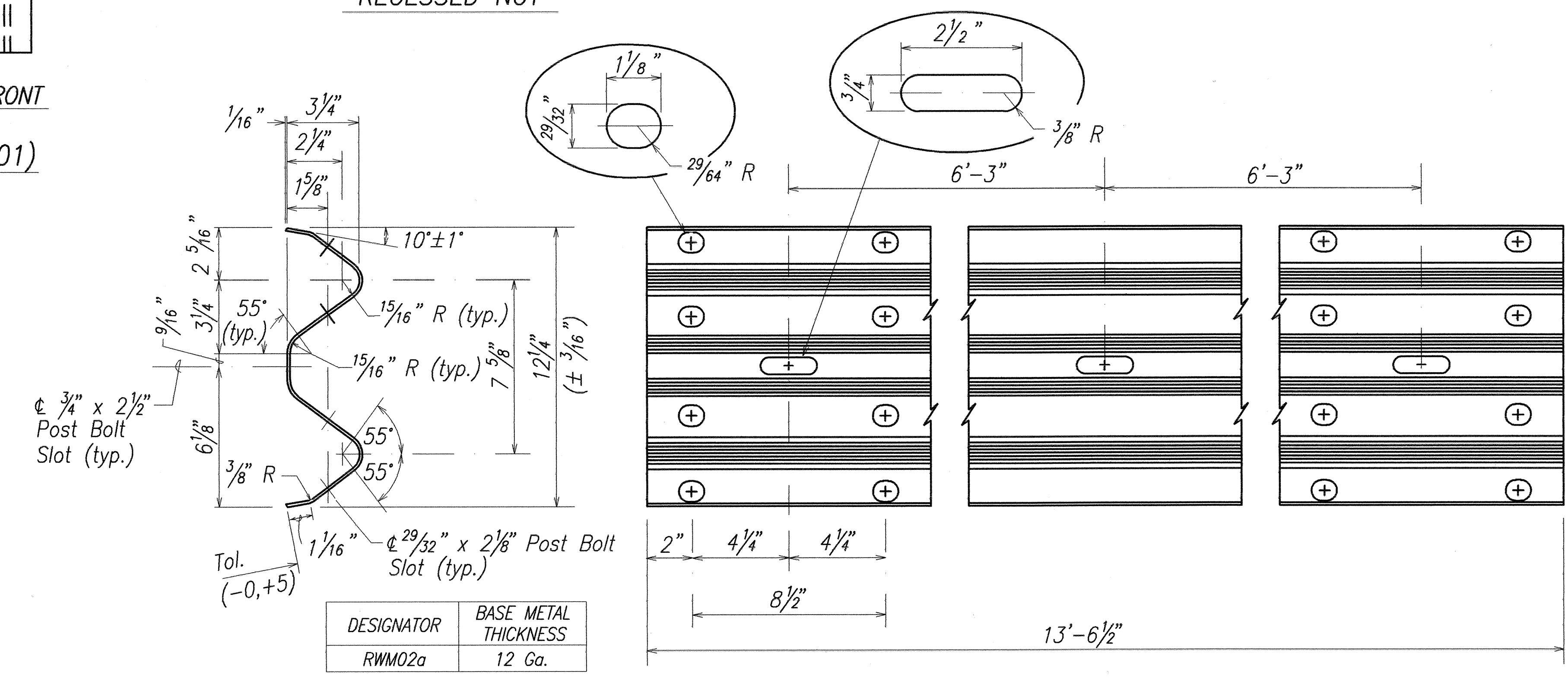


DESIGNATOR	BASE METAL THICKNESS
RWB01a	12 Ga.

W-BEAM BACK-UP-PLATE (RWB01a)



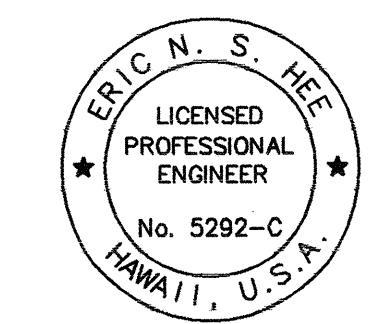
STRONG POST W-BEAM GUARDRAIL WITH RECYCLED OFFSET BLOCK OR PLASTIC BLOCKOUT



DESIGNATOR	BASE METAL THICKNESS
RWM02a	12 Ga.

2 SPACE W-BEAM GUARDRAIL (RWM02a)

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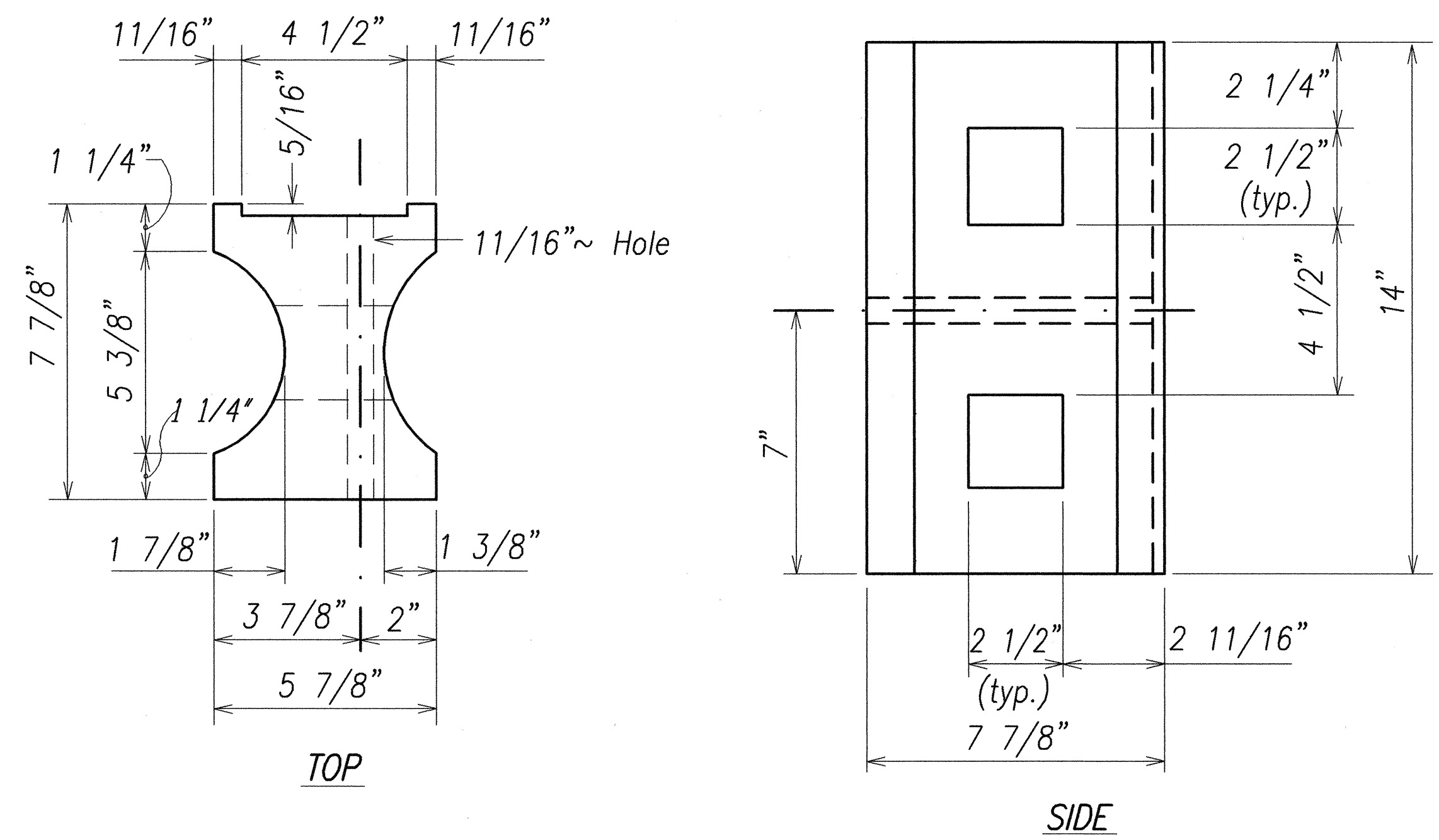
STRONG POST W-BEAM  
GUARDRAIL

WAAPA ROAD/RICE STREET RESURFACING  
Nawiliwili Road To Kapule Highway  
Federal Aid Project No. NH-051-1(10)  
Scale: Not to Scale Date: July, 2000  
SHEET No. 1 OF 1 SHEETS

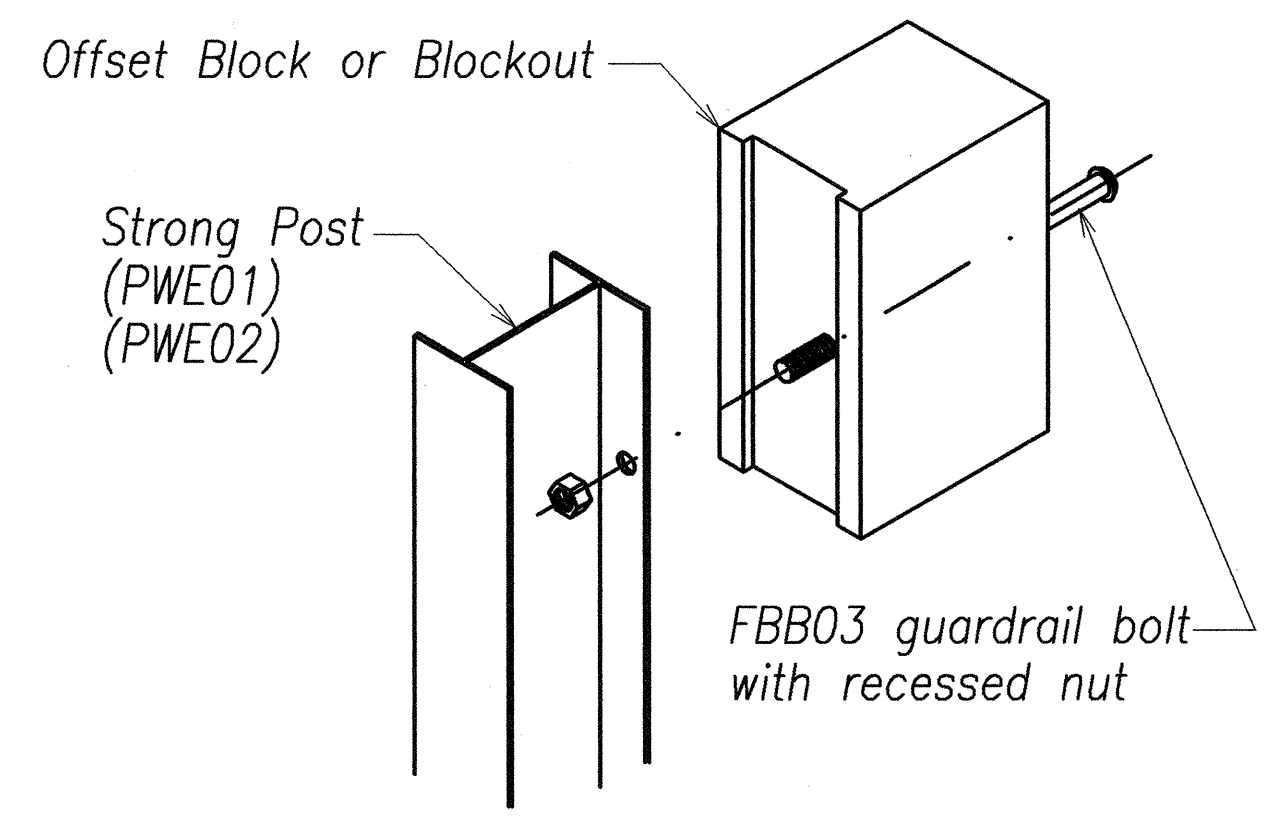
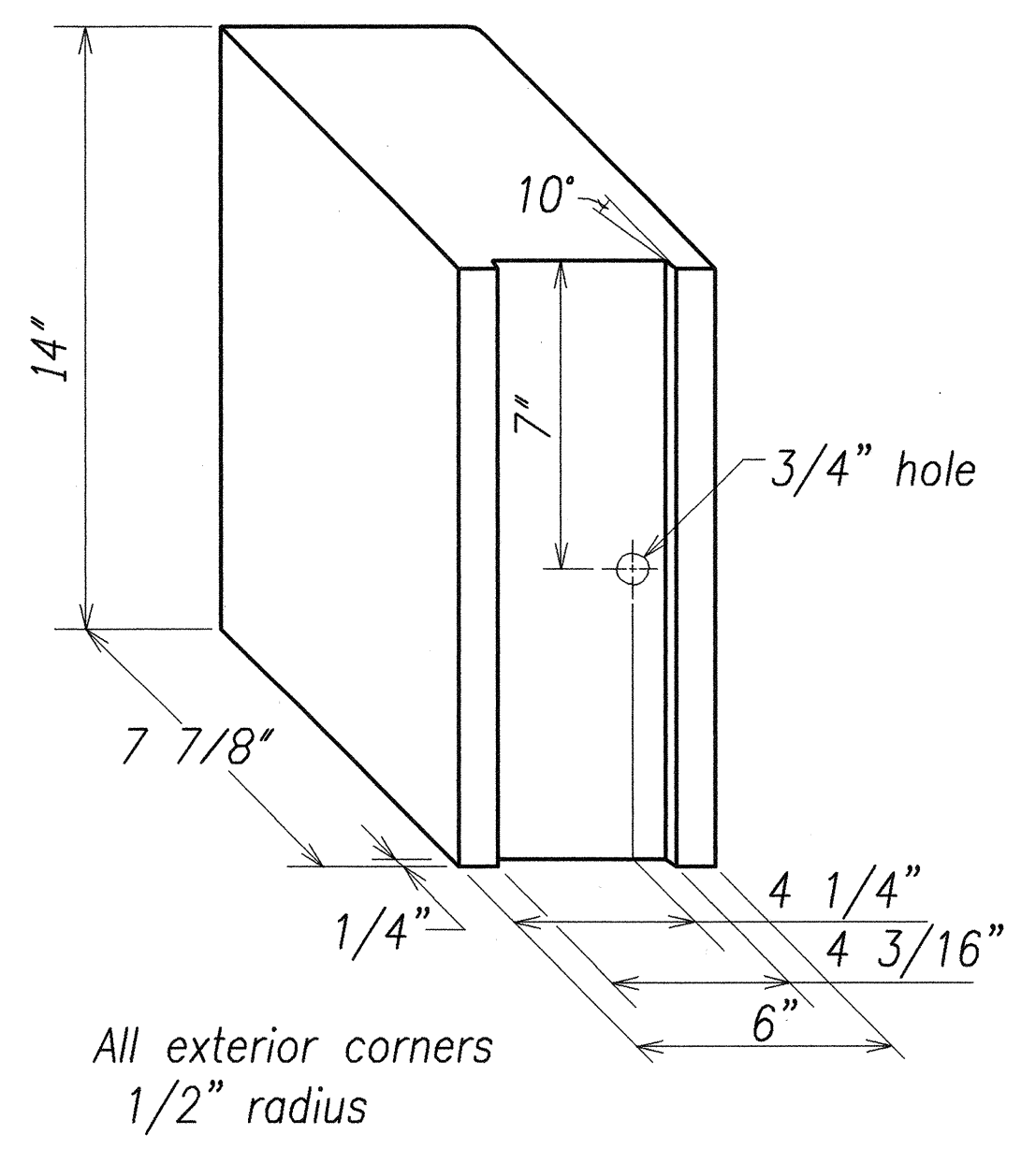
FED. ROAD DIST. NO.	STATE	FED. AID PROJ. NO.	FISCAL YEAR	SHEET NO.	TOTAL SHEETS
HAWAII	HAW.	NH-051-1(10)	2001	13	34

GENERAL NOTES:

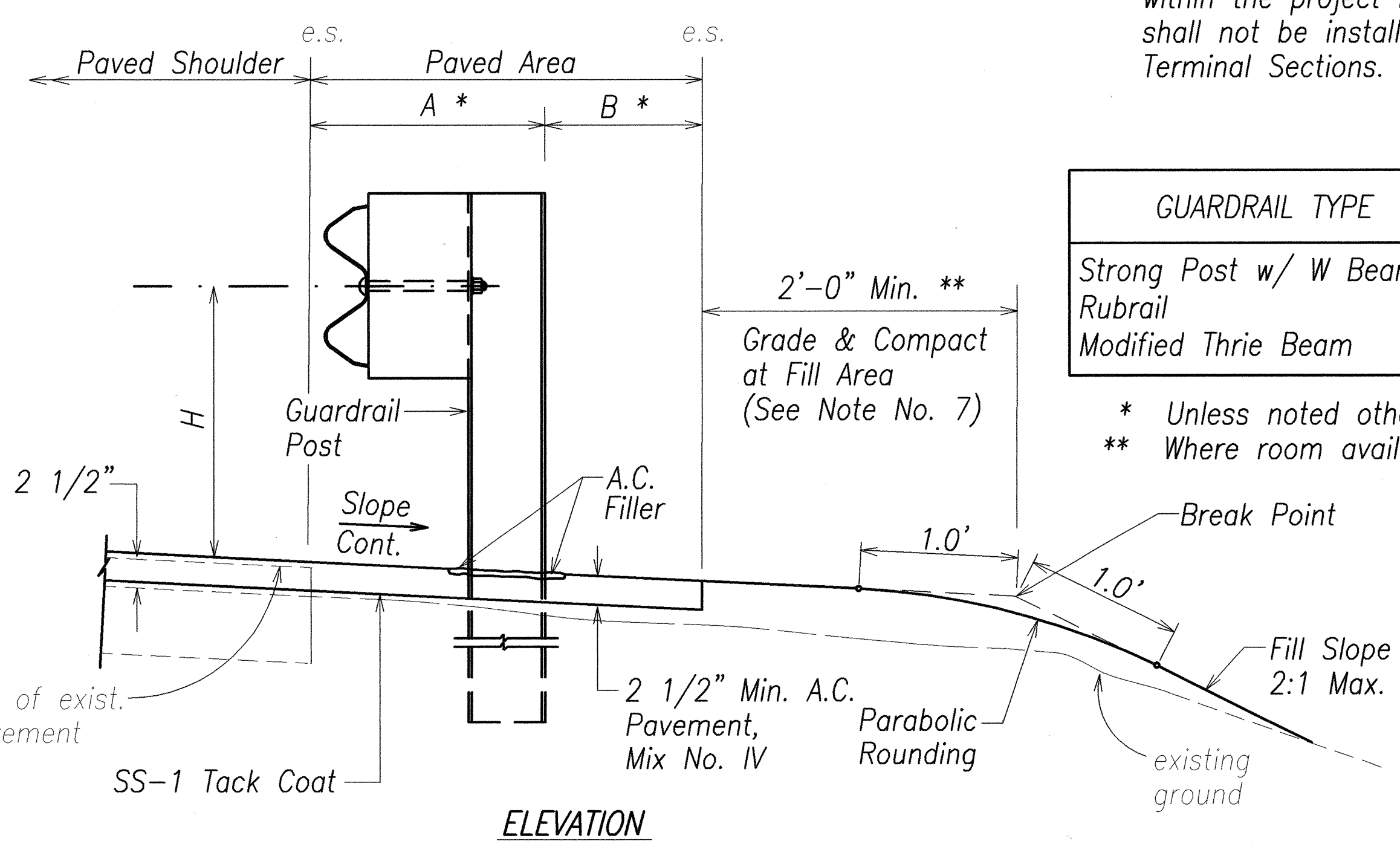
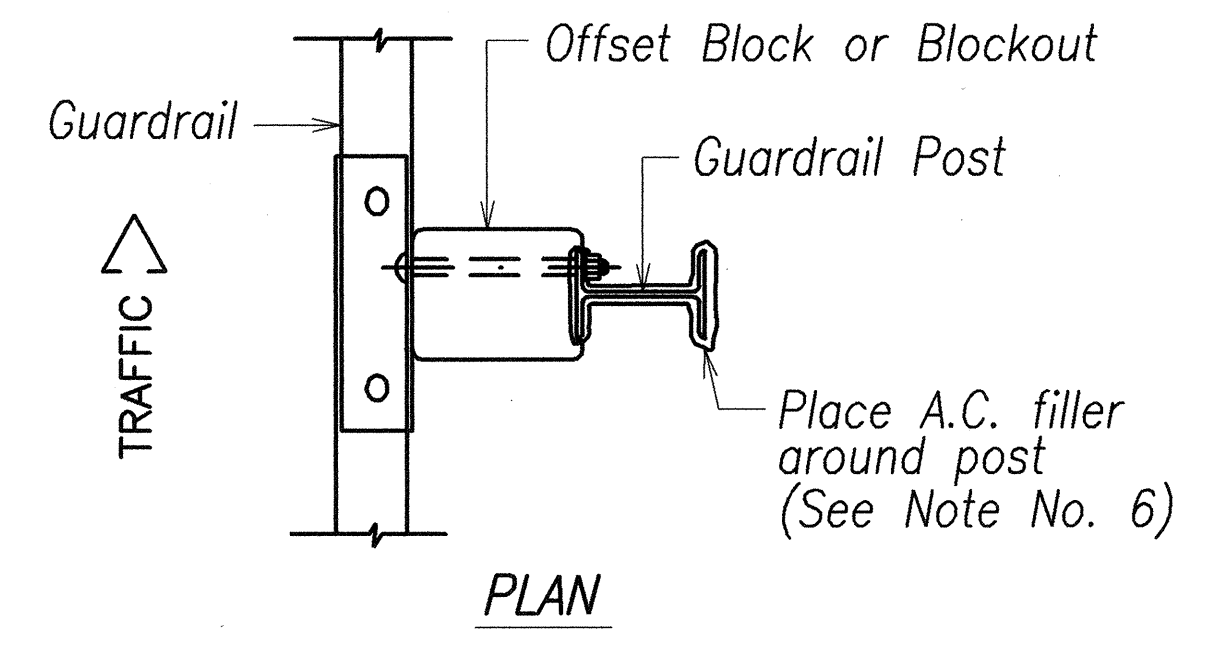
- All hardware, posts and fasteners shall be hot-dip zinc coated galvanized after fabrication. No punching, drilling or cutting will be permitted after galvanizing.
- Where conditions require, special post lengths in increments of 6 inches may be specified.
- All fasteners, posts, and rail elements (i.e. FBB03, PWE01, RWM02a, etc.) 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, Subcommittee On New Highway Materials, Task Force 13 Report. Dimensions of fastners, posts and rail elements have been converted from metric units into their present form.
- The Recycled Plastic Block or Offset Block shall be approved by the State.
- Prior to installing A. C. Mix. No. IV, level & remove vegetation and compact existing ground to 95% compaction. New A.C. pavement at guardrails shall extend 6' longitudinally beyond terminal ends.
- After the guardrail posts are installed in the paved area, the Contractor shall place A.C. filler around the guardrail post and seal all cracks in the paved area that was caused during the guardrail post installation. If required by the inspector/engineer, the Contractor shall tamper the paved area around the guardrail post prior to placing A.C. filler. The cost for this work shall not be paid for separately, but shall be considered incidental to the various guardrail items.
- When standards for the fill slope area cannot be met, a site specific, Engineer-approved design may be used.
- Reflector Markers (RM-5) mounted on new and existing guardrails within the project limits shall be spaced every 50'-0". RM-5's shall not be installed on the FLEAT-350 or Type "G" Modified Terminal Sections.



RECYCLED PLASTIC BLOCKOUT (TYPE I)



STEEL POST AND BLOCK DETAIL

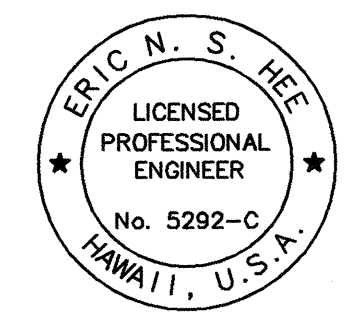
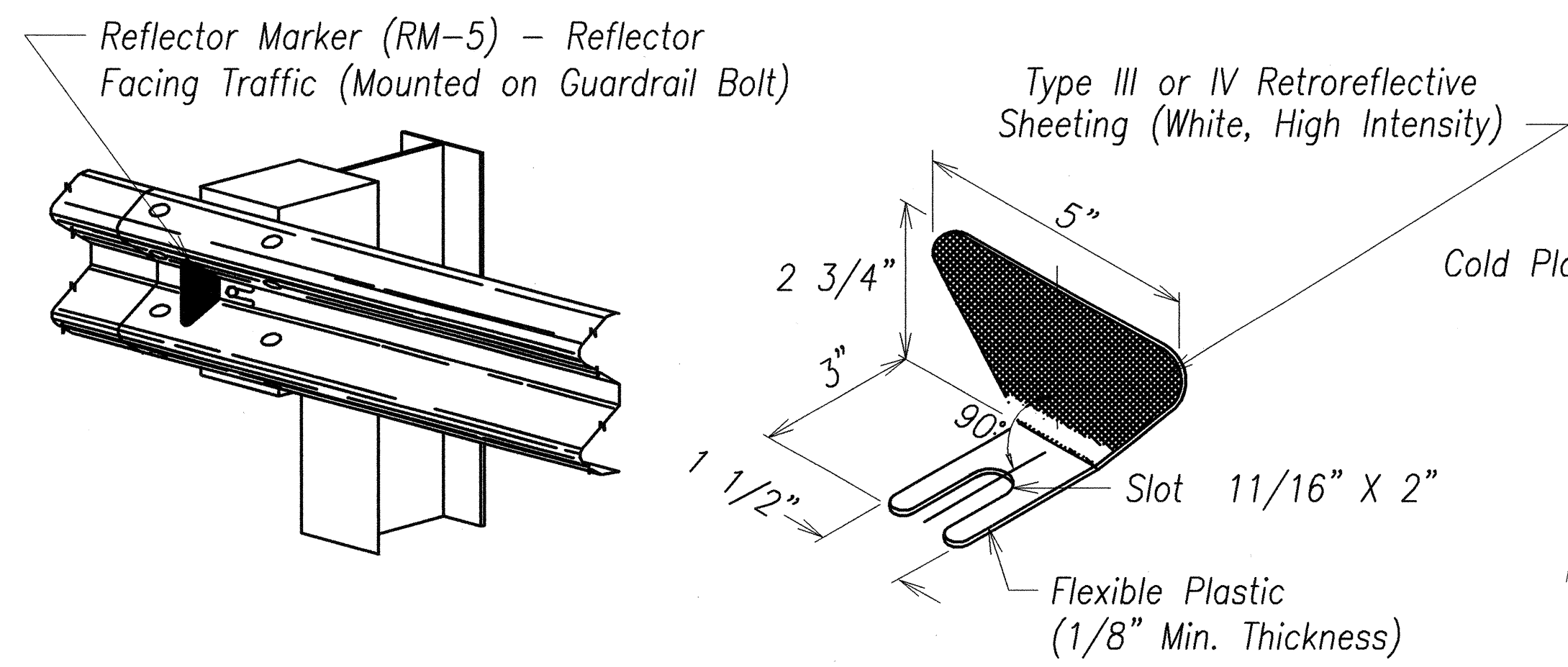


TYPICAL GUARDRAIL INSTALLATION

GUARDRAIL TYPE	DIMENSION		
	H	A*	B*
Strong Post w/ W Beam	1'-9 5/8"	1'-6"	1'-0"
Rubrail	2'-0"	1'-6"	2'-0"
Modified Thrie Beam	2'-0"	2'-0"	1'-0"

\* Unless noted otherwise on plans.  
 \*\* Where room available.

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



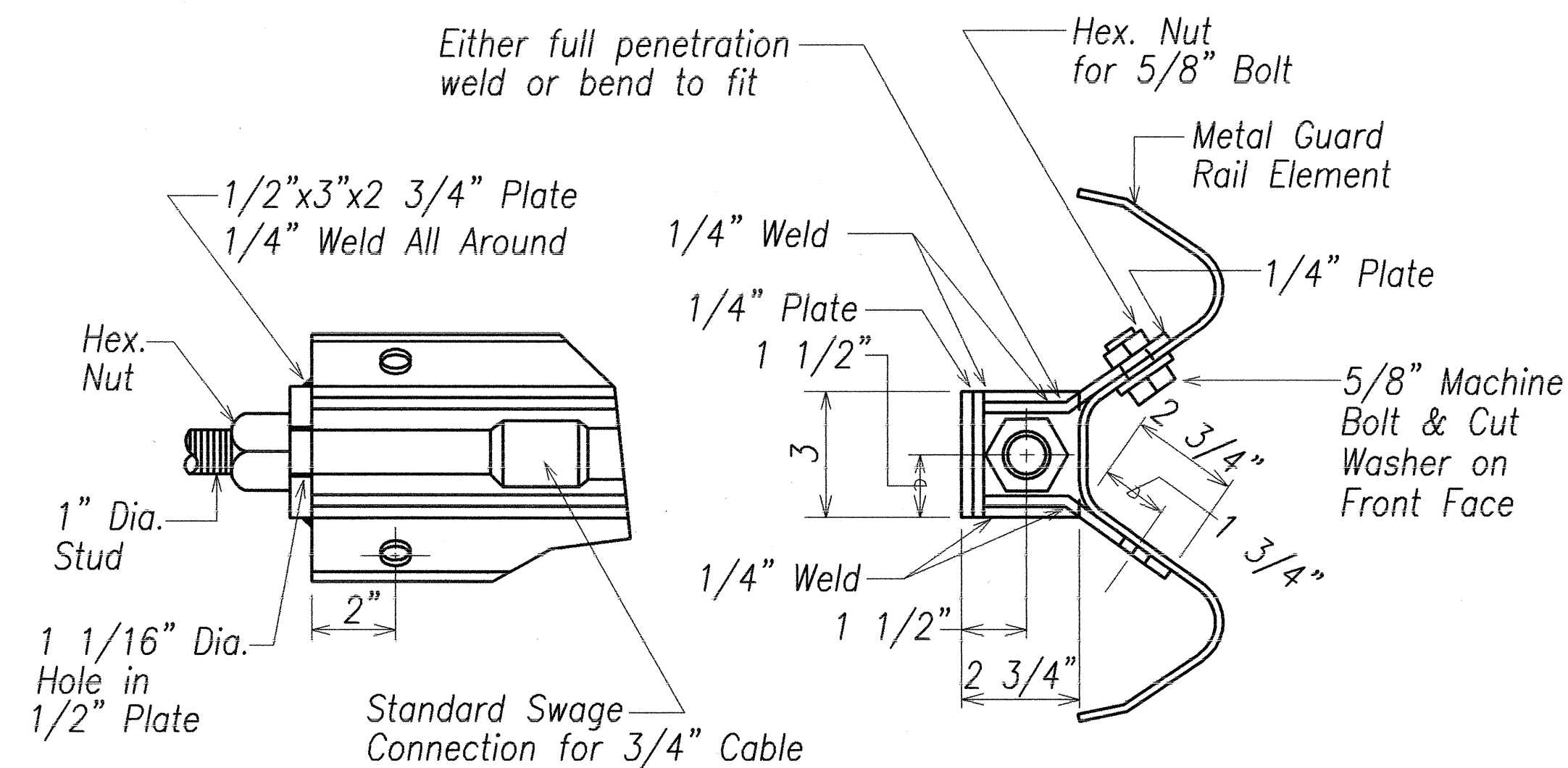
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STATE OF HAWAII  
DEPARTMENT OF TRANSPORTATION  
HIGHWAYS DIVISION  
**GUARDRAIL DETAILS AND NOTES**  
WAAPA ROAD/RICE STREET RESURFACING  
Nawiliwili Road To Kapule Highway  
Federal Aid Project No. NH-051-1(10)  
Scale: No Scale Date: July, 2000  
SHEET No. 1 OF 2 SHEETS

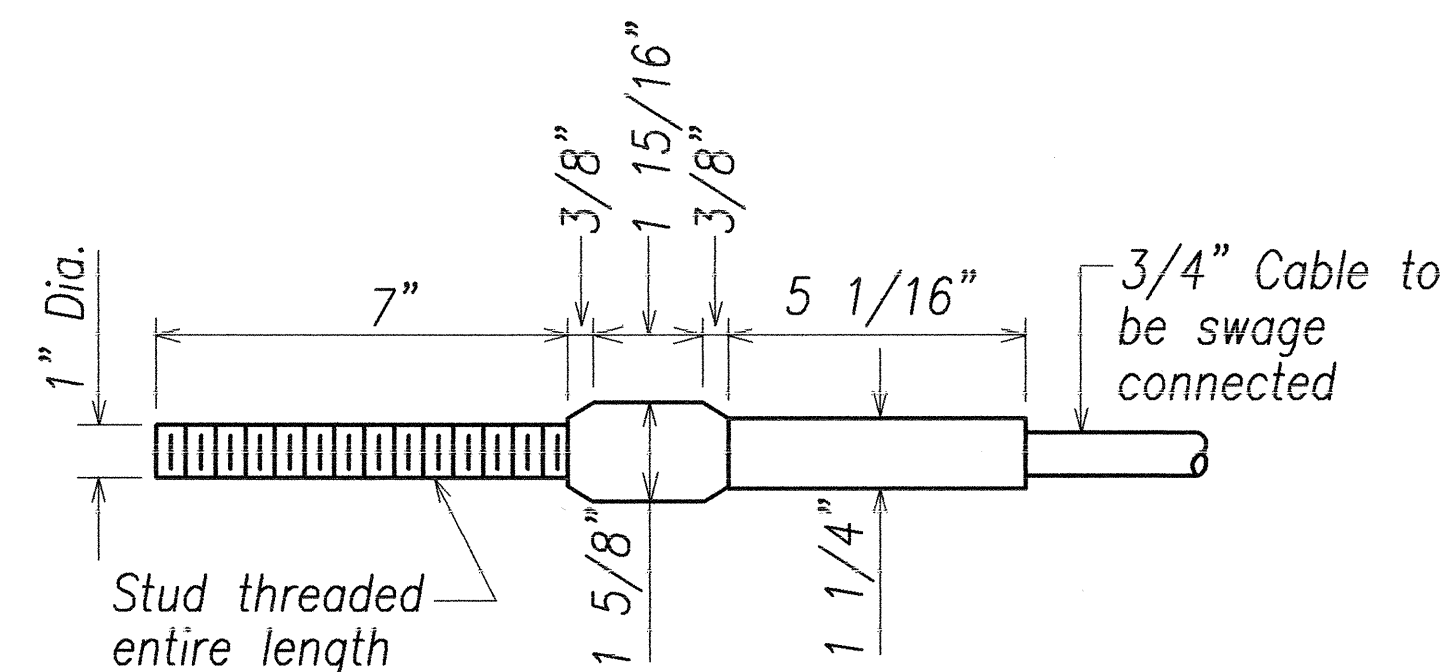
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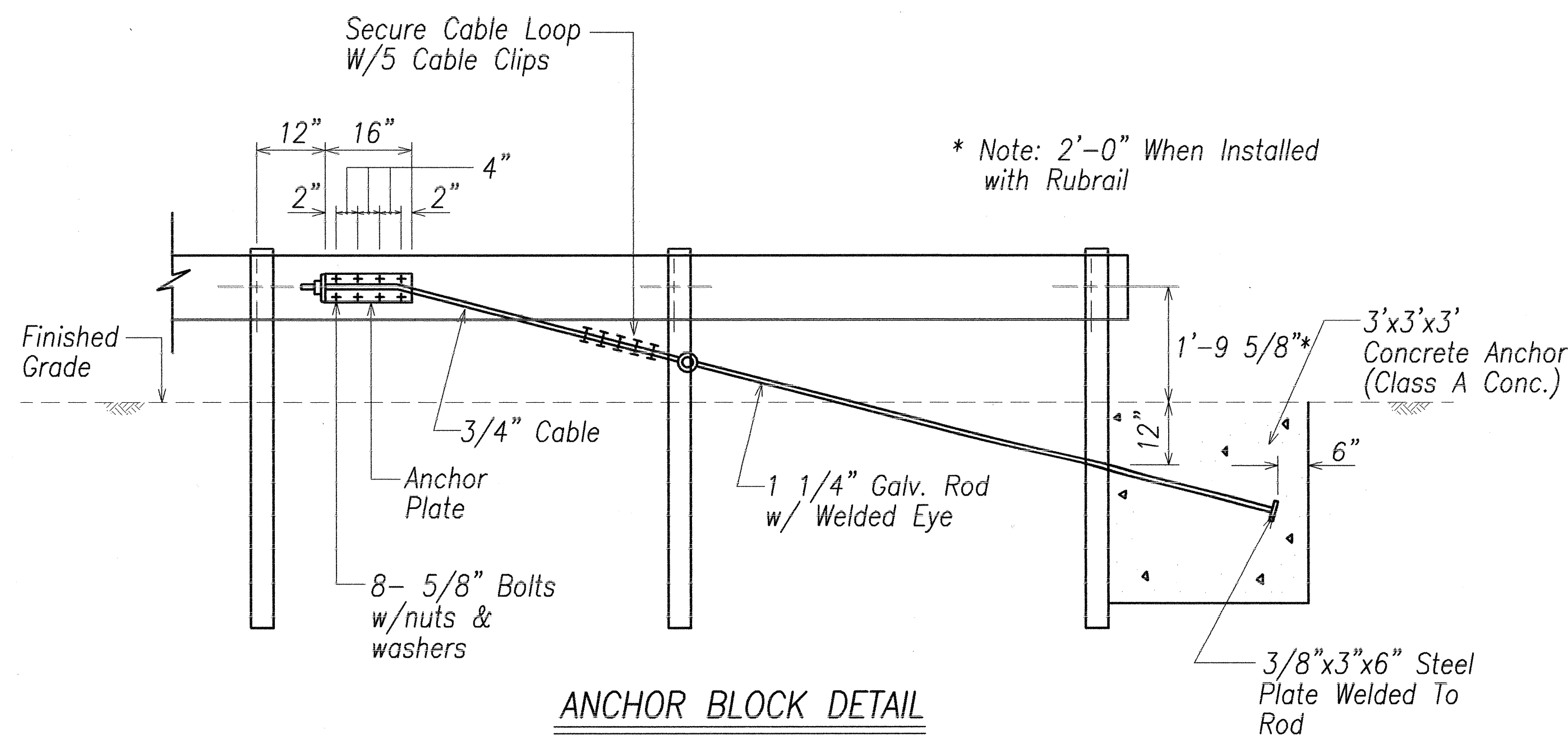
FED. ROAD DIST. NO.	STATE	FED. AID PROJ. NO.	FISCAL YEAR	SHEET NO.	TOTAL SHEETS
HAWAII	HAW.	NH-051-1(10)	2001	14	34



ANCHOR PLATE DETAILS



STANDARD SWAGED FITTING  
AND STUD

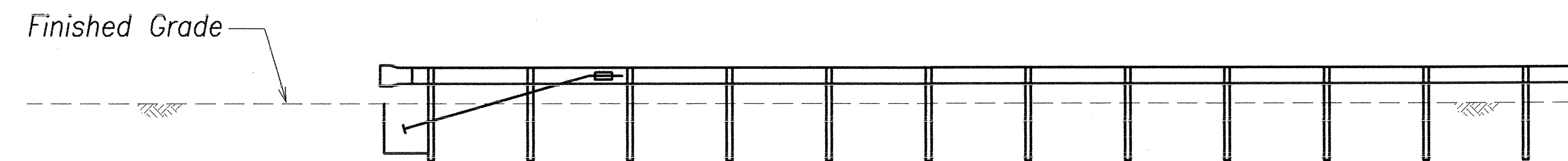


ANCHOR BLOCK DETAIL

NOTES:

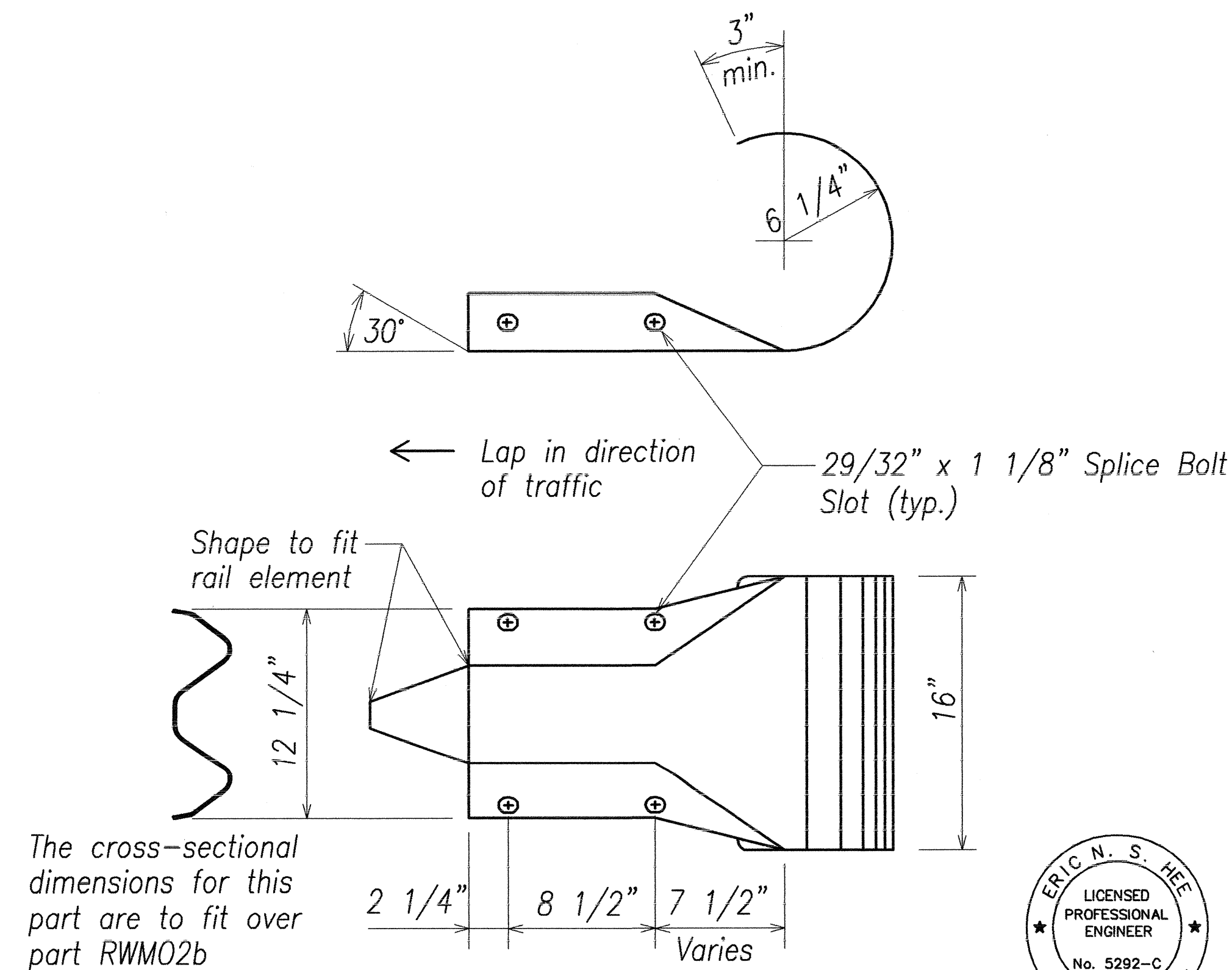
- During construction, the Contractor shall layout the proposed Type 'G' Modified End Terminal and receive approval from the Construction Engineer prior to installation.
- Strong Post, Offset Block or Blockout, and W Beam shall be paid under Item No. 606.3101 - GUARDRAIL, TYPE 3-SINGLE WITH STRONG POST
- Concrete anchor block, excavation, anchor rod, rounded end and miscellaneous appurtenances necessary to anchor the guardrail ends shall be paid unde Item No. 607.7011 - TERMINAL SECTION, TYPE 'G' MODIFIED

For Details of Concrete Anchor Block in Ground See Det. below.



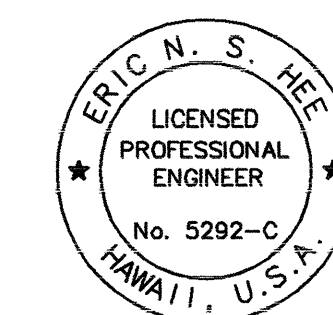
ELEVATION

TERMINAL SECTION,  
TYPE "G" MODIFIED WITH ROUNDED END



DESIGNATOR	BASE METAL THICKNESS
RWE03a	7/64"

W-BEAM END SECTION (ROUNDED RWE03a)



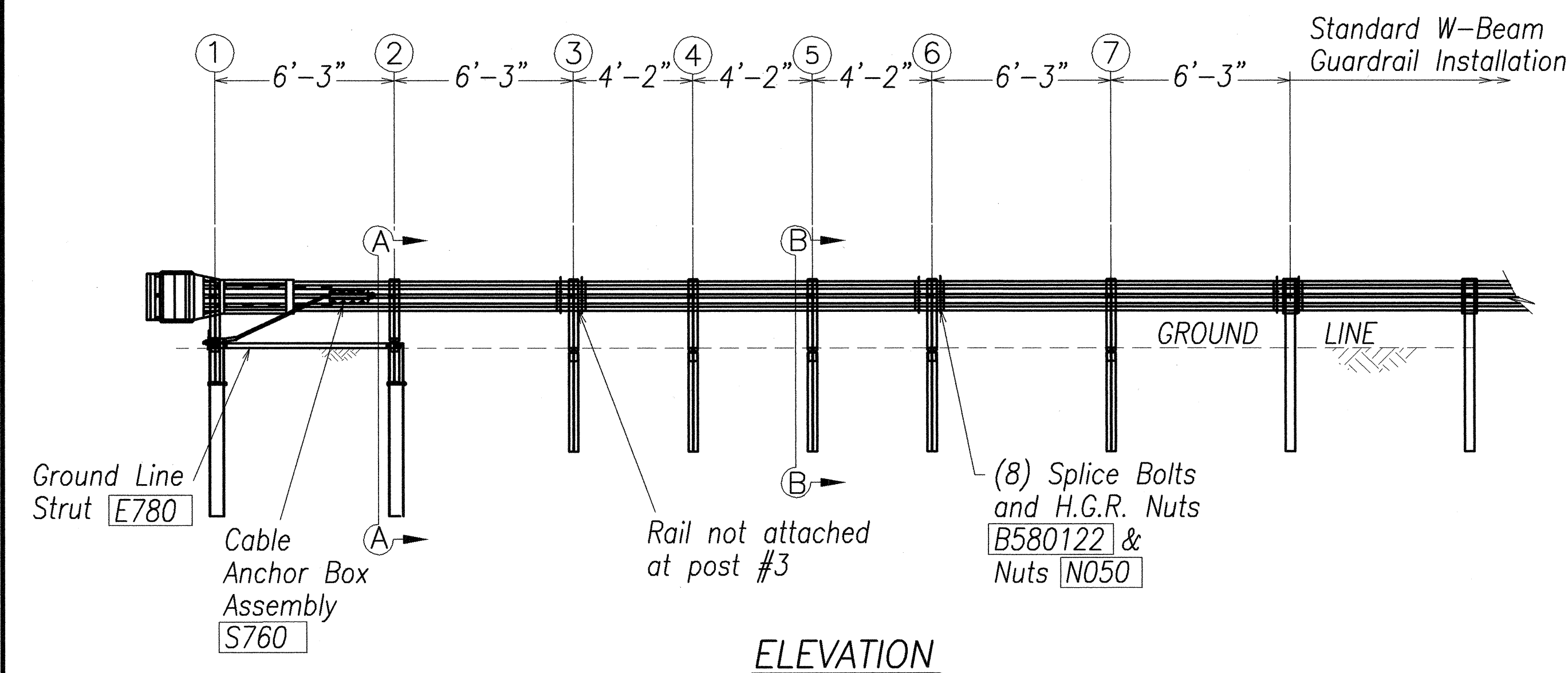
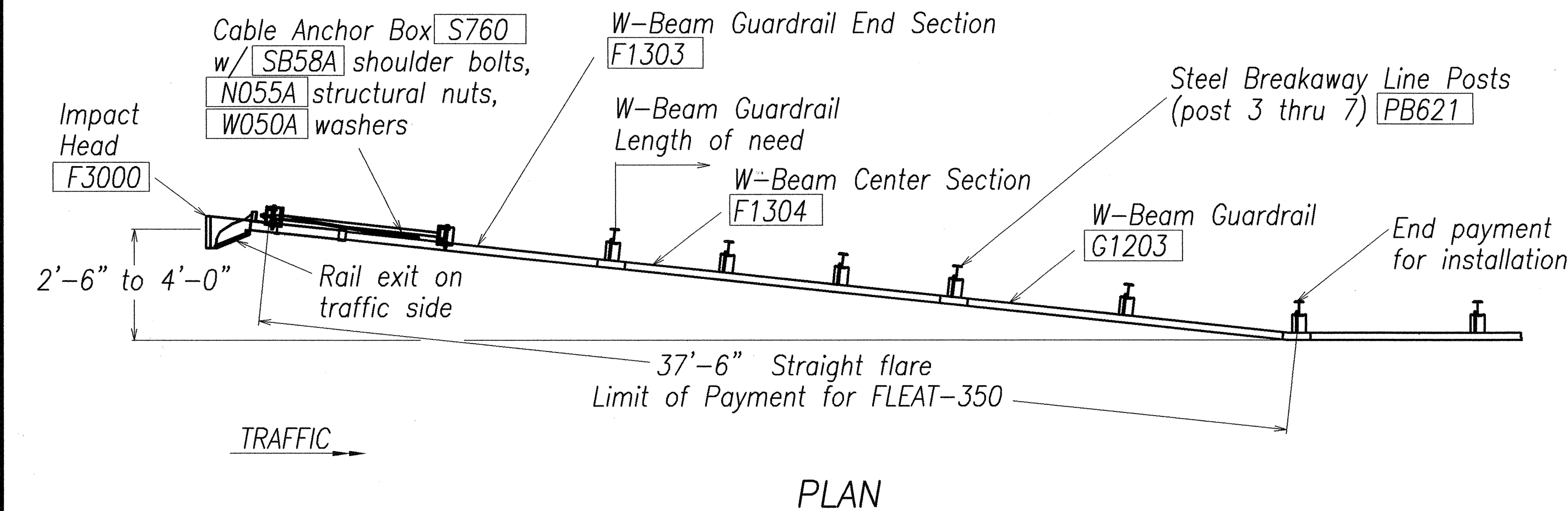
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GUARDRAIL DETAILS

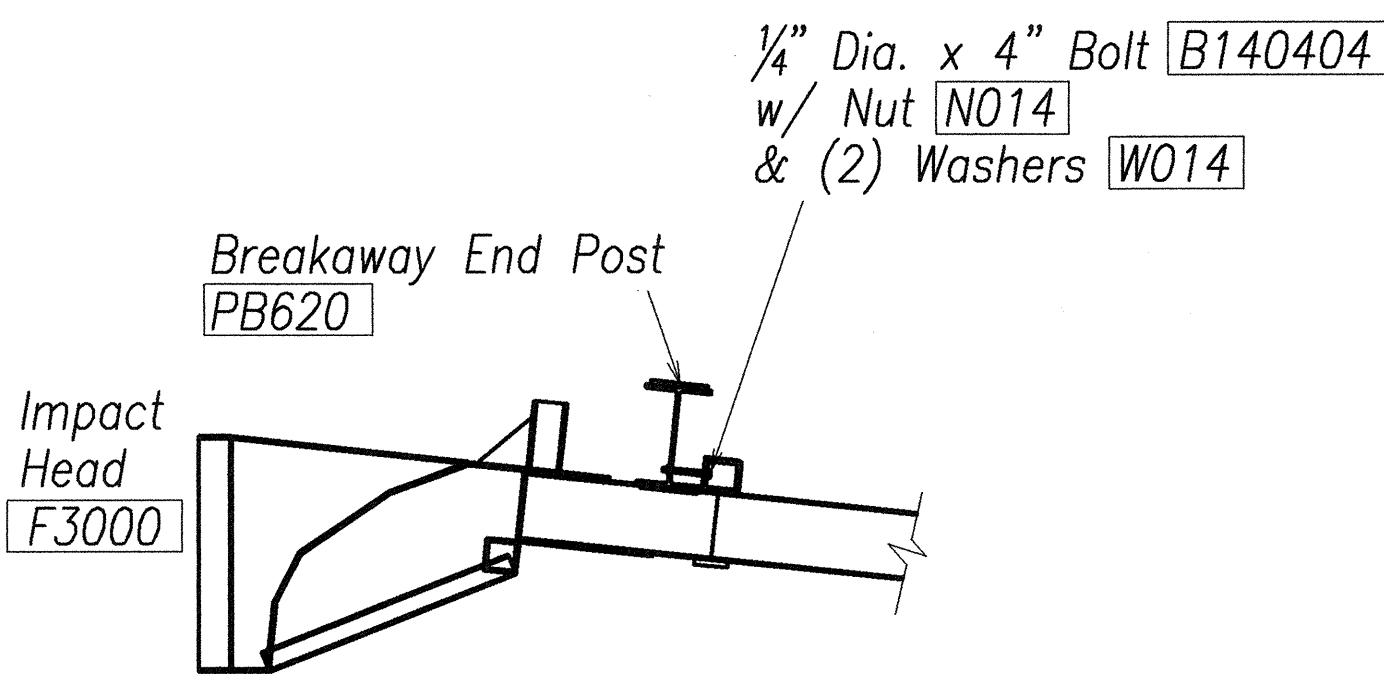
WAAPA ROAD/RICE STREET RESURFACING  
Nawiliwili Road To Kapule Highway  
Federal Aid Project No. NH-051-1(10)  
Scale: Not to Scale Date: July, 2000  
SHEET No. 2 OF 2 SHEETS

FED. ROAD DIST. NO.	STATE	FED. AID PROJ. NO.	FISCAL YEAR	SHEET NO.	TOTAL SHEETS
HAWAII	HAW.	NH-051-1(10)	2001	15	34

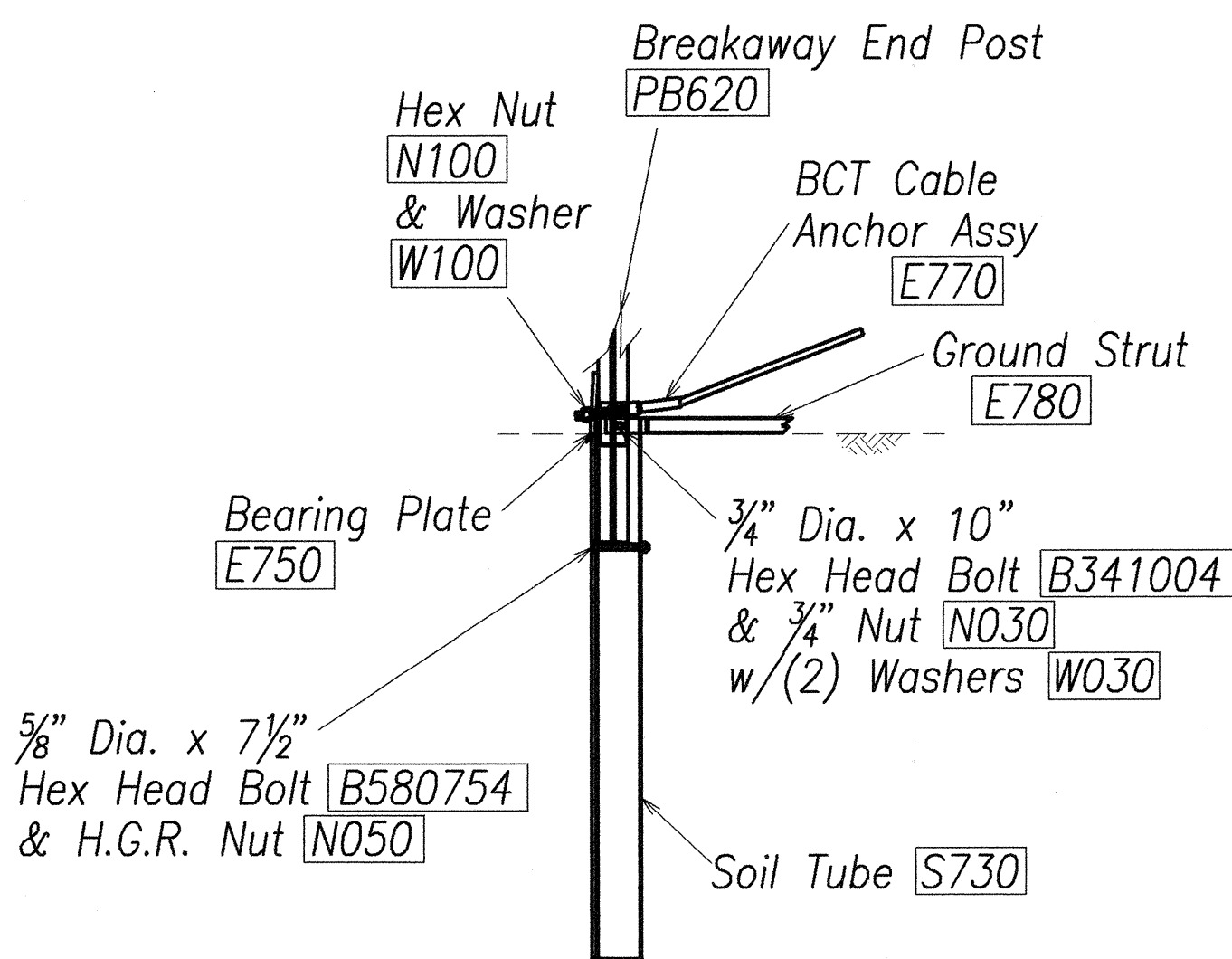


# GENERAL NOTES:

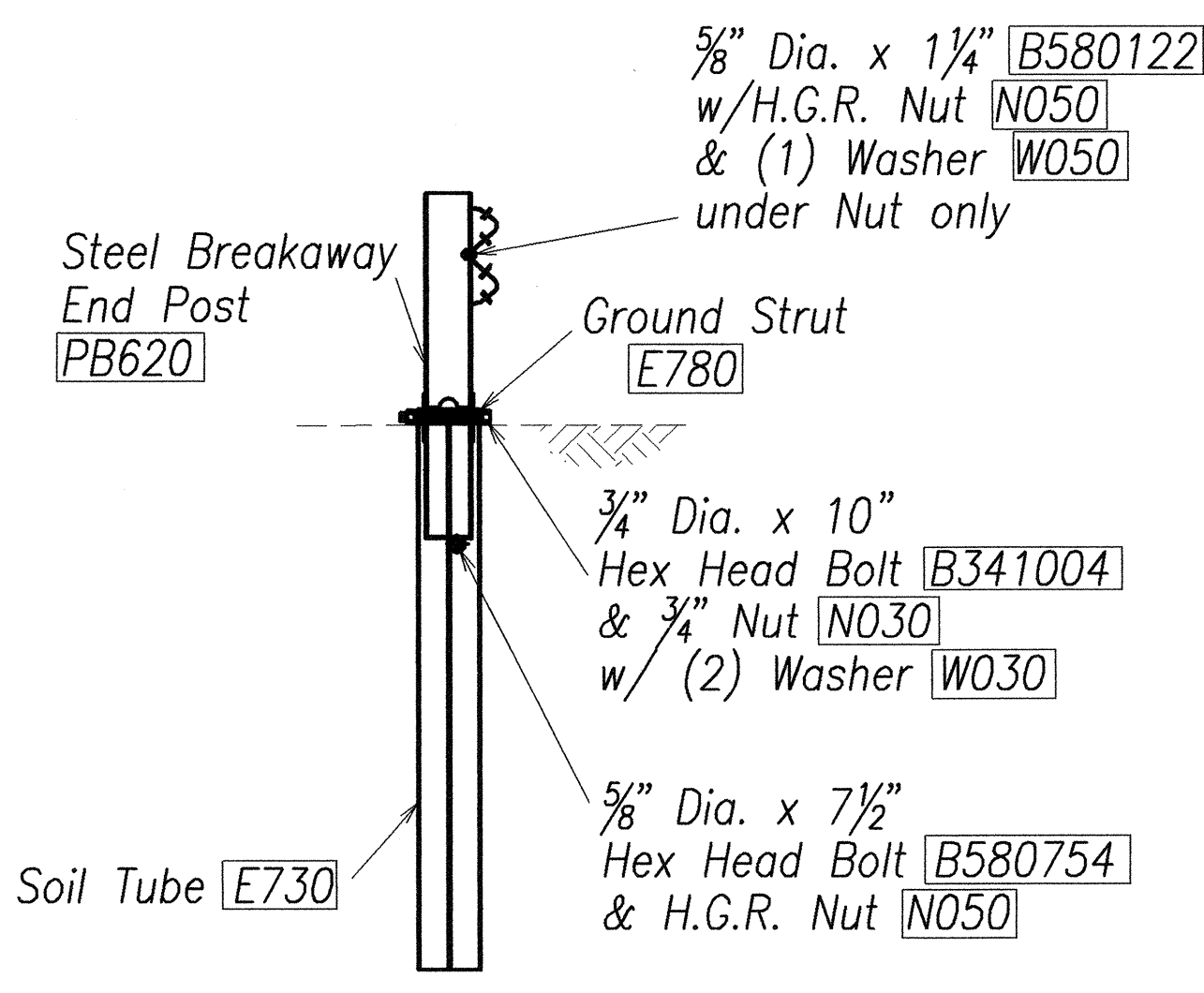
- Breakaway posts are required with the FLEAT Terminal.
- All bolts, nuts, cable assemblies, cable anchors and bearing plates shall be galvanized.
- The soil tubes shall not protrude more than 4" above ground (measured along a 5' cord). Site grading may be necessary to meet this requirement.
- The soil tubes may be driven with an approved driving head. Soil tubes should not be driven with the post in the tube. If the tubes are placed in drilled holes, the backfill material must be satisfactorily compacted to prevent settlement.
- When rock is encountered during excavation, a 12" Dia. post hole, 20" deep may be used if approved by the engineer. Granular material will be placed in the bottom of the hole approx. 2 1/2" deep to provide drainage. The soil tubes will be field cut to length, placed in the hole and backfilled with adequately compacted material excavated from the hole.
- The breakaway cable assembly must be taut. A locking device, (vice grips or channel lock pliers) should be used to prevent the cable from twisting when tightening nuts.



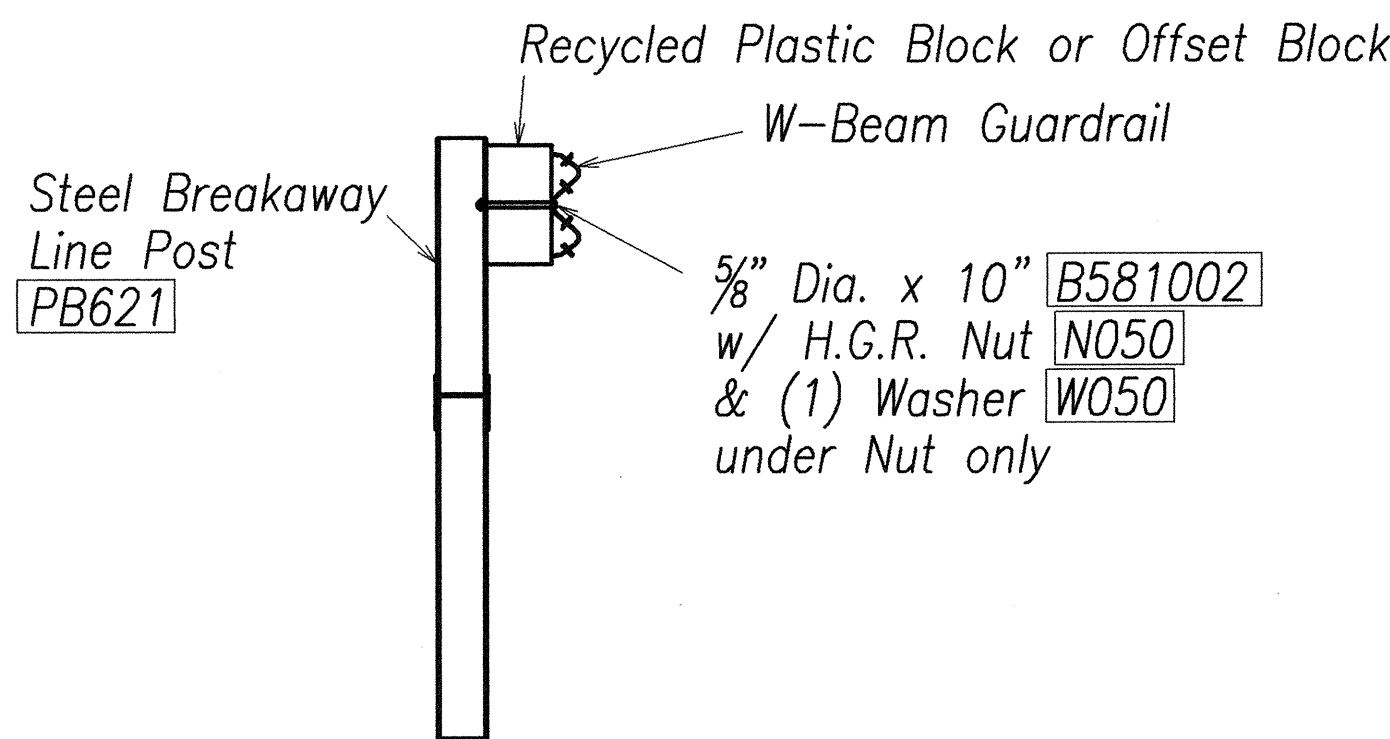
# IMPACT HEAD CONNECTING DETAIL



# PARTIAL VIEW OF POST 1



# SECTION A-A (@ Post #2)



# SECTION B-B

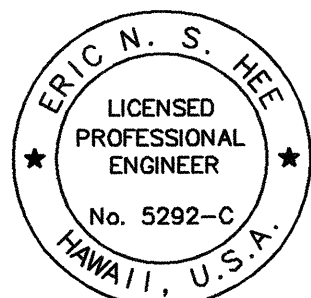
(Typical @ Posts #3-7)  
Note: Rail Not Bolted @ Post #3

ITEM NO.	QTY	BILL OF MATERIALS
F3000	1	IMPACT HEAD
F1303	1	W-BEAM GUARDRAIL END SECTION, 12 GA.
F1304	1	W-BEAM GUARDRAIL CENTER SECTION, 12 GA.
G1203	1	W-BEAM GUARDRAIL, 12 GA.
S730	2	*FOUNDATION SOIL TUBE, 6" x 8" x 72"
E750	1	BEARING PLATE
S760	1	CABLE ANCHOR BOX
E770	1	BCT CABLE ANCHOR ASSEMBLY
E780	1	GROUND STRUT
PB620	2	STEEL BREAKAWAY END POST
PB621	5	STEEL BREAKAWAY LINE POST
	5	RECYCLED PLASTIC BLOCKOUT OR OFFSET BLOCK
HARDWARE		
B580122	25	5/8" Dia. x 1 1/4" SPLICE BOLT, POST #2
B580754	2	5/8" Dia. x 7 1/2" HEX BOLT
B341004	2	3/4" Dia. x 10" HEX BOLT
B581002	5	5/8" Dia. x 10" H.G.R. BOLT (POST 3 THRU 7)
N050	32	5/8" Dia. H.G.R. NUT (SPLICE 24, SOIL TUBES 2, POST 2 THRU 7, 6)
N030	2	3/4" Dia. HEX NUT
W050	6	H.G.R. WASHER
W030	4	3/4" ID WASHER
N100	2	1" ANCHOR CABLE HEX NUT
W100	2	1" ANCHOR CABLE WASHER
B140404	2	1/4" x 4" HEX BOLT
N014	2	1/4" HEX NUT
W014	4	1/4" WASHER
SB58A	8	CABLE ANCHOR BOX SHOULDER BOLT
N055A	8	1/2" A325 STRUCTURAL NUT
W050A	16	1 1/16" OD x 9/16" ID A325 STR. WASHER

# Foundation Tube Options For Posts 1 & 2

- \*6'-0" Split Foundation Tubes S730
- \*6'-0" Solid Foundation Tubes E731
- \*5'-0" Foundation Tubes S735 W/Soil Plates SP600
- \*4'-6" Foundation Tubes E735 W/Soil Plates SP600

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HIGHWAYS DIVISION  
**FLEAT 350**  
**FLARED ENERGY ABSORBING TERMINAL**  
WAAPA ROAD/RICE STREET RESURFACING  
Nawiliwili Road To Kapule Highway  
Federal Aid Project No. NH-051-1(10)  
Scale: Not to Scale Date: July, 2000  
SHEET No. 1 OF 1 SHEETS

15



16

GENERAL NOTES:

DESIGN SPECIFICATIONS:

AASHTO LRFD Bridge Design Specifications, Second Edition, 1998

MATERIALS:

- A. Reinforced Concrete: Class A ( $f'c = 3,000$  psi min.)
- B. Reinforced Steel: ASTM A 615, Grade 60
- C. Admixture in Concrete: See Special Provisions
- D. All expansion and premolded joint filler shall be incidental to concrete and will not be paid for separately.
- E. All structural steel shall be ASTM A 36, hot-dip galvanized after fabrication.
- F. All anchor bolts, nuts and washers shall be ASTM A 325, hot-dip galvanized after fabrication, unless noted otherwise.
- G. All welding shall be in accordance with the current edition of Reinforcing Steel Welding Code AWS D 1.4.

CONSTRUCTION REQUIREMENTS:

- A. Refer to Hawaii Standard Specifications for Road, Bridge and Public Works Construction, (Hawaii 1994 edition and Special Provisions).
- B. Except as noted otherwise, all vertical dimensions are measured plumb.
- C. For steel reinforcing , stagger all splices where possible.
- D. Steel reinforcing shall be supported, bent and placed as per the ACI Detailing Manual, 1994.
- E. For cast-in-place concrete, minimum reinforcement cover:  
Concrete cast against earth: 3"  
Walls: 2"
- F. At time concrete is placed, reinforcing shall be free from mud, oil latance or other coatings adversely affecting bond capacity.
- G. Reinforcement, dowels and other embedded items shall be positively secured before pouring.
- H. Minimum clear spacing between parallel bars shall be one and one-half (1 1/2) times the diameter of the bars (for non-bundled bars). But in no case shall the clear distance between the bars be less than one and one-half (1 1/2) times the maximum size of the course aggregate.
- I. All dimensions relating to reinforcing bars (e.g. spacing of bars, etc.) are to centers of bars unless noted otherwise.
- J. All footings shall bear on firm undisturbed natural soils or properly compacted structural fill.

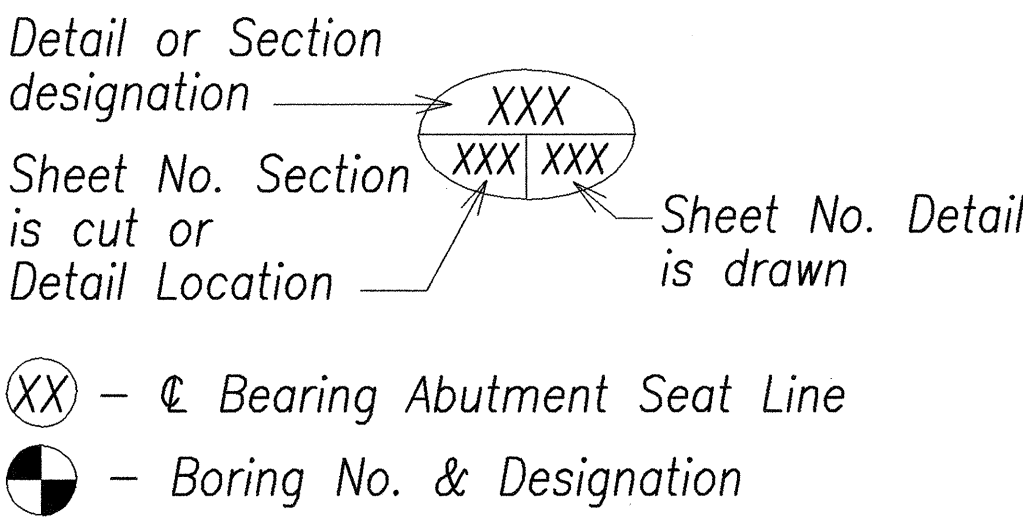
REFERENCE:

- A. Refer to Standard Plans for additional details and notes not covered by details and typical drawings.

GENERAL:

- A. The Contractor shall conduct his work in such a manner and provide such temporary shoring or other measures as may be necessary to insure the safety of all concerned and to protect existing structures.
- B. In the event of over-excavation, the space between the footing or footing key and ground shall be filled with a minimum of Class D concrete at the Contractor's expense at no cost to the State.
- C. Unless noted otherwise, chamfer all exposed concrete edges three-quarters (3/4) of an inch.

SYMBOLS AND ABBREVIATIONS



Abut.	Abutment
AC	Asphaltic Concrete
Adj.	Adjacent
Alt.	Alternate
Approx.	Approximate
Az.	Azimuth
℄	Baseline
Bal.	Balance
Bet., Btwn.	Between
B.F.	Both faces
B.F.E.	Bottom Footing Elevation
Bk.	Back
Blt.	Bolt
Bm.	Beam
B, Bot., Bott.	Bottom
Br.	Bridge
Brg., Brgs.	Bearing, Bearings
B.V.C.	Beginning of Vertical Curve
℄	Center Line
Cant.	Cantilever
C.F.	Cubic Feet
CIp	Cast in Place
C.I.P.	Cast Iron Pipe
Cl., Clr.	Clear
Col.	Column
Conc.	Concrete
Conn.	Connection
Const.	Construction
Cont.	Continuous
CRM	Cement Rubble Masonry
C.Y., Cu. Yd.	Cubic Yards

Det.	Detail
Dia., ∅	Diameter
Dim.	Dimension
Dwg., Dwgs.	Drawing, Drawings

EA, Ea., ea.	Each
E.F.	Each Face
Elec.	Electrical
El., Elev.	Elevation
Emb.	Embankment
E.P.	Edge of Pavement
Eq.	Equal
Est.	Estimated
E.W.	Each Way
Exc.	Excavation
Exist.	Existing
Exp., (E)	Expansion
Ext.	Exterior

(F)	Fixed
$F'c$	Specified Strength of Concrete
$F'ci$	Strength of Concrete at Time of Initial Prestress
F.F.	Front Face
Fig.	Figure
Fin.	Finish
Fin. Gr.	Finish Grade
Ftg.	Footing

Ga.	Gage, Gauge
Galv.	Galvanized
Gir., G	Girder
G.R.P.	Grouted Rubble Paving
Gr.	Grade
Grd.	Ground

(H)	Hinge
Horiz.	Horizontal
HS	High Strength
Ht.	Height
Hwy.	Highway

I.B.	Inbound
I.F.	Inside Face
In.	Inch
Int.	Interior
Inv.	Invert

Jt.	Joint
-----	-------

L	Length
LBS., lb., lbs.	Pound, Pounds
L.F., Lin. Ft.	Linear Feet
Lg.	Long
Longit.	Longitudinal
L.S.	Lump Sum
Lt.	Left
Ltg. Std.	Lighting Standard

Max.	Maximum
Mech.	Mechanical
Min.	Minimum
Misc.	Miscellaneous

N	North
N.B.	Northbound
N.F.	Near Face
No., #	Number
N.T.S.	Not To Scale

O.B.	Outbound
o.c.	On Center
O.G.	Outside Girder
Opn'g	Opening
o/s, O/S	Offset

FED.ROAD DIST.NO.	STATE	FED. AID PROJ. NO.	FISCAL YEAR	SHEET NO.	TOTAL SHEETS
HAWAII	HAW.	NH-051-1(10)	2001	17	34

P.B.	Pull Box
P.C.	Point of Curvature
P.C.C.	Portland Cement Concrete
Perf.	Perforated
PG-( )	Prestressed Girder-(Type)
PL	Plate
P/S	Prestressed Strands
Pvmt.	Pavement

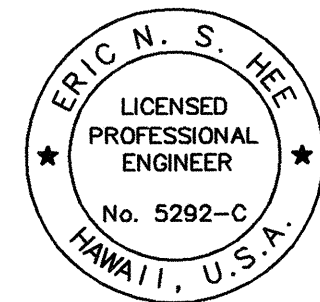
R	Radius
Rdwy	Roadway
Ref.	Reference
Reinf.	Reinforcement
Ret.	Retaining
Req'd	Required
R.F.	Rear Face
Rt.	Right
R/W	Right Of Way

S	South
S.B.	Southbound
Sect.	Section
SF	Square Feet
Shldr.	Shoulder
Sht.	Sheet
Spc.	Space
Spcd.	Spaced
Spcg.	Spacing
Spec.	Specification
Sprd.	Spread
Sta.	Station
Std.	Standard
Stirr.	Stirrup
Str.	Straight
Struct.	Structural
Symm.	Symmetrical

T	Top
Temp.	Temporary
Thk.	Thick, Thickness
T.O.D.	Top Of Deck
Tot.	Total
Transv.	Transverse
Typ.	Typical

Var.	Varies
V.C.	Vertical Curve
Vert.	Vertical

W	West
w/	With
W.W.	Wingwall



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DEPARTMENT OF TRANSPORTATION  
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**TYPE "A" ENDPOST UPGRADE NOTES,  
SYMBOLS, AND ABBREVIATIONS**

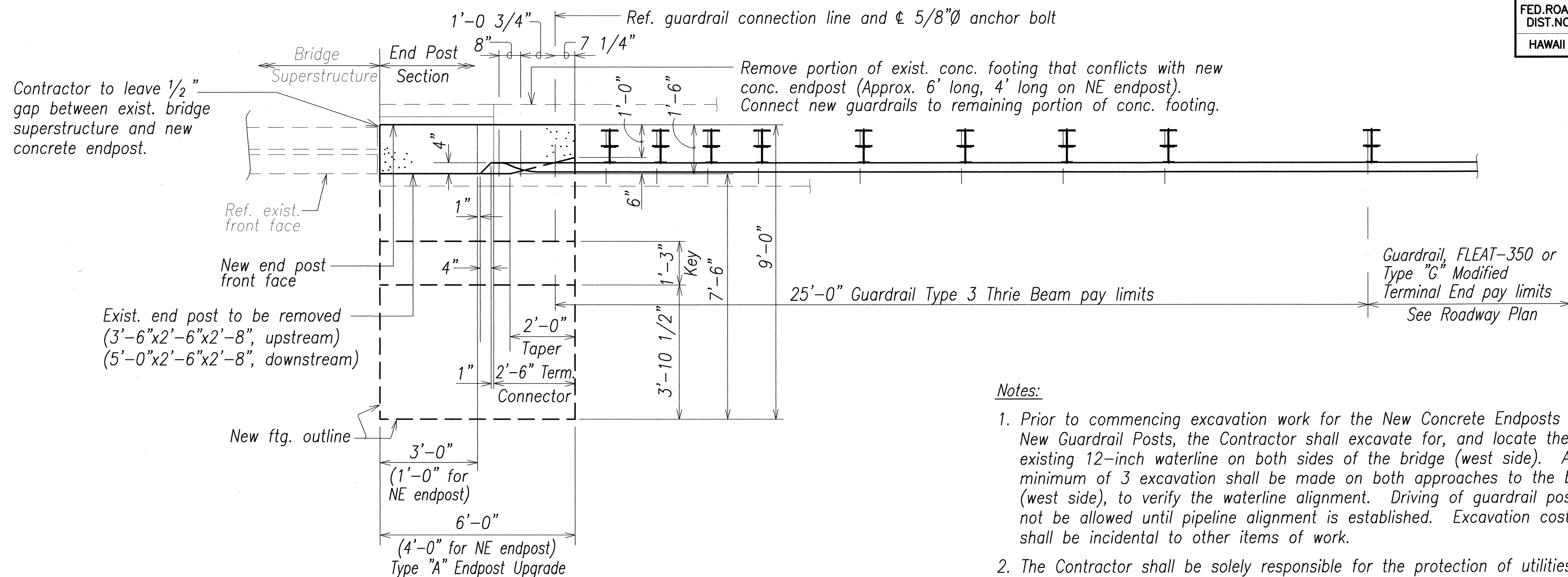
**WAAPA ROAD/RICE STREET RESURFACING**  
Nawiliwili Road To Kapule Highway  
Federal Aid Project No. NH-051-1(10)

Scale: No Scale Date: July, 2000

SHEET No. 1 OF 4 SHEETS



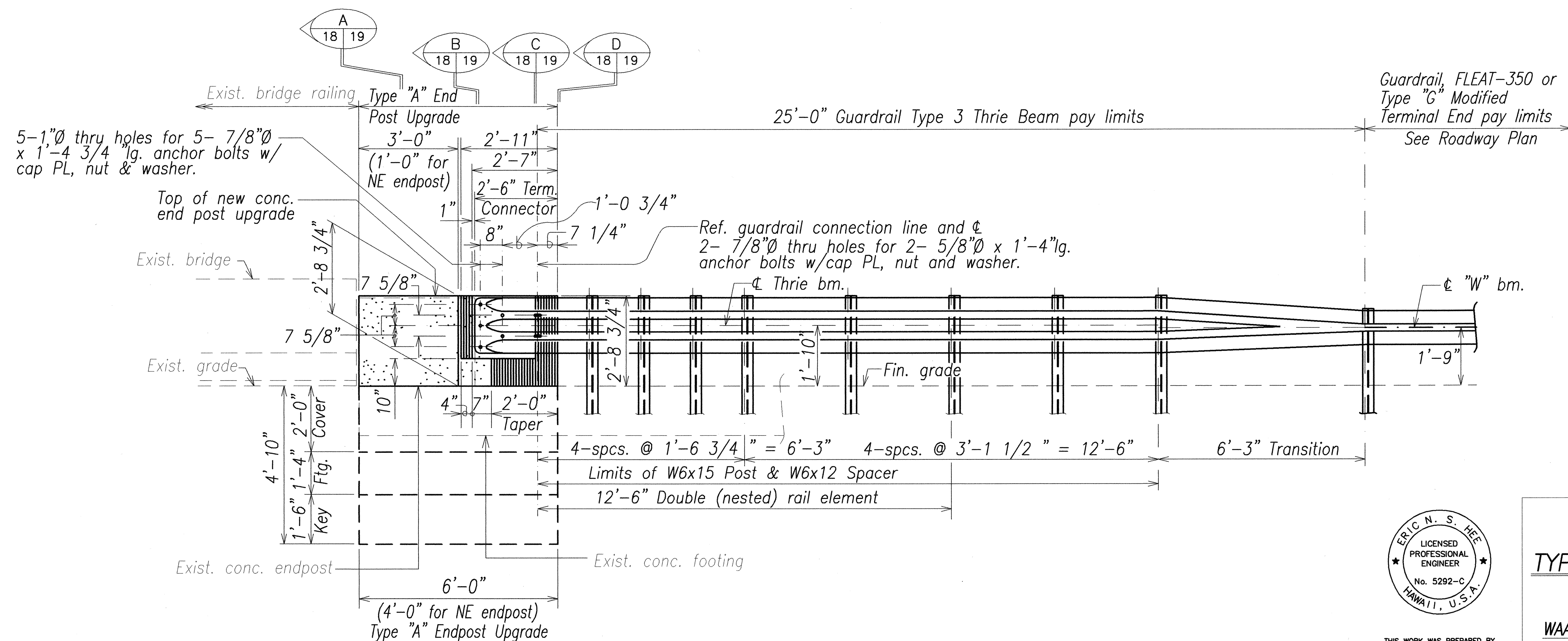
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HAWAII	HAW.	NH-051-1(10)	2001	18	34



PLAN

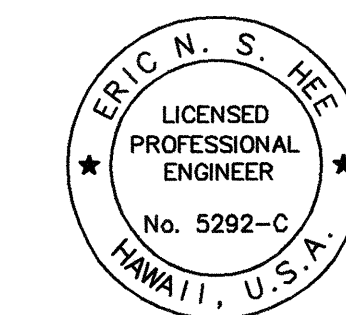
Notes:

1. Prior to commencing excavation work for the New Concrete Endposts and New Guardrail Posts, the Contractor shall excavate for, and locate the existing 12-inch waterline on both sides of the bridge (west side). A minimum of 3 excavation shall be made on both approaches to the bridge (west side), to verify the waterline alignment. Driving of guardrail post will not be allowed until pipeline alignment is established. Excavation costs shall be incidental to other items of work.
2. The Contractor shall be solely responsible for the protection of utilities and existing and new structures from damage due to construction. Any damage shall be repaired at the Contractor's sole expense to the satisfaction of the Engineer.



ELEVATION

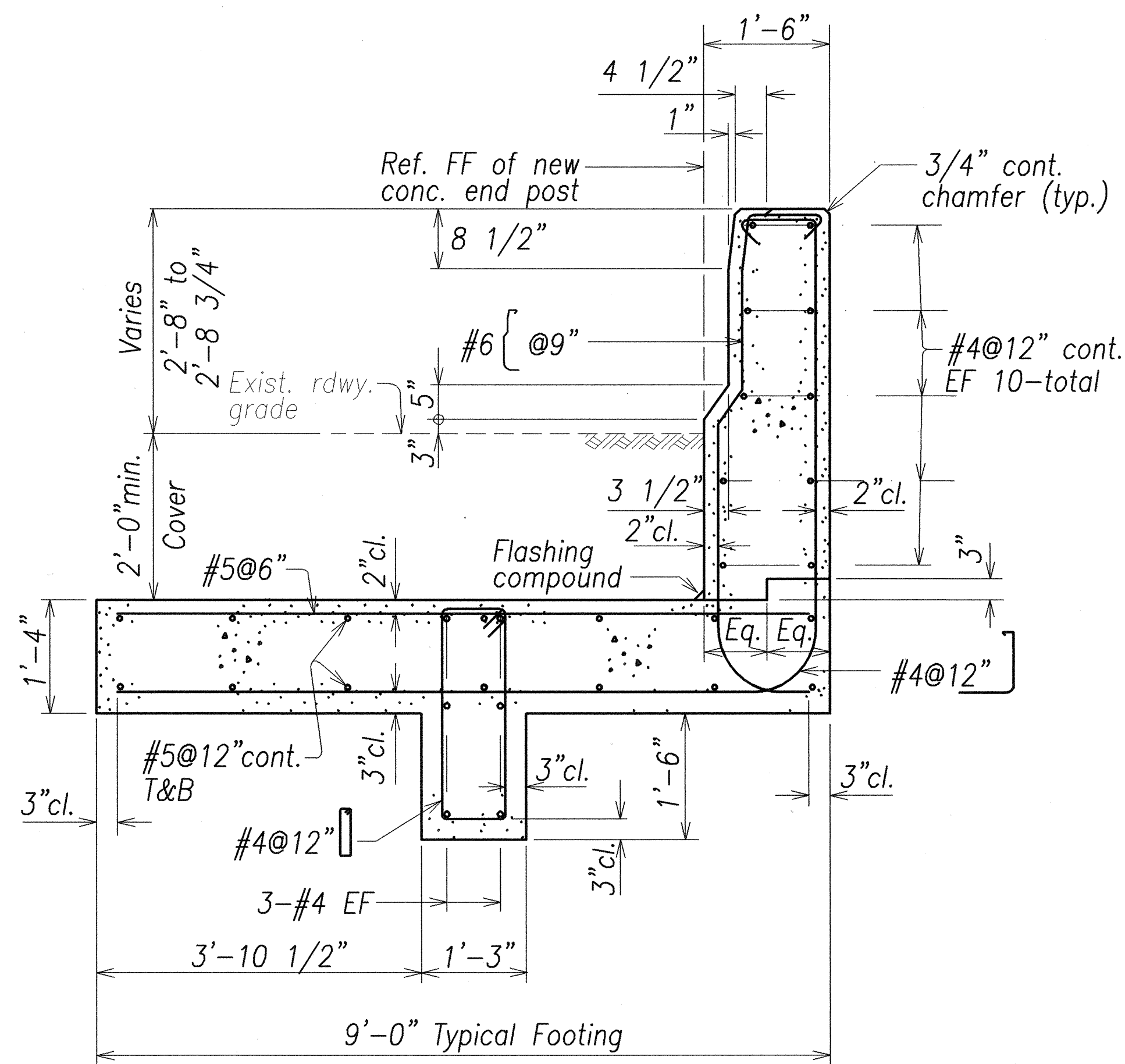
ORIGINAL PLAN	DATE
SURVEY PLOTTED BY	DATE
DRAWN BY	DATE
DESIGNED BY	DATE
CHECKED BY	DATE
NOTED BY	DATE
INCHES	DATE
NO.	DATE



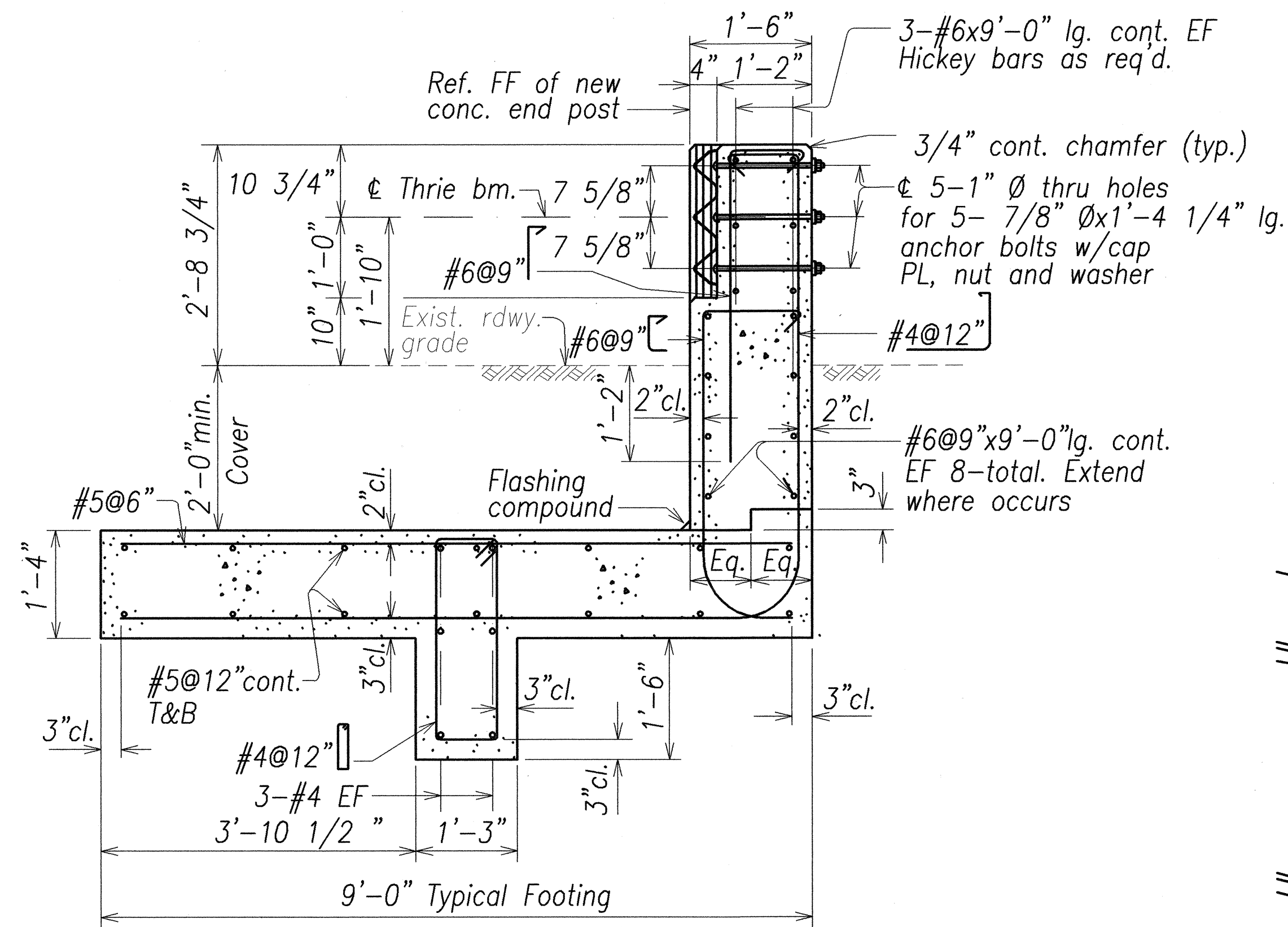
THIS WORK WAS PREPARED BY ME OR UNDER MY SUPERVISION.  
Eric N. S. Hee  
ENGINEERS SURVEYORS HAWAII, INC.

STATE OF HAWAII  
DEPARTMENT OF TRANSPORTATION  
HIGHWAYS DIVISION  
**TYPE "A" ENDPOST UPGRADE**  
**PLAN AND ELEVATION**  
WAAPA ROAD/RICE STREET RESURFACING  
Nawiliwili Road To Kapule Highway  
Federal Aid Project No. NH-051-1(10)  
Scale: 1/2"=1' Date: July, 2000  
SHEET No. 2 OF 4 SHEETS

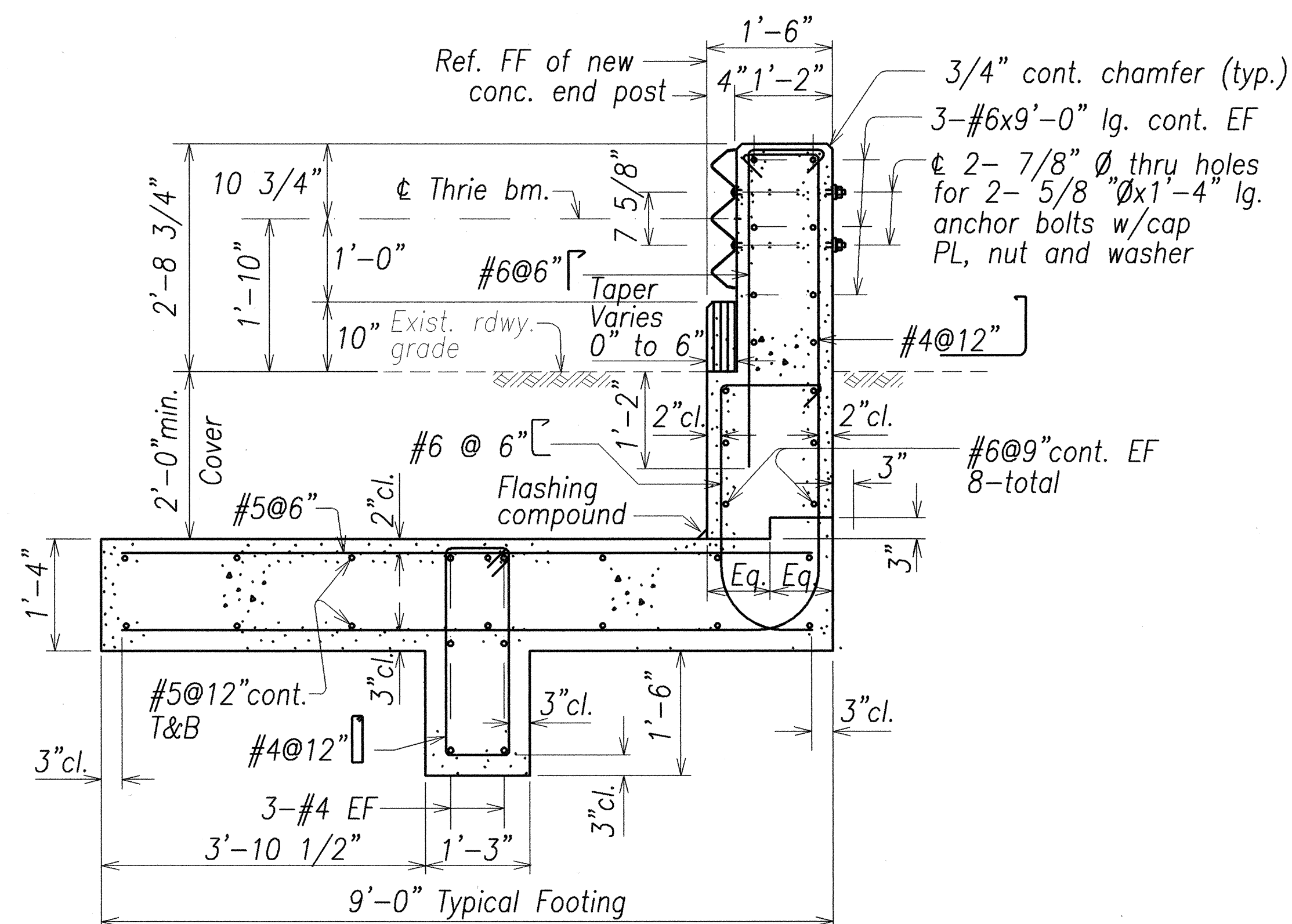
FED. ROAD DIST. NO.	STATE	FED. AID PROJ. NO.	FISCAL YEAR	SHEET NO.	TOTAL SHEETS
HAWAII	HAW.	NH-051-1(10)	2001	19	34



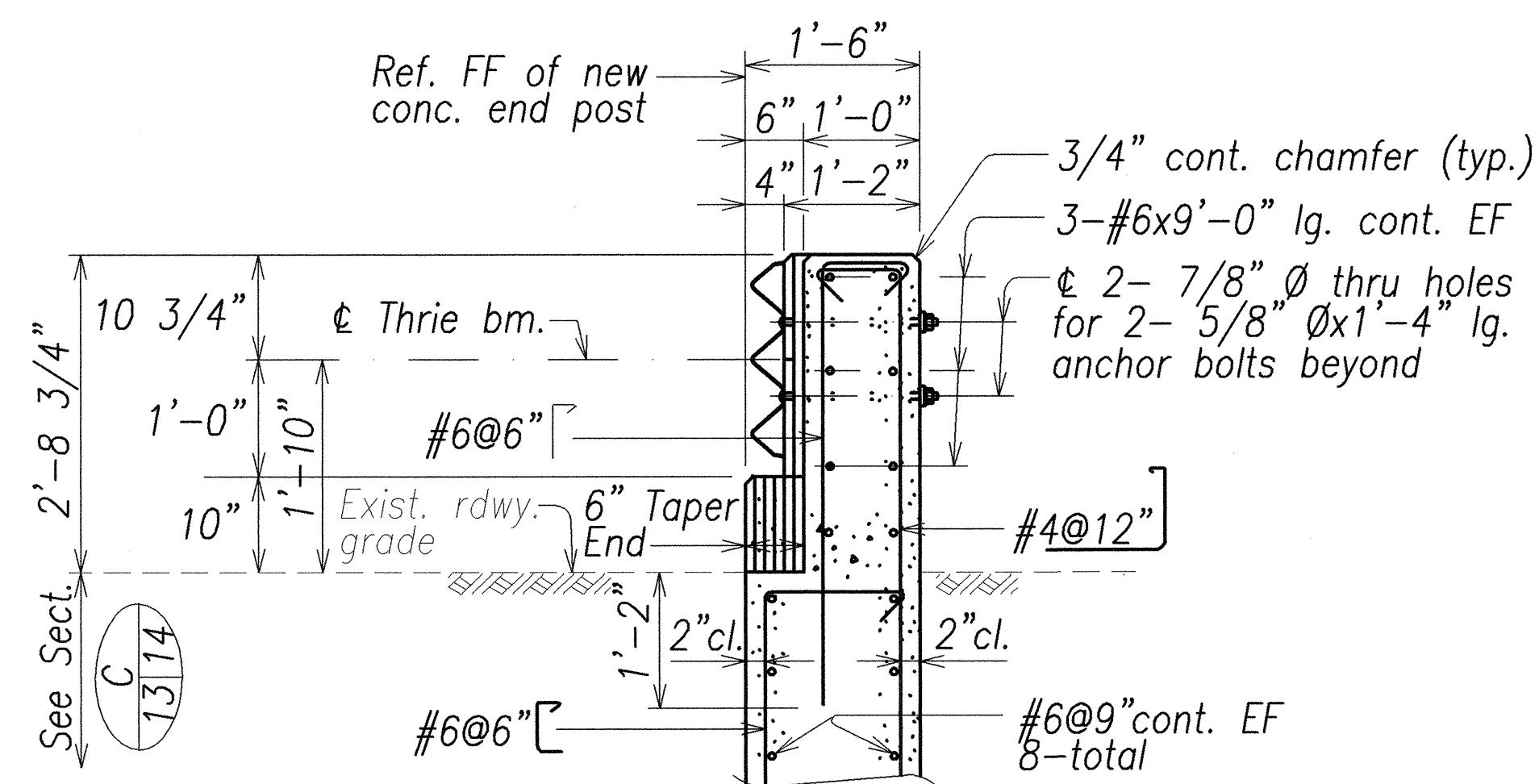
SECTION A  
Scale: 3/4"=1'-0" 18 19



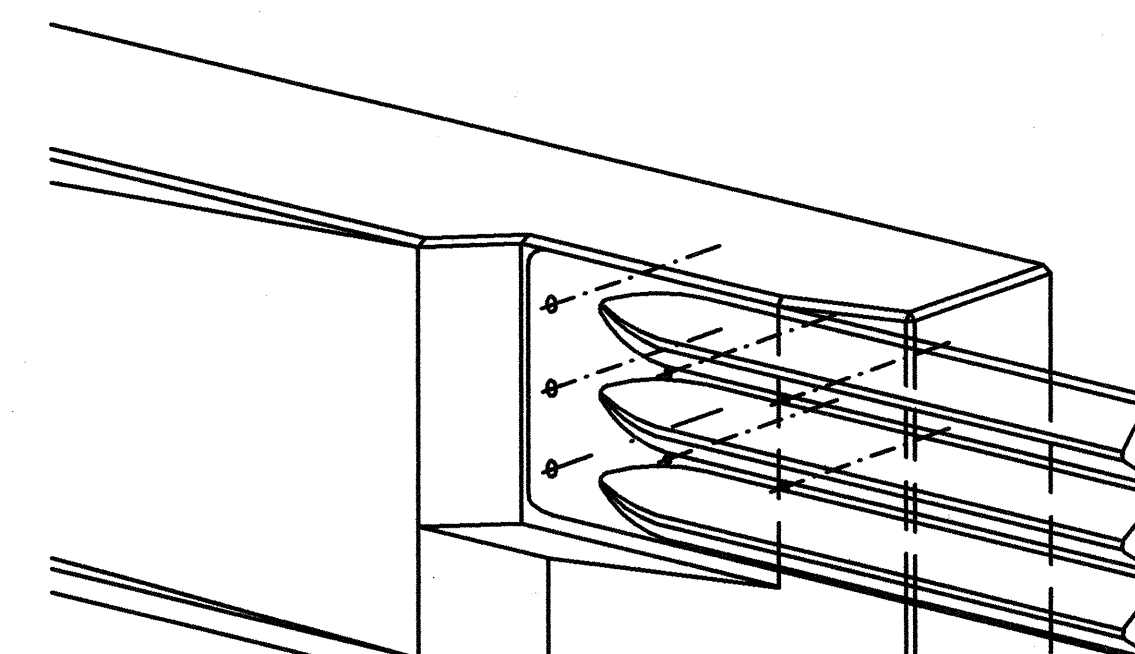
SECTION B  
Scale: 3/4"=1'-0" 18 19



SECTION C  
Scale: 3/4"=1'-0" 18 19

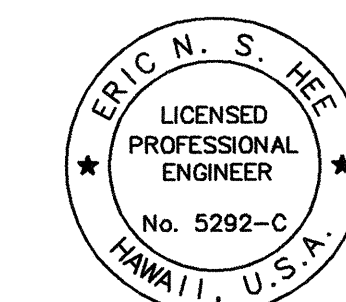


SECTION D  
Scale: 3/4"=1'-0" 18 19



PARTIAL ISOMETRIC VIEW -  
TYPE "A" ENDPOST UPGRADE  
Not to Scale

ORIGINAL PLAN	SURVEY PLOTTED BY	DATE
NOTE BOOK	DRAWN BY	MAY 1998
DESIGNED BY	DESIGNED BY	MAY 1998
CHECKED BY	CHECKED BY	MAY 1998
No.	No.	No.



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Eric N. S. Hee  
ENGINEERS SURVEYORS HAWAII, INC.

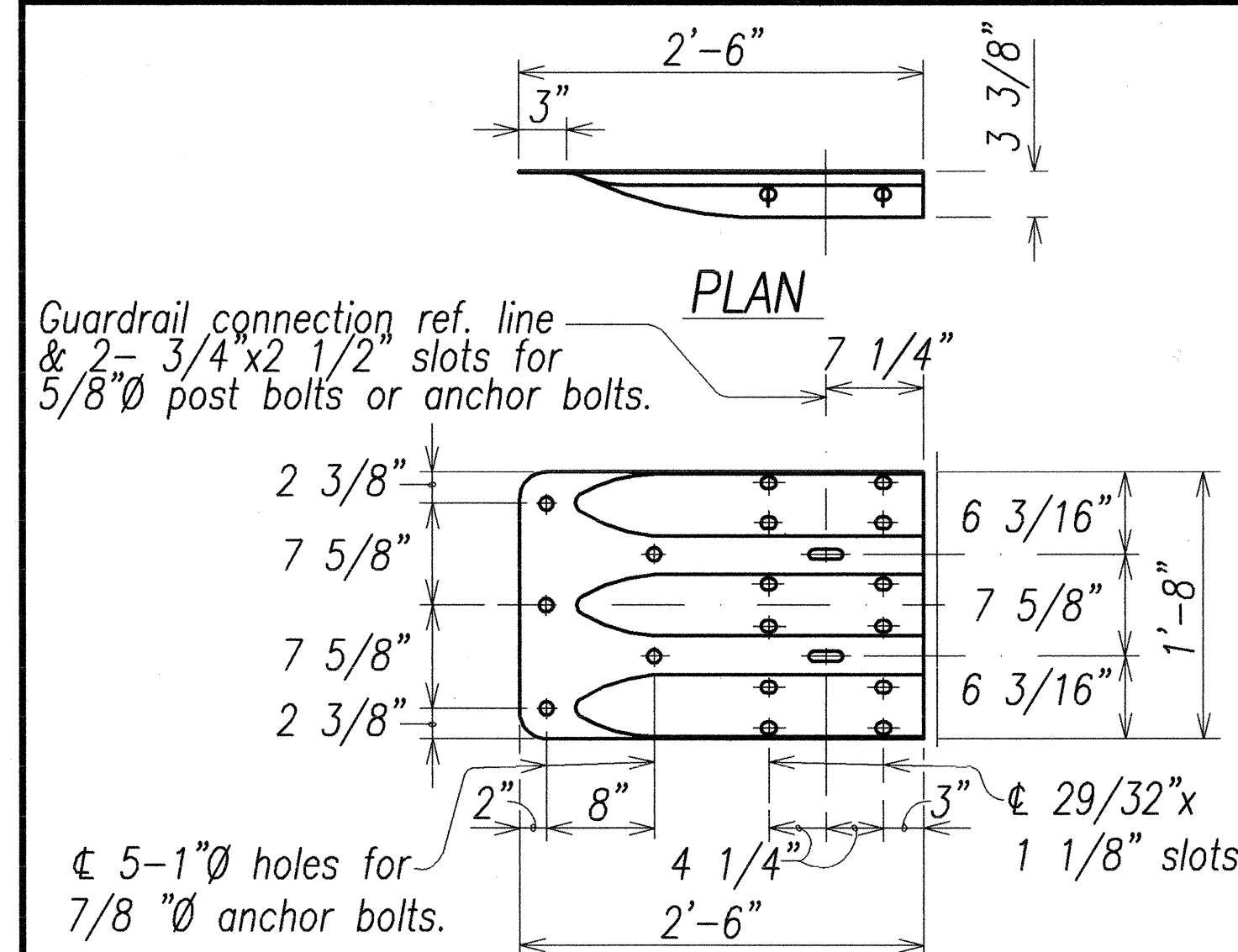
STATE OF HAWAII  
DEPARTMENT OF TRANSPORTATION  
HIGHWAYS DIVISION

**TYPE "A" ENDPOST UPGRADE PARTIAL ISOMETRIC VIEW AND TYPICAL SECTIONS**

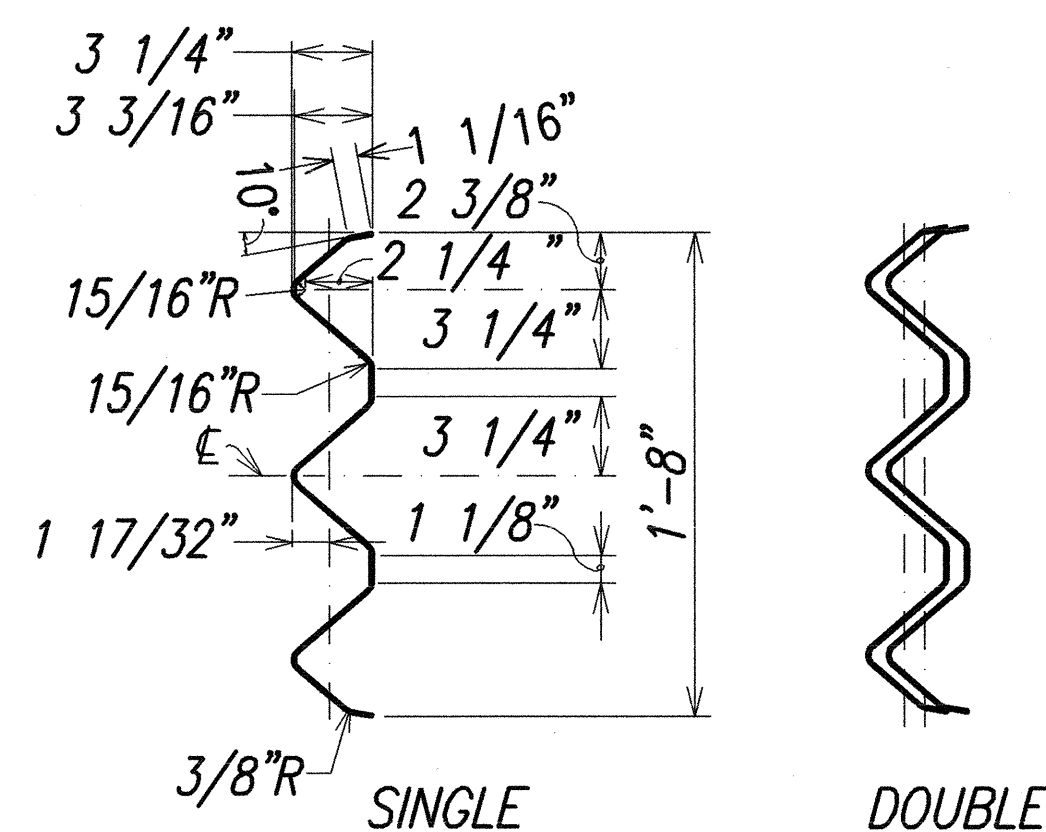
WAAPA ROAD/RICE STREET RESURFACING  
Nawiliwili Road To Kapule Highway  
Federal Aid Project No. NH-051-1(10)  
Scale: As Noted Date: July, 2000  
SHEET No. 3 OF 4 SHEETS



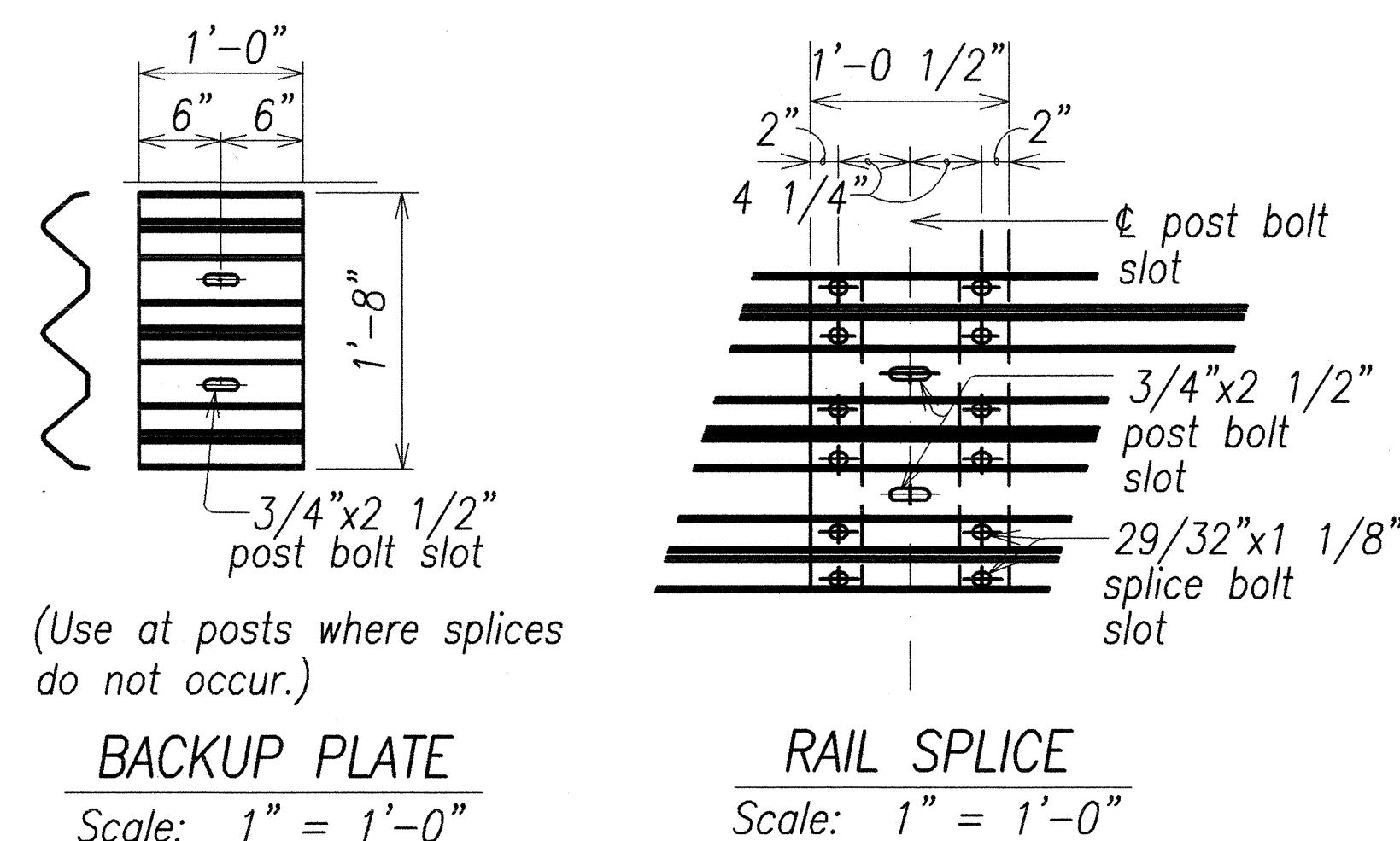
FED.ROAD DIST.NO.	STATE	FED. AID PROJ. NO.	FISCAL YEAR	SHEET NO.	TOTAL SHEETS
HAWAII	HAW.	NH-051-1(10)	2001	20	34



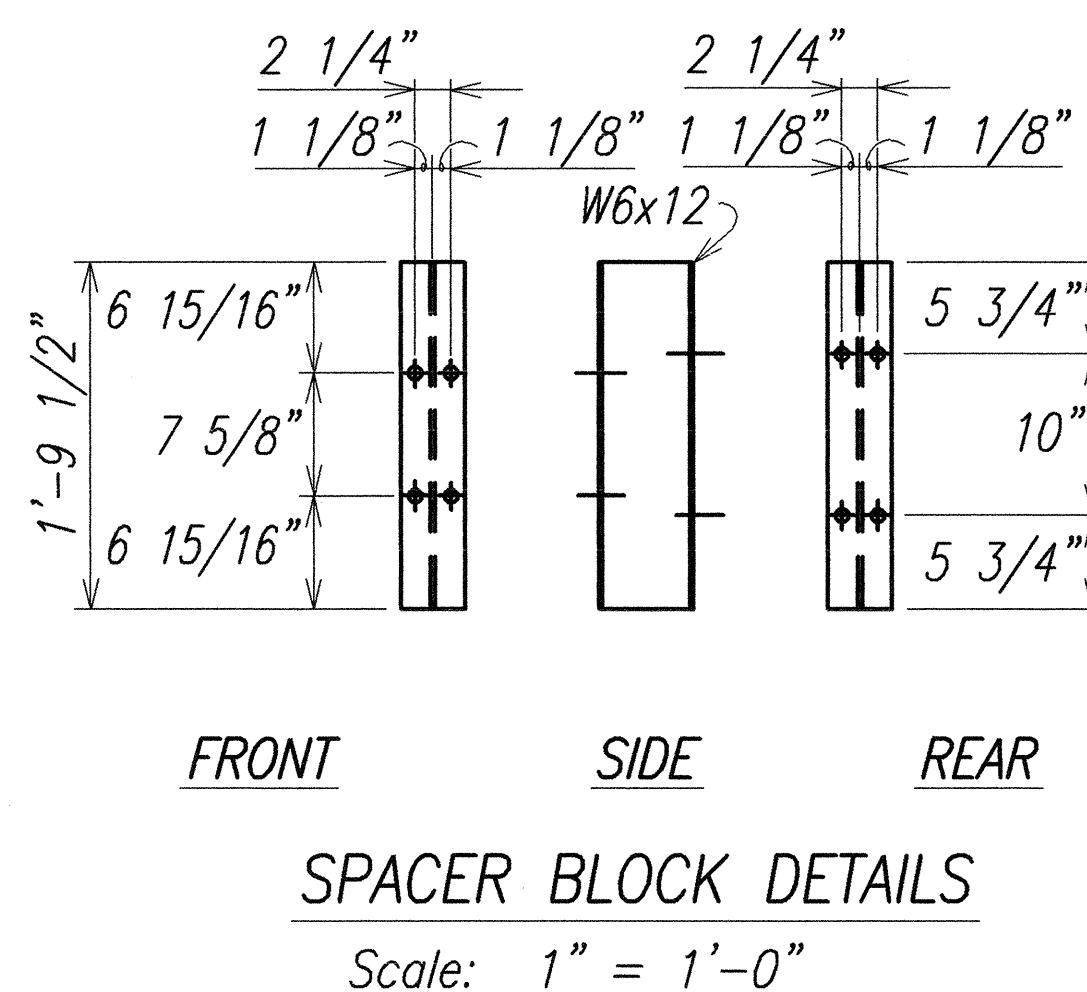
ELEVATION  
TERMINAL CONNECTOR  
Scale: 1" = 1'-0"



SECTION THRU RAIL ELEMENT  
Scale: 1 1/2" = 1'-0"

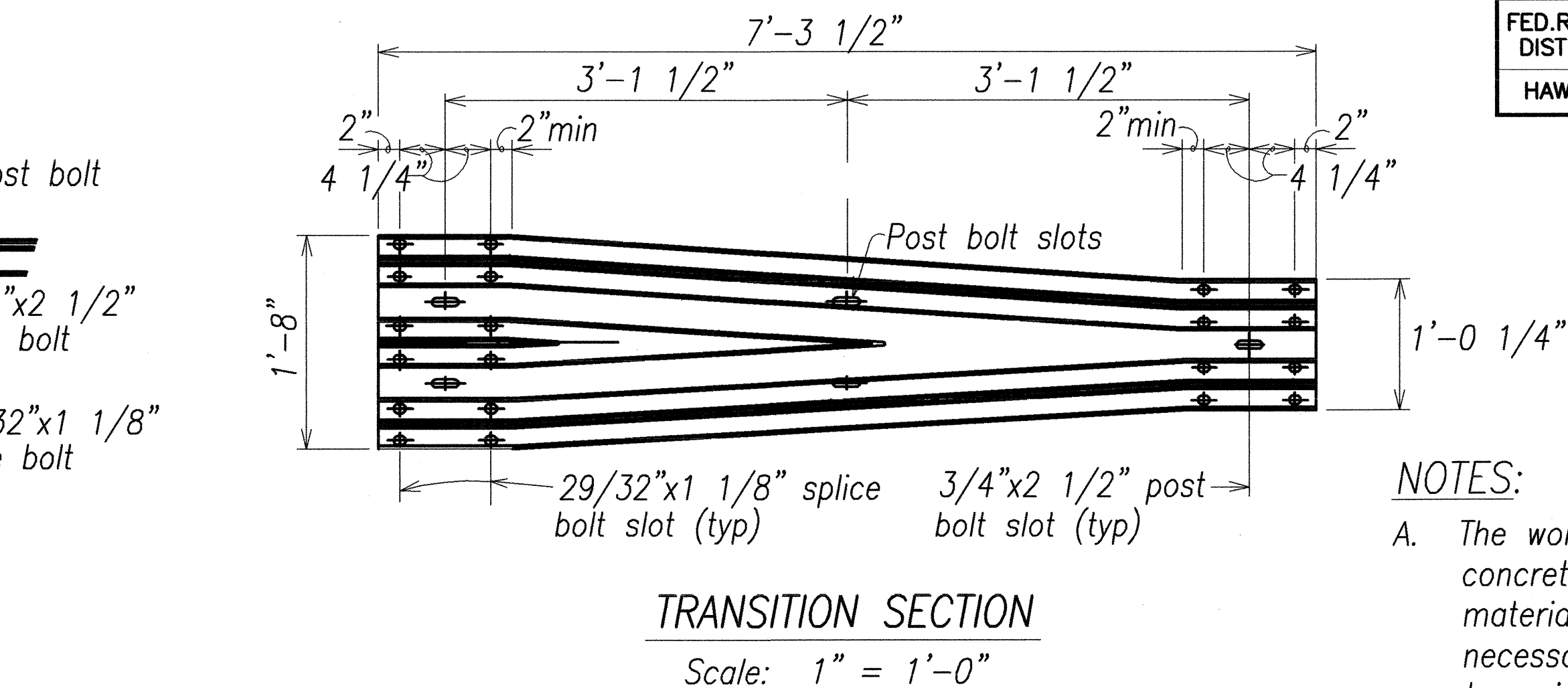


BACKUP PLATE  
Scale: 1" = 1'-0"

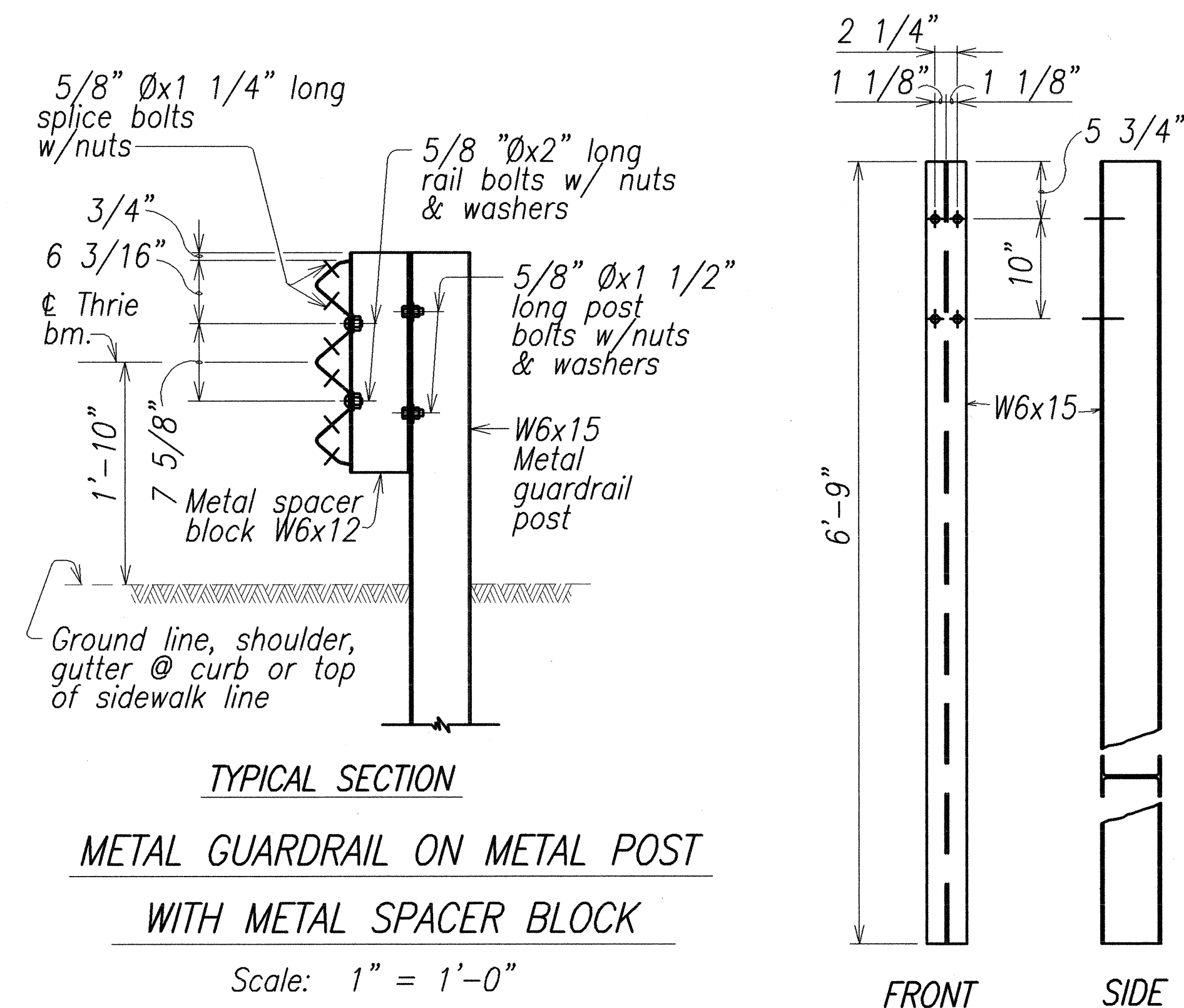


SPACER BLOCK DETAILS

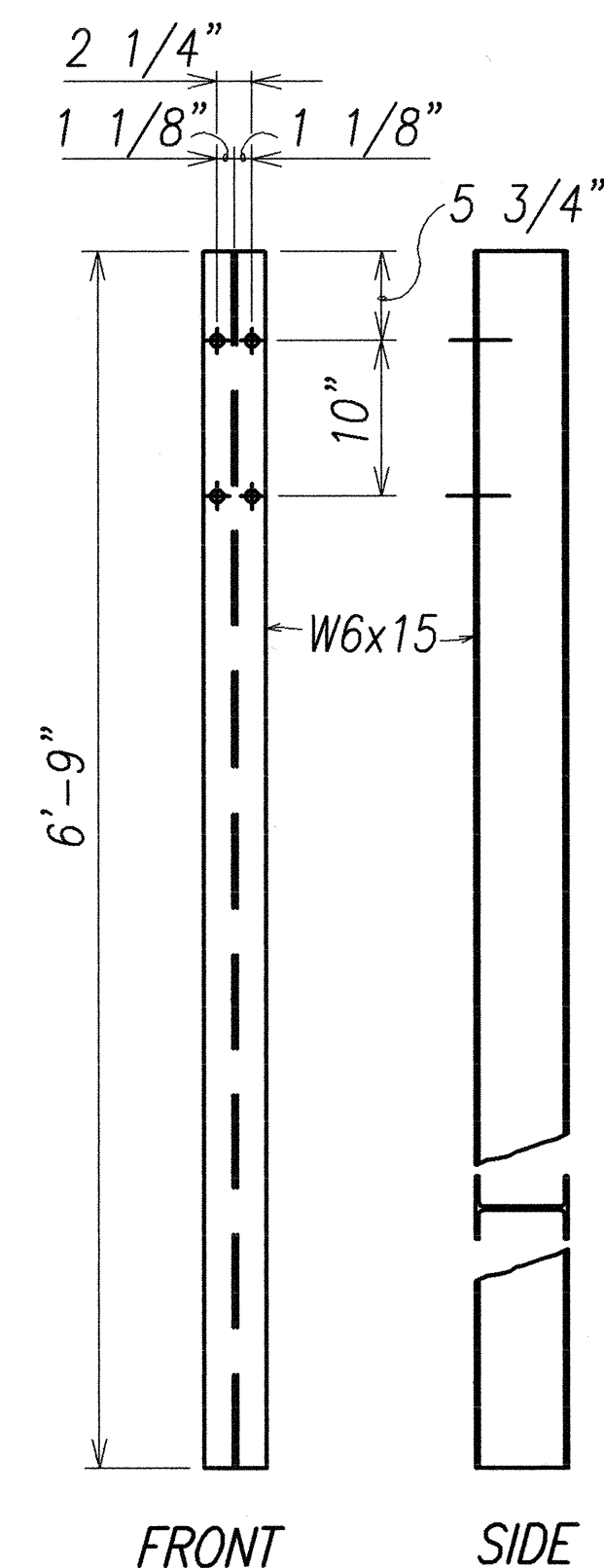
Scale: 1" = 1'-0"



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



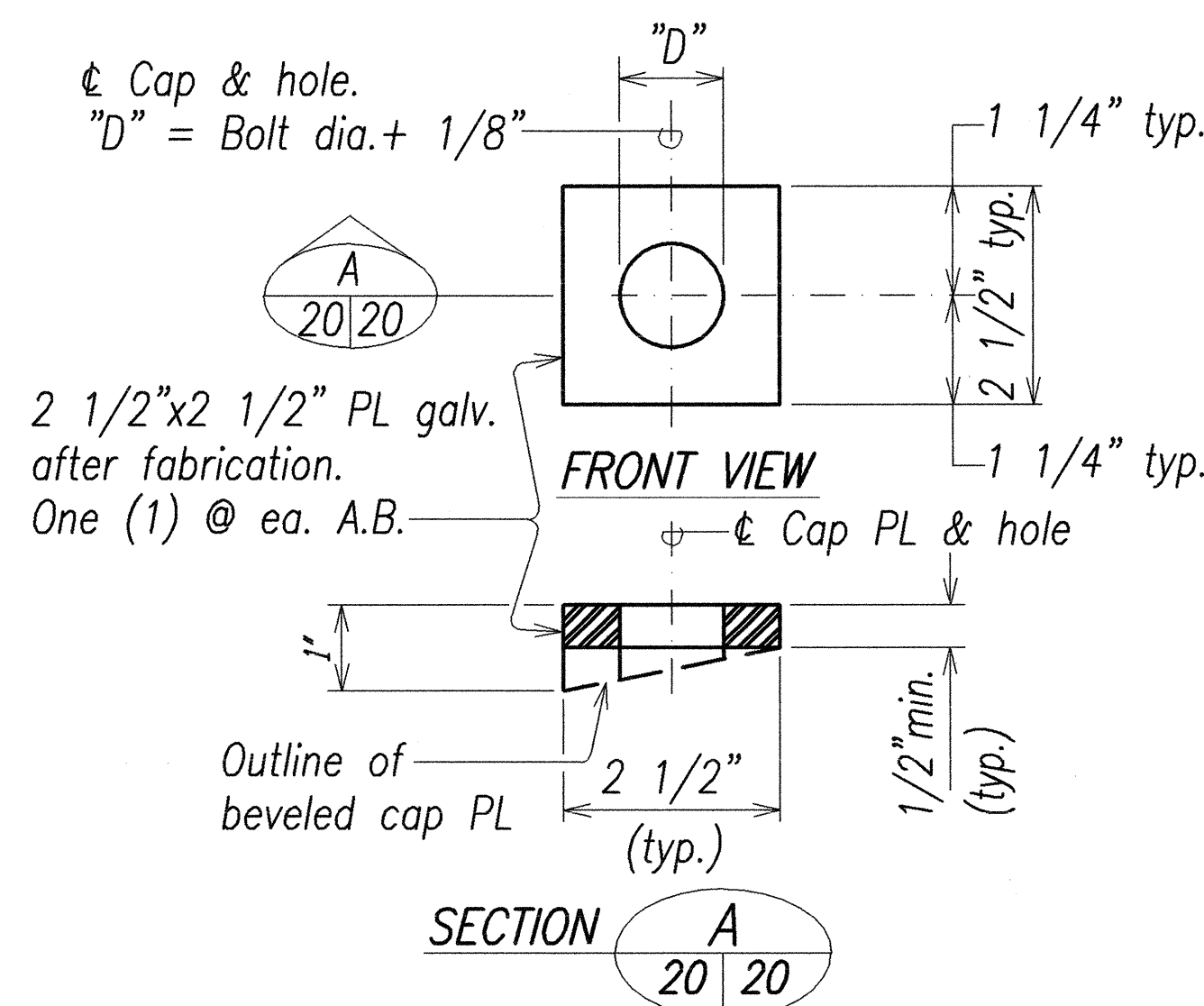
METAL GUARDRAIL ON METAL POST  
WITH METAL SPACER BLOCK



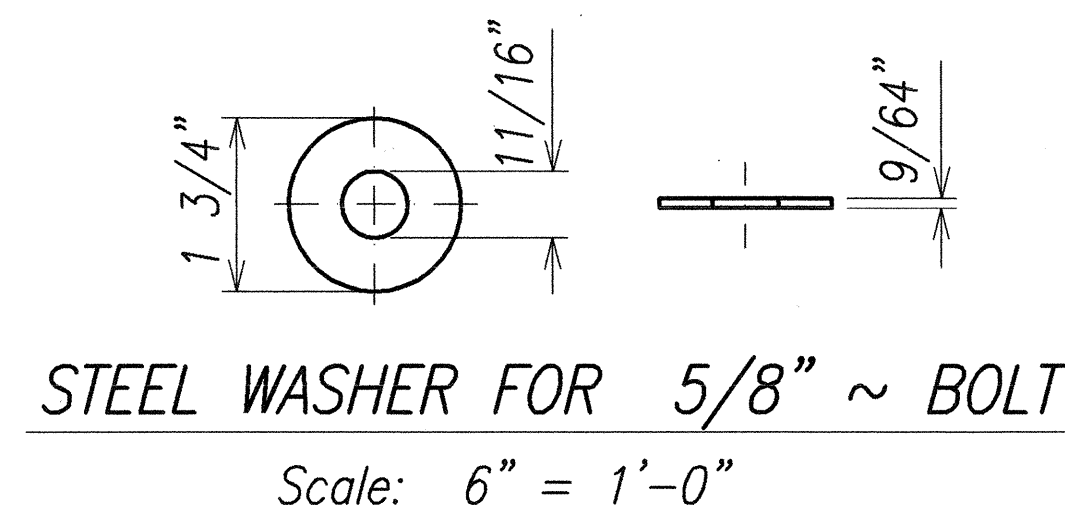
POST DETAILS

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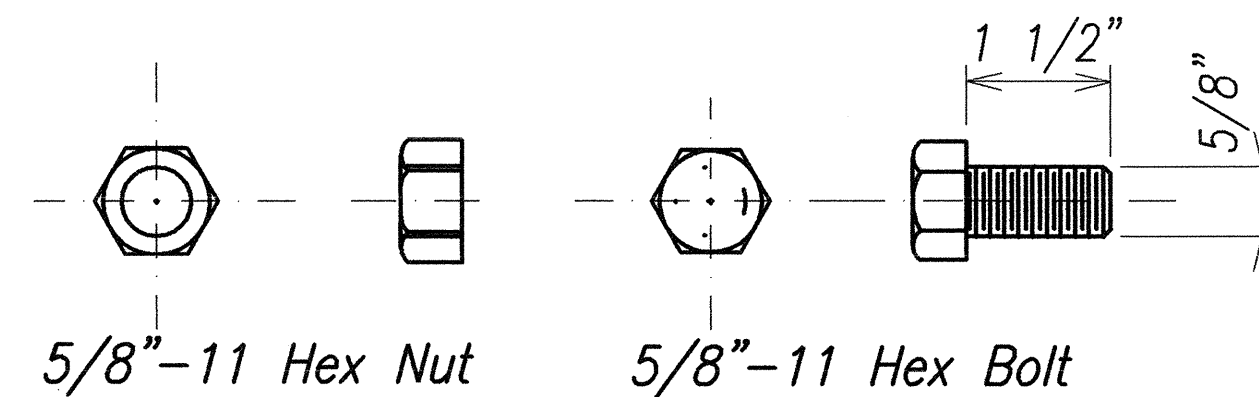
Scale: 1" = 1'-0"



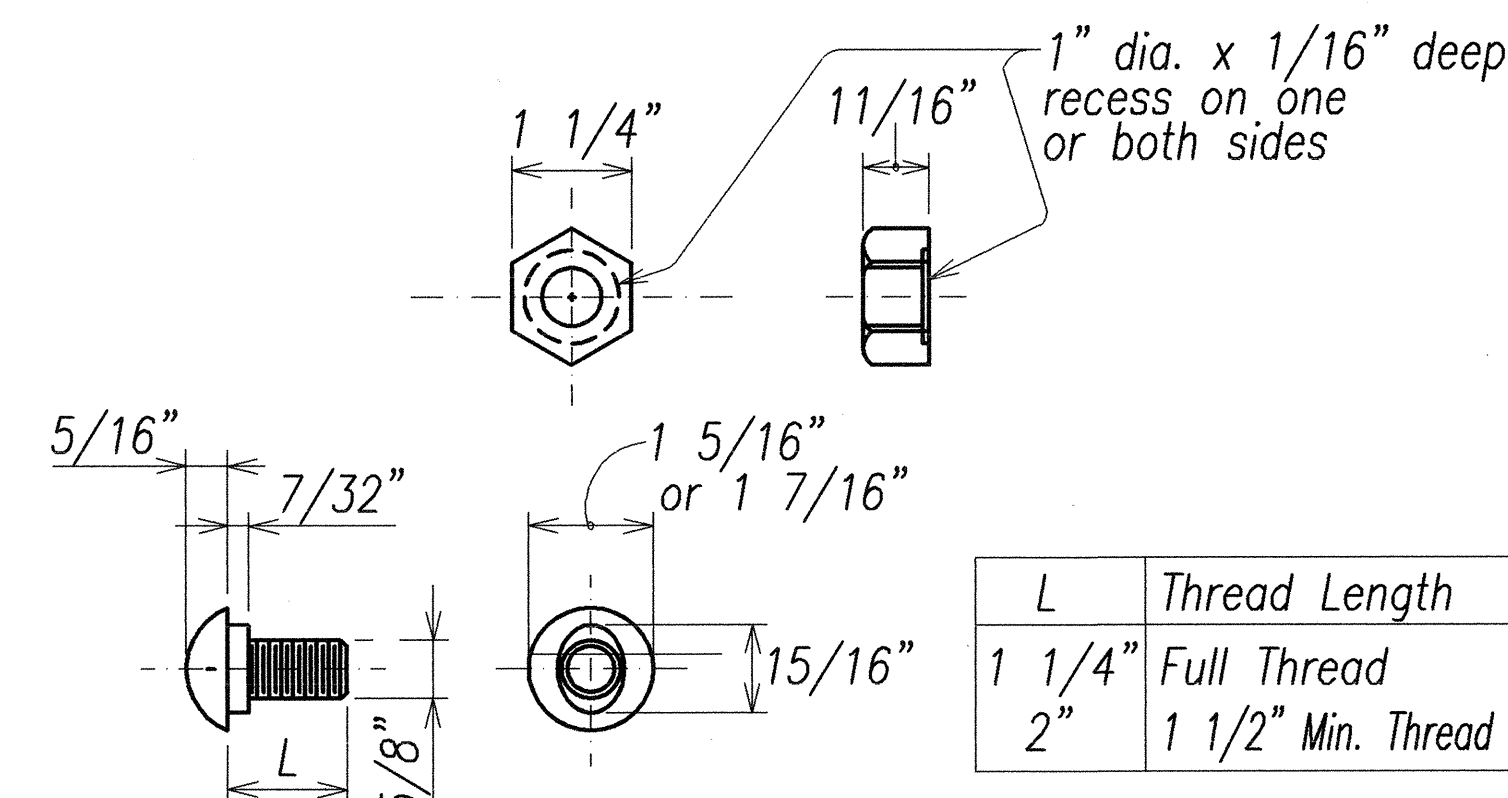
CAP (BEARING) PLATE DETAIL  
Scale: 6" = 1'-0"



STEEL WASHER FOR 5/8" ~ BOLT  
Scale: 6" = 1'-0"

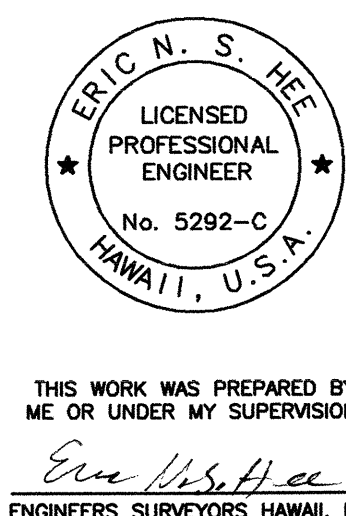


$5/8'' \sim \text{HEX BOLT \& NUT}$   
Scale:  $6'' = 1'-0''$



5/8" ~ BUTTON HEAD BOLT & RECESS NUT  
Scale: 6" = 1'-0"

L	Thread Length
1 1/4"	Full Thread
2"	1 1/2" Min. Thread Length



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Eric N. S. H. Lee

ENGINEERS SURVEYORS HAWAII

STATE OF HAWAII  
DEPARTMENT OF TRANSPORTATION  
HIGHWAYS DIVISION

TYPE "A" ENDPST UPGRADE TYPE 3  
THRIE BEAM AND APPURTENANCE DETAILS

WAAPA ROAD/RICE STREET RESURFACING  
Nawiliwili Road To Kapule Highway  
Federal Aid Project No. NH-051-1(10)

Scale: As Noted      Date: July, 2000

SHEET No. 4 OF 4 SHEETS