

FED. ROAD DIST. NO.	STATE	PROJ. NO.	FISCAL YEAR	SHEET NO.	TOTAL SHEETS
HAWAII	HAW.	19G-01-99M	1999	27	55

ABBREVIATIONS AND SYMBOLS

Abut.	Abutment	Max.	Maximum
AB	Anchor Bolt	Min.	Minimum
Alum.	Aluminum	MP	Mile Post
Approx.	Approximate	No., #	Number
℄	Baseline	N.T.S.	Not To Scale
Bal.	Balance	OB	Outbound
Beg.	Begin, Beginning	oc	On Center
Blk.	Block	OD	Outside Dimension
Bm.	Beam	o/s, O/S	Offset
Brg., Brgs.	Bearing, Bearings	PC	Point of Curvature
℄	Center Line	PL	Plate
Cl., Clr.	Clear	R	Radius
Conc.	Concrete	Rdwy.	Roadway
Cont.	Continuous	Ref.	Reference
Det.	Detail	Reinf.	Reinforcement
Dia., ø	Diameter	Req'd.	Required
Dim.	Dimension	R/W	Right of Way
Dwg., Dwgs.	Drawing, Drawings	Sect.	Section
EA, Ea, ea.	Each	Sht.	Sheet
EF	Each Face	Spcs.	Spaces
EP	Edge of Pavement	Spcg.	Spacing
ES	Edge of Shoulder	Sta.	Station
Exist.	Existing	Std.	Standard
Exp., (E)	Expansion	Str.	Straight
FF	Front Face	Symm.	Symmetrical
Fin.	Finish	T#B	Top and Bottom
Ftg.	Footing	Thk.	Thick, Thickness
Ga.	Gage, Gauge	TS	Tubular Steel
Galv.	Galvanized	Typ.	Typical
Gr.	Grade	Vert.	Vertical
Horiz.	Horizontal	w/	With
HS	High Strength		
Hwy.	Highway		
IB	Inbound		
Jt.	Joint		
LC	Length of Curve		
LF, Lin. Ft.	Linear Feet		
Lg.	Long		
Longit.	Longitudinal		
L.S.	Lump Sum		

Detail or  
Section  
designation

XXX  
XXX XXX

Sheet No.  
Section is cut or  
Detail Location

Sheet No.  
Detail  
is drawn

GENERAL NOTES

DESIGN SPECIFICATIONS:

A. AASHTO LRFD Bridge Design Specifications, 1998

MATERIALS:

- A. Reinforced Concrete: Class A  
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, washers and nuts 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 METHODS:

- A. Refer to Hawaii Standard Specifications for Road, Bridge and Public Works Construction, 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 (1½) 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 (1½) 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.  
K. All existing reinforcing and anchor bolts that can be incorporated in the new work shall be bent or cut as required and cleaned before being utilized in the new work.  
L. All existing reinforcing and anchor bolts that cannot be incorporated in the new work shall be completely removed or removed to a minimum depth of one and one-half (1½) inches below finish grade and the area patched with mortar.  
M. All existing concrete face receivng new concrete in the finish product shall be roughened, cleaned and have concrete epoxy adhesive applied prior to placement of new pour, unless indicated otherwise or as ordered by the Engineer.  
N. Epoxy fill shall be "Double Cartridge" type. Epoxies that require manual measuring or mixing shall not be allowed.

REFERENCE:

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

GENERAL:

- A. All items noted incidental will not be paid for separately.  
B. The location of the existing utilities shown on the plans are approximate.  
C. The Contractor shall verify the locations of all existing utility lines and notify their respective owners before commencing with any work.  
D. The Contractor shall verify all grades and dimensions in the field before commencing with any work.  
E. The Contractor shall be solely responsible for the protection of adjacent property, utilities and existing and new structures from damage due to construction. Repairing any damage shall be at no cost to the State.  
F. 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 saftey of all concerned and to protect existing structures.  
G. In the event of over-excavation, the space between the footing or footing key and ground shall be filled with minimum of Class D concrete at no cost to the State.  
H. Unless noted otherwise, chamfer all exposed concrete edges three-quarters (¾) of an inch.

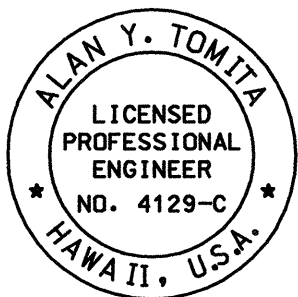
TRAFFIC CONTROL:

- A. The Contractor's attention is called to the traffic control costs for constructing the end post work. Such costs are incidental to the End Post Upgrade pay item. No separate payment for such traffic control is provided under Section 645 - Traffic Control Devices.  
B. During working hours, traffic control may be covered by the one lane traffic control plan described in Section 645 - Traffic Control Devices. However, during non-working hours, additional provisions for safely maintaining traffic shall be required. For example, portable traffic signals to control traffic. Another means to control traffic would be to fully illuminate the site, illuminate approach warning signs, and provide flashing warning lights and flagmen on both approaches.  
C. If there are any dropoffs next to the traveled way of more than two inches in height, portable concrete barriers or other approved crashworthy barriers shall be required to separate public traffic from the dropoff area.  
D. For any non-working hour lane closure, the Contractor shall submit a Notice to Motorists for publication in the Hawaii Tribune Herald. The Notice shall be published at least three times prior to implementing the lane closure. Each separate lane closure phase shall require a Notice to Motorists, such as switching of detour routes.  
E. The Contractor shall submit a site-specific traffic control plan to the Engineer for acceptance. The Traffic control plan shall include a layout showing the locations of all traffic control devices and crashworthy barriers, the Notice to Motorists, and the proposed work schedule.

ESTIMATED QUANTITIES

ITEM NO.	ITEM DESCRIPTION	UNIT	KAUNOALI BRIDGE	WAIPUWAHINA BRIDGE	TOTAL
507.7601	Type "A" End Post Upgrade	Ea.	4	4	8
606.3112	Guardrail Type 3 Thrie Beam Transition to End Post or Median Barrier	L.F.	100	100	200

SURVEY PLOTTED BY	DATE
DRAWN BY	
DESIGNED BY	
QUANTITIES BY	
CHECKED BY	
ORIGINAL PLAN	
NOTE BOOK	
N.	



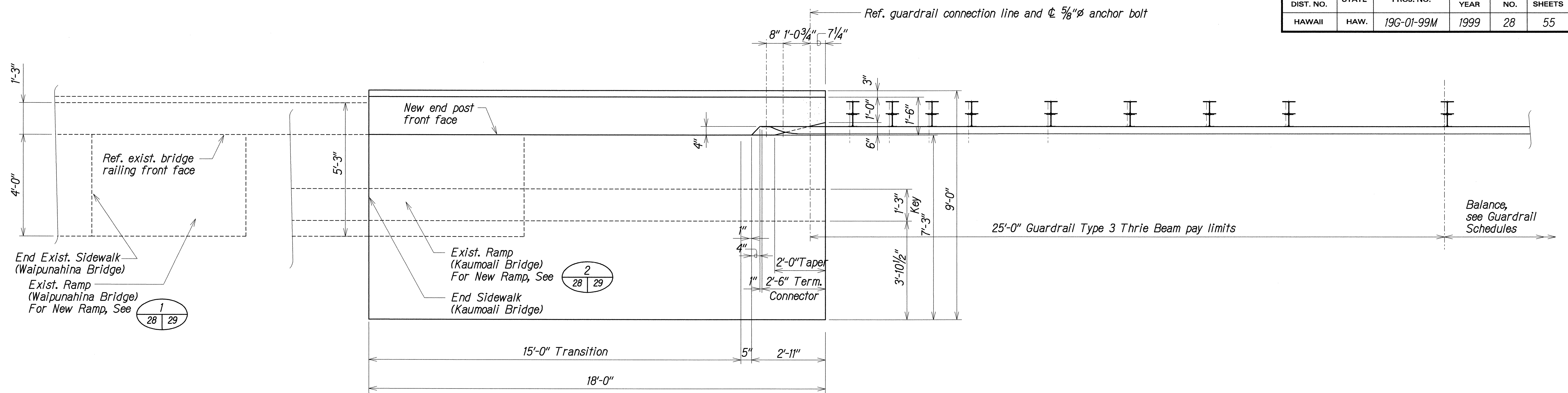
THIS WORK WAS PREPARED BY ME  
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Alan Y. Tomita

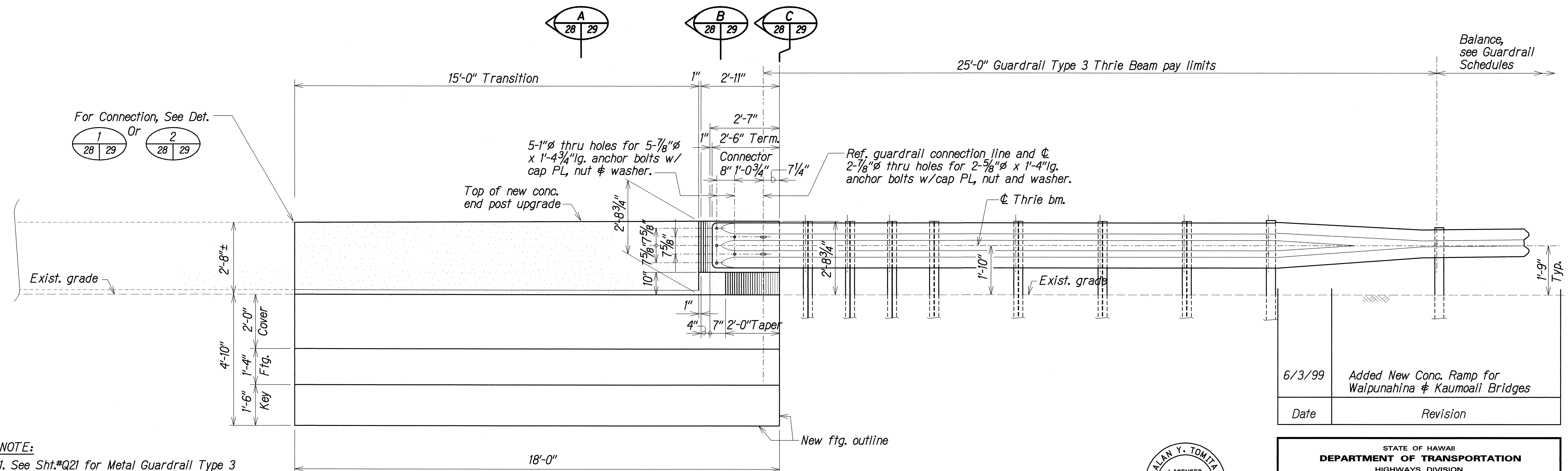
STATE OF HAWAII
DEPARTMENT OF TRANSPORTATION
HIGHWAYS DIVISION
END POST UPGRADE
HAWAII BELT ROAD RESURFACING
Vicinity of Kahawailiili Bridge to East Paauilo Bridge
Project No. 19G-01-99M
Scale: NTS Date: May, 1999

SHEET No. 1 OF 6 SHEETS

FED. ROAD DIST. NO.	STATE	PROJ. NO.	FISCAL YEAR	SHEET NO.	TOTAL SHEETS
HAWAII	HAW.	19G-01-99M	1999	28	55



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

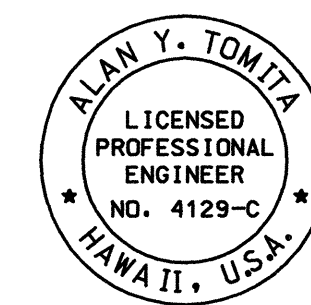


**ELEVATION**  
Scale: 1/2" = 1'-0"

## TYPE "G" JERSEY BARRIER UPGRADE PLAN AND ELEVATION

**NOTE:**  
1. See Sht.#Q21 for Metal Guardrail Type 3 Thrie Beam and Appurtenances details.

SURVEY PLOTTED BY	DATE
DRAWN BY	
DESIGNED BY	
QUANTITIES BY	
CHECKED BY	
ORIGINAL PLAN	
NOTE BOOK	
N°	



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Alan Y. Tomita

6/3/99	Added New Conc. Ramp for Waipunahina & Kaumoali Bridges
Date	Revision

STATE OF HAWAII  
DEPARTMENT OF TRANSPORTATION  
HIGHWAYS DIVISION

**END POST UPGRADE**  
**PLAN AND ELEVATION**

HAWAII BELT ROAD RESURFACING  
Vicinity of Kahawailiili Bridge to East Paavilo Bridge  
Project No. 19G-01-99M

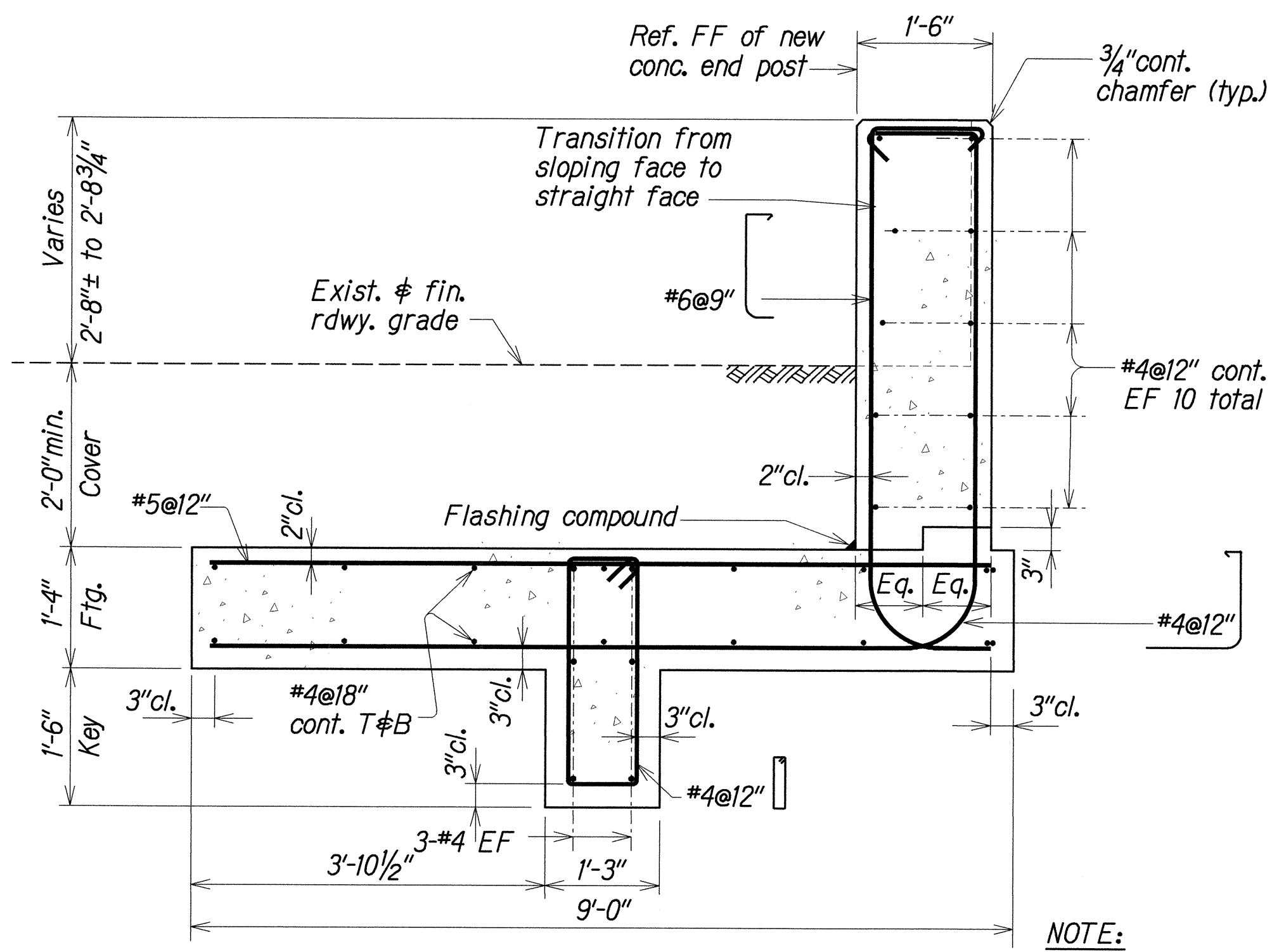
Scale: NTS Date: June, 1999

SHEET No. 2 OF 6 SHEETS

**ADD. 28**

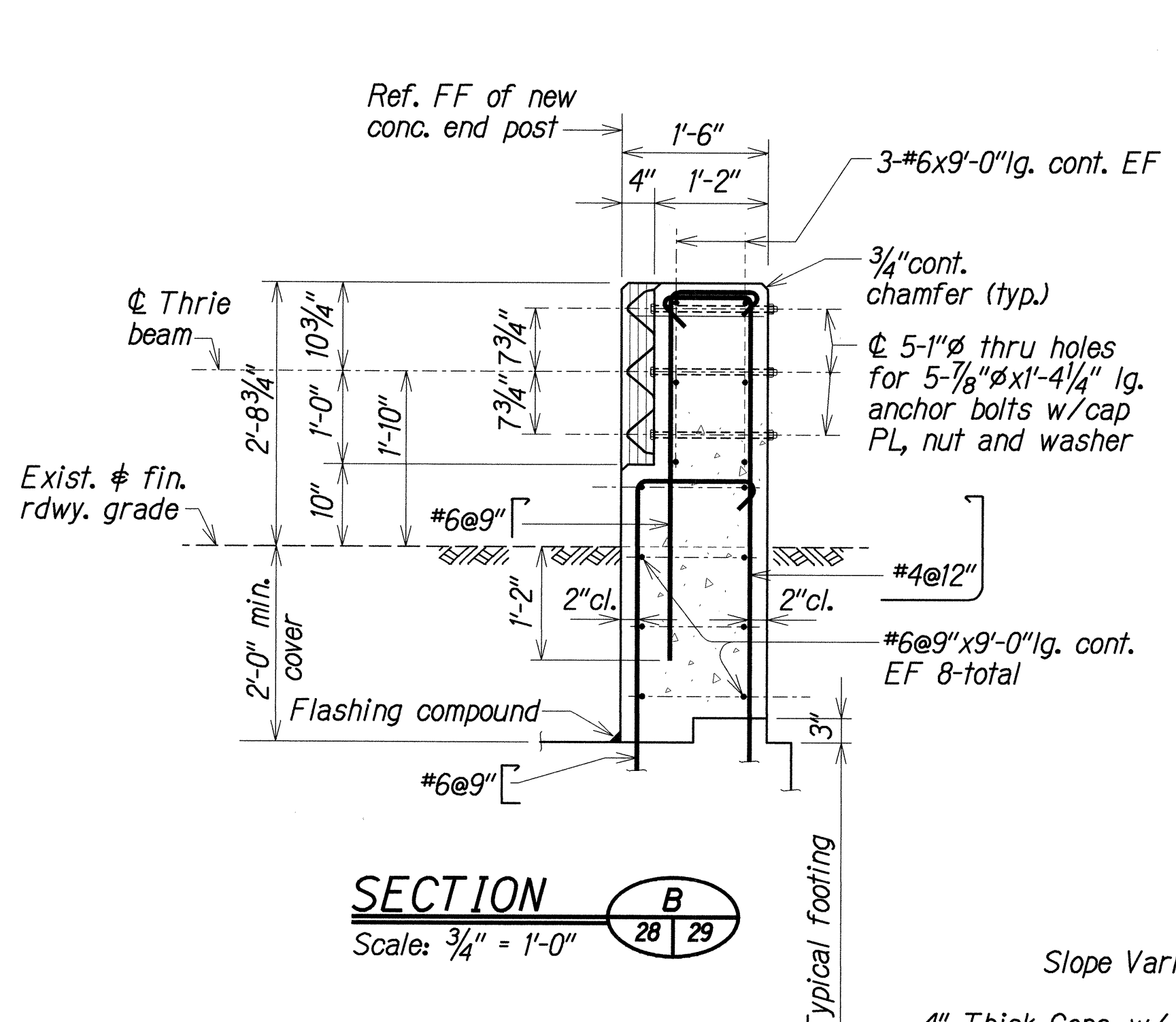


FED. ROAD DIST. NO.	STATE	PROJ. NO.	FISCAL YEAR	SHEET NO.	TOTAL SHEETS
HAWAII	HAW.	19G-01-99M	1999	29	55

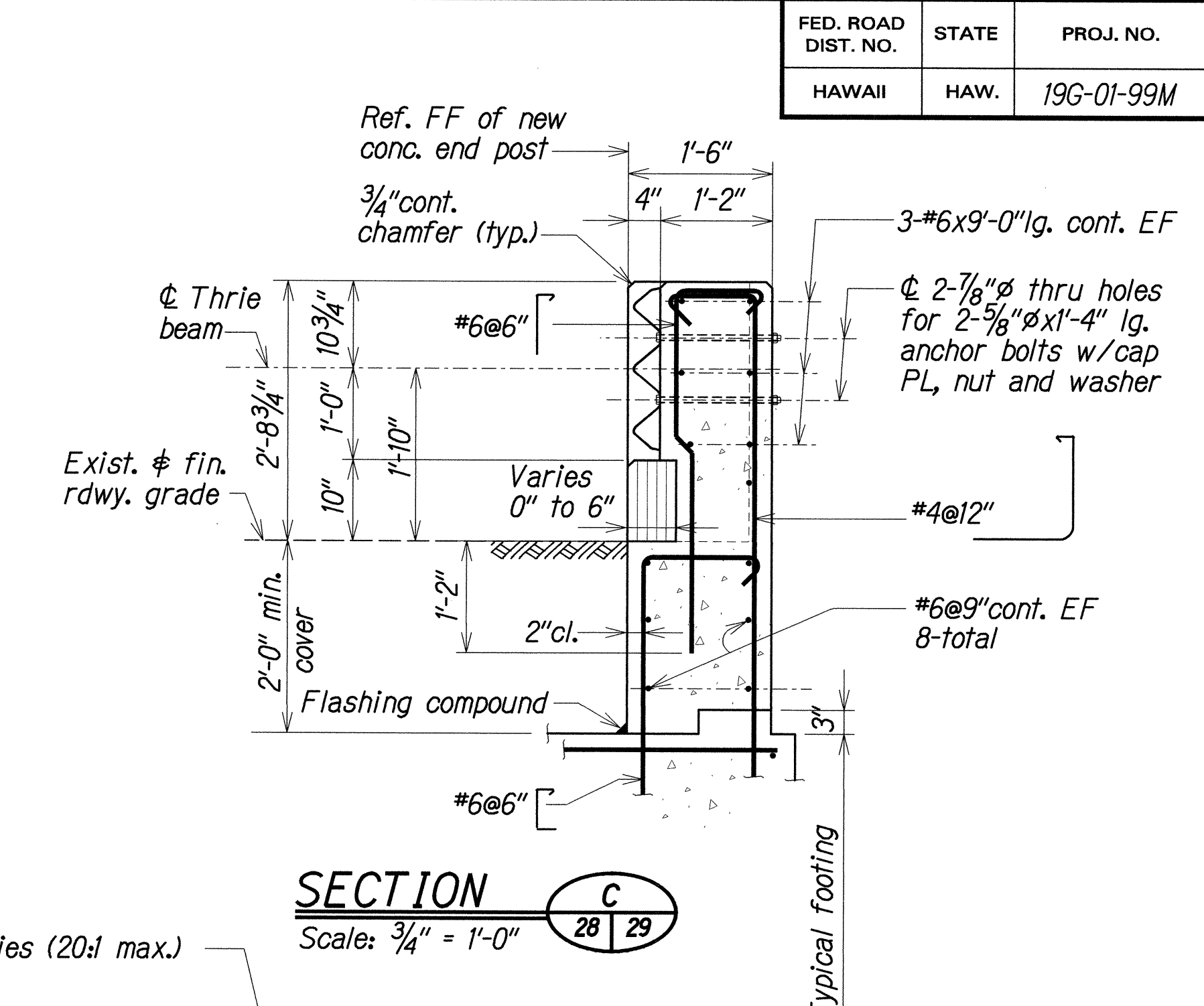


**SECTION A**  
Scale: 3/4" = 1'-0"  
28 29

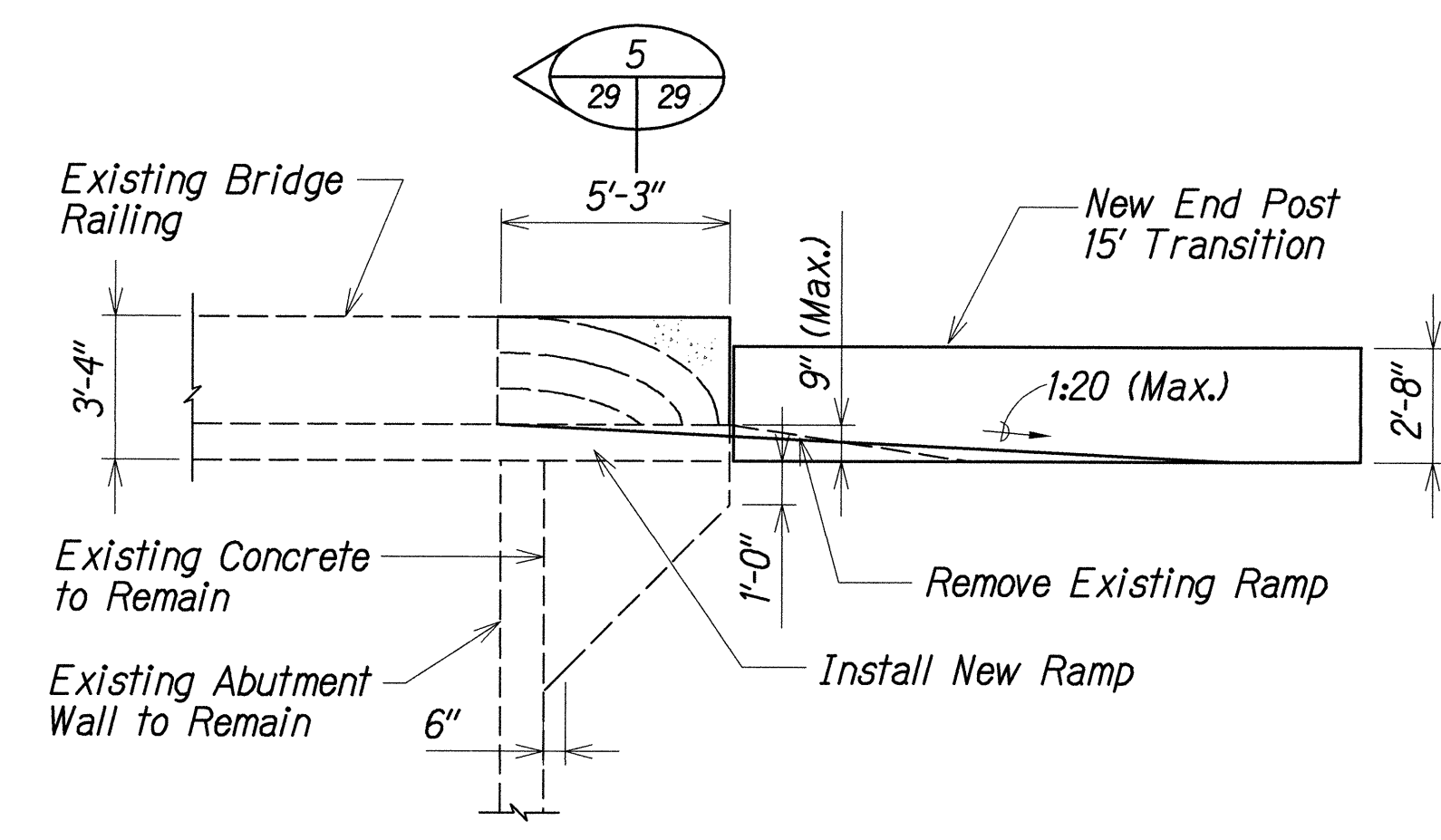
**NOTE:**  
1. Drill 3-3/4"Øx2'-0" deep holes into exist. jersey barrier for 3-5/8"Øx4'-0" lg. #5 dowels EF. Secure dowels with neat epoxy.



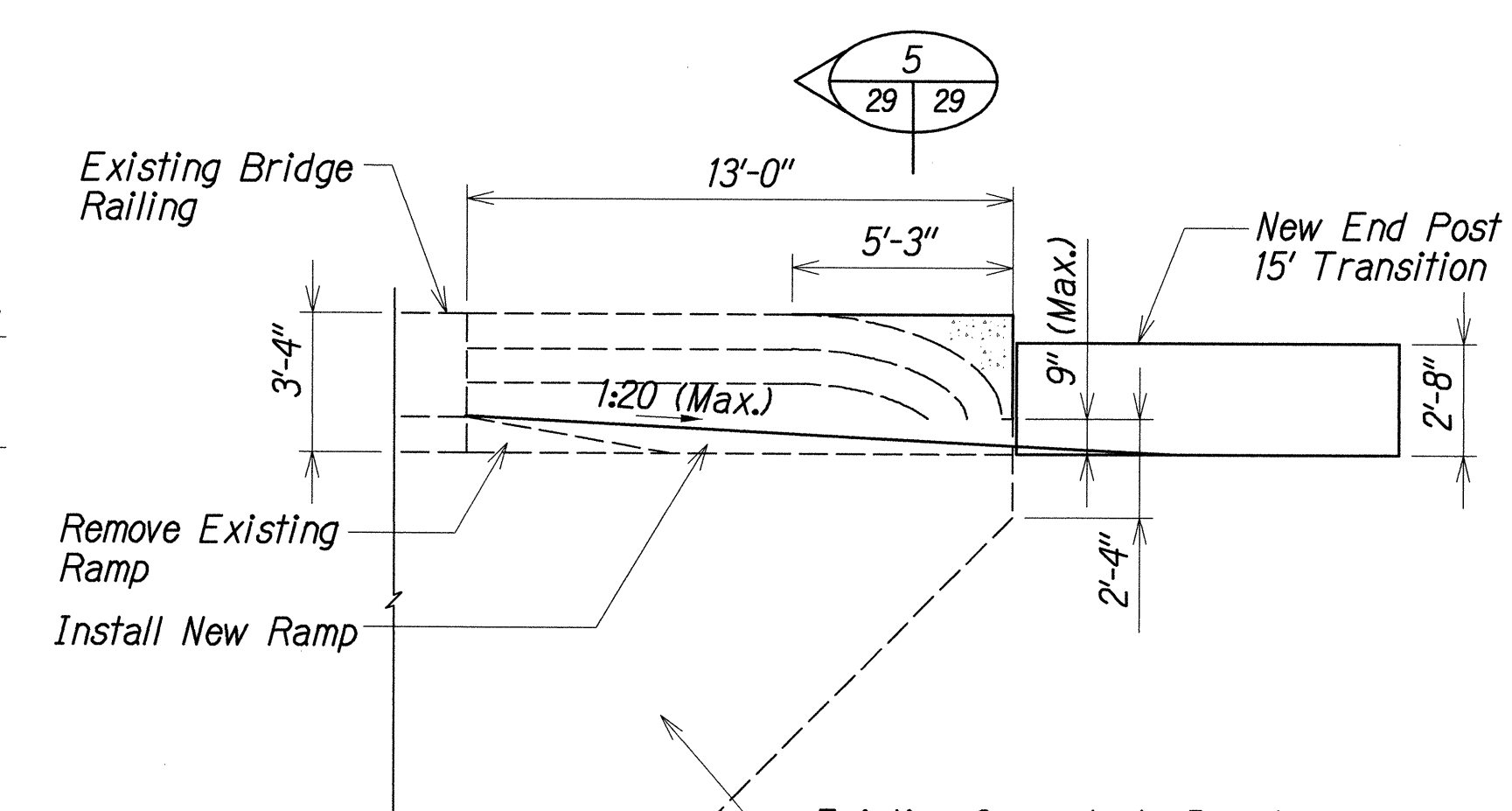
**SECTION B**  
Scale: 3/4" = 1'-0"  
28 29



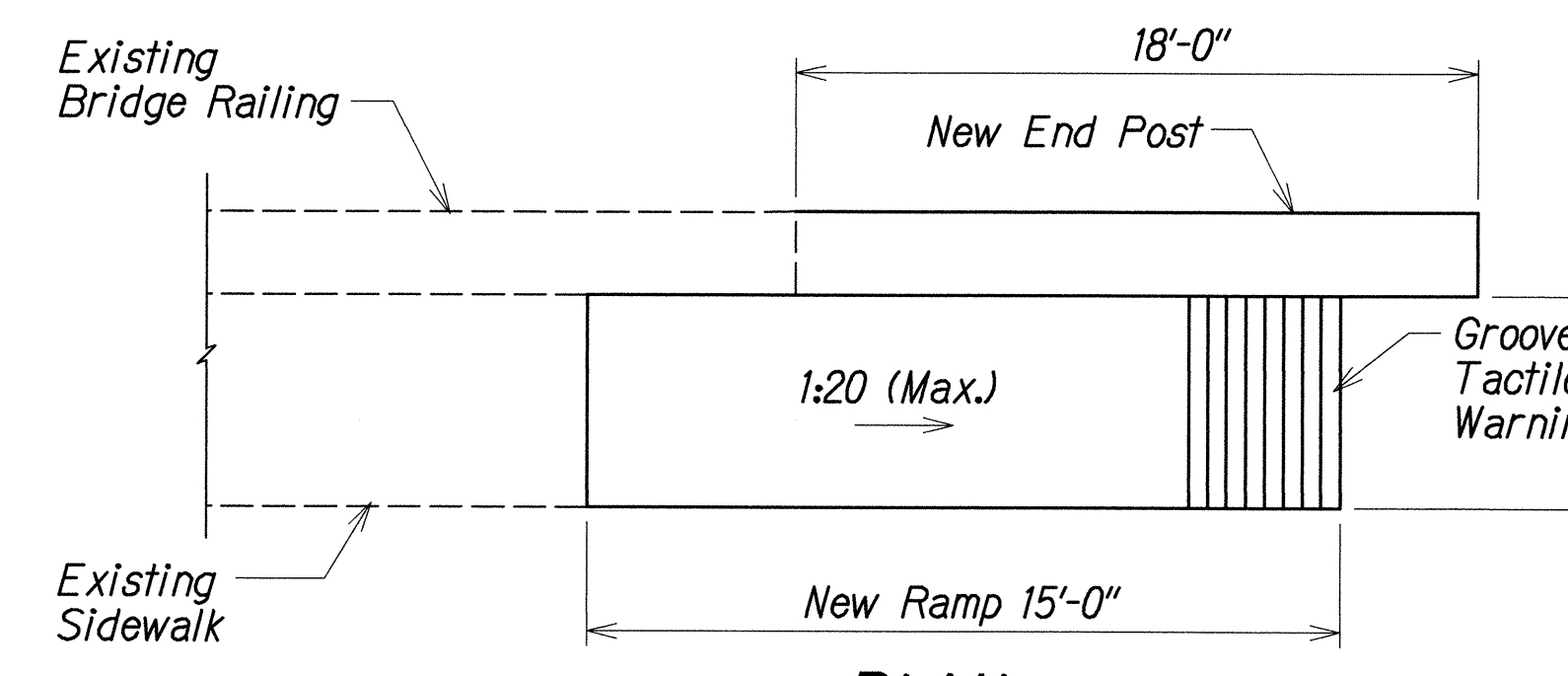
**SECTION C**  
Scale: 3/4" = 1'-0"  
28 29



**ELEVATION**

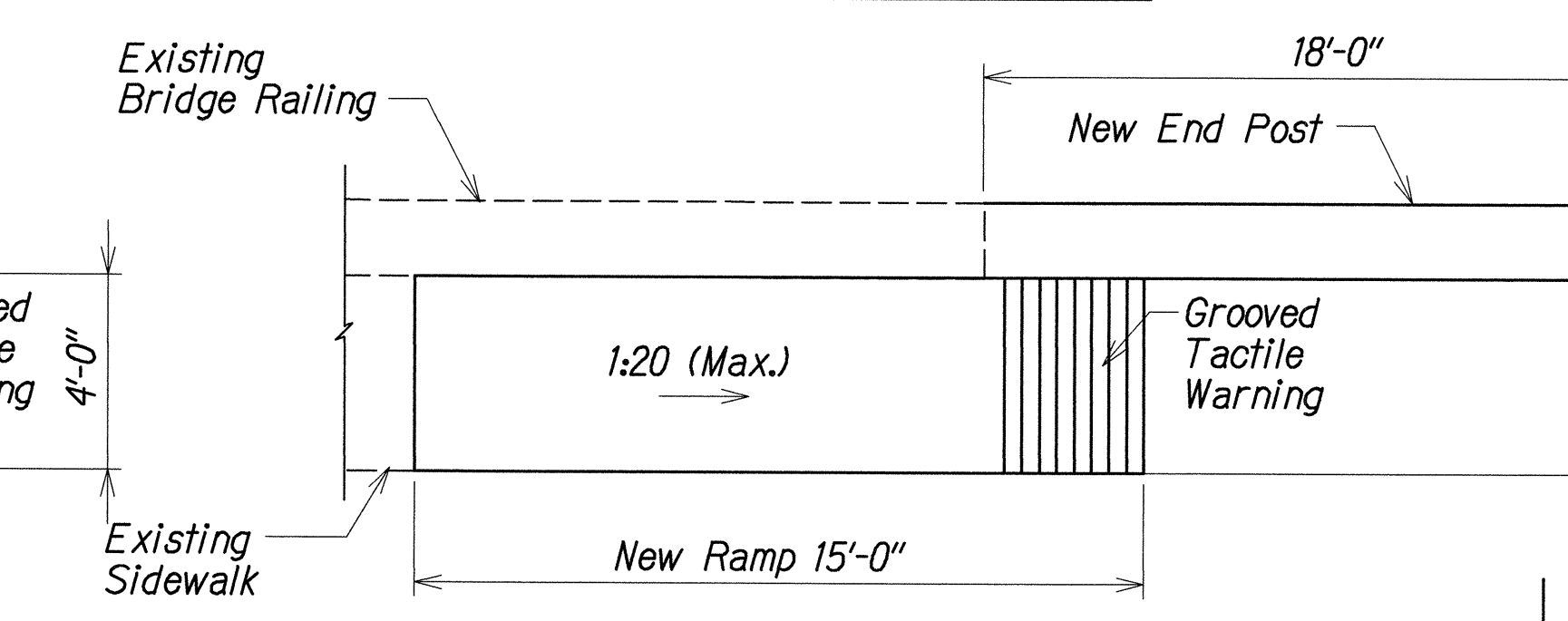


**ELEVATION**



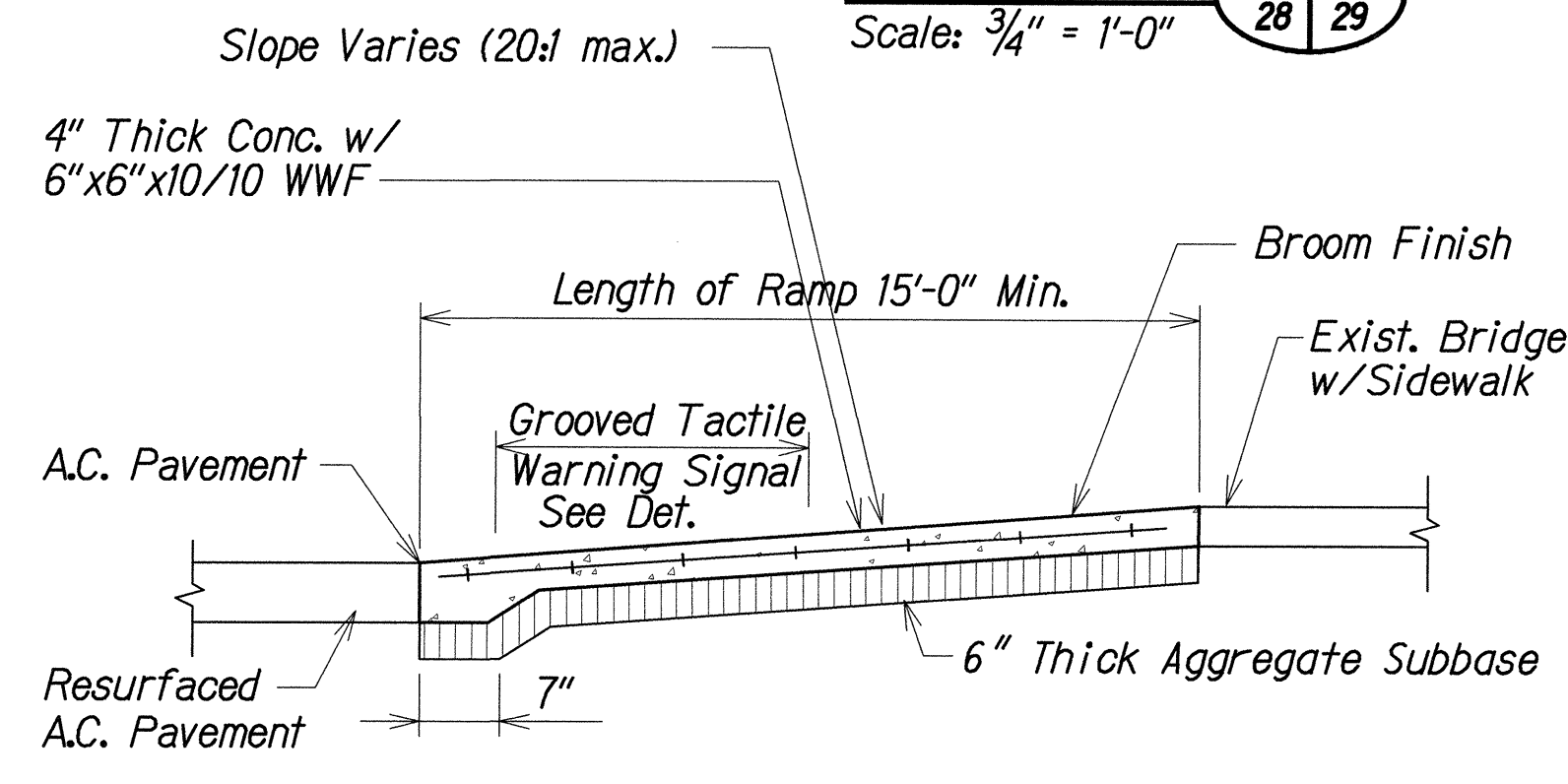
**PLAN**

**KAUMOALI BRIDGE  
END POST CONN. DETAIL**  
Not to Scale  
28 29

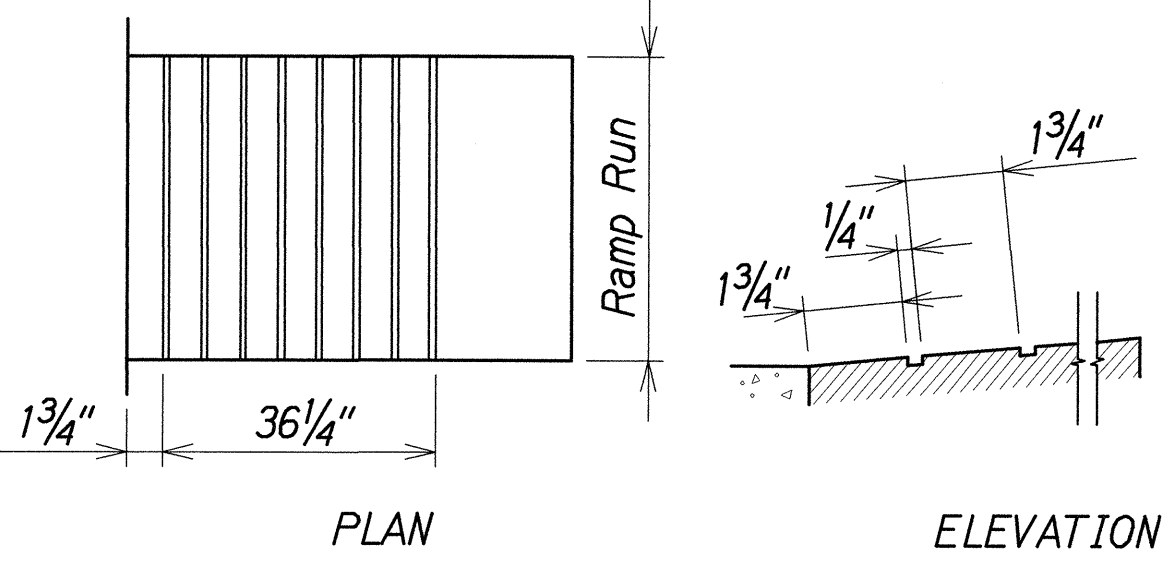


**PLAN**

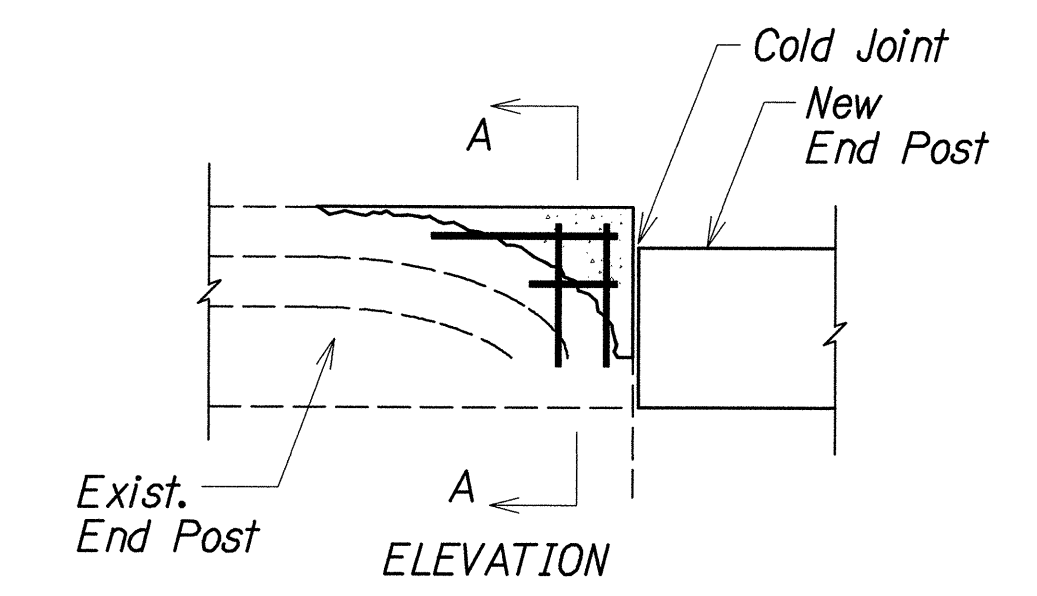
**WAIPUHAHINA BRIDGE  
END POST CONN. DETAIL**  
Not to Scale  
28 29



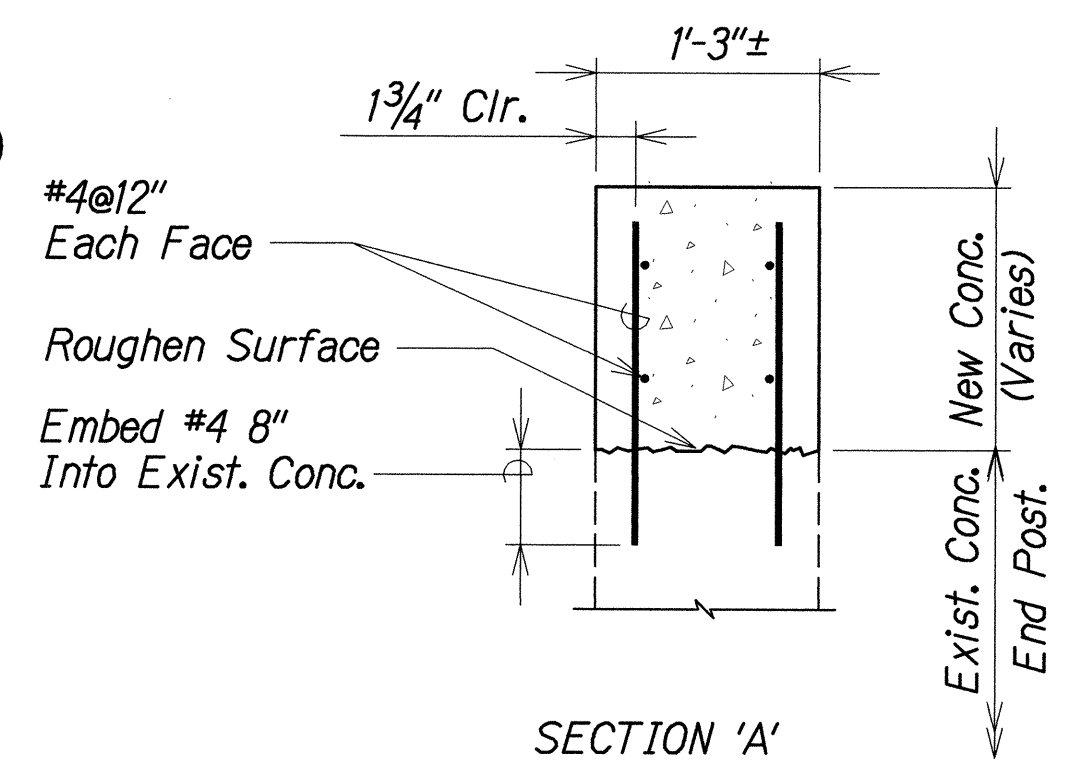
**CONCRETE RAMP  
W/TACTILE LINES**  
Not to Scale  
29 29



**GROOVED TACTILE  
WARNING SIGNAL DETAIL**  
Not to Scale  
29 29



**ELEVATION**



**SECTION 'A'**

**END POST  
MODIFICATION DETAIL**  
Not to Scale  
29 29

ORIGINAL PLAN	DATE
DRAWN BY	
DESIGNED BY	
QUANTITIES BY	
CHECKED BY	

6/3/99	Added Kaumoali Bridge End Post Conn. Detail, Waipunahina Bridge End Post Conn. Detail, Conc. Ramp w/Tactile Lines, End Post Modification & Grooved Tactile Warning Signal Detail
Date	Revision

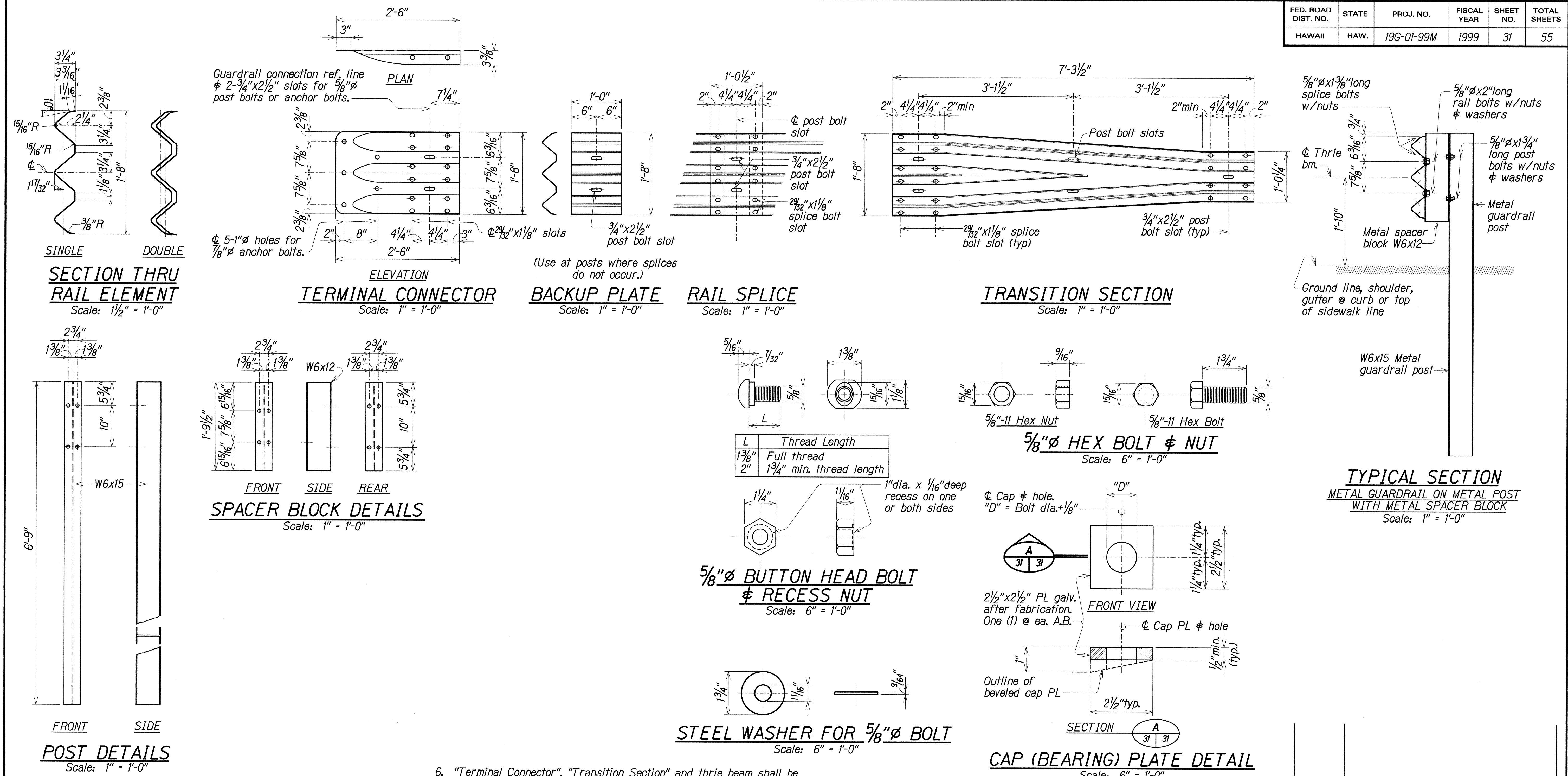
ALAN Y. TOMITA  
LICENSED PROFESSIONAL ENGINEER  
NO. 4129-C  
HAWAII, U.S.A.  
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Alan Y. Tomita

STATE OF HAWAII  
DEPARTMENT OF TRANSPORTATION  
HIGHWAYS DIVISION  
**END POST UPGRADE  
SECTION AND DETAILS**  
HAWAII BELT ROAD RESURFACING  
Vicinity of Kahawiliilii Bridge to East Paauilo Bridge  
Project No. 19G-01-99M  
Scale: NTS Date: June, 1999  
SHEET No. 3 OF 6 SHEETS





FED. ROAD DIST. NO.	STATE	PROJ. NO.	FISCAL YEAR	SHEET NO.	TOTAL SHEETS
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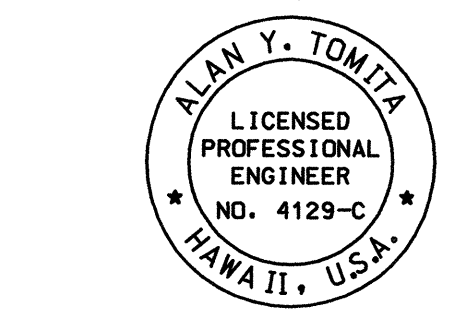
### NOTES:

- The work necessary to connect guardrail to concrete end post shall include all labor, materials, tools, equipment and incidentals necessary to complete the work and shall be incidental to Item No. 606.3112, Guardrail Type 3 Thrie Beam Transition to Endpost and will not be paid for separately.
- Lap terminal connector and rail element in direction of traffic to prevent snagging.
- See "General Notes" on Sht. #27 for additional guardrail and drilling information.
- All anchor bolts shall be high strength bolts conforming to the requirements of ASTM 325 and Standard Specification, Section 713.04.
- Anchor bolt length shall be such that a snug fit of the elements and full thread engagement plus 1/4" (max) is attained.
- "Terminal Connector", "Transition Section" and thrie beam shall be fabricated from 10 gauge steel conforming to the requirements of AASHTO M 180, Type II, Class B.
- "Terminal Connector" and standard spacer, including all anchor bolts, cap PL, nuts and washers, shall be hot-dip galvanized after fabrication.
- Cap PL shall be fabricated from ASTM A 36.
- First 25'-0" of guardrail adjoining "Terminal Connector" shall be galvanized steel and supports spaced as shown on the detail drawings. This section of rail shall be placed on tangent to end post or parallel to roadway, unless conditions at site renders it impossible to do so. Flare point to be determined in field.
- Double (nest 1st panel) thrie beam elements at all end post connections, except on highways with one-way traffic pattern, use single thrie beam elements at end post on trailing end only.
- Where double (nested) beam occur, 12" "Back-up Plate" not required.
- Heads of through anchor bolts shall be placed on the traffic side of the rail.
- Drilling of thru holes shall be done in such a manner as to prevent cone puncturing of the daylighting end.
- All steel shapes, rails and plates shall conform to ASTM A36 specifications.

6/3/99	Revised Height of Post
Date	Revision

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

## METAL GUARDRAIL TYPE 3 THRIE BEAM AND APPURTENANCES DETAILS



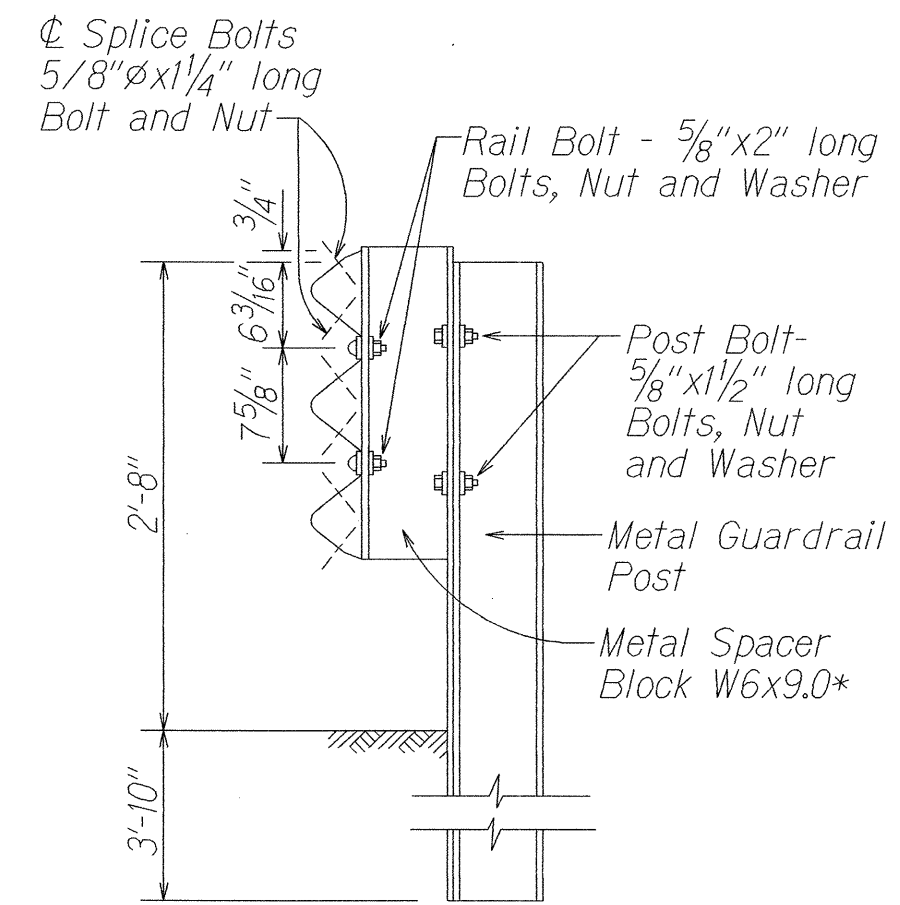
THIS WORK WAS PREPARED BY ME OR UNDER MY SUPERVISION.

*Alan Y. Tomita*

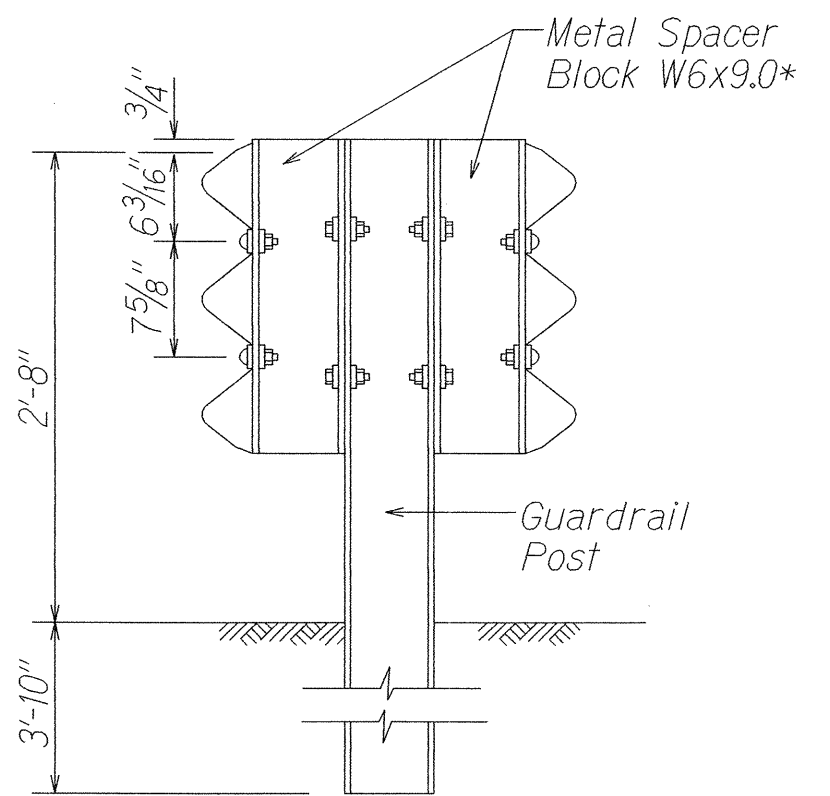
STATE OF HAWAII  
DEPARTMENT OF TRANSPORTATION  
HIGHWAYS DIVISION  
**END POST UPGRADE**  
METAL GUARDRAIL TYPE 3 THRIE BEAM  
AND APPURTENANCES DETAILS  
**HAWAII BELT ROAD RESURFACING**  
Vicinity of Kahawiliilii Bridge to East Paauilo Bridge  
Project No. 19G-01-99M  
Scale: NTS  
Date: June, 1999  
SHEET No. 5 OF 6 SHEETS

6/3/99  
Revised Height of Post  
Date  
Revision

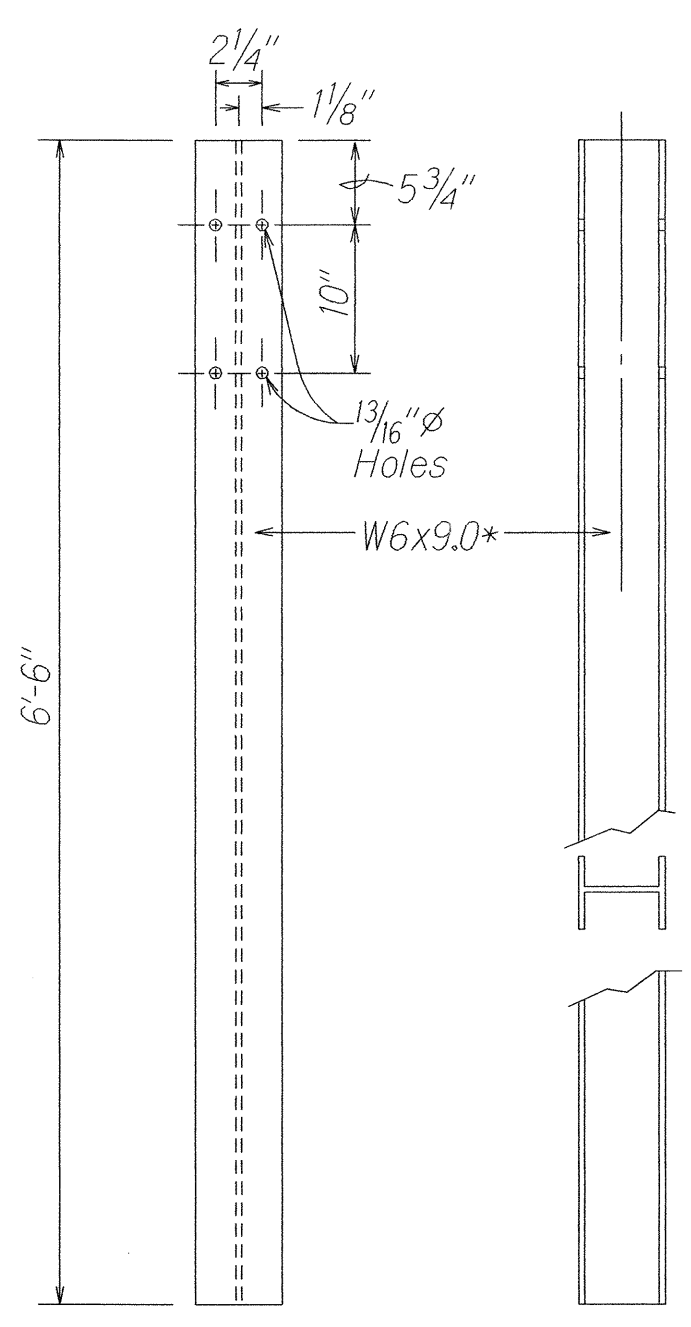
FED. ROAD DIST. NO.	STATE	PROJ. NO.	FISCAL YEAR	SHEET NO.	TOTAL SHEETS
HAWAII	HAW.	19G-01-99M	1999	32	55



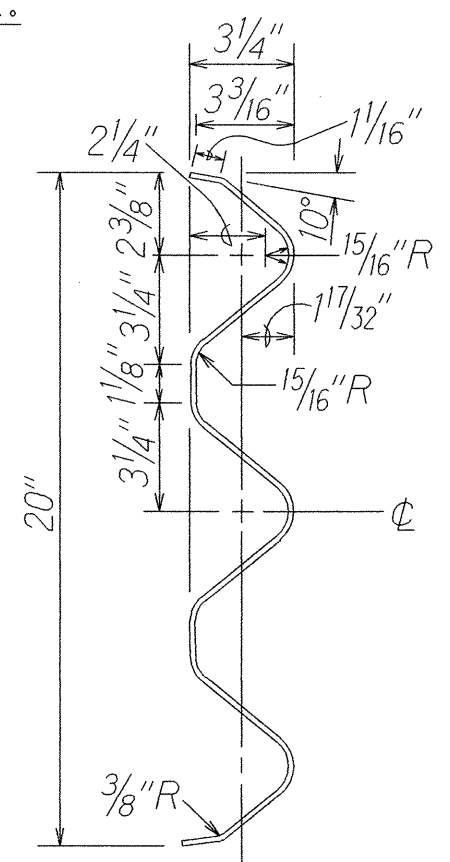
SINGLE METAL GUARDRAIL ON METAL POST W/METAL SPACER BLK.



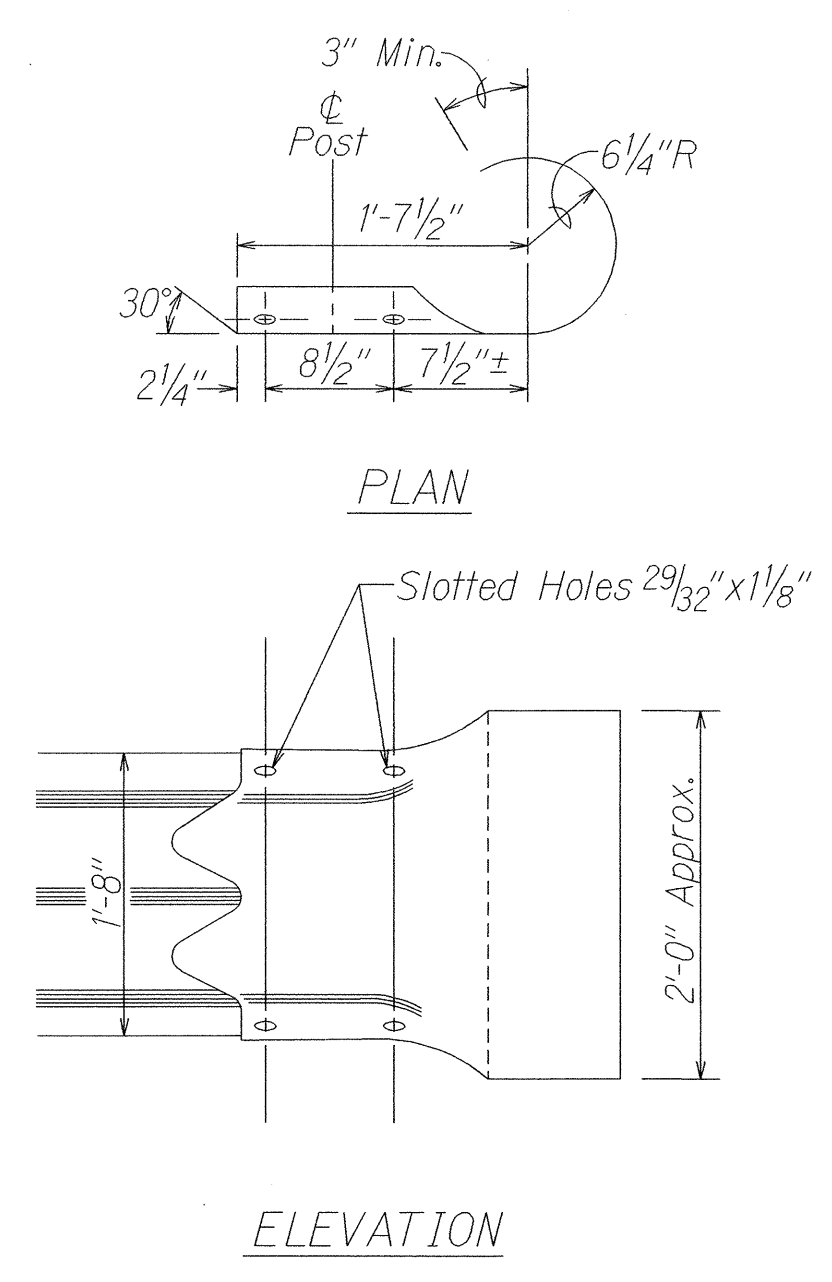
DOUBLE METAL GUARDRAIL ON METAL POST WITH METAL SPACER BLOCK



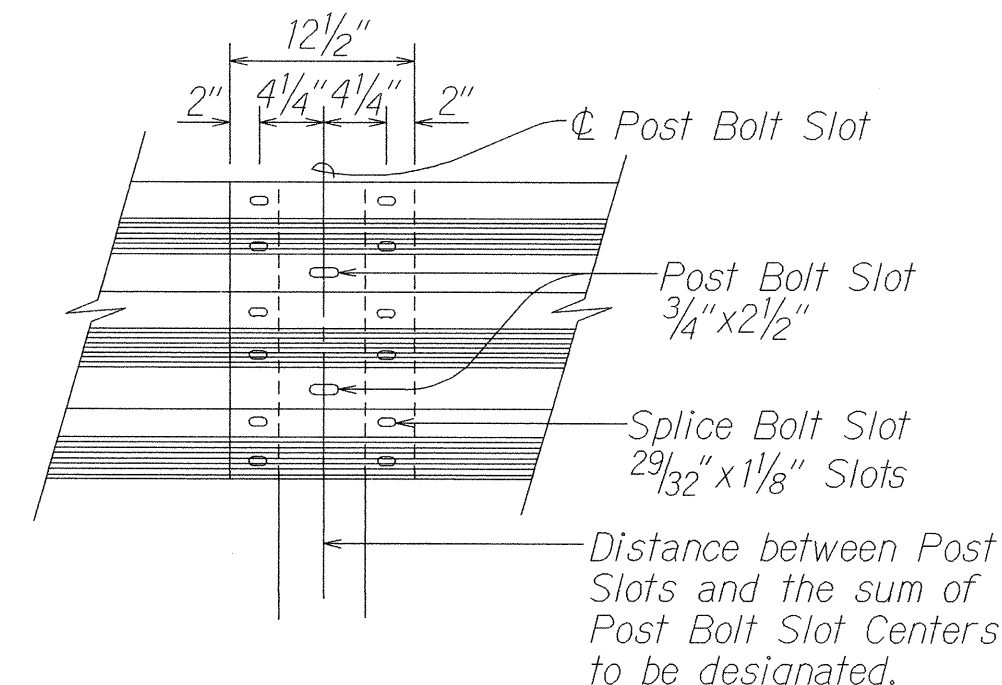
POST DETAILS



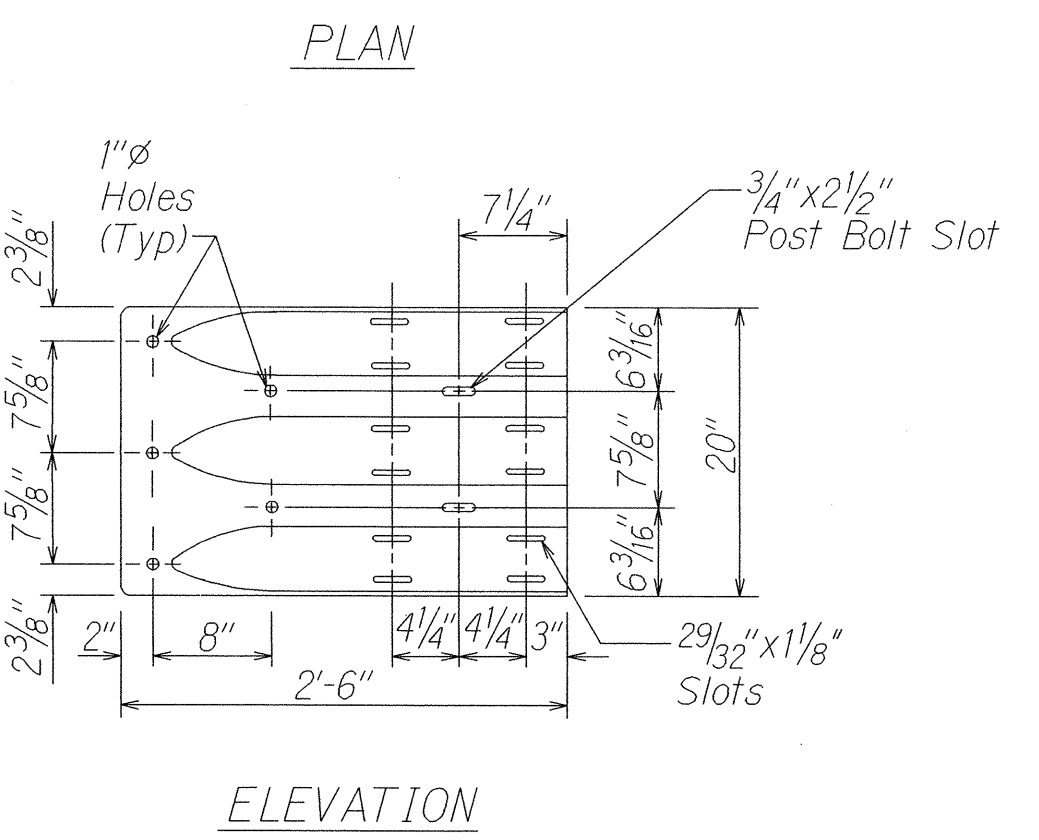
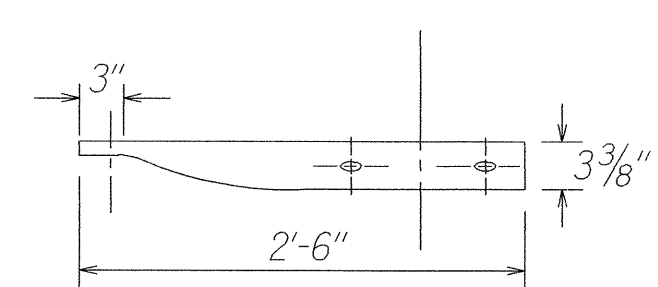
SECTION THRU RAIL ELEMENT



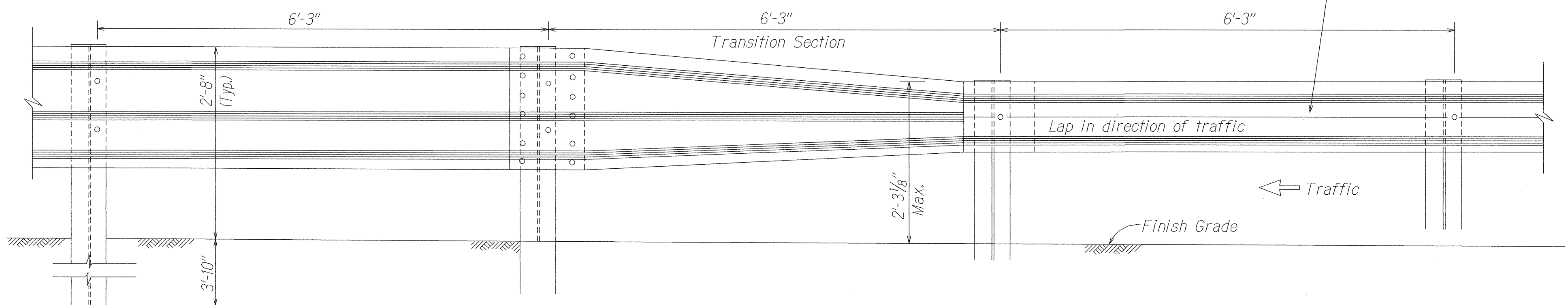
SECTION (ROUNDED)



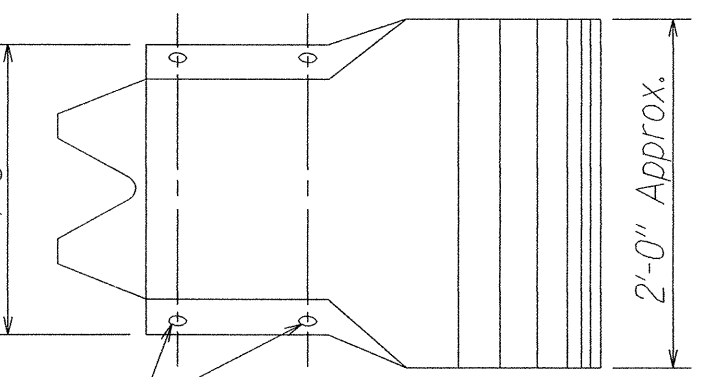
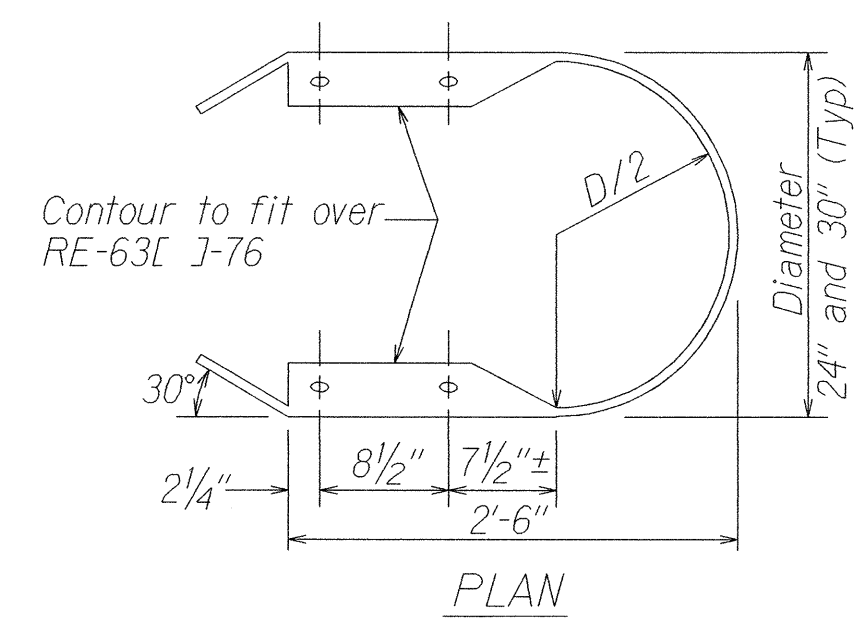
RAIL SPLICE



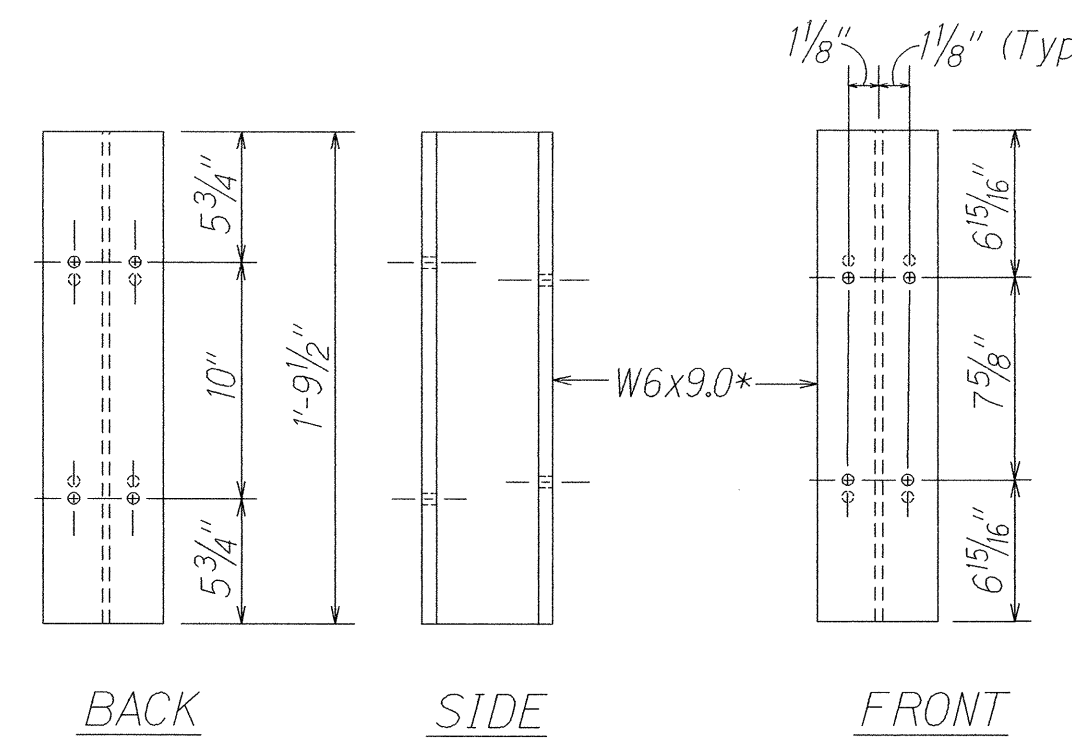
TERMINAL CONNECTOR



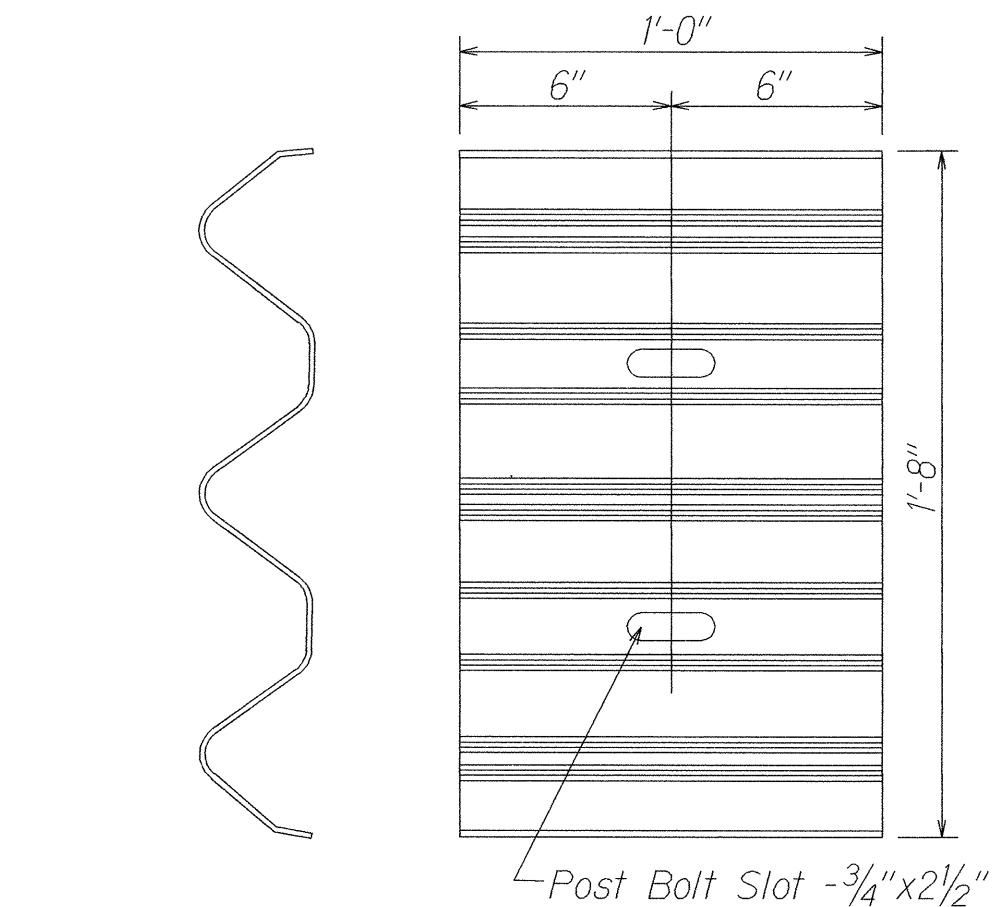
TRANSITION SECTION



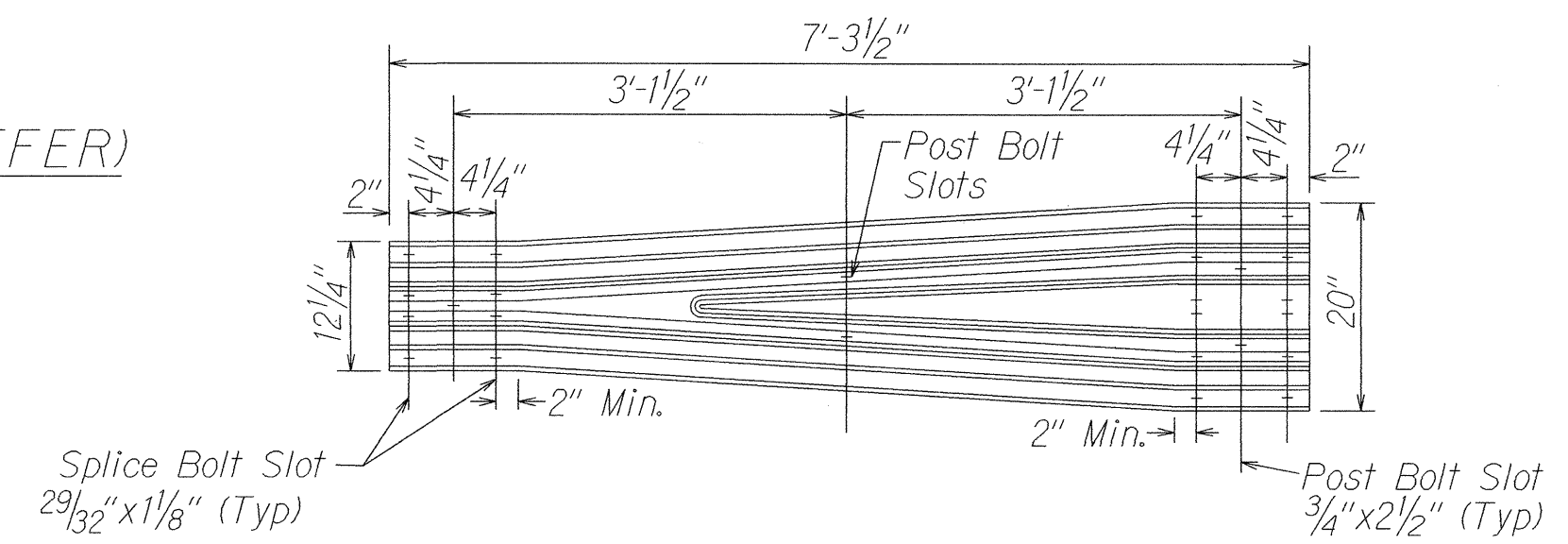
END SECTION (BUFFER)



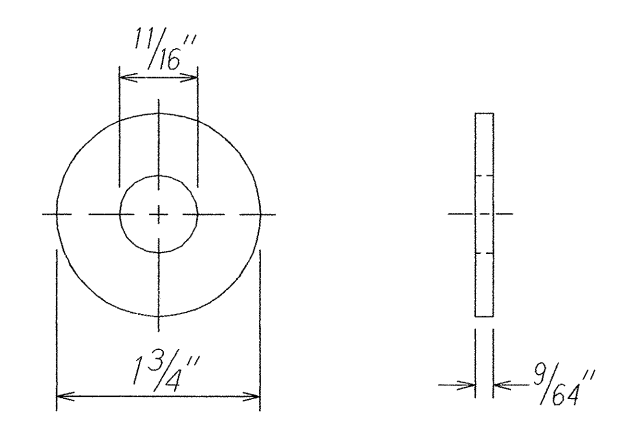
SPACER BLOCK



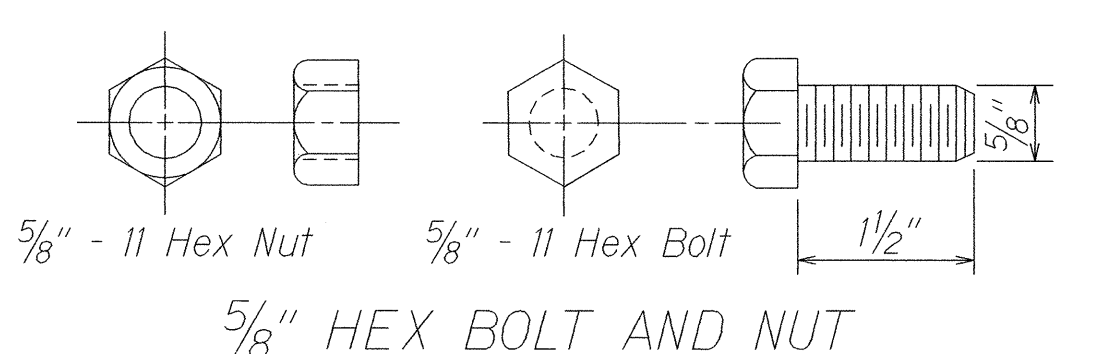
BACKUP PLATE (Use at Posts where Splices do not occur)



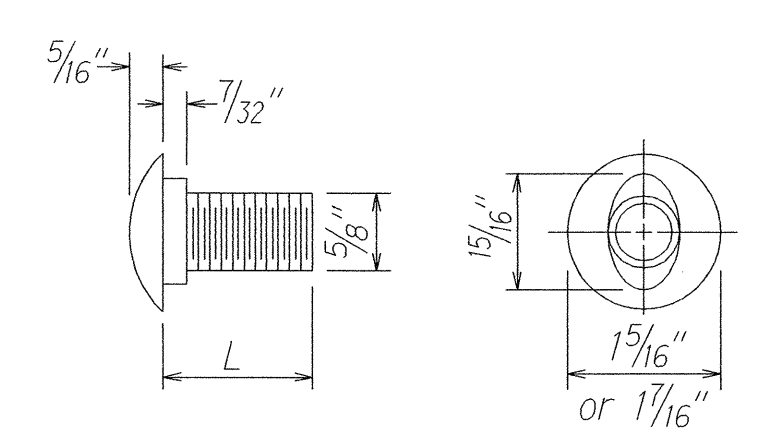
TRANSITION SECTION



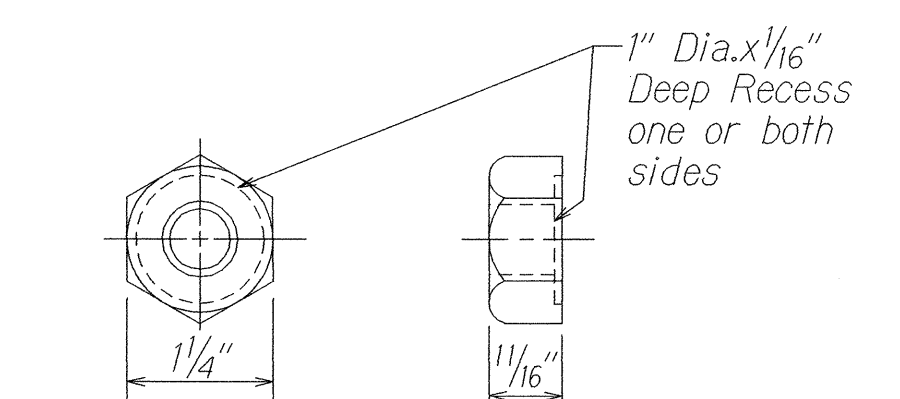
STEEL WASHER FOR 5/8" BOLT



5/8" HEX BOLT AND NUT

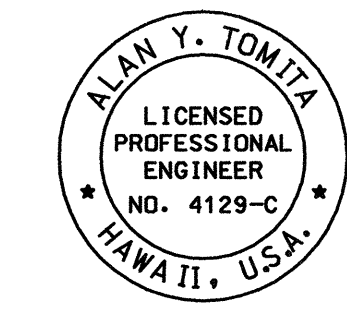


L	Thread Length
1 1/4"	Full Tread
2"	1 1/2" Min. thread Length



5/8" BUTTON HEAD BOLTS AND RECESS NUT

\* Replaced W6x8.5, which is acceptable as an alternate.



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Alan Y. Tomita

STATE OF HAWAII  
DEPARTMENT OF TRANSPORTATION  
HIGHWAYS DIVISION

### END POST UPGRADE

#### GUARDRAIL TYPE 3 THRIE BEAM

#### HAWAII BELT ROAD RESURFACING

#### Vicinity of Kahawiliilii Bridge to East Paavilo Bridge

#### Project No. 19G-01-99M

Scale: NTS
Date: May, 1999

SHEET No. 6 OF 6 SHEETS

ORIGINAL PLAN	DATE
DRAWN BY	
DESIGNED BY	
QUANTITIES BY	
CHECKED BY	