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Q3	Typical Bridge Concrete Railing Upgrade
Q4	Concrete Railing Details and Section; Concrete Railing Details at Light Standard
Q5	Typical Tube Splice Detail
Q6	Detail A and Detail B
Q7	Detail C and Detail D
Q8	Detail E, Sections and Wall Spacer Block Details
Q9	Plan - South Frontage Road and Detail J
Q10	Metal Guardrail Details
Q11	Metal Guardrail Type 3 Thrie Beam and Appurtenances Details

GENERAL SPECIFICATIONS:

State of Hawaii, Department of Transportation Standard Specifications for Road and Bridge Construction, 1994 and Special Provisions.

1. AASHTO LRFD Bridge Design Specifications, First Edition including 1996 and 1997 Interim revisions.

1. Reinforced concrete: Class A
2. Reinforced steel: ASTM A 615, Grade 60.
3. Admixture in concrete: See Special Provisions
4. All expansion and premolded joint filler shall be incidental to concrete and will not be paid for separately.
5. All structural steel shall be ASTM A 36 hot-dip galvanized after fabrication.
6. All anchor bolts, washers and nuts shall be ASTM A 325, hot-dip galvanized after fabrication, unless noted otherwise.
7. All welding shall be in accordance with the current edition of Reinforcing Steel Welding Code AWS D 1.4. Welding electrodes for structural steel shall be E 70.

1. Refer to Hawaii Standard Specifications for Road, Bridge and Public Works Construction, 1994 Edition and Special Provisions.
2. Except as noted otherwise, all dimensions are measured plumb.
3. For concrete finish, see Standard Specifications and Special Provisions.
4. For steel reinforcing, stagger all splices where possible.
5. Steel reinforcing shall be supported, bent and placed as per the ACI Detailing Manual, 1994.
6. For cast-in-place concrete, minimum reinforcement cover: 2"
7. At time concrete is placed, reinforcing shall be free from mud, oil, laitance or other coatings adversely affecting bond capacity.
8. Reinforcement, dowels and other embedded items shall be positively secured before pouring.
9. 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 1½ inches below finish grade and the area patched with mortar.
10. All existing concrete face receiving new concrete in the finish product shall be roughened and cleaned prior to placement of new pour, unless indicated otherwise according to the contract.
11. The Contractor shall avoid dropping any debris or other items on the roadway below. All necessary precautionary measures shall be considered incidental to the concrete barrier. Any damage or injuries caused by falling materials shall be the responsibility of the Contractor.

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

1. All items noted incidental will not be paid for separately.
2. The Contractor shall verify the locations of all existing utility lines and notify their respective owners before commencing with any work.
3. The Contractor shall verify all grades and dimensions in the field before commencing with any work.
4. 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 the Contractor's own expense, and at no cost to the State. He 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.
5. Unless noted otherwise, chamfer all exposed concrete edges three-quarters ($\frac{3}{4}$ ") of an inch.

AB.	Anchor Bolt	Jt.	Joint	T#B	Top and Bottom
Alum.	Aluminum	LC	Length of Curve	Thk.	Thick
Approx.	Approximate	Lg.	Long	TS	Tubular Steel
Bal.	Balance	Longit.	Longitudinal	Typ.	Typical
Beg.	Begin, Beginning	Max.	Maximum	Vert.	Vertical
ℒ	Baseline	Min.	Minimum	w/	with
Blk.	Block				
Bm.	Beam	No.	Number		
℄	Center line				
Cl.	Clear	OB	Outbound		
Conc.	Concrete	OD	Outside Dimension		
Cont.	Continuous	PL	Plate		
Det.	Detail	R	Radius		
Dia.	Diameter	Rdwy.	Roadway		
Ea.	Each	Ref.	Reference		
EF	Each Face	Reinf.	Reinforcing		
Exist.	Existing	Req'd	Required		
Exp.	Expansion	Sect.	Section		
		Shf.	Sheet		
Fin.	Finish	Spes.	Spaces		
		Spog	Spacing		
Ga.	Gage	Sta.	Station		
Galv.	Galvanized	Std.	Standard		
HS	High Strength	Struct.	Structural		
Horiz.	Horizontal	Str.	Structure		
IB	Inbound				

Detail or section designation

Sheet number section is cut or detail section

Sheet number detail is drawn on

FED. ROAD DIST. NO.	STATE	PROJ. NO.	FISCAL YEAR	SHEET NO.	TOTAL SHEETS
HAWAII	HAW.	STP-H20(13)	1999	30	51

<i>ESTIMATED QUANTITIES</i>			
<i>ITEM NO.</i>	<i>ITEM</i>	<i>UNIT</i>	<i>TOTAL</i>
507.5000	Concrete Barrier with Metal Railing	Lin. Ft.	334 l.f.
606.3220	Guardrail, Type 3 W-beam	Lin. Ft.	425 l.f.
606.3230	Guardrail, Type 3 Thrie Beam	Lin. Ft.	1534 l.f.

ITEM NO.	ITEM	UNIT	TOTAL
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606.3220	Guardrail, Type 3 W-beam	Lin. Ft.	425 l.f.
606.3230	Guardrail, Type 3 Thrie Beam	Lin. Ft.	1534 l.f.

ORIGINAL PLAN	SURVEY PLOTTED BY <u>LMA</u> DATE <u>May 1998</u>	
	DRAWN BY _____	•
	DESIGNED BY _____	•
	QUANTITIES BY _____	•
	CHECKED BY <u>DCO</u>	•
NO. <u>4mceab01</u>		•

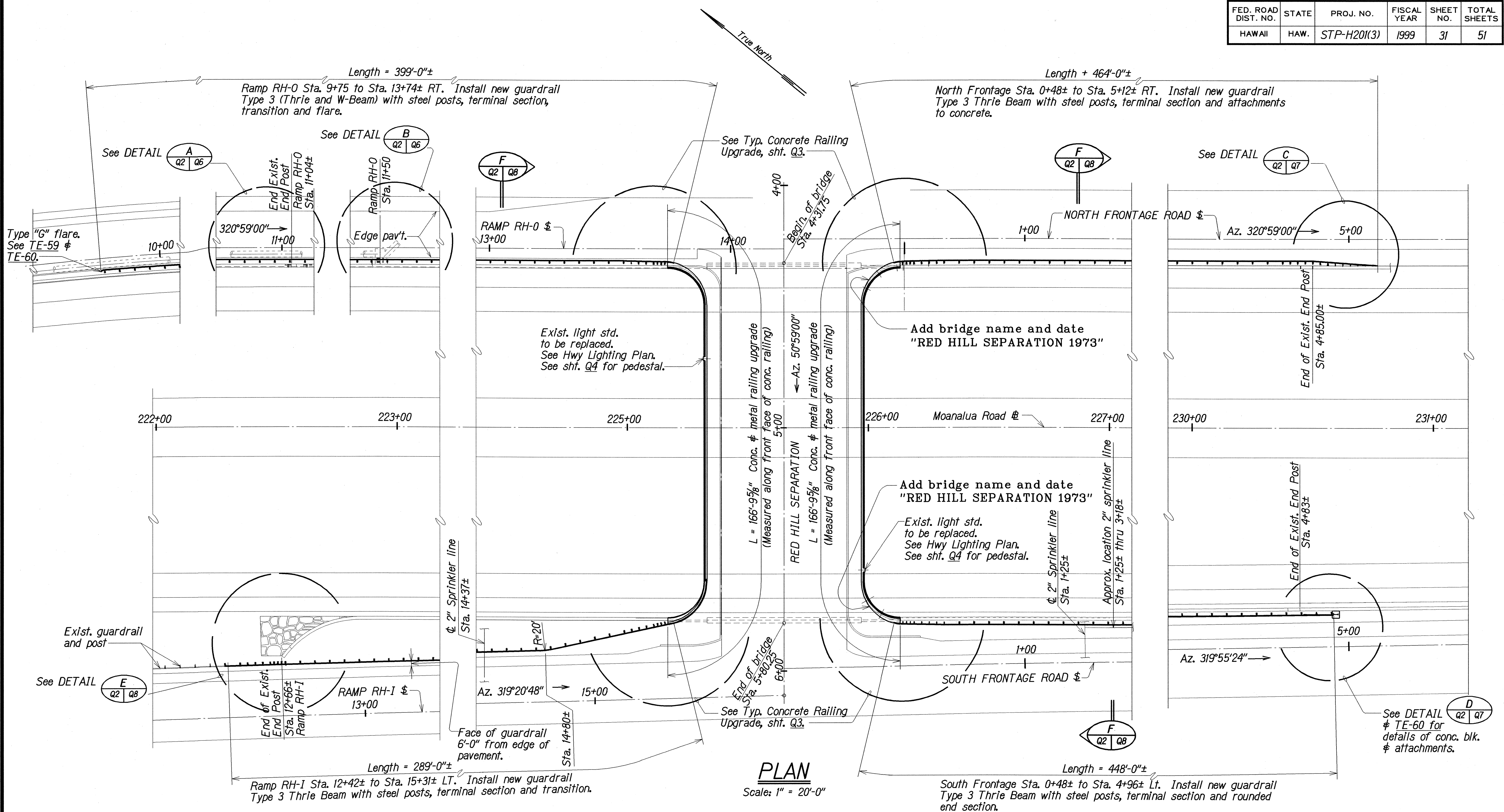
STATE OF HAWAII
DEPARTMENT OF TRANSPORTATION
HIGHWAYS DIVISION

RED HILL SEPARATION IMPROVEMENTS
INDEX, GENERAL NOTES, ABBREVIATIONS
AND ESTIMATED QUANTITIES
MOANALUA FREEWAY RAMP RESURFACING
Vicinity of Ala Kapuna to Vicinity of Ala Napunani
Federal Aid Project No. STP-H20(3)

Scale: As Noted Date: Sept. 1998

SHEET No. 01 OF 11 SHEETS

FED. ROAD DIST. NO.	STATE	PROJ. NO.	FISCAL YEAR	SHEET NO.	TOTAL SHEETS
HAWAII	HAW.	STP-H20(K3)	1999	31	51



NOTE:

- Sprinkler line locations shown are an approximation. It is the Contractor's responsibility to determine actual locations. Contractor shall repair all lines damaged during construction at no expense to the State.
- For location and detail of control and expansion joint along concrete railing, see sht. Q4.

LEGEND FOR AS-BUILT POSTINGS	
	Squiggly line for as-built deletion
	Double line for as-built deletion
	Text for as-built posting

STATE OF HAWAII
DEPARTMENT OF TRANSPORTATION
HIGHWAYS DIVISION

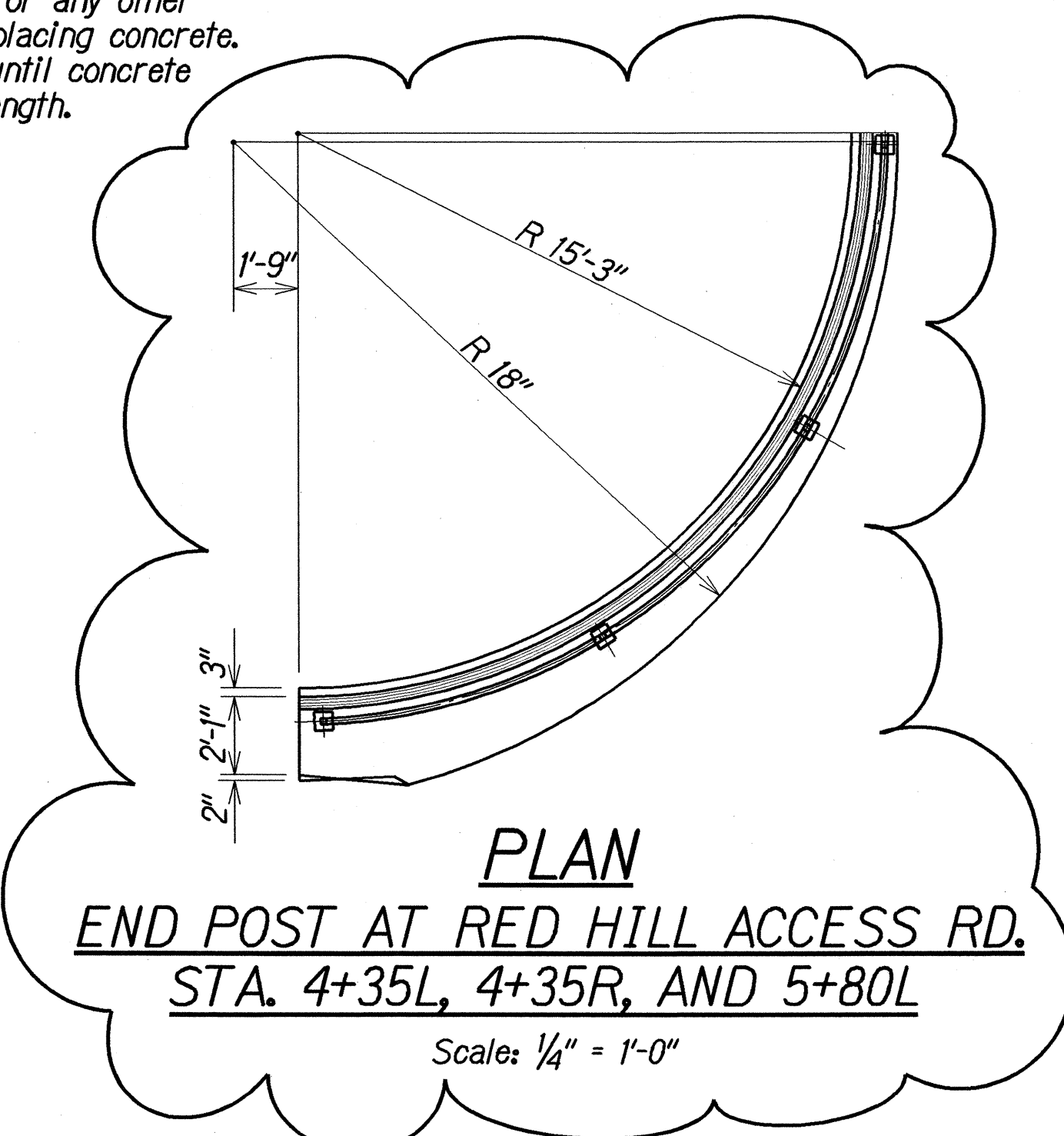
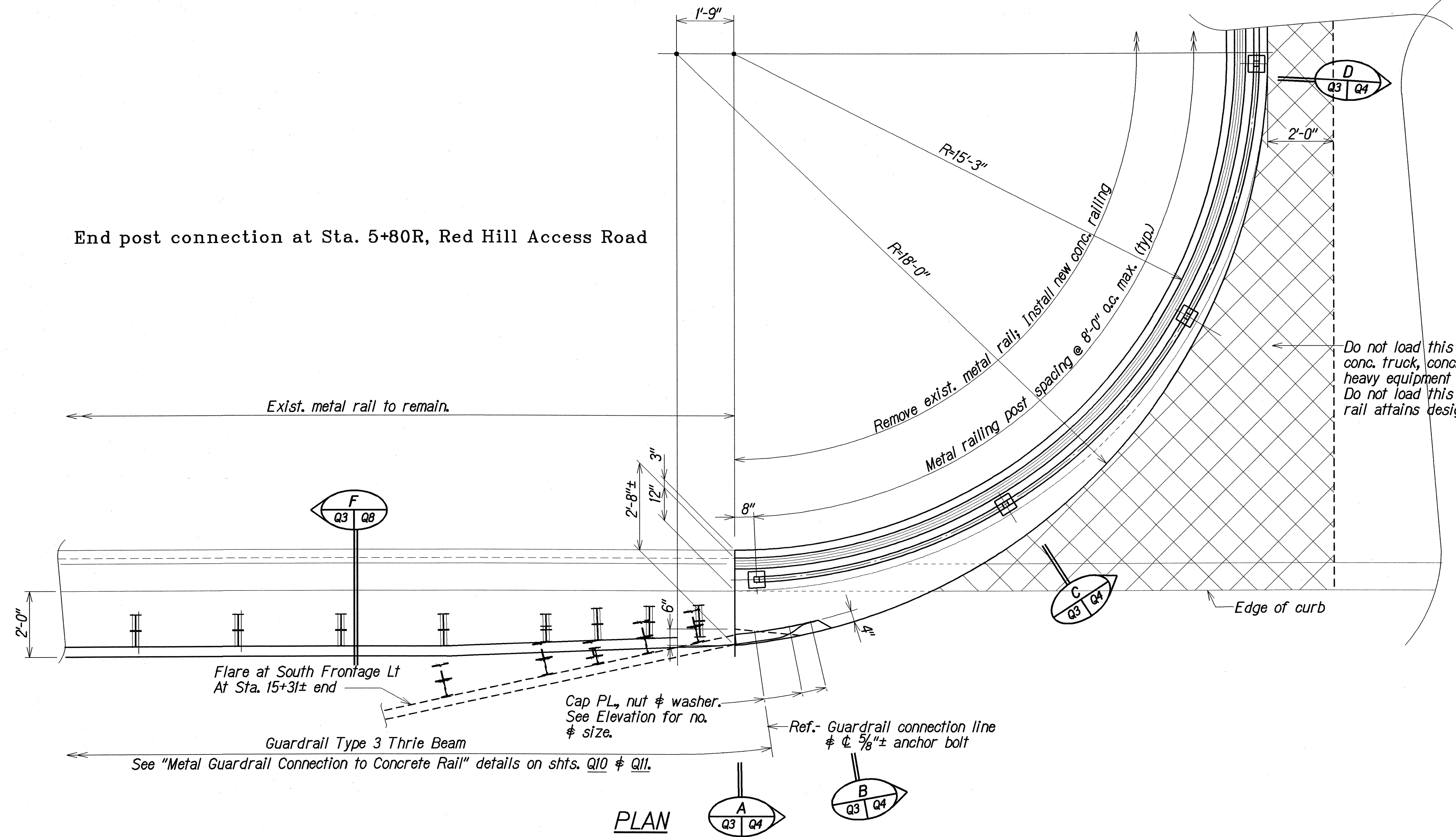
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PLAN
MOANALUA FREEWAY RAMP RESURFACING
Vicinity of Ala Kapuna to Vicinity of Ala Napunani
Federal Aid Project No. STP-H20(K3)

Scale: As Noted
Date: Sept. 1998

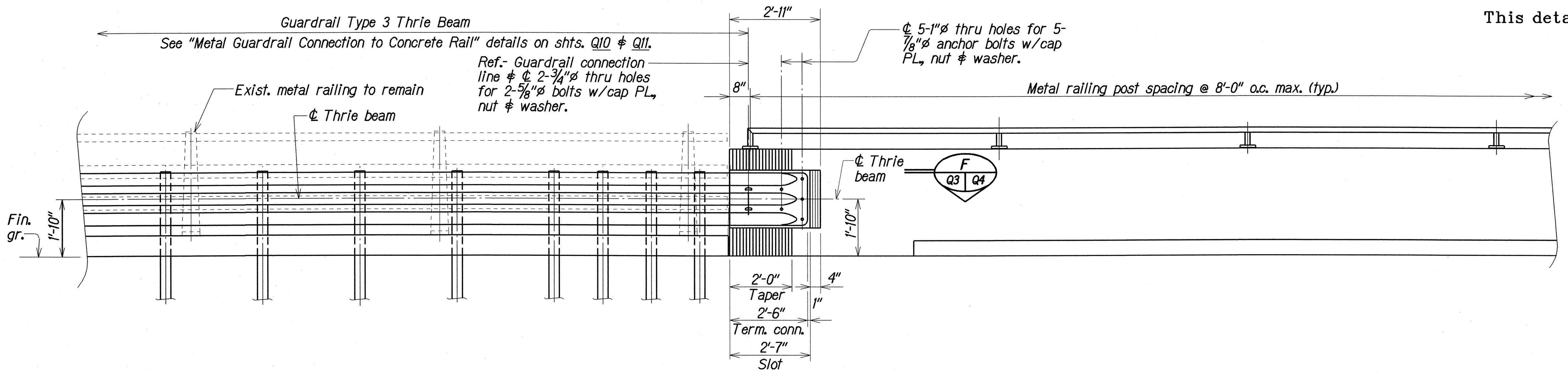
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DRAWN BY: LMA	DESIGNED BY: LMA
NOTE BOOK	CHECKED BY: LMA
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FED. ROAD DIST. NO.	STATE	PROJ. NO.	FISCAL YEAR	SHEET NO.	TOTAL SHEETS
HAWAII	HAW.	STP-H20(3)	1999	32	51

End post connection at Sta. 5+80R, Red Hill Access Road



This detail added during "As-Built" posting.



DEVELOPED ELEVATION
TYPICAL CONCRETE RAILING UPGRADE

LEGEND FOR AS-BUILT POSTINGS	
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	Double line for as-built deletion
	Text for as-built posting

STATE OF HAWAII
DEPARTMENT OF TRANSPORTATION
HIGHWAYS DIVISION

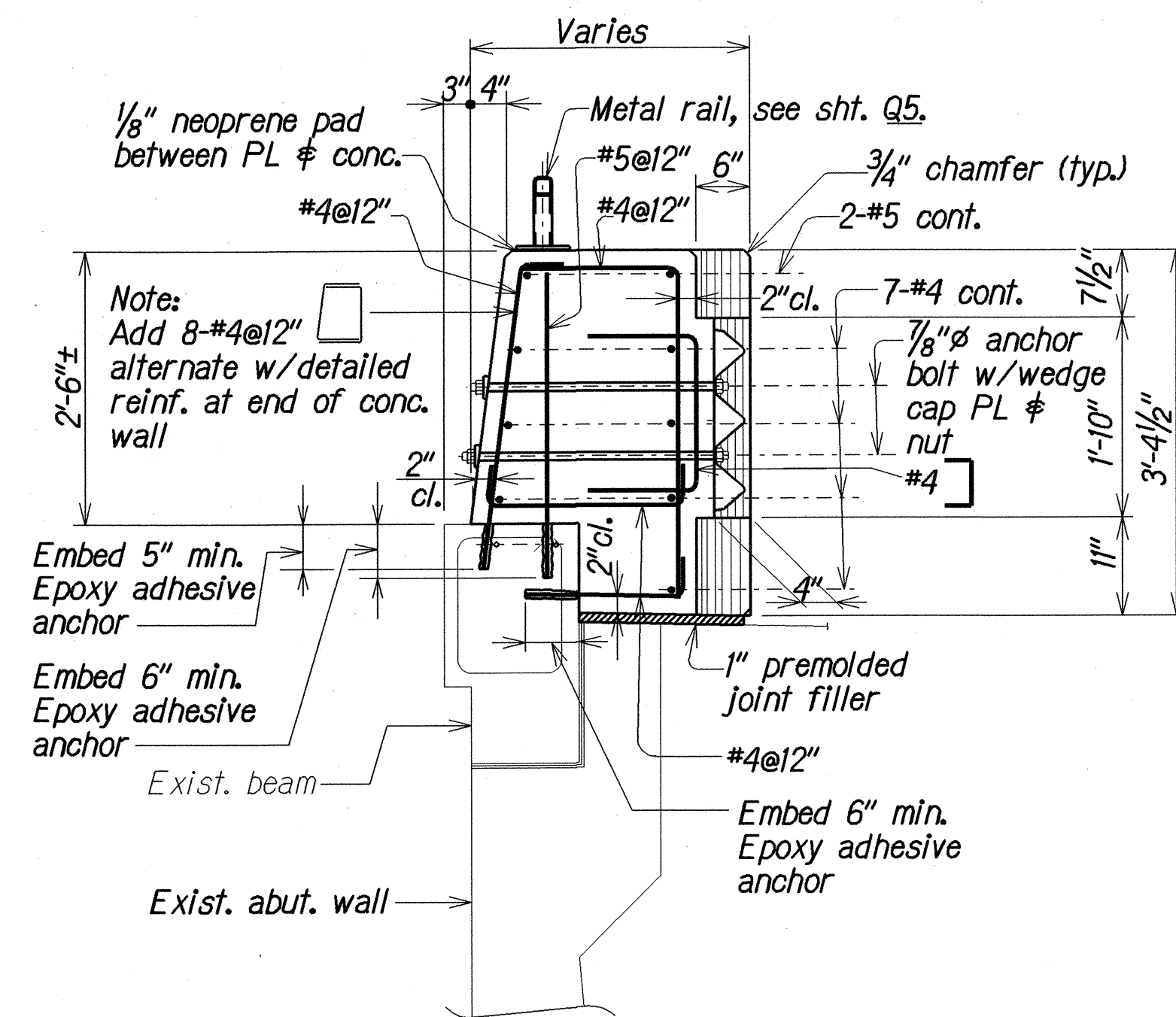
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TYPICAL CONCRETE RAILING UPGRADE
MOANALUA FREEWAY RAMP RESURFACING
Vicinity of Ala Kapuna to Vicinity of Ala Napunani
Federal Aid Project No. STP-H20(3)

Scale: As Noted Date: Sept. 1998

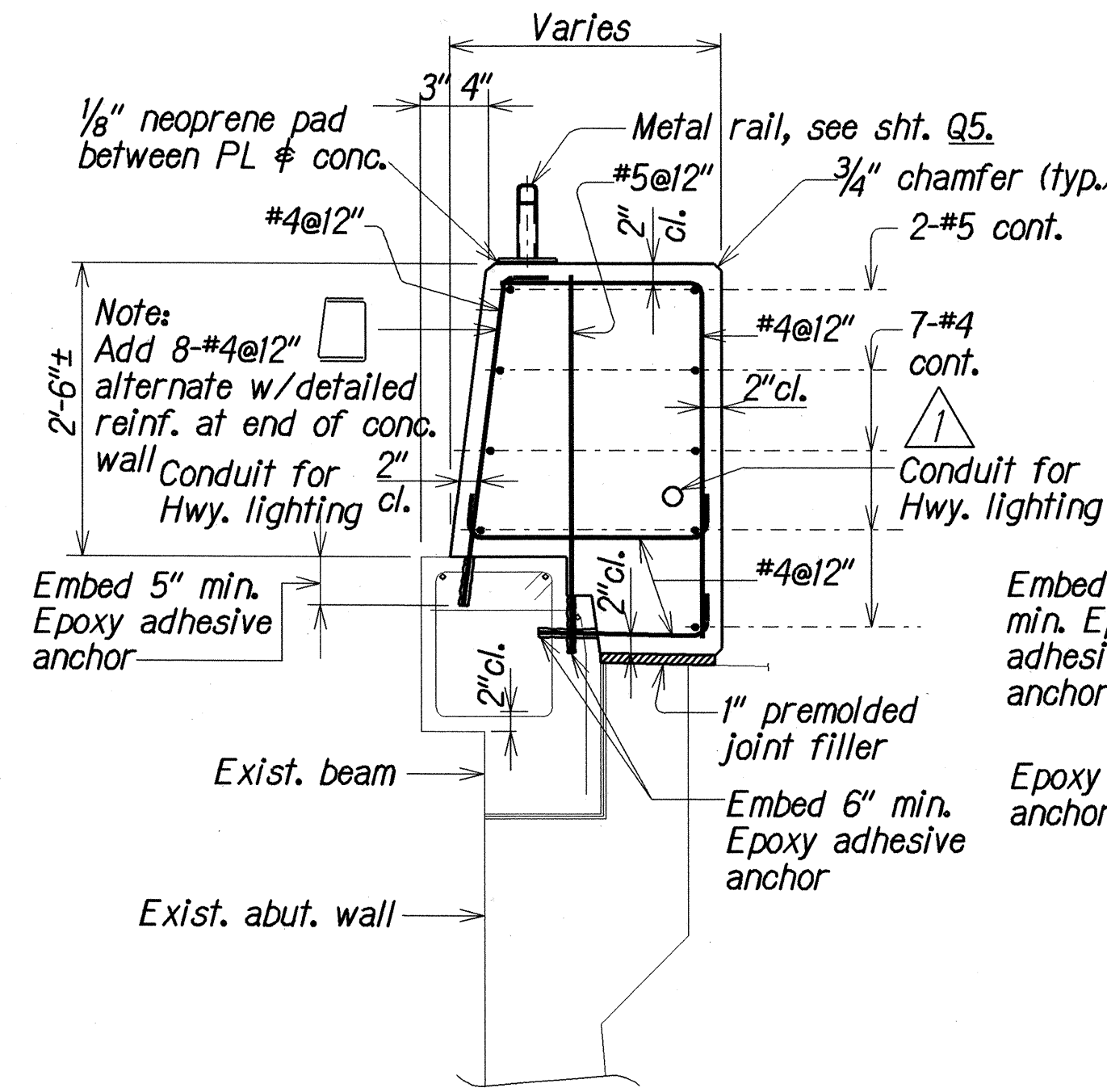
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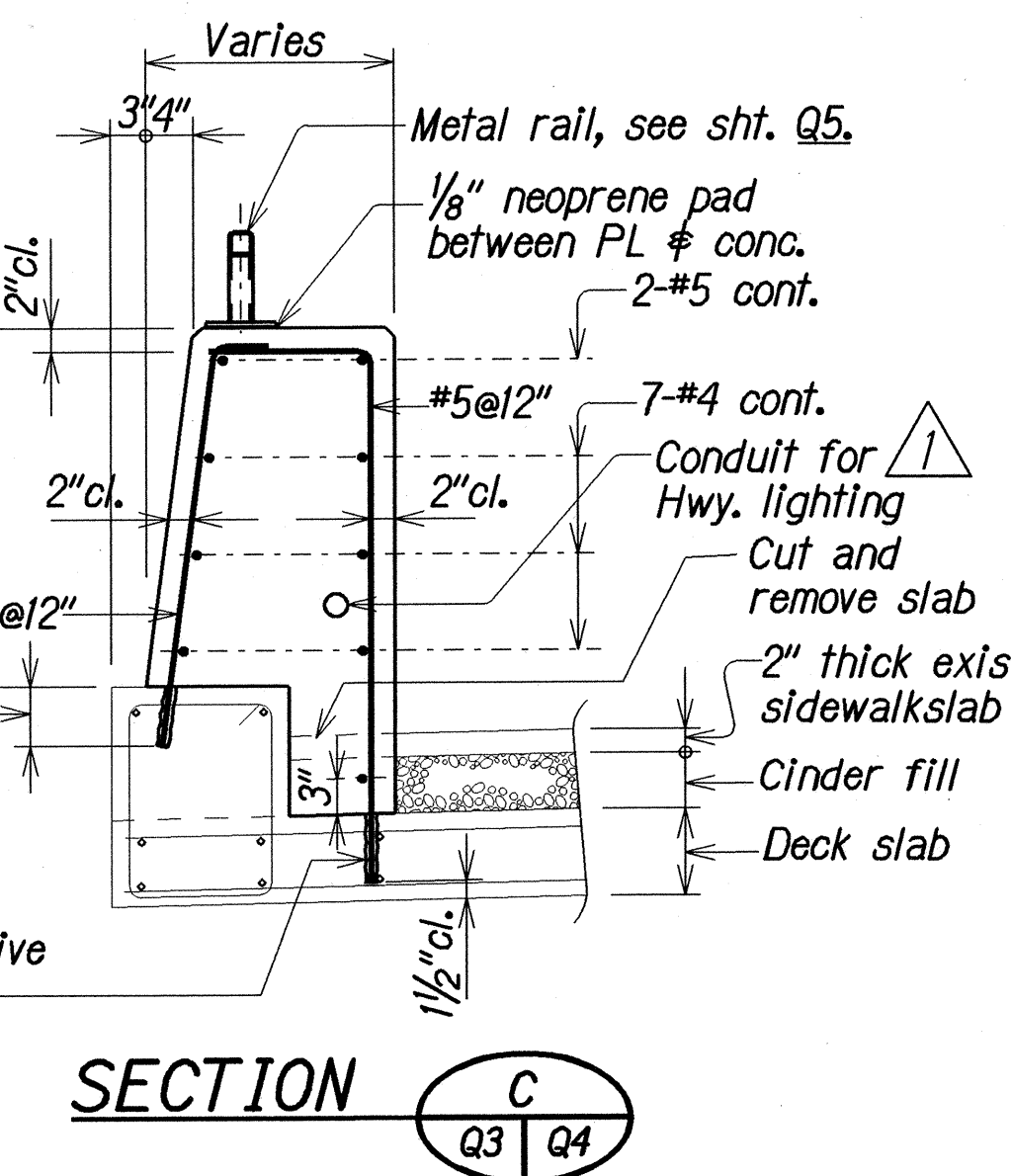
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HAWAII	HAW.	STP-H20(3)	1999	ADD. 33	51



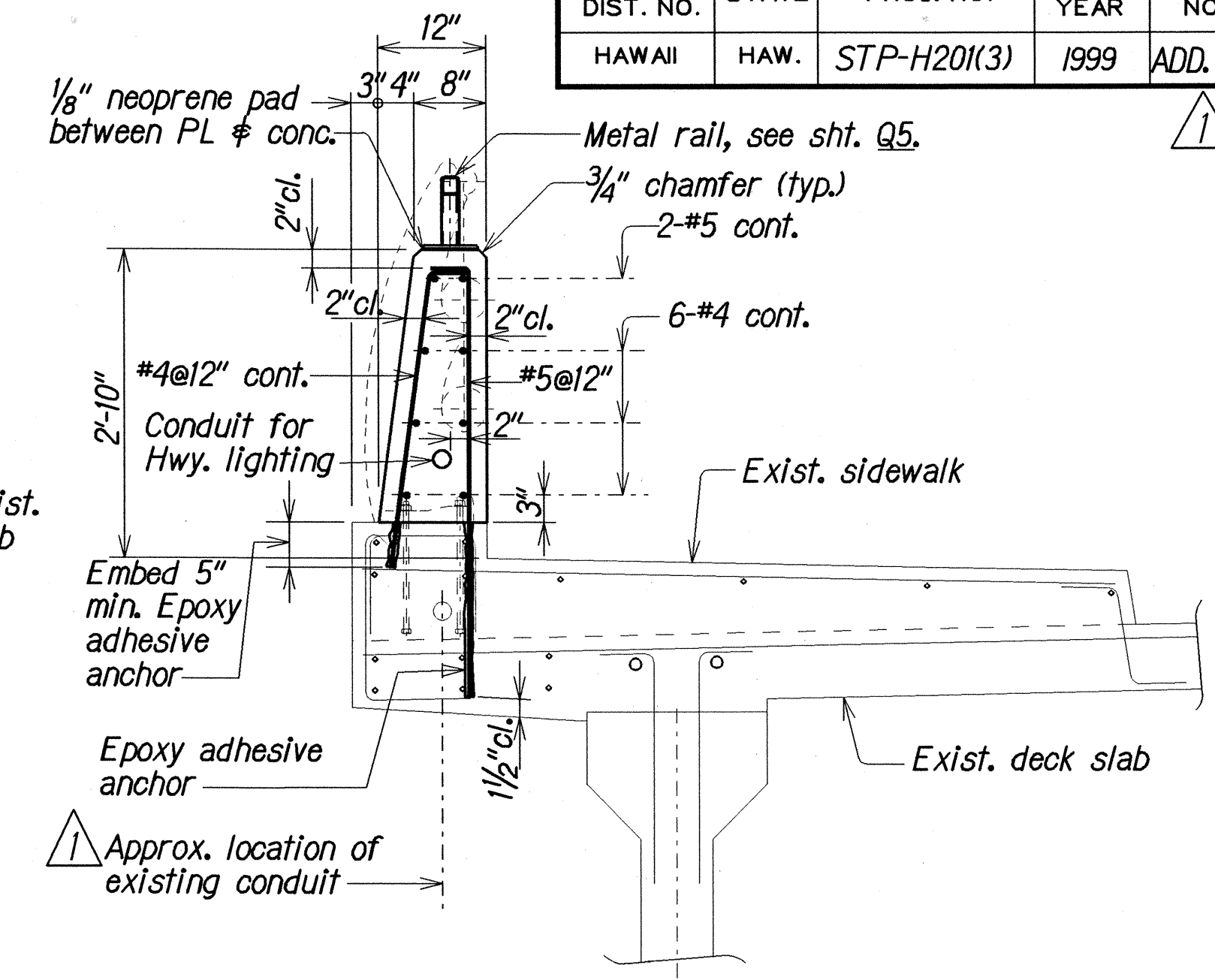
SECTION A
Q3 Q4



SECTION B
Q3 Q4



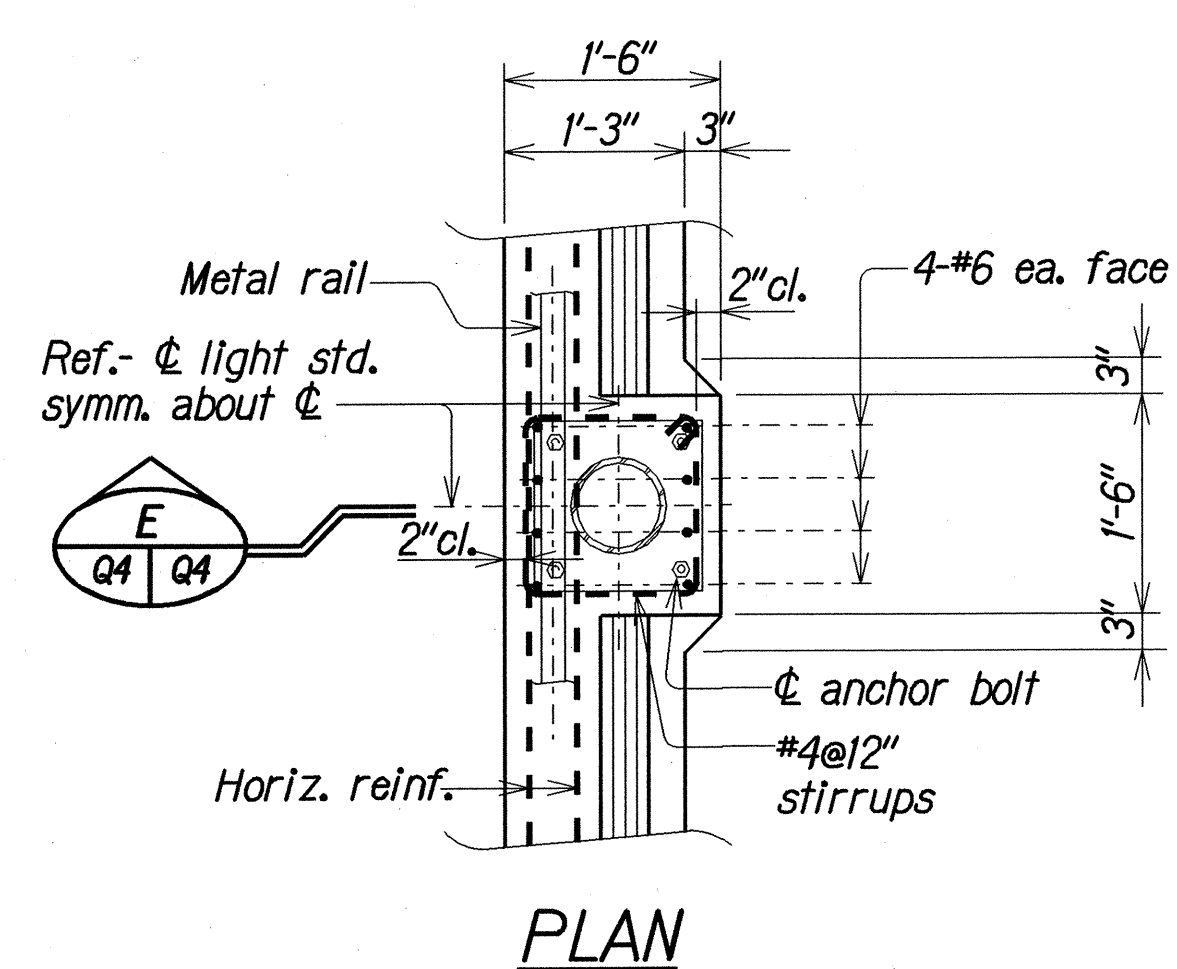
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Q3 Q4



SECTION D
Q3 Q4

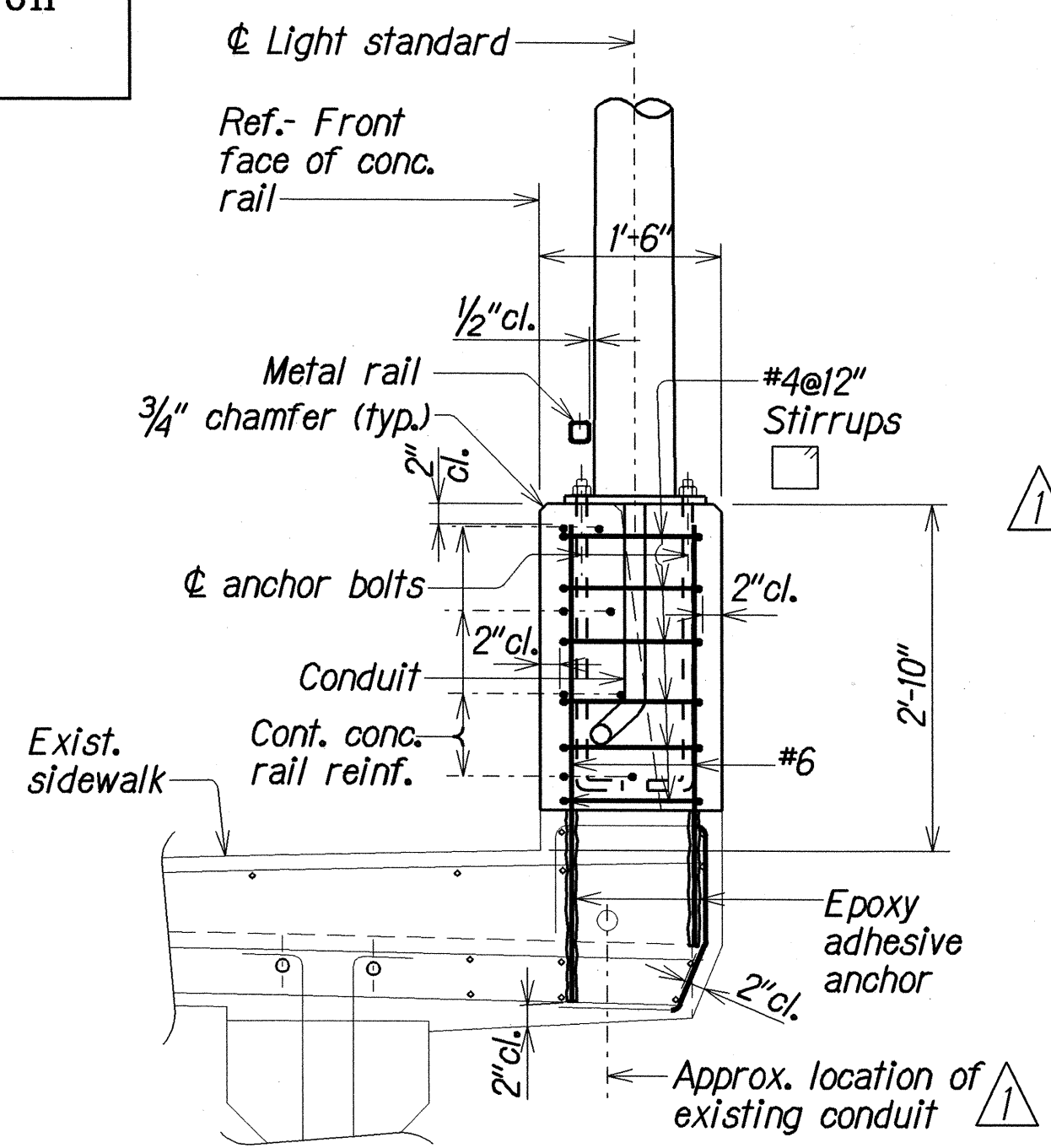
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- Double line for as-built deletion
- Roadway Text for as-built posting



PLAN

NOTE:
See Hwy Lighting Plan for light standard and anchorage.



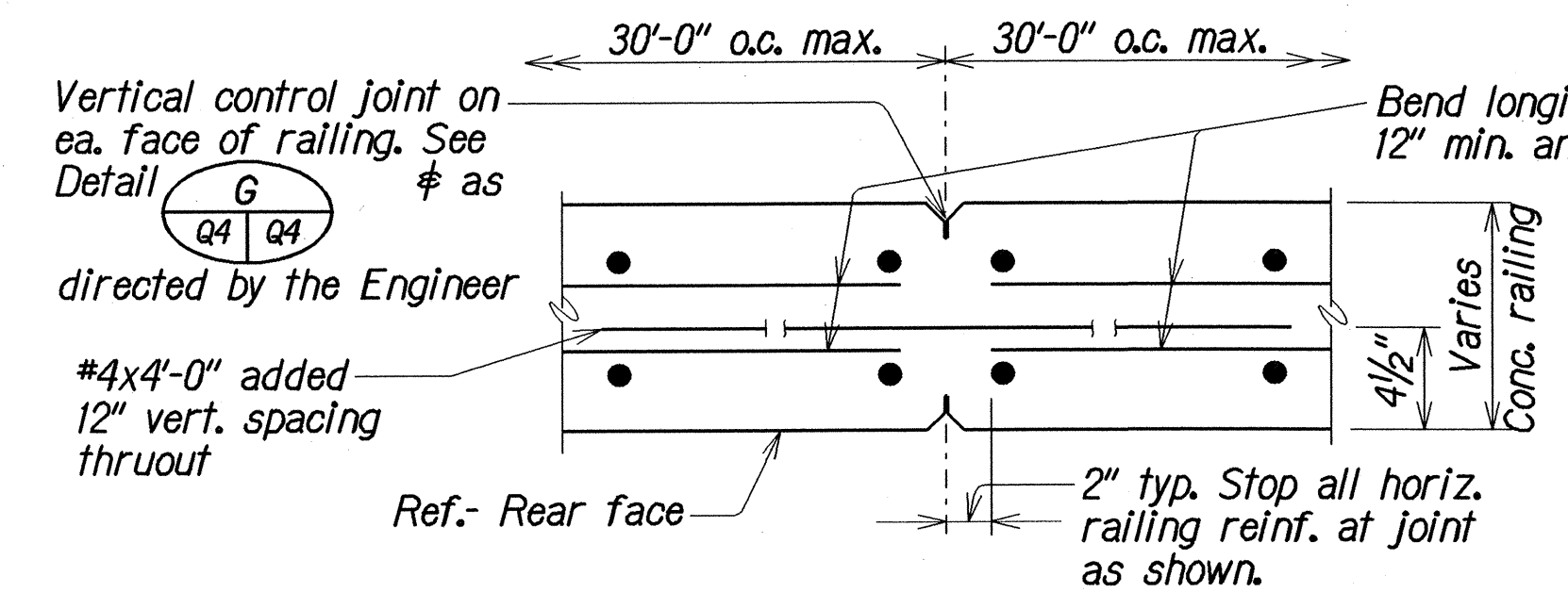
SECTION E
Q4 Q4

CONCRETE RAILING DETAILS AT LIGHT STANDARD

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

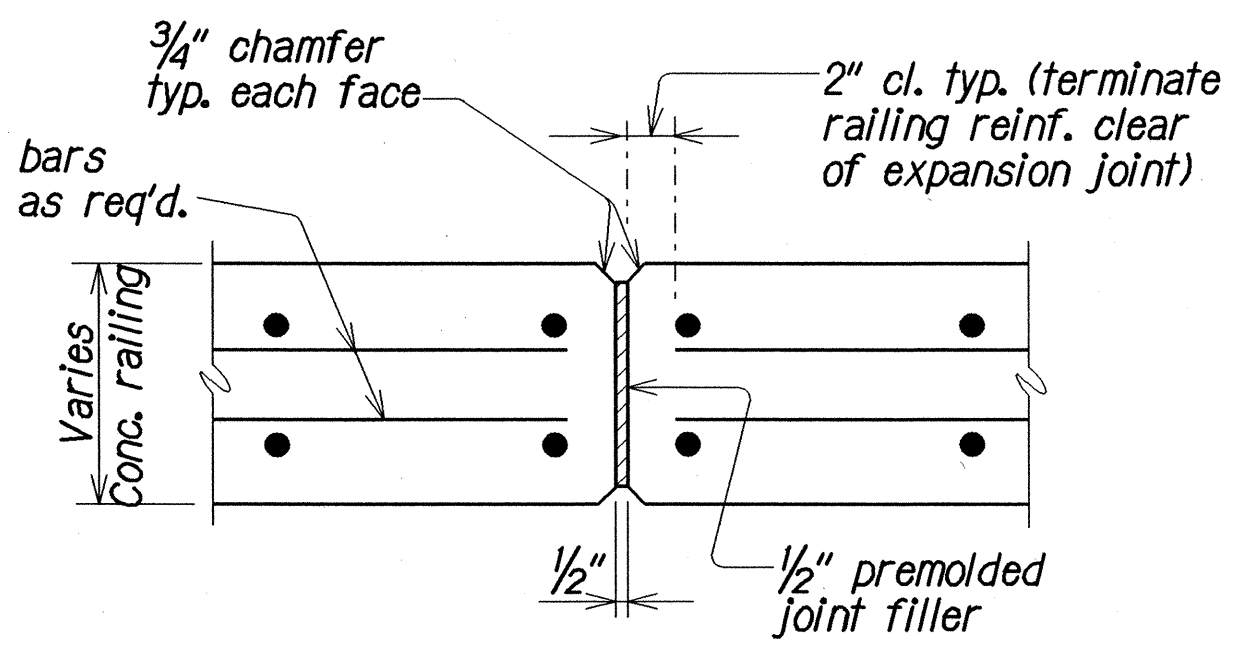
CONCRETE RAILING DETAILS

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

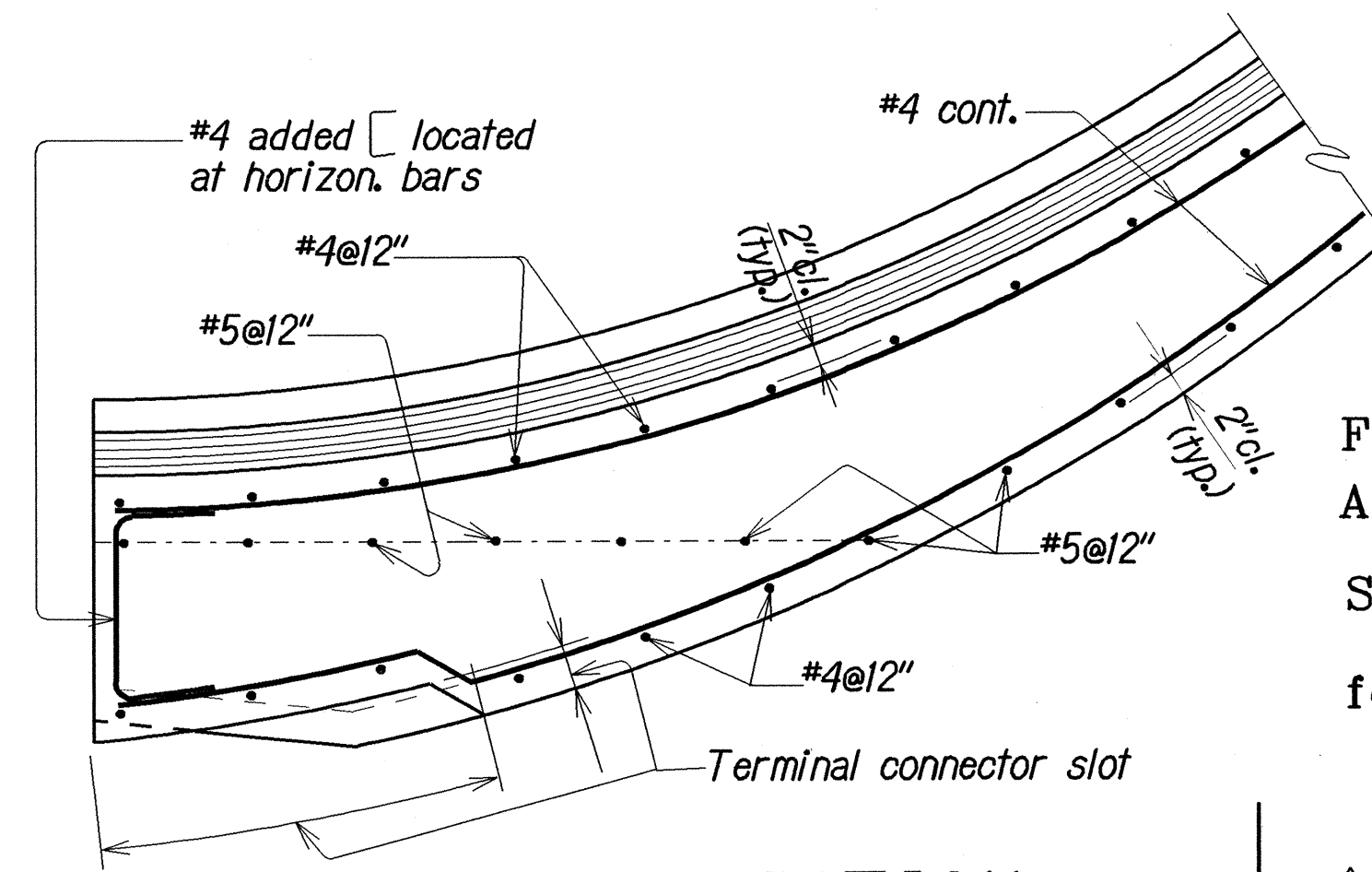


(STA. 4+90± & STA. 5+50±)
AT CONTROL JOINT
Scale: 1 1/2" = 1'-0"

NOTE:
Chip concrete to accommodate light standard anchor bolt, if necessary.



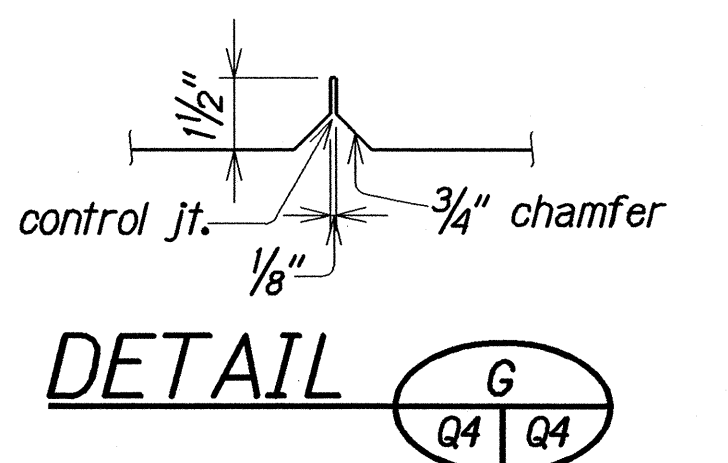
(STA. 4+60± & STA. 5+20±)
AT EXPANSION JOINT
Scale: 1 1/2" = 1'-0"



SECTION F
Q3 Q4
Scale: 3/4" = 1'-0"

For the end post at Red Hill Access Rd. Sta. 5+ 80, Rt. See Section F1 for other locations.

Added note, approximate location of existing conduit and conduit for highway lighting.



DETAIL G
Q4 Q4

STATE OF HAWAII
DEPARTMENT OF TRANSPORTATION
HIGHWAYS DIVISION

RED HILL SEPARATION IMPROVEMENTS
CONCRETE RAILING DETAILS AND SECTIONS
CONCRETE RAILING DETAILS AT LIGHT STANDARD
MOANALUA FREEWAY RAMP RESURFACING
Vicinity of Ala Kapuna to Vicinity of Ala Napunani
Federal Aid Project No. STP-H20(3)

Scale: As Noted Date: Sept. 1998

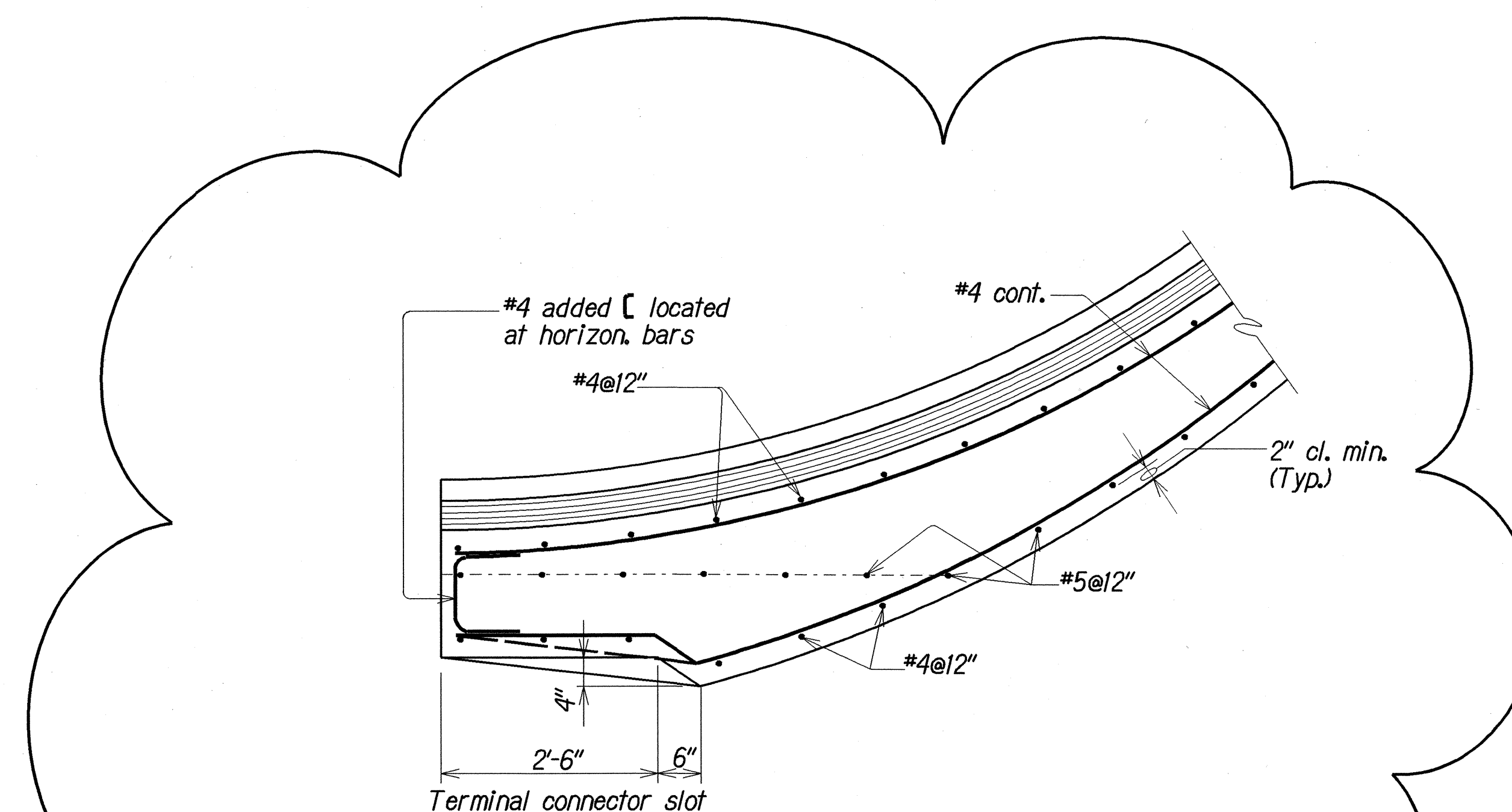
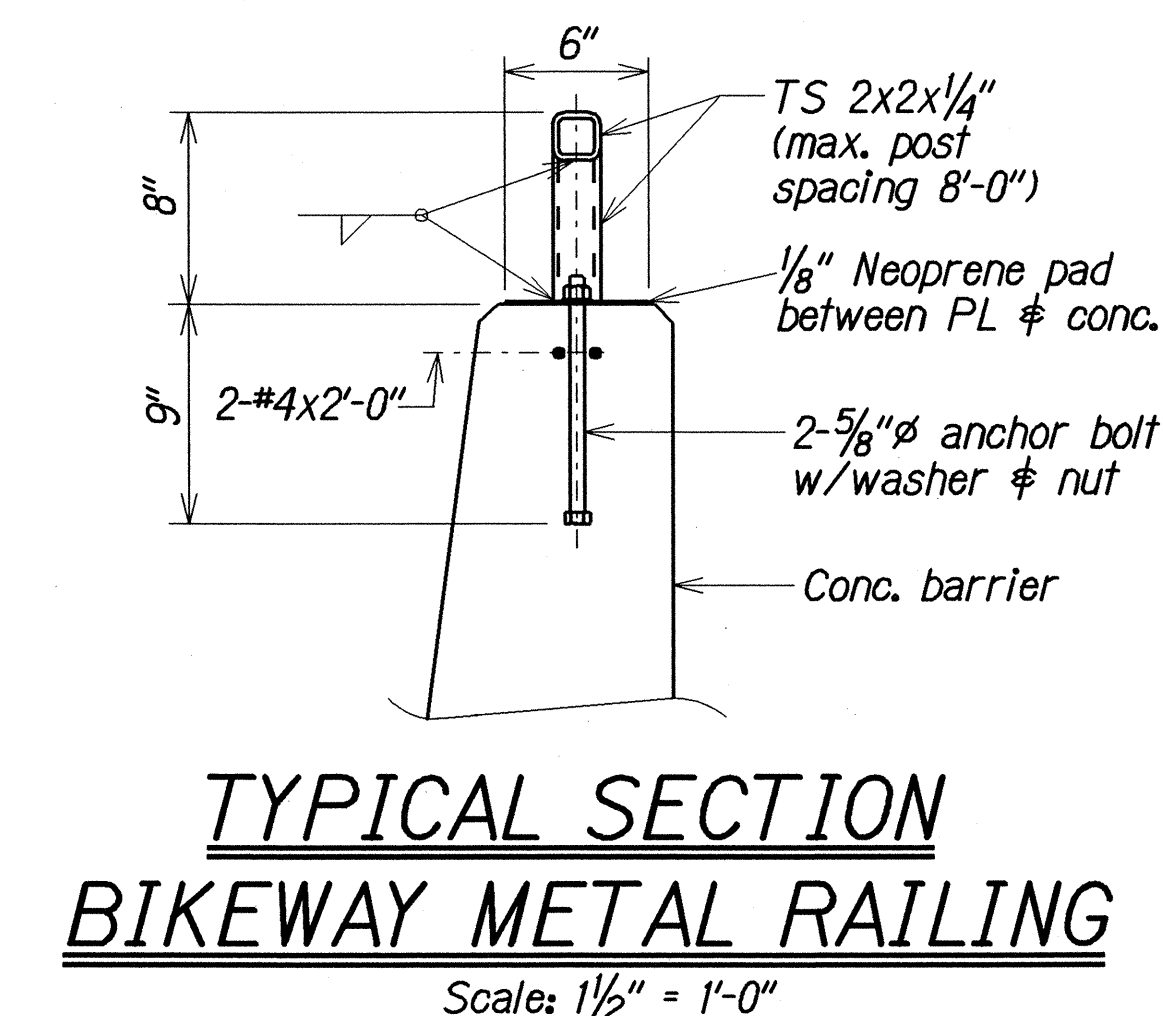
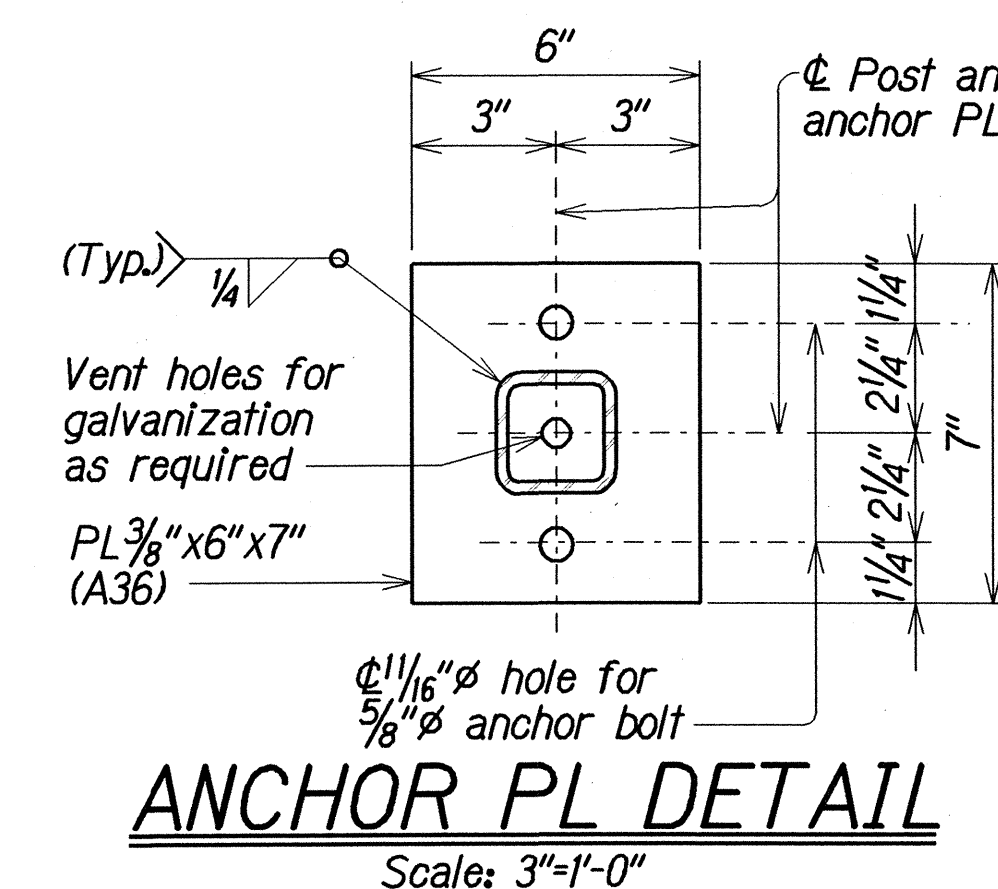
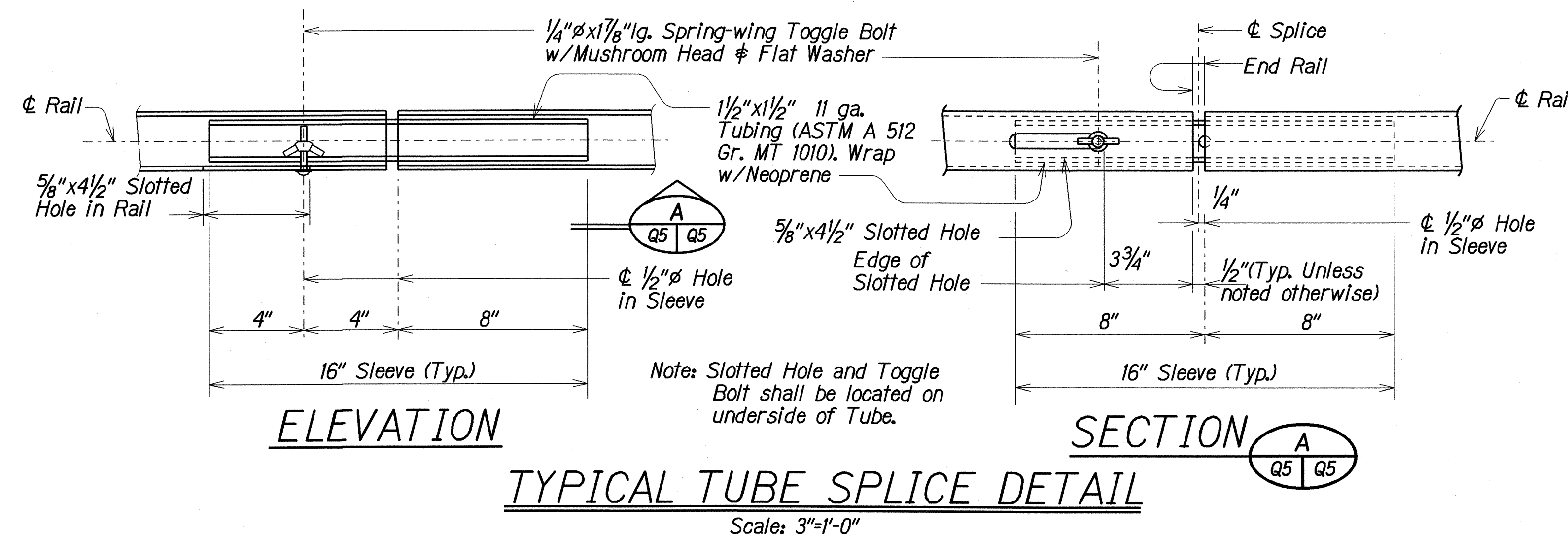
SHEET No. Q4 OF 11 SHEETS

"AS-BUILT"

ADD. 33

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DESIGNED BY	MA
DRAWN BY	MA
CHECKED BY	MA
NOTED BY	MA
DATE	10/1/98
DESIGNED BY	MA
DRAWN BY	MA
CHECKED BY	MA
NOTED BY	MA

FED. ROAD DIST. NO.	STATE	PROJ. NO.	FISCAL YEAR	SHEET NO.	TOTAL SHEETS
HAWAII	HAW.	STP-H20(3)	1999	34	51



This detail prepared during "As-Built" posting.

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	Double line for as-built deletion
	Text for as-built posting

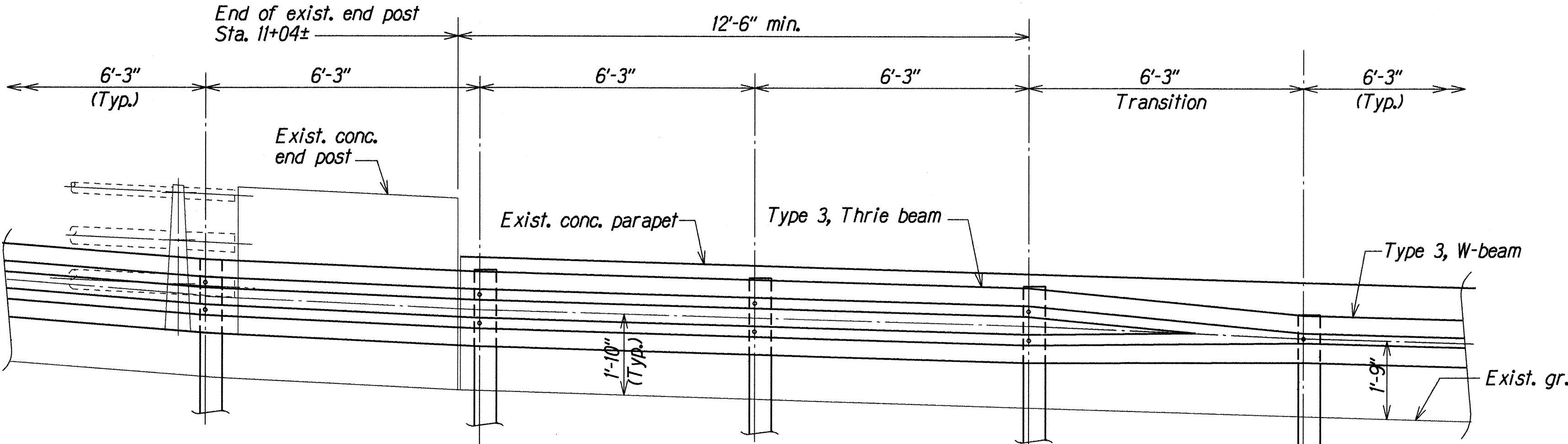
STATE OF HAWAII DEPARTMENT OF TRANSPORTATION HIGHWAYS DIVISION
RED HILL SEPARATION IMPROVEMENTS
TYPICAL TUBE SPLICE DETAIL
ANCHOR PLATE DETAIL
MOANALUA FREEWAY RAMPS RESURFACING Vicinity of Ala Kapuna to Vicinity of Ala Napunani Federal Aid Project No. STP-H20(3)
Scale: As Noted Date: Sept. 1998

SHEET No. Q5 OF 11 SHEETS

"AS-BUILT"

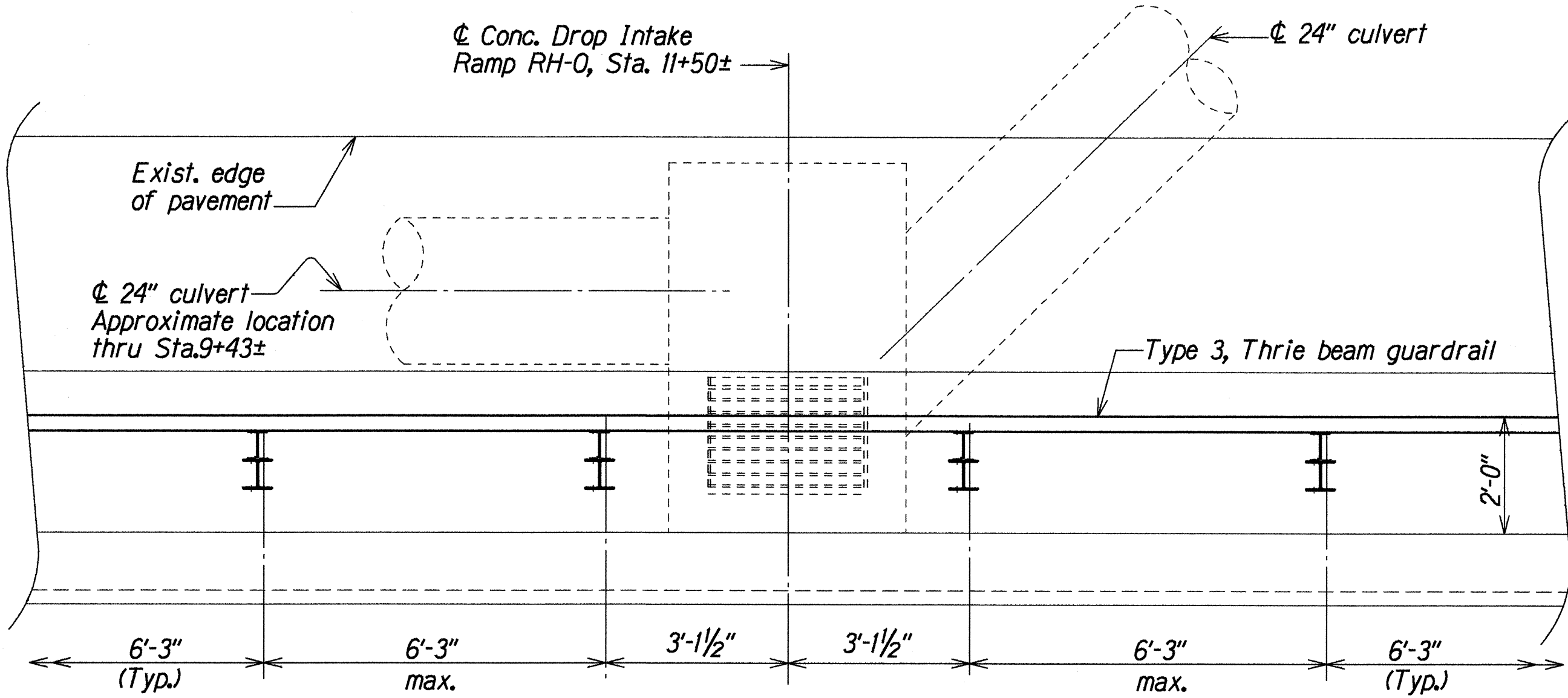
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FED. ROAD DIST. NO.	STATE	PROJ. NO.	FISCAL YEAR	SHEET NO.	TOTAL SHEETS
HAWAII	HAW.	STP-H20(13)	1999	35	51



GUARDRAIL TRANSITION DETAIL - RAMP RH-0

DETAIL A
Scale: 1/2" = 1'-0" Q2 Q6



GUARDRAIL DETAIL AT C.D.I. - RAMP RH-0

DETAIL B
Scale: 1/2" = 1'-0" Q2 Q6

ORIGINAL PLAN	DATE	1/1/1998
NOTED BY	DATE	1/1/1998
DESIGNED BY	DATE	1/1/1998
CHECKED BY	DATE	1/1/1998
NO. 41000006		

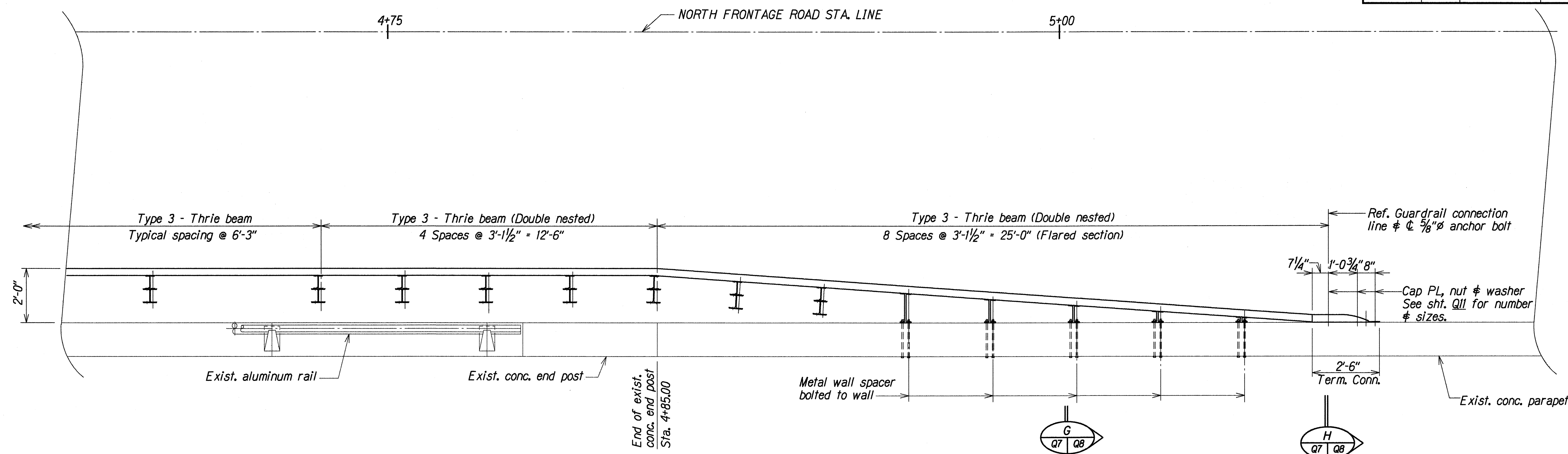
STATE OF HAWAII
DEPARTMENT OF TRANSPORTATION
HIGHWAYS DIVISION

RED HILL SEPARATION IMPROVEMENTS
DETAIL A AND DETAIL B
MOANALUA FREEWAY RAMP RESURFACING
Vicinity of Ala Kapuna to Vicinity of Ala Napunani
Federal Aid Project No. STP-H20(13)

Scale: As Noted
Date: Sept. 1998

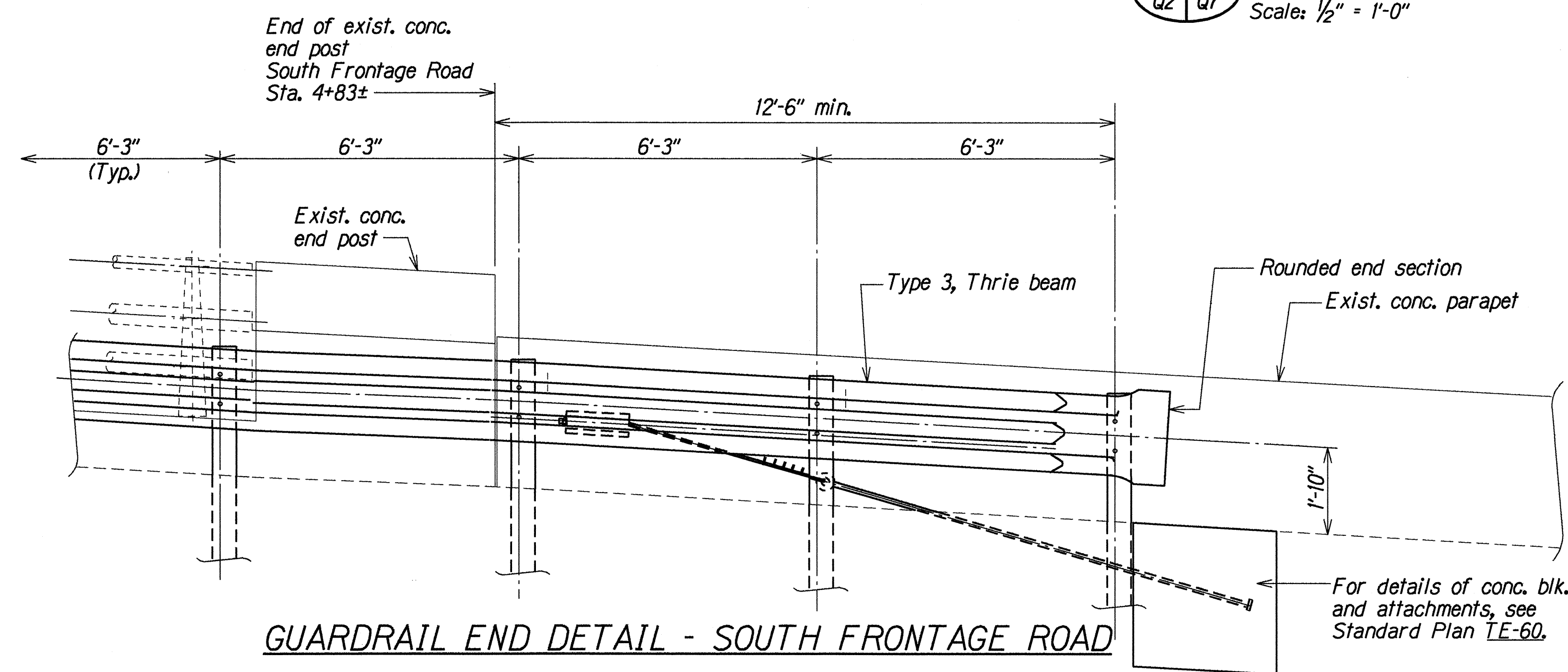
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FED. ROAD DIST. NO.	STATE	PROJ. NO.	FISCAL YEAR	SHEET NO.	TOTAL SHEETS
HAWAII	HAW.	STP-H20(13)	1999	36	51



GUARDRAIL FLARE DETAIL

C
Q2 Q7 Scale: 1/2" = 1'-0"



GUARDRAIL END DETAIL - SOUTH FRONTAGE ROAD

D
Q2 Q7 Scale: 1/2" = 1'-0"

ORIGINAL PLAN	DATE
SURVEY PLOTTED BY LMA	May 1992
DRAWN BY JH	May 1992
DESIGNED BY JH	May 1992
CHECKED BY JH	May 1992
NO. 41000007	

STATE OF HAWAII
DEPARTMENT OF TRANSPORTATION
HIGHWAYS DIVISION

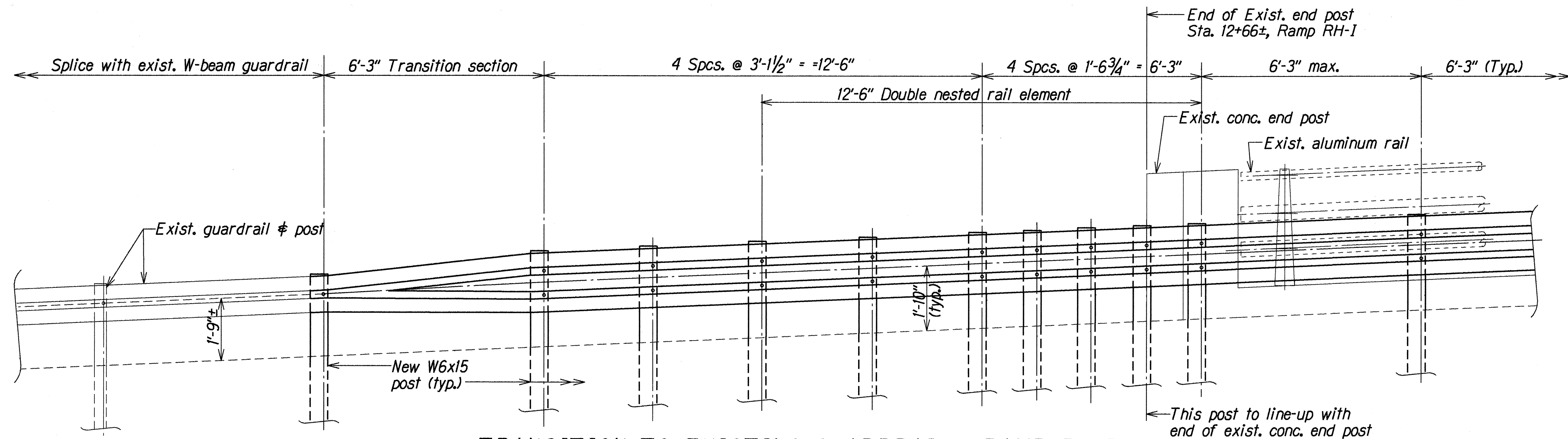
RED HILL SEPARATION IMPROVEMENTS
DETAIL C AND DETAIL D

MOANALUA FREEWAY RAMP RESURFACING
Vicinity of Ala Kapuna to Vicinity of Ala Napunani
Federal Aid Project No. STP-H20(13)

Scale: As Noted Date: Sept. 1998

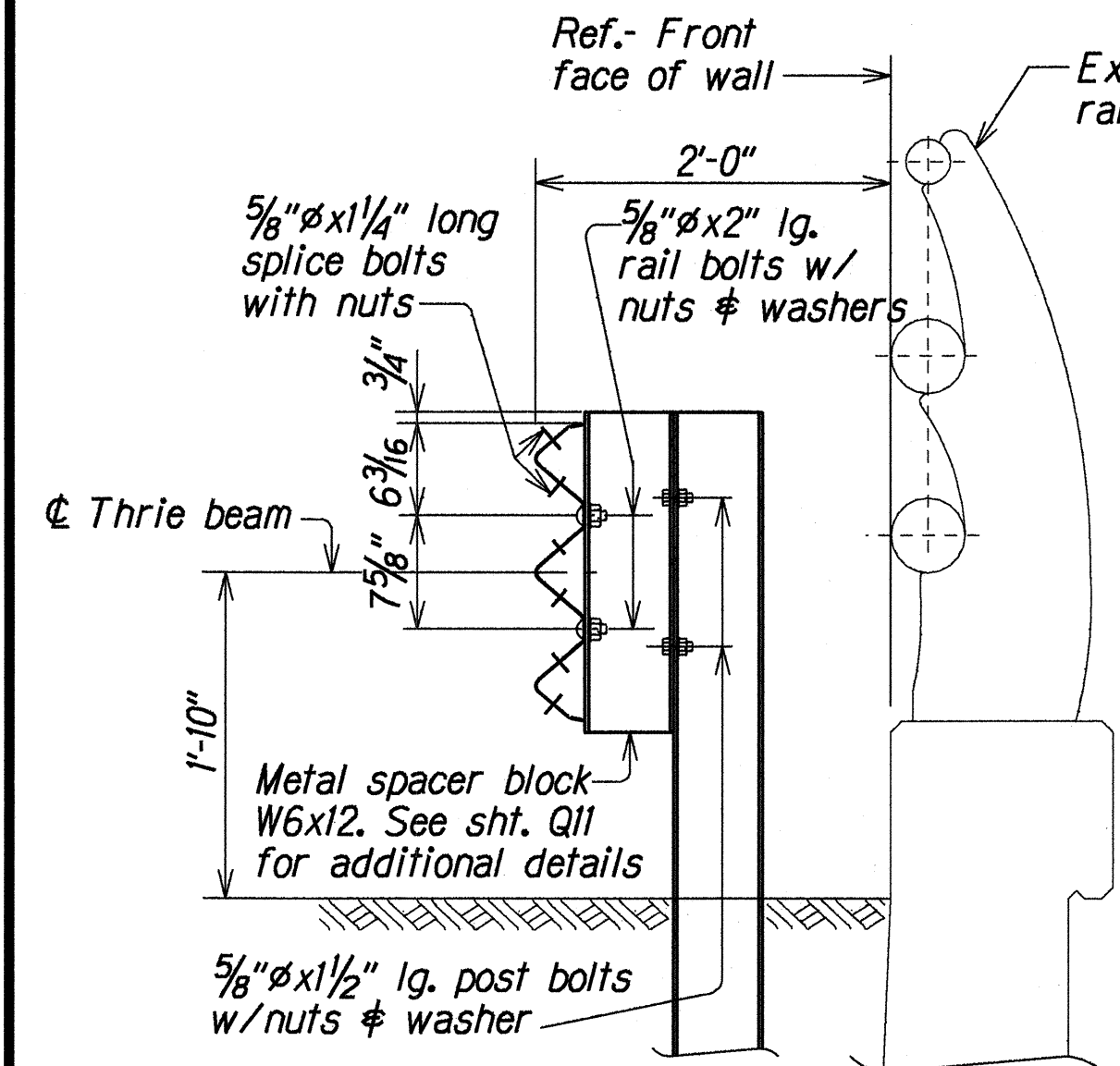
SHEET No. Q7 OF 11 SHEETS

FED. ROAD DIST. NO.	STATE	PROJ. NO.	FISCAL YEAR	SHEET NO.	TOTAL SHEETS
HAWAII	HAW.	STP-H201(3)	1999	37	51

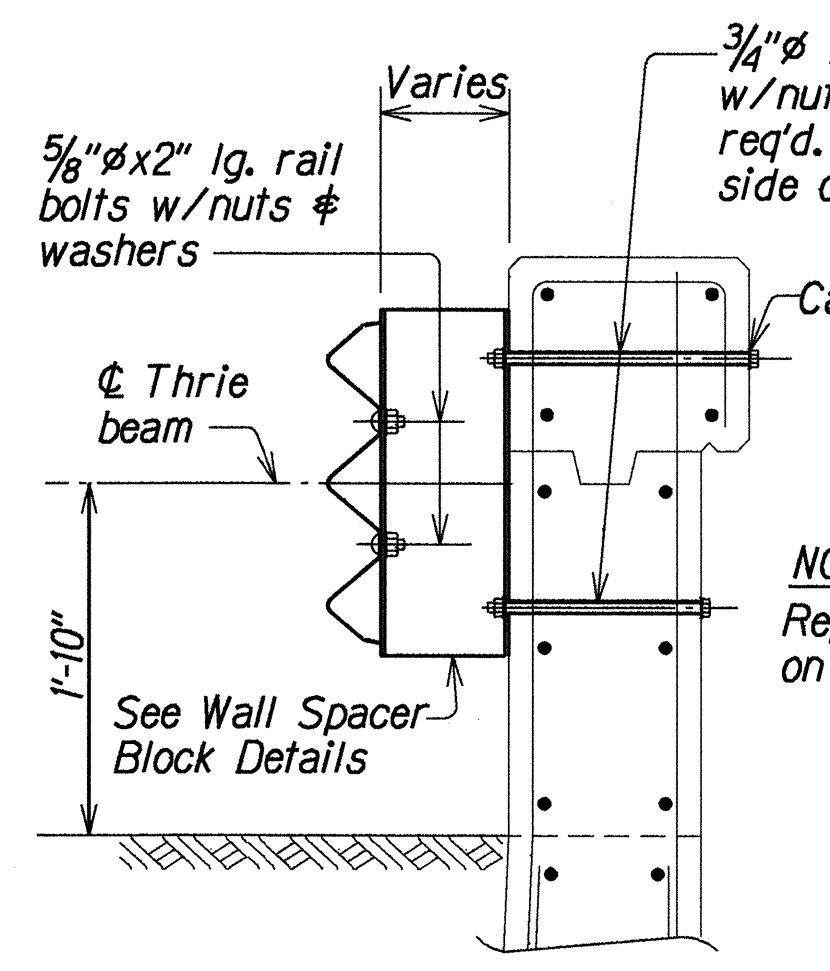


TRANSITION TO EXISTING GUARDRAIL - RAMP RH-1

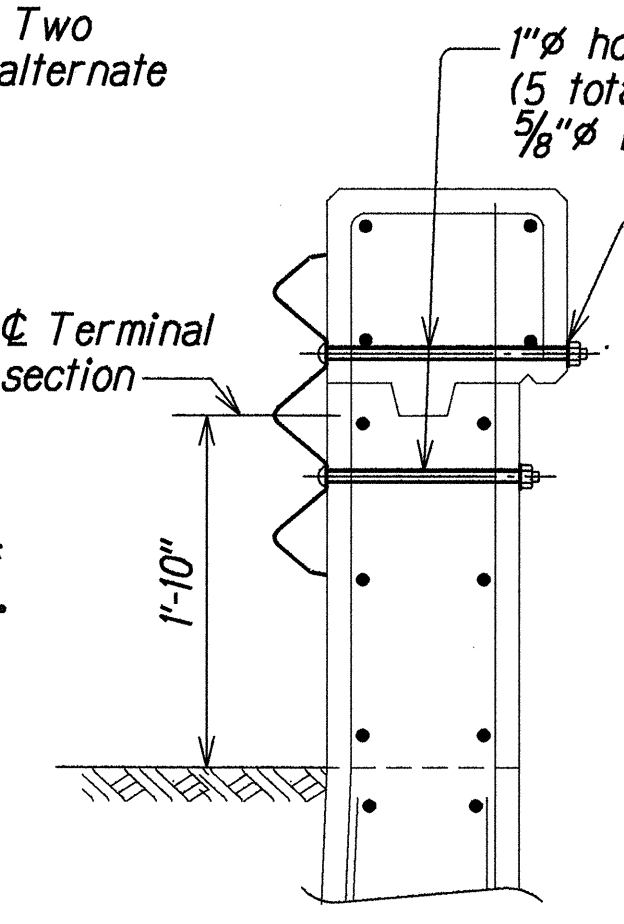
DETAIL E
Scale: 1/2" = 1'-0"



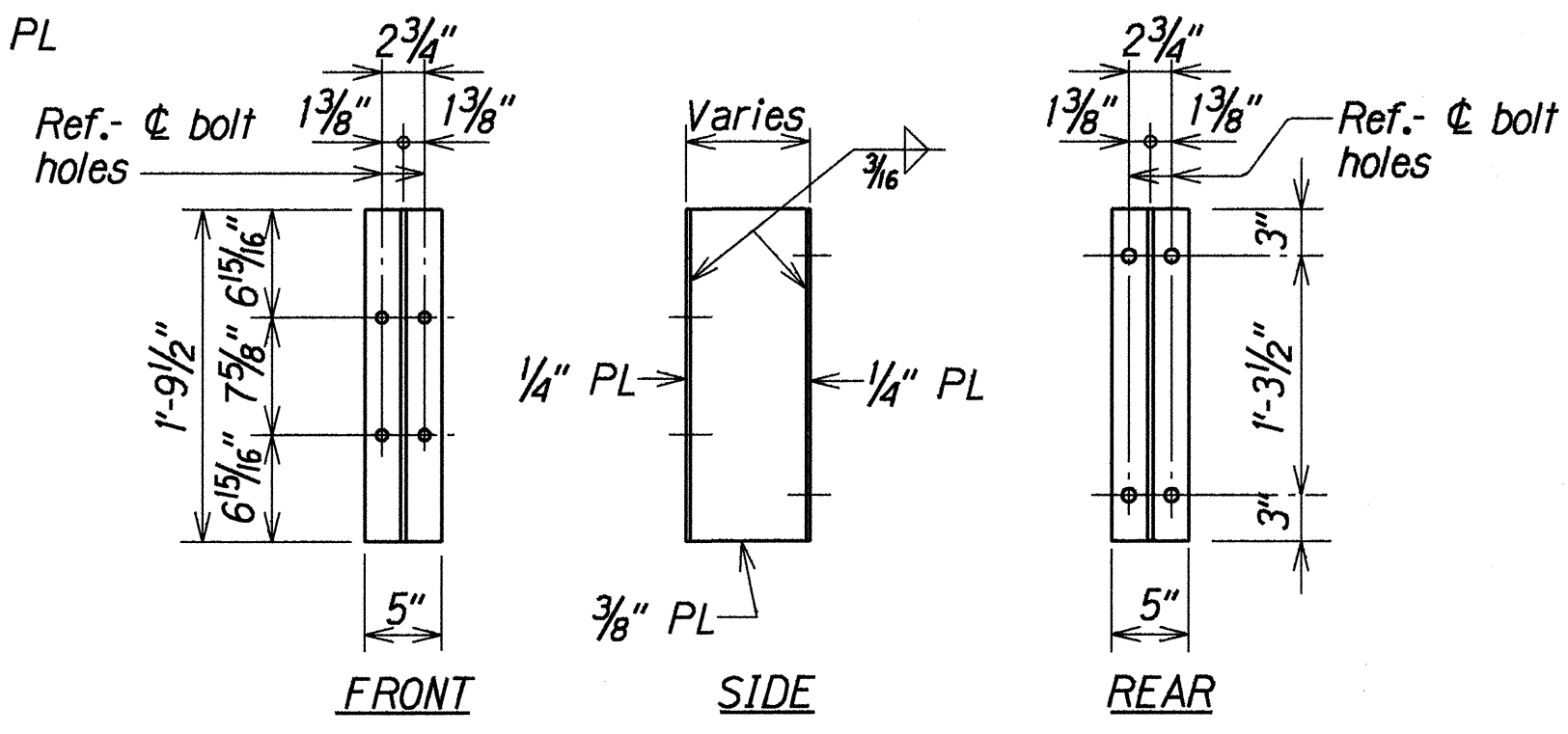
SECTION F
Scale: 1" = 1'-0"



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



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



WALL SPACER BLOCK DETAILS
Scale: 1" = 1'-0"

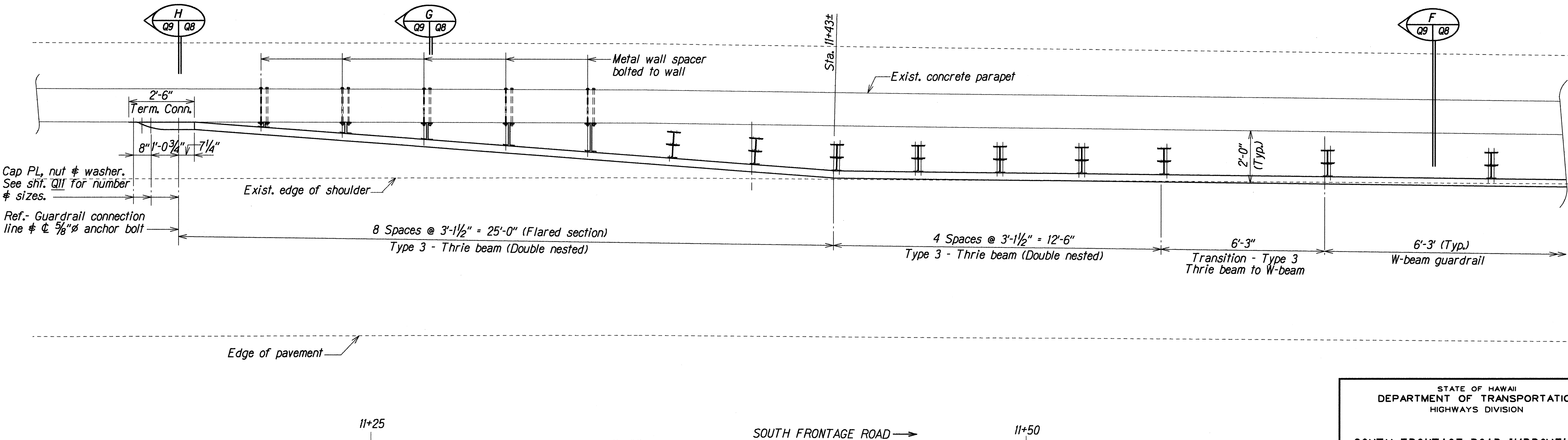
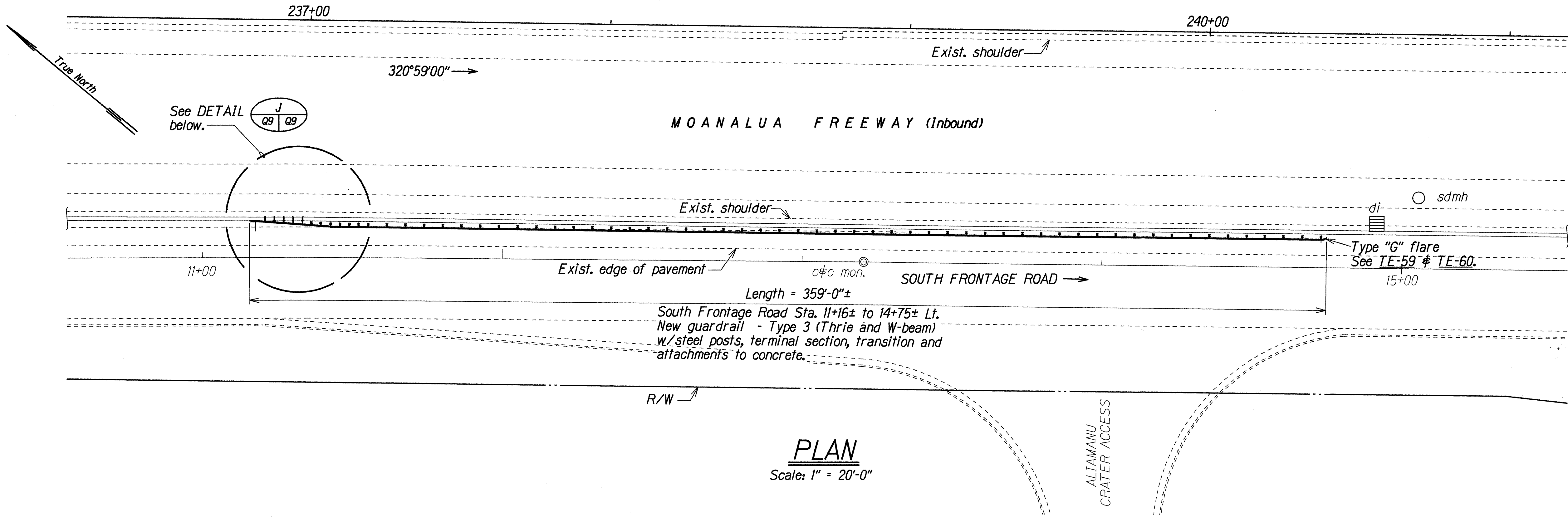
ORIGINAL PLAN	DATE
DESIGNED BY	1/1/1998
CHECKED BY	1/1/1998
NOTED BY	1/1/1998
APPROVED BY	1/1/1998

STATE OF HAWAII
DEPARTMENT OF TRANSPORTATION
HIGHWAYS DIVISION

RED HILL SEPARATION IMPROVEMENTS
DETAIL E, SECTIONS & WALL SPACER BLOCK DETAILS
MOANALUA FREEWAY RAMP RESURFACING
Vicinity of Ala Kapuna to Vicinity of Ala Napunani
Federal Aid Project No. STP-H201(3)

Scale: As Noted
Date: Sept. 1998

FED. ROAD DIST. NO.	STATE	PROJ. NO.	FISCAL YEAR	SHEET NO.	TOTAL SHEETS
HAWAII	HAW.	STP-H20(3)	1999	38	51



ORIGINAL PLAN	DATE
NOTED BY	MA
DESIGNED BY	MA
CHECKED BY	MA
DATE	MA

STATE OF HAWAII
DEPARTMENT OF TRANSPORTATION
HIGHWAYS DIVISION

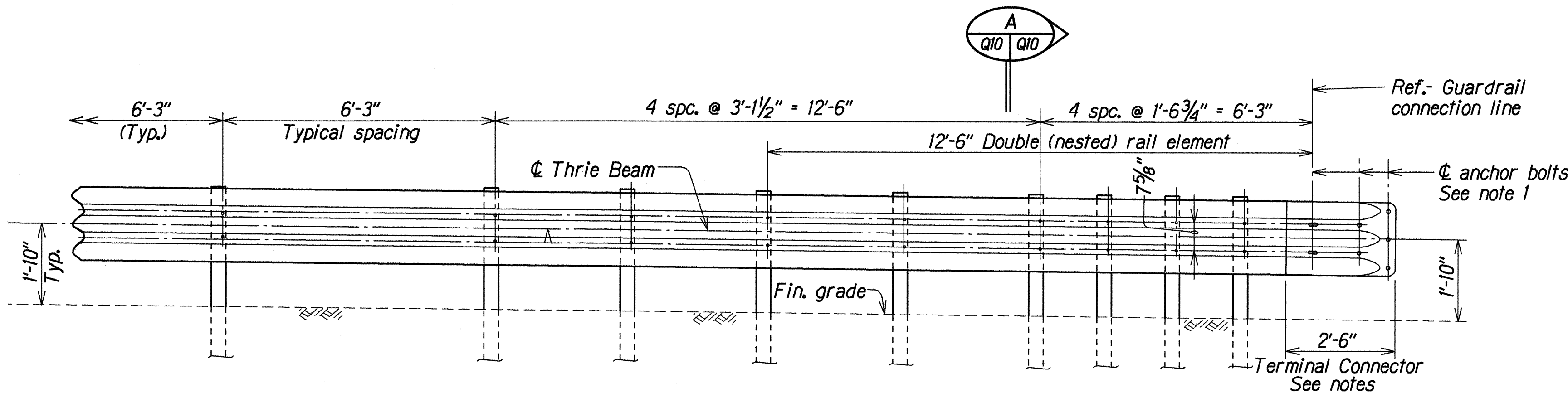
SOUTH FRONTAGE ROAD IMPROVEMENTS
PLAN AND DETAIL J
MOANALUA FREEWAY RAMP RESURFACING
Vicinity of Ala Kapuna to Vicinity of Ala Napunani
Federal Aid Project No. STP-H20(3)
Scale: As Noted Date: Sept. 1998

SHEET No. Q9 OF 11 SHEETS

FED. ROAD DIST. NO.	STATE	PROJ. NO.	FISCAL YEAR	SHEET NO.	TOTAL SHEETS
HAWAII	HAW.	STP-H20(13)	1999	39	51

NOTES:

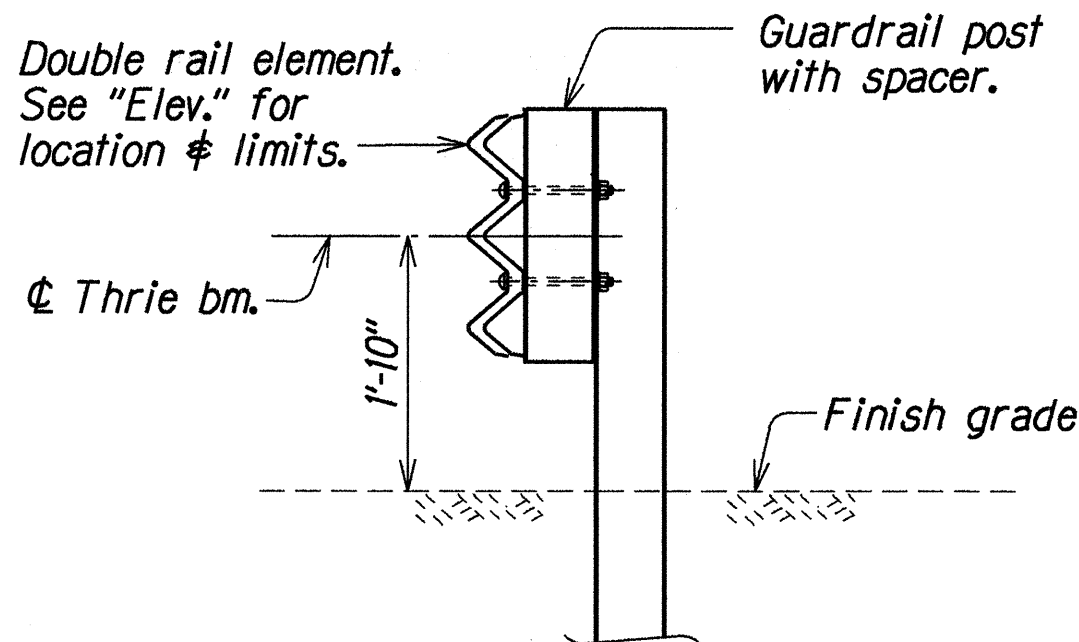
1. The work necessary to connect guardrail to concrete end post shall include all labor, materials, tools, equipment and incidentals necessary to complete the work and shall be incidental to Item No. 606.3230, Guardrail Type 3 Thrie Beam on Steel Post and will not be paid for separately.
2. All anchor bolts shall be high strength bolts conforming to the requirements of ASTM A 325 and Standard Specification, Section 713.04.
3. Anchor bolt length shall be such that a snug fit of the elements and full thread engagement plus 1/4" (max) is attained.
4. "Terminal Connector" shall be fabricated from 10 gauge steel conforming to the requirements of AASHTO M 180.
5. "Terminal Connector" and standard spacer, including all anchor bolts, cap PL, nuts and washers, shall be hot-dip galvanized after fabrication.
6. Cap PL shall be fabricated from ASTM A 36.
7. Where double (nested) beam occur, 12" "Back-up Plate" not required.
8. Heads of through bolts shall be placed on the traffic side of the rail.
9. Drilling of through holes shall be done in such a manner as to prevent cone puncturing of the daylighting end.



ELEVATION

TYPICAL TYPE 3 THRIE BEAM METAL GUARDRAIL CONNECTION TO CONCRETE RAIL

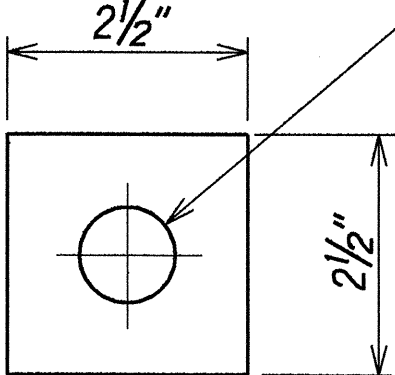
Scale: 1/2"=1'-0"



SECTION

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

Hole centered in 1/2" thick steel PL (bolt size + 1/8") Galvanize after fabrication



CAP PLATE DETAIL

Scale: 6" = 1'-0"

ORIGINAL PLAN	DESIGNED BY	DATE
NOTED BY	DESIGNED BY	DATE
CHECKED BY	DESIGNED BY	DATE
NO. 41000000	DESIGNED BY	DATE

STATE OF HAWAII
DEPARTMENT OF TRANSPORTATION
HIGHWAYS DIVISION

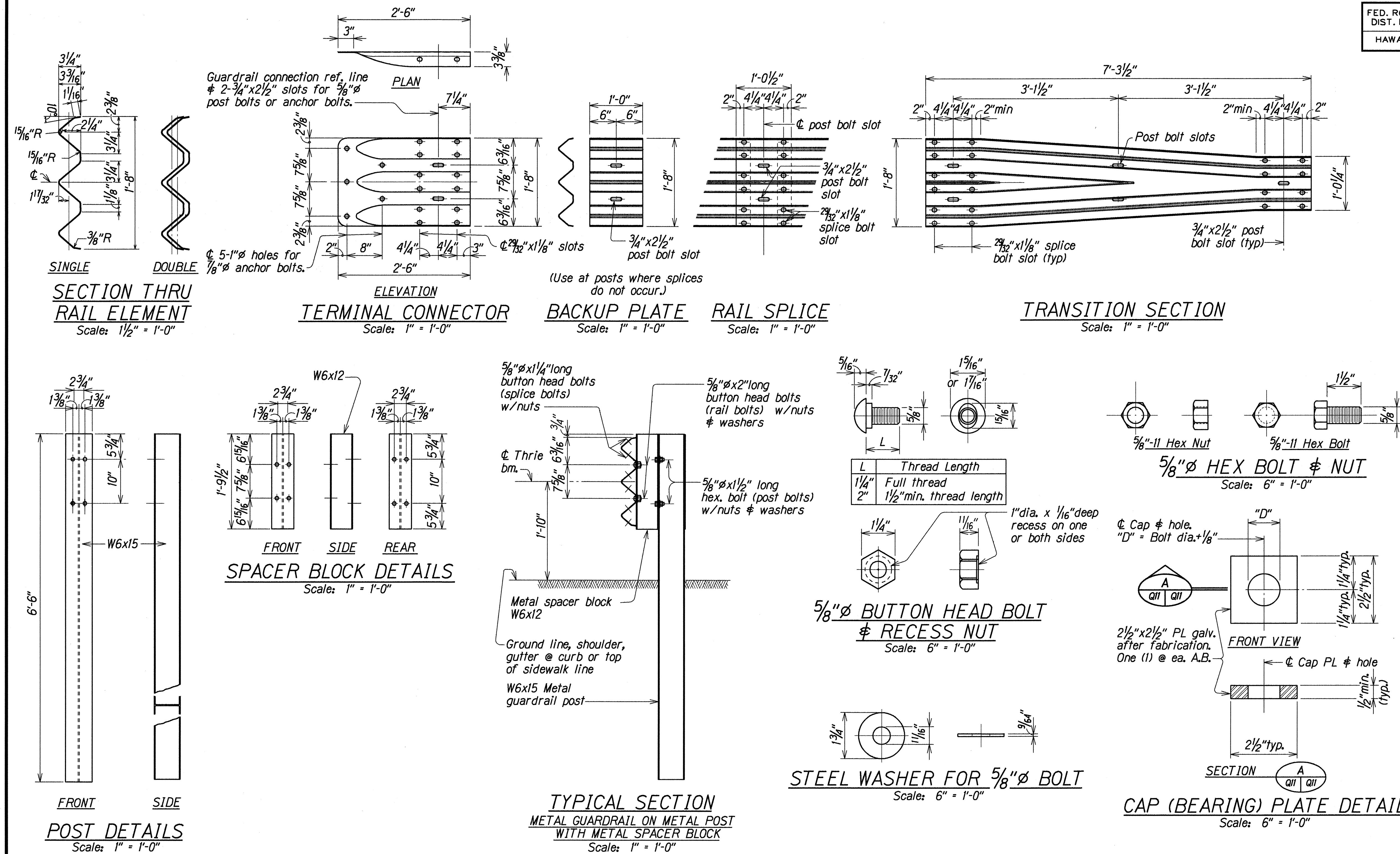
RED HILL SEPARATION IMPROVEMENTS
METAL GUARDRAIL DETAILS
MOANALUA FREEWAY RAMPS RESURFACING
Vicinity of Ala Kapuna to Vicinity of Ala Napunani
Federal Aid Project No. STP-H20(13)

Scale: As Noted
Date: Sept. 1998

FED. ROAD DIST. NO.	STATE	PROJ. NO.	FISCAL YEAR	SHEET NO.	TOTAL SHEETS
HAWAII	HAW.	STP-H20(13)	1999	40	51

NOTES:

1. For details not shown, see "DOT Standard Plan" Sht. #TE-57.



METAL GUARDRAIL TYPE 3 THRIE BEAM AND APPURTENANCES DETAILS

ORIGINAL PLAN	DATE	DESIGNED BY	CHECKED BY
NOTE BOOK	10/1/97	SK	SK
DESIGNED BY	10/1/97	SK	SK
CHECKED BY	10/1/97	SK	SK
DATE	10/1/97	SK	SK
DESIGNED BY	10/1/97	SK	SK
CHECKED BY	10/1/97	SK	SK

STATE OF HAWAII
DEPARTMENT OF TRANSPORTATION
HIGHWAYS DIVISION

RED HILL SEPARATION IMPROVEMENTS
METAL GUARDRAIL TYPE 3 THRIE BEAM AND APPURTENANCES DETAILS
MOANALUA FREEWAY RAMP RESURFACING
Vicinity of Ala Kapuna to Vicinity of Ala Napunani
Federal Aid Project No. STP-H20(13)

Scale: As Noted Date: Sept. 1998

SHEET No. 40 OF 51 SHEETS