FED. ROAD DIST. NO.	STATE	FED. AID PROJ. NO.	FISCAL YEAR	SHEET NO.	TOTAL SHEETS
HAWAII	HAW.	IM-NH-H1-1(239)	2001	36	103

STRUCTURAL NOTES

CONCRETE

1. Concrete shall be Class A (3,000 psi), unless otherwise noted
2. Minimum clear coverage of concrete over outer reinforcing bars shall be as follows, unless otherwise noted.

Concrete poured directly against earth	3" clear
All others	2" clear

3. Concrete admixtures containing chloride salts shall not be used.
4. All roughened surfaces in concrete shall be made with a minimum amplitude of 1/4"
5. Except as otherwise noted on drawings, all exterior corners and re-entrant angles 90 degrees or less in concrete work shall be chamfered 3/4"x3/4".

REINFORCING STEEL

1. Reinforcing bars shall be ASTM A-615 Grade 40 for #3 and #4 and Grade 60 for #5 and larger. Contractor option to use all Grade 60 bars providing the same number, size and spacing is provided.
2. All reinforcing bars, anchor bolts, dowels and other embedded items are to be securely tied in place before concrete pour.
3. All reinforcing bar bends shall be made cold.

STRUCTURAL STEEL AND GUARDRAILS

1. All structural steel shall conform to ASTM A-36.
2. All structural steel for guardrail shall be hot dip galvanized after fabrication. All holes shall be prepunched before galvanizing. See Standard Specifications and Special Provisions.
3. All anchor bolts and other hardware including nuts and washers which connect steel to concrete shall conform to AASHTO M 164 and be hot dip galvanized in accordance with ASTM A153. Tighten MI64 bolts snug tight condition.
4. All welds shall be in conformity with the ANSI/AASHTO/AWS D1.5 Bridge Welding Code. Electrodes for A36 and A500 shall be E70.
5. W-beam guardrail and splices shall confirm to Class A AASHTO M180, (12 GAGE) Type II. For guardrail on bridge deck, see notes on sheets Q-1 through Q-3.
6. All existing guardrails, posts, terminal ends, etc associated with the existing guardrails shall be removed. Removal work considered incidental.
8. New guardrails shall generally replace the existing in terms of locations, and lengths, extend as indicated on guardrail schedule on Sheet S-2.

CONCRETE DECK REPAIRS

1. Crack and spall repairs shall conform to details as shown, and according to special provisions.

INDEX TO DRAWINGS

ORIGINAL PLAN
NOTEBOOK No.
SURVEY PLOTTED BY
DRAWN BY
TRACED BY
DESIGNED BY
QUANTITIES BY
CHECKED BY
DATE

NORMAN K. NAGAMINE LICENSED PROFESSIONAL ENGINEER NO. 5479-S HAWAII, U.S.A

Norman K. Nagamine

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STATE OF HAWAII
DEPARTMENT OF TRANSPORTATION
HIGHWAYS DIVISION

NOTES AND INDEX TO DRAWINGS

INTERSTATE ROUTE H-1
Palailai Interchange Reconstruction
F.A.I. Project No. IM-NH-H1-1(239)

Scale: As Shown Date: 4/1/01

SHEET NO. S-1 OF 12 SHEETS

FED. ROAD DIST. NO.	STATE	FED. AID PROJ. NO.	FISCAL YEAR	SHEET NO.	TOTAL SHEETS
HAWAII	HAW.	IM-NH-H1-1(239)	2001	37	103

GUARDRAIL SCHEDULE

SHEET NO.	LOCATION	STATION FROM	STATION TO	EXISTING GUARDRAIL TO BE REMOVED * (Lin. Ft.)	NEW STRONG POST (W-BEAM) GUARDRAIL* * (Lin. Ft.)	NEW GUARDRAIL END TREATMENTS LEAD	NEW GUARDRAIL END TREATMENTS TRAIL	REMARKS
13, 15	Ramp "A" (Left side)	Ramp "A" Sta 2+20L (Ramp "C" Sta 3+05R)	Ramp "A" Sta 9+45L	750	700	3 Bay Quadguard System (See S-10)	Type G End Treatment (See S-7) w/Buffer End	Strong Post (W-Beam) Double Guardrail at Trail End; See (S-9)
13	Ramp "A" (Right side)	Ramp "A" Sta 0+35R	Ramp "A" Sta 2+30R	150	200	Connect to exist guardrail post to remain	Type G Flare (See S-7) Flare 25-Foot Trail End 12:1	
13	Ramp "B" (Left side)	Ramp "B" Sta 5+70L	Ramp "B" Sta 9+00L (Kalaeloa Blvd. Sta 2+10R)	330	295	Connect to exist guardrail post approx 100' from end of exist SRT-350	Connect to guardrail from Kalaeloa Blvd	
13, 15	H-1 Inbound, Ramp "B" and Kalaeloa Blvd. (Right side)	H-1 Sta 187+00R	Kalaeloa Blvd Sta 4+30R	2,200	2,225	FLEAT 350 - (See S-8)	Type G Flare (See S-7) Flare 25-Foot Trail End 12:1	
13	Ramp "C" (West side)	Ramp "C" Sta 6+50R	Ramp "C" Sta 3+05R (Ramp "A" Sta 2+20L)	445	445 * * *	Construct Concrete End Post with Terminal Connection (See Sheet Q5)	3 Bay Quadguard at Ramp "A" Left side (See S-10)	
13	Ramp "C" and Kalaeloa Blvd North of Palailai I.C. Bridge (West side)	Ramp "C" Sta 2+80L	Kalaeloa Blvd Sta (-) 1+10R	490	460	FLEAT 350 - (See S-8)	Connect to Palailai I.C. Bridge West Railing (See Sheet Q2)	
13	Kalaeloa Blvd South of Palailai I.C. Bridge (West side)	Kalaeloa Blvd Sta 1+08R	Kalaeloa Blvd Sta 2+10R (Ramp "B" Sta 9+00L)	100	150	Connect to Palailai I.C. Bridge West Railing (See Sheet Q2)	Extend guardrail 70' + connect to Ramp "B" (Left side)	
13	Kalaeloa Blvd South of Palailai Interchange Bridge (East side)	Kalaeloa Blvd Sta 1+19L	Kalaeloa Blvd Sta 5+05L O/S 30'± L	210	360	3-Bay Quadguard System (See S-10)	Connect to Palailai I.C. Bridge East Railing (See Sheet Q3)	
13	Kalaeloa Blvd North of Palailai I.C. Bridge (East side)	Kalaeloa Blvd Sta (-) 5+05 (Farrington Hwy Sta 4+50R)	Kalaeloa Blvd Sta (-) 1+10L	425	425	Connect to Palailai I.C. Bridge East Railing (See Sheet Q3)	Connect to exist guardrail post at junction of Farrington Hwy	
9, 10, 11, 12	Ramp "C1", Palailai Weaving Lanes and Ramp "F" (Right side)	Ramp "C1" Sta 1+40R	Ramp "F" Sta 16+70R O/S 20'R	2,805	3,625	FLEAT 350 - (See S-8)	FLEAT 350 - (See S-8)	Strong Post Rubrail (W-Beam) Guardrail for Light Post at Ramp C1 Sta 6+05L (See S-5)
11	Ramp "F" (Left side)	Ramp "F" Sta 4+85L	Ramp "F" Sta 7+45L	275	225	FLEAT 350 - (See S-8)	Type G Flare (See S-7) Flare 25-Foot Trail End 12:1	See Sheet S-9 for Culvert Crossing at Sta 6+52L
9	Ramp "C1" (Left side)	Ramp "C1" Sta 4+20L O/S 30'± L	Ramp "C1" Sta 6+72L	0	235	3-Bay Quadguard System (See S-10)	Type G Flare (See S-7) Flare 25-Foot Trail End 15:1	
10	On Ramp (Left Side)	On Ramp Sta 1+10L O/S 18'± L	On Ramp Sta 2+44L O/S 18'± L	25	100	9-Bay Quadguard System (See S-10)	Type G End Treatment (See Sheet S-7) w/Buffer End	Strong post (W-Beam) Guardrail
10	H-1 Inbound (Right Side)	H-1 Inbound Sta 57+22R O/S 58'± R	H-1 Inbound Sta 58+56 R O/S 58'± R	25	100	9-Bay Quadguard System (See S-10)	Type G End Treatment (See Sheet S-7) w/Buffer End	Strong Post Rubrail (W-Beam) Guardrail (See Sheet S-5)

Notes:

* Includes End Treatment

* * Excludes End Lead Treatment

* * * Includes Concrete End Post

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HIGHWAYS DIVISION

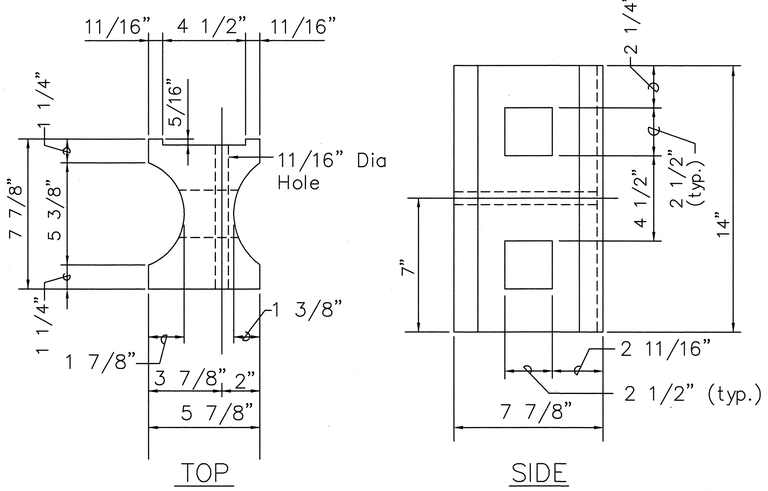
GUARDRAIL SCHEDULE

INTERSTATE ROUTE H-1
Palailai Interchange Reconstruction
F.A.I. Project No. IM-NH-H1-1(239)

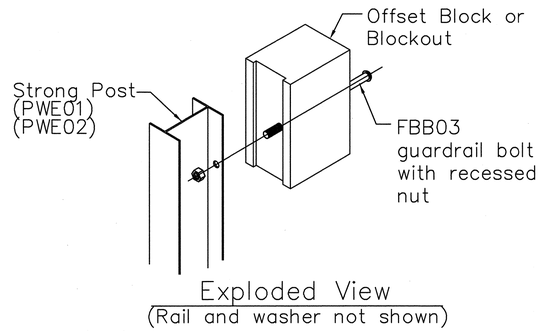
Scale: As Shown Date: 4/1/01

SHEET NO. S-2 OF 12 SHEETS

FED. ROAD DIST. NO.	STATE	FED. AID PROJ. NO.	FISCAL YEAR	SHEET NO.	TOTAL SHEETS
HAWAII	HAW.	IM-NH-H1-1(239)	2001	ADD38	103

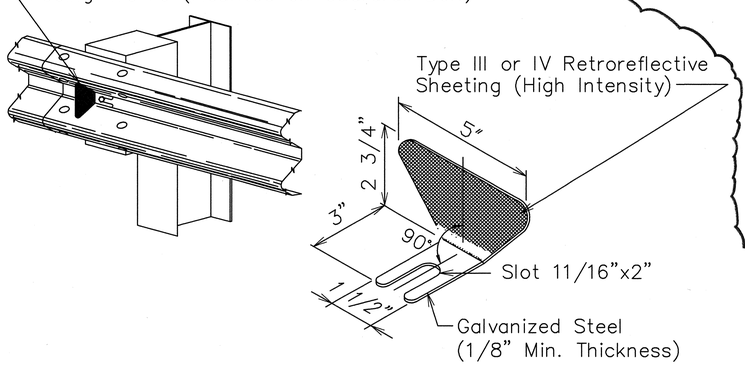


RECYCLED PLASTIC BLOCKOUT (TYPE I)

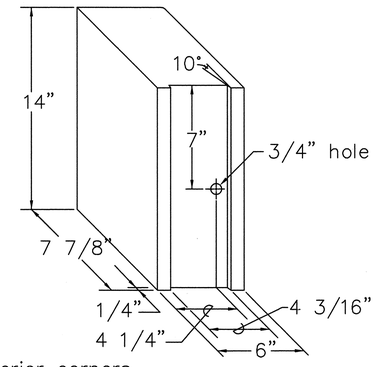


Exploded View
(Rail and washer not shown)

STEEL POST AND BLOCK DETAIL

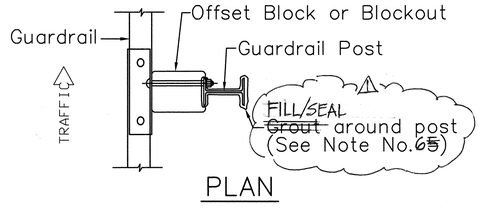


REFLECTOR MARKER (RM-5) DETAIL AND TYPICAL INSTALLATION

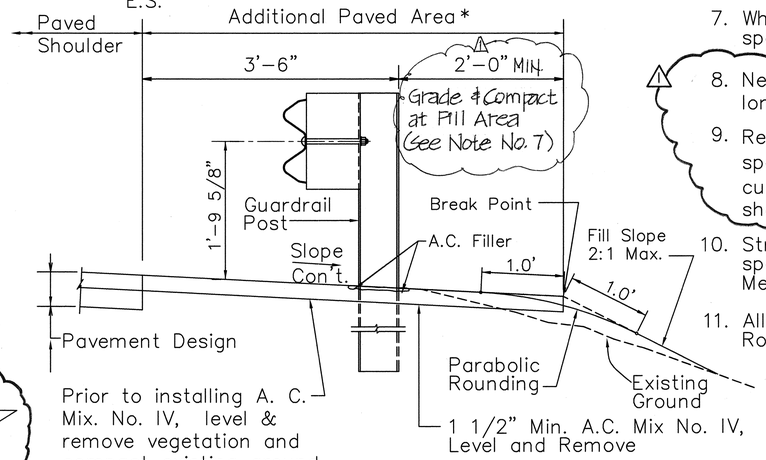


All exterior corners 1/2" radius

RECYCLED POLYETHELENE OFFSET BLOCK (TYPE II)



PLAN



ELEVATION

* - For paved area at guardrail, refer to typical sections.

TYPICAL GUARDRAIL INSTALLATION

GENERAL NOTES

1. All hardware, posts and fasteners shall be hot-dip zinc coated galvanized after fabrication. No punching, drilling or cutting will be permitted after galvanizing.
2. Where conditions require, special post lengths in increments of 6 inches may be specified.
3. All fasteners, posts, and rail elements (i.e. FBB03, PWE01, RWM02b, 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 fasteners, posts and rail elements have been converted from metric units into their present form.
4. The Recycled Plastic Block or Offset Block shall be approved by the State.
5. All new guardrail systems (system consist of total length of guardrail including both end treatments) shall include the additional paved area.
6. After the guardrail posts are installed in the paved area, the Contractor shall fill/seal around each guardrail post and all cracks in the paved area 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 filling/sealing. All costs associated with this work shall not be paid for separately, but shall be considered incidental to the various guardrail items.
7. When standards for the fill slope area cannot be met, a site specific, engineer approved design may be used.
8. New A.C. pavement at guardrails shall extend 6 feet longitudinally beyond terminal ends.
9. Reflector Markers (RM-5) mounted on guardrails shall be spaced every 200 feet. Spacing of RM-5's on horizontal curves shall comply with Table III-1 of the MUTCD. RM-5's shall not be installed on terminal sections.
10. Strong Post with W Beam Guardrail is referred to on the plans, specifications and proposal schedule as Type 3 - Single Metal Beam Guardrail.
11. All guardrail flare rates shall be in accordance with AASHTHO Roadway Design Guide, January 1996.

DATE	REVISION
6/20/01	UPDATED NOTES AND DETAILS AND ADDED REFLECTOR MARKER PER ADDENDUM NO. 1

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DEPARTMENT OF TRANSPORTATION
HIGHWAYS DIVISION

STRONG POST GUARDRAIL DETAILS AND NOTES

INTERSTATE ROUTE H-1
Palailai Interchange Reconstruction
F.A.I. Project No. IM-NH-H1-1(239)

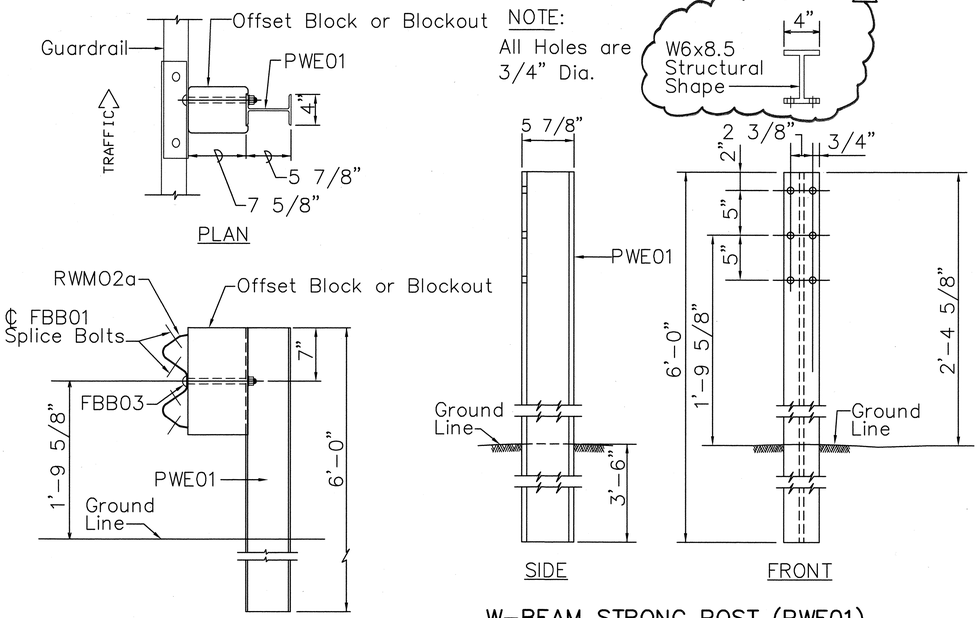
Scale: As Shown Date: 4/1/01

SHEET NO. S-3 OF 12 SHEETS

ADD38

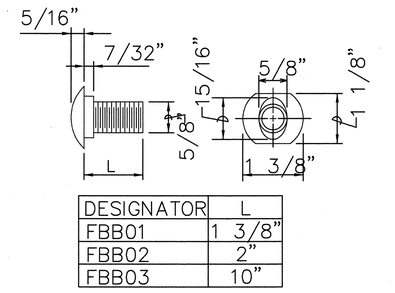
ORIGINAL PLAN | NOTEBOOK | No. | DESIGNED BY | TRACED BY | DRAWN BY | CHECKED BY | QUANTITIES BY | SURVEY PLOTTED BY | DATE

FED. ROAD DIST. NO.	STATE	FED. AID PROJ. NO.	FISCAL YEAR	SHEET NO.	TOTAL SHEETS
HAWAII	HAW.	IM-NH-H1-1(239)	2001	ADD39	103

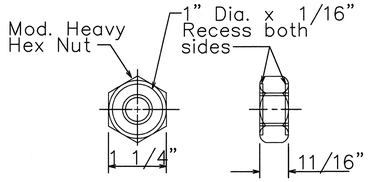


STRONG POST W-BEAM GUARDRAIL (SGR04a)

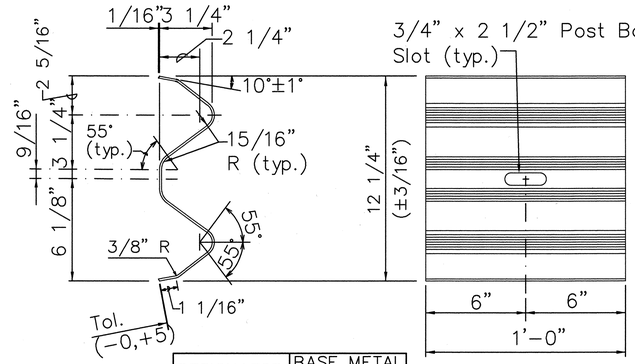
W-BEAM STRONG POST (PWE01)



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

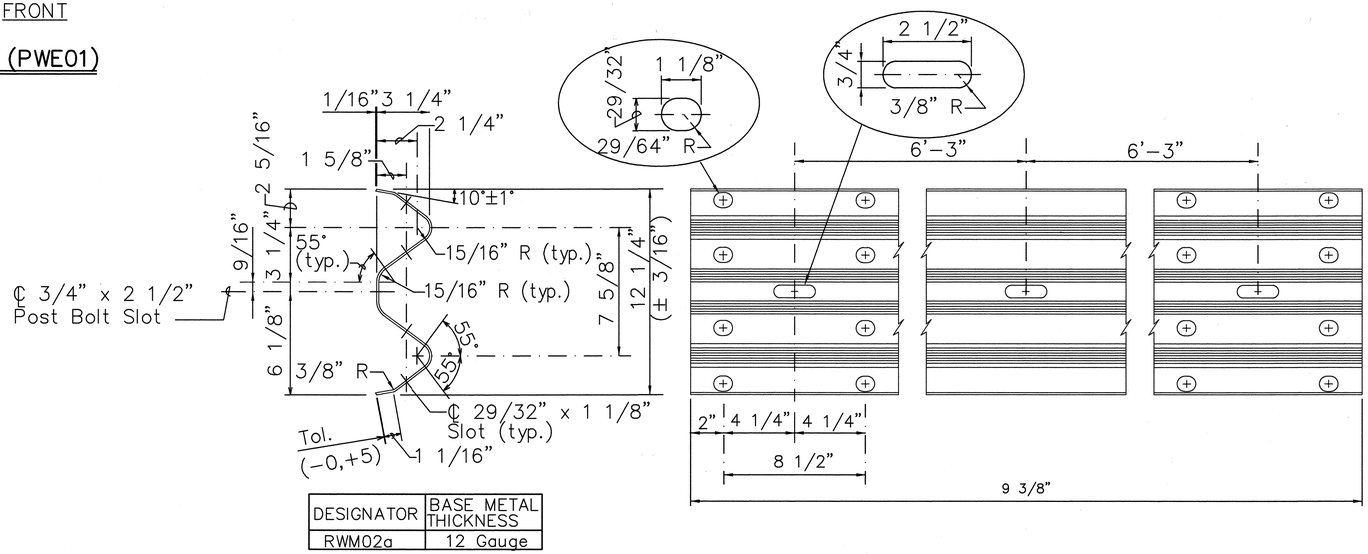


GUARDRAIL BOLTS AND RECESSED NUT



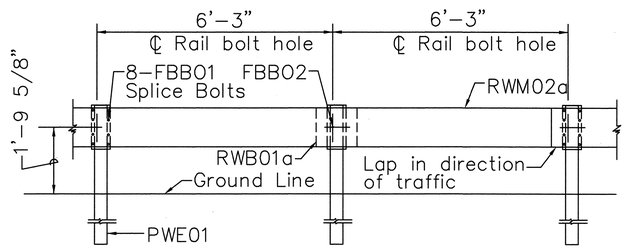
DESIGNATOR	BASE METAL THICKNESS
RWB01a	12 Gauge

W-BEAM BACK-UP-PLATE (RWB01a)



DESIGNATOR	BASE METAL THICKNESS
RWM02a	12 Gauge

2 SPACE W-BEAM GUARDRAIL (RWM02a)



ELEVATION

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

DATE	REVISION
6/20/01	REVISED W-BEAM STRONG POST

STATE OF HAWAII
DEPARTMENT OF TRANSPORTATION
HIGHWAYS DIVISION

STRONG POST W-BEAM GUARDRAIL

INTERSTATE ROUTE H-1
Palailai Interchange Reconstruction
F.A.I. Project No. IM-NH-H1-1(239)

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SHEET NO. S-4 OF 12 SHEETS

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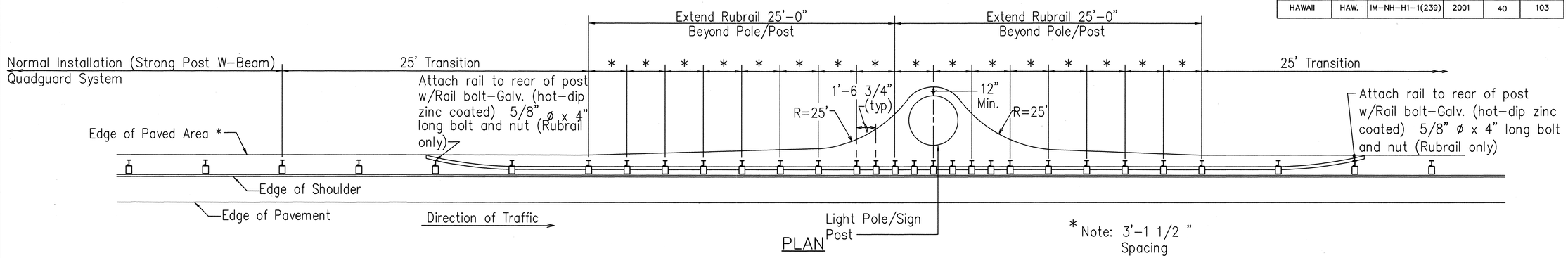
FED. ROAD DIST. NO.	STATE	FED. AID PROJ. NO.	FISCAL YEAR	SHEET NO.	TOTAL SHEETS
HAWAII	HAW.	IM-NH-H1-1(239)	2001	40	103



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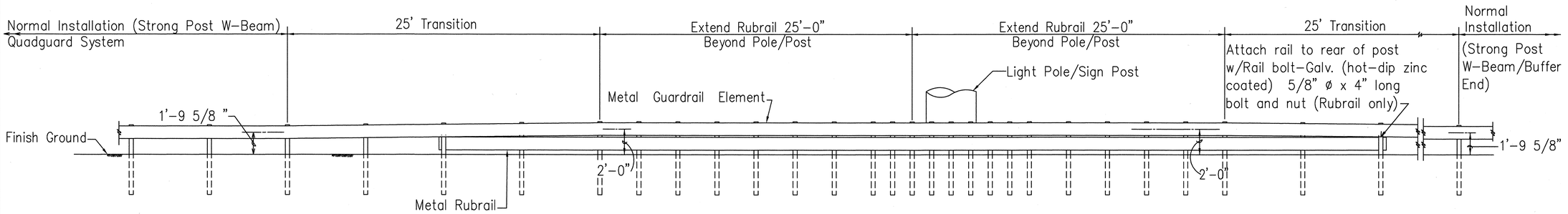
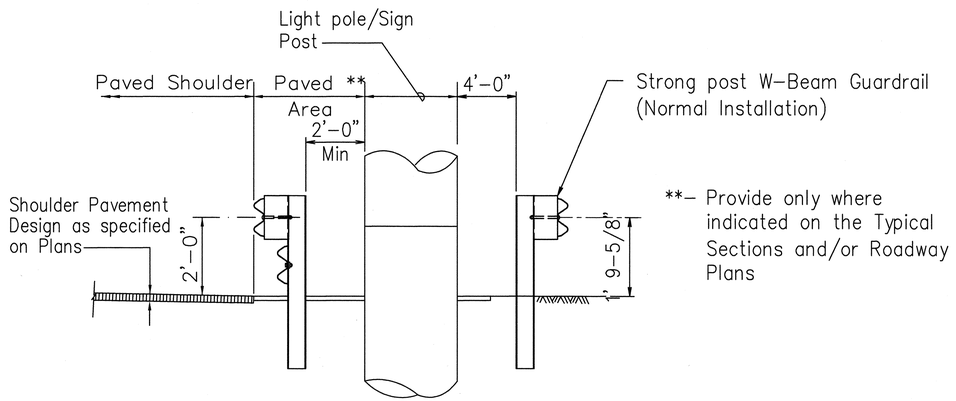


ELEVATION



TYPICAL SECTION AT OBSTRUCTION

DETAIL OF GUARDRAIL INSTALLATION AT OBSTRUCTION

ORIGINAL PLAN	SURVEY PLOTTED BY	DATE
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HIGHWAYS DIVISION

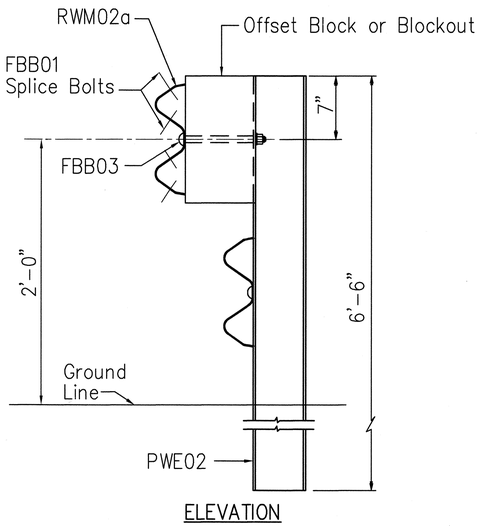
DETAIL OF GUARDRAIL AT OBSTRUCTION

INTERSTATE ROUTE H-1
Palailai Interchange Reconstruction
F.A.I. Project No. IM-NH-H1-1(239)

Scale: As Shown Date: 4/1/01

SHEET NO. S-5 OF 12 SHEETS

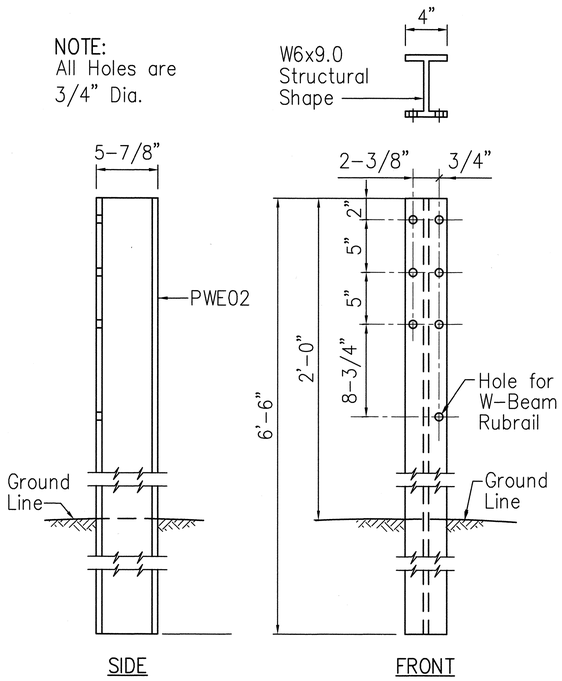
FED. ROAD DIST. NO.	STATE	FED. AID PROJ. NO.	FISCAL YEAR	SHEET NO.	TOTAL SHEETS
HAWAII	HAW.	IM-NH-H1-1(239)	2001	41	103



ELEVATION

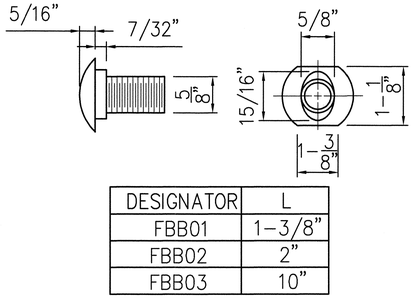
STRONG POST RUBRAIL (W-BEAM) GUARDRAIL

NOTE:
All Holes are
3/4" Dia.

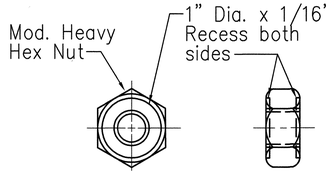


SIDE FRONT

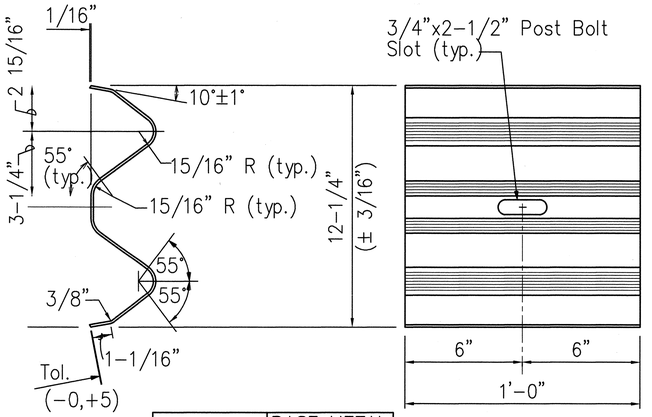
W-BEAM STRONG POST (PWE02)



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

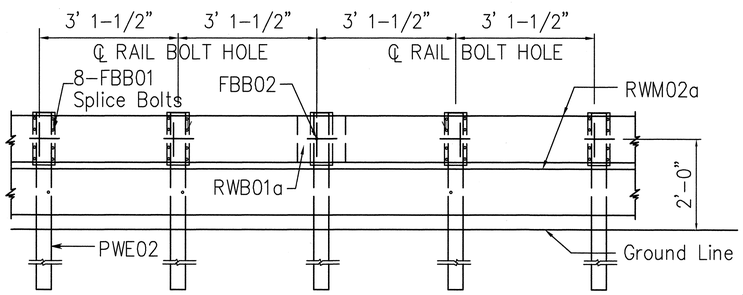


GUARDRAIL BOLTS AND RECESSED NUT



DESIGNATOR	BASE METAL THICKNESS
RWB01a	12 Gauge

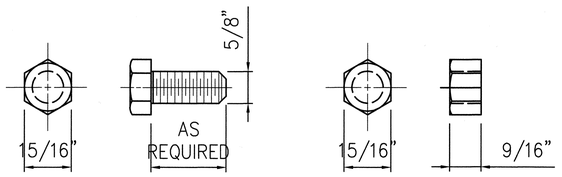
W-BEAM BACK-UP-PLATE (RWB01a)



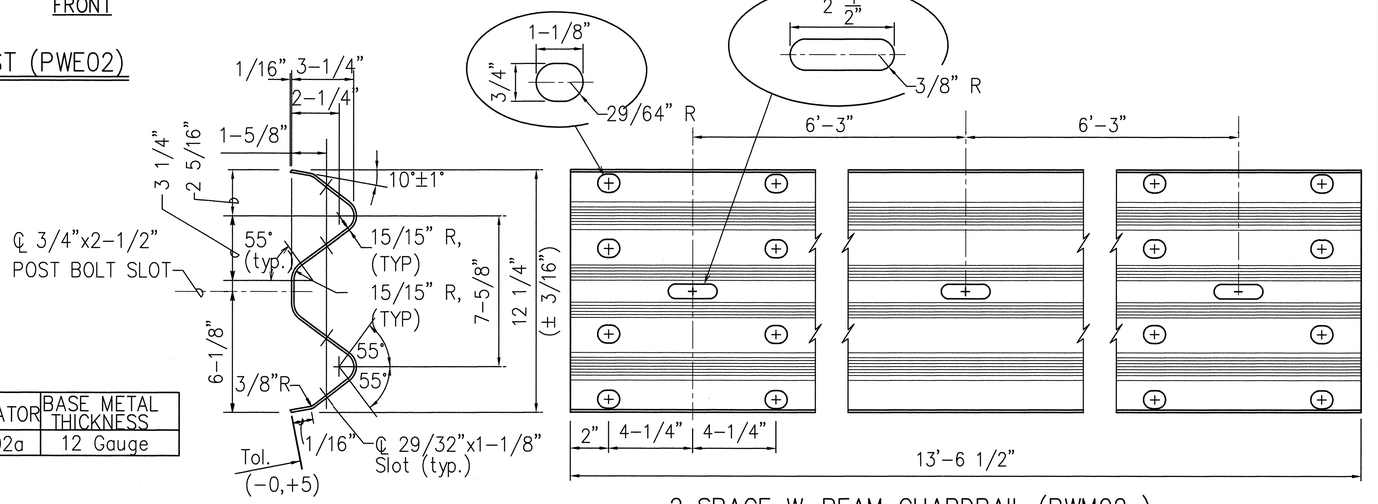
ELEVATION

DESIGNATOR	BASE METAL THICKNESS
RWM02a	12 Gauge

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



HEX BOLT& NUT (FBX16a)



2 SPACE W-BEAM GUARDRAIL (RWM02a)

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HAWAII, U.S.A.

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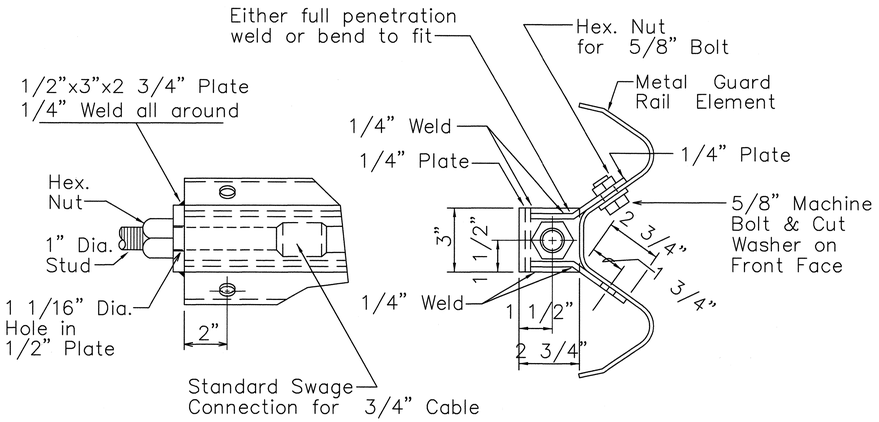
STRONG POST RUBRAIL (W-BEAM) GUARDRAIL

INTERSTATE ROUTE H-1
Palailai Interchange Reconstruction
F.A.I. Project No. IM-NH-H1-1(239)

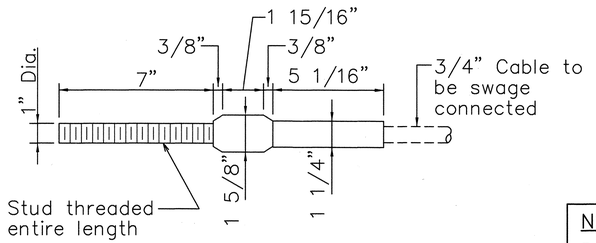
Scale: As Shown Date: 4/1/01

SHEET NO. S-6 OF 12 SHEETS

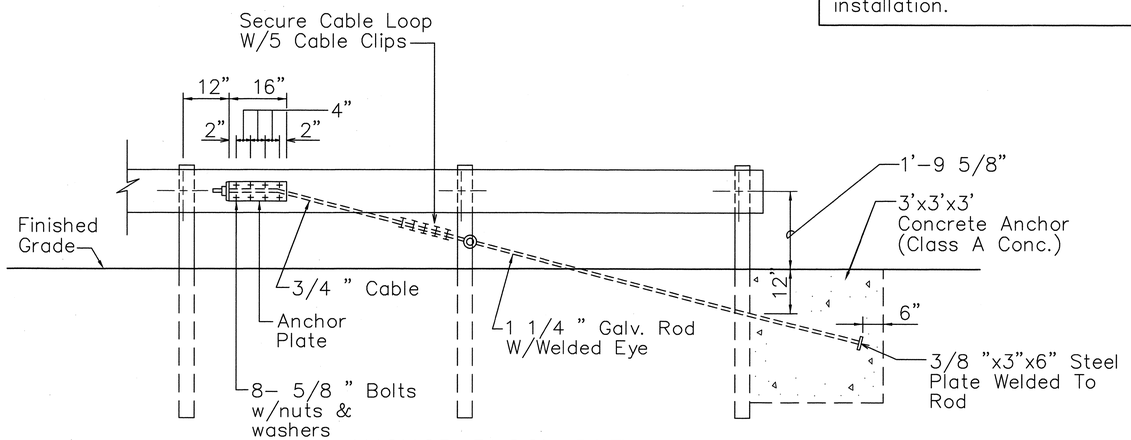
FED. ROAD DIST. NO.	STATE	FED. AID PROJ. NO.	FISCAL YEAR	SHEET NO.	TOTAL SHEETS
HAWAII	HAW.	IM-NH-H1-1(239)	2001	42	103



ANCHOR PLATE DETAILS



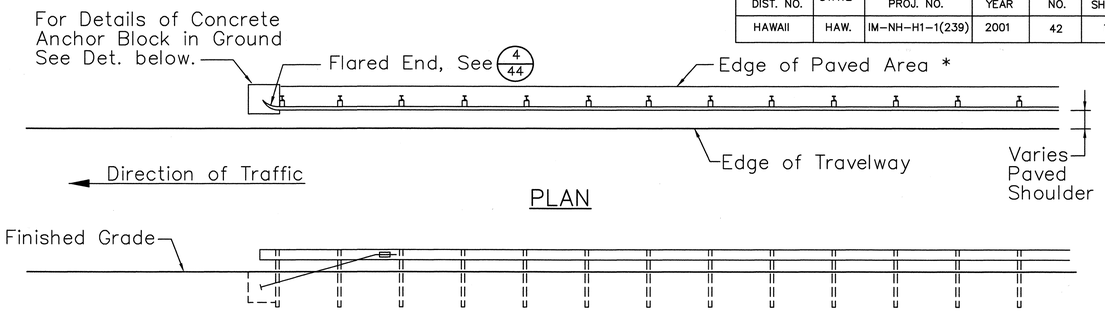
STANDARD SWAGED FITTING AND STUD



ANCHOR BLOCK DETAIL

1. Concrete, excavation, anchor rod and miscellaneous appurtenances necessary to anchor the guardrail ends shall be incidental to metal guardrail.

NOTE:
During construction, the Contractor shall layout the proposed Type "G" Modified End Terminal and receive approval from the Engineer prior to installation.



TYPE "G" FLARE END TERMINAL

* Note:
Provide only where indicated on the Typical Sections and/or Roadway Plans

ORIGINAL PLAN	SURVEY PLOTTED BY	DATE
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NOTEBOOK	TRACED BY	
	DESIGNED BY	
No.	QUANTITIES BY	
	CHECKED BY	

NORMAN K. NAGAMINE LICENSED PROFESSIONAL ENGINEER NO. 5479-S HAWAII, U.S.A.

Norman K. Nagamine

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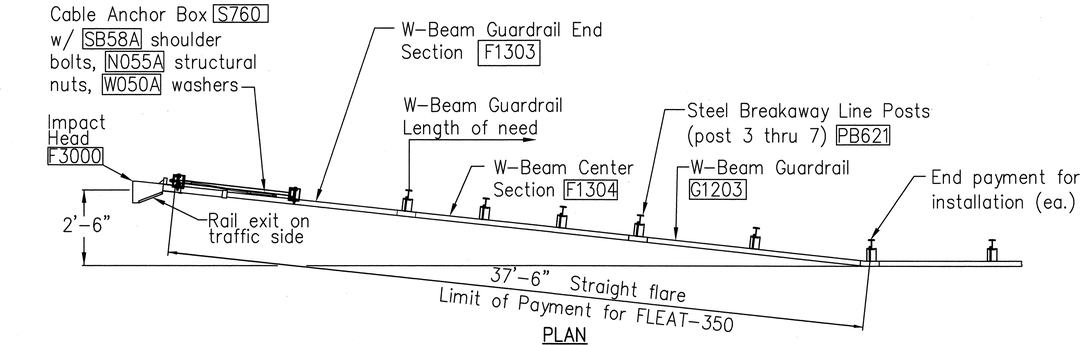
STATE OF HAWAII
DEPARTMENT OF TRANSPORTATION
HIGHWAYS DIVISION

TYPE "G" FLARE END TERMINAL

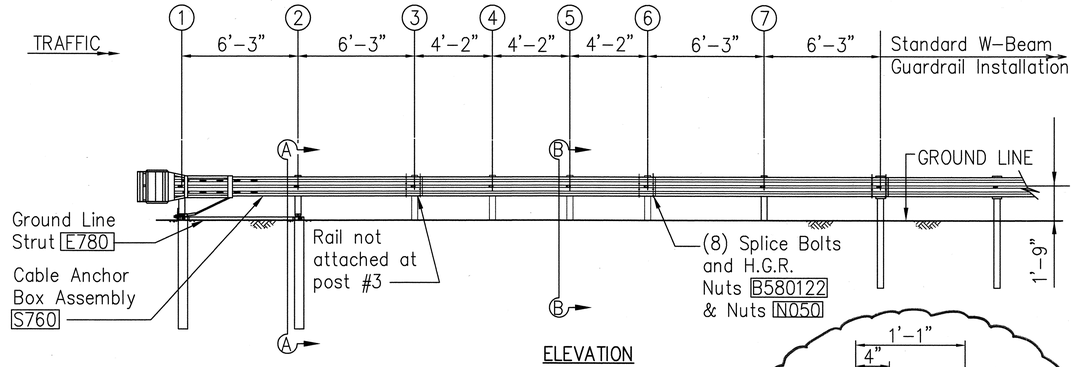
INTERSTATE ROUTE H-1
Palailai Interchange Reconstruction
F.A.I. Project No. IM-NH-H1-1(239)

Scale: As Shown Date: 4/1/01

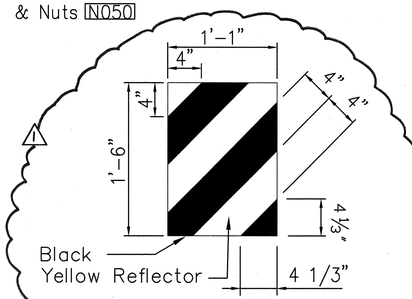
SHEET NO. S-7 OF 12 SHEETS



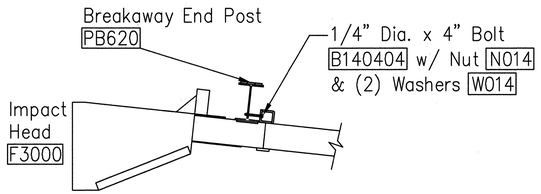
PLAN



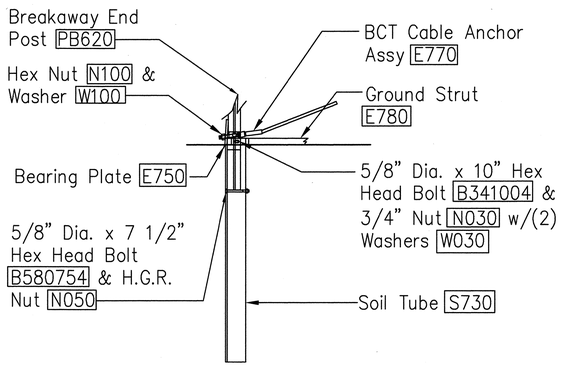
ELEVATION



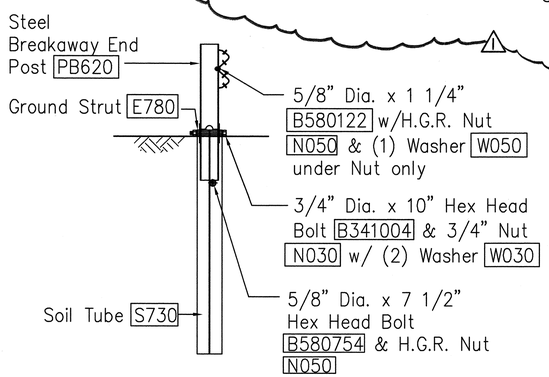
IHRM(R) IMPACT HEAD REFLECTOR
MARKER INSERT DETAIL



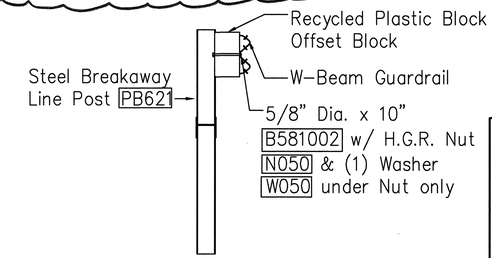
IMPACT HEAD CONNECTING DETAIL



PARTIAL VIEW OF POST 1



SECTION A-A
(@ Post #2)



SECTION B-B
(Typical @ Post 3 - 7)

NOTE: RAIL NOT BOLTED @ POST #3

GENERAL NOTES

1. Breakaway posts are required with the FLEAT Terminal.
2. All bolts, nuts, cable assemblies, cable anchors and bearing plates shall be galvanized.
3. 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.
4. The soil tubes may be driven with an approved driving head. Soil tubes shall 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.
5. 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.
6. 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.
7. (R) or (L) indicates right or left Impact Head Reflector Marker (IHRM). Providing and installing of IHRM shall be considered incidental to end treatment.
8. The stripes for IHRM shall slope downward at an angle of 45^ towards the side of the end treatment that traffic is to pass.

FED. ROAD DIST. NO.	STATE	FED. AID PROJ. NO.	FISCAL YEAR	SHEET NO.	TOTAL SHEETS
HAWAII	HAW.	IM-NH-H1-1(239)	2001	ADD43	103

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
	1	IMPACT HEAD REFLECTOR MARKER-IHRM(R) OR (L)
		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

DATE	REVISION
6/20/01	UPDATED NOTES AND DETAILS AND ADDED REFLECTOR MARKER PER ADDENDUM NO. 1

NORMAN K. NAGAMINE
LICENSED PROFESSIONAL ENGINEER NO. 5479-S
HAWAII, U.S.A.

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STATE OF HAWAII
DEPARTMENT OF TRANSPORTATION
HIGHWAYS DIVISION

FLEAT-350 FLARED ENERGY ABSORBING TERMINAL

INTERSTATE ROUTE H-1
Palailai Interchange Reconstruction
F.A.I. Project No. IM-NH-H1-1(239)

Scale: As Shown Date: 4/1/01

SHEET NO. S-8 OF 12 SHEETS

ADD43

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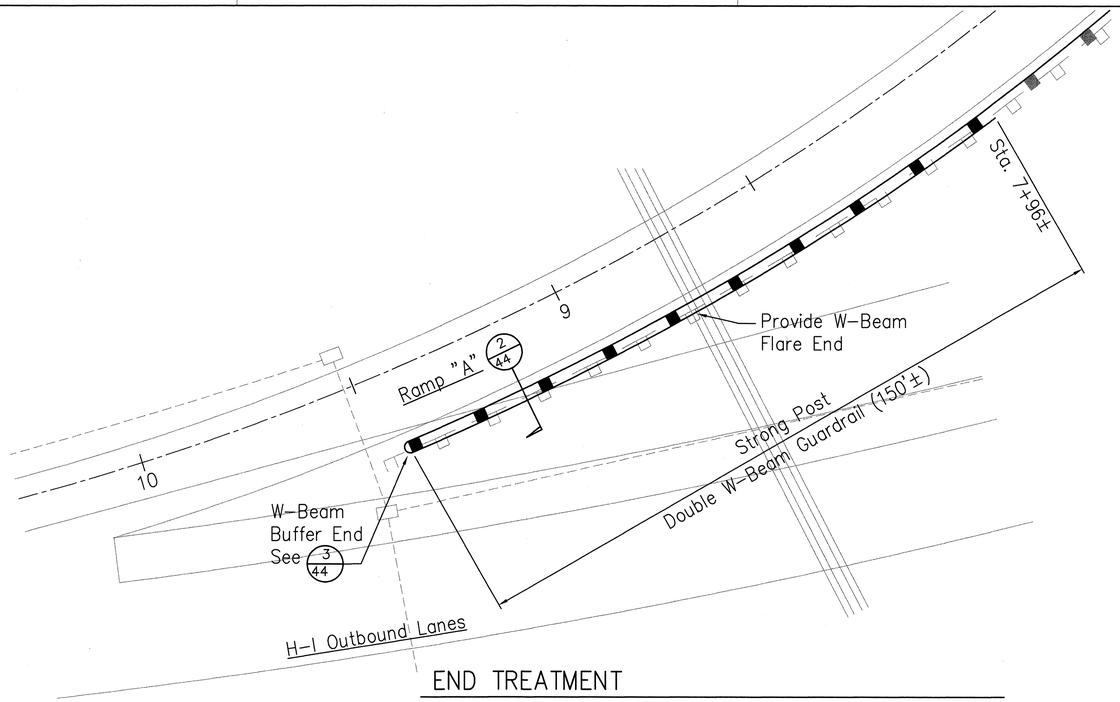
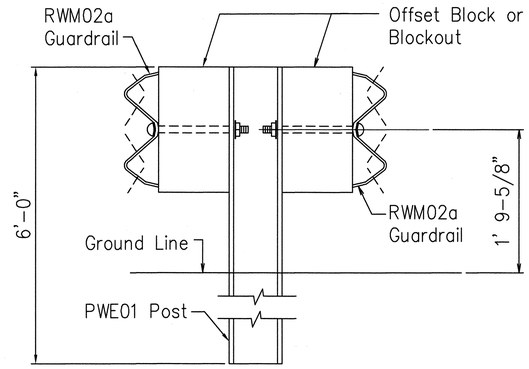
\Dwgs\PALAILAI\PALAI_S08.dwg Tue Jun 19 11:41:43 2001

FED. ROAD DIST. NO.	STATE	FED. AID PROJ. NO.	FISCAL YEAR	SHEET NO.	TOTAL SHEETS
HAWAII	HAW.	IM-NH-H1-1(239)	2001	44	103



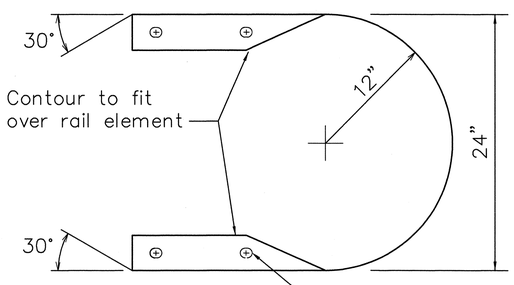
END TREATMENT (RAMP "A" – H-1 OUTBOUND JUNCTION)

1/44 SCALE: 1/16"=1'-0"



STRONG POST DOUBLE W-BEAM GUARDRAIL

2/44 SCALE: 1-1/2"=1'-0"

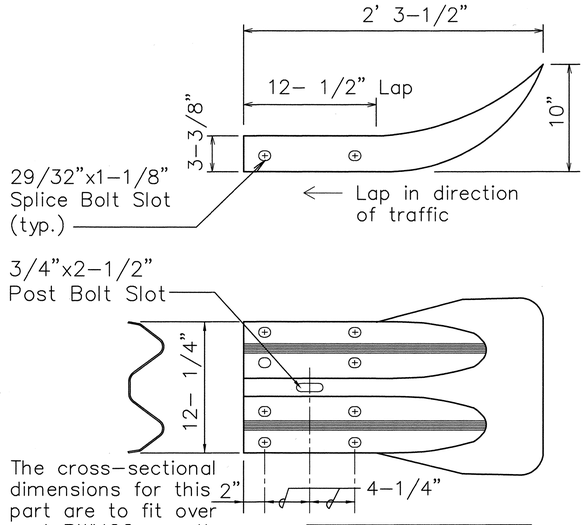


The cross-sectional dimensions for this part are to fit over part RWM02a

DESIGNATOR	BASE METAL THICKNESS
RWE06a	12 Gauge

W-BEAM END SECTION (BUFFER RWE06a)

3/44

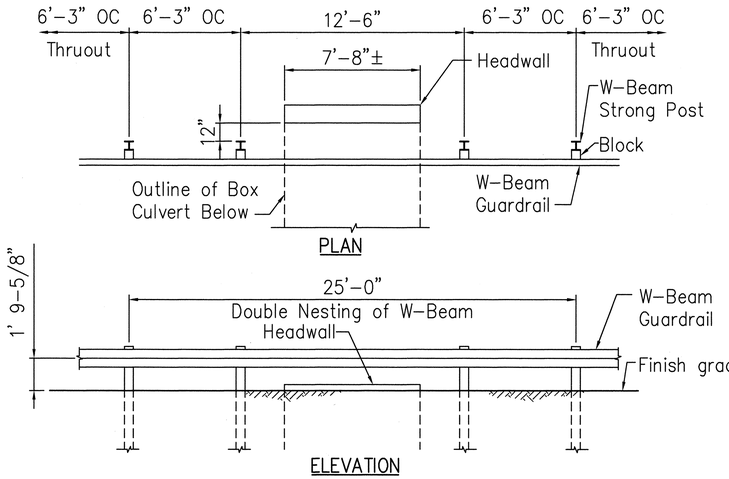


The cross-sectional dimensions for this 2" part are to fit over part RWM02a on the approach end and under part RWM02a on the trailing end.

DESIGNATOR	BASE METAL THICKNESS
RWE01a	12 Gauge

W-BEAM END SECTION (FLARED RWE01a)

4/44



GUARDRAIL AT BOX CULVERT

5/44

(RAMP IF STA. 6+52L)

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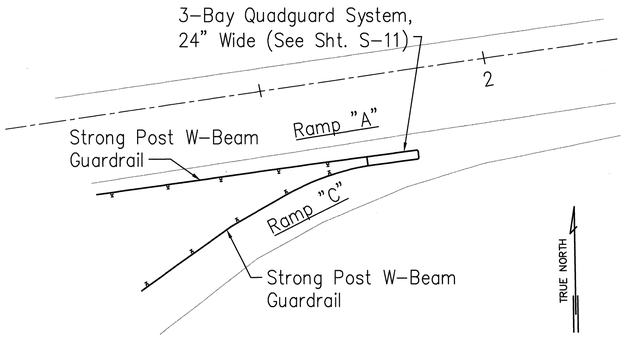
SPECIAL GUARDRAIL DETAILS

INTERSTATE ROUTE H-1
Palailai Interchange Reconstruction
F.A.I. Project No. IM-NH-H1-1(239)

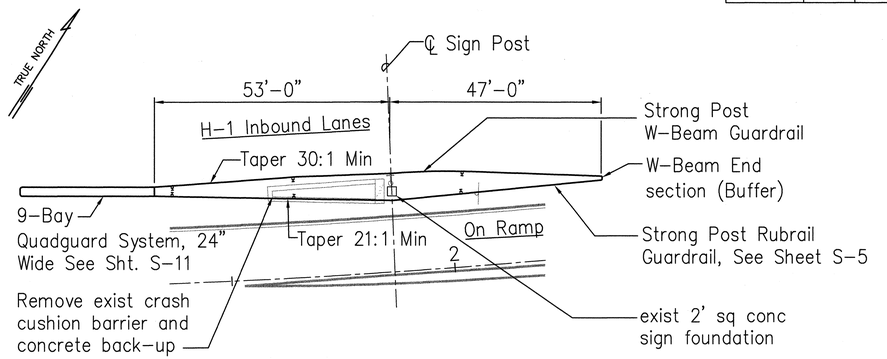
Scale: As Shown Date: 4/1/01

SHEET NO. S-9 OF 12 SHEETS

FED. ROAD DIST. NO.	STATE	FED. AID PROJ. NO.	FISCAL YEAR	SHEET NO.	TOTAL SHEETS
HAWAII	HAW.	IM-NH-H1-1(239)	2001	45	103

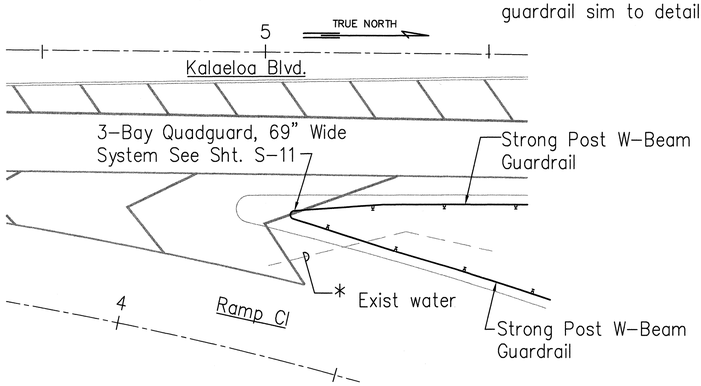


QUADGUARD LOCATION
1/45 RAMP "A" AND "C" JUNCTION
SCALE: 1/16"=1'-0"



GUARDRAIL PLAN AT H-I INBOUND
2/45 (SIGN POST FOUNDATION OBSTRUCTION)
SCALE: 1/16"=1'-0"

Note:
Straddle exist water line with guardrail sim to detail 5/44



QUADGUARD PLAN
3/45 JUNCTION OF KALAELOA BLVD. RAMP CI)
SCALE: 1/16"=1'-0"

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HIGHWAYS DIVISION

SPECIAL GUARDRAIL DETAILS

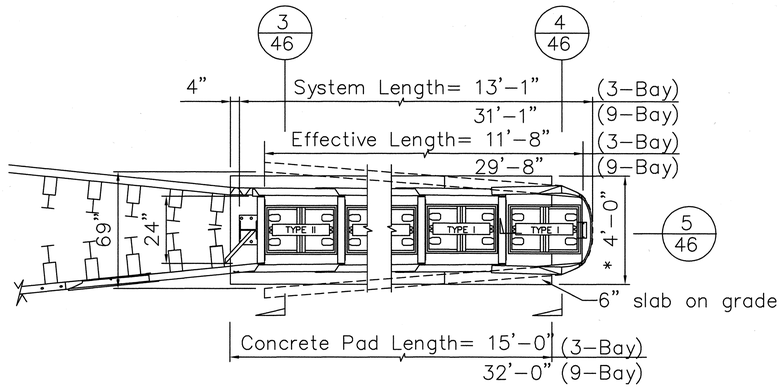
INTERSTATE ROUTE H-1
Palailai Interchange Reconstruction
F.A.I. Project No. IM-NH-H1-1(239)

Scale: As Shown Date: 4/1/01

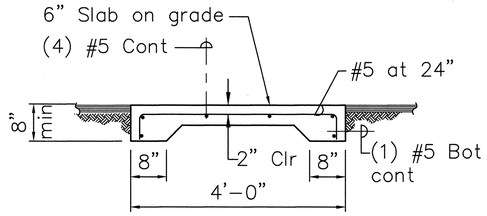
SHEET NO. S-10 OF 12 SHEETS

FED. ROAD DIST. NO.	STATE	FED. AID PROJ. NO.	FISCAL YEAR	SHEET NO.	TOTAL SHEETS
HAWAII	HAW.	IM-NH-H1-1(239)	2001	46	103

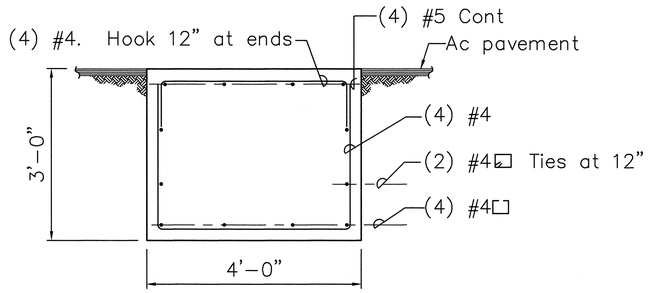
Note:
For 69" (5'-9") wide Quadguard, adjust concrete width accordingly per manufacturer's instructions



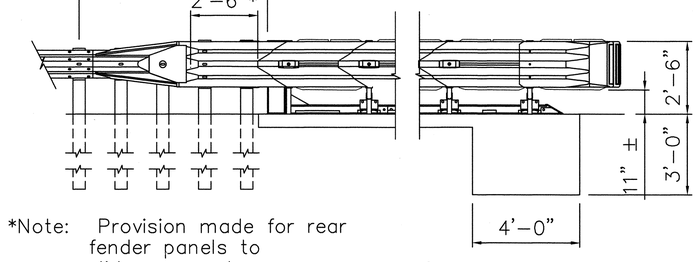
1/46 PLAN OF QUADGUARD SYSTEM
Scale: 3/8"=1'-0"



3/46 SECTION
Scale: 3/4"=1'-0"

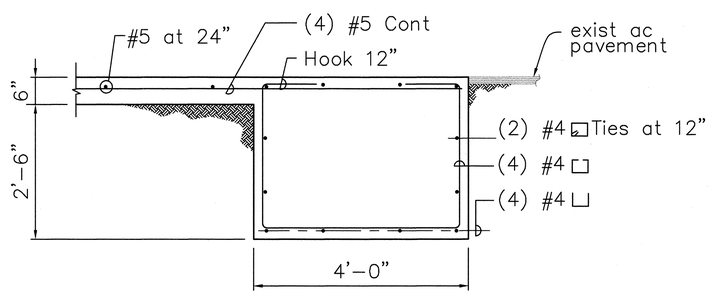


4/46 SECTION
Scale: 3/4"=1'-0"



*Note: Provision made for rear fender panels to slide rearward

2/46 ELEVATION OF QUADGUARD SYSTEM
Scale: 3/8"=1'-0"



5/46 SECTION
Scale: 3/4"=1'-0"

Notes:

1. Concrete strength at 28 days (4,000 PSI)
2. Reinforcing steel shall be ASTM A615 Grade 60.
3. Cross slope of concrete pad shall not exceed 8% and vary not more than 2% from front to back.
4. Install in accordance with manufacturer's recommendations.

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DEPARTMENT OF TRANSPORTATION
HIGHWAYS DIVISION

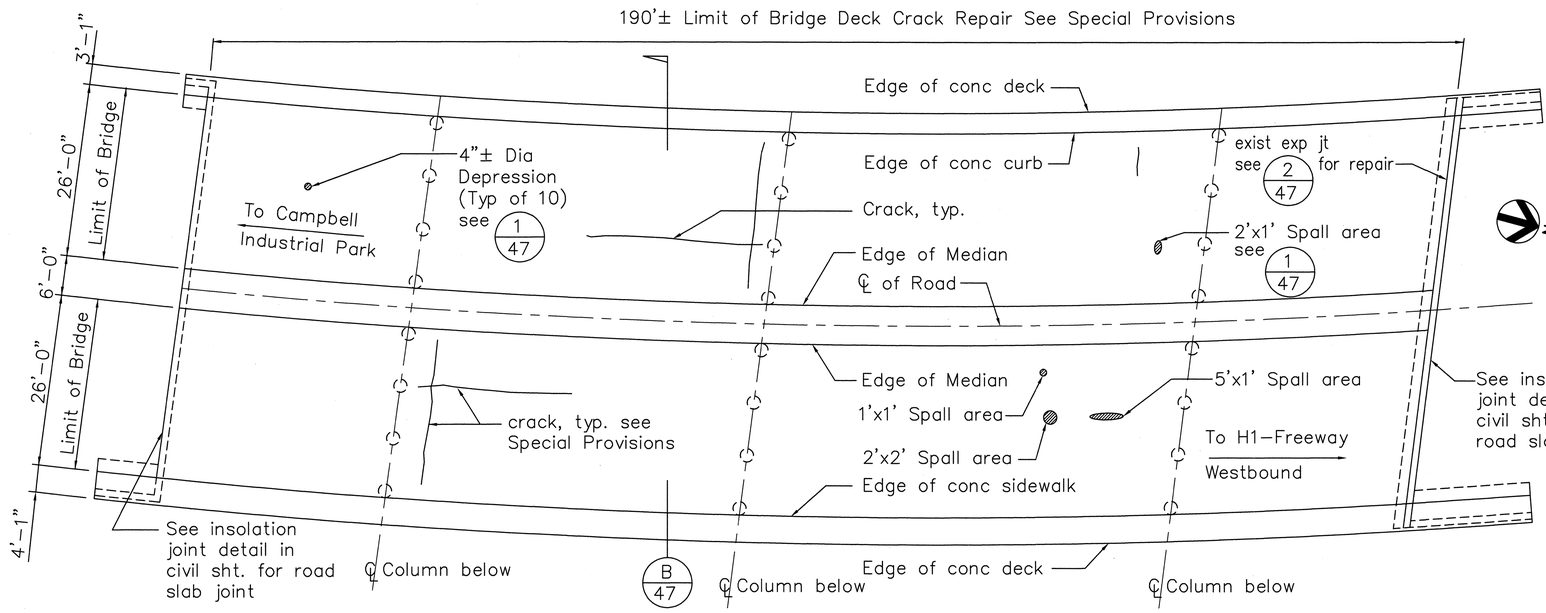
QUADGUARD SYSTEM DETAILS

INTERSTATE ROUTE H-1
Palailai Interchange Reconstruction
F.A.I. Project No. IM-NH-H1-1(239)

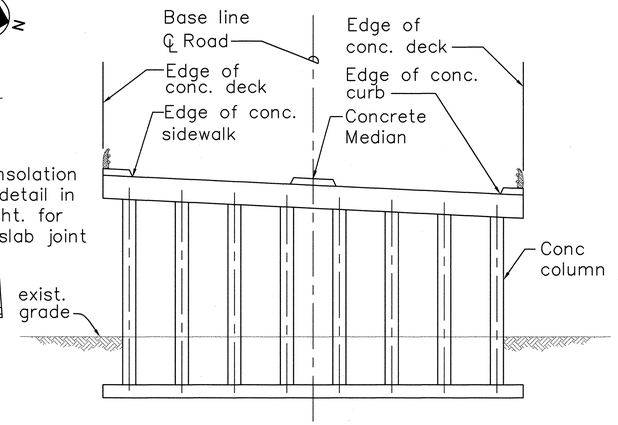
Scale: As Shown Date: 4/1/01

SHEET NO. S-11 OF 12 SHEETS

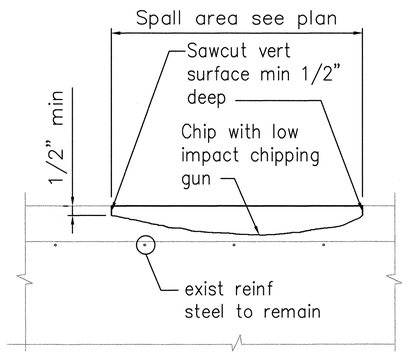
FED. ROAD DIST. NO.	STATE	FED. AID PROJ. NO.	FISCAL YEAR	SHEET NO.	TOTAL SHEETS
HAWAII	HAW.	IM-NH-H1-1(239)	2001	47	103



A/47 PALAILAI INTERCHANGE BRIDGE DECK REPAIR PLAN
Scale: 1"=10'-0"



B/47 BRIDGE CROSS SECTION
Scale: 1"=10'-0"



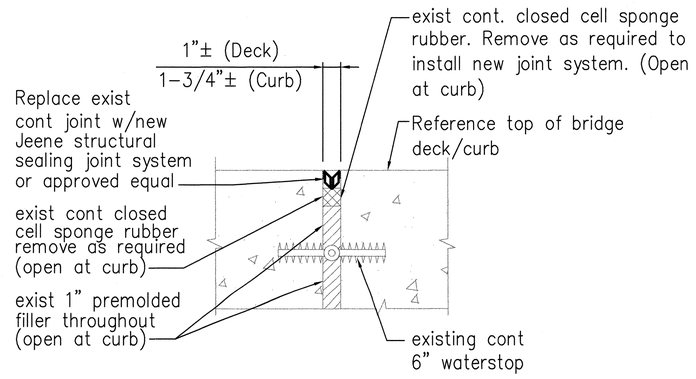
NOTES FOR SPALL REPAIR

① Clean concrete and roughen surface

② Apply concrete repair product in accordance with manufacture's recommendations. Concrete shall be worked into the surface of the existing deck, especially at the corners and edges.

③ Concrete deck temperature shall not exceed 85°F at any time during application of repair concrete.

1/47 TYP CONCRETE DECK SPALL REPAIR Not to Scale



2/47 TYPICAL BRIDGE DECK EXPANSION JOINT REPAIR DETAIL Not to Scale

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DEPARTMENT OF TRANSPORTATION
HIGHWAYS DIVISION

CONC BRIDGE DECK REPAIR PLAN, SECTION AND DETAILS

INTERSTATE ROUTE H-1
Palailai Interchange Reconstruction
F.A.I. Project No. IM-NH-H1-1(239)

Scale: As Shown Date: 4/1/01

SHEET NO. S-12 OF 12 SHEETS

INDEX TO DRAWINGS

ABBREVIATIONS

Alum.	Aluminum	Jt.	Joint
Approx.	Approximate	Lg.	Long
Bal.	Balance	Lin. Ft., L.F.	Linear Feet
BF	Back face	Max.	Maximum
℄	Baseline	Min.	Minimum
Cl.	Clear	No.	Number
Conc.	Concrete	PL	Plate
Det.	Detail	Ref.	Reference
ø	Diameter	Reinf.	Reinforcing
Ea.	Each	Sect.	Section
EF	Each face	Sht.	Sheet
Exist.	Existing	Spcs.	Spaces
Exp.	Expansion	Sta.	Station
FF	Front face	Typ.	Typical
Fin.	Finish		

GENERAL NOTES

DESIGN SPECIFICATIONS - AASHTO:

1. AASHTO LRFD Bridge Design Specifications, 1994 with 1997 Interims.

MATERIALS:

1. Shapes and plates shall conform to ASTM A 36 and be hot-dip galvanized after fabrication, unless noted otherwise.
2. All welding shall be in accordance with the current edition of ANSI/AASHTO/AWS D1.5 Bridge Welding Code.

CONSTRUCTION METHODS:

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. Removal of part of existing structure shall be done in such a manner as to preclude any damage to the existing structures. Large vibratory type of equipment will not be permitted in the removal operation, nor for drilling of holes. Only small vibratory hand tools approved by the Engineer will be allowed. Any damage to the existing structure due to the Contractor's operation or negligence shall be repaired at his expense with no additional cost to the State, and to the satisfaction of the Engineer.

REFERENCE:

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

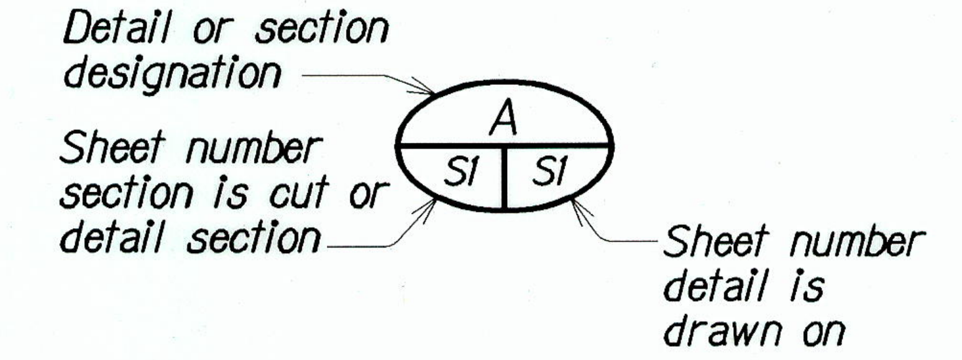
GENERAL:

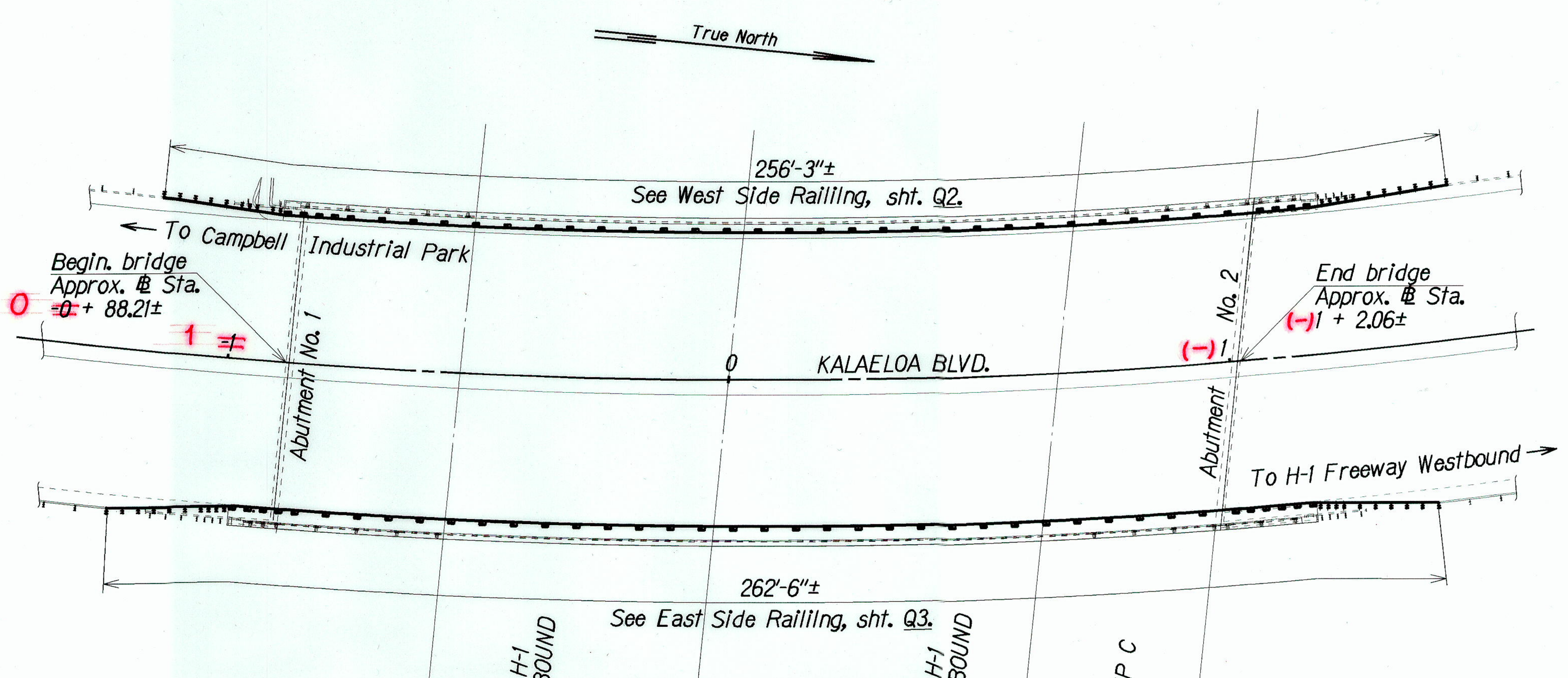
1. All items noted incidental will not be paid for separately.
2. The Contractor shall verify the locations of all existing utility lines and notify their respective owners before commencing with any work.
3. The Contractor shall verify all grades and dimensions. The Engineer shall be informed of all discrepancies 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, with no additional cost to the State. 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.

ESTIMATED QUANTITIES

ITEM NO.	ITEM	UNIT	TOTAL
507.7600	12' End Post With Terminal Connector	Ea.	1 Ea.
606.3350	Guardrail, Type 3 - Thrie Beam with Steel Post on Concrete Structure	Lin. Ft.	419 L.F.
606.3360	Guardrail, 25' Transition - Double Thrie Beam to Single W-Beam	Lin. Ft.	125 L.F.

SYMBOLS





LAYOUT PLAN

Scale: 1" = 20'-0"

STATE OF HAWAII
DEPARTMENT OF TRANSPORTATION
HIGHWAYS DIVISION

PALAILAI INTERCHANGE STRUCTURE

INDEX, GENERAL NOTES, ABBREVIATIONS LAYOUT PLAN & ESTIMATED QUANTITIES

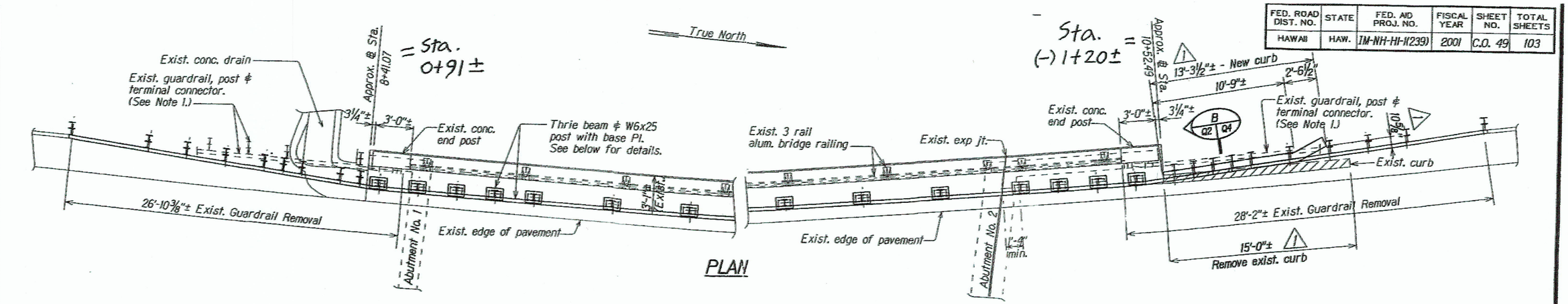
INTERSTATE ROUTE H-1
PALAILAI INTERCHANGE RECONSTRUCTION
Fed. Aid Project No. IM-NH-H1-1(239)

Scale: As Noted Date: Apr. 2001

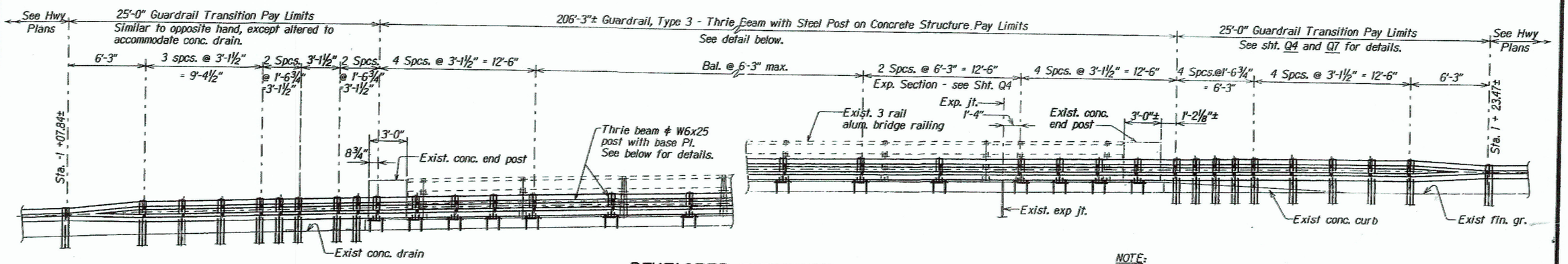
SHEET No. Q1 OF 7 SHEETS

"AS-BUILT"

FED. ROAD DIST. NO.	STATE	FED. AID PROJ. NO.	FISCAL YEAR	SHEET NO.	TOTAL SHEETS
HAWAII	HAW.	IM-NH-HI-1(239)	2001	C.O. 49	103



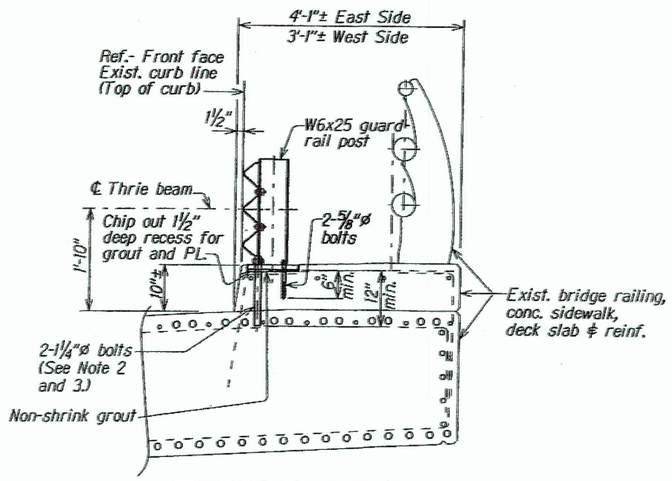
PLAN



DEVELOPED ELEVATION

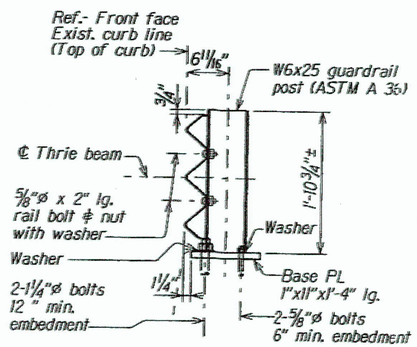
WEST SIDE RAILING

Scale: ½" = 1'-0"



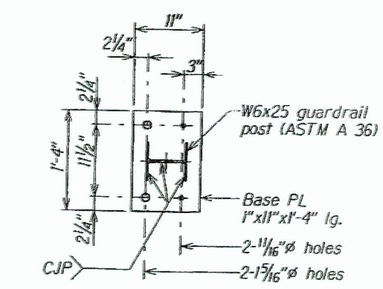
TYPICAL SECTION

Scale: ¾" = 1'-0"



TYPICAL THRIE BEAM AND POST DETAIL

Scale: 1" = 1'-0"



PLAN - BASE PLATE

Scale: 1" = 1'-0"

NOTE:

1. Removal of existing guardrail, posts and terminal connectors shall be incidental to contract. Bolt holes for the terminal connectors shall be patched with grout and painted to match existing color.
2. Anchor bolts for the base plate shown on this sheet shall be high strength full length threaded rods (studs) conforming to ASTM A 449 and hot dip galvanized.
3. Anchor bolts shall be embedded in a two-component self-mixing epoxy-resin system with minimum ultimate bond strength of 55,000 lbs. for 1¼"ø bolts and 15,000 lbs. for ⅝"ø bolts.

DATE	REVISIONS
1 6/17/03	Change made to remove exist. curb and to add new curb as indicated.

C.C.O. NO. 11

STATE OF HAWAII
DEPARTMENT OF TRANSPORTATION
HIGHWAYS DIVISION

PALAILAI INTERCHANGE STRUCTURE

WEST SIDE RAILING; TYPICAL SECTION
TYPICAL THRIE BEAM & POST DETAIL; PLAN-BASE PLATE

INTERSTATE ROUTE H-1
PALAILAI INTERCHANGE RECONSTRUCTION
Fed. Aid Project No. IM-NH-HI-1(239)

Scale: As Noted Date: Apr. 2001

SHEET No. Q2 OF 7 SHEETS

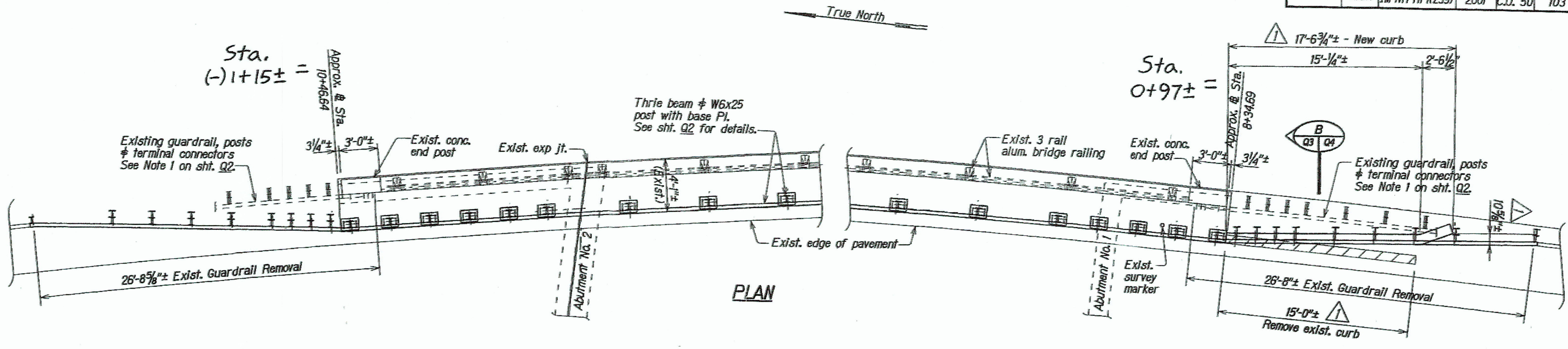
DESIGNED BY	DRAWN BY	TRACED BY	CHECKED BY
SA	JMZ	JMZ	JMZ
2000	2000	2000	2000

NOTE BOOK N. 2000 dgn

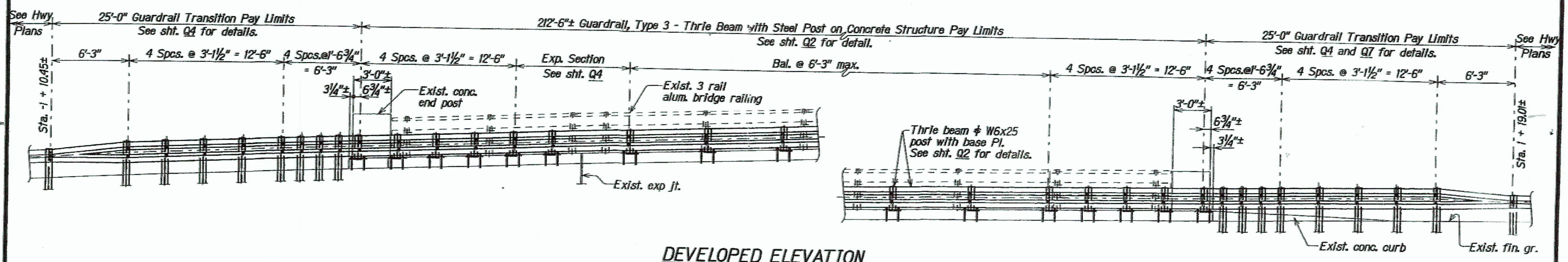
"AS-BUILT"

JUN 20 2003 C.O. 49

FED. ROAD DIST. NO.	STATE	FED. AID PROJ. NO.	FISCAL YEAR	SHEET NO.	TOTAL SHEETS
HAWAII	HAW.	IM-NH-H1-1(239)	2001	C.O. 50	103



PLAN



DEVELOPED ELEVATION

EAST SIDE RAILING

Scale: ¼" = 1'-0"

C.C.O. NO. 11

DATE	REVISIONS
6/17/03 (1)	Change made to remove exist. curb and to add new curb as indicated.

STATE OF HAWAII
DEPARTMENT OF TRANSPORTATION
HIGHWAYS DIVISION

PALAILAI INTERCHANGE STRUCTURE
EAST SIDE RAILING
INTERSTATE ROUTE H-1
PALAILAI INTERCHANGE RECONSTRUCTION
Fed. Aid Project No. IM-NH-H1-1(239)

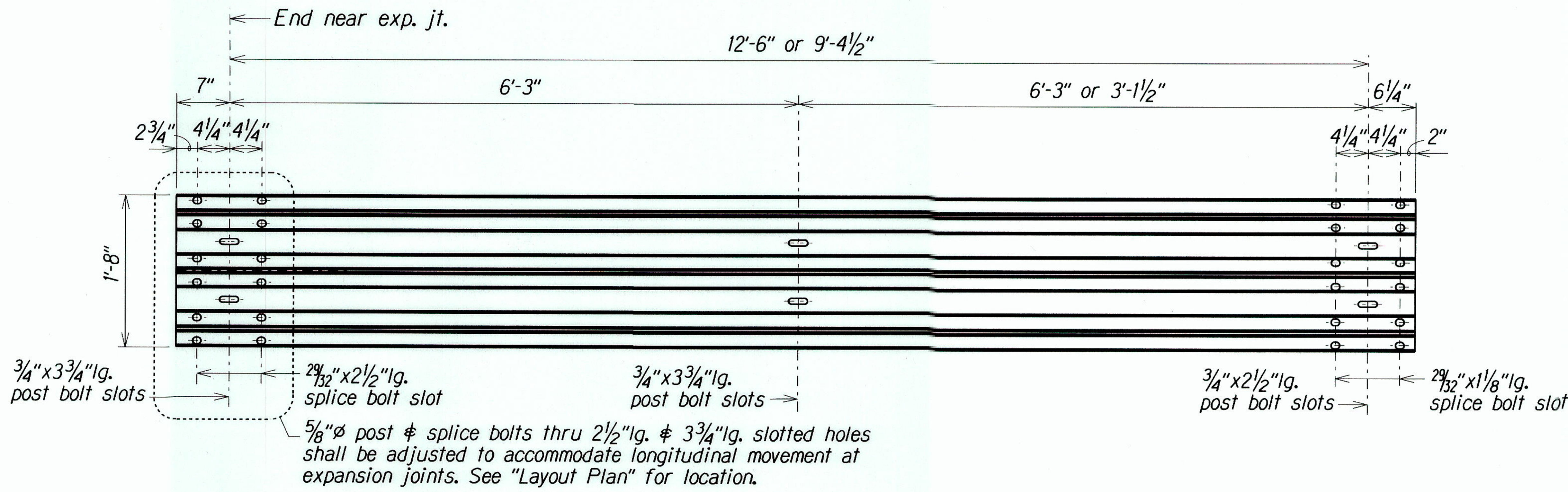
Scale: As Noted   Date: Apr. 2001

SHEET No. Q3 OF 7 SHEETS

"AS-BUILT"

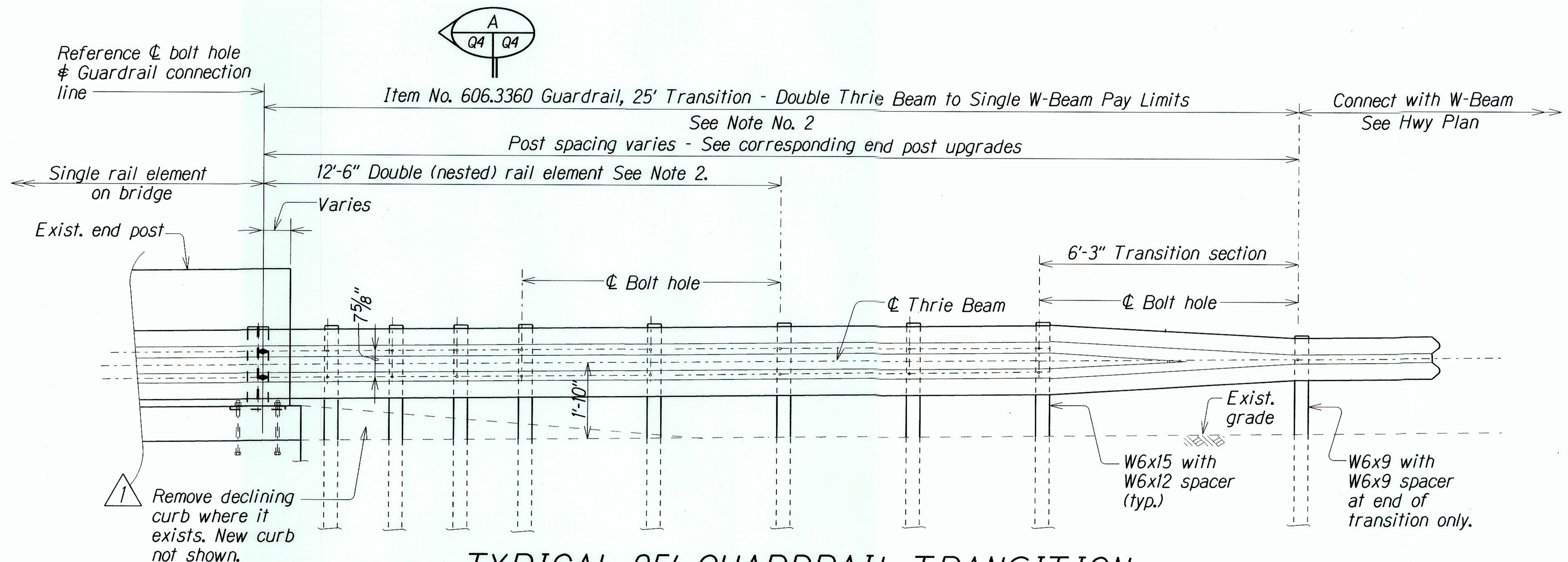
JUN 2 0 2003 C.O. 50

FED. ROAD DIST. NO.	STATE	FED. AID PROJ. NO.	FISCAL YEAR	SHEET NO.	TOTAL SHEETS
HAWAII	HAW.	IM-NH-H1-1(239)	2001	C.O. 51	103



THRIE BEAM EXPANSION SECTION

Scale: 1" = 1'-0"

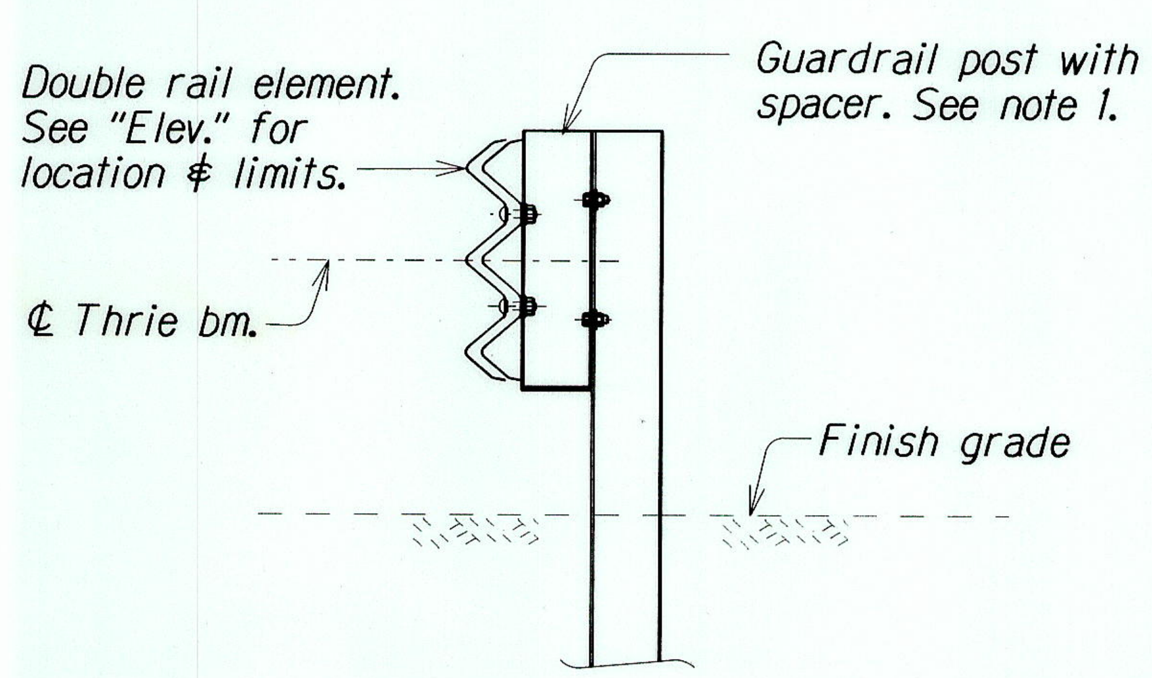


TYPICAL 25' GUARDRAIL TRANSITION

Scale: ½"=1'-0"

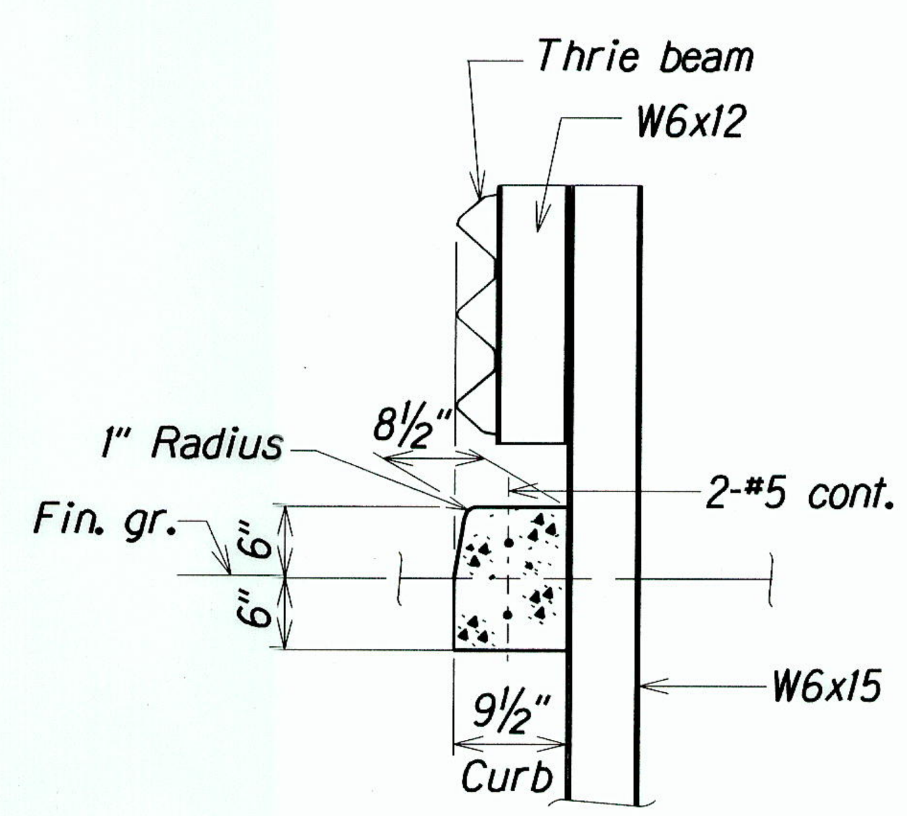
GUARDRAIL NOTES:

1. The work necessary to connect guardrail to concrete end post or metal spacer block shall include all labor, materials, tools, equipment and incidentals necessary to complete the work and shall be incidental to Item No. 606.3360 - Guardrail, 25' Transition - Double Thrie Beam to Single W-Beam.
2. Unless otherwise noted, all fasteners, posts, and rail elements shall conform to the latest edition and amendments of "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 fasteners, posts and rail elements have been converted from metric units into their present form.
3. Terminal connector, guardrail post, spacer block, transition section and all other associated hardware will not be paid for separately and shall be considered incidental to Item No. 606.3360 - Guardrail, 25' Transition - Double Thrie Beam to Single W-Beam.
4. See "General Notes" on sht. Q1 for additional jersey barrier, guardrail and drilling information.
5. All anchor bolts shall be high strength bolts conforming to the requirements of AASHTO M 164, unless otherwise noted in these drawing. See Special Provisions.
6. Anchor bolt length shall be such that a snug fit of the elements and full thread engagement plus ¼" (max.) is attained.
7. Terminal connector, Thrie Beam Metal Guardrail and Transition Section shall be fabricated from 10 guage steel conforming to the requirements of AASHTO M 180 and shall be hot-dip galvanized with Type II zinc coating after fabrication. See Special Provisions.
8. Guardrail posts, spacer blocks, "Terminal connectors" and all anchor bolts, cap PLs, bolts, nuts and washers shall be hot-dip galvanized after fabrication.
9. Cap PLs shall be fabricated from ASTM A 36.
10. First 25'-0" of guardrail adjoining "Terminal connectors" 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.
11. Double (nest 1st panel) thrie beam elements at all end post connections.
12. Where double (nested) beam occur, 12" "Back-up Plate" not required.
13. Heads of through anchor bolts shall be placed on the traffic side of the rail.
14. Drilling of through holes shall be done in such a manner as to prevent cone puncturing of the daylighting end.
15. See sht. Q7 for Guardrail Type 3 Thrie Beam details.



SECTION A (Q4 Q4)

Scale: ¾"=1'-0"



1 SECTION B (Q2 Q4)

Scale: ¾" = 1'-0"

Q3

DATE	REVISIONS
1 6/17/03	Added Det. "B" for guardrail detail at curb and label changed to indicate change.

STATE OF HAWAII
DEPARTMENT OF TRANSPORTATION
HIGHWAYS DIVISION

PALAILAI INTERCHANGE STRUCTURE

TYPICAL 25' GUARDRAIL TRANSITION
THRIE BEAM EXPANSION SECTION AND SECTIONS

INTERSTATE ROUTE H-1
PALAILAI INTERCHANGE RECONSTRUCTION
Fed. Aid Proj. No. IM-NH-H1-1(239)

Scale: As Noted   Date: Apr. 2001

SHEET No. Q4 OF 7 SHEETS

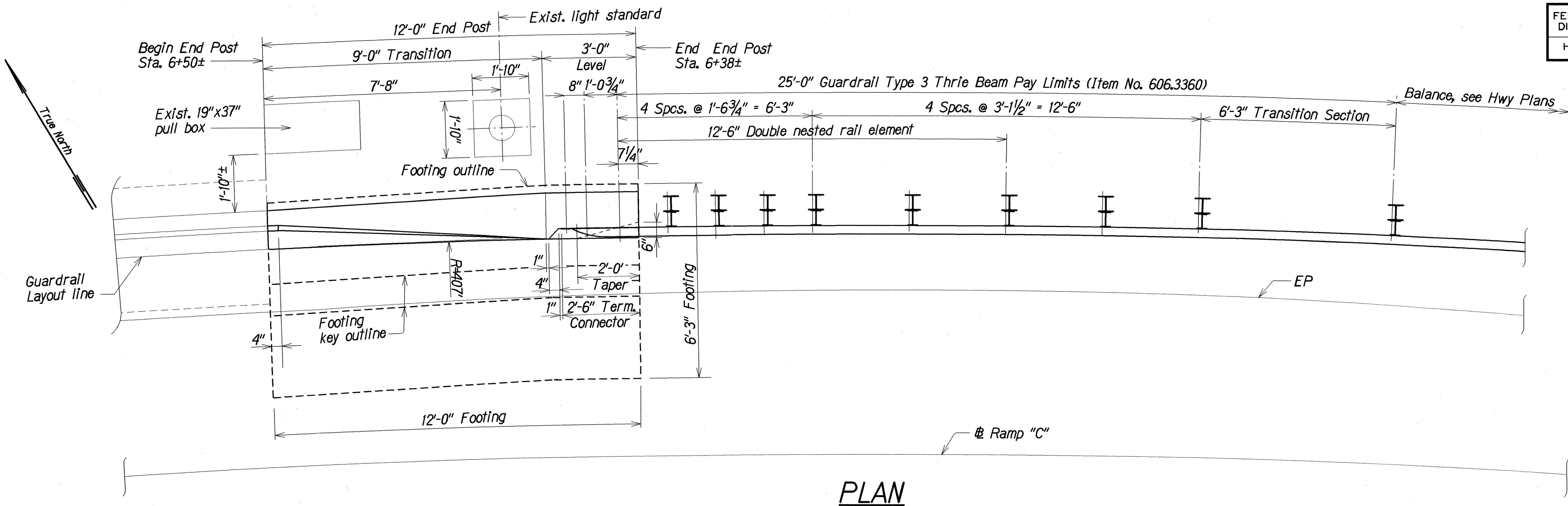
ORIGINAL PLAN	SURVEY PLOTTED BY	
	DRAWN BY	LMA JUL 1998
	TRACED BY	
NOTE BOOK	DESIGNED BY	SA JUL 1998
	QUANTITIES BY	SA JUL 1998
S: 2k1bq4.dgn	CHECKED BY	DCO JUL 1998

"AS-BUILT"

FED. ROAD DIST. NO.	STATE	FED. AID PROJ. NO.	FISCAL YEAR	SHEET NO.	TOTAL SHEETS
HAWAII	HAW.	IM-NH-H1-1(239)	2001	52	103

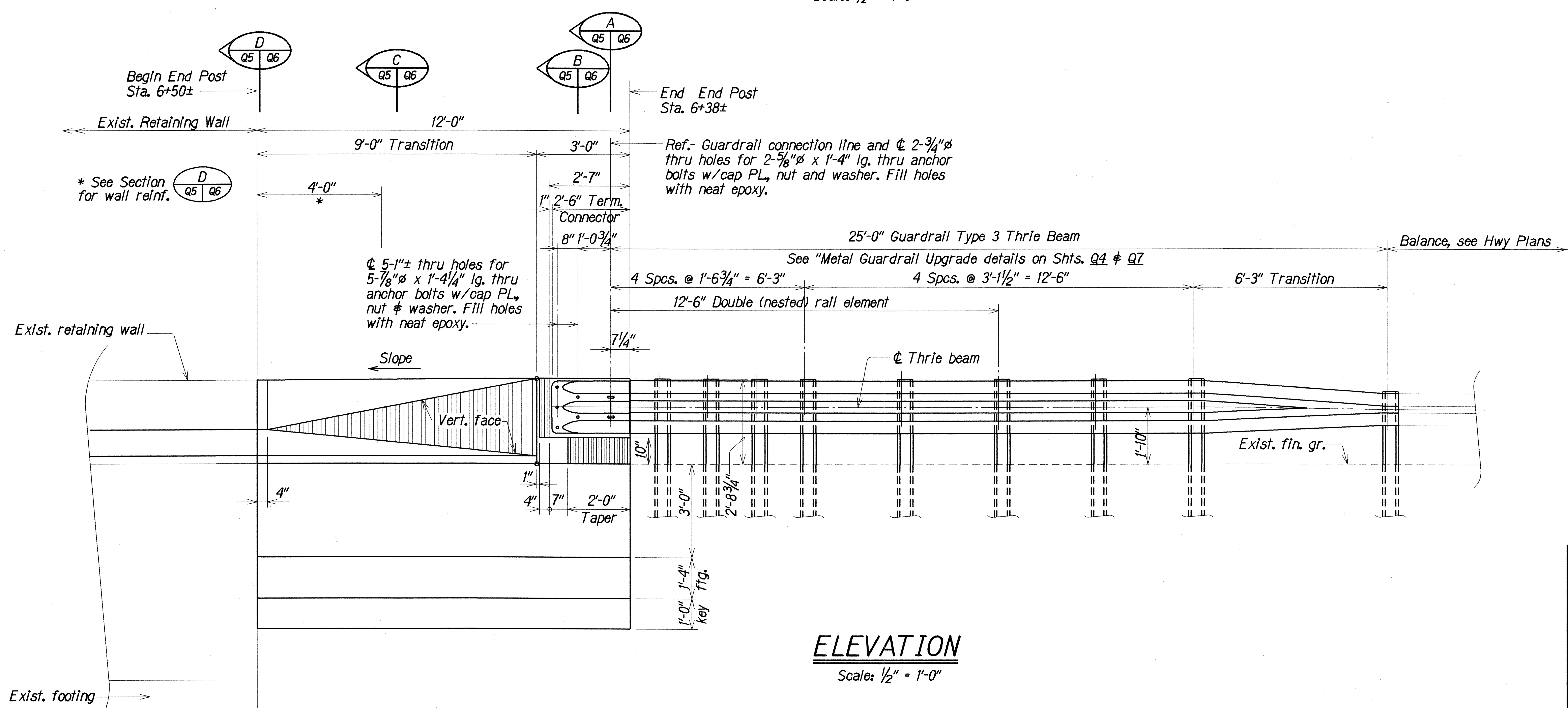
NOTES:

1. See Note 1 on Sht. Q2
2. See Guardrail Notes on Sht. Q4



PLAN

Scale: ½" = 1'-0"



ELEVATION

Scale: ½" = 1'-0"

ORIGINAL PLAN	SURVEY PLOTTED BY XXX	DATE XXX 1991
	DRAWN BY	
	TRACED BY	
NOTE BOOK	DESIGNED BY XXX	XXX 1991
	QUANTITIES BY XXX	XXX 1991
No. 2klbq5.dgn	CHECKED BY XXX	XXX 1991

STATE OF HAWAII
DEPARTMENT OF TRANSPORTATION
HIGHWAYS DIVISION

PALAILAI INTERCHANGE RAMP "C"

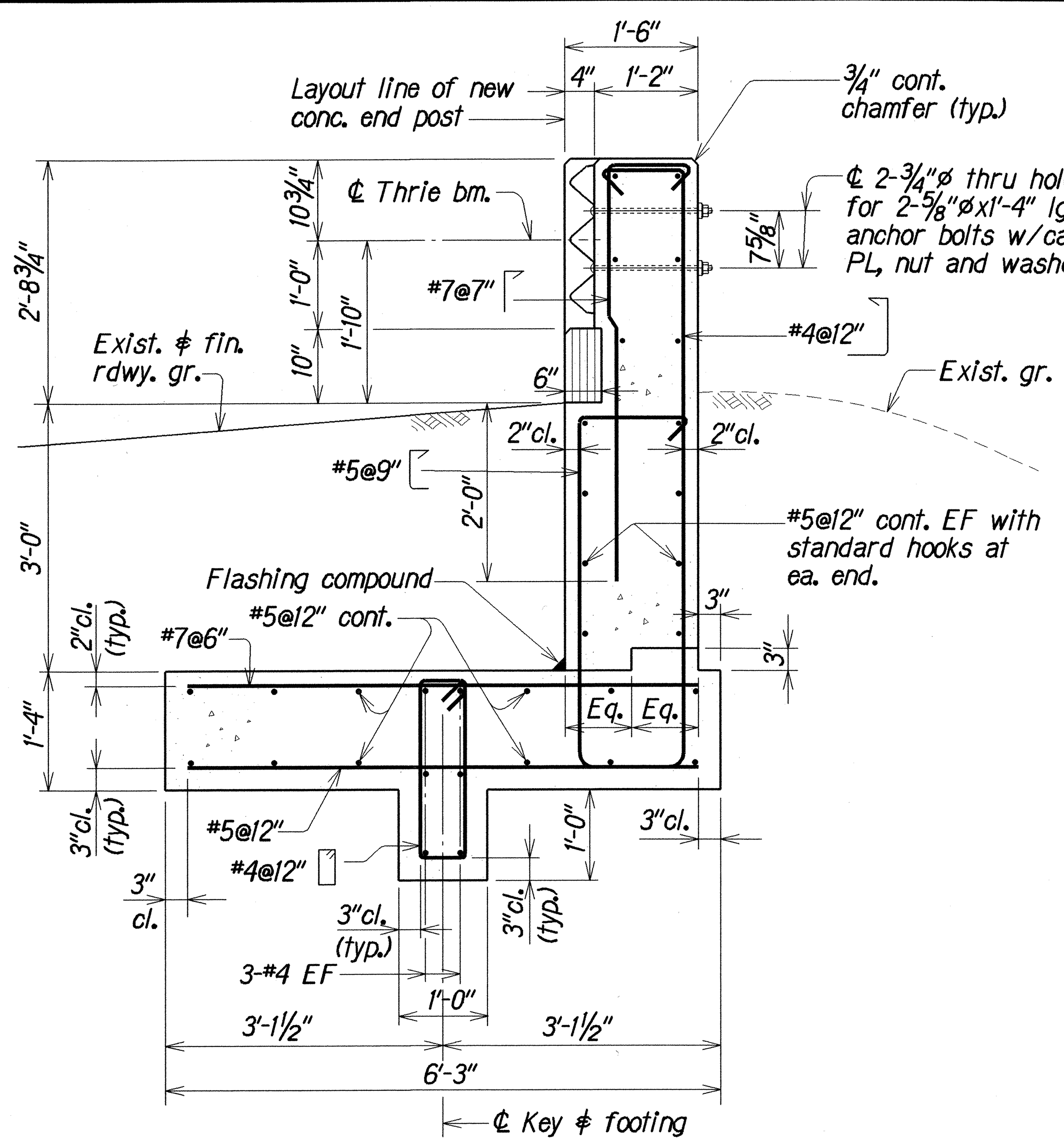
END POST & 25' METAL GUARDRAIL TRANSITION

INTERSTATE ROUTE H-1
PALAILAI INTERCHANGE RECONSTRUCTION
Fed. Aid Project No. IM-NH-H1-1(239)

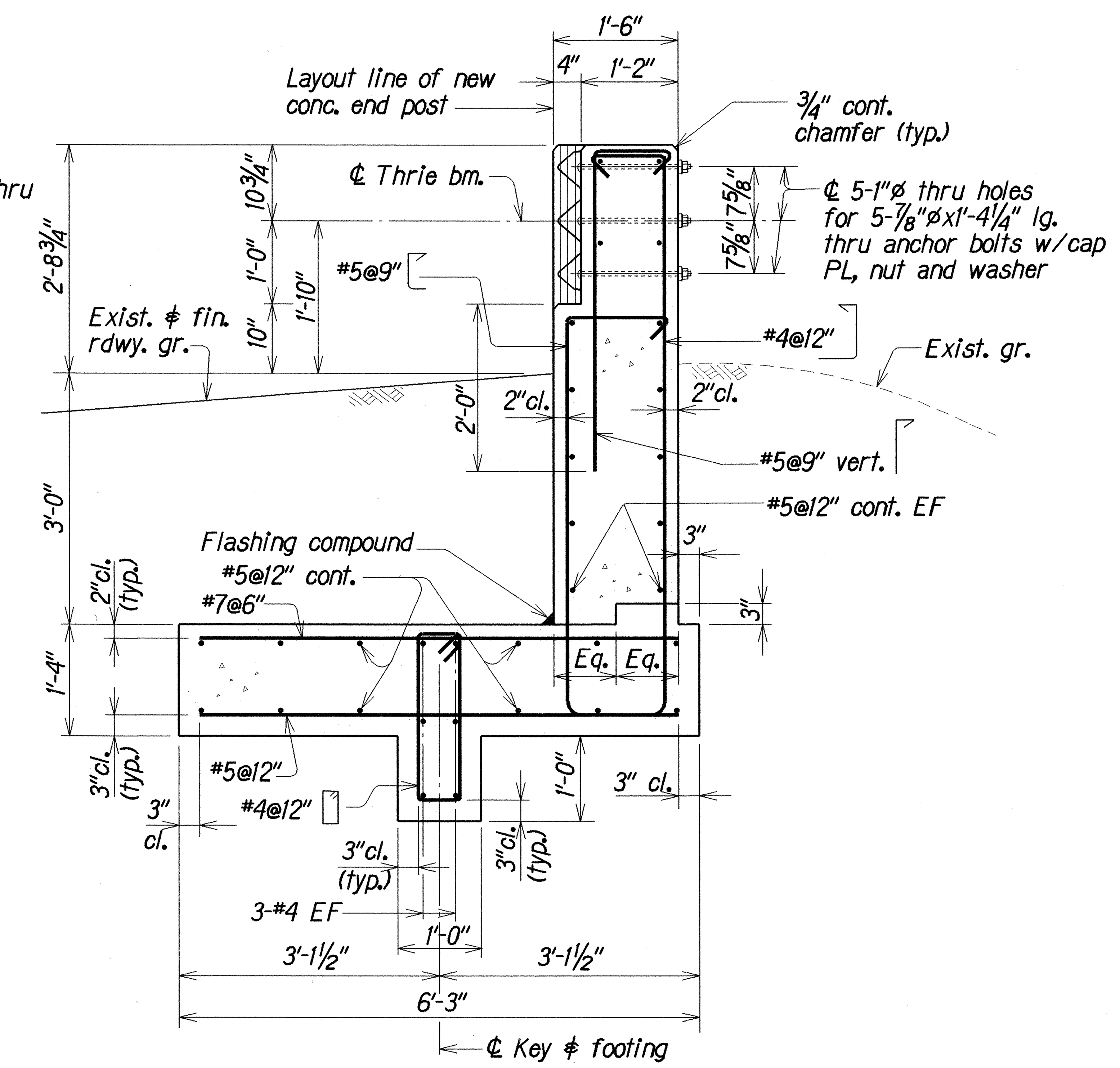
Scale: As Noted   Date: Apr. 2001

SHEET No. Q5 OF 7 SHEETS

FED. ROAD DIST. NO.	STATE	FED. AID PROJ. NO.	FISCAL YEAR	SHEET NO.	TOTAL SHEETS
HAWAII	HAW.	IM-NH-H1-1(239)	2001	53	103



SECTION A (Q5 | Q6)



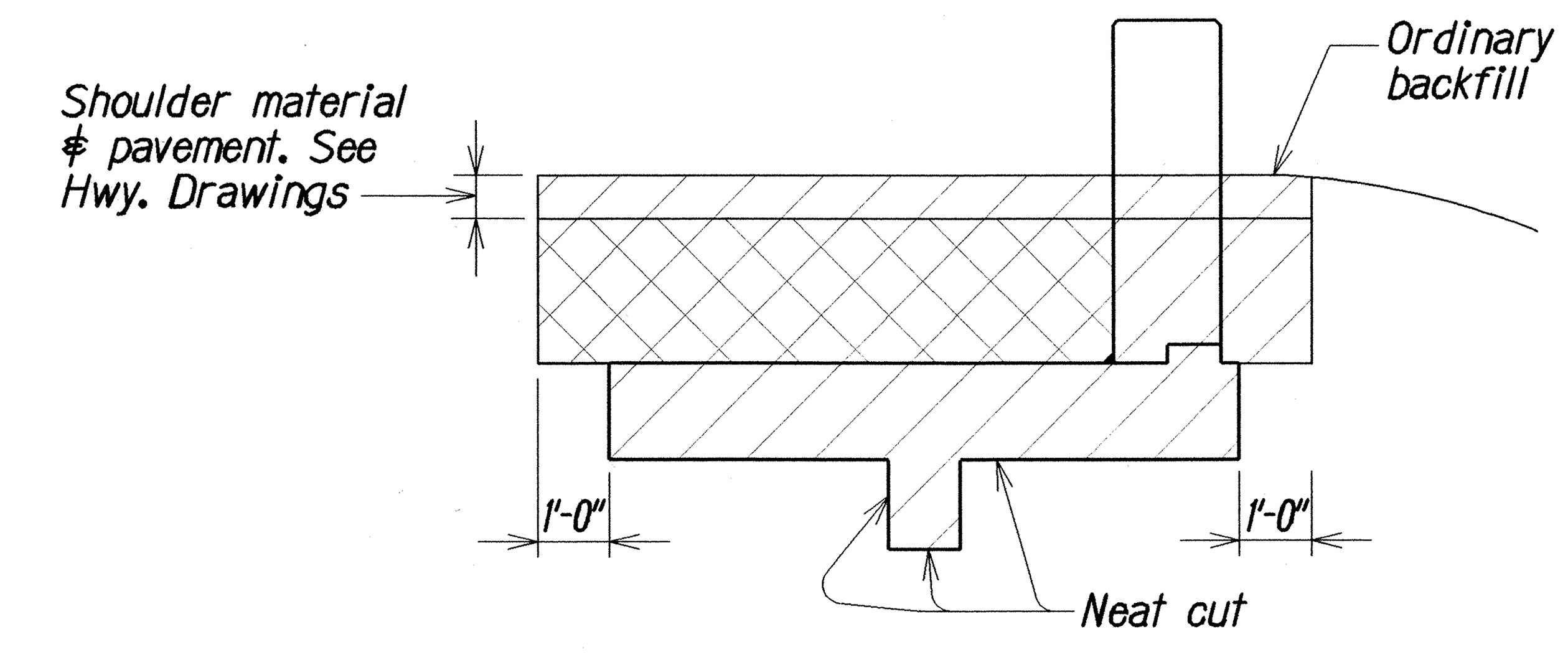
SECTION B (Q5 | Q6)

NOTE:

Structure excavation shown thus

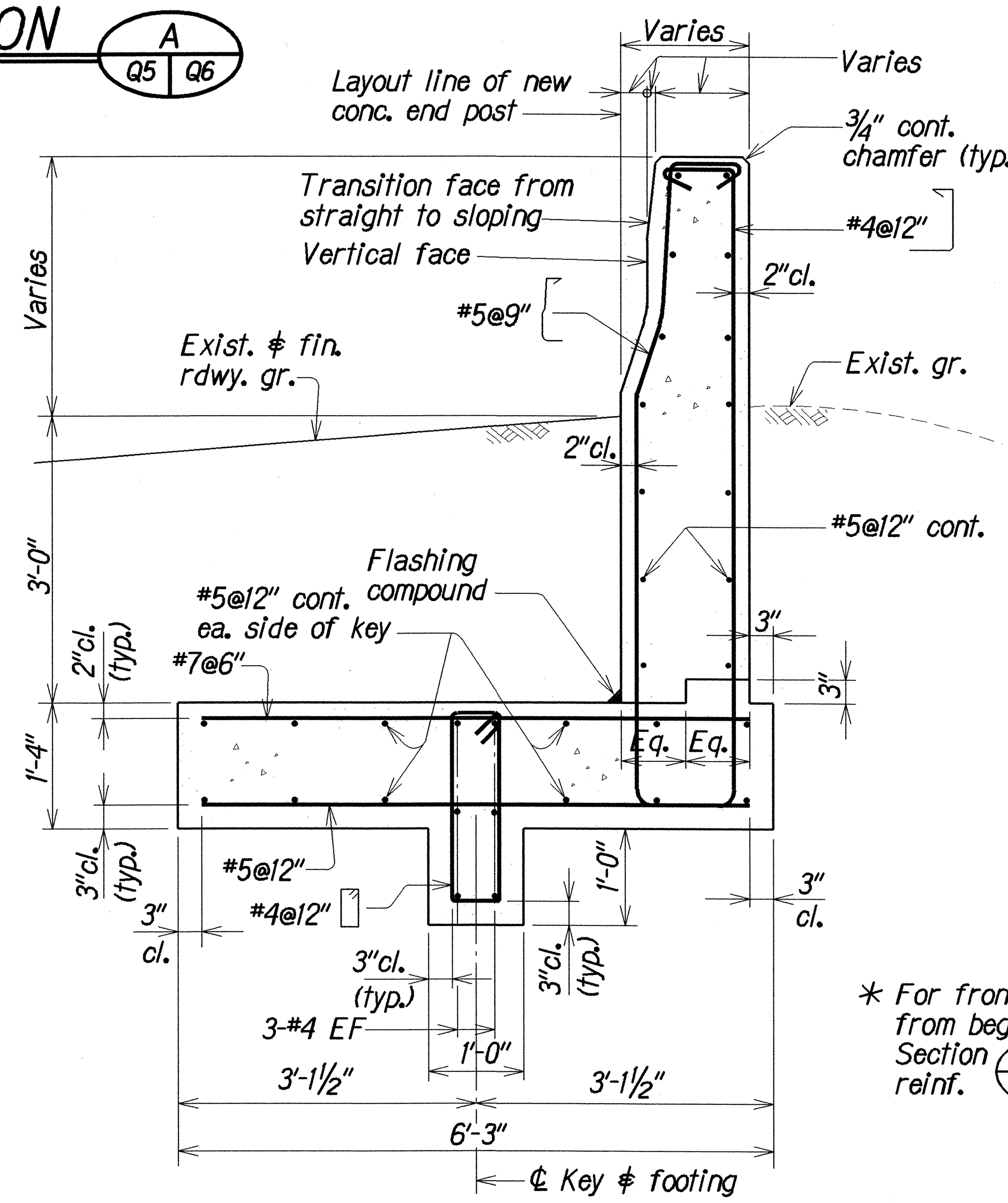
Structure backfill shown thus

Structure backfill material shall conform to glassphalt base course. See Section 312 of Standard Specifications.

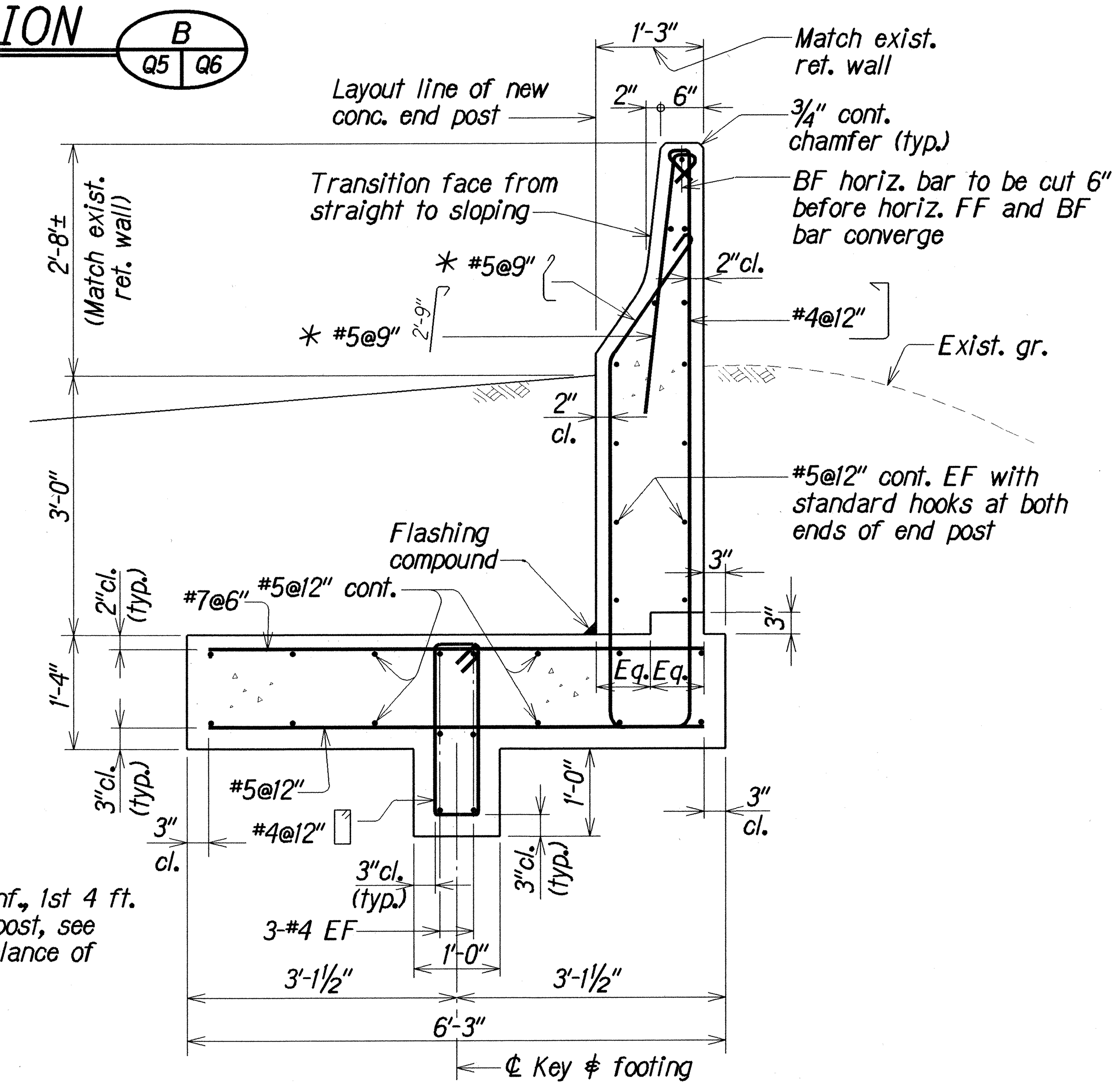


TYPICAL STRUCTURE EXCAVATION AND BACKFILL

Not to Scale



SECTION C (Q5 | Q6)



SECTION D (Q5 | Q6)

* For front face wall reinf., 1st 4 ft. from beginning of end post, see Section C (Q5 | Q6) for balance of reinf.

END POST DETAILS

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

STATE OF HAWAII
DEPARTMENT OF TRANSPORTATION
HIGHWAYS DIVISION

PALAILAI INTERCHANGE RAMP "C"

END POST DETAILS

INTERSTATE ROUTE H-1

PALAILAI INTERCHANGE RECONSTRUCTION

Fed. Aid Project No. IM-NH-H1-1(239)

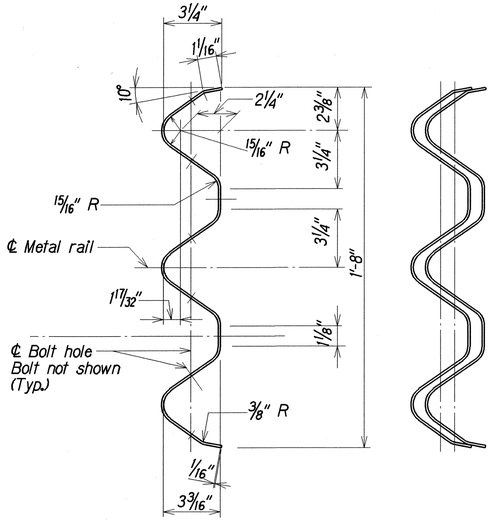
Scale: As Noted — Date: Apr. 2001

SHEET No. Q6 OF 7 SHEETS

ORIGINAL PLAN / NOTE BOOK — SURVEY PLOTTED BY; DRAWN BY LMA, Feb. 1999; TRACED BY; DESIGNED BY SA, Feb. 1999; QUANTITIES BY SA; CHECKED BY DCO, Feb. 1999

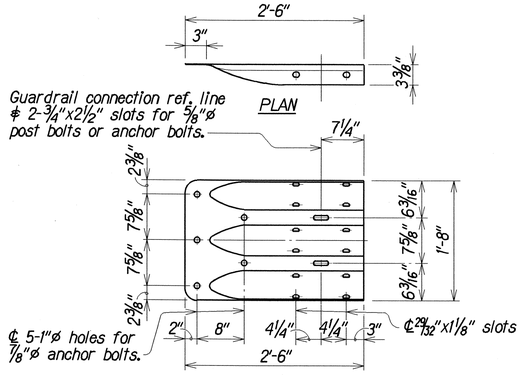
FED. ROAD DIST. NO.	STATE	FED. AID PROJ. NO.	FISCAL YEAR	SHEET NO.	TOTAL SHEETS
HAWAII	HAW.	IM-NH-HI-1(239)	2001	54	103

NOTES:
1. Bolt length varies and shall be verified in the field. Dimensions are approximate.



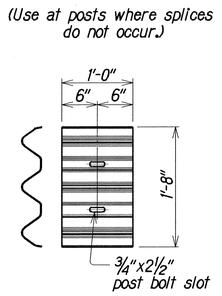
SINGLE DOUBLE

SECTION THRU RAIL ELEMENT
Scale: 3" = 1'-0"

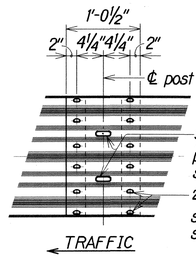


ELEVATION

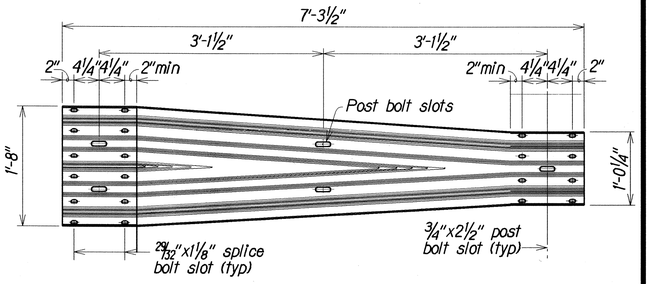
TERMINAL CONNECTOR
Scale: 1" = 1'-0"



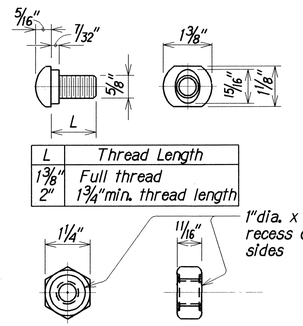
BACKUP PLATE
Scale: 1" = 1'-0"



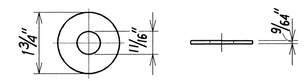
RAIL SPLICE
Scale: 1" = 1'-0"



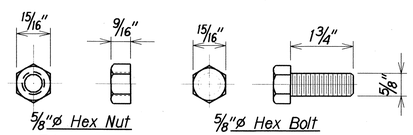
TRANSITION SECTION
Scale: 1" = 1'-0"



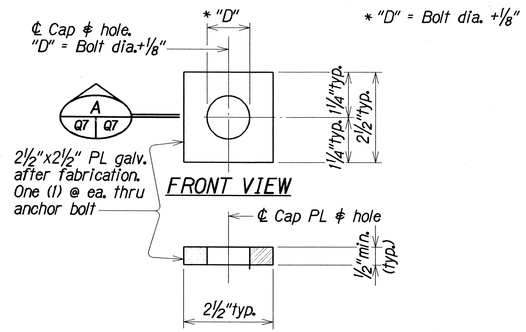
⅝"ø BUTTON HEAD BOLT ℄ RECESS NUT
Scale: 6" = 1'-0"



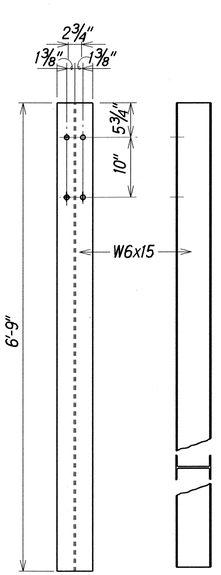
STEEL WASHER FOR ⅝"ø BOLT
Scale: 6" = 1'-0"



⅝"ø HEX BOLT ℄ NUT (POST)
Scale: 6" = 1'-0"

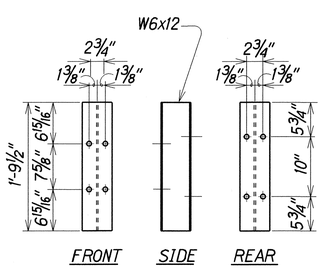


CAP (BEARING) PLATE DETAIL
Scale: 6" = 1'-0"



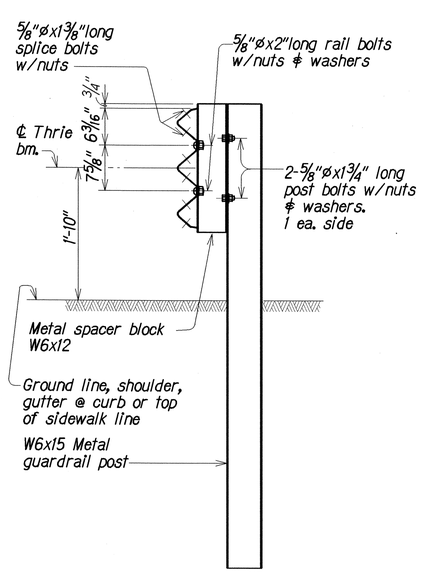
FRONT SIDE

POST DETAILS
Scale: 1" = 1'-0"



FRONT SIDE REAR

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



TYPICAL SECTION
METAL GUARDRAIL ON METAL POST WITH METAL SPACER BLOCK
Scale: 1" = 1'-0"

ORIGINAL PLAN	SURVEY PLOTTED BY	KSG, LWA	DATE July 1998
	DRAWN BY		July 1998
NOTE BOOK	TRACED BY		July 1998
	DESIGNED BY	SA	July 1998
No. 2\dlhg7.dgn	QUANTITIES BY	SA	July 1998
	CHECKED BY	DDO	July 1998

METAL GUARDRAIL TYPE 3 THRIE BEAM AND APPURTENANCES DETAILS

STATE OF HAWAII
DEPARTMENT OF TRANSPORTATION
HIGHWAYS DIVISION

PALAILAI INTERCHANGE STRUCTURE
METAL GUARDRAIL TYPE 3 THRIE BEAM AND APPURTENANCES DETAILS
INTERSTATE ROUTE H-1
PALAILAI INTERCHANGE RECONSTRUCTION
Fed. Aid Project No. IM-NH-HI-1(239)

Scale: As Noted Date: Apr. 2001

SHEET No. Q7 OF 7 SHEETS