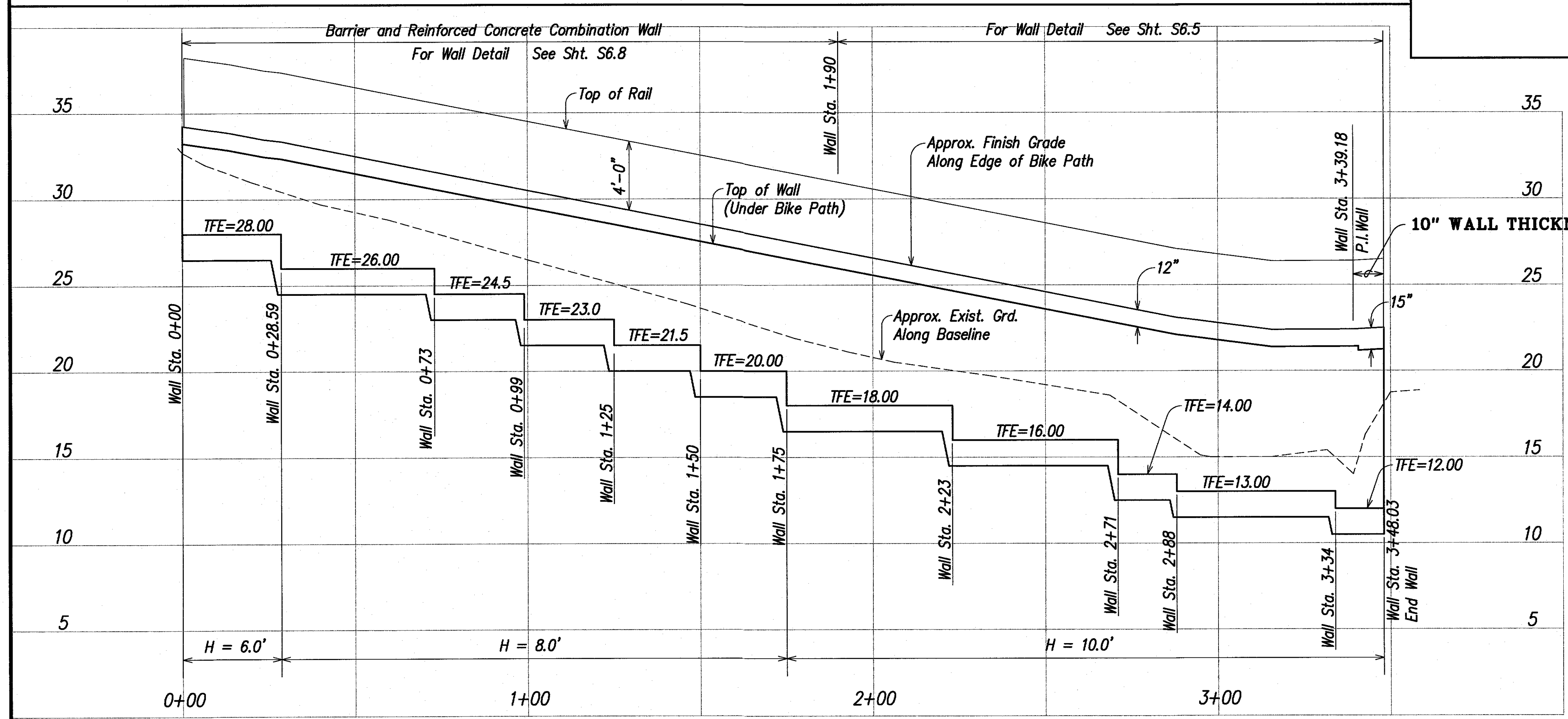
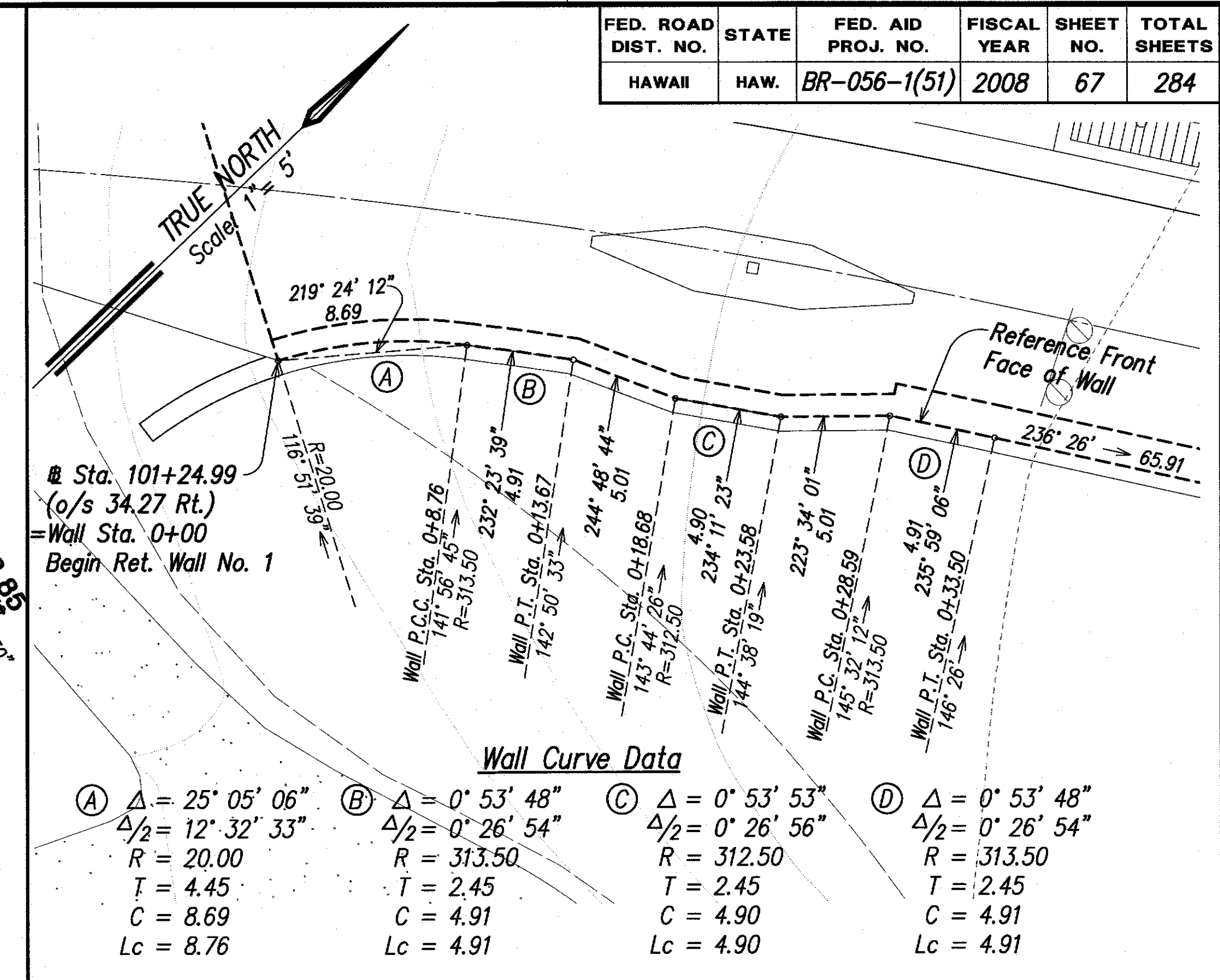
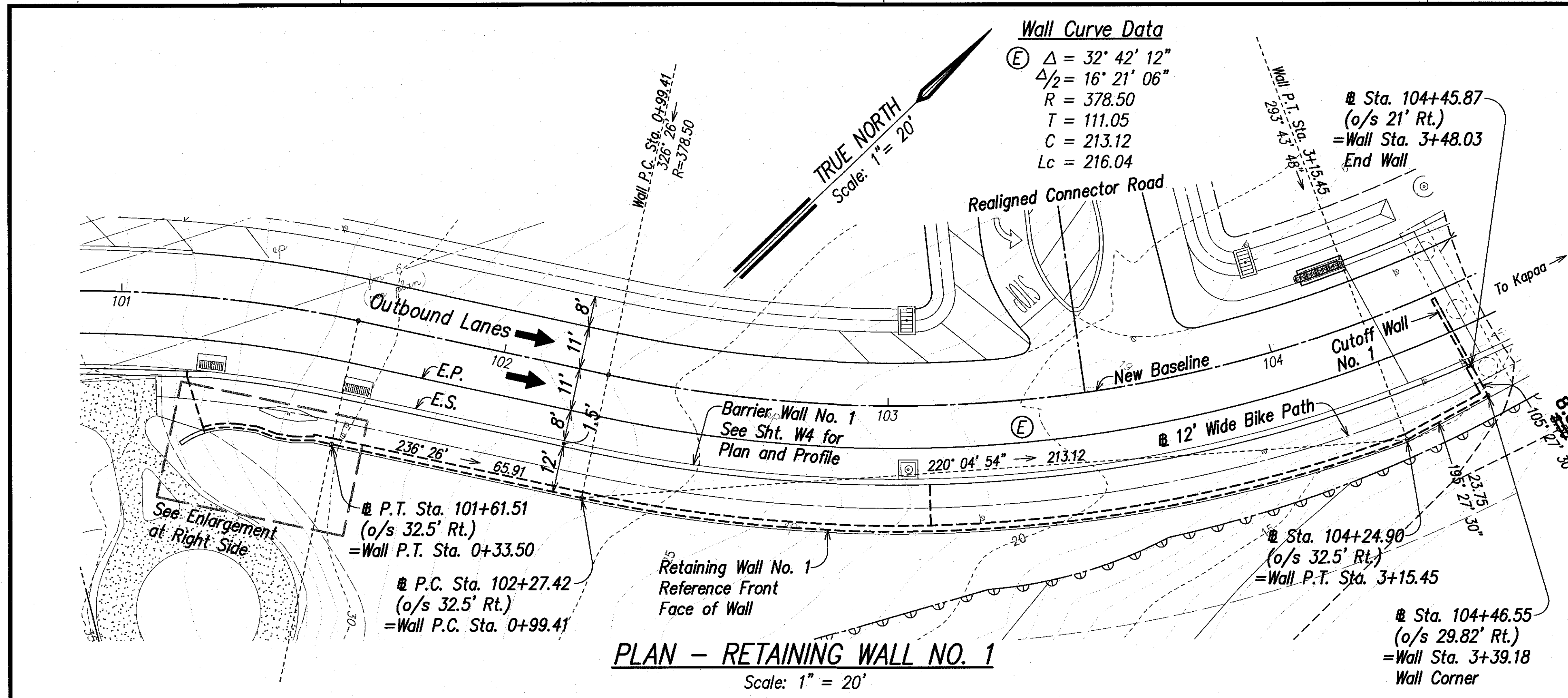


FED. ROAD DIST. NO.	STATE	FED. AID PROJ. NO.	FISCAL YEAR	SHEET NO.	TOTAL SHEETS
HAWAII	HAW.	BR-056-1(51)	2008	67	284



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

RUSSELL M. ARAKI
LICENSED PROFESSIONAL ENGINEER
No. 8287-C
HAWAII, U.S.A.

THIS WORK WAS PREPARED BY ME OR UNDER MY SUPERVISION

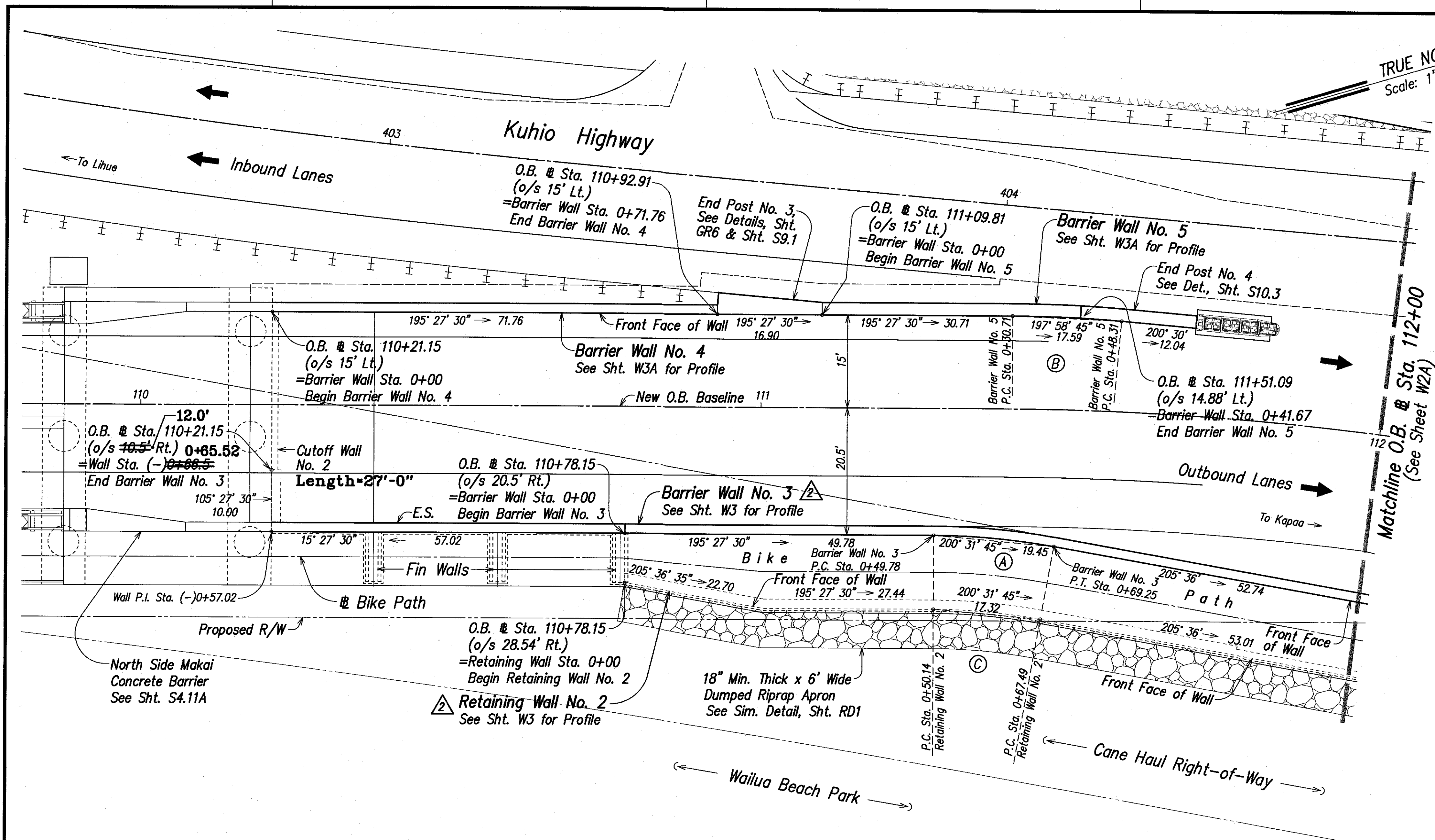
Russell M. Araki
RPA, Inc.
480 PARK ENGINEERING
LICENSE EXPIRES 4-30-20

STATE OF HAWAII
DEPARTMENT OF TRANSPORTATION
HIGHWAYS DIVISION

RETAINING WALL NO. 1
PLAN & PROFILE
KUHIO HIGHWAY, SHORT TERM IMPROVEMENTS
Wailua Cane Haul Bridge Widening
Fed. Aid Project No. BR-056-1(51)
Scale: As Noted Date: MAY 2008
SHEET No. W1 OF W5 SHEETS

"AS-BUILT"

FED. ROAD DIST. NO.	STATE	FED. AID PROJ. NO.	FISCAL YEAR	SHEET NO.	TOTAL SHEETS
HAWAII	HAW.	BR-056-1(51)	2008	C.O. 68	284



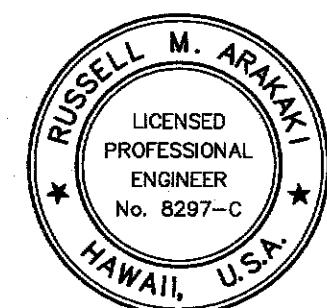
Wall Curve Data

- (A) $\Delta = 10^\circ 08' 30''$
 $\Delta/2 = 5^\circ 04' 15''$
 $R = 110.00$
 $T = 9.76$
 $C = 19.45$
 $Lc = 19.47$
- (B) $\Delta = 1^\circ 57' 27''$
 $\Delta/2 = 0^\circ 58' 44''$
 $R = 200.00$
 $T = 8.81$
 $C = 17.59$
 $Lc = 17.60$
- (C) $\Delta = 10^\circ 08' 30''$
 $\Delta/2 = 5^\circ 04' 15''$
 $R = 98.00$
 $T = 8.70$
 $C = 17.32$
 $Lc = 17.35$

LEGEND FOR AS-BUILT POSTINGS

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

07/06/10	Revised Barrier Wall 3 & Retaining Wall 2 and Deleted Ret. Walls 3-5
DATE	REVISION
STATE OF HAWAII DEPARTMENT OF TRANSPORTATION HIGHWAYS DIVISION PLAN-BARRIER WALLS NO. 3-5 & RETAINING WALL NO. 2 KUHIU HIGHWAY, SHORT TERM IMPROVEMENTS Wailua Cane Haul Bridge Widening Fed. Aid Project No. BR-056-1(51) Scale: As Noted Date: MAY 2008 SHEET No. W2 OF W5 SHEETS	



THIS WORK WAS PREPARED BY
ME OR UNDER MY SUPERVISION
Russell M. Aramaki
RPM, Inc.
d/b/a PARK ENGINEERING
LICENSE EXPIRES 4-30-20

PLAN

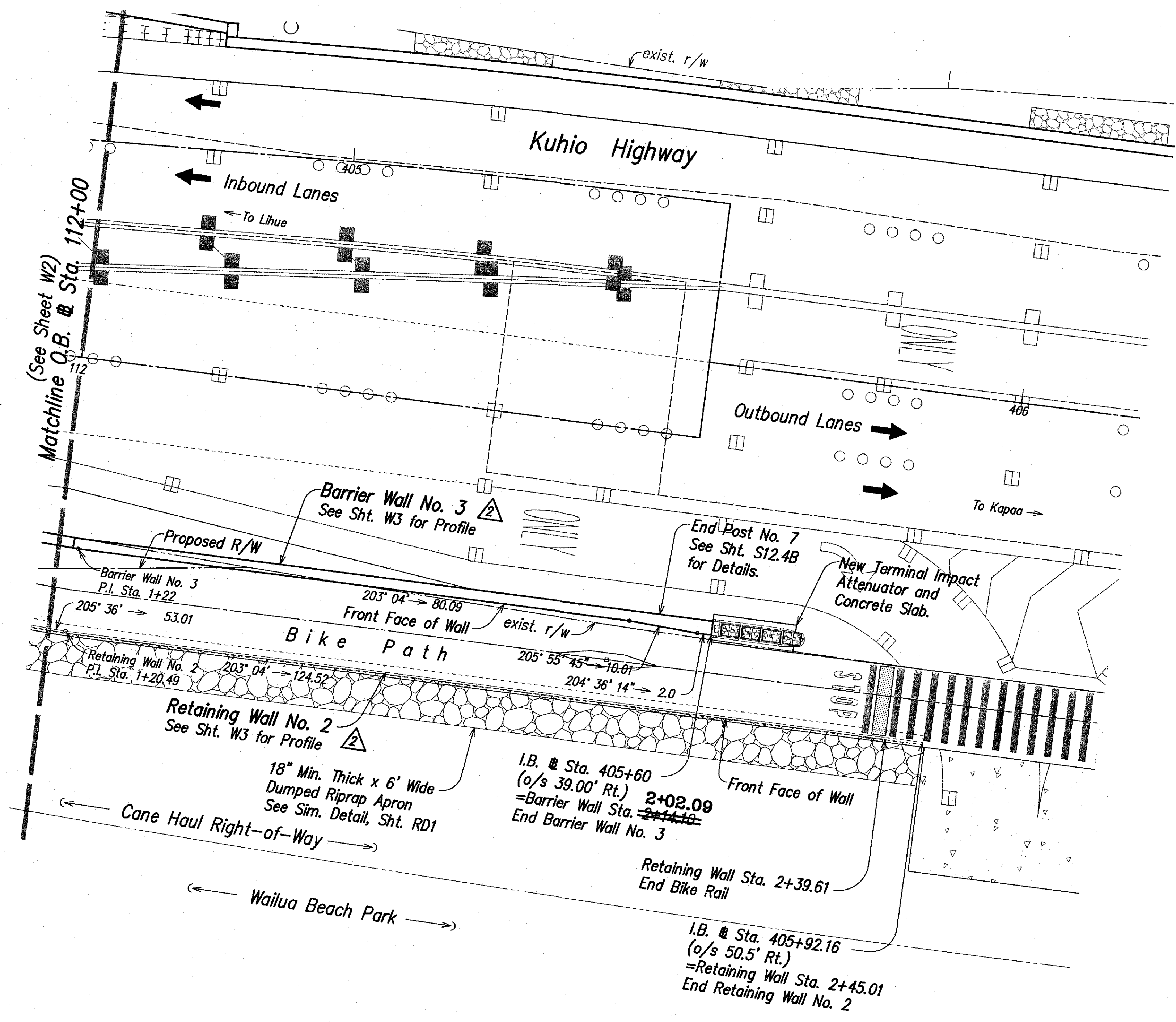
Scale: 1" = 10'

DATE	_____
DESIGNED BY	_____
CHECKED BY	_____
QUANTITIES BY	_____
NOTE BOOK	_____
ORIGINAL PLAN	_____

"AS-BUILT"

C.O. 68

FED. ROAD DIST. NO.	STATE	FED. AID PROJ. NO.	FISCAL YEAR	SHEET NO.	TOTAL SHEETS
HAWAII	HAW.	BR-056-1(51)	2008	C.O. 68 S-1	284



TRUE NORTH
Scale: 1" = 10'

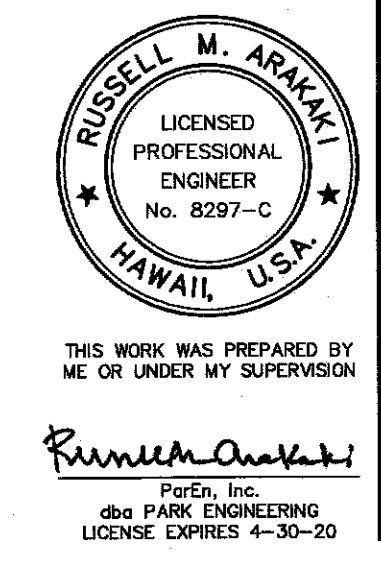
Wall Curve Data
 (A) $\Delta = 90^\circ 00'$
 $\Delta/2 = 45^\circ 00'$
 $R = 20.50$
 $T = 20.50$
 $C = 28.99$
 $L_c = 32.20$

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

PLAN
Scale: 1" = 10'

DESIGNED BY	DATE
CHECKED BY	
NOTED BY	
QUANTITIES BY	
PLANNED BY	
ORIGINAL PLAN	

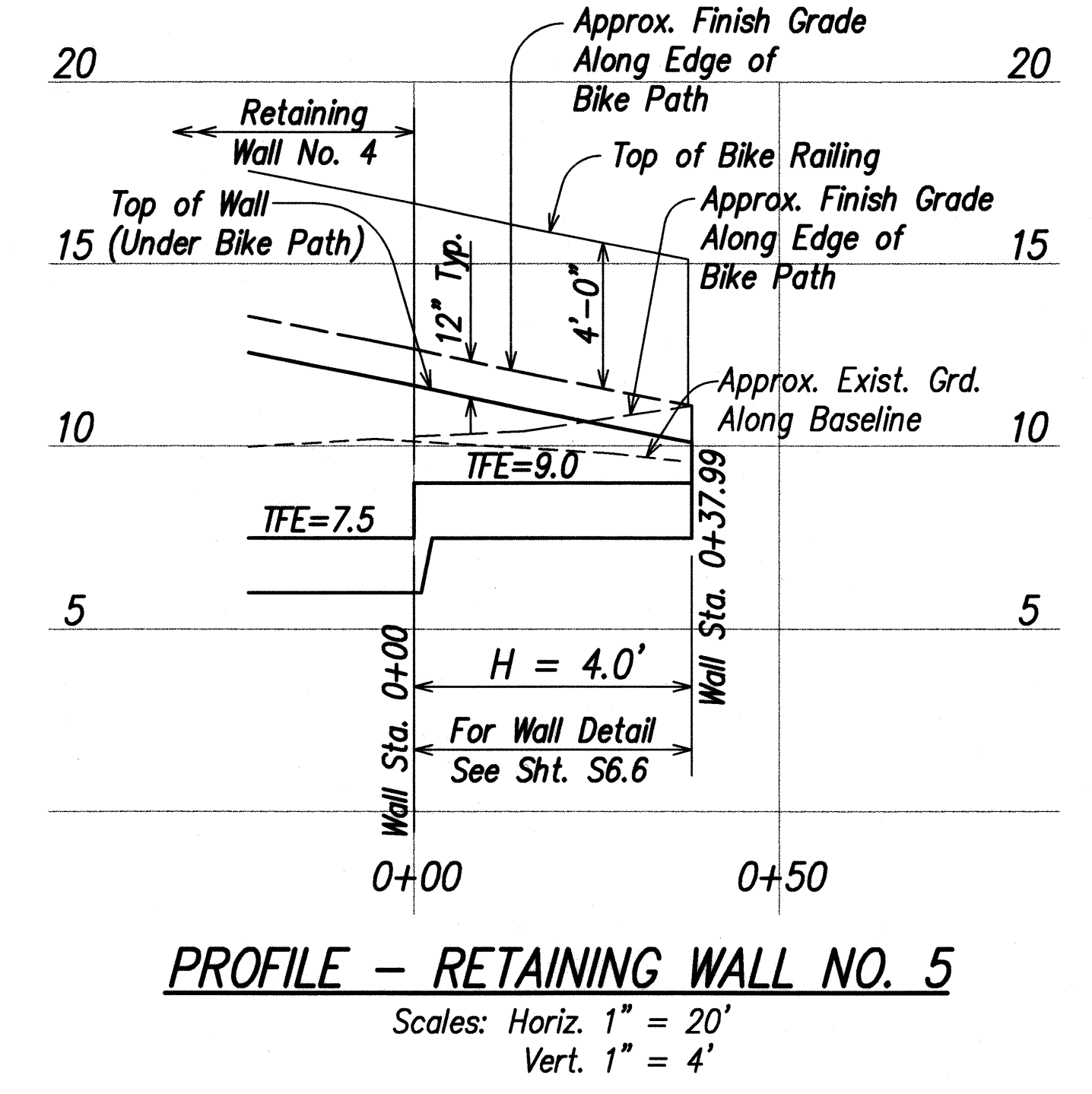
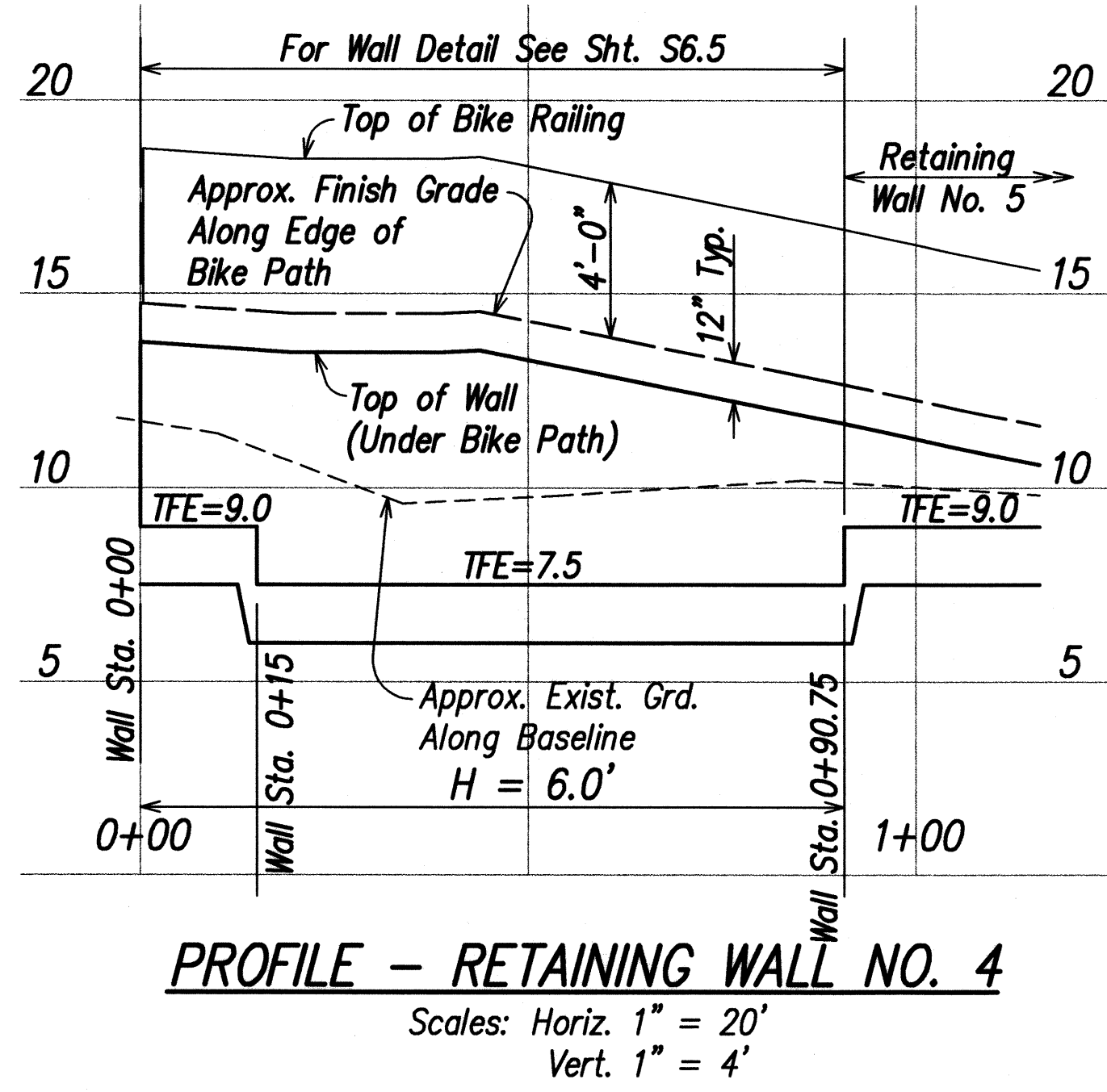
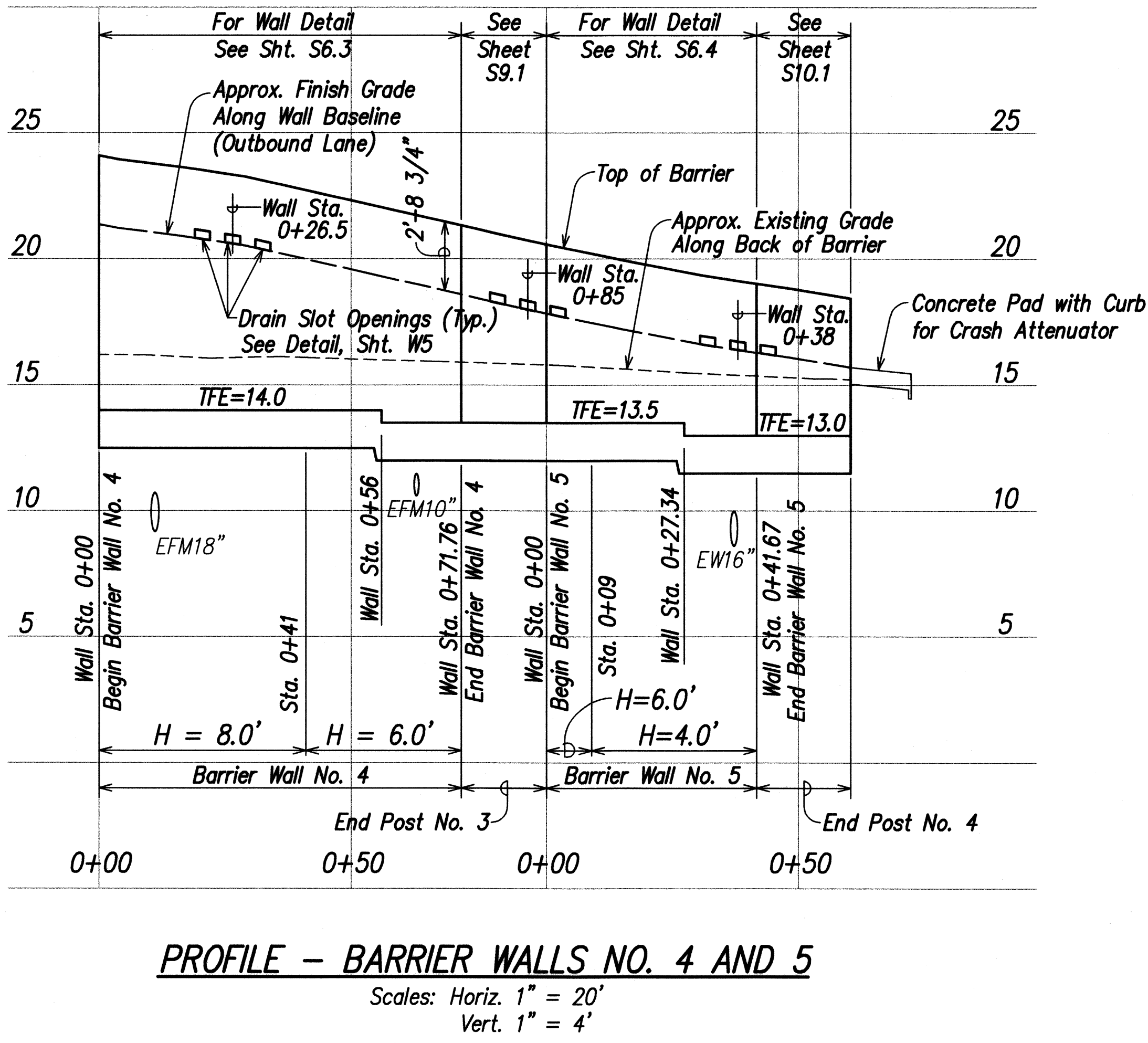
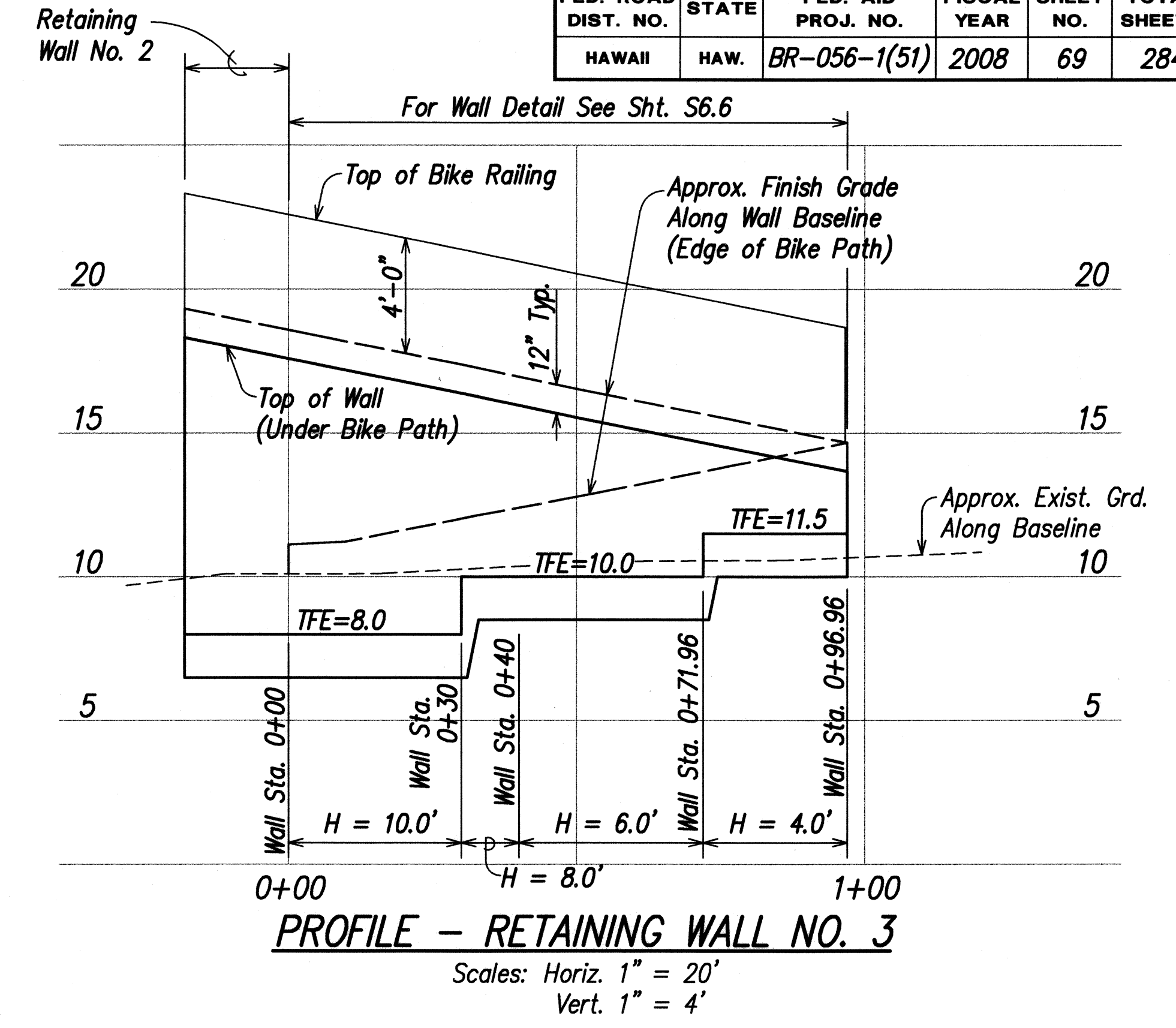
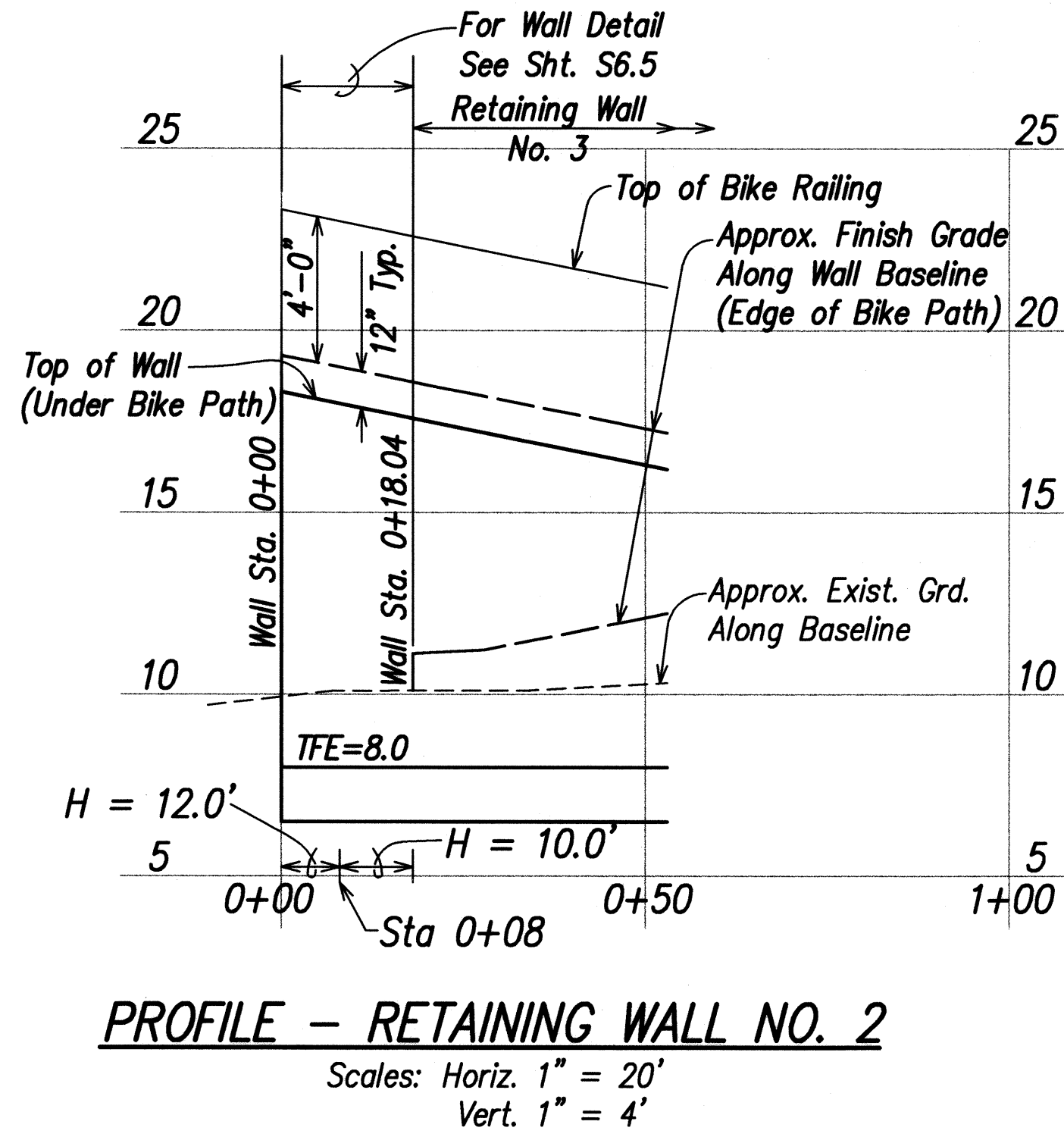
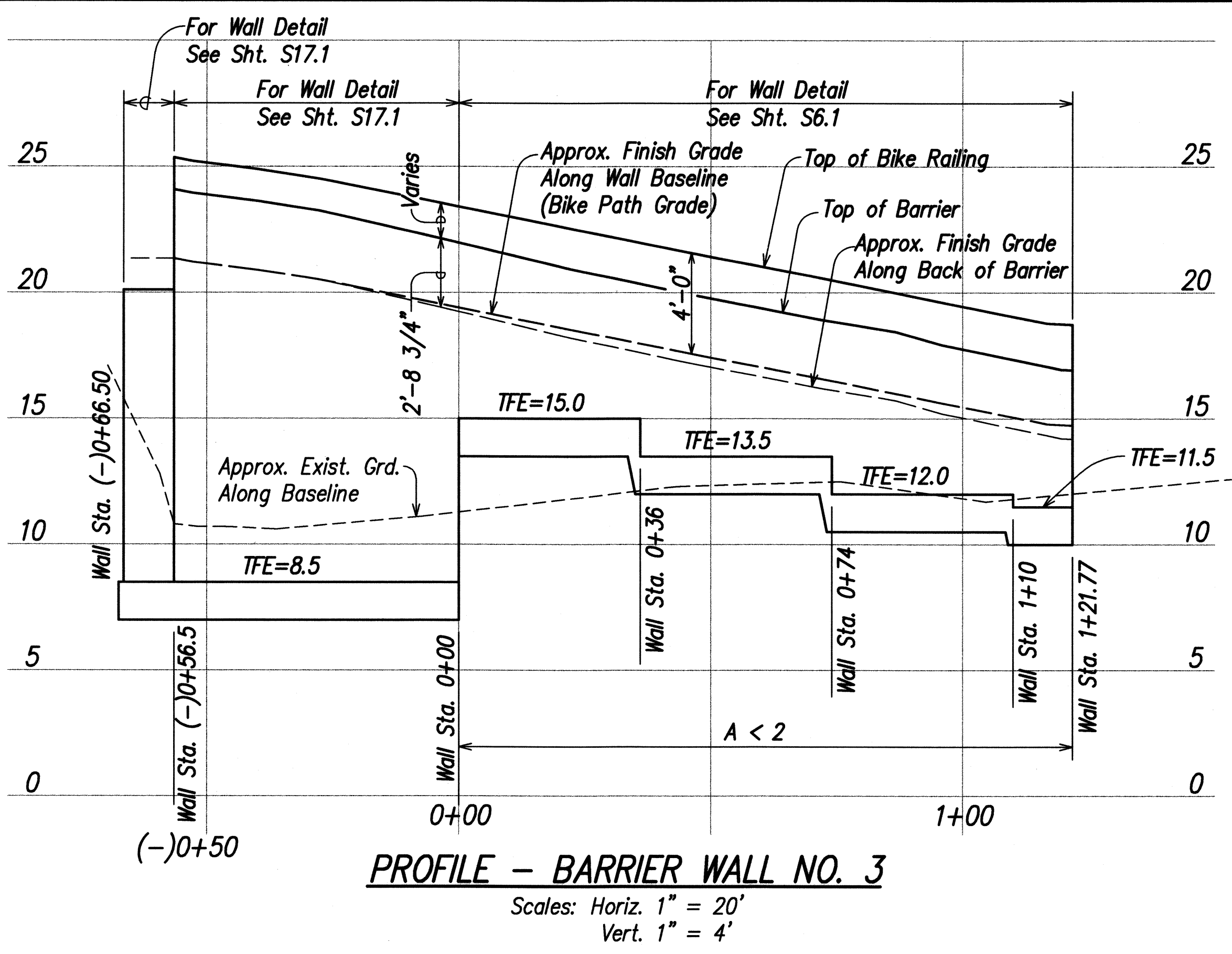
07/06/10	Added Sheet for Revision of Barrier Wall 3 and Retaining Wall 2
DATE	REVISION
STATE OF HAWAII DEPARTMENT OF TRANSPORTATION HIGHWAYS DIVISION PLAN-BARRIER WALL NO. 3 & RETAINING WALL NO. 2 KUHIO HIGHWAY, SHORT TERM IMPROVEMENTS Wailua Cane Haul Bridge Widening Fed. Aid Project No. BR-056-1(51) Scale: As Noted Date: MAY 2008 SHEET No. W2A OF W5 SHEETS	



"AS-BUILT"

C.O. 68 S-1

FED. ROAD DIST. NO.	STATE	FED. AID PROJ. NO.	FISCAL YEAR	SHEET NO.	TOTAL SHEETS
HAWAII	HAW.	BR-056-1(51)	2008	69	284



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

RUSSELL M. ARAMAKI
LICENSED PROFESSIONAL ENGINEER
No. 8297-C
HAWAII, U.S.A.

THIS WORK WAS PREPARED BY ME OR UNDER MY SUPERVISION

Russell M. Aramaki
PAREN, INC.
888 PARK ENGINEERING
LICENSE EXPIRES 4-30-10

STATE OF HAWAII
DEPARTMENT OF TRANSPORTATION
HIGHWAYS DIVISION

**PROFILES-BARRIER WALLS 3-5
& RETAINING WALLS NO. 2-5**

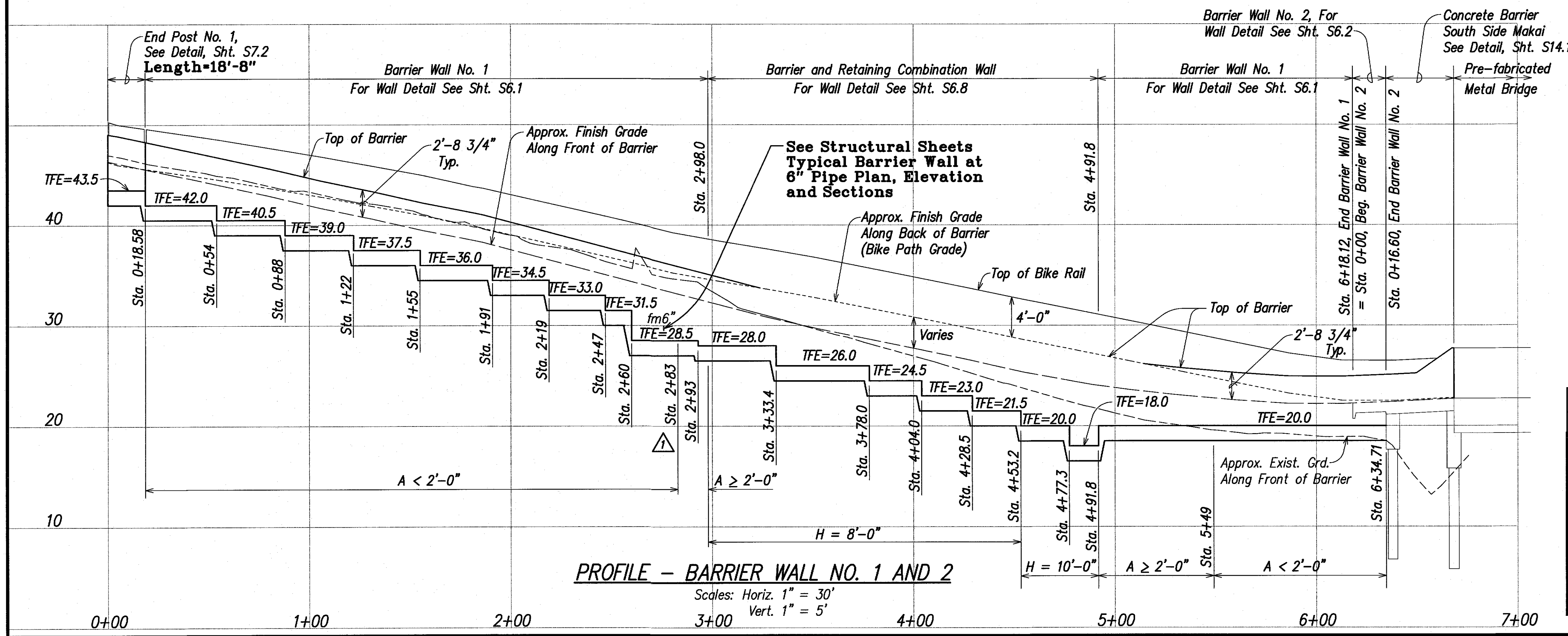
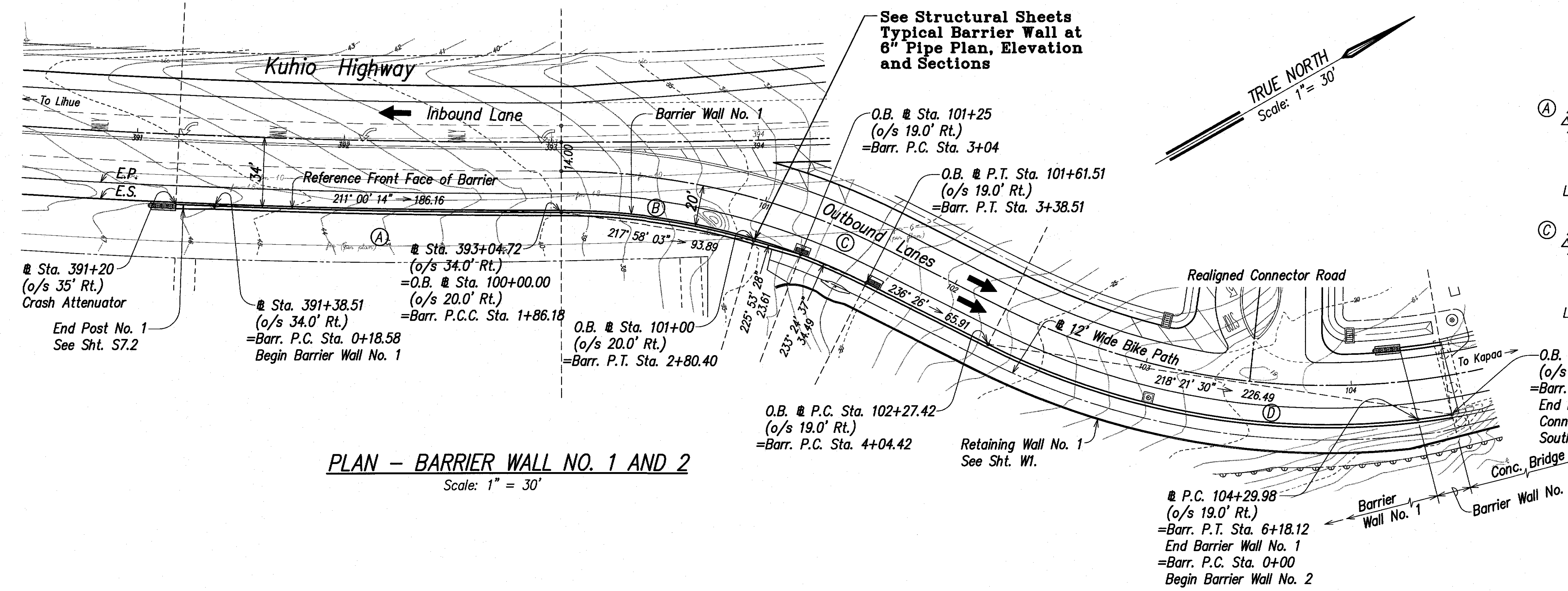
KUHIO HIGHWAY, SHORT TERM IMPROVEMENTS

Wailua Cane Haul Bridge Widening
Fed. Aid Project No. BR-056-1(51)

Scale: As Noted Date: MAY 2008

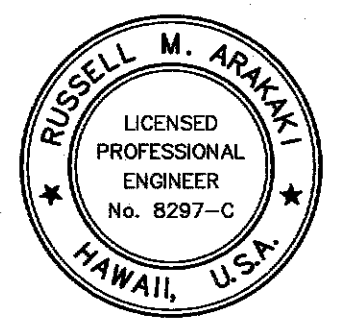
SHEET No. W3 OF W5 SHEETS

FED. ROAD DIST. NO.	STATE	FED. AID PROJ. NO.	FISCAL YEAR	SHEET NO.	TOTAL SHEETS
HAWAII	HAW.	BR-056-1(51)	2008	CO 70	284



LEGEND FOR AS-BUILT POSTINGS

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



02/11/10 Revised wall profile

DATE **REVISION**

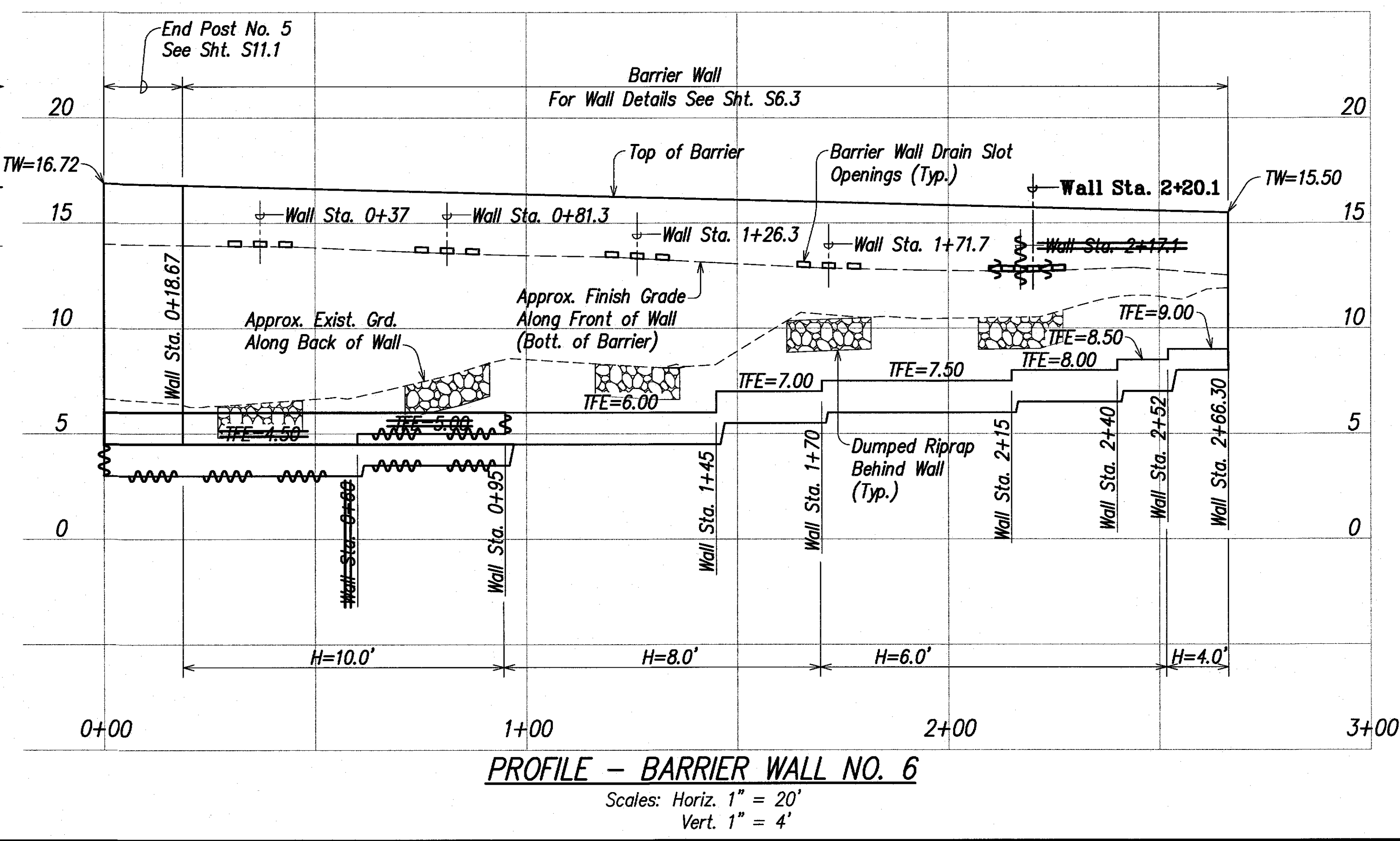
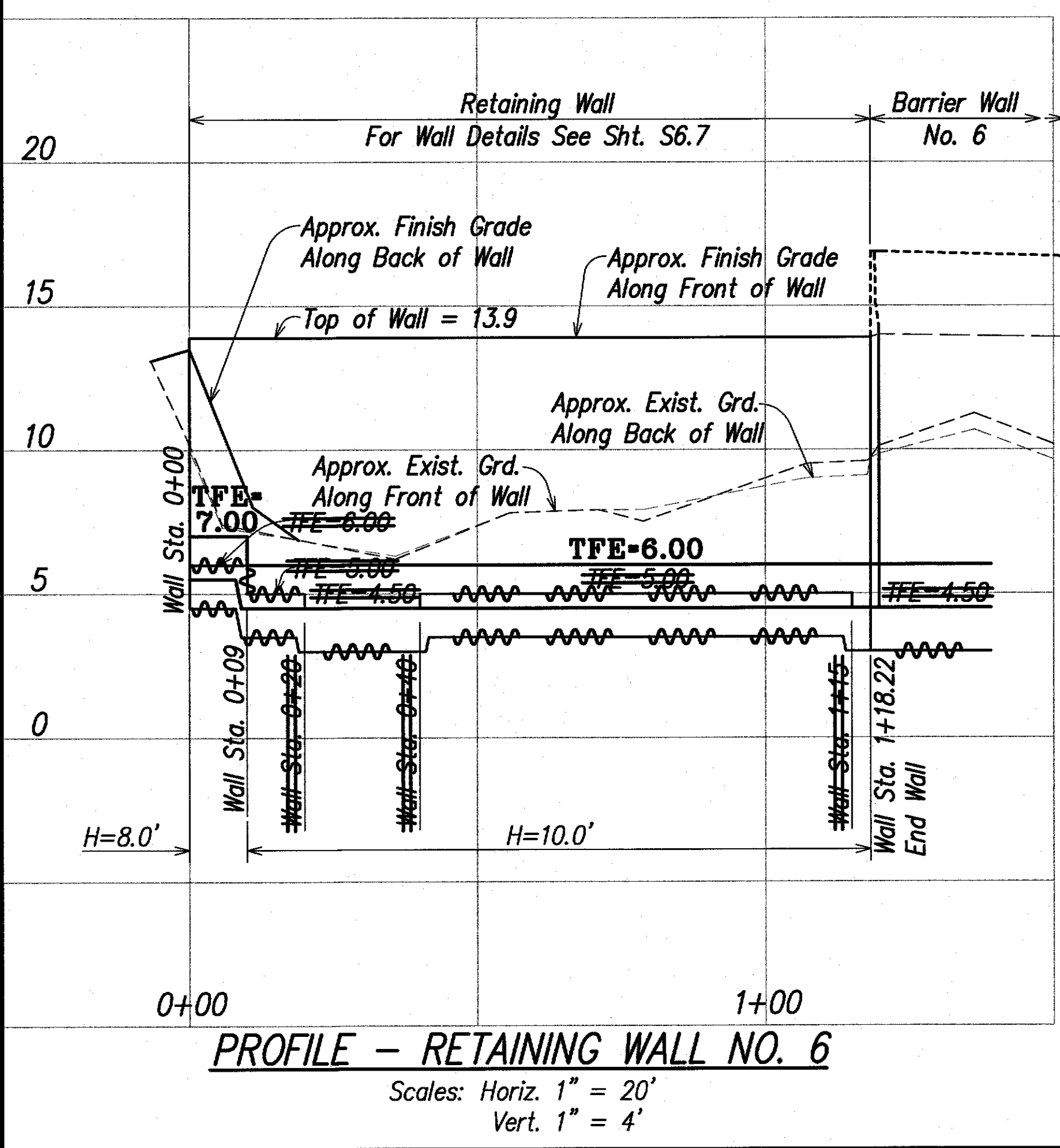
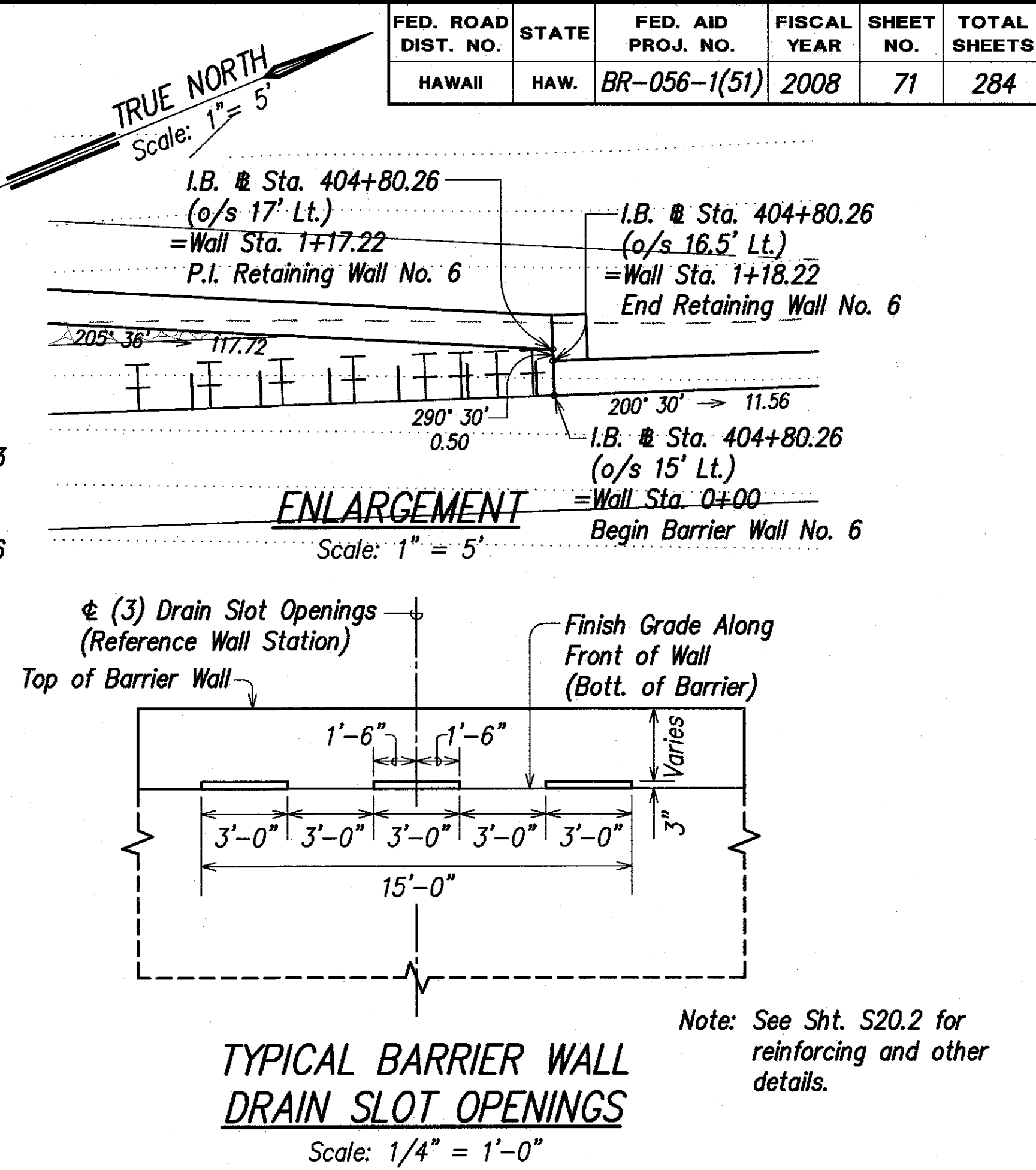
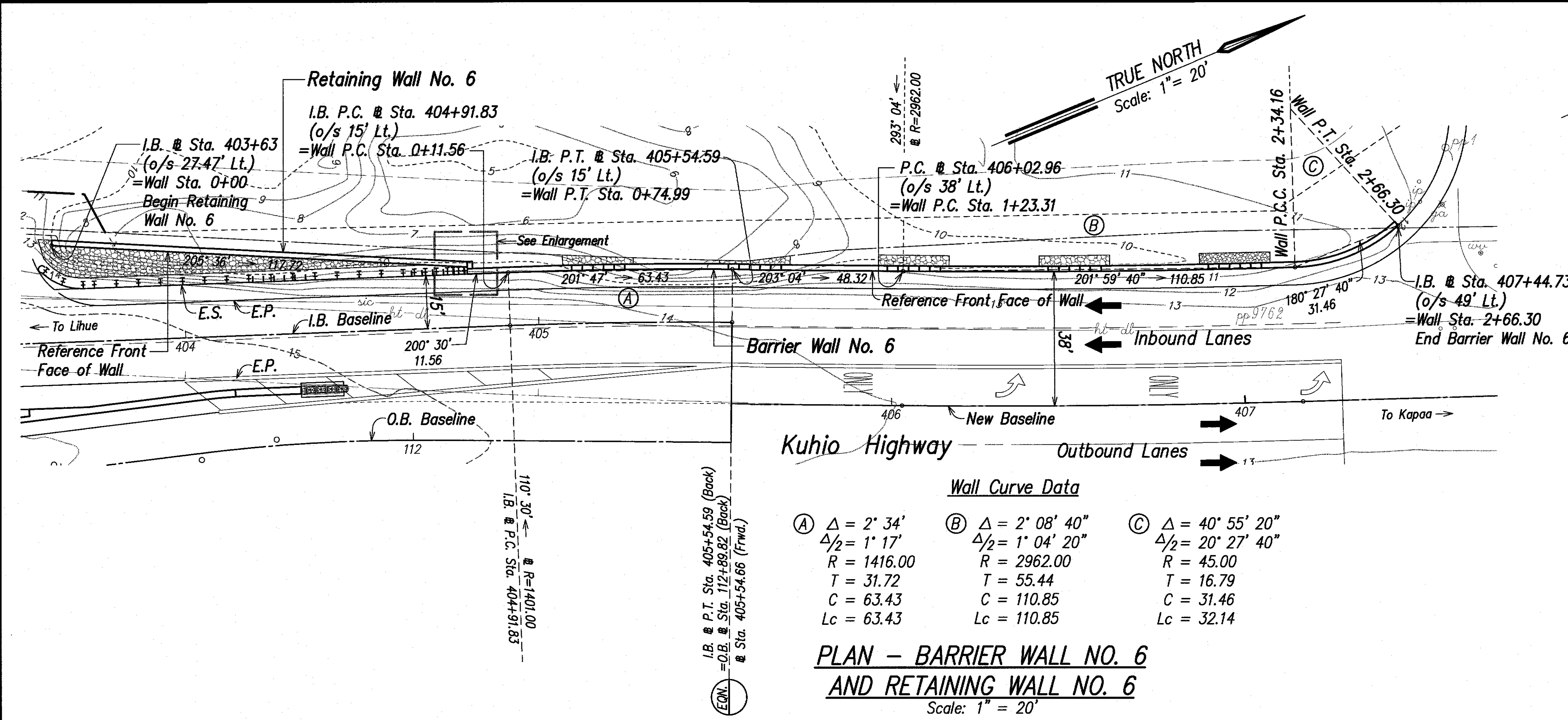
STATE OF HAWAII
DEPARTMENT OF TRANSPORTATION
HIGHWAYS DIVISION
BARRIER WALL NO. 1 AND 2
PLAN & PROFILE
KUHIO HIGHWAY, SHORT TERM IMPROVEMENTS
Wailua Cane Haul Bridge Widening
Fed. Aid Project No. BR-056-1(51)
Scale: As Noted Date: MAY 2008
SHEET No. W4 OF W5 SHEETS

ORIGINAL PLAN	DATE
DESIGNED BY	
CHECKED BY	
NOTED BY	
QUANTITIES BY	
CHECKED BY	

"AS-BUILT"

C.O. 70

FED. ROAD DIST. NO.	STATE	FED. AID PROJ. NO.	FISCAL YEAR	SHEET NO.	TOTAL SHEETS
HAWAII	HAW.	BR-056-1(51)	2008	71	284



LEGEND FOR AS-BUILT POSTINGS

Squiggly line for as-built deletion

Double line for as-built deletion

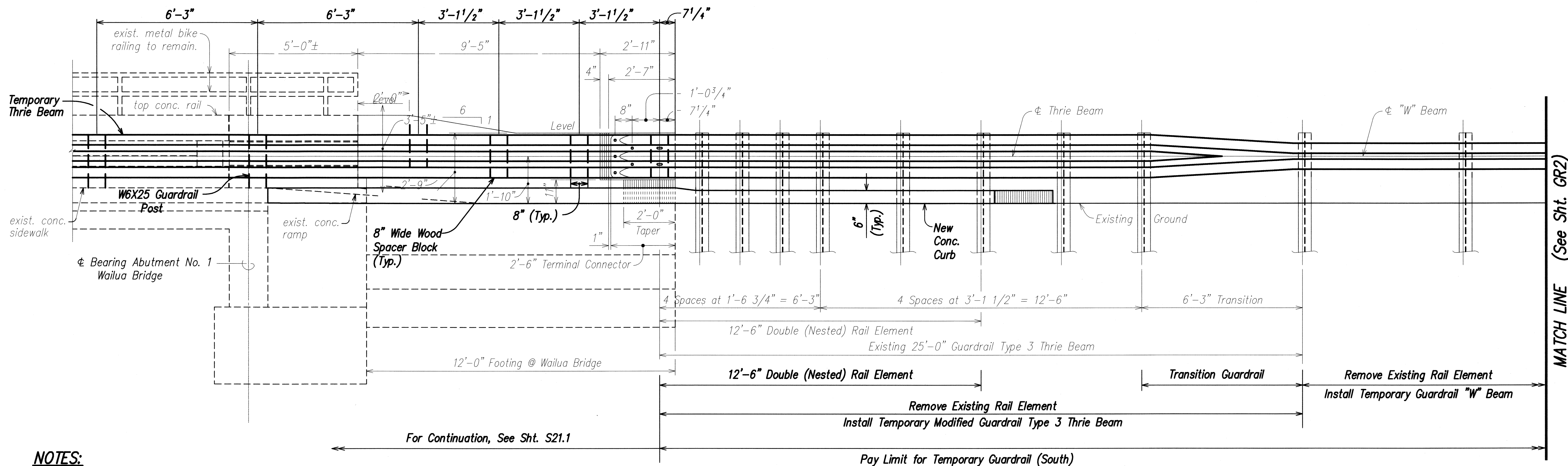
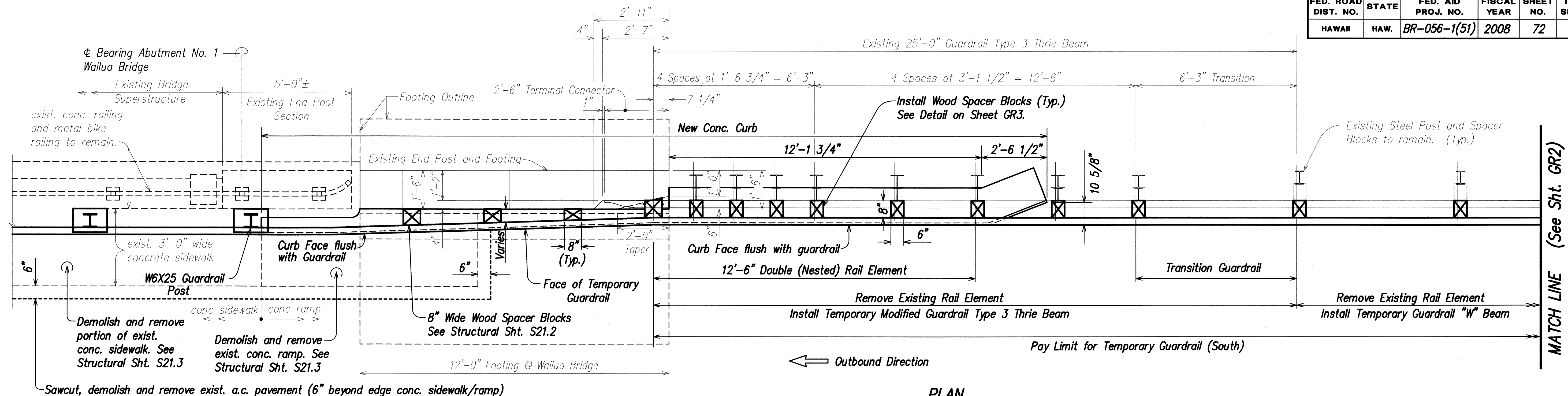
Roadway

Text for as-built posting

STATE OF HAWAII
DEPARTMENT OF TRANSPORTATION
HIGHWAYS DIVISION
BARRIER WALL NO. 6 & RET. WALL NO. 6 PLAN & PROFILE
KUHIO HIGHWAY, SHORT TERM IMPROVEMENTS
Wailua Cane Haul Bridge Widening
Fed. Aid Project No. BR-056-1(51)
Scale: As Noted Date: MAY 2008
SHEET No. W5 OF W5 SHEETS

RUSSELL M. ARAKY
LICENSED PROFESSIONAL ENGINEER
No. 8297-C
HAWAII, U.S.A.
THIS WORK WAS PREPARED BY ME OR UNDER MY SUPERVISION
Rusell M. Araky
RPA, INC.
480 PARK ENGINEERING
LICENSE EXPIRES 4-30-20

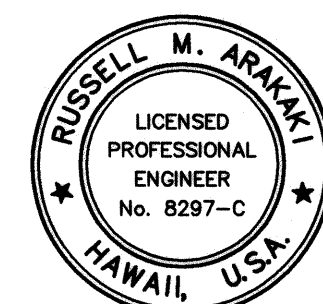
FED. ROAD DIST. NO.	STATE	FED. AID PROJ. NO.	FISCAL YEAR	SHEET NO.	TOTAL SHEETS
HAWAII	HAW.	BR-056-1(51)	2008	72	284

**NOTES:**

- Temporary guardrail shall be constructed during Construction Phase 4. See Sht. CP7.
- During Construction Phase 10, the Contractor shall remove all temporary guardrails, spacer blocks, and incidentals installed for this temporary work. Install new rail elements and incidentals back to the original rail location.
- Reflector markers (RM-5) shall be mounted on the temporary and restored guardrails at every 25-feet on center. See Detail Notes on Sht. GR8 and GR11.

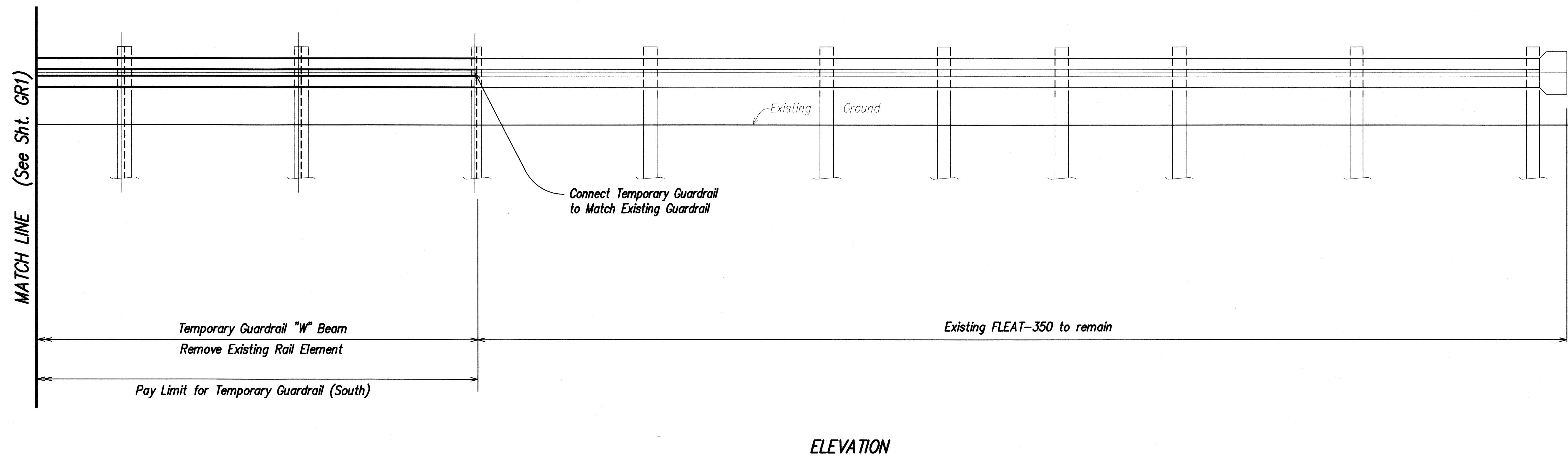
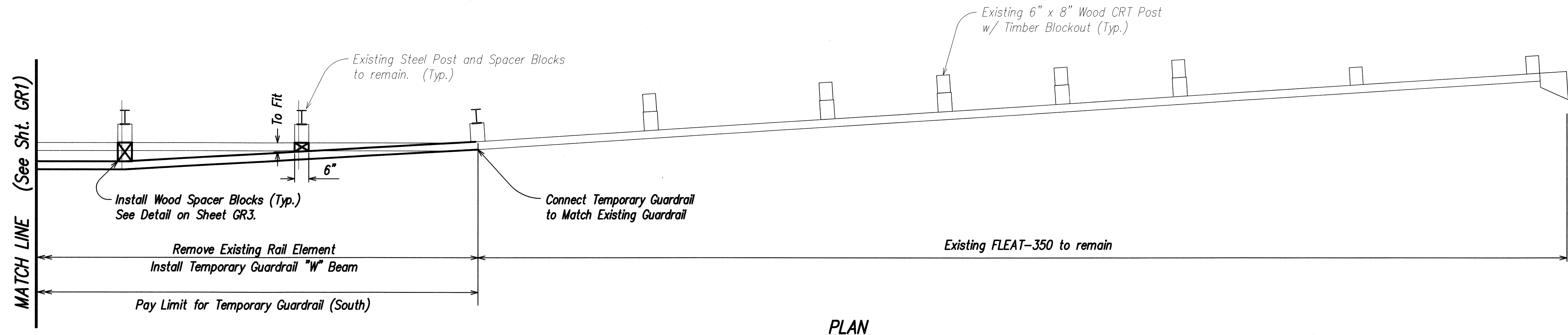
ELEVATION**TEMPORARY GUARDRAIL (SOUTH)**

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

THIS WORK WAS PREPARED BY
ME OR UNDER MY SUPERVISIONRussell M. Araki
P.E., Inc.
484 PARK ENGINEERING
LICENSE EXPIRES 4-30-10

STATE OF HAWAII
DEPARTMENT OF TRANSPORTATION
HIGHWAYS DIVISION
TEMPORARY GUARDRAIL (SOUTH)
PLAN AND ELEVATION
KUHO HIGHWAY, SHORT TERM IMPROVEMENTS
Wailua Cane Haul Bridge Widening
Fed. Aid Project No. BR-056-1(51)
Scale: As Noted Date: MAY 2008
SHEET No. GR1 OF GR13 SHEETS

FED. ROAD DIST. NO.	STATE	FED. AID PROJ. NO.	FISCAL YEAR	SHEET NO.	TOTAL SHEETS
HAWAII	HAW.	BR-056-1(51)	2008	73	284



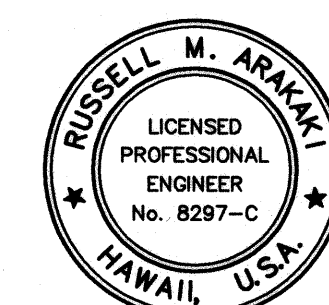
NOTES:

1. Temporary guardrail shall be constructed during Construction Phase 4. See Sht. CP7.
2. During Construction Phase 10, the Contractor shall remove all temporary guardrails, spacer blocks, and incidentals installed for this temporary work. Install new rail elements and incidentals back to the original rail location.
3. Reflector markers (RM-5) shall be mounted on the temporary and restored guardrails at every 25-feet on center. See Detail Notes on Sht. GR8 and GR11.

TEMPORARY GUARDRAIL (SOUTH)

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

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

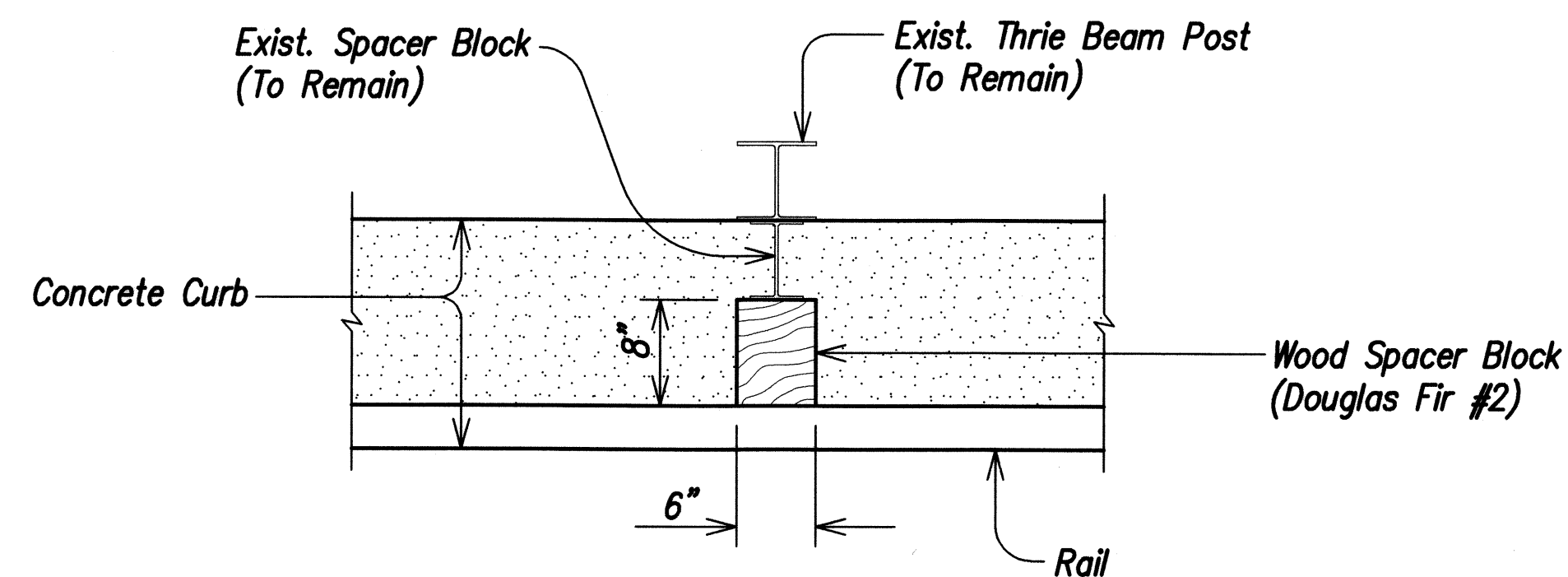


THIS WORK WAS PREPARED BY
ME OR UNDER MY SUPERVISION

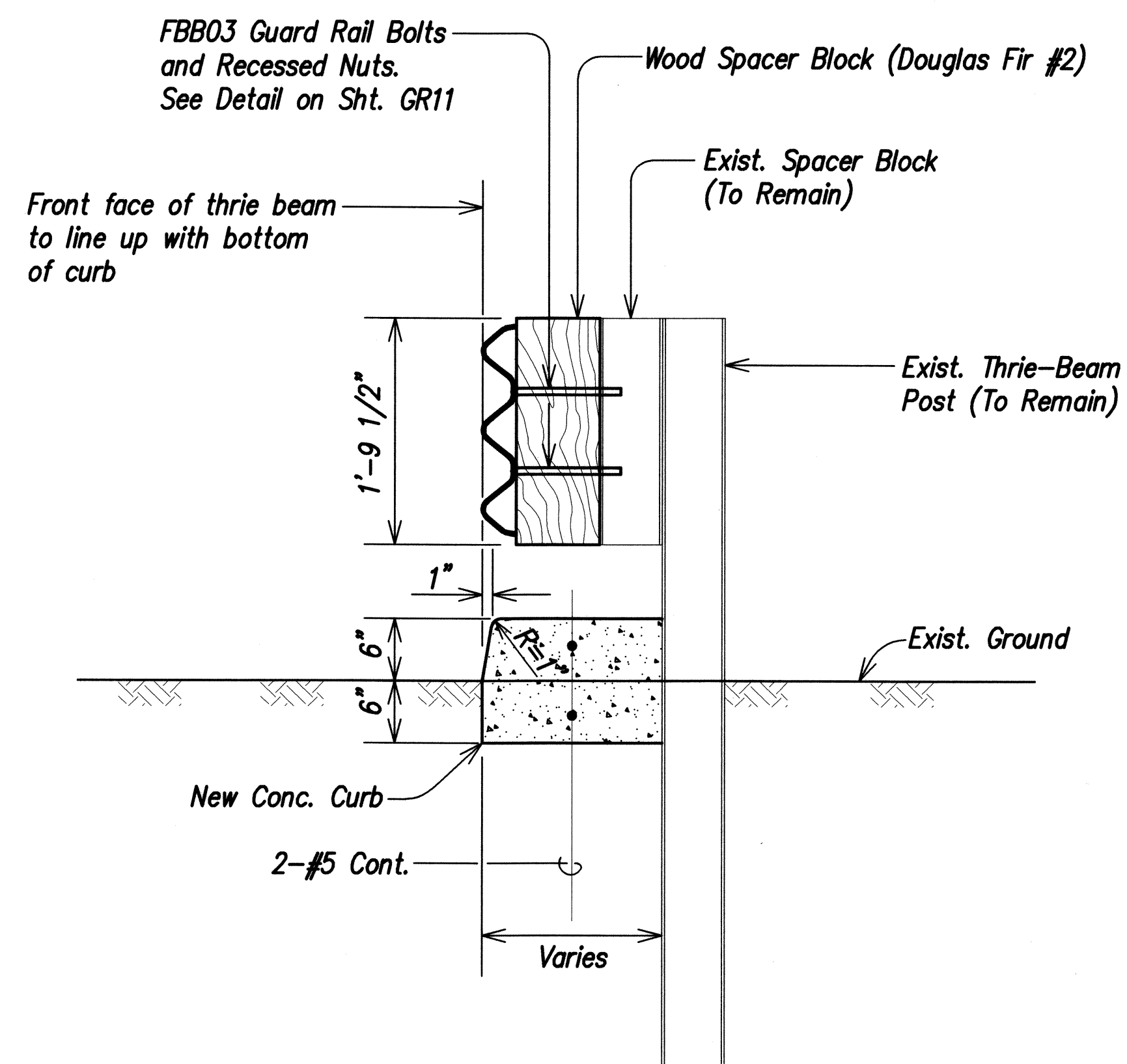
Russell M. Araki
ParEn, Inc.
dba PARK ENGINEERING
LICENSE EXPIRES 4-30-10

STATE OF HAWAII
DEPARTMENT OF TRANSPORTATION
HIGHWAYS DIVISION
TEMPORARY GUARDRAIL (SOUTH)
PLAN AND ELEVATION
KUHIO HIGHWAY, SHORT TERM IMPROVEMENTS
Wailua Cane Haul Bridge Widening
Fed. Aid Project No. BR-056-1(51)
Scale: As Noted Date: MAY 2008
SHEET No. GR2 OF GR13 SHEETS

FED. ROAD DIST. NO.	STATE	FED. AID PROJ. NO.	FISCAL YEAR	SHEET NO.	TOTAL SHEETS
HAWAII	HAW.	BR-056-1(51)	2008	74	284

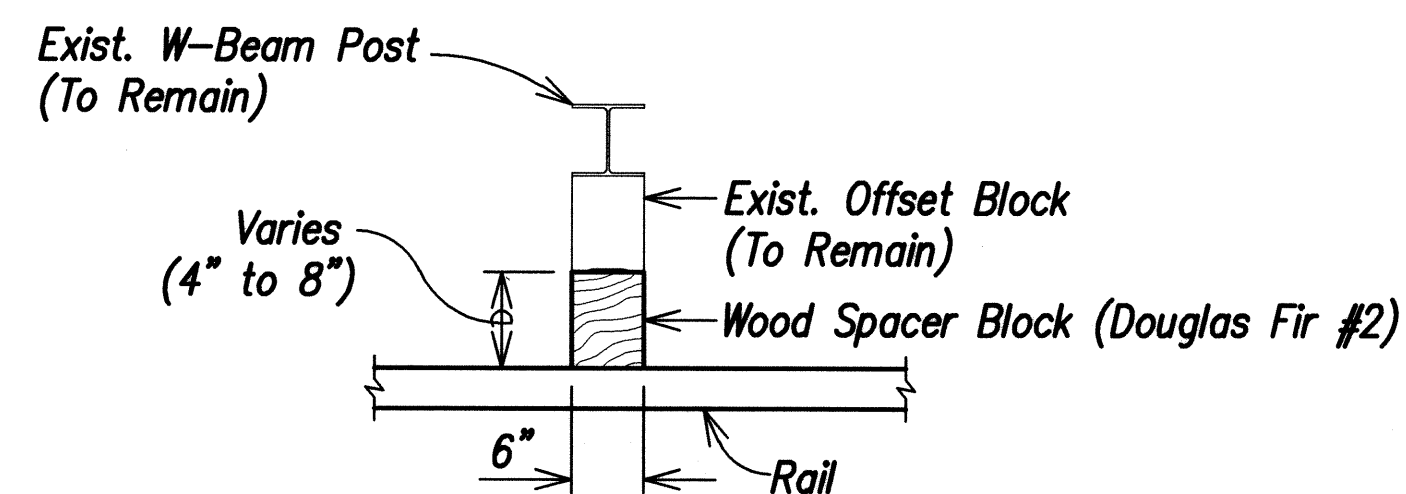


PLAN

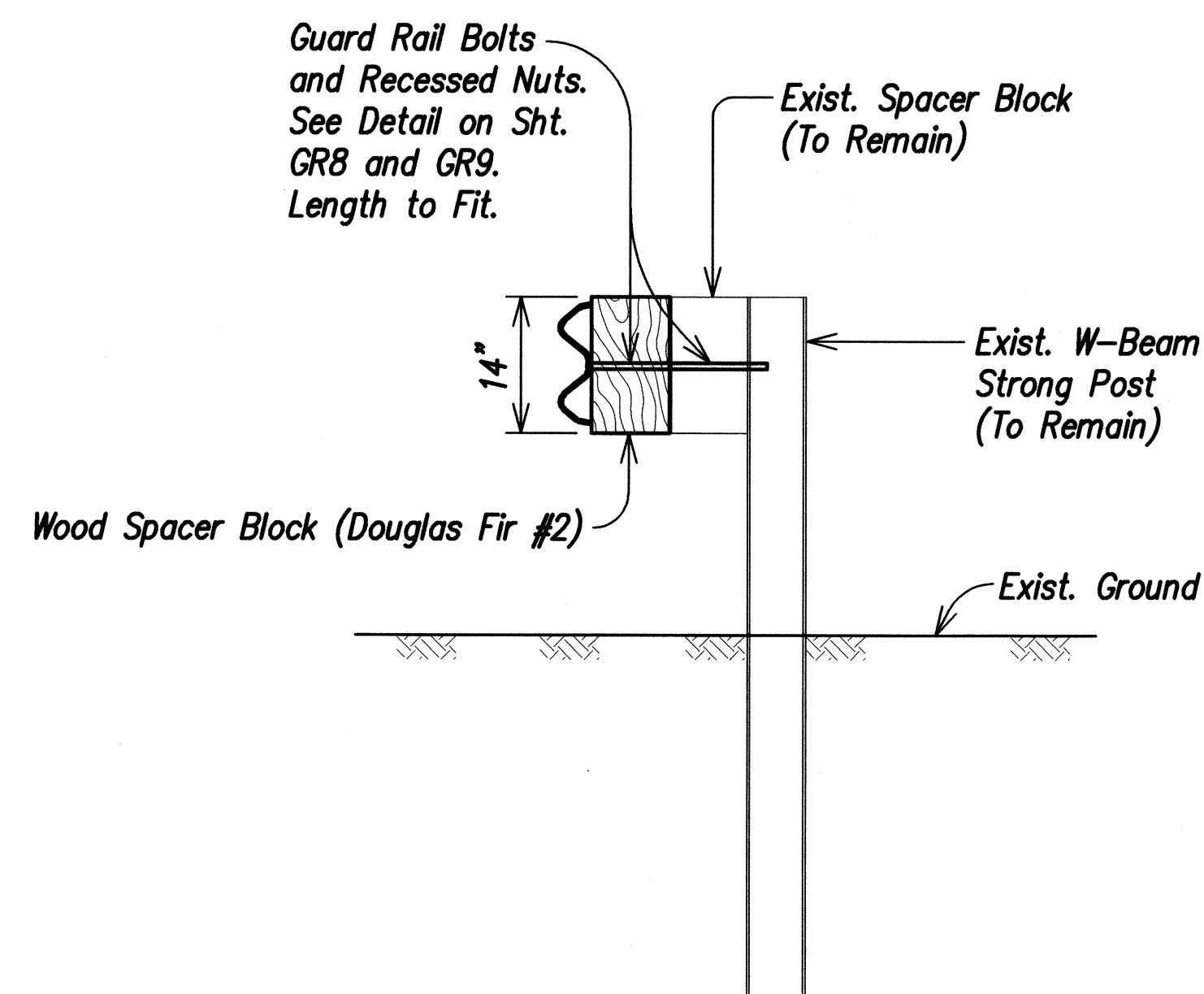


ELEVATION

TYPICAL DETAIL-WOOD SPACER BLOCK
AT TYPE 3 THRIE BEAM GUARDRAIL
Scale: 1"= 1'-0"

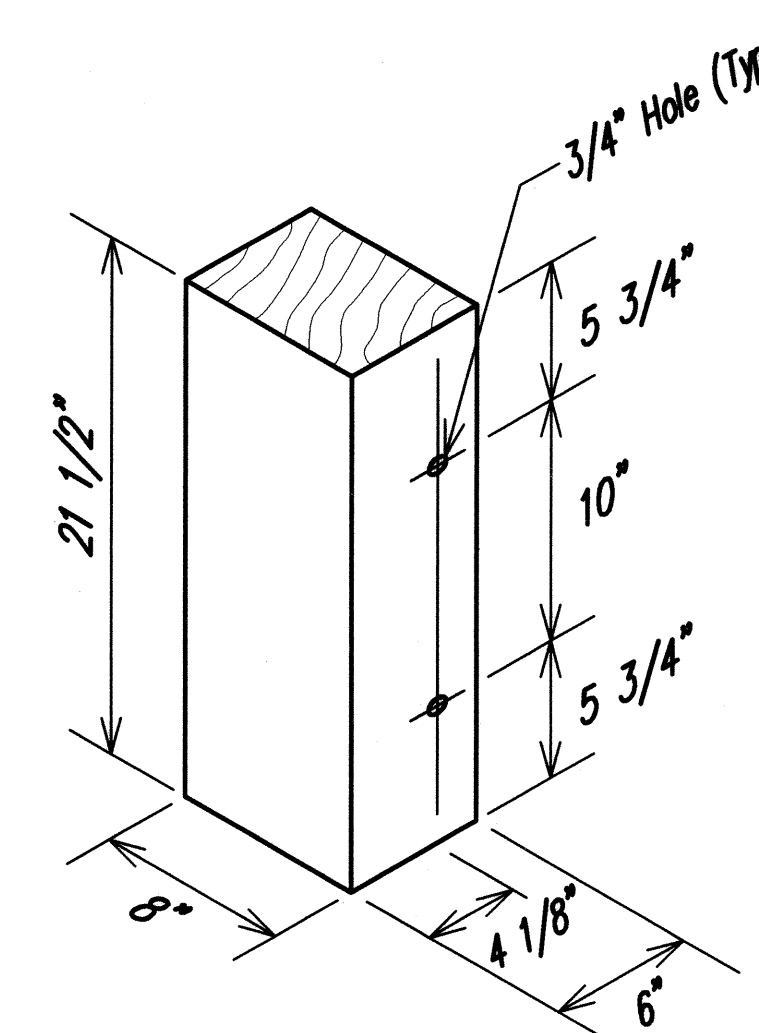


PLAN

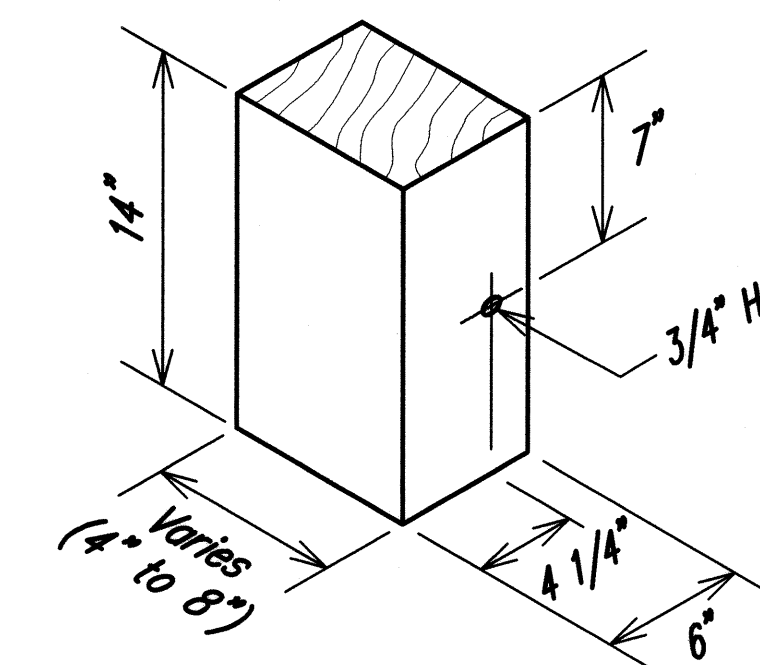


ELEVATION

TYPICAL DETAIL-WOOD SPACER BLOCK
AT "W" BEAM GUARDRAIL
Scale: 3/4"= 1'-0"



THRIE BEAM



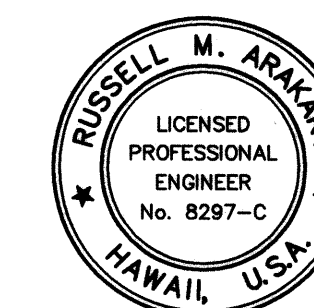
"W" BEAM

NOTES:

1. Timber block shall be one (1) piece.
2. The minimum thickness of the timber block shall be 4"
3. The entire back side of the timber block shall be flush with the existing spacer block.
4. Wood grain shall be vertical.

DOUGLAS FIR #2
WOOD SPACER BLOCK
Scale: 1 1/2"= 1'-0"

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

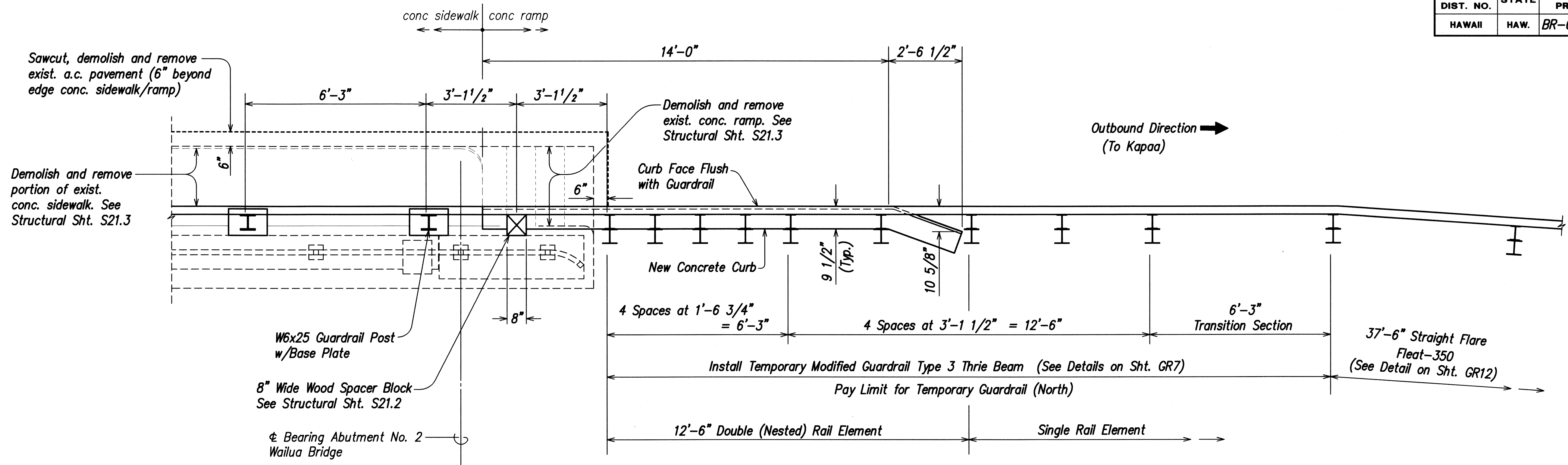


THIS WORK WAS PREPARED BY
ME OR UNDER MY SUPERVISION

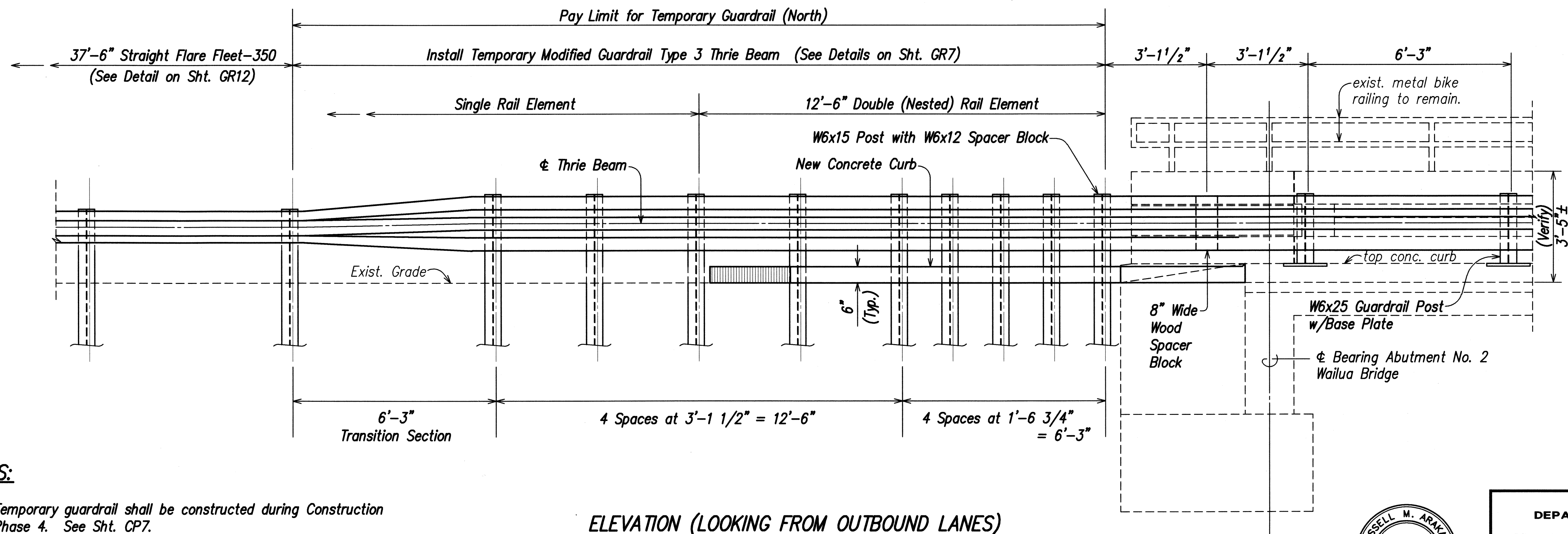
Russell M. Araki
Permit, Inc.
dba PARK ENGINEERING
LICENSE EXPIRES 4-30-10

STATE OF HAWAII DEPARTMENT OF TRANSPORTATION HIGHWAYS DIVISION TEMPORARY GUARDRAIL (SOUTH) DETAILS KUHIO HIGHWAY, SHORT TERM IMPROVEMENTS Wailua Cane Haul Bridge Widening Fed. Aid Project No. BR-056-1(51) Scale: As Noted Date: MAY 2008 SHEET No. GR3 OF GR13 SHEETS

FED. ROAD DIST. NO.	STATE	FED. AID PROJ. NO.	FISCAL YEAR	SHEET NO.	TOTAL SHEETS
HAWAII	HAW.	BR-056-1(51)	2008	75	284



PLAN



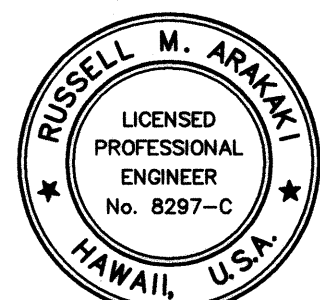
ELEVATION (LOOKING FROM OUTBOUND LANES)

TEMPORARY GUARDRAIL (NORTH)

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

NOTES:

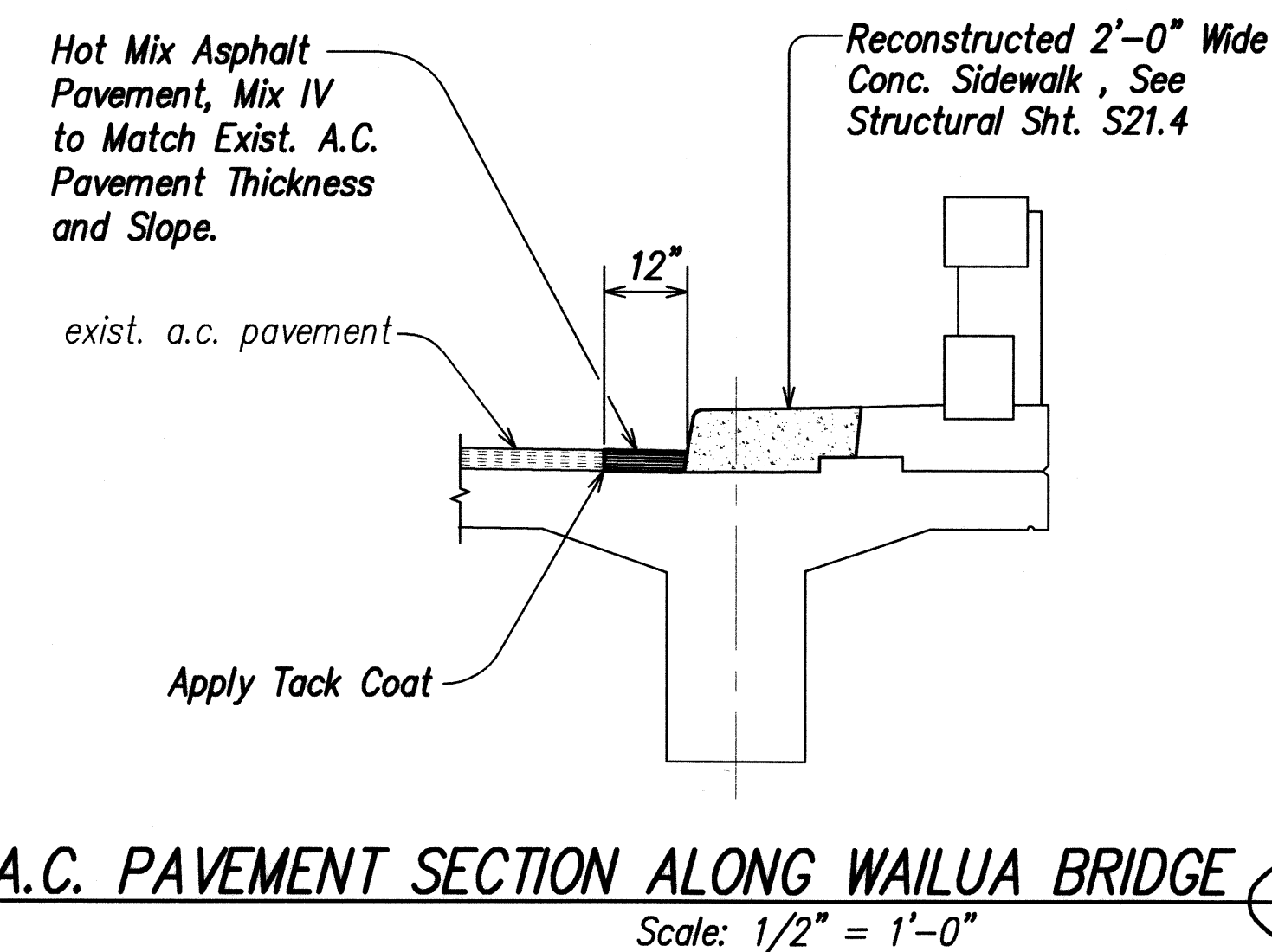
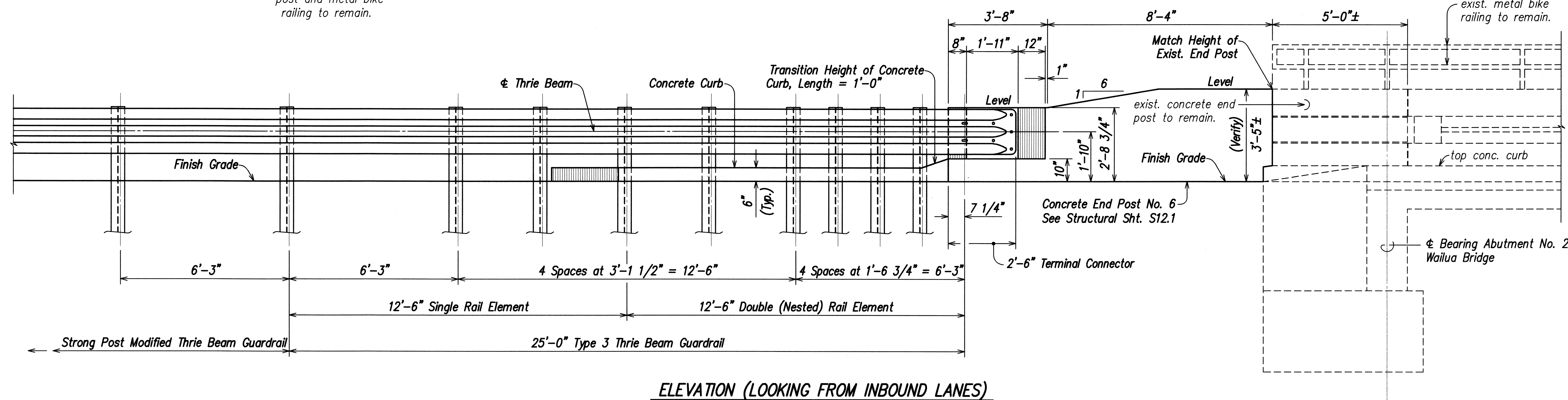
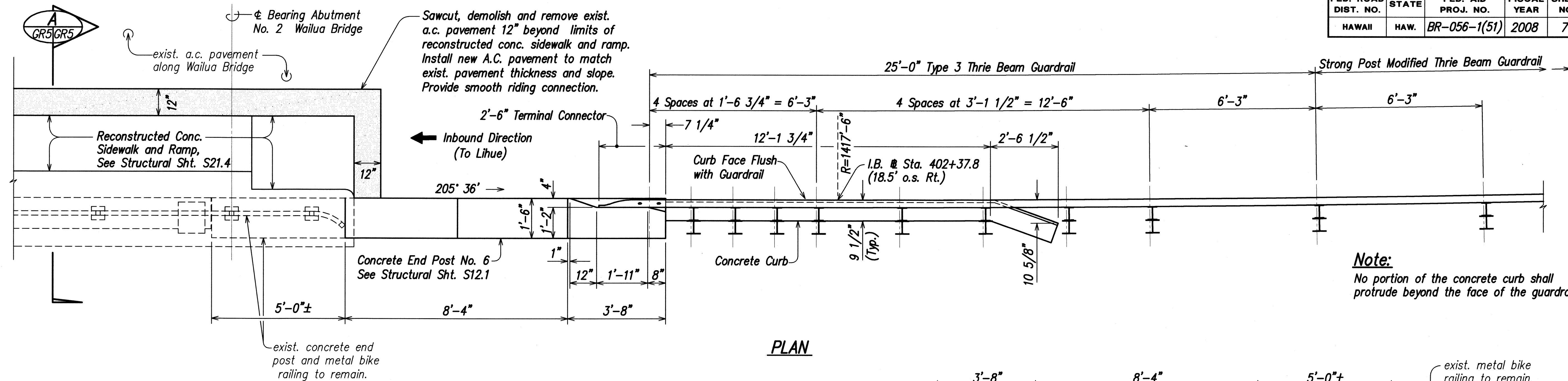
1. Temporary guardrail shall be constructed during Construction Phase 4. See Sht. CP7.
2. During Construction Phase 10, the Contractor shall demolish and remove all temporary guardrail and concrete curb. See Shts. CP15 and C16.



THIS WORK WAS PREPARED BY ME OR UNDER MY SUPERVISION
Russell M. Araki
P.E., Inc.
d/b/a PARK ENGINEERING
LICENSE EXPIRES 4-30-10

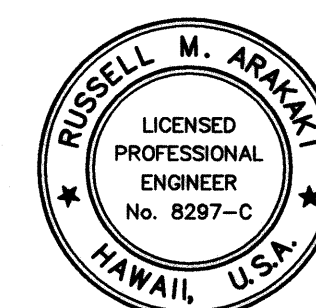
STATE OF HAWAII
DEPARTMENT OF TRANSPORTATION
HIGHWAYS DIVISION
TEMPORARY GUARDRAIL (NORTH)
PLAN AND ELEVATION
KUHIU HIGHWAY, SHORT TERM IMPROVEMENTS
Wailua Cane Haul Bridge Widening
Fed. Aid Project No. BR-056-1(51)
Scale: As Noted Date: MAY 2008
SHEET No. GR4 OF GR13 SHEETS

FED. ROAD DIST. NO.	STATE	FED. AID PROJ. NO.	FISCAL YEAR	SHEET NO.	TOTAL SHEETS
HAWAII	HAW.	BR-056-1(51)	2008	76	284



TYPE 3 THRIE BEAM AT END POST NO. 6

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



THIS WORK WAS PREPARED BY ME OR UNDER MY SUPERVISION

Russell M. Arakaki
P.E., Inc.
ONE PARK ENGINEERING
LICENSE EXPIRES 4-30-10

STATE OF HAWAII
DEPARTMENT OF TRANSPORTATION
HIGHWAYS DIVISION

**TYPE 3 THRIE-BEAM GUARDRAIL
AT END POST NO. 6**

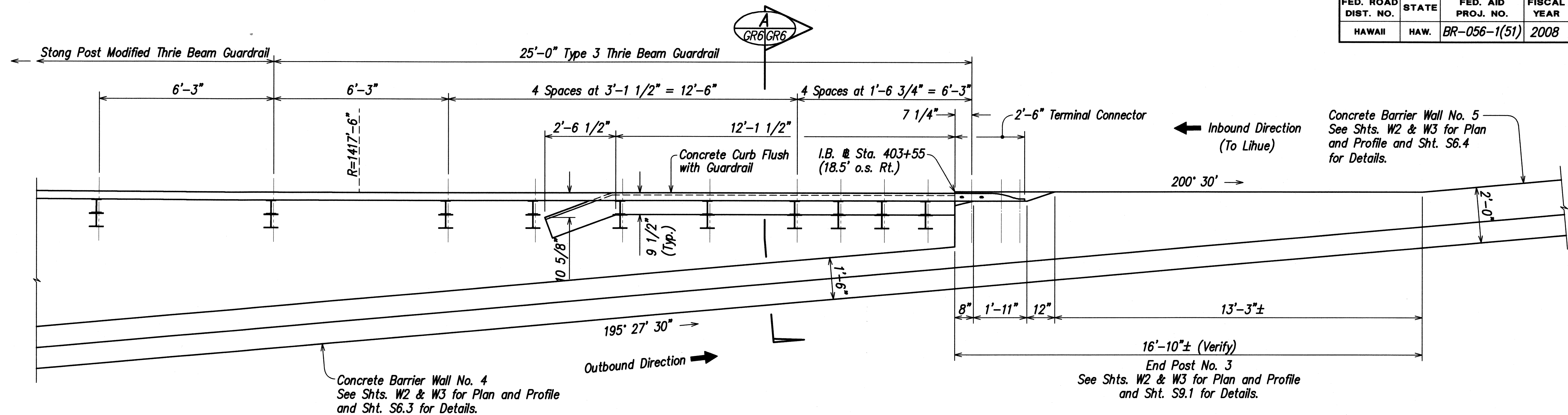
KUHIO HIGHWAY, SHORT TERM IMPROVEMENTS

Wailua Cane Haul Bridge Widening
Fed. Aid Project No. BR-056-1(51)

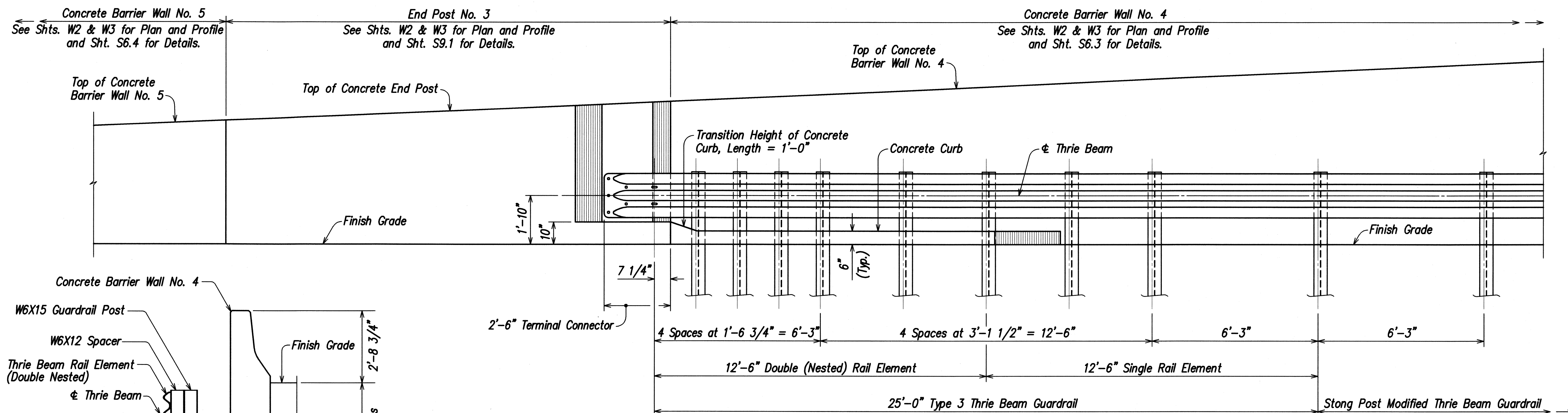
Scale: As Noted Date: MAY 2008

SHEET No. GR5 OF GR13 SHEETS

FED. ROAD DIST. NO.	STATE	FED. AID PROJ. NO.	FISCAL YEAR	SHEET NO.	TOTAL SHEETS
HAWAII	HAW.	BR-056-1(51)	2008	77	284



PLAN



ELEVATION (LOOKING FROM INBOUND LANES)

TYPE 3 THRIE BEAM GUARDRAIL AT END POST NO. 3

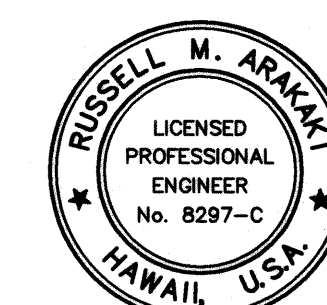
Scale: 1/2" = 1'-0"

Note:

No portion of the concrete curb shall protrude beyond the face of the guardrail.

TYPE 3 THRIE BEAM GUARDRAIL SECTION

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



THIS WORK WAS PREPARED BY ME OR UNDER MY SUPERVISION

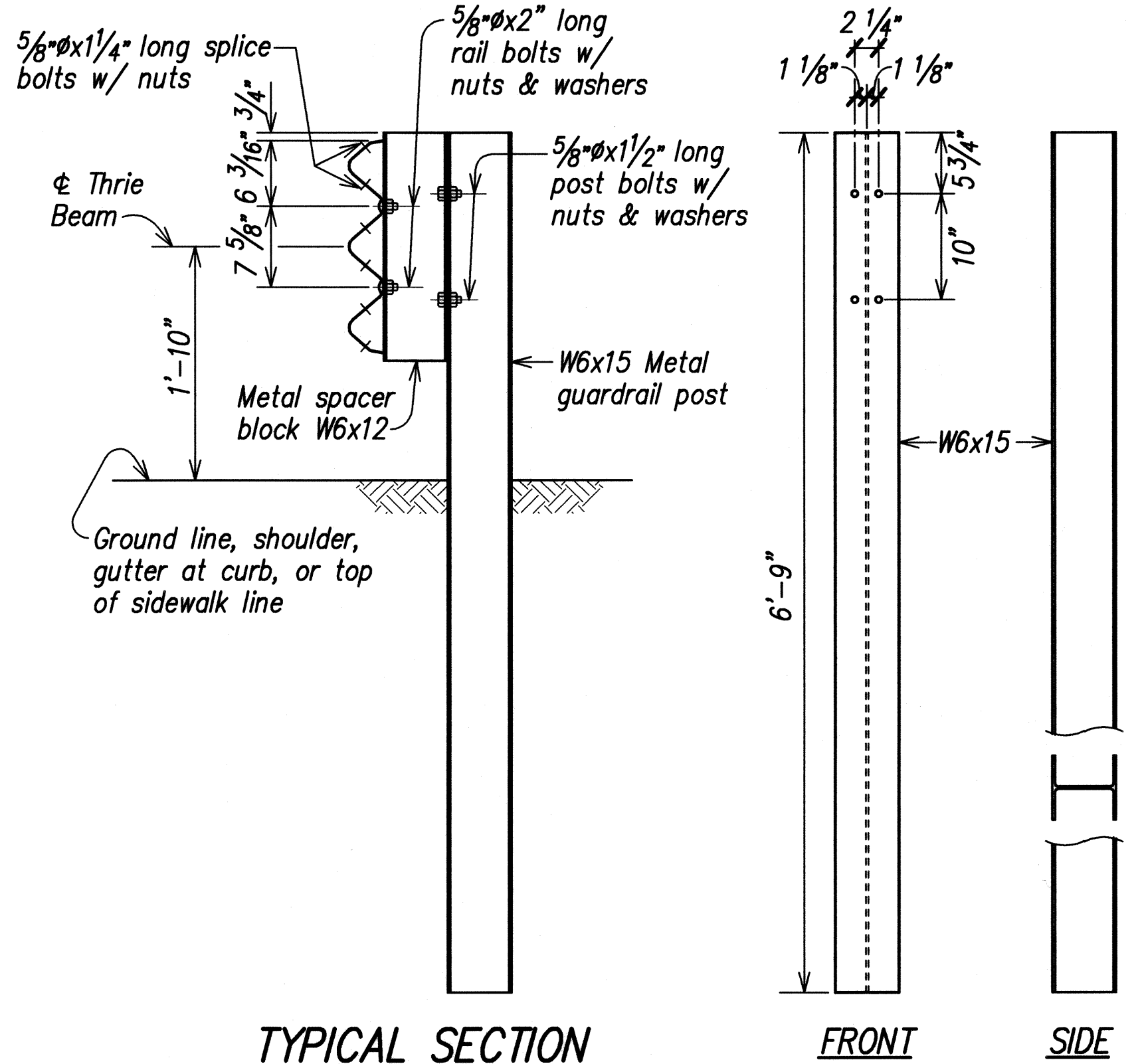
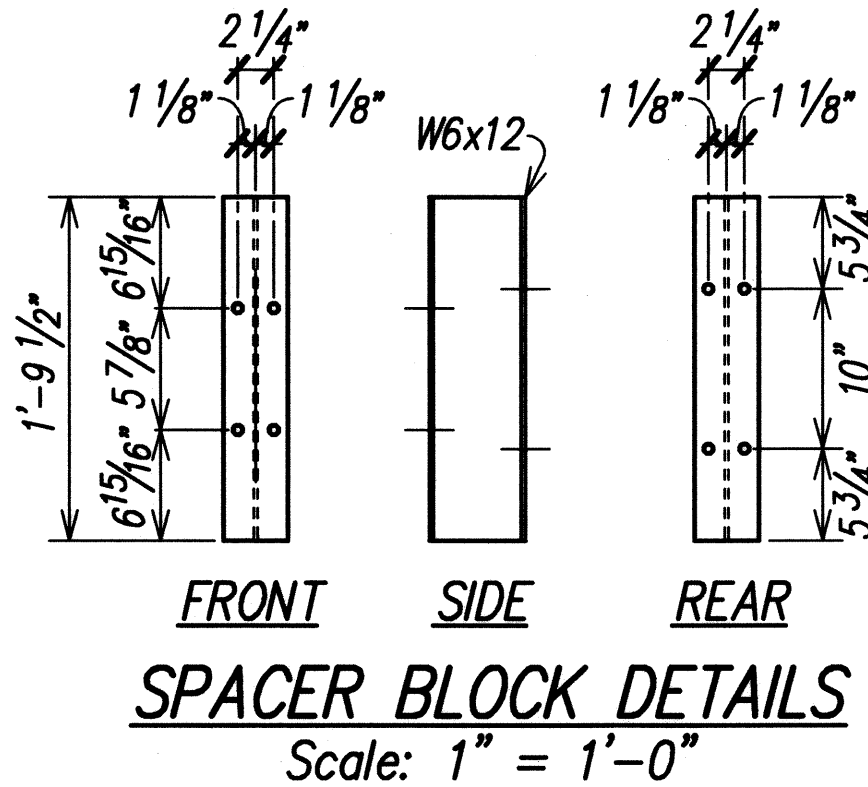
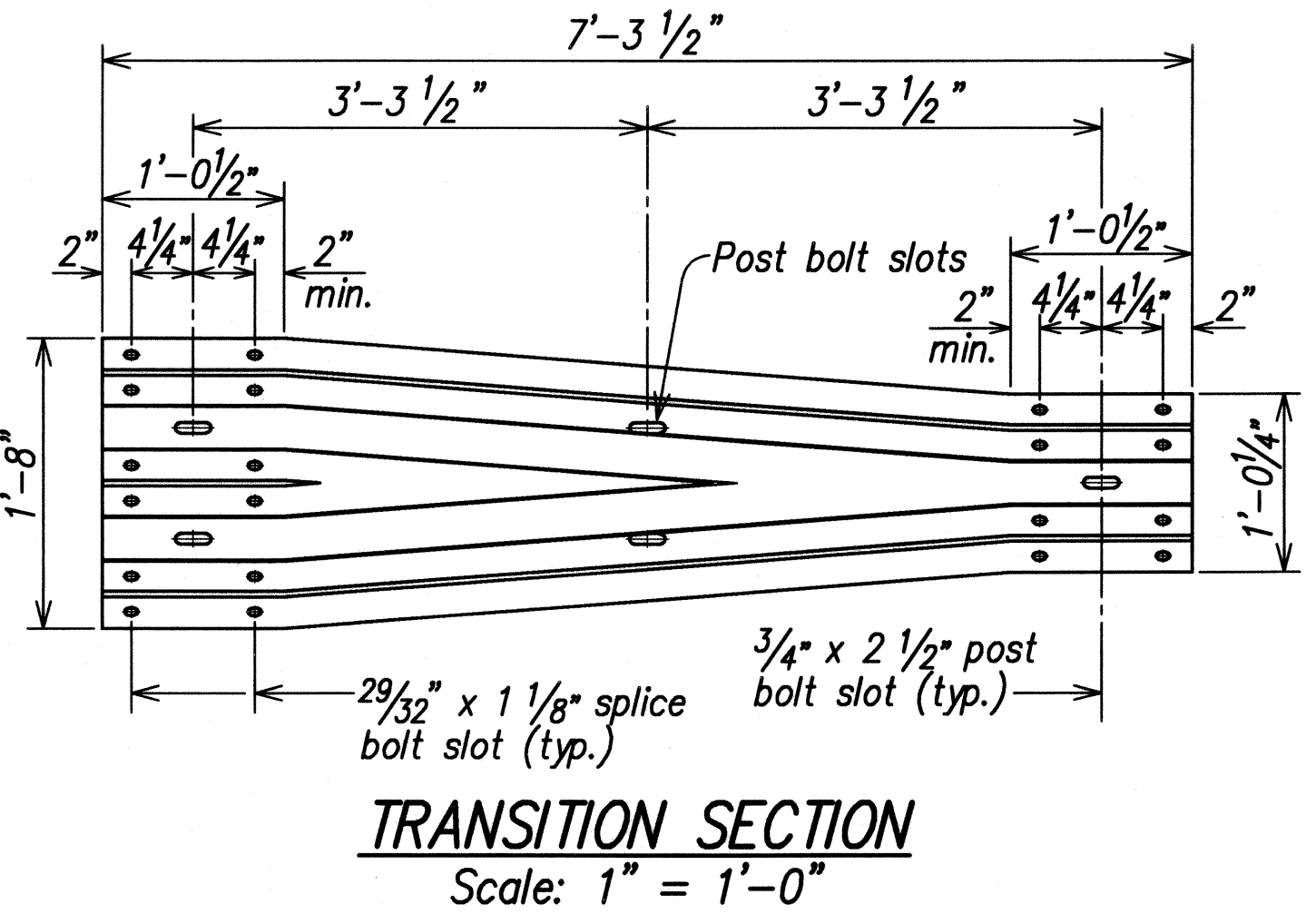
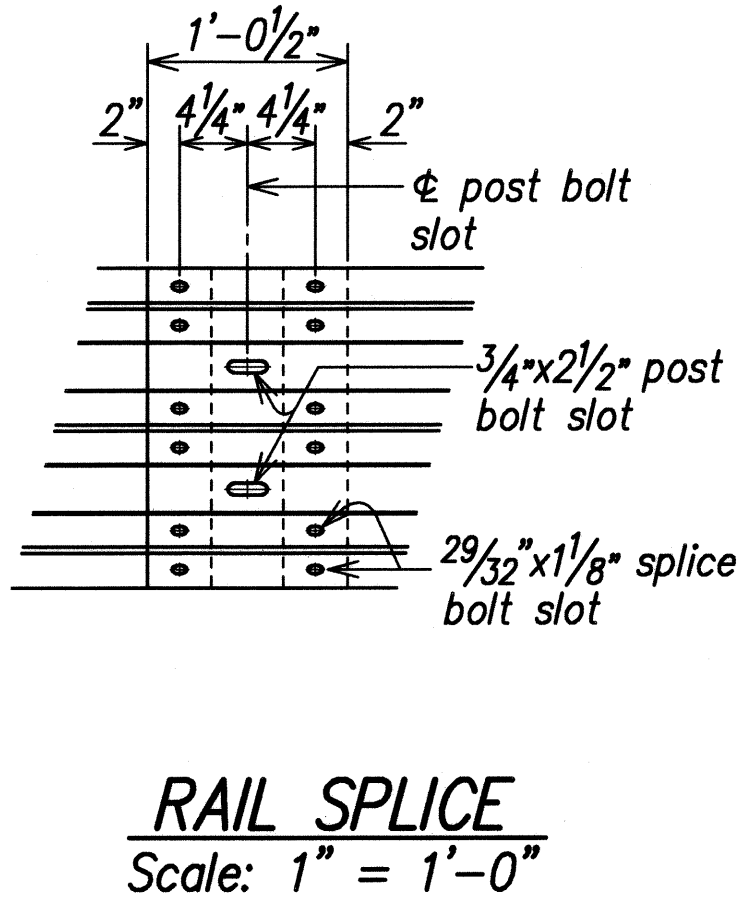
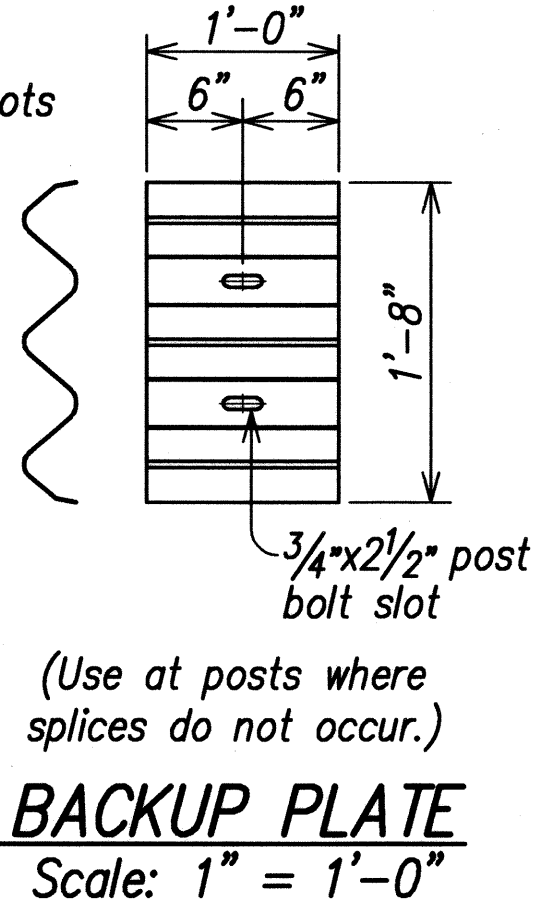
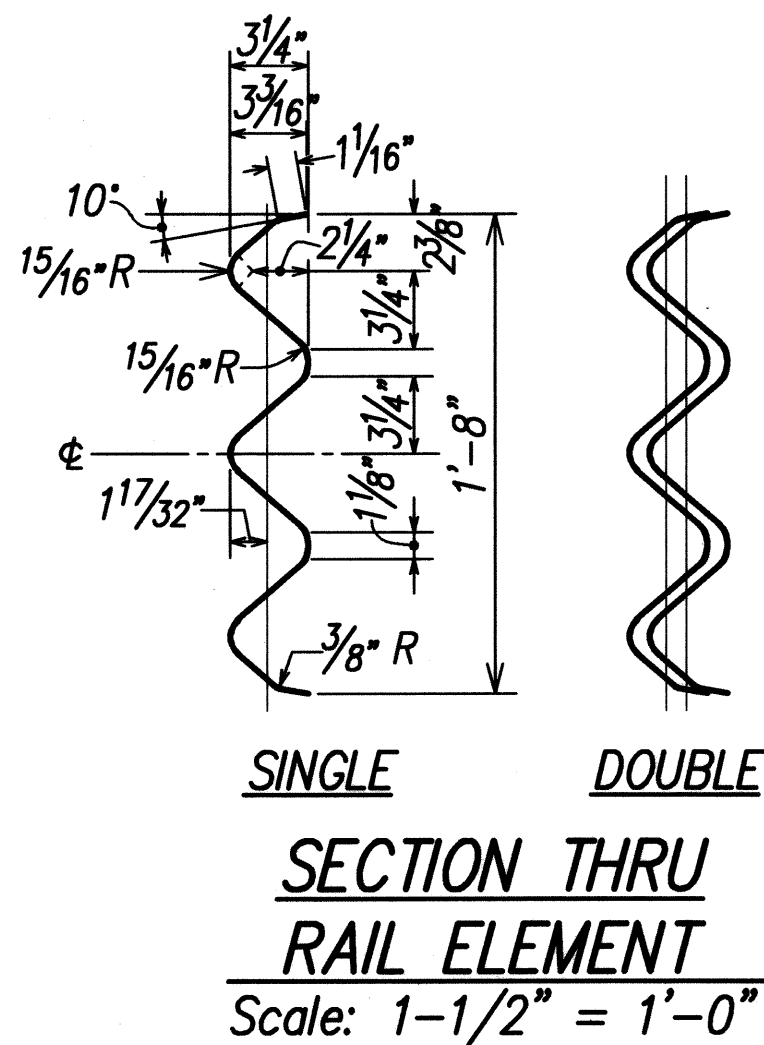
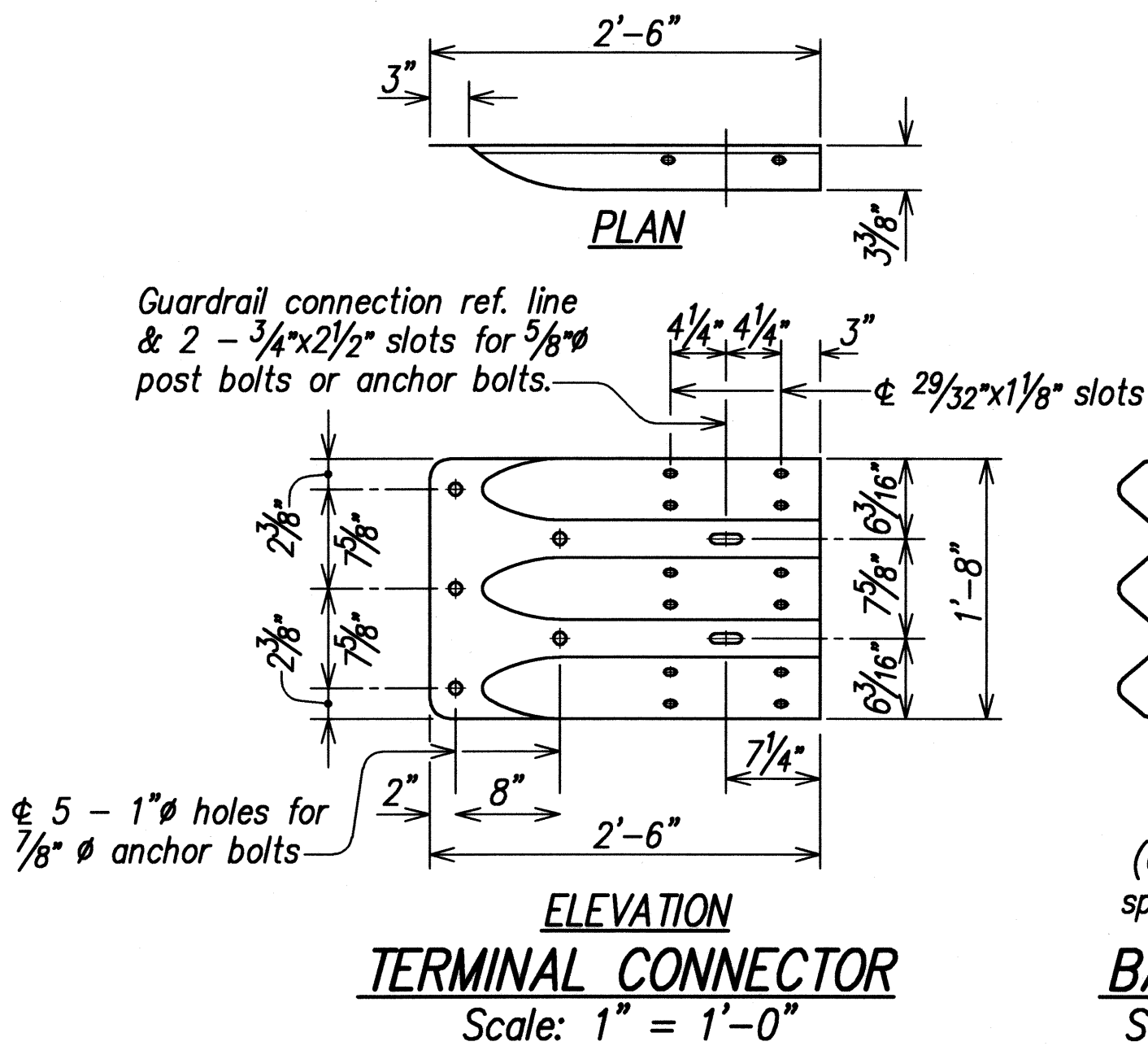
Russell M. Aramaki, Inc.
dba PARK ENGINEERING
LICENSE EXPIRES 4-30-10

STATE OF HAWAII
DEPARTMENT OF TRANSPORTATION
HIGHWAYS DIVISION
TYPE 3 THRIE-BEAM GUARDRAIL
AT END POST NO. 3
KUHIO HIGHWAY, SHORT TERM IMPROVEMENTS
Wailua Cane Haul Bridge Widening
Fed. Aid Project No. BR-056-1(51)
Scale: As Noted Date: MAY 2008
SHEET No. GR6 OF GR13 SHEETS

FED. ROAD DIST. NO.	STATE	FED. AID PROJ. NO.	FISCAL YEAR	SHEET NO.	TOTAL SHEETS
HAWAII	HAW.	BR-056-1(51)	2008	78	284

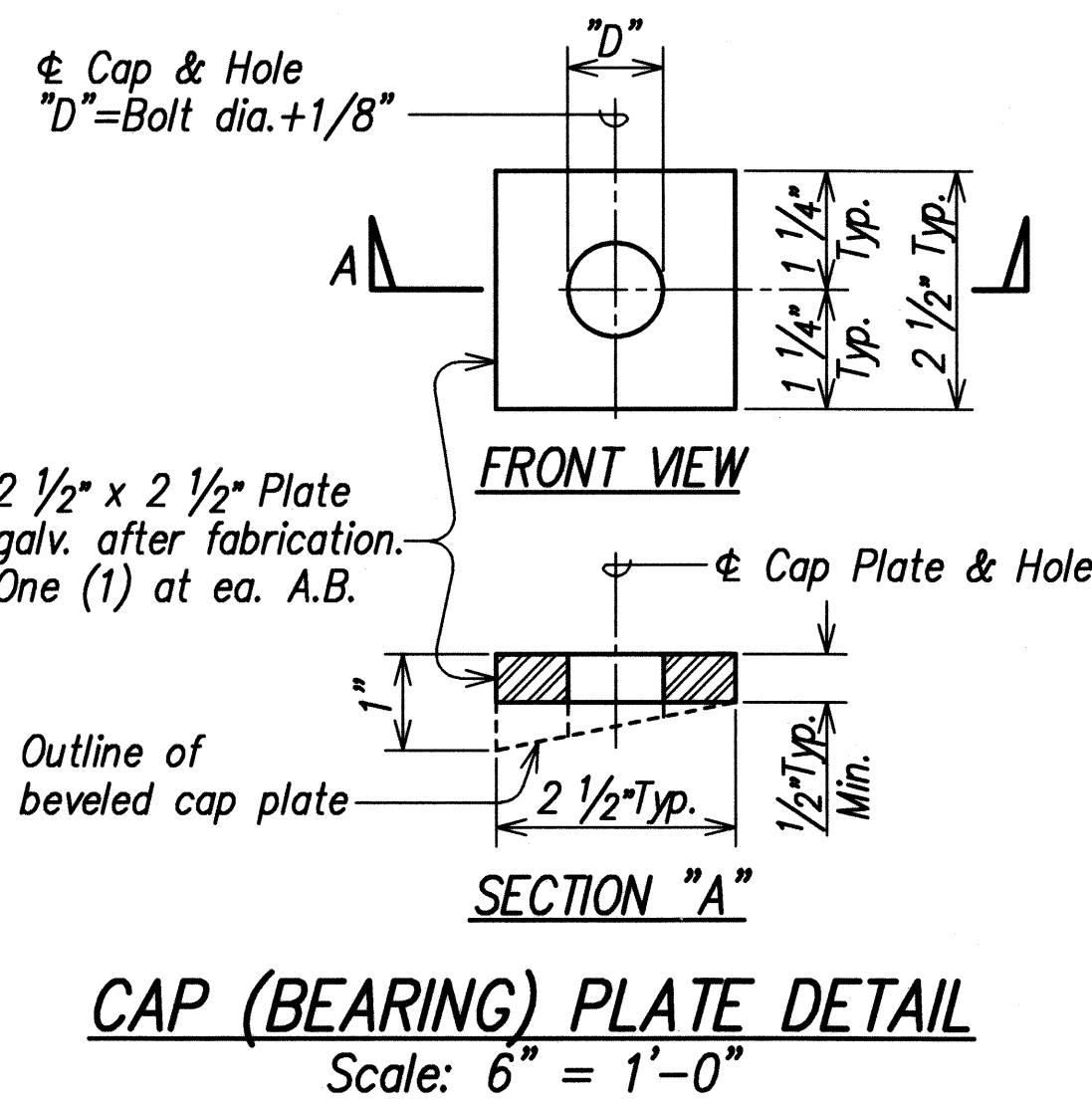
NOTES:

- 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 will not be paid for separately.
- Lap terminal connector and rail element in direction of traffic to prevent snagging.
- 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 plate, nuts and washers, shall be hot-dip galvanized after fabrication.
- Cap plate 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.
- All steel shapes, rails and plates shall conform to ASTM A 36 specifications.

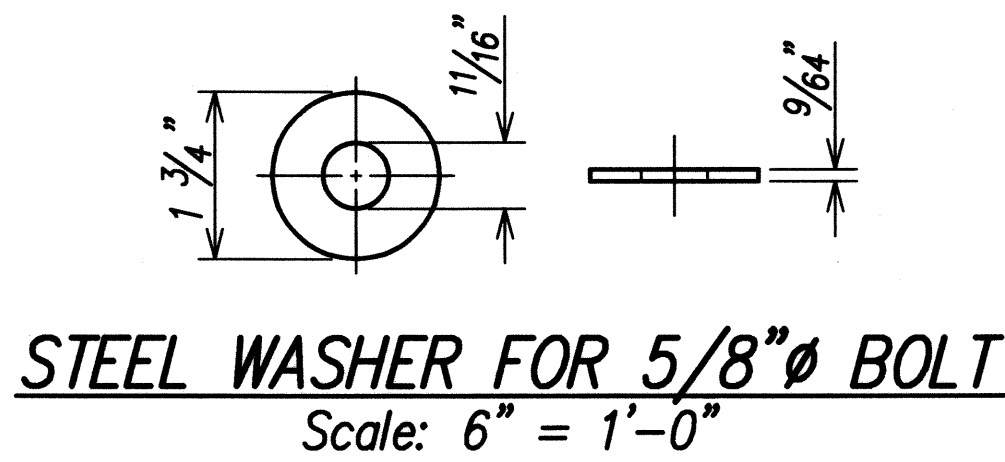


TYPICAL SECTION
METAL GUARDRAIL ON METAL POST
WITH METAL SPACER BLOCK
Scale: 1" = 1'-0"

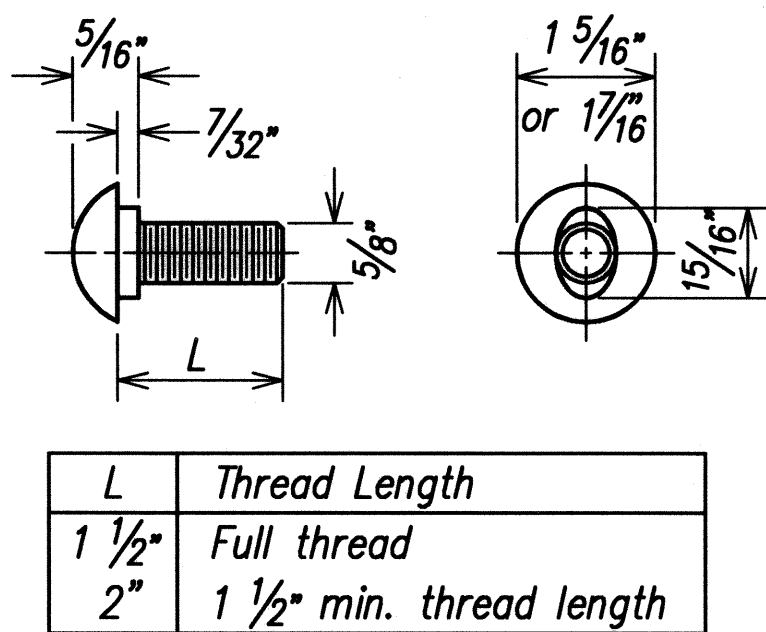
POST DETAILS
Scale: 1" = 1'-0"



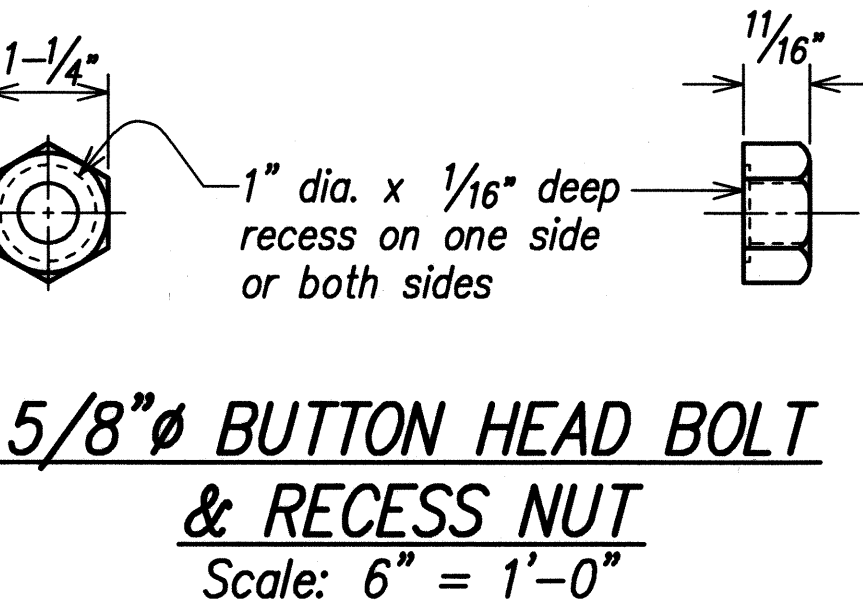
CAP (BEARING) PLATE DETAIL
Scale: 6" = 1'-0"



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



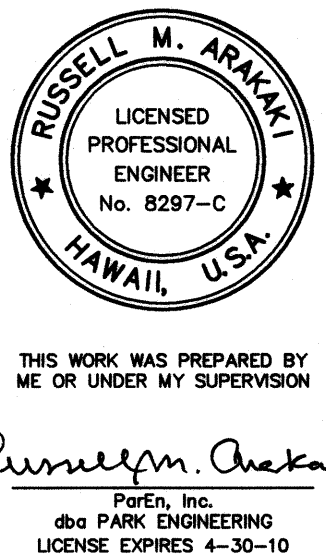
L	Thread Length
1 1/2"	Full thread
2"	1 1/2" min. thread length



5/8" HEX BOLT & NUT
Scale: 6" = 1'-0"

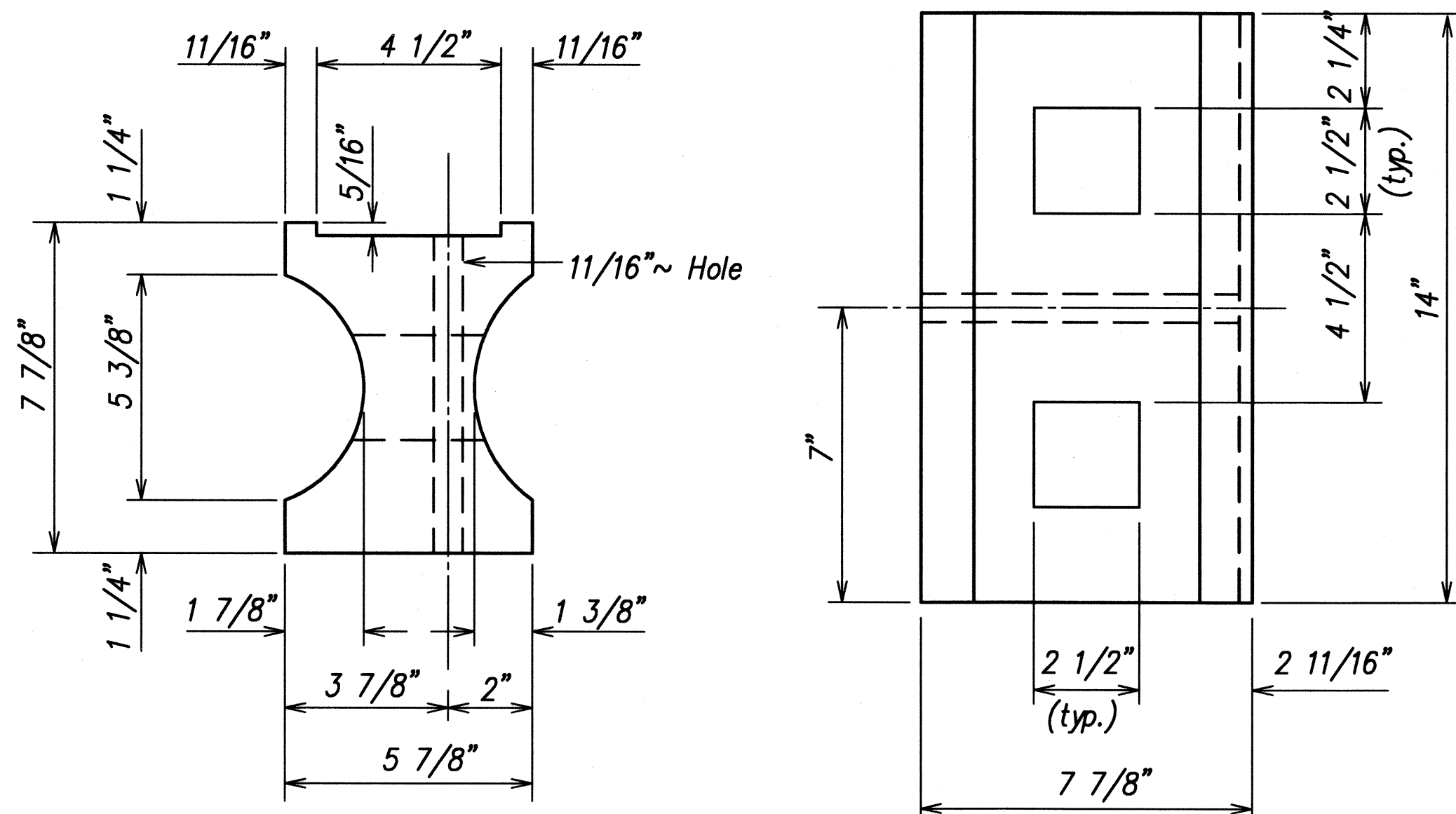
5/8" BUTTON HEAD BOLT & RECESS NUT
Scale: 6" = 1'-0"

METAL GUARDRAIL TYPE 3 THRIE BEAM AND APPURTENANCES DETAILS

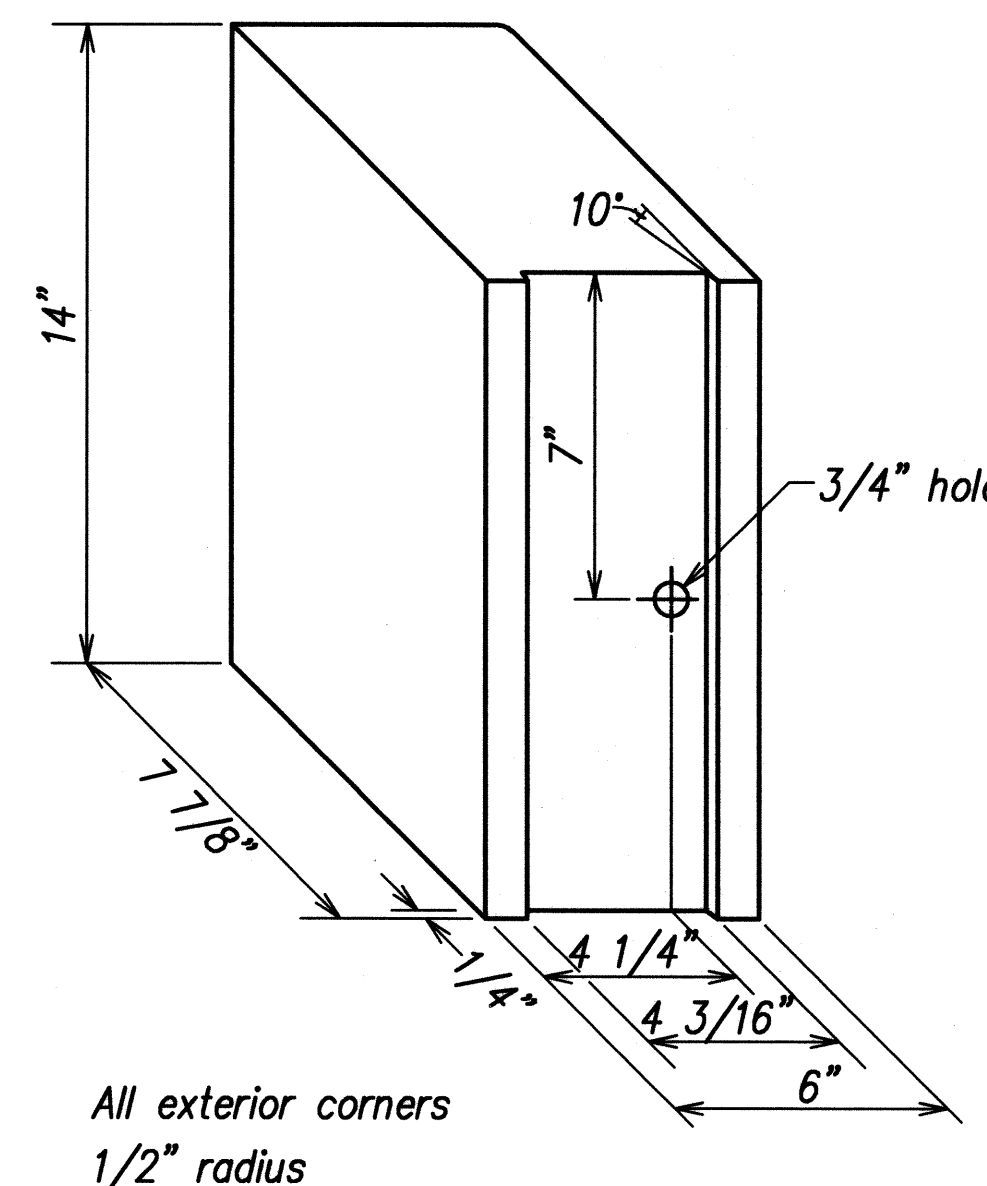


STATE OF HAWAII
DEPARTMENT OF TRANSPORTATION
HIGHWAYS DIVISION
TYPE 3 THRIE-BEAM GUARDRAIL
AND APPURTENANCES
KUHIU HIGHWAY, SHORT TERM IMPROVEMENTS
Wailua Cane Haul Bridge Widening
Fed. Aid Project No. BR-056-1(51)
Scale: As Noted Date: MAY 2008
SHEET No. GR7 OF GR13 SHEETS

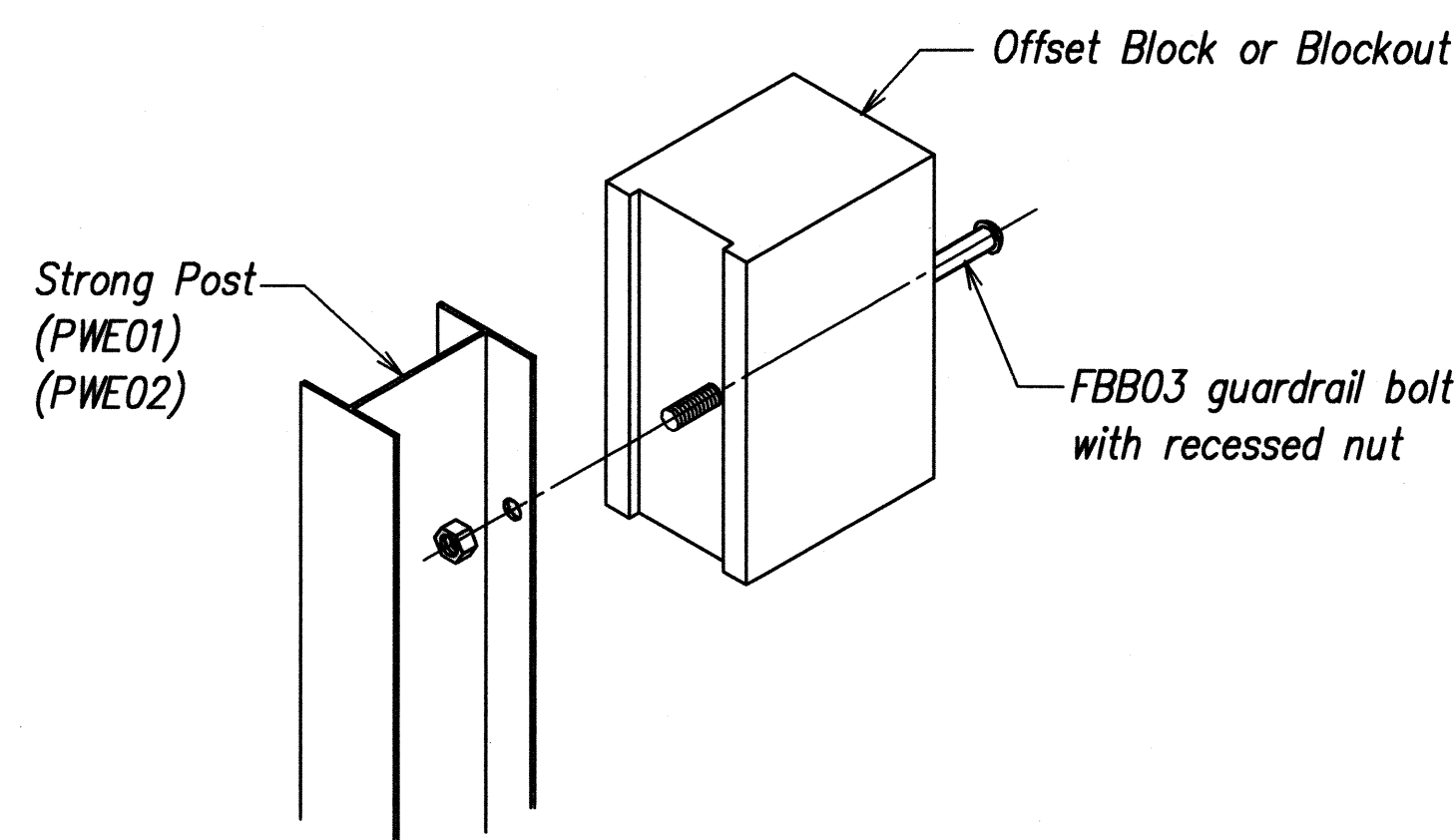
FED. ROAD DIST. NO.	STATE	FED. AID PROJ. NO.	FISCAL YEAR	SHEET NO.	TOTAL SHEETS
HAWAII	HAW.	BR-056-1(51)	2008	79	284



RECYCLED PLASTIC BLOCKOUT (TYPE I)

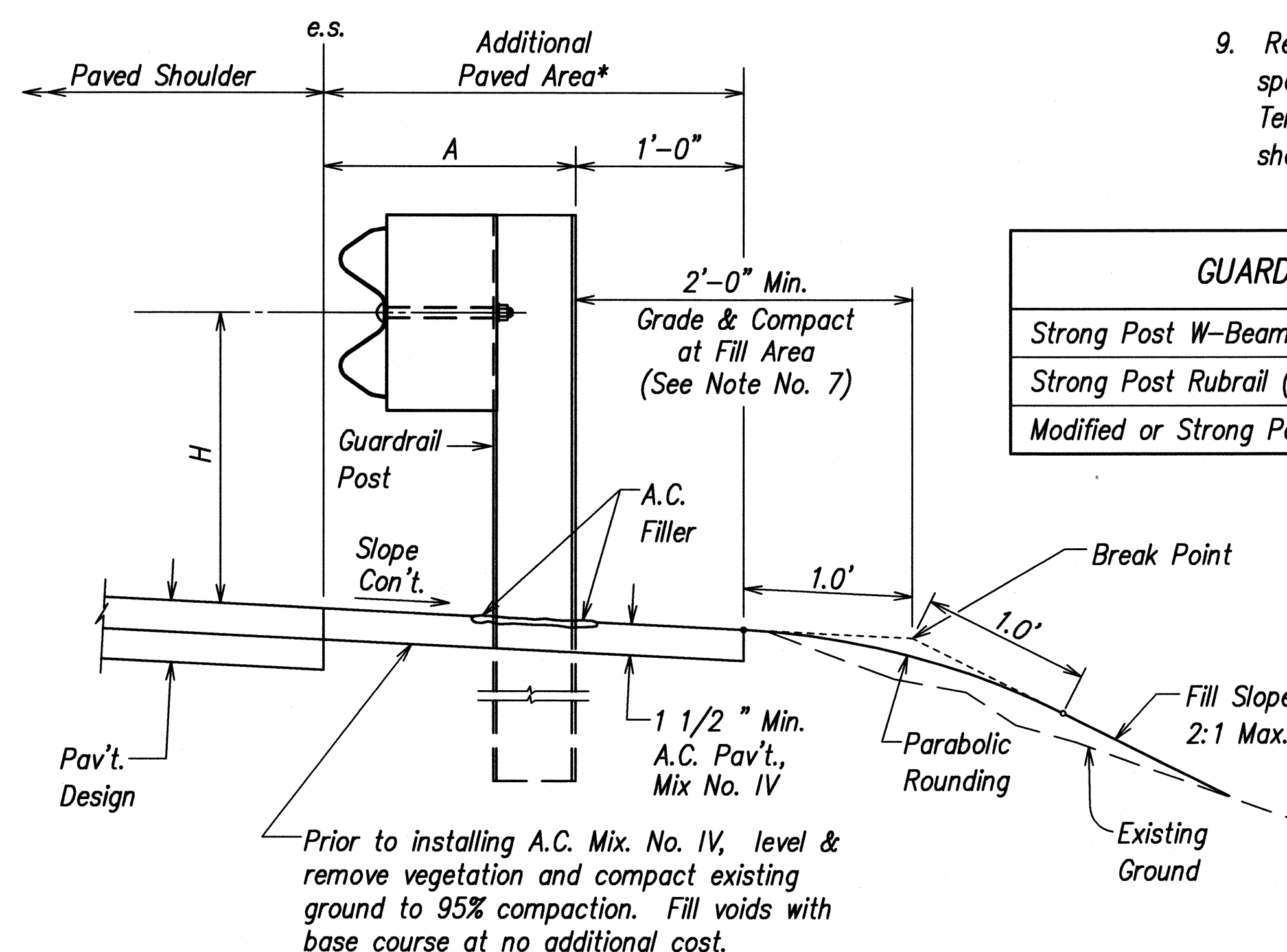
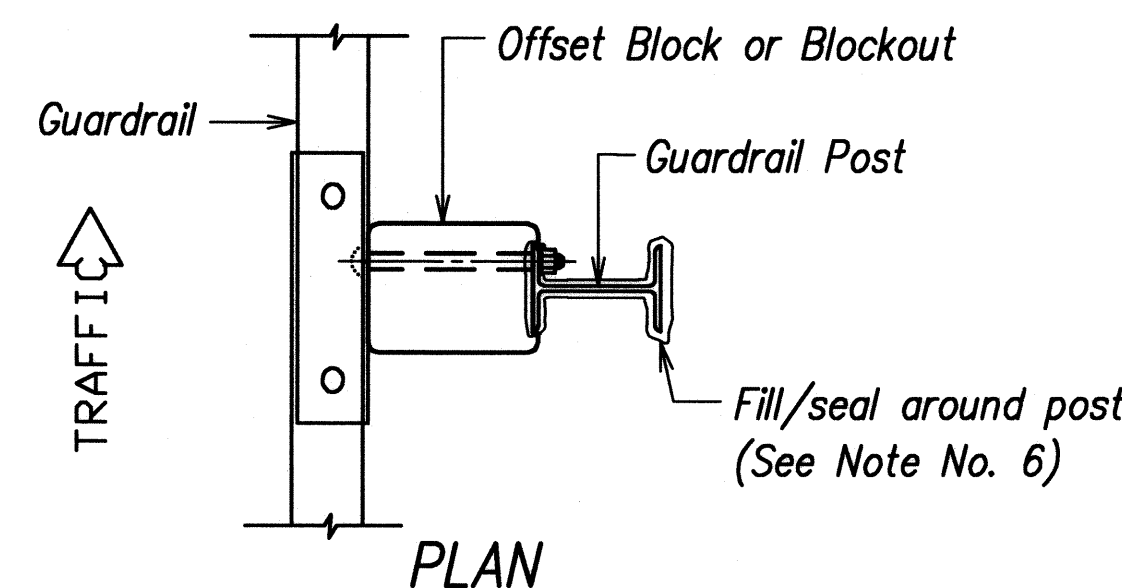


**RECYCLED POLYETHYLENE
OFFSET BLOCK (TYPE II)**



Exploded View
(Rail and washer not shown)

STEEL POST AND BLOCK DETAIL



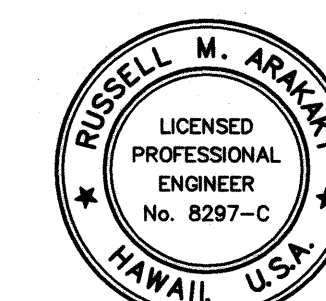
ELEVATION

TYPICAL GUARDRAIL INSTALLATION

GENERAL NOTES

- All hardware, posts and fasteners shall be hot-dip zinc coated galvanized after fabrication. No punching, drilling or cutting will be permitted after galvanizing.
- Where conditions require, special post lengths in increments of 6 inches may be specified.
- All fasteners, posts, and rail elements (i.e. FBB03, PWE01, 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.
- The Recycled Plastic Block or Offset Block shall be approved by the State.
- All new guardrail systems (system consists of total length of guardrail including both end treatments) shall include the Additional Paved Area.
- 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.
- When standards for the fill slope area cannot be met, a site specific, engineer approved design may be used.
- New A.C. pavement at guardrails shall extend 6 feet longitudinally beyond terminal ends.
- Reflector Markers (RM-5) mounted on guardrails shall be spaced every 25 feet. RM-5's shall not be installed on Terminal Sections. Furnishing and installing of each RM-5 shall be considered incidental to the adjacent guardrail system.

GUARDRAIL TYPE	DIMENSION	
	H	A
Strong Post W-Beam	1'-9 5/8"	1'-6"
Strong Post Rubrail (W-Beam)	2'-0"	1'-6"
Modified or Strong Post Thrie Beam	2'-0"	2'-0"



THIS WORK WAS PREPARED BY
ME OR UNDER MY SUPERVISION

Russell M. Araki
Professional Engineer
License No. 8297-C
License Expires 4-30-10

STATE OF HAWAII
DEPARTMENT OF TRANSPORTATION
HIGHWAYS DIVISION

GUARDRAIL DETAILS & NOTES

KUHIU HIGHWAY, SHORT TERM IMPROVEMENTS

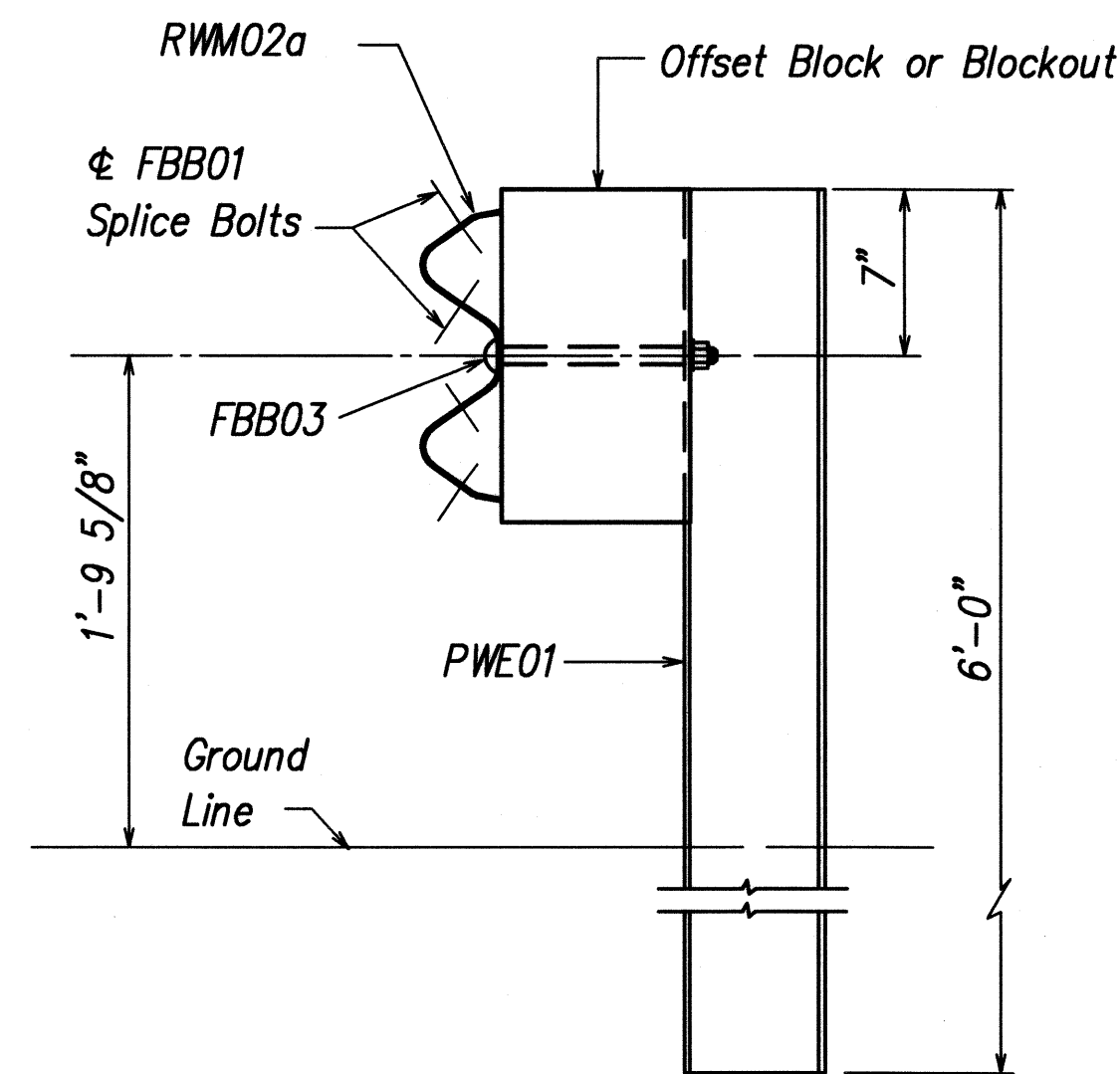
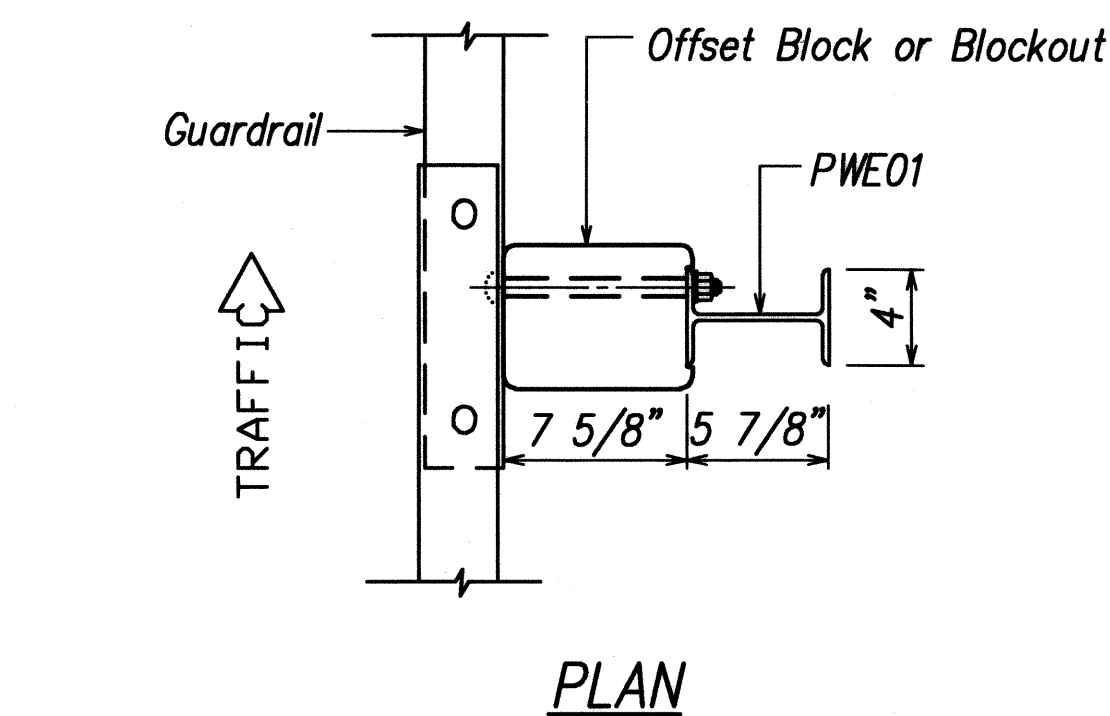
Wailua Cane Haul Bridge Widening

Fed. Aid Project No. BR-056-1(51)

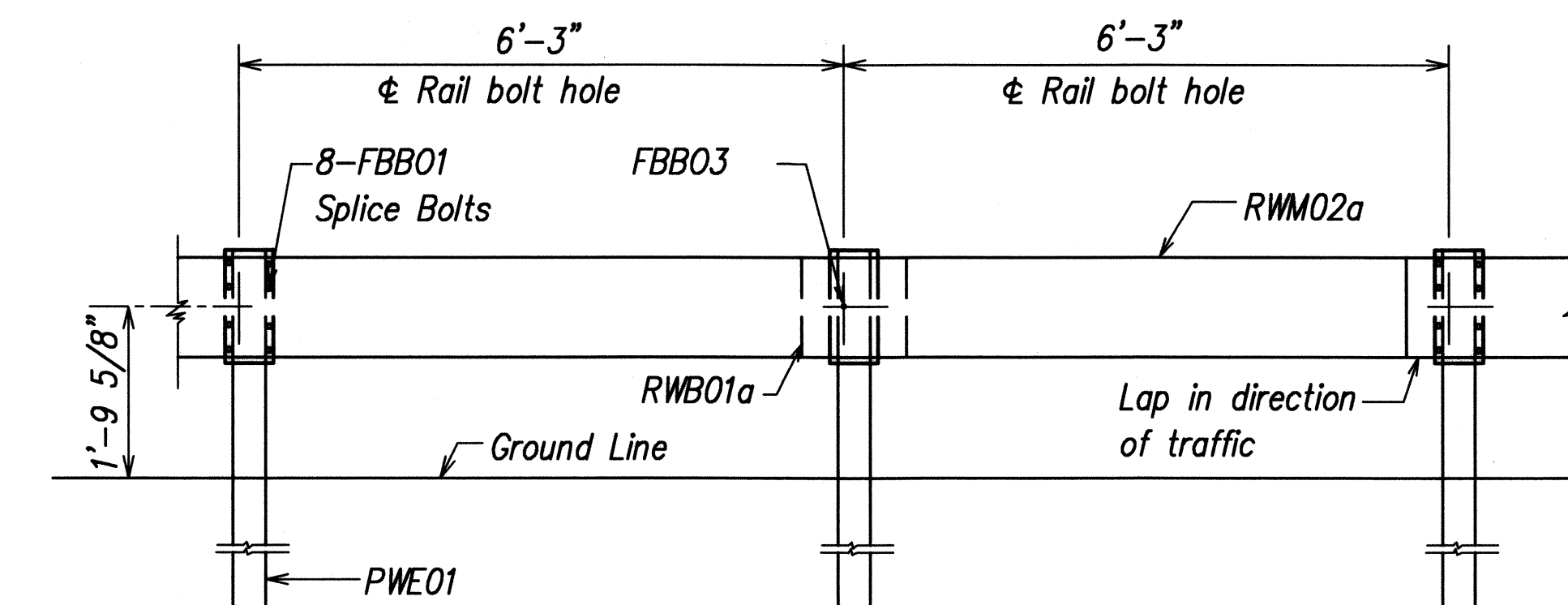
Scale: As Noted Date: MAY 2008

SHEET No. GR8 OF GR13 SHEETS

FED. ROAD DIST. NO.	STATE	FED. AID PROJ. NO.	FISCAL YEAR	SHEET NO.	TOTAL SHEETS
HAWAII	HAW.	BR-056-1(51)	2008	80	284

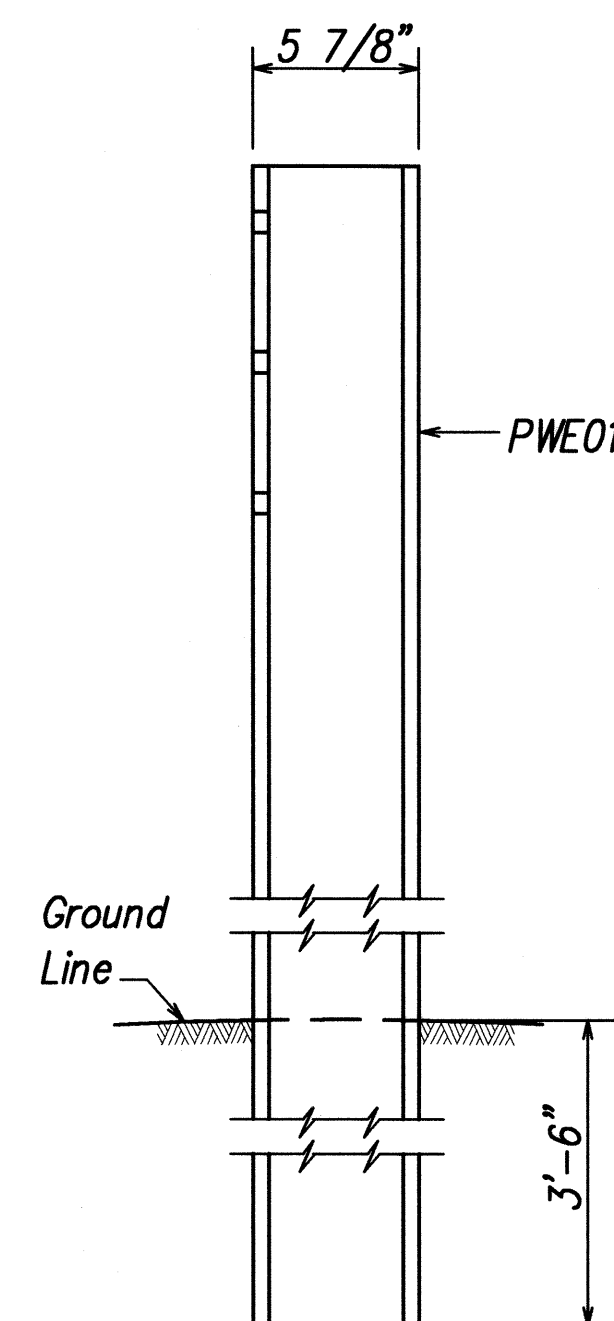


**STRONG POST W-BEAM GUARDRAIL
(SGR04a)**

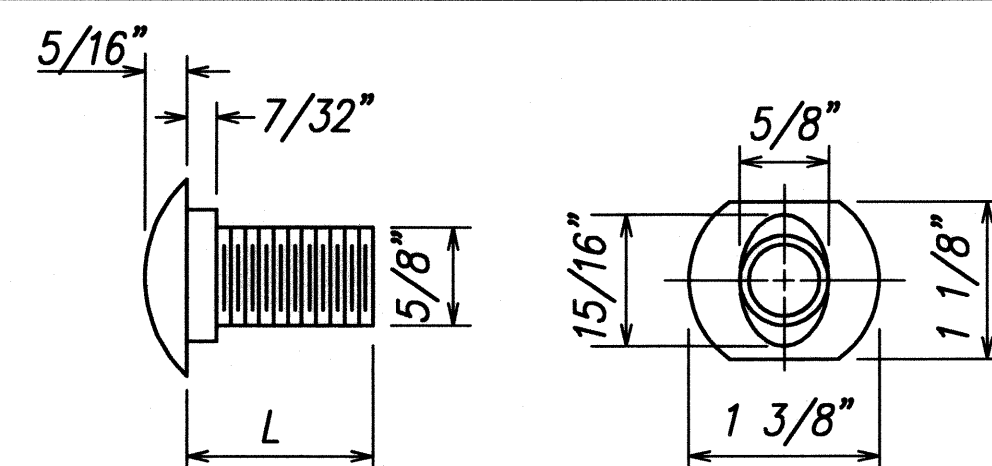
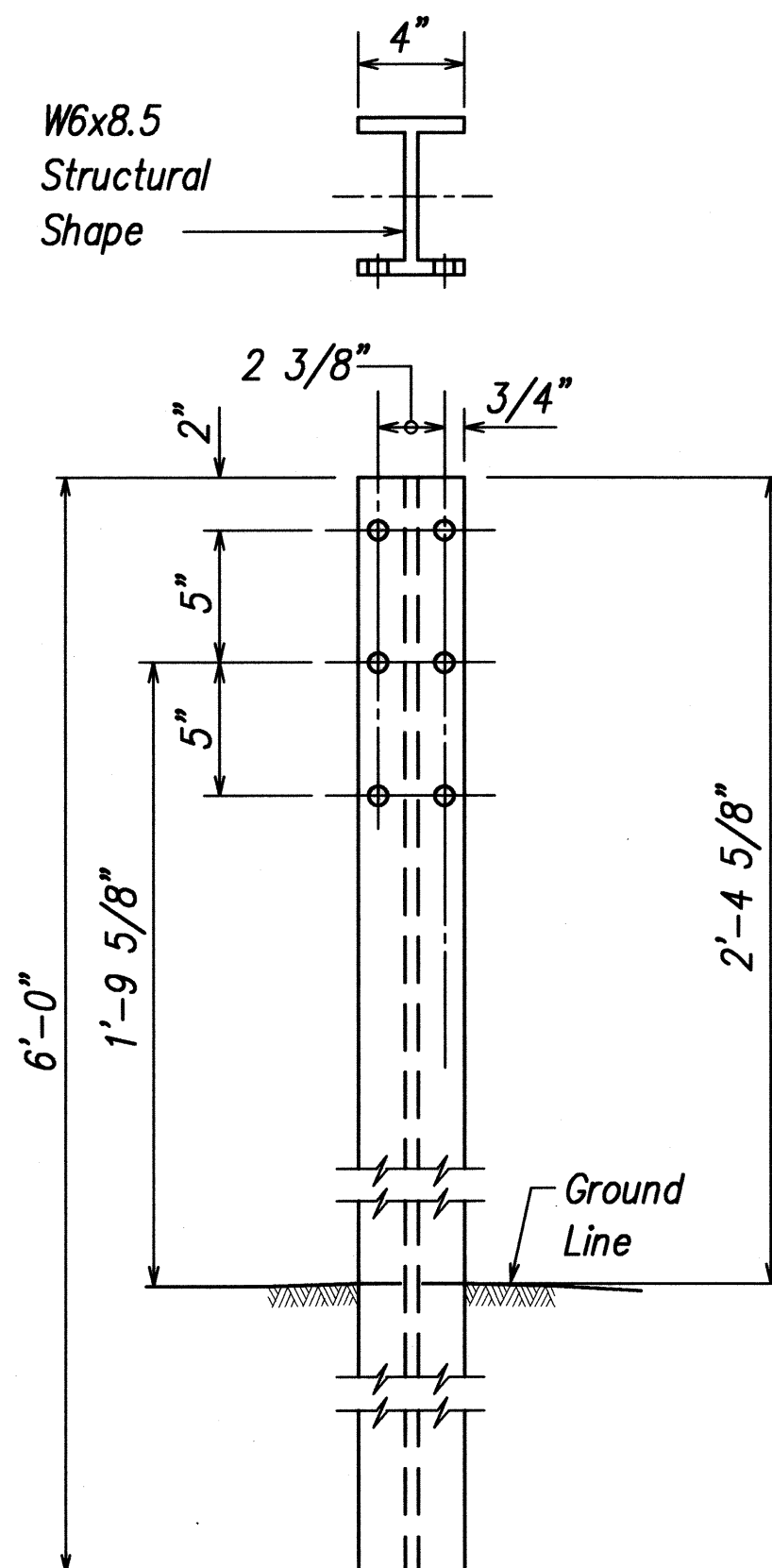


**STRONG POST W-BEAM GUARDRAIL WITH
RECYCLED OFFSET BLOCK OR PLASTIC BLOCKOUT**

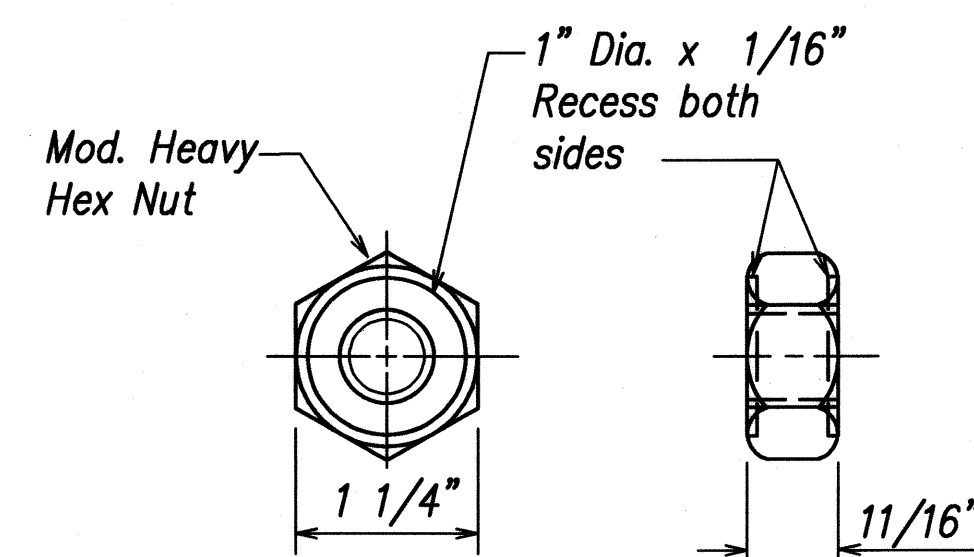
NOTE:
All Holes are
3/4" Dia.



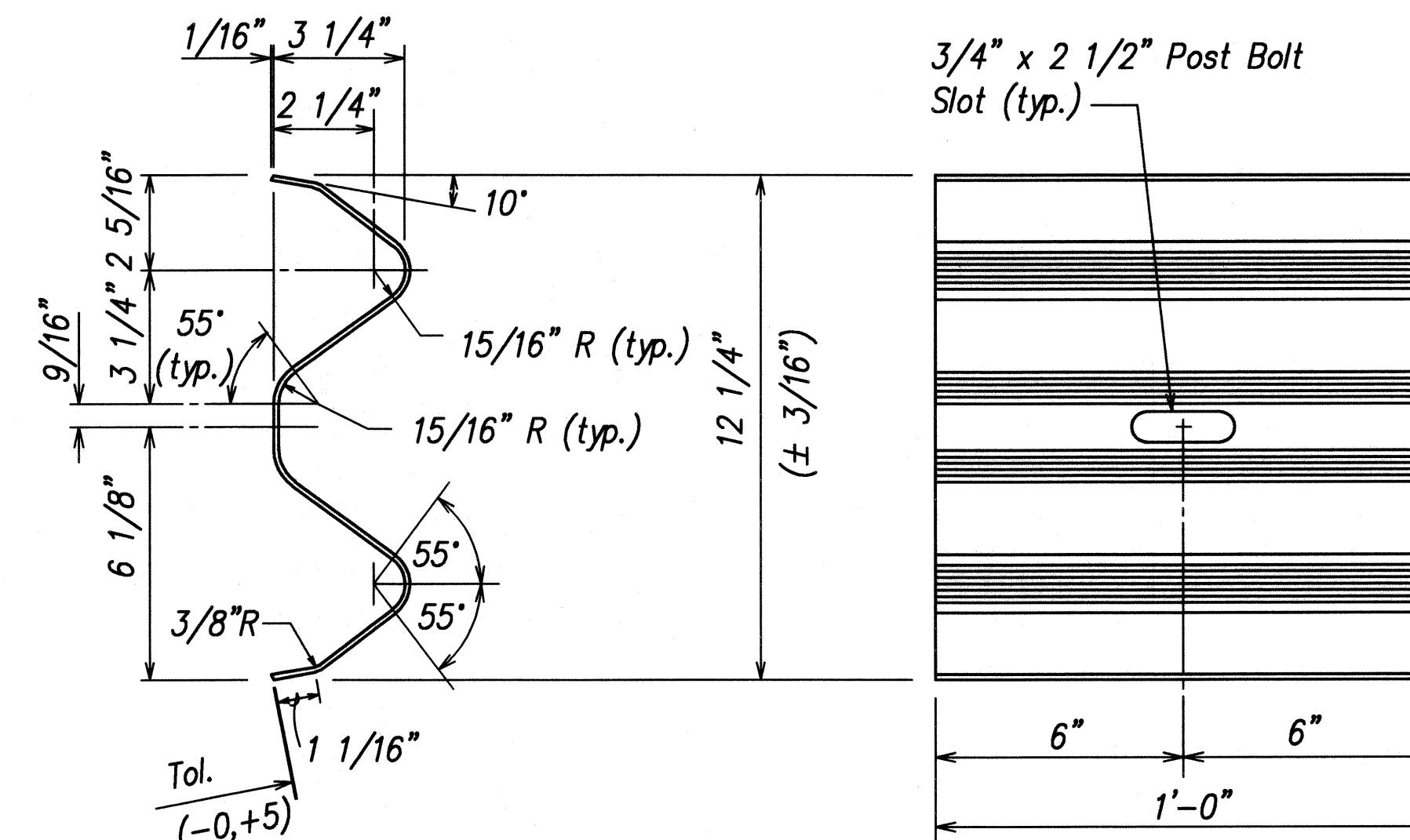
W-BEAM STRONG POST (PWE01)



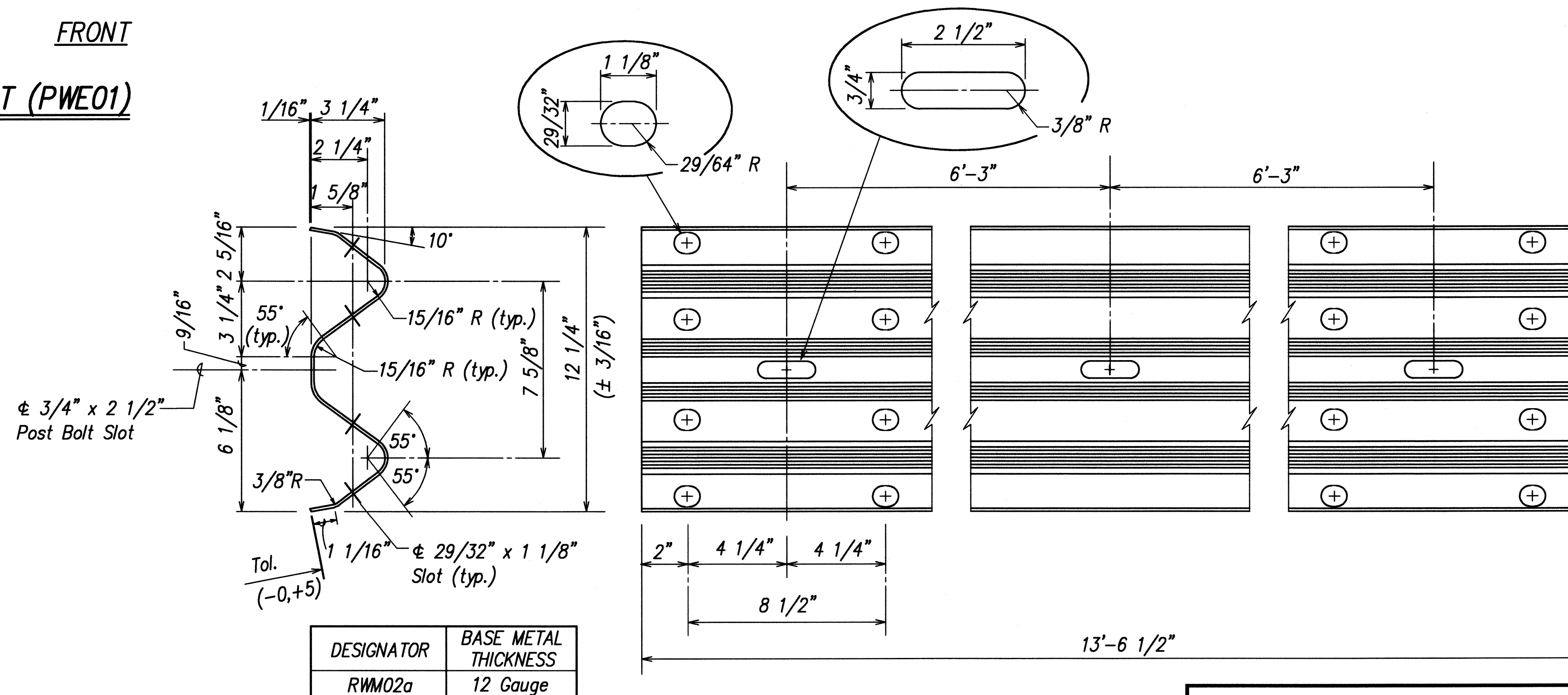
DESIGNATOR	L
FBB01	1 3/8"
FBB02	2"
FBB03	10"



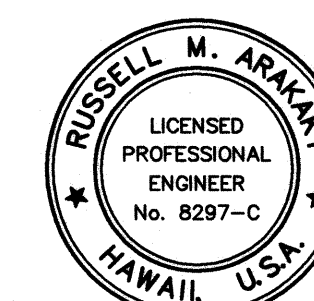
**GUARDRAIL BOLTS AND
RECESSED NUT**



W-BEAM BACK-UP-PLATE (RWB01a)



2 SPACE W-BEAM GUARDRAIL (RWM02a)

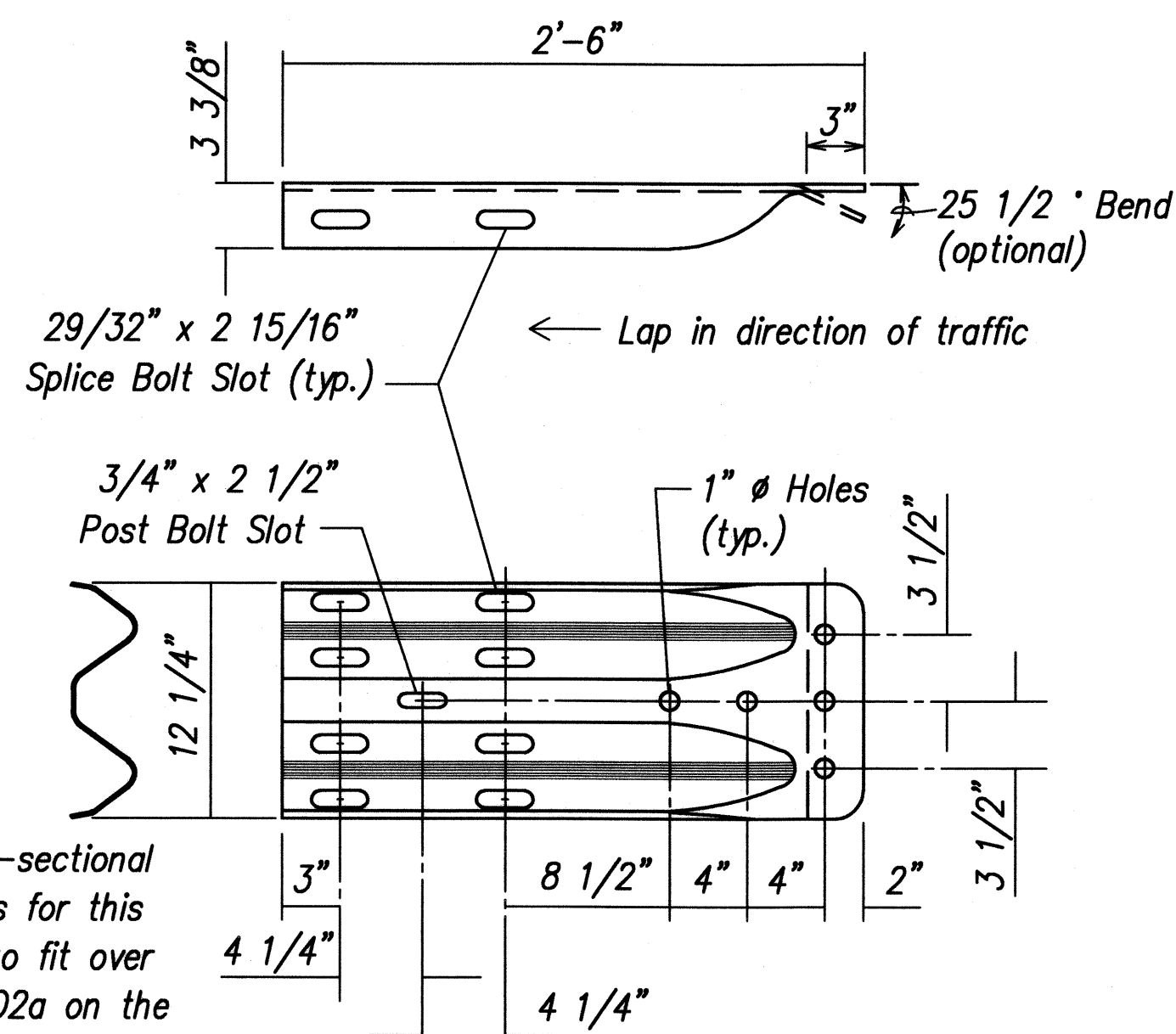


THIS WORK WAS PREPARED BY
ME OR UNDER MY SUPERVISION

Russell M. Araki
Professional Engineer
License No. 8297-C
License Expires 4-30-10

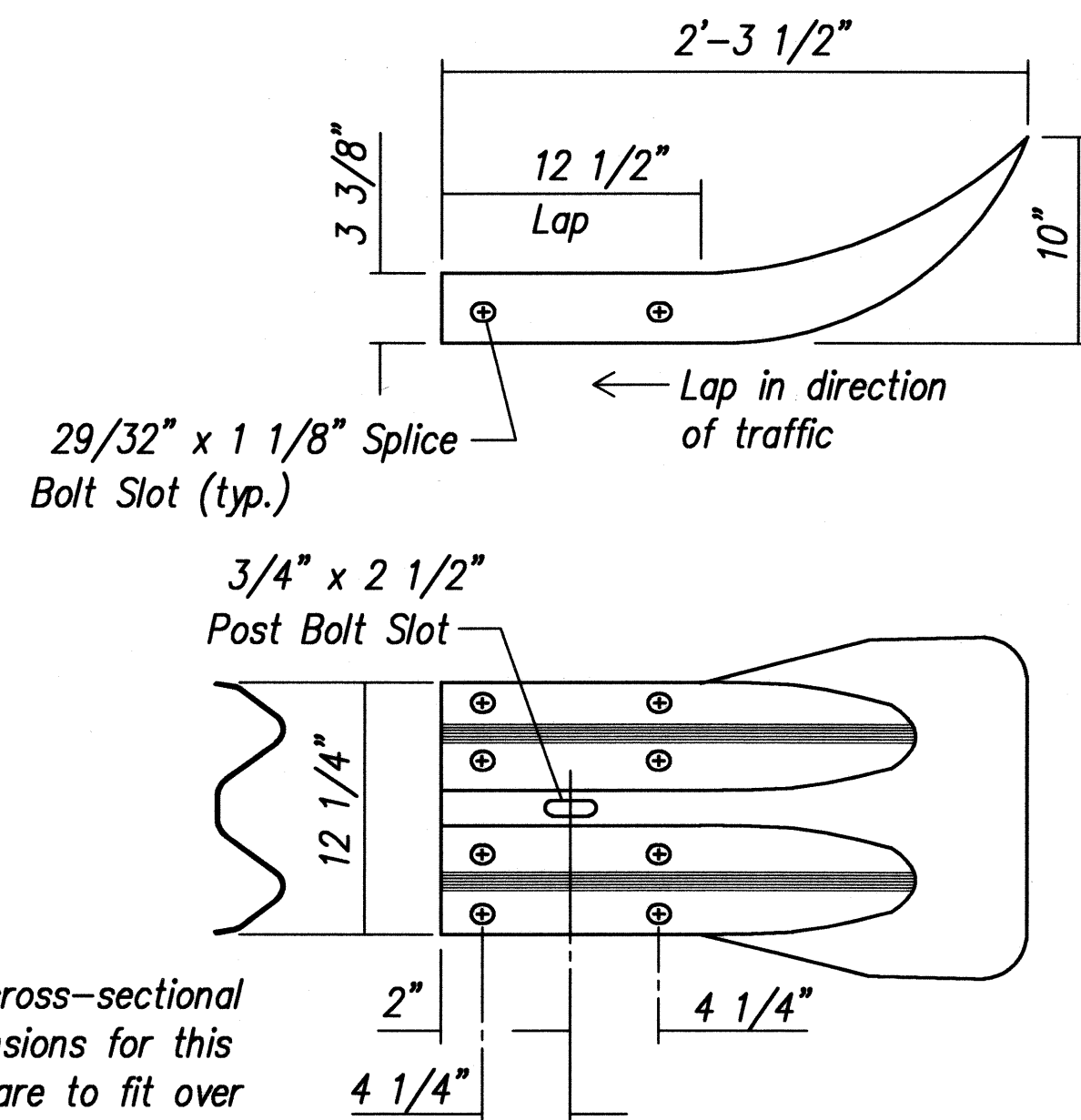
STATE OF HAWAII
DEPARTMENT OF TRANSPORTATION
HIGHWAYS DIVISION
**STRONG POST W-BEAM
GUARDRAIL**
KUHIU HIGHWAY, SHORT TERM IMPROVEMENTS
Wailua Cane Haul Bridge Widening
Fed. Aid Project No. BR-056-1(51)
Scale: As Noted Date: MAY 2008
SHEET No. GR9 OF GR13 SHEETS

FED. ROAD DIST. NO.	STATE	FED. AID PROJ. NO.	FISCAL YEAR	SHEET NO.	TOTAL SHEETS
HAWAII	HAW.	BR-056-1(51)	2008	81	284



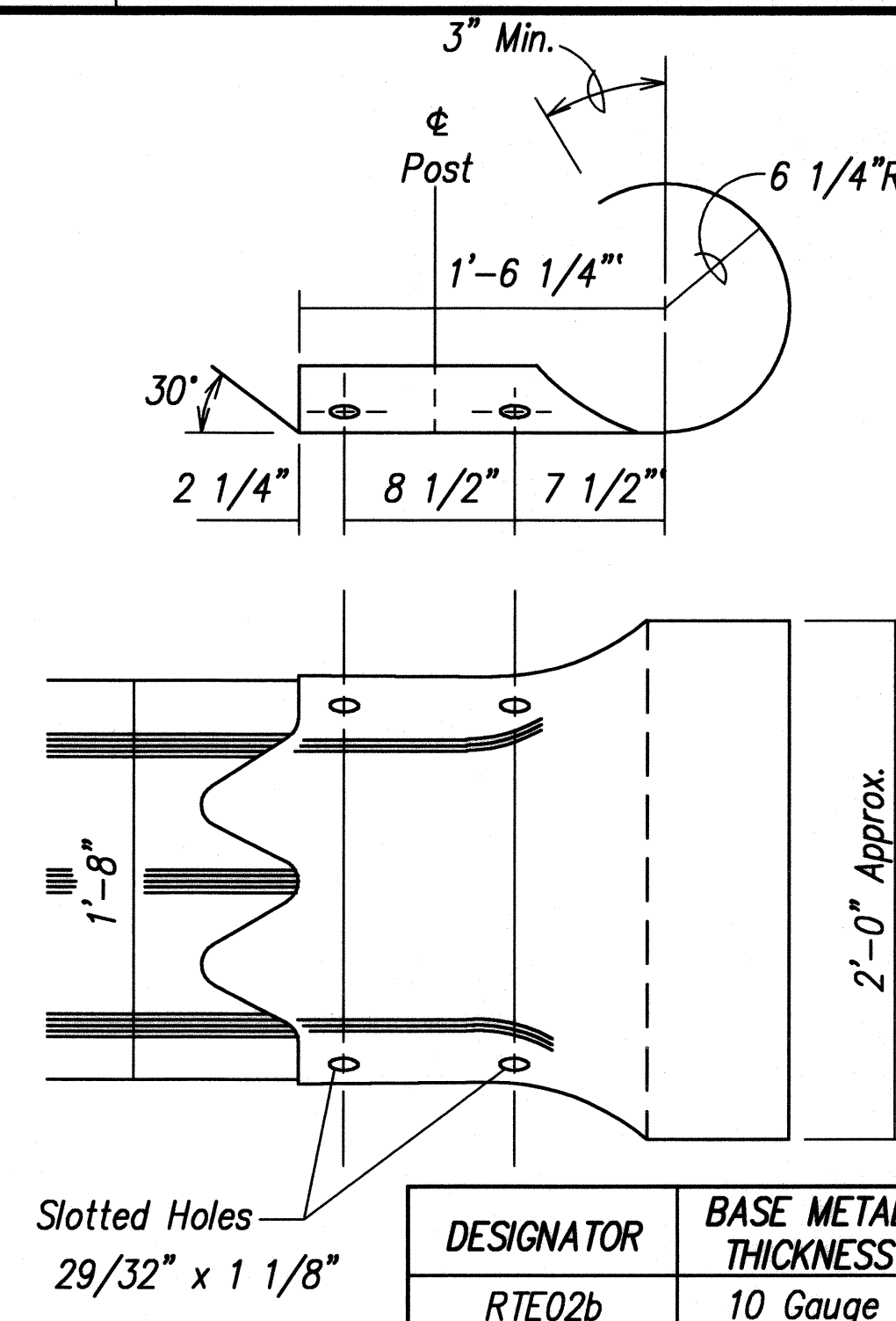
DESIGNATOR	BASE METAL THICKNESS
RWE02b	10 Gauge

W-BEAM TERMINAL CONNECTOR (RWE02b)

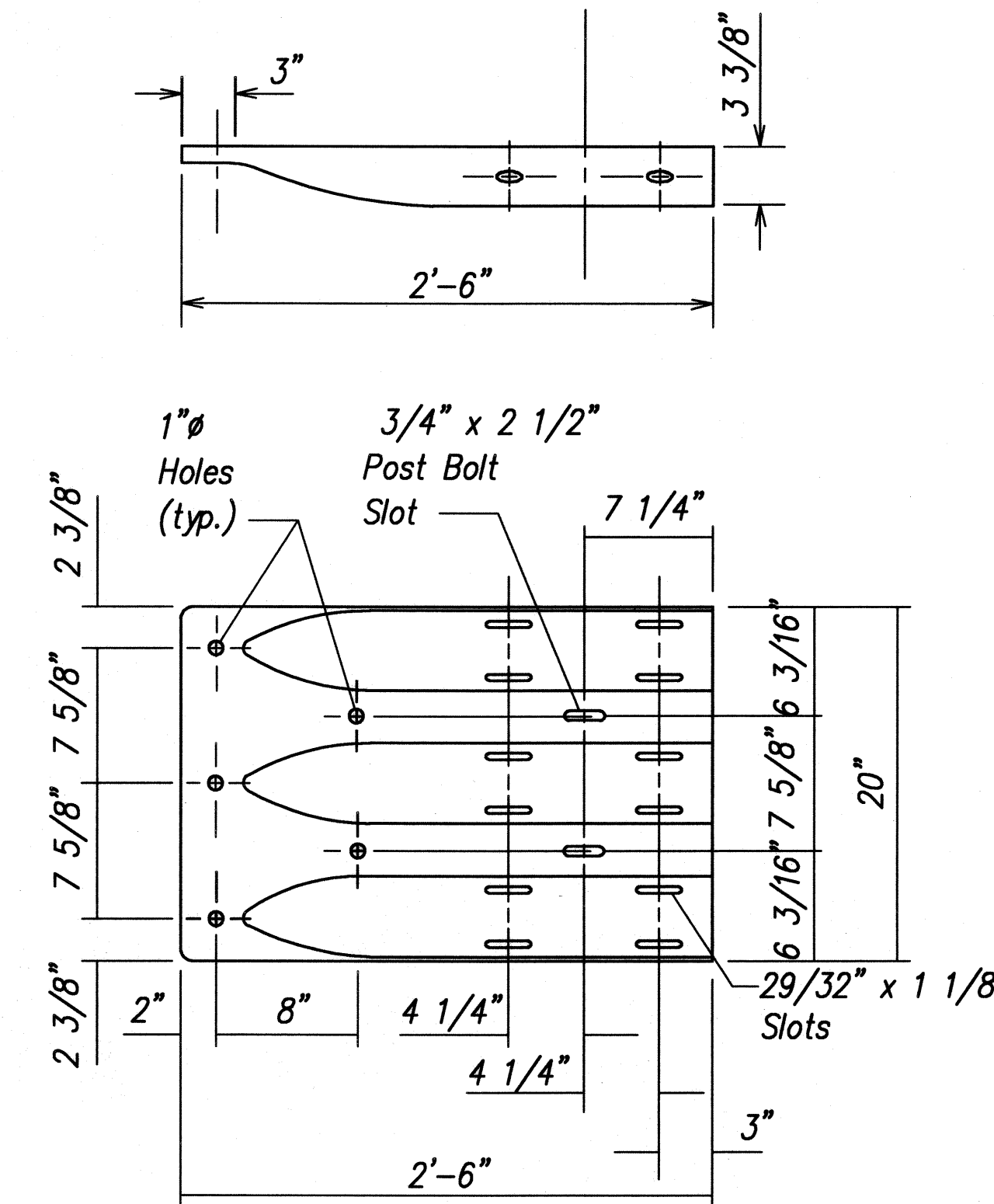


DESIGNATOR	BASE METAL THICKNESS
RWE01a	12 Gauge

W-BEAM END SECTION (FLARED RWE01a)

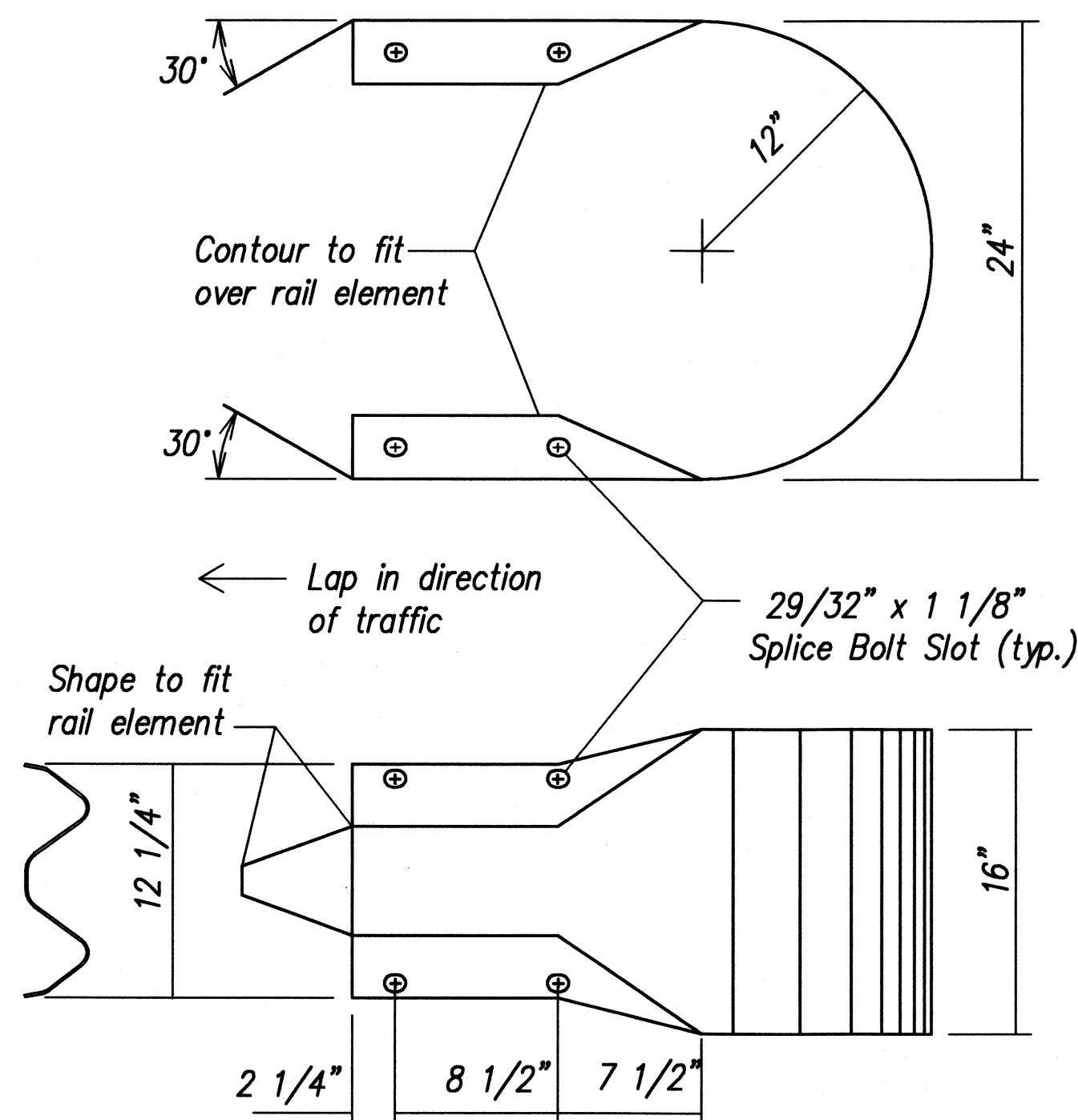


THRIE-BEAM SECTION (ROUNDED) (RTE02b)



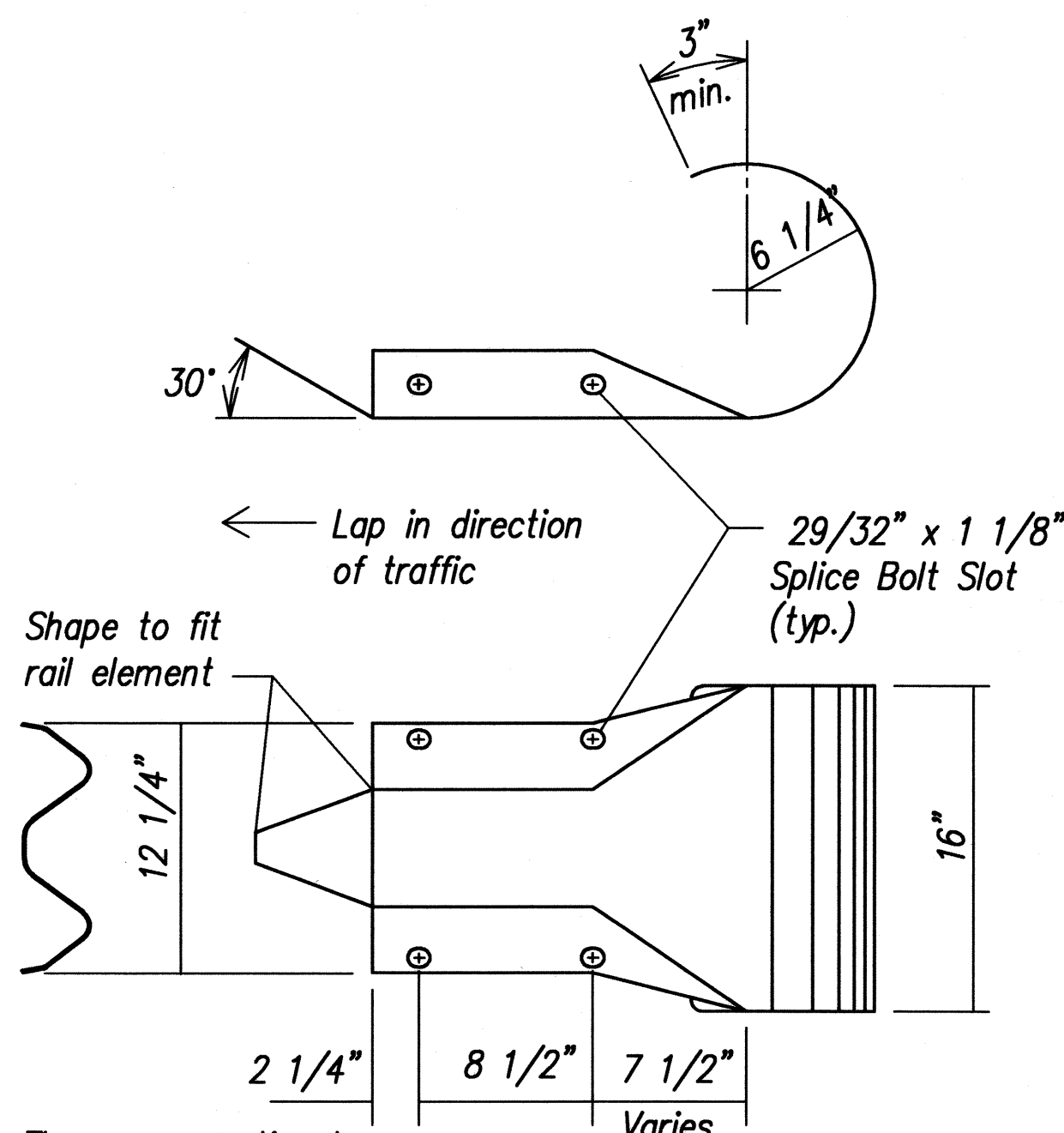
DESIGNATOR	BASE METAL THICKNESS
RTE01b	10 Gauge

THRIE-BEAM TERMINAL CONNECTOR (RTE01b)



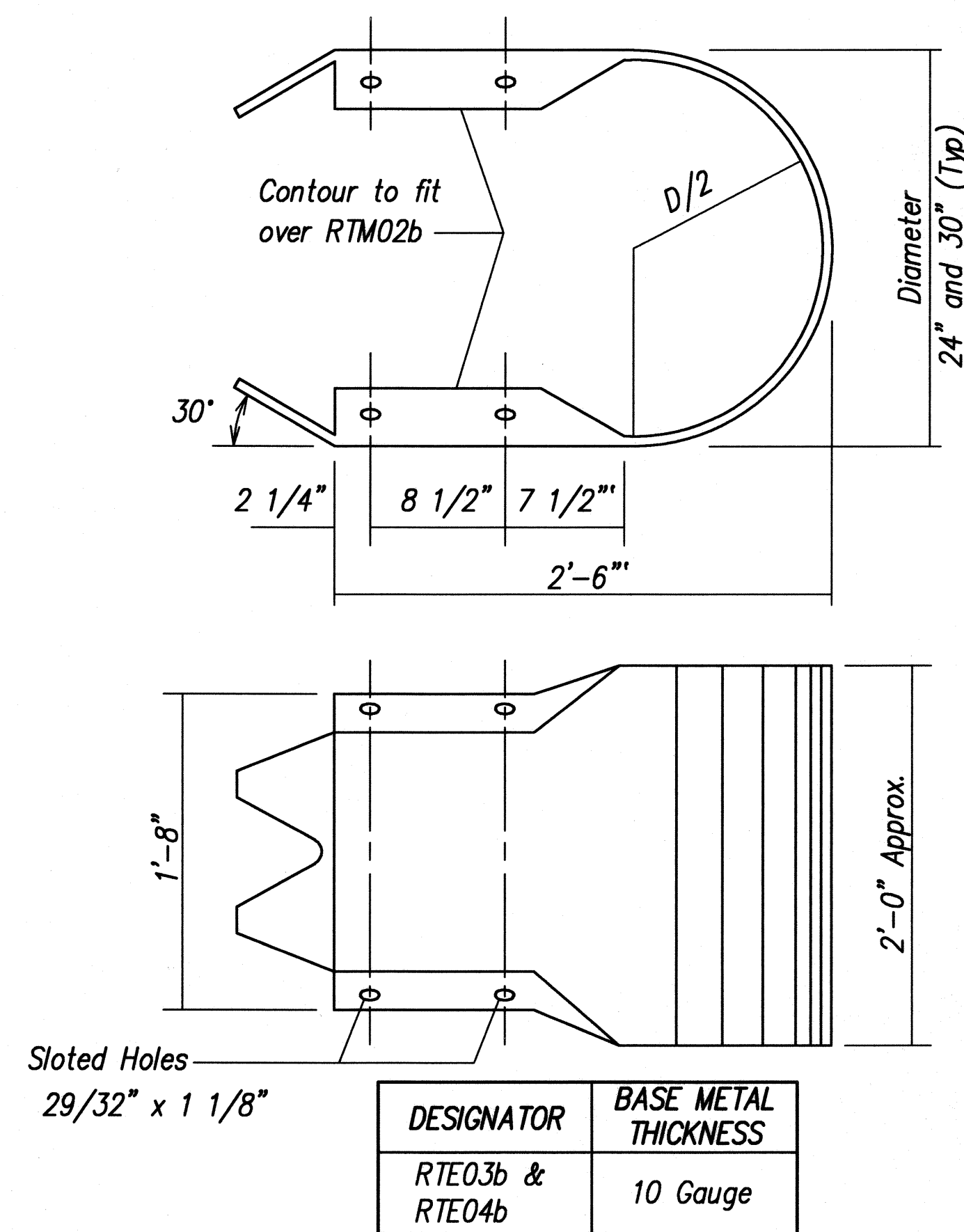
DESIGNATOR	BASE METAL THICKNESS
RWE06a	12 Gauge

W-BEAM END SECTION (BUFFER RWE06a)

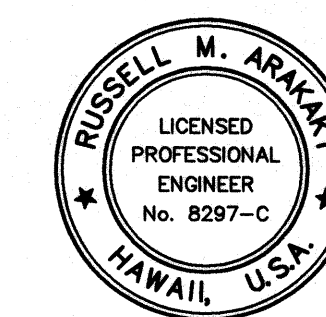


DESIGNATOR	BASE METAL THICKNESS
RWE03a	12 Gauge

W-BEAM END SECTION (ROUNDED RWE03a)



THRIE-BEAM END SECTION (BUFFER RTE03b or RTE04b)



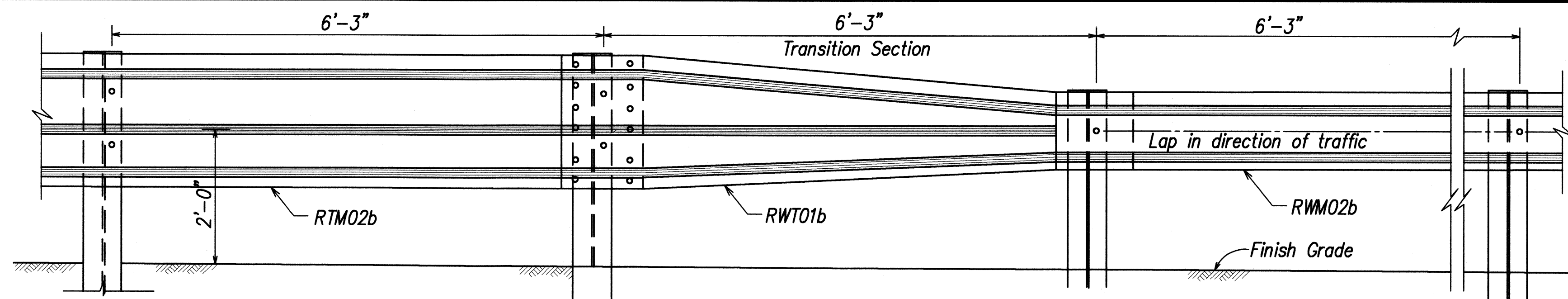
THIS WORK WAS PREPARED BY ME OR UNDER MY SUPERVISION

Russell M. Araki
P.E., Inc.
dba PARK ENGINEERING
LICENSE EXPIRES 4-30-10

STATE OF HAWAII
DEPARTMENT OF TRANSPORTATION
HIGHWAYS DIVISION
GUARDRAIL TERMINAL CONNECTORS AND END SECTIONS
KUHO HIGHWAY, SHORT TERM IMPROVEMENTS
Wailua Cane Haul Bridge Widening
Fed. Aid Project No. BR-056-1(51)
Scale: As Noted Date: MAY 2008
SHEET No. GR10 OF GR13 SHEETS

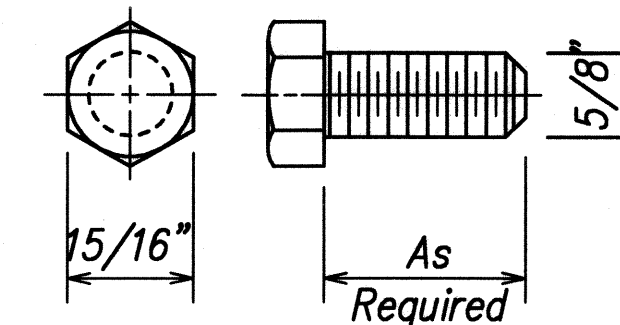
ORIGINAL PLAN	DATE
DRAWN BY	
DESIGNED BY	
QUANTITIES BY	
CHECKED BY	
NO.	

FED. ROAD DIST. NO.	STATE	FED. AID PROJ. NO.	FISCAL YEAR	SHEET NO.	TOTAL SHEETS
HAWAII	HAW.	BR-056-1(51)	2008	82	284



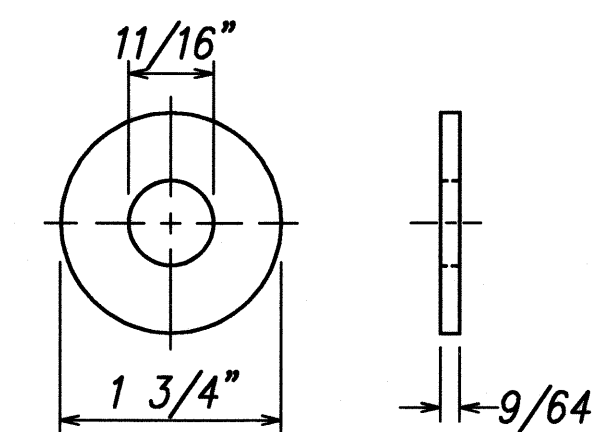
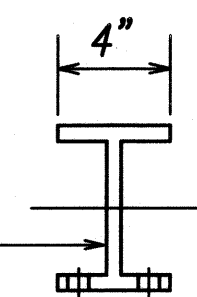
TRANSITION SECTION *

* Not to be used for Thrie Beam connection to structures.

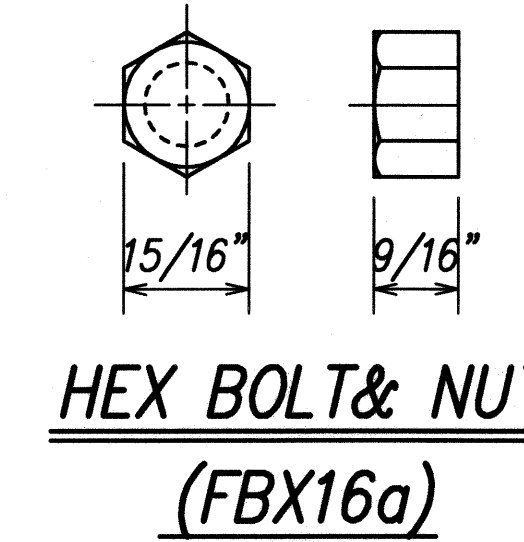


NOTE:
All Holes are
3/4" Dia.

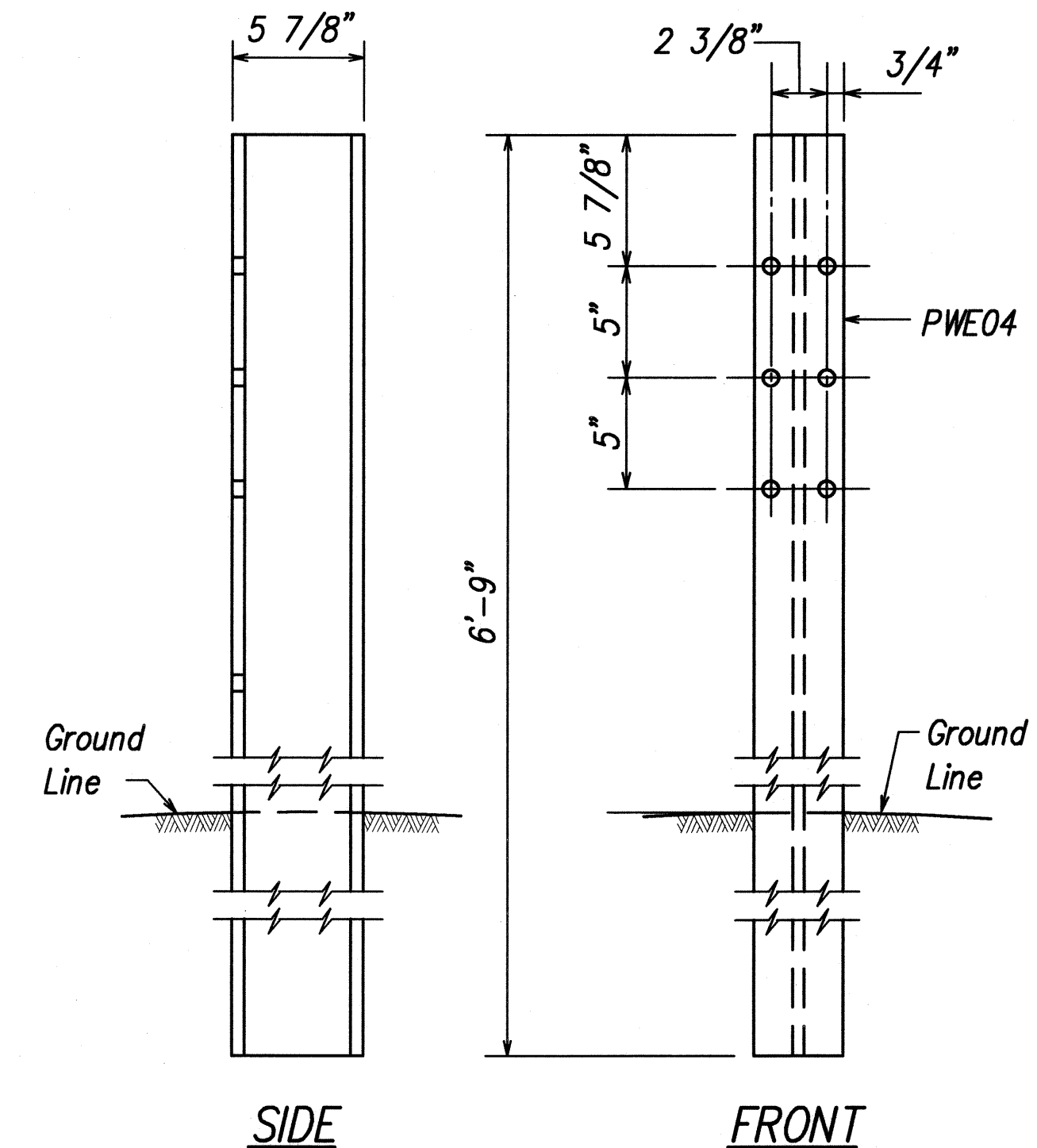
W6x8.5
Structural
Shape



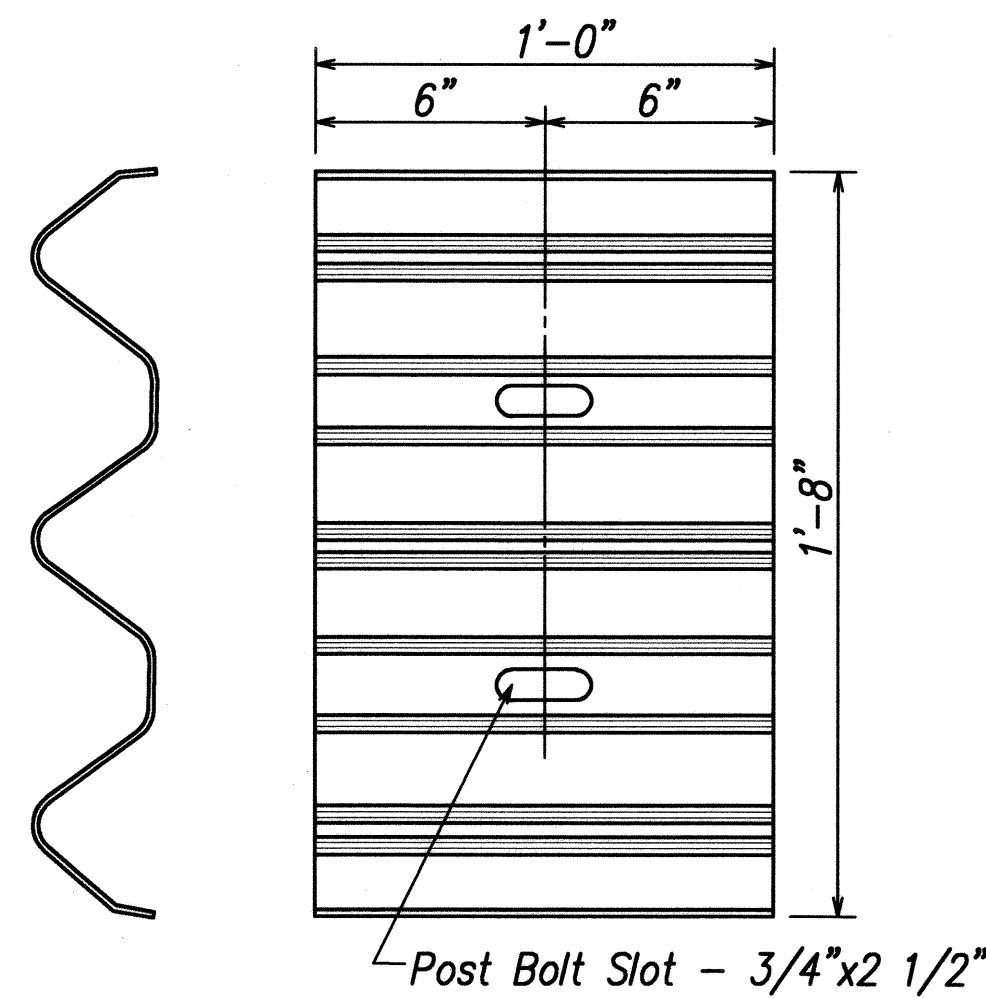
STEEL WASHER FOR 5/8" BOLT



HEX BOLT & NUT (FBX16a)

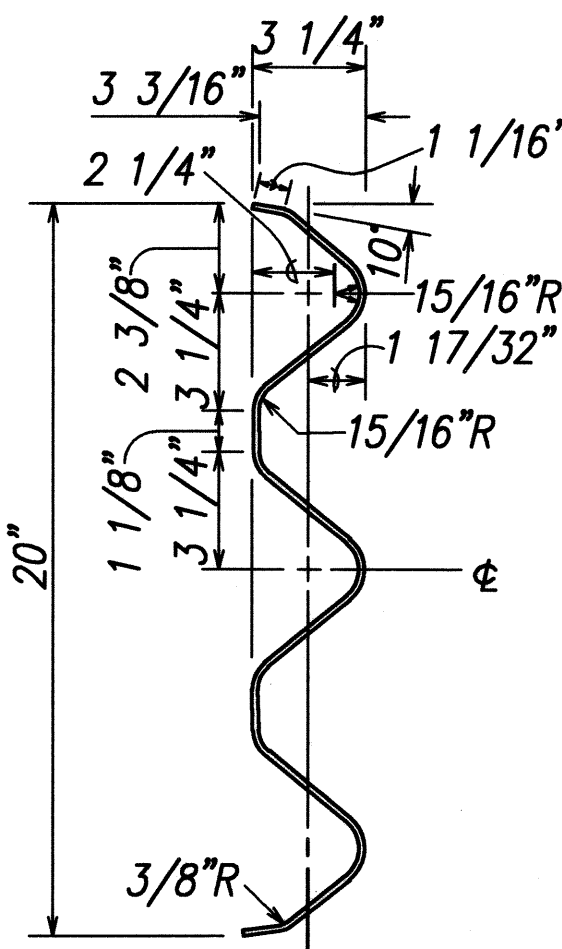


W-BEAM STRONG POST (PWE04)

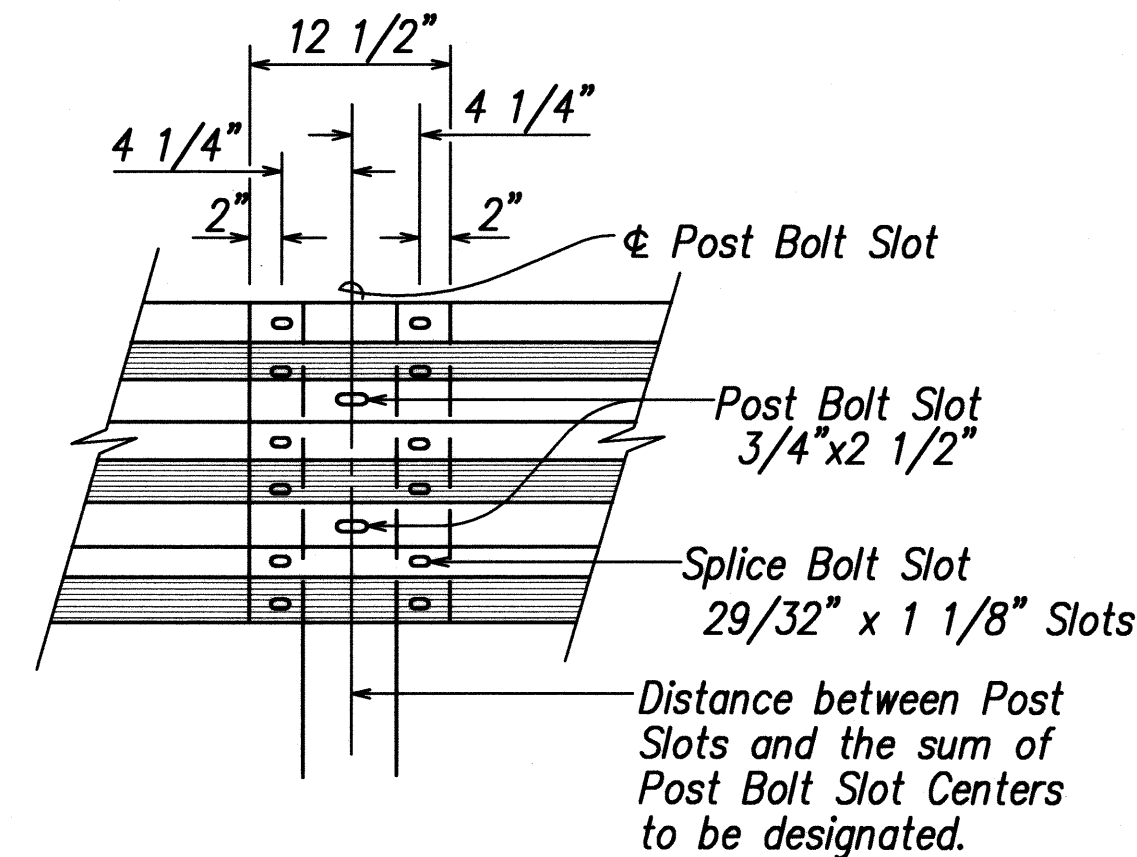


BACKUP PLATE (RTB01b)

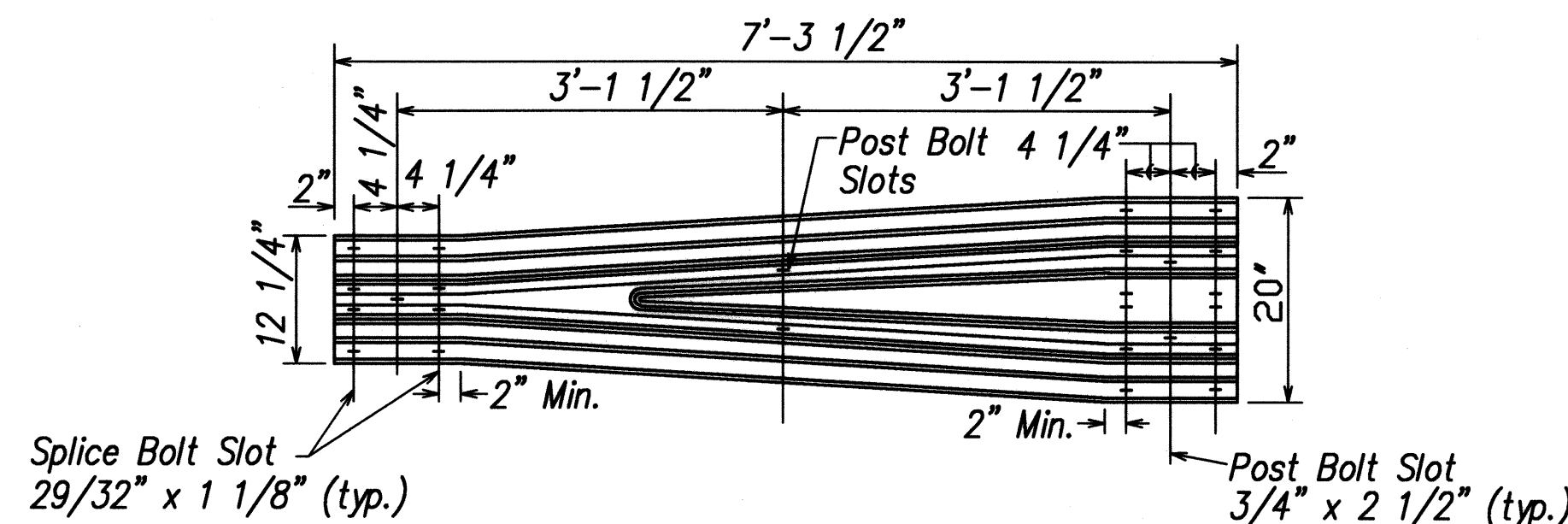
(Use at Posts where
Splices do not occur)



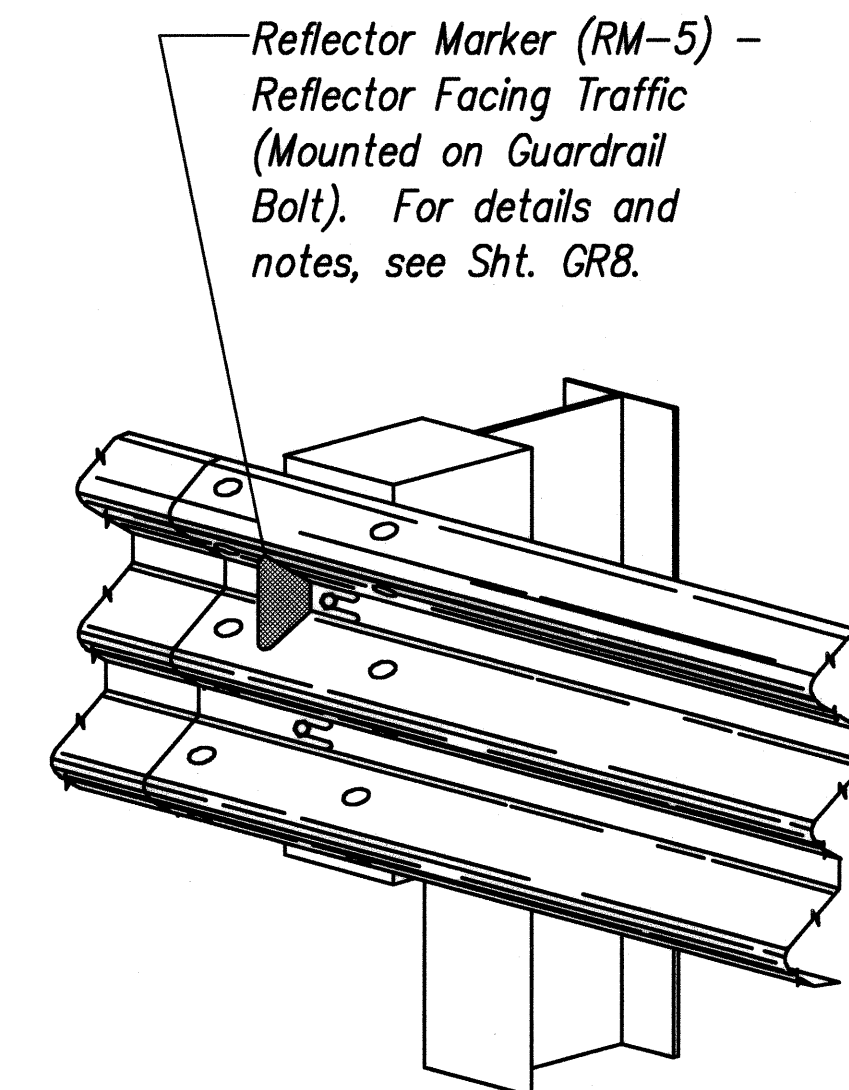
SECTION THRU RAIL ELEMENT (RTM02b)



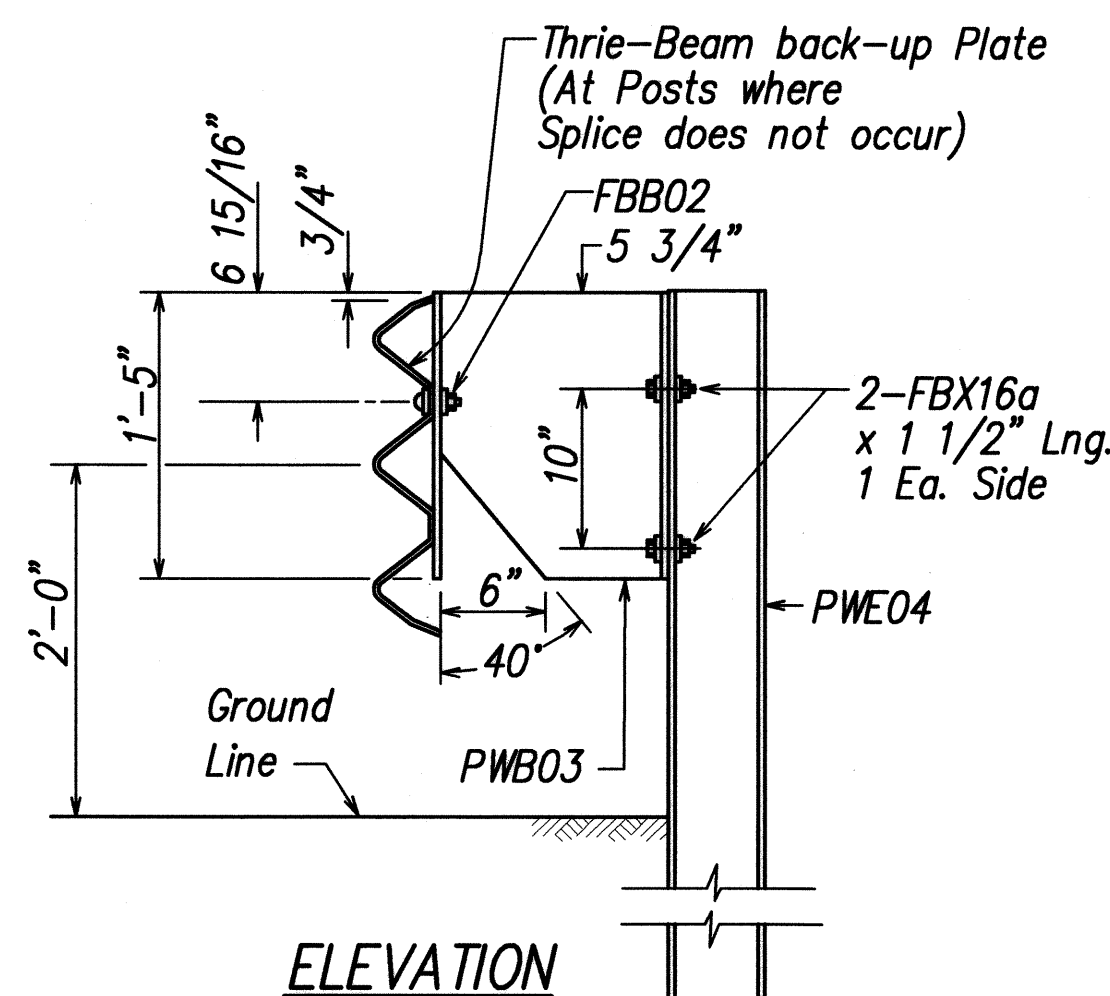
RAIL SPLICE



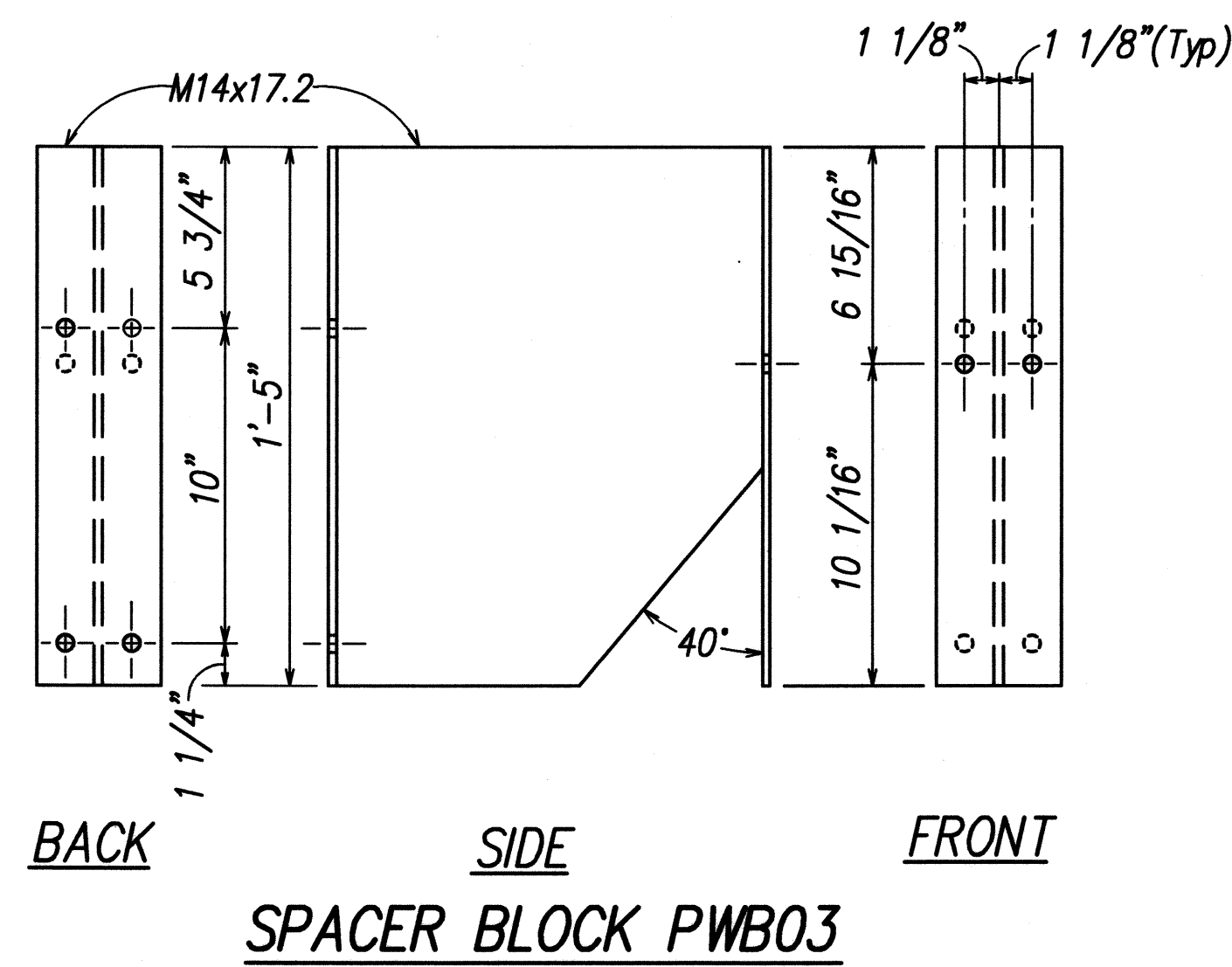
TRANSITION SECTION (RWT01b)



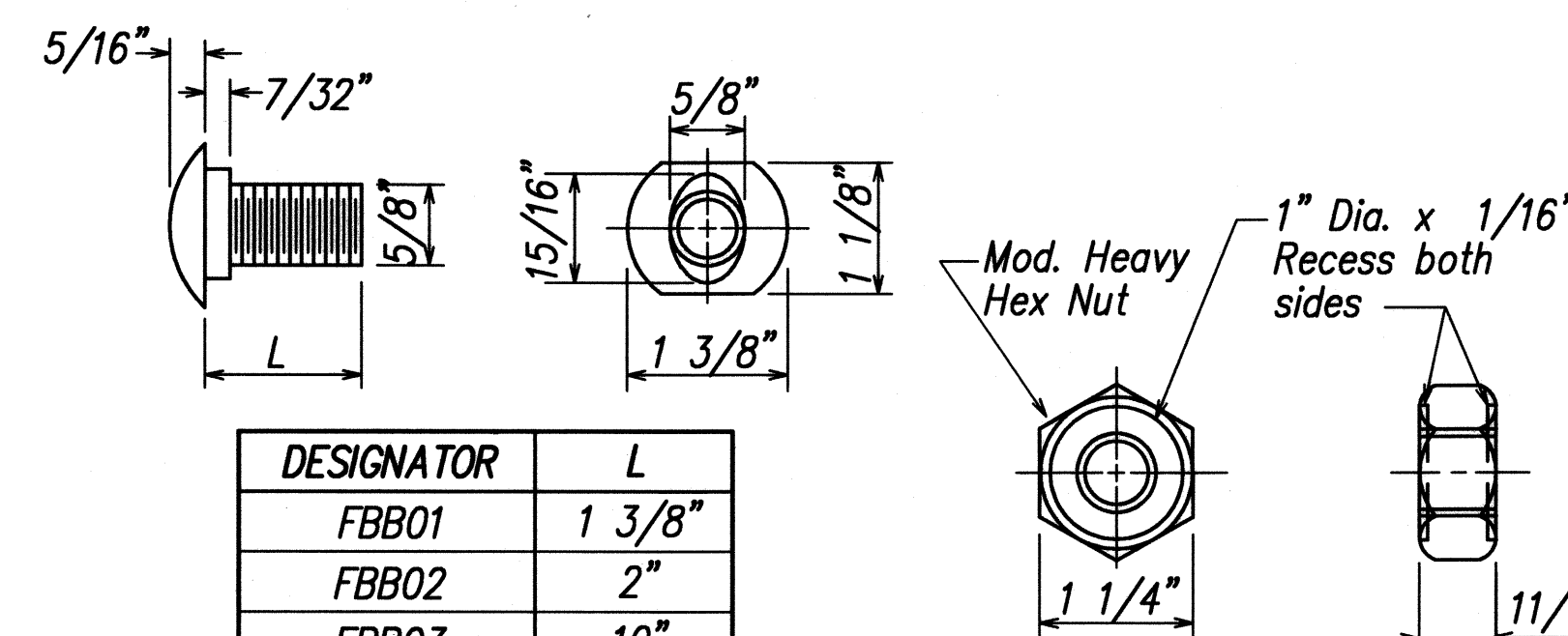
TYPICAL INSTALLATION OF REFLECTOR MARKER (RM-5)



STRONG POST MODIFIED THRIE-BEAM GUARDRAIL (SGR09b)

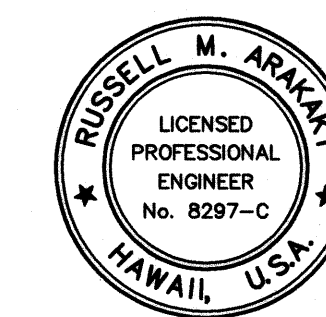


SPACER BLOCK PWB03



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

GUARDRAIL BOLTS AND RECESSED NUT



THIS WORK WAS PREPARED BY
ME OR UNDER MY SUPERVISION
Russell M. Arakaki
P.E., Inc.
dba PARK ENGINEERING
LICENSE EXPIRES 4-30-10

STATE OF HAWAII
DEPARTMENT OF TRANSPORTATION
HIGHWAYS DIVISION
**STRONG POST MODIFIED
THRIE-BEAM GUARDRAIL**
KUHO HIGHWAY, SHORT TERM IMPROVEMENTS
Wailua Cane Haul Bridge Widening
Fed. Aid Project No. BR-056-1(51)
Scale: As Noted Date: MAY 2008
SHEET No. GR11 OF GR13 SHEETS

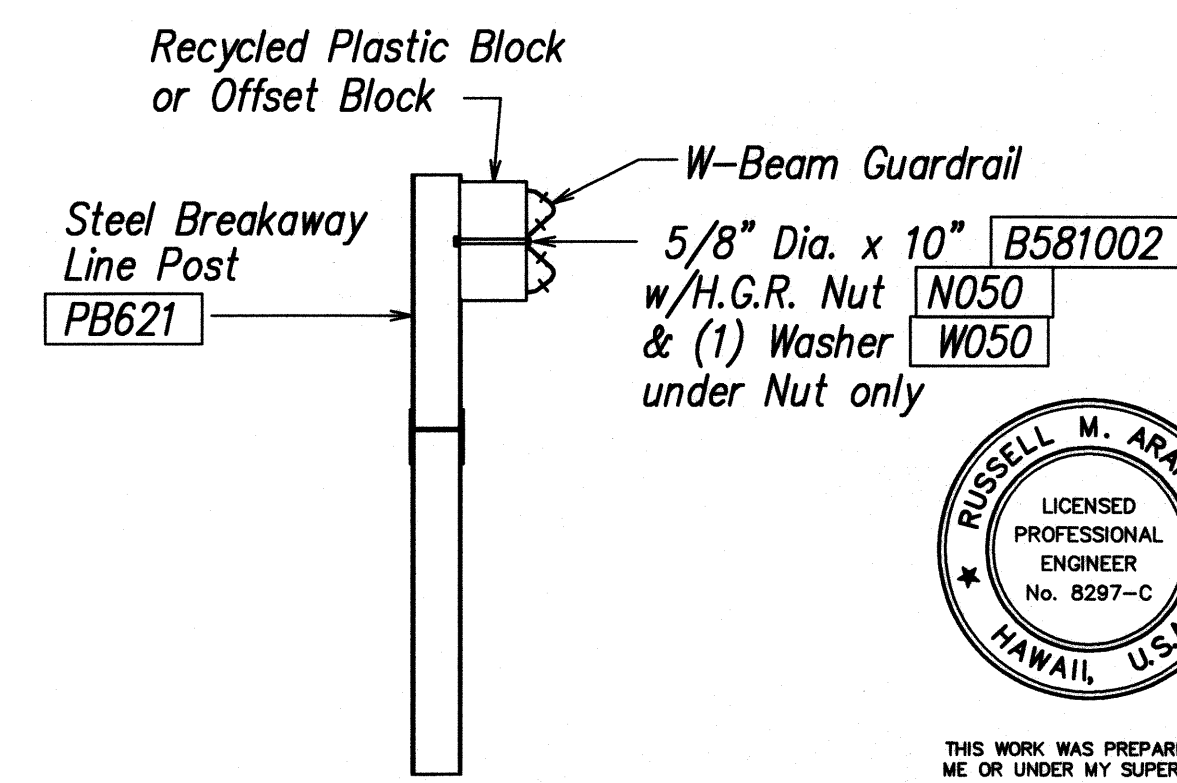
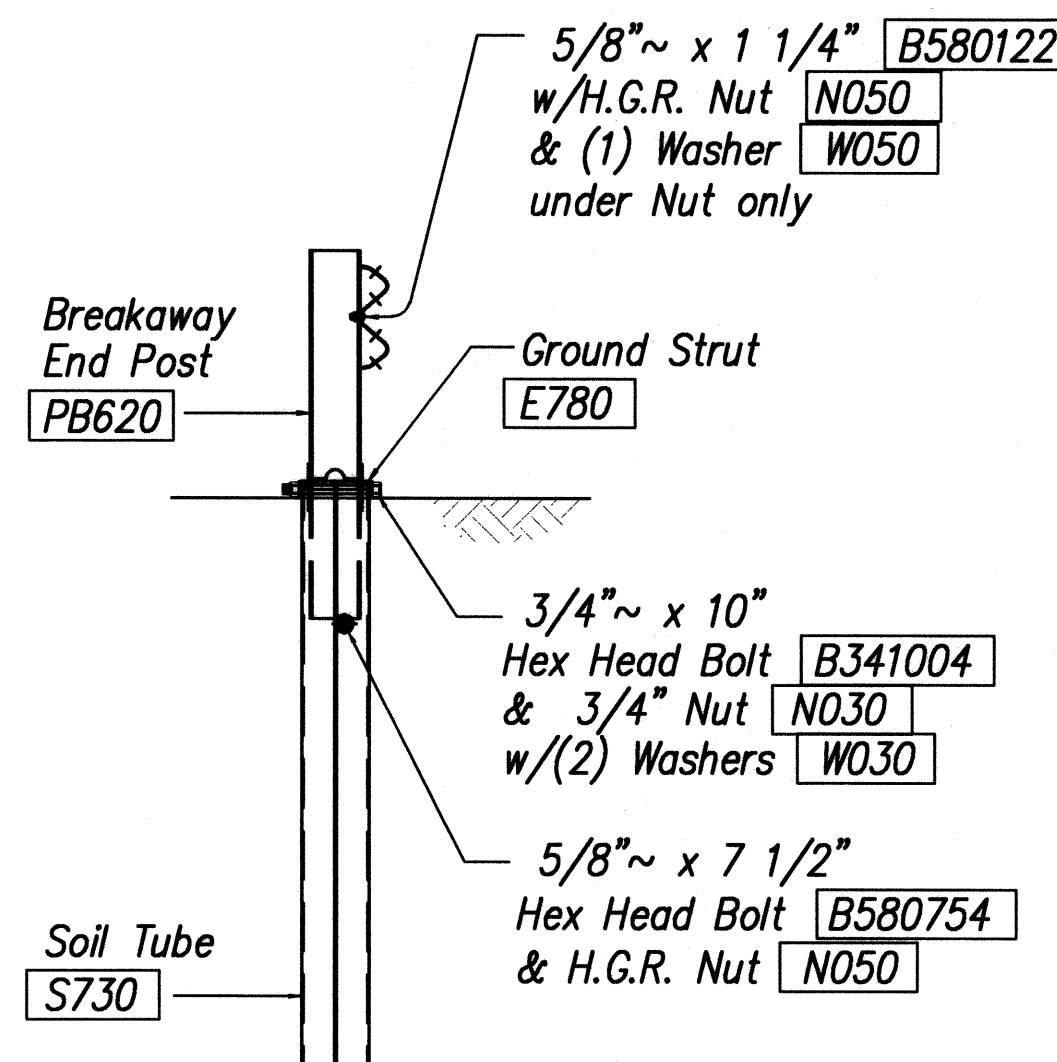
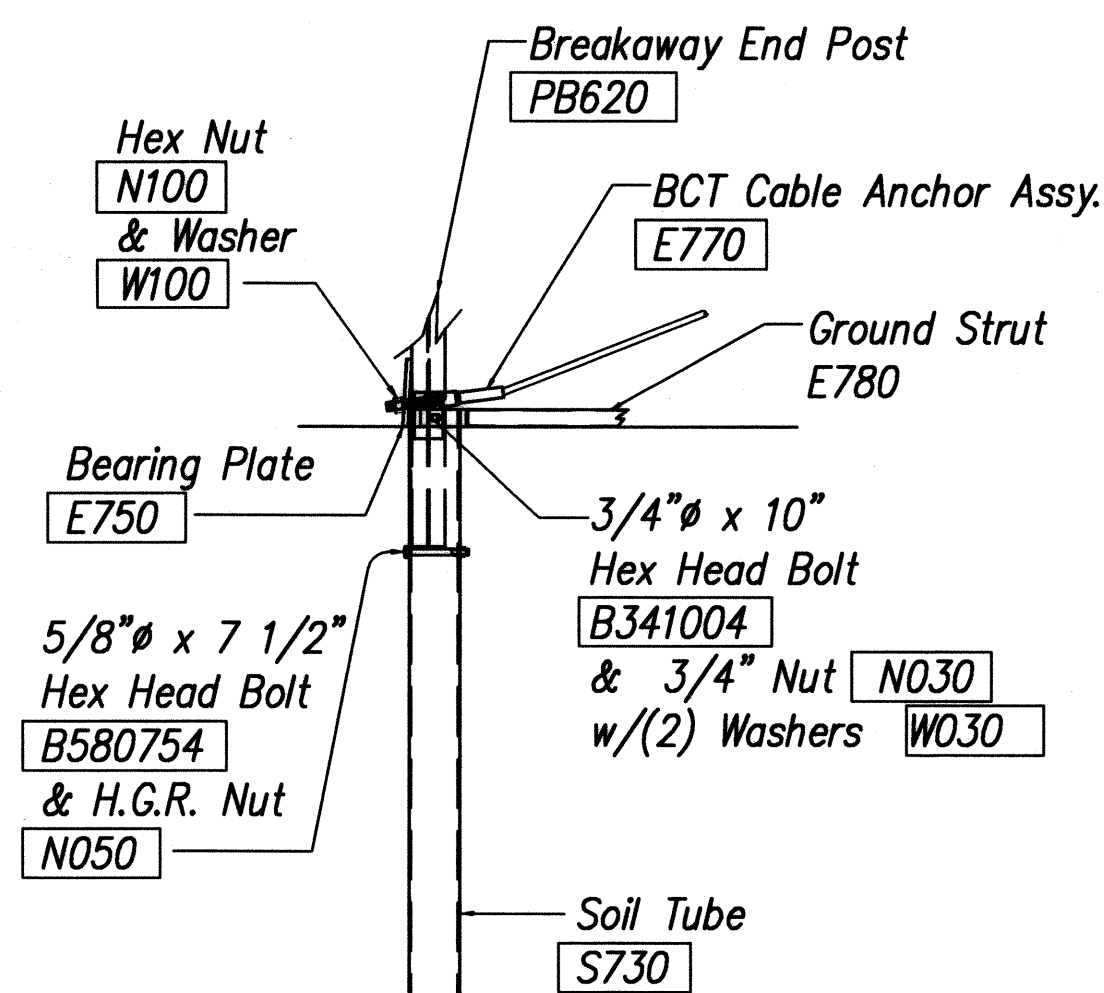
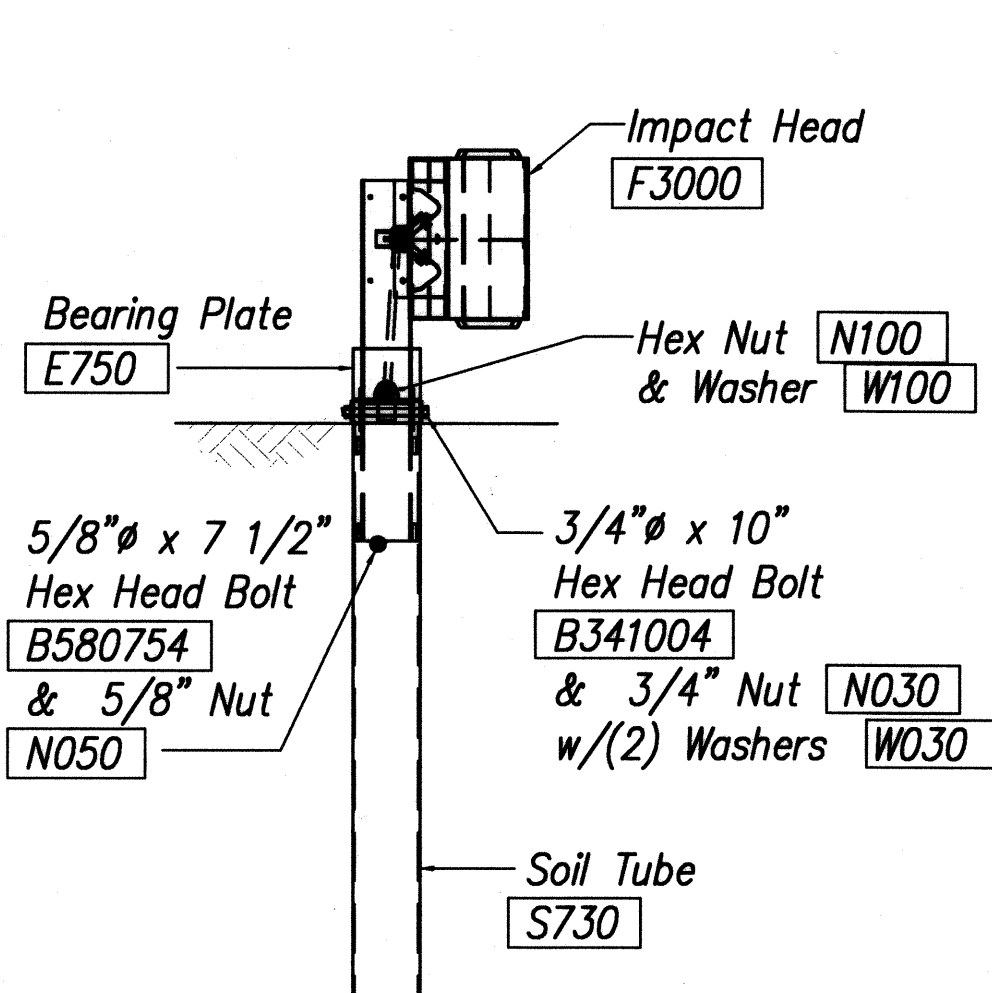
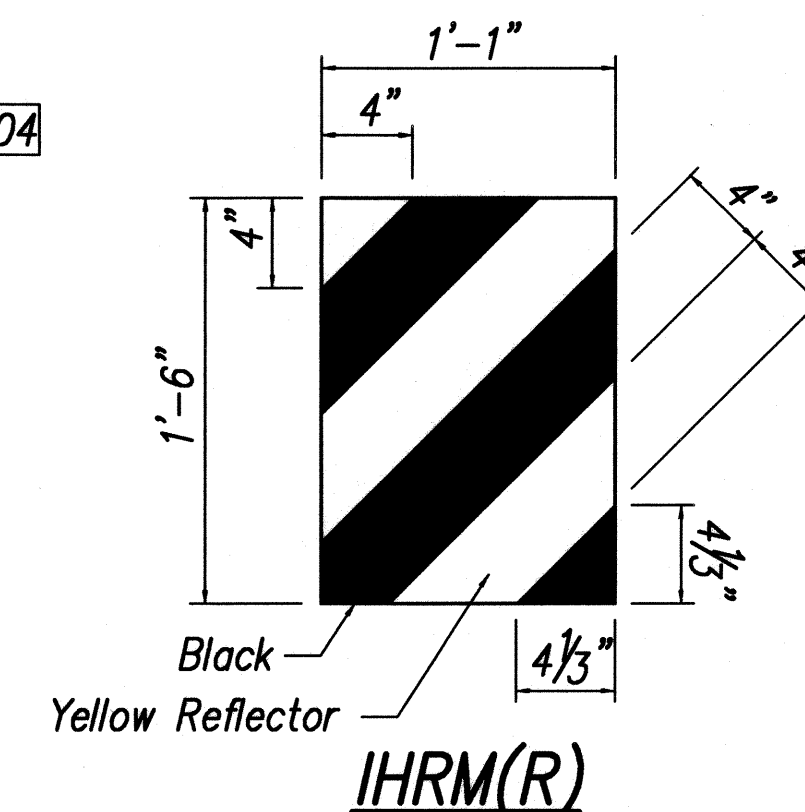
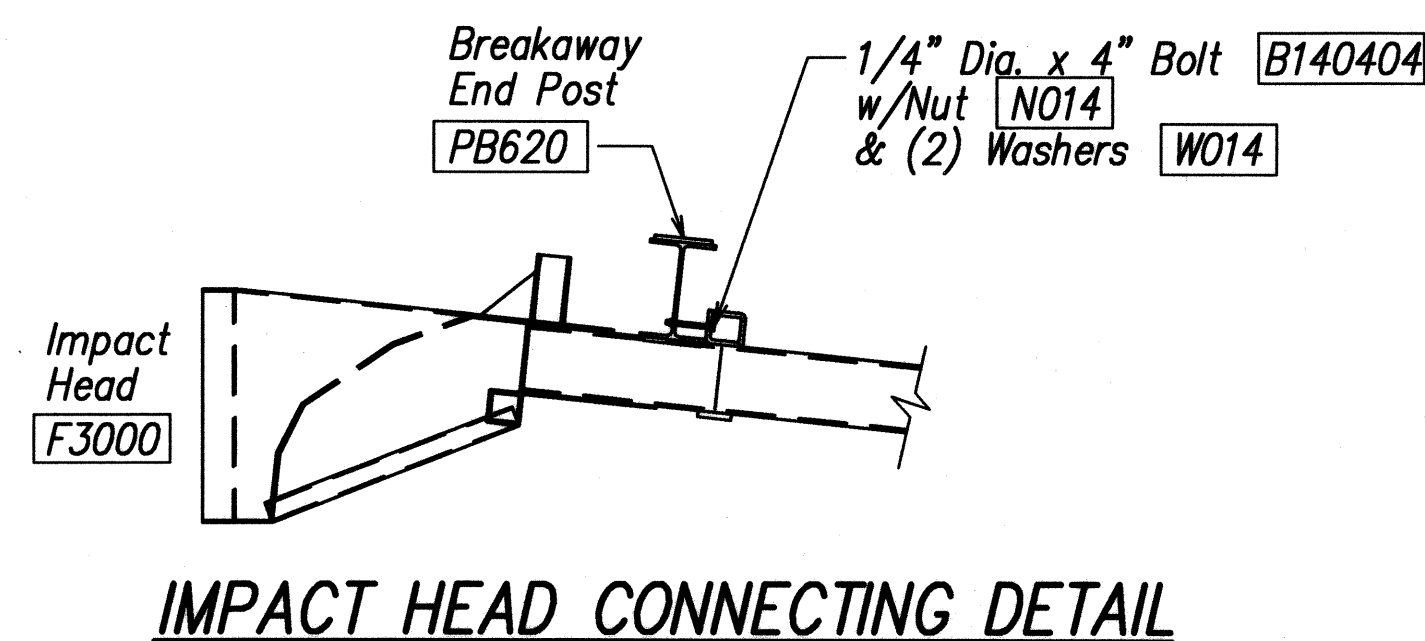
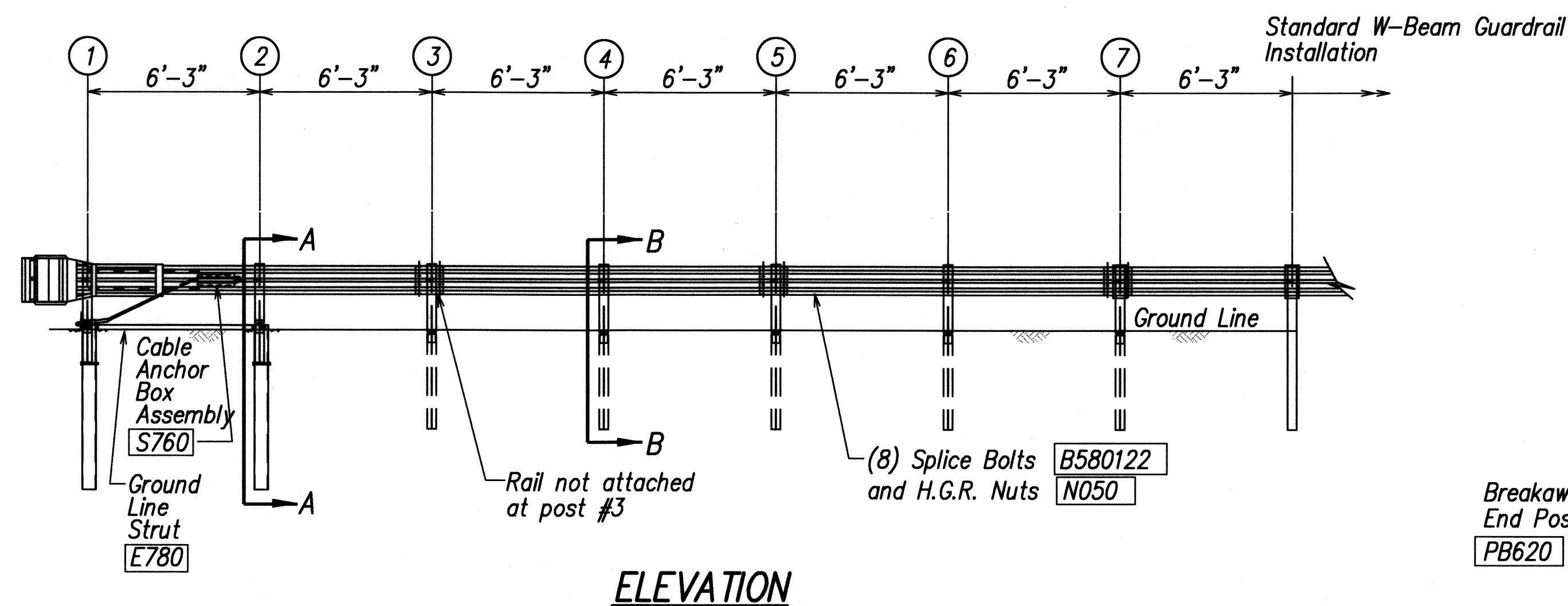
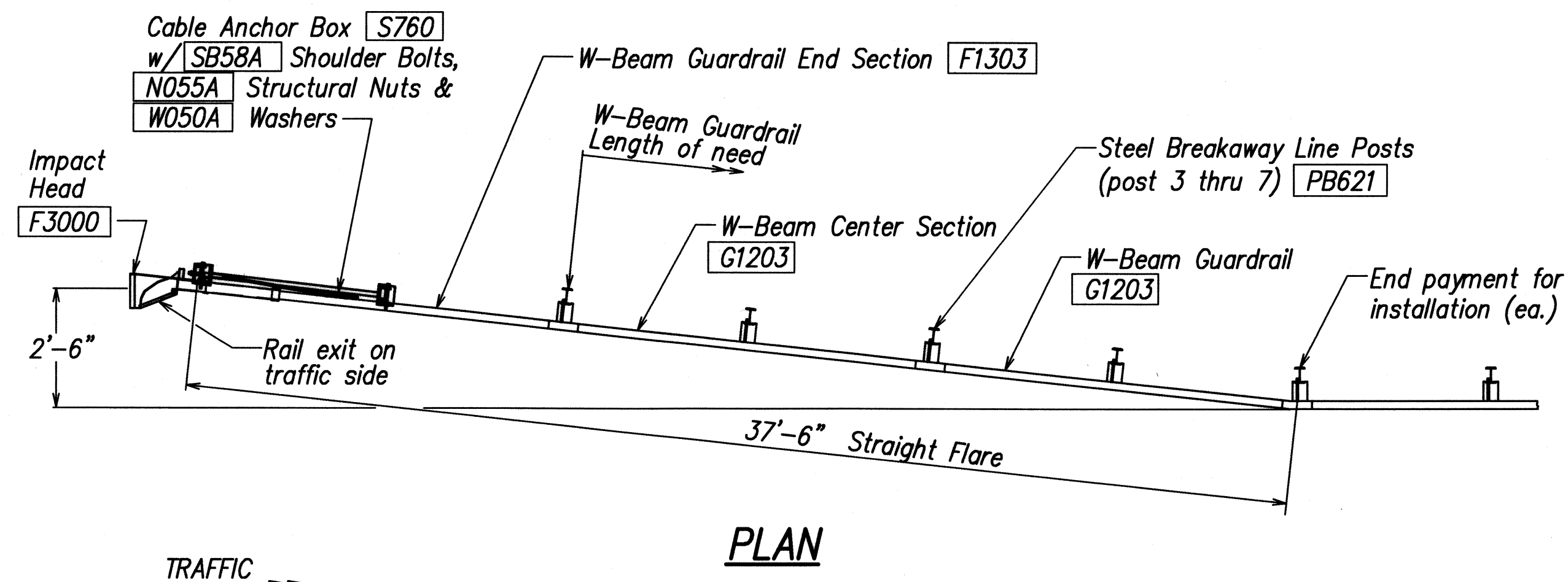
FED. ROAD DIST. NO.	STATE	FED. AID PROJ. NO.	FISCAL YEAR	SHEET NO.	TOTAL SHEETS
HAWAII	HAW.	BR-056-1(51)	2008	83	284

ITEM NO.	QTY.	BILL OF MATERIALS
F3000	1	IMPACT HEAD
F1303	1	W-BEAM GUARDRAIL END SECTION, 12 GA.
G1203	2	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 (SPICE 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

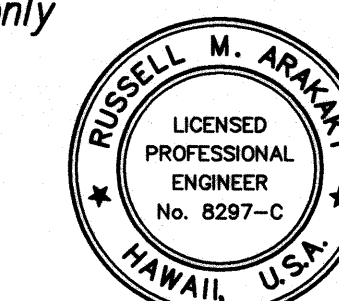
Foundation Tube Options For Posts 1 & 2
*6'-0" Split Foundation Tubes S730
*6'-0" Solid Foundation Tubes E731
*5'-0" Foundation Tubes S735 W/Soil
Plates SP600
*4'-6" Foundation Tubes E735 W/Soil
Plates SP600

GENERAL NOTES

- Breakaway steel posts are required with the FLEAT Terminal.
- All bolts, nuts, cable assemblies, cable anchors and bearing plates shall be galvanized.
- The soil tubes shall not protrude more than 4" above ground (measured along a 5' cord). Site grading may be necessary to meet this requirement.
- The soil tubes may be driven with an approved driving head. Soil tubes 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.
- When rock is encountered during excavation, a 12" Dia. post hole, 20" deep may be used if approved by the engineer. Granular material will be placed in the bottom of the hole approx. 2 1/2" deep to provide drainage. The soil tubes will be field cut to length, placed in the hole and backfilled with adequately compacted material excavated from the hole.
- The breakaway cable assembly must be taut. A locking device, (vice grips or channel lock pliers) should be used to prevent the cable from twisting when tightening nuts.
- (R) or (L) indicates right or left Impact Head Reflector Marker (IHRM). Providing and installing of IHRM shall be considered incidental to end treatment.
- The stripes for IHRM shall slope downward at an angle of 45° towards the side of the end treatment that traffic is to pass.



SECTION B-B
(Typical @ Post 3 - 7)
NOTE: RAIL NOT BOLTED @ POST #3



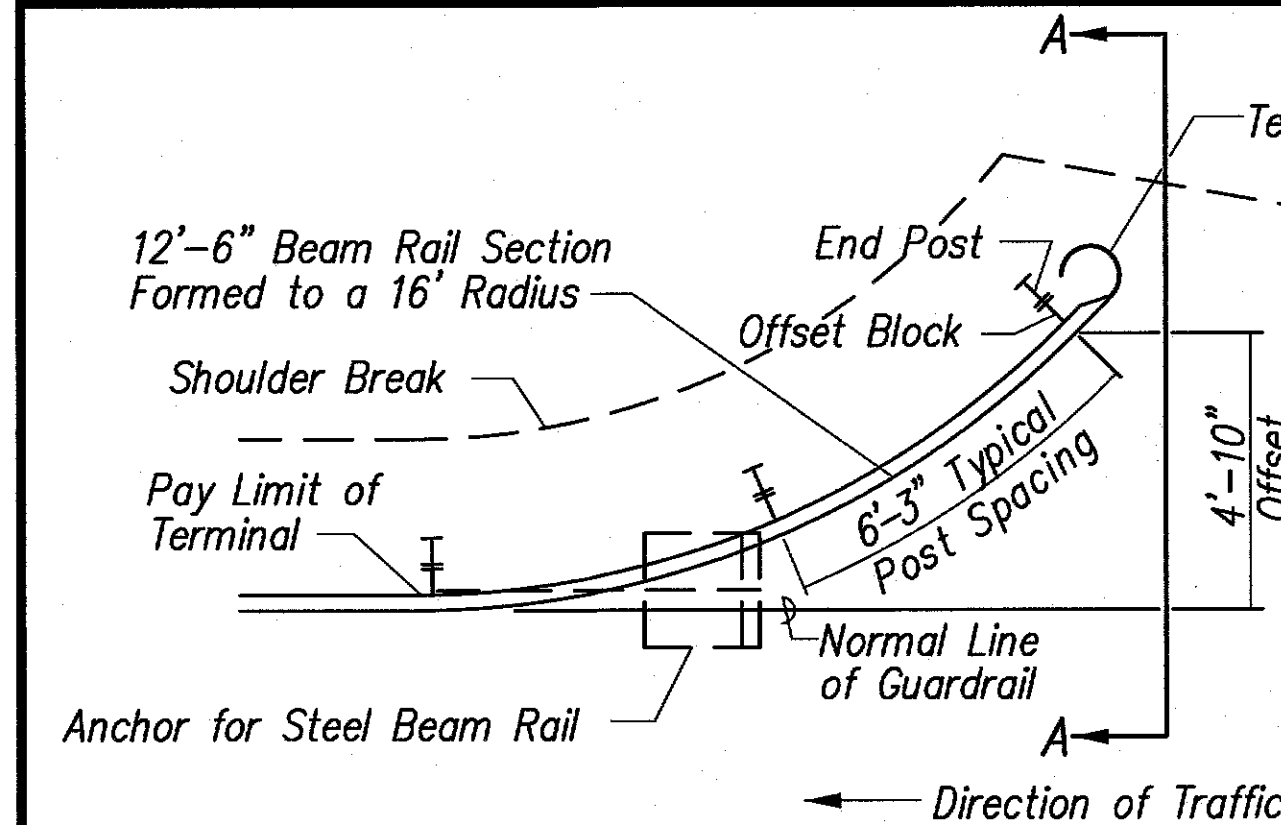
THIS WORK WAS PREPARED BY
ME OR UNDER MY SUPERVISION

Russell M. Araki
Professional Engineer
License Expires 4-30-10

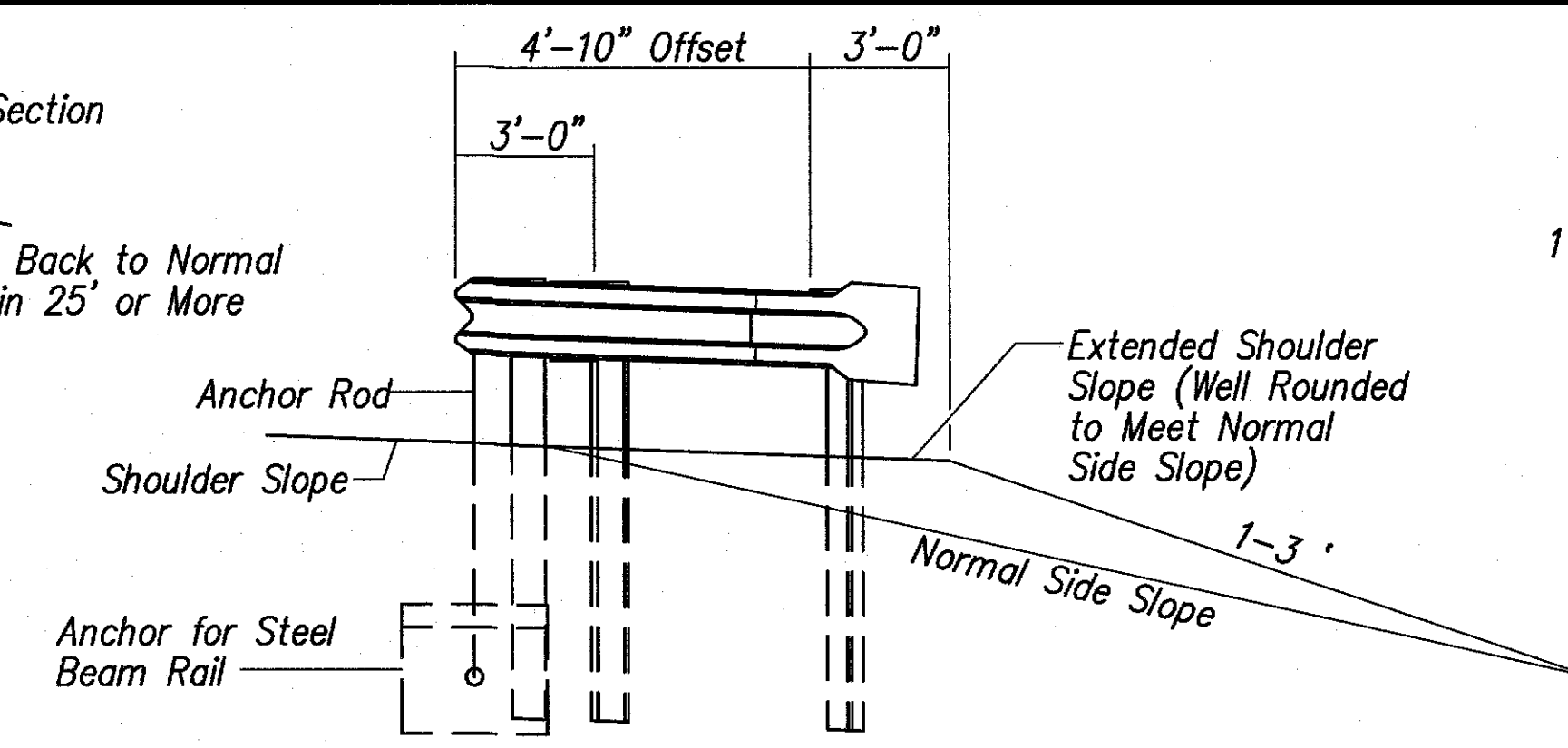
STATE OF HAWAII
DEPARTMENT OF TRANSPORTATION
HIGHWAYS DIVISION
**FLEAT-350 - FLARED ENERGY
ABSORBING TERMINAL**
KUHO HIGHWAY, SHORT TERM IMPROVEMENTS
Wailua Cane Haul Bridge Widening
Fed. Aid Project No. BR-056-1(51)
Scale: As Noted Date: MAY 2008
SHEET No. GR12 OF GR13 SHEETS

FED. ROAD DIST. NO.	STATE	FED. AID PROJ. NO.	FISCAL YEAR	SHEET NO.	TOTAL SHEETS
HAWAII	HAW.	BR-056-1(51)	2008	84	284

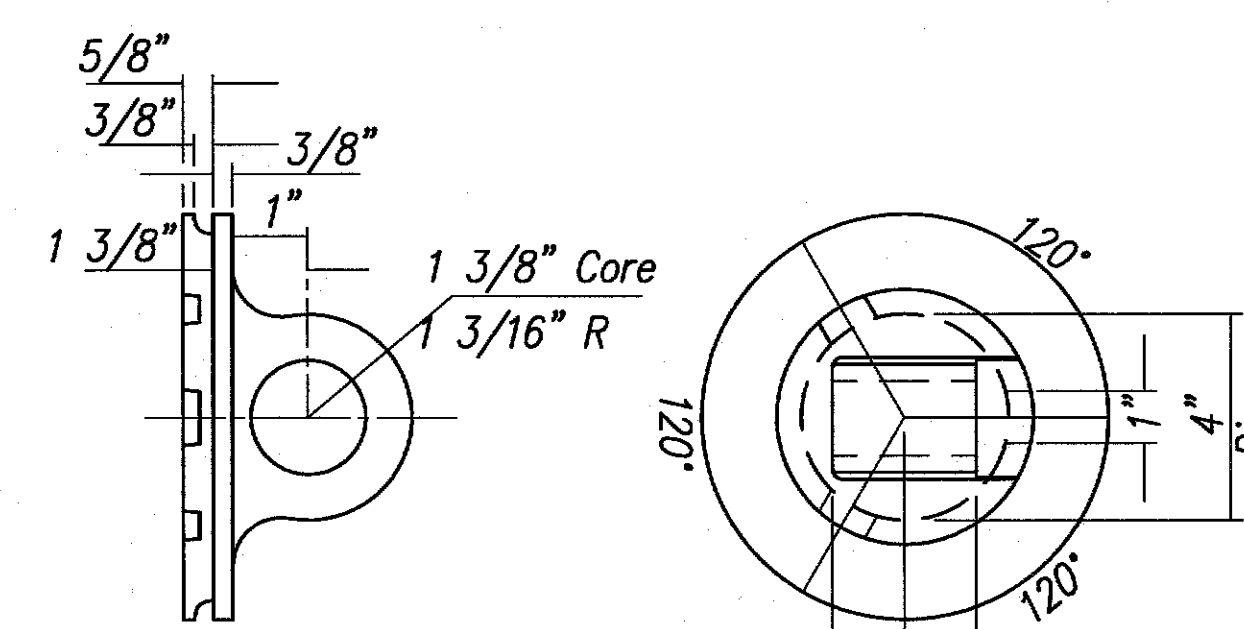
LEGEND FOR AS-BUILT POSTINGS	
	Squiggly line for as-built deletion
	Double line for as-built deletion
Roadway	Text for as-built posting



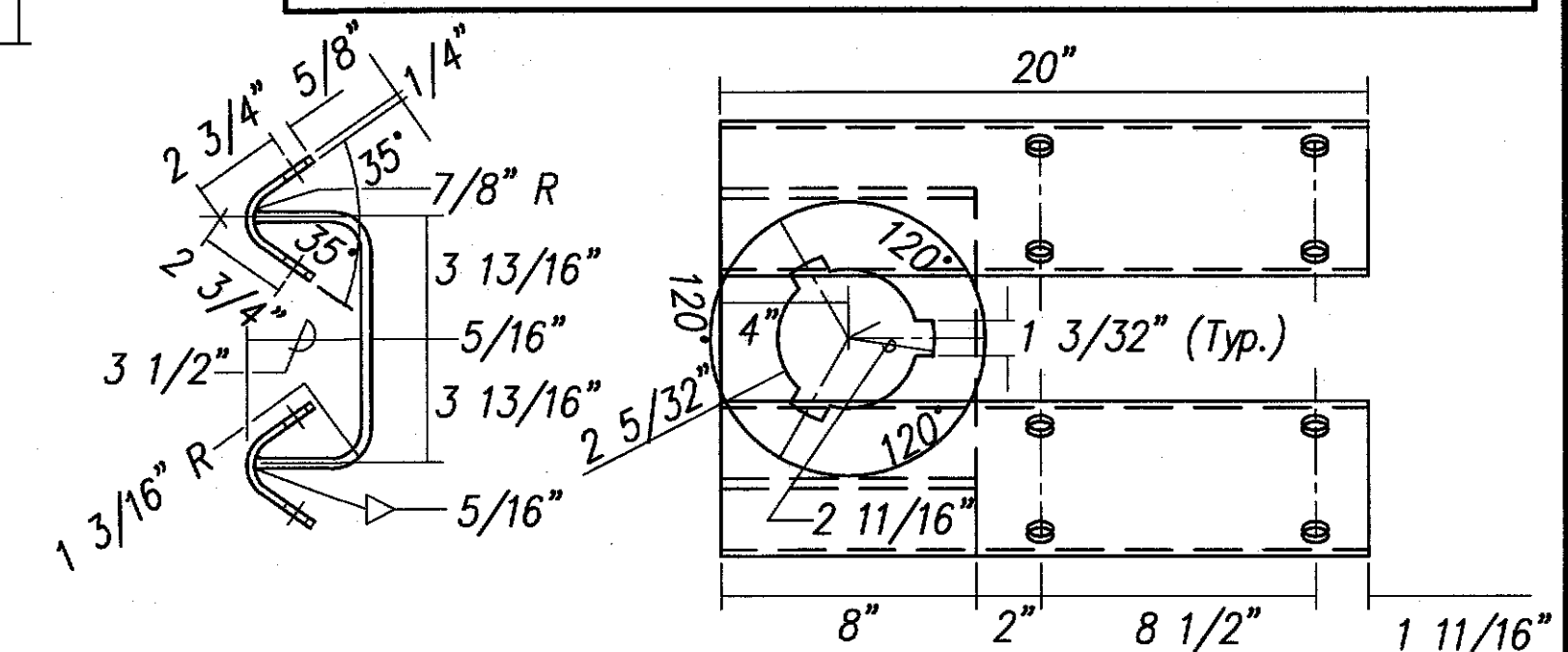
APPROACH END DETAIL
(APPROVED FOR USE WHERE V < 45 MPH)



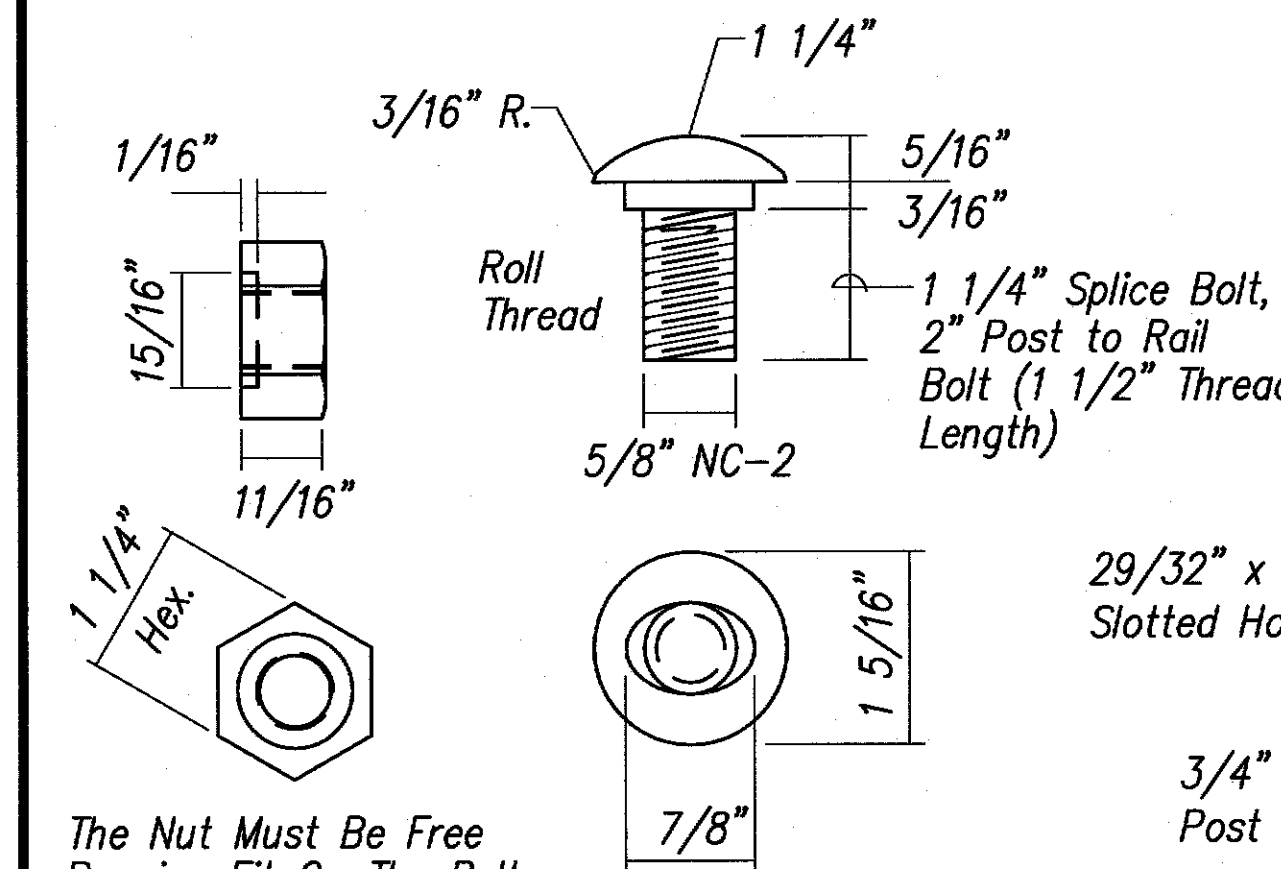
SECTION A-A



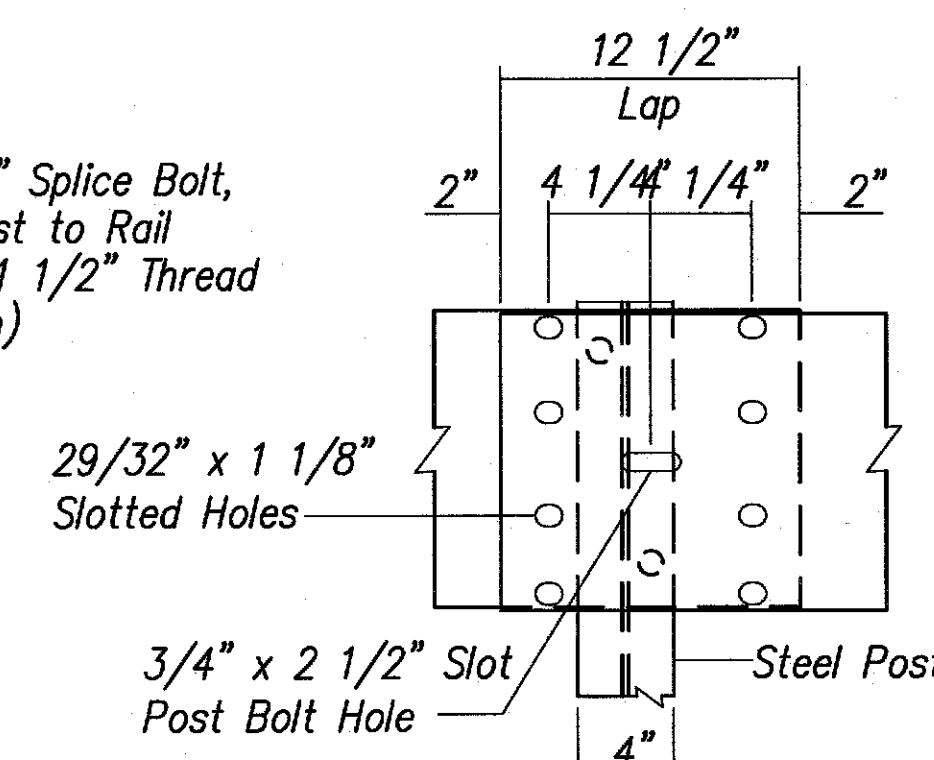
ANCHOR ROD CONNECTOR
(MALLEABLE IRON CASTING OR EQUAL)



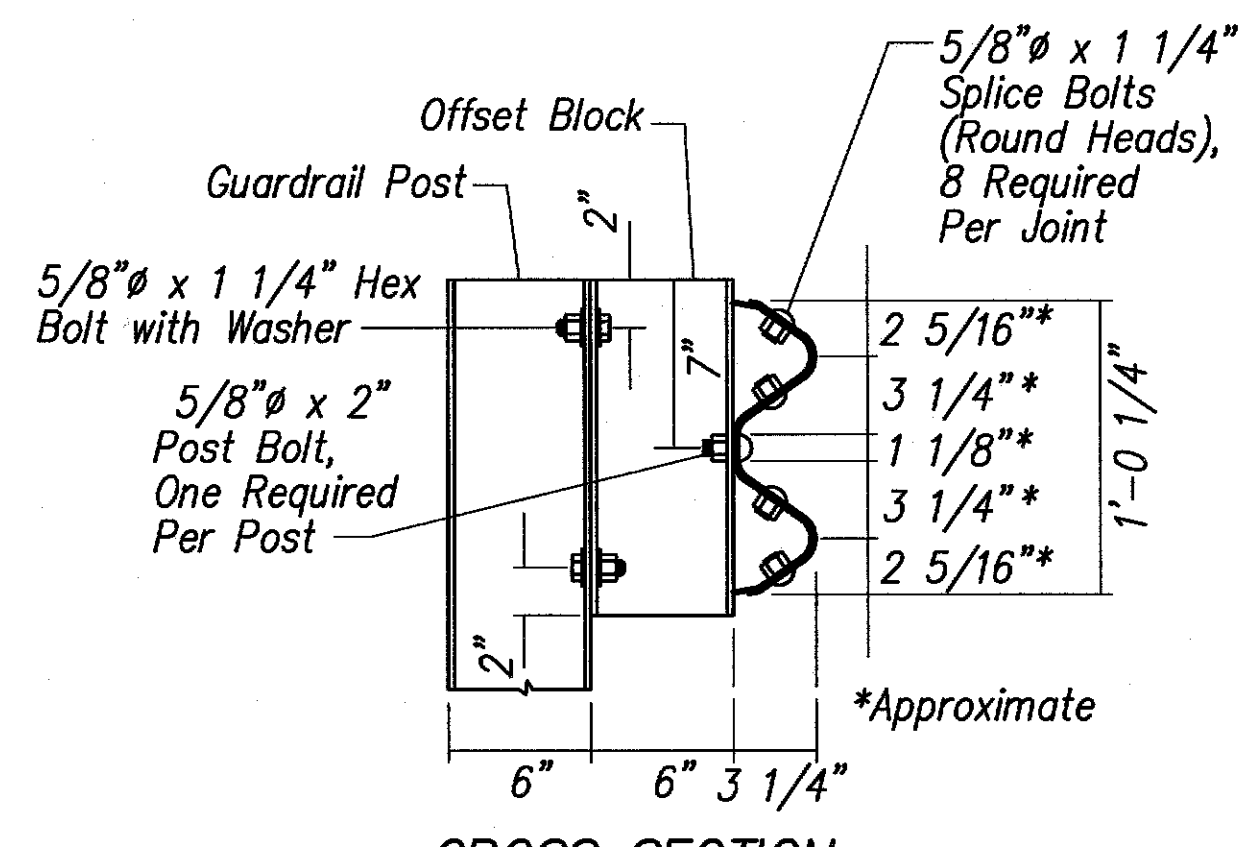
ANCHOR SPIDER
(WELDMENT)



The Nut Must Be Free Running Fit On The Bolt After Galvanization.

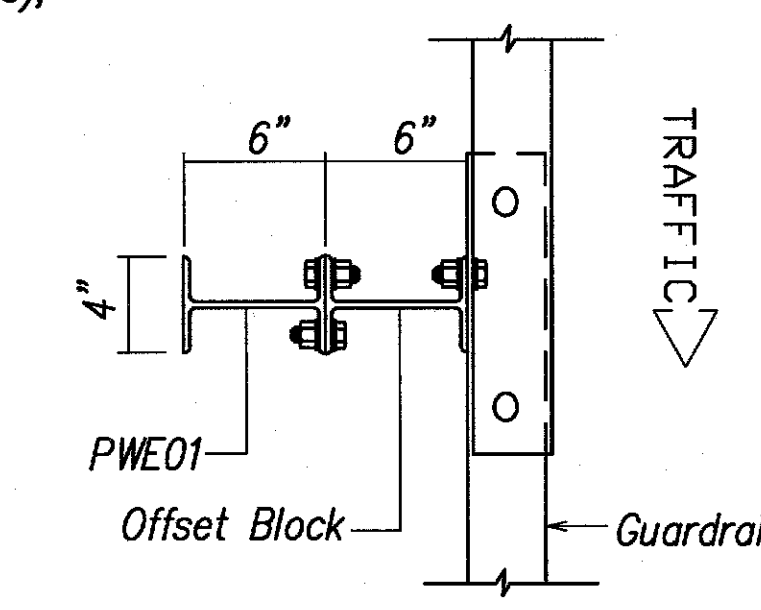


ELEVATION OF GUARDRAIL
SPLICE AT POST

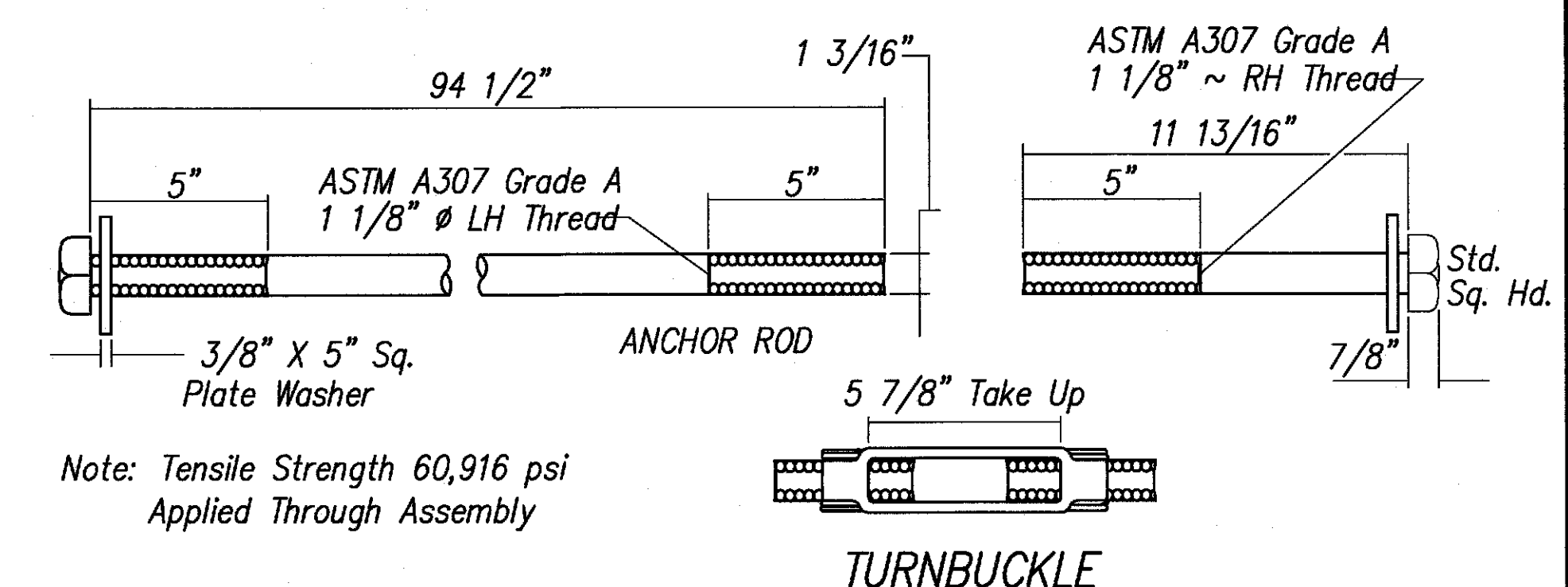


CROSS SECTION

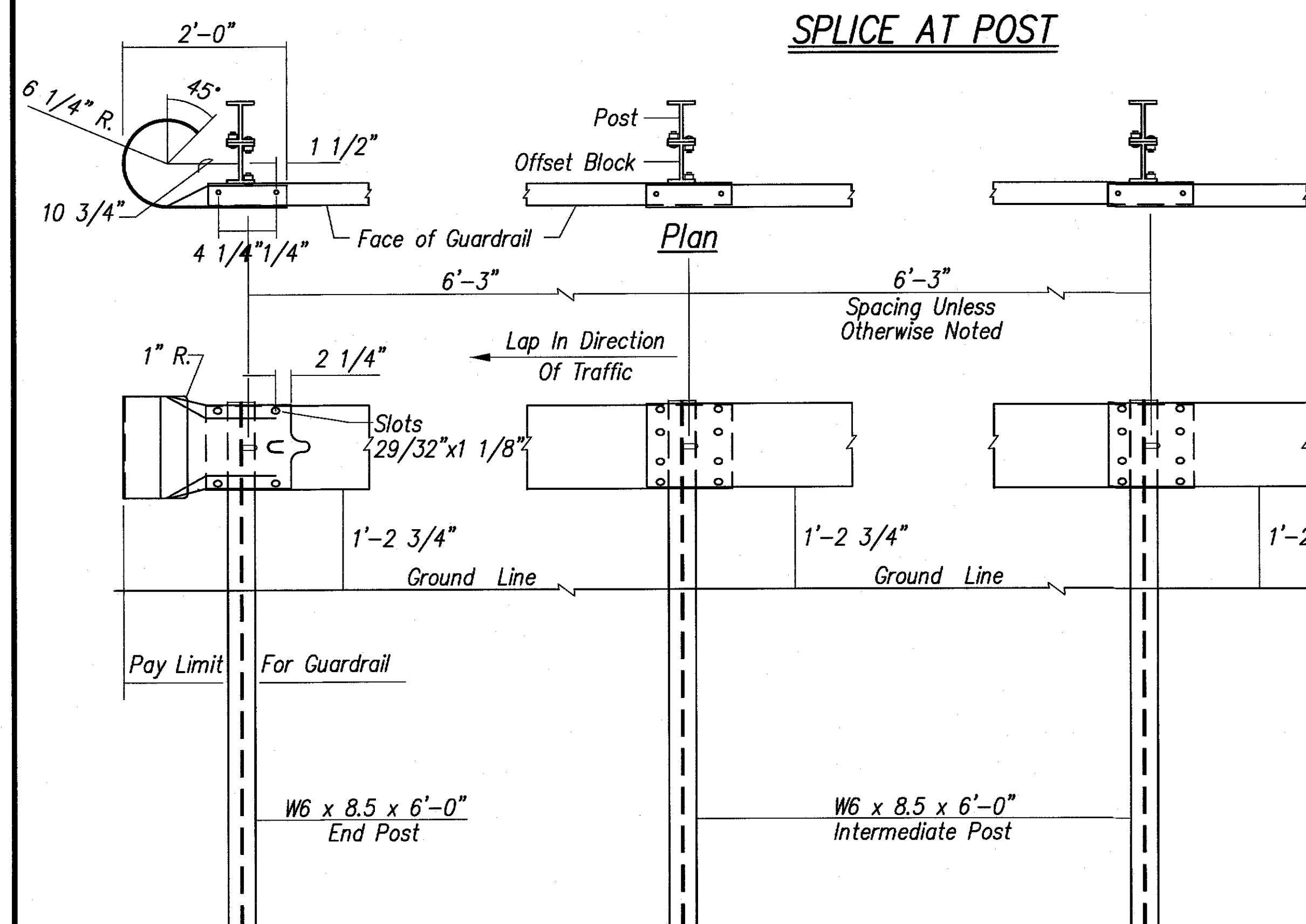
GUARDRAIL SPLICE



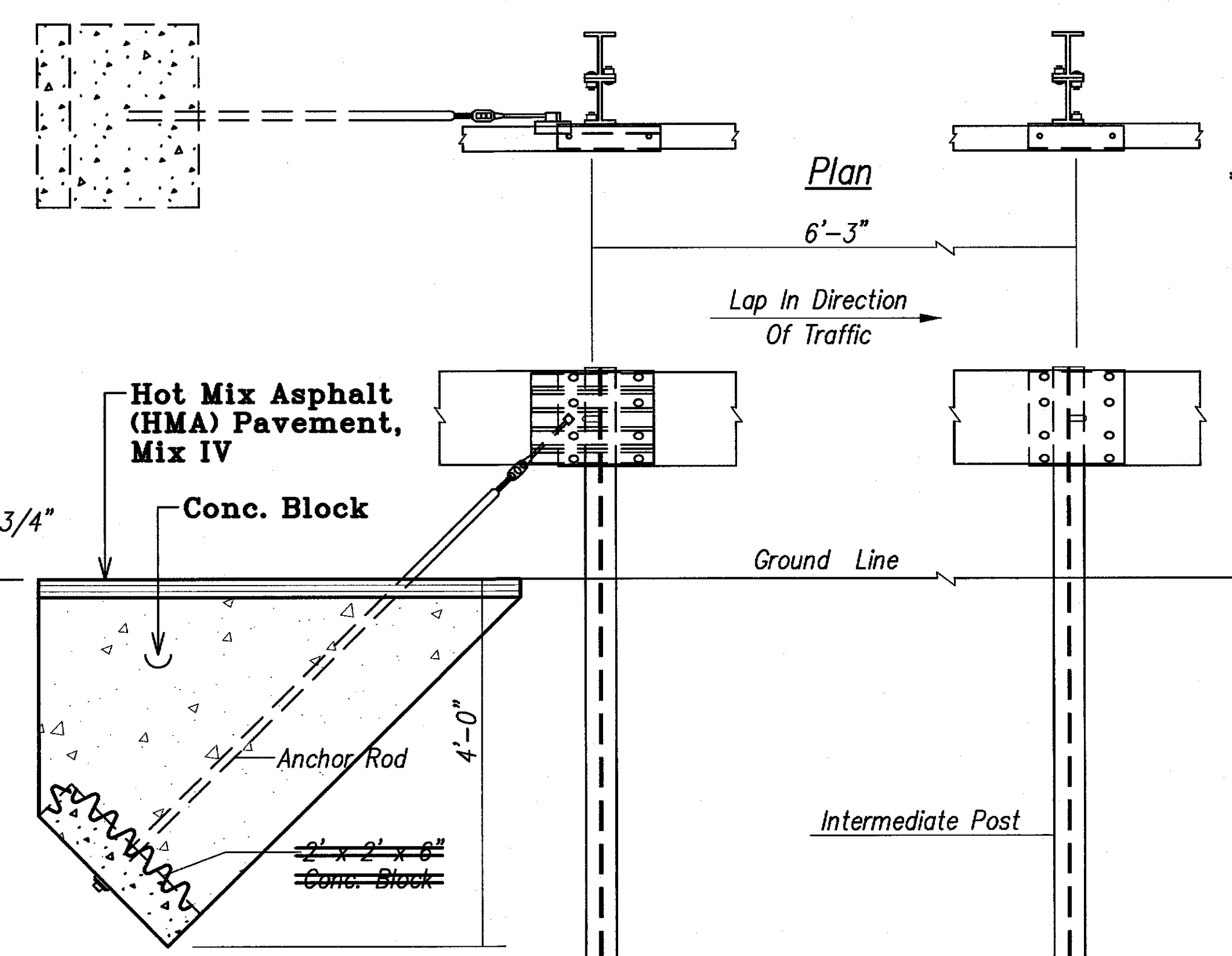
PLAN



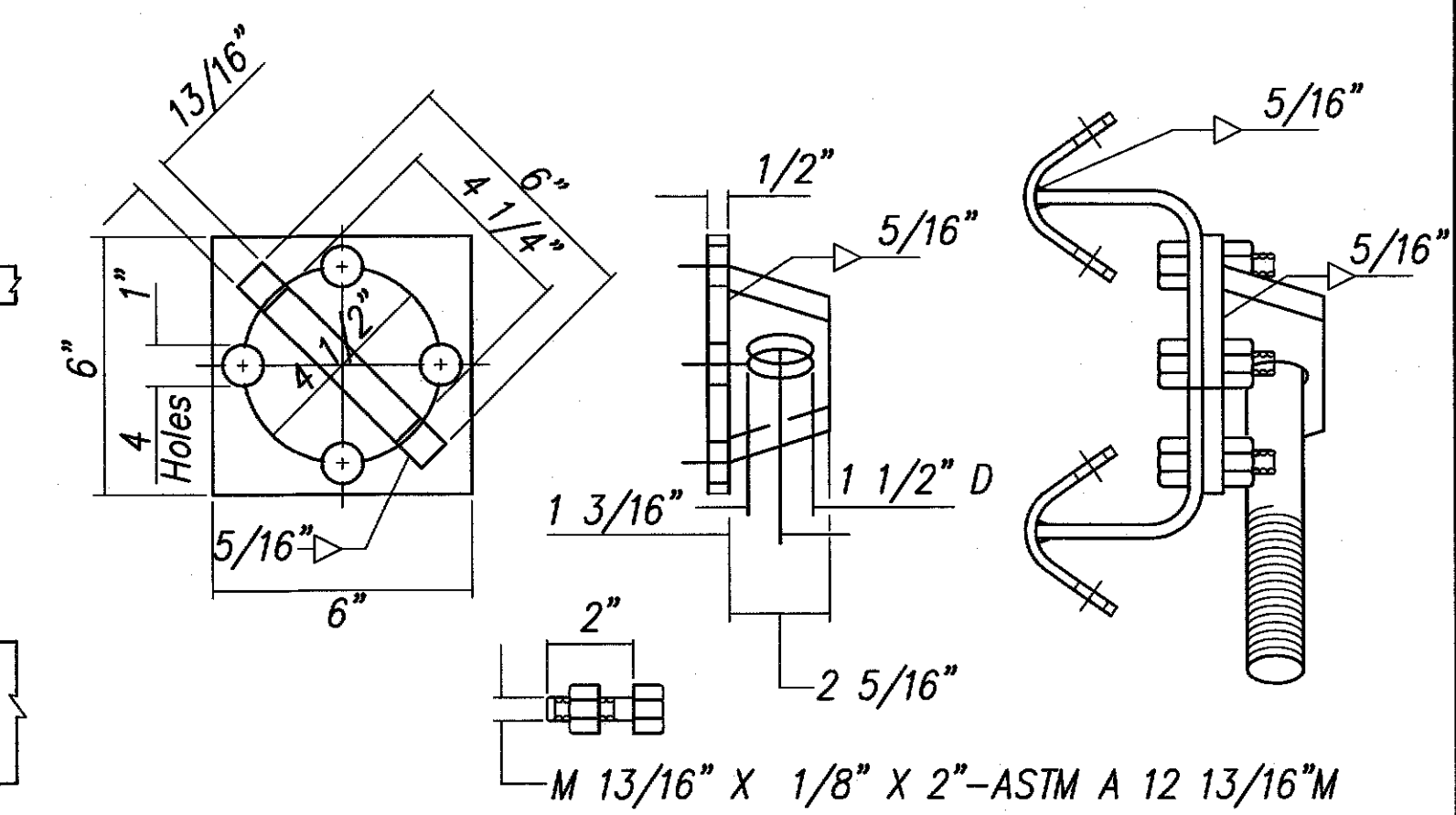
TURNBUCKLE



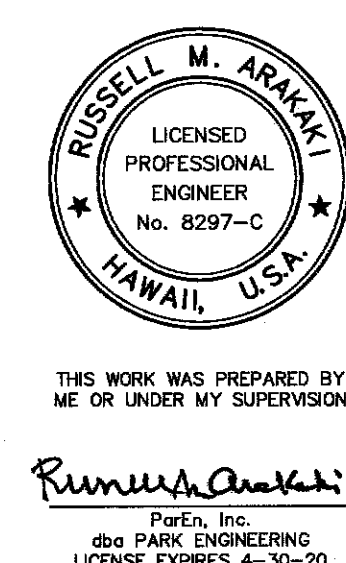
ASSEMBLY ELEVATION



ANCHOR FOR STEEL BEAM RAIL



ALTERNATE ANCHOR ROD CONNECTOR



STATE OF HAWAII
DEPARTMENT OF TRANSPORTATION
HIGHWAYS DIVISION

TYPE G-1d TL-2 TERMINAL

KUHIO HIGHWAY, SHORT TERM IMPROVEMENTS
Wailua Cane Haul Bridge Widening
Fed. Aid Project No. BR-056-1(51)

Scale: As Noted Date: MAY 2008

SHEET No. GR13 OF GR13 SHEETS