

FED. ROAD DIST. NO.	STATE	FED. AID PROJ. NO.	FISCAL YEAR	SHEET NO.	TOTAL SHEETS
HAWAII	HAW.	NH-HI-1 (260)	2014	198	605

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 fastners, 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 consists 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 25 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.

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"



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Matthew K. Fujitaka
WILSON OKAMOTO CORPORATION APRIL 30, 2018 LIC. EXP. DATE

STATE OF HAWAII
DEPARTMENT OF TRANSPORTATION
HIGHWAYS DIVISION
**GUARDRAIL DETAILS
AND NOTES**

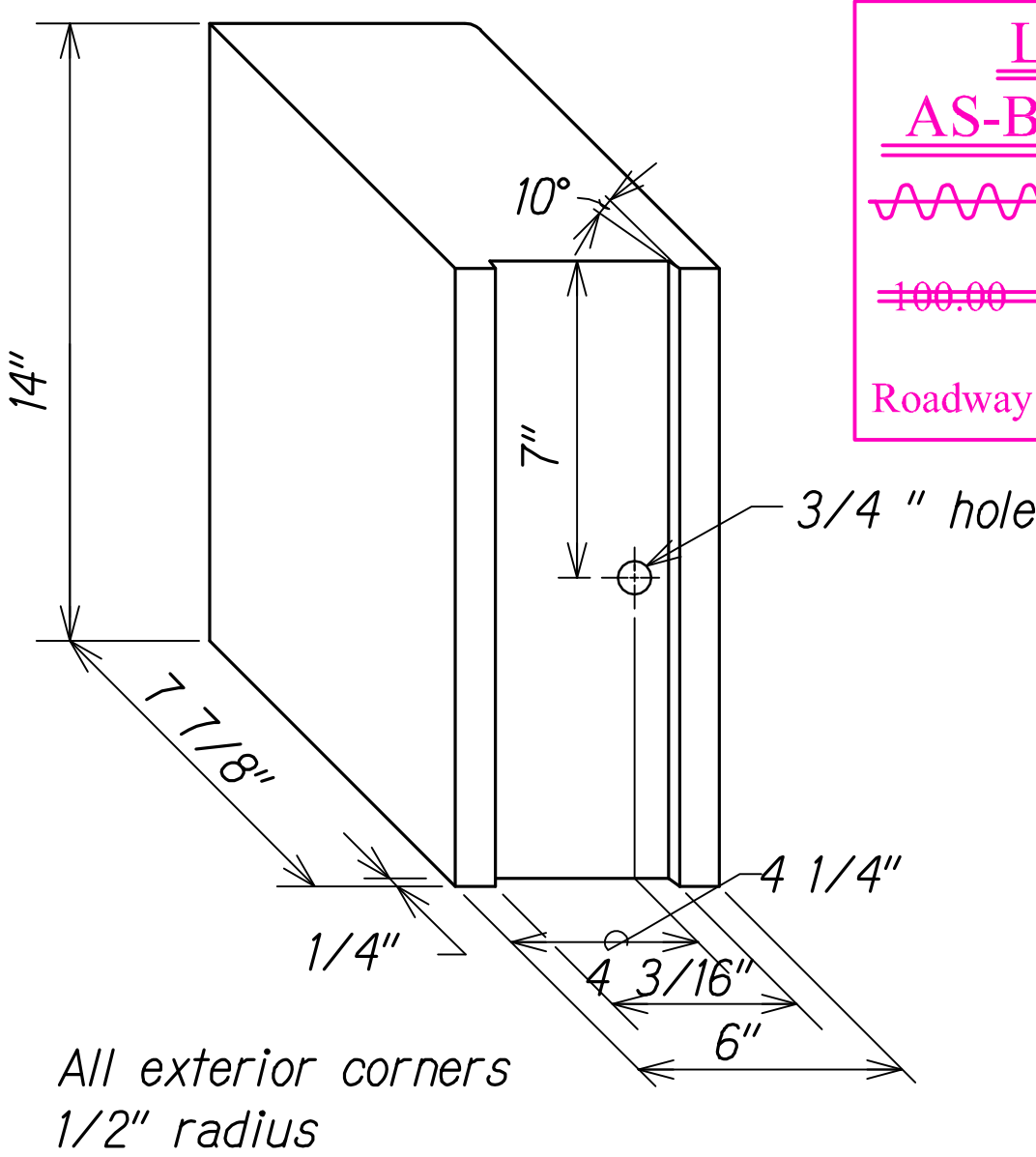
INTERSTATE ROUTE H-1
PM CONTRAFLOW LANE, PHASE 1 & 2
FEDERAL AID PROJECT NO. NH-HI-1 (260)
Scale: None Date: July, 2016
SHEET No. GRD-01 OF 12 SHEETS

**LEGEND FOR
AS-BUILT POSTINGS**

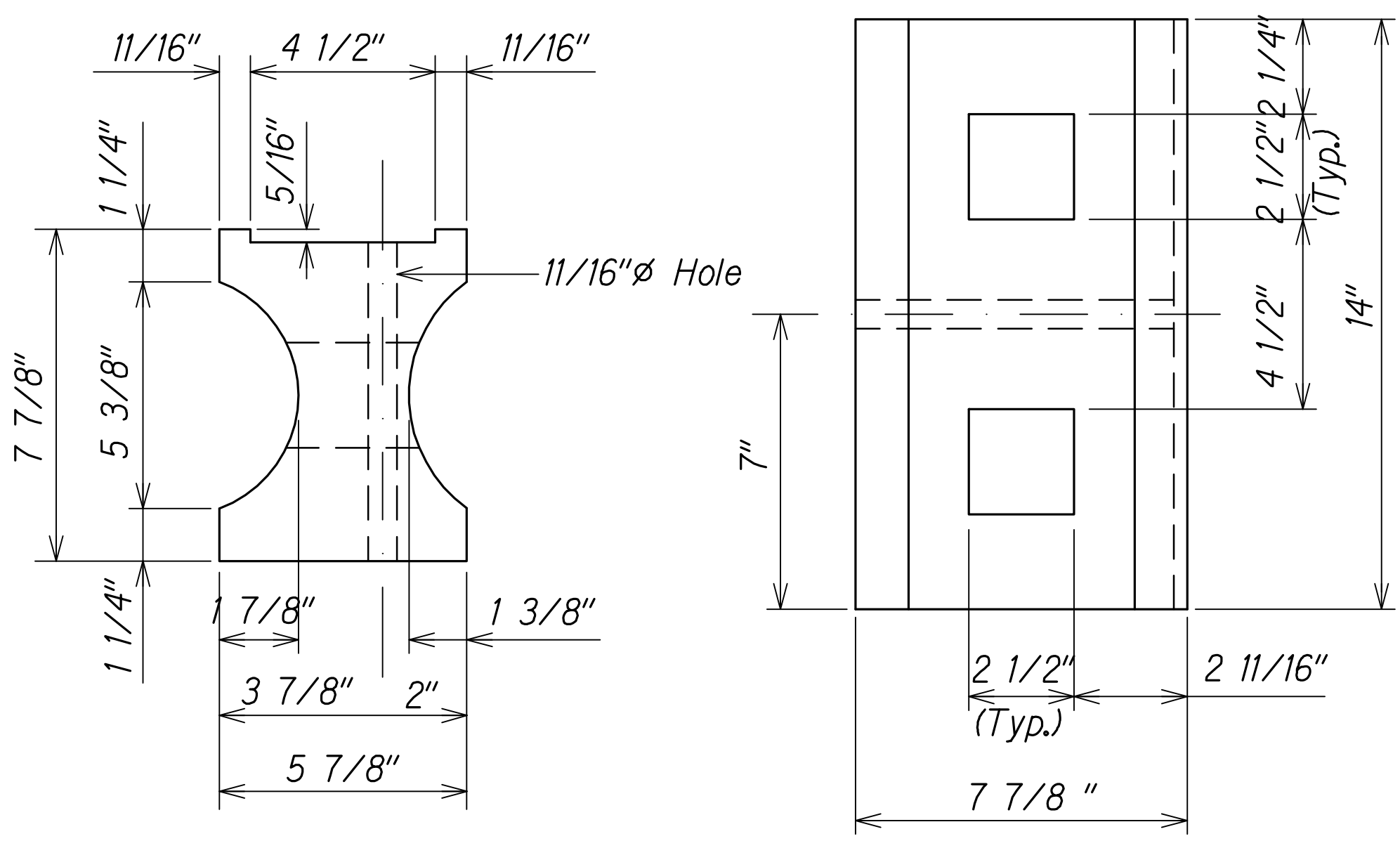
Squiggly line for as-built deletion

Double line for as-built deletion

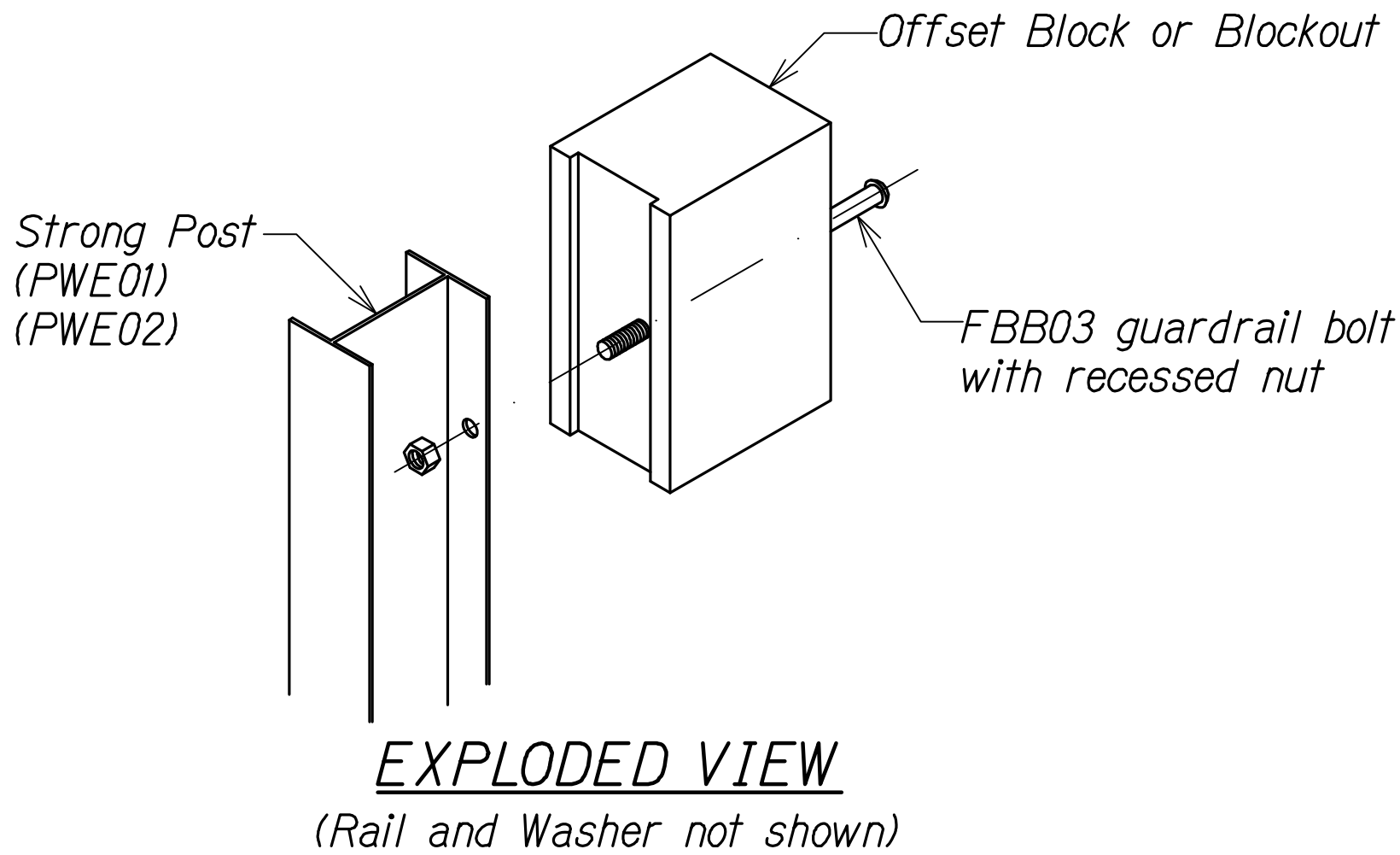
Text for as-built posting



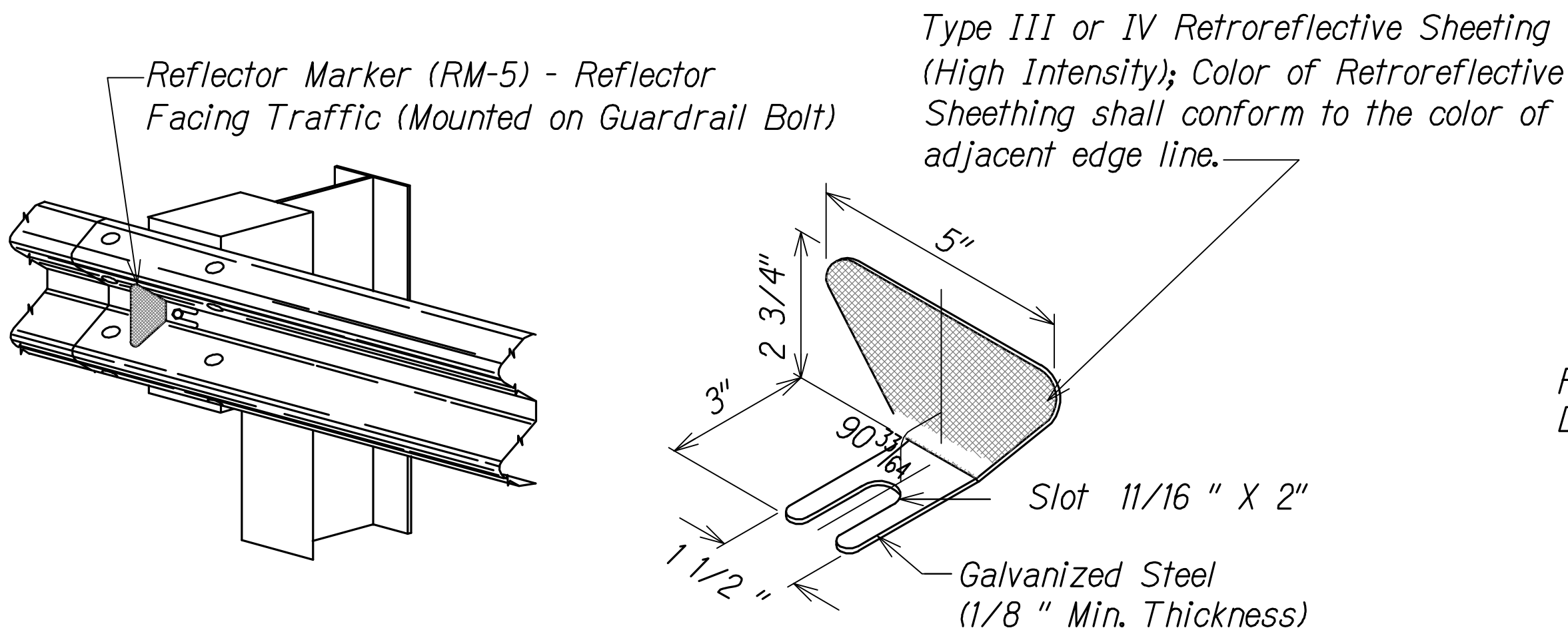
**RECYCLED POLYETHYLENE
OFFSET BLOCK (TYPE II)**
Not to Scale



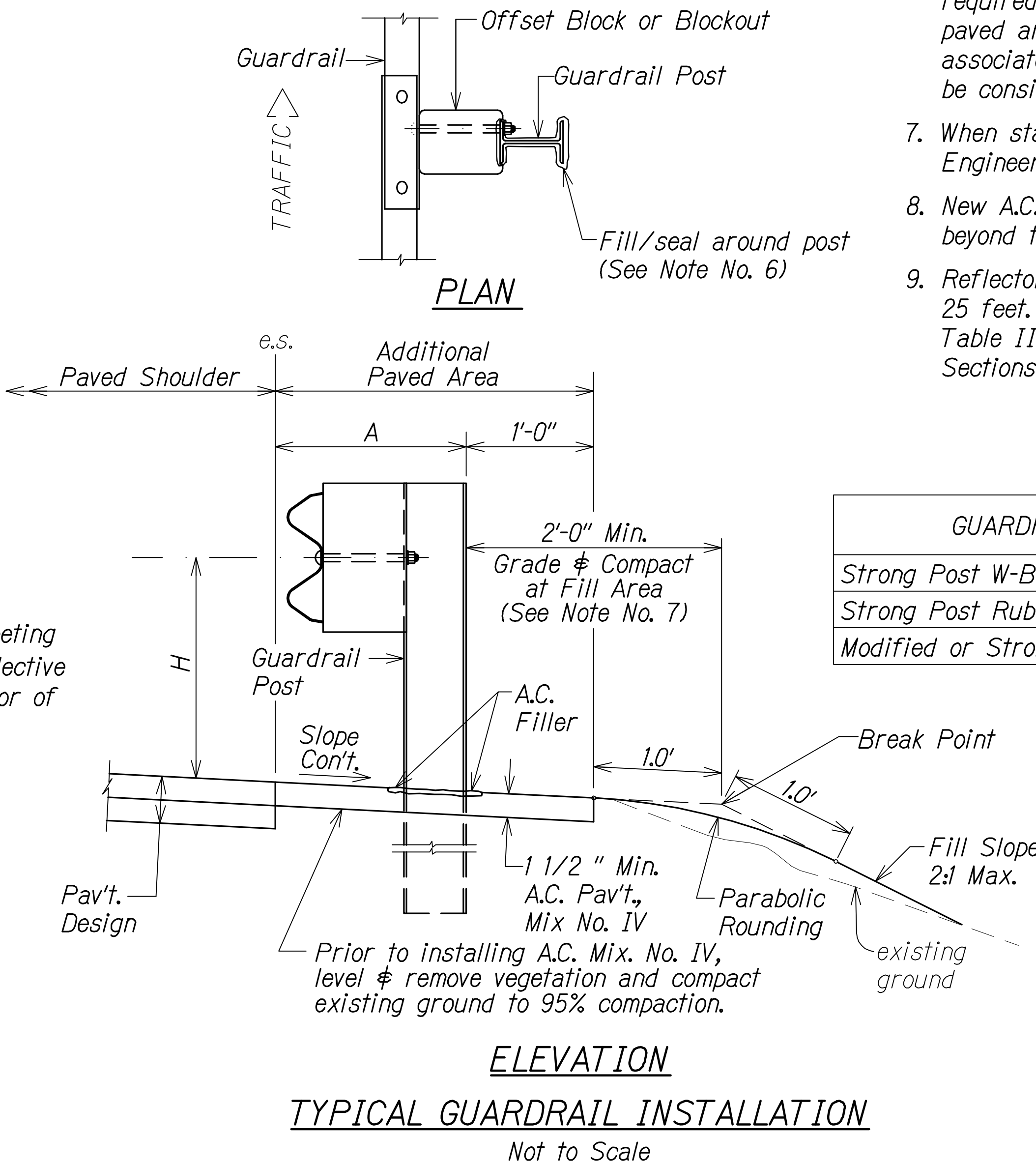
**TOP
RECYCLED PLASTIC BLOCKOUT (TYPE I)**
Not to Scale



**EXPLODED VIEW
STEEL POST AND BLOCK DETAIL**
Not to Scale



REFLECTOR MARKER (RM-5) DETAIL AND TYPICAL INSTALLATION
Not to Scale

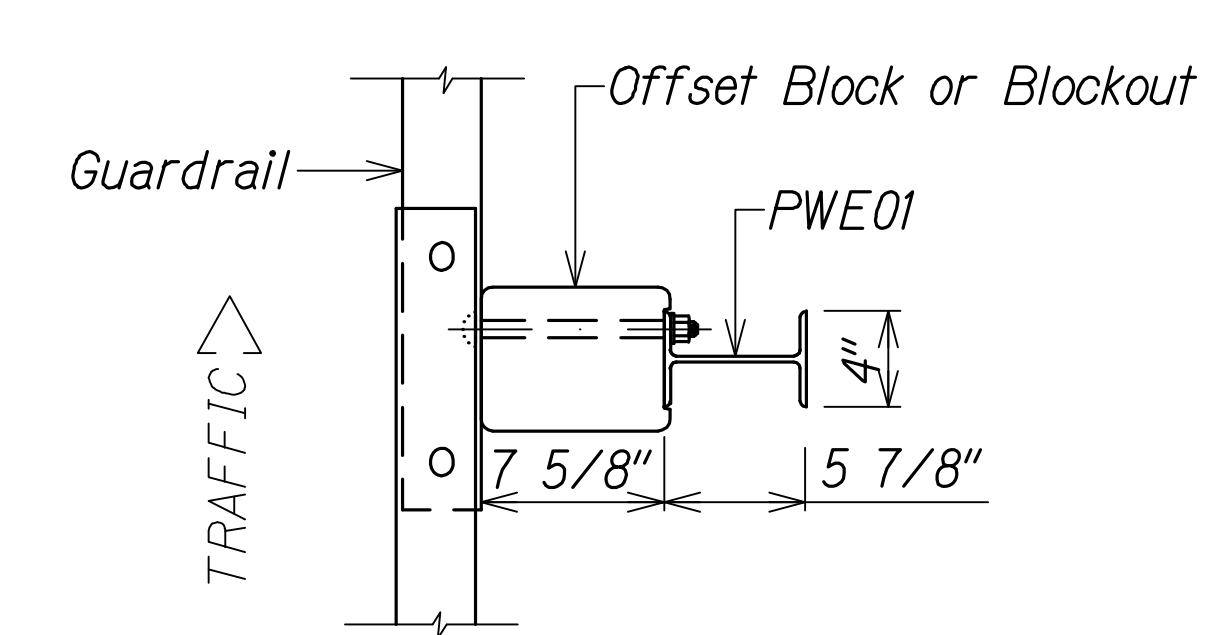


**ELEVATION
TYPICAL GUARDRAIL INSTALLATION**
Not to Scale

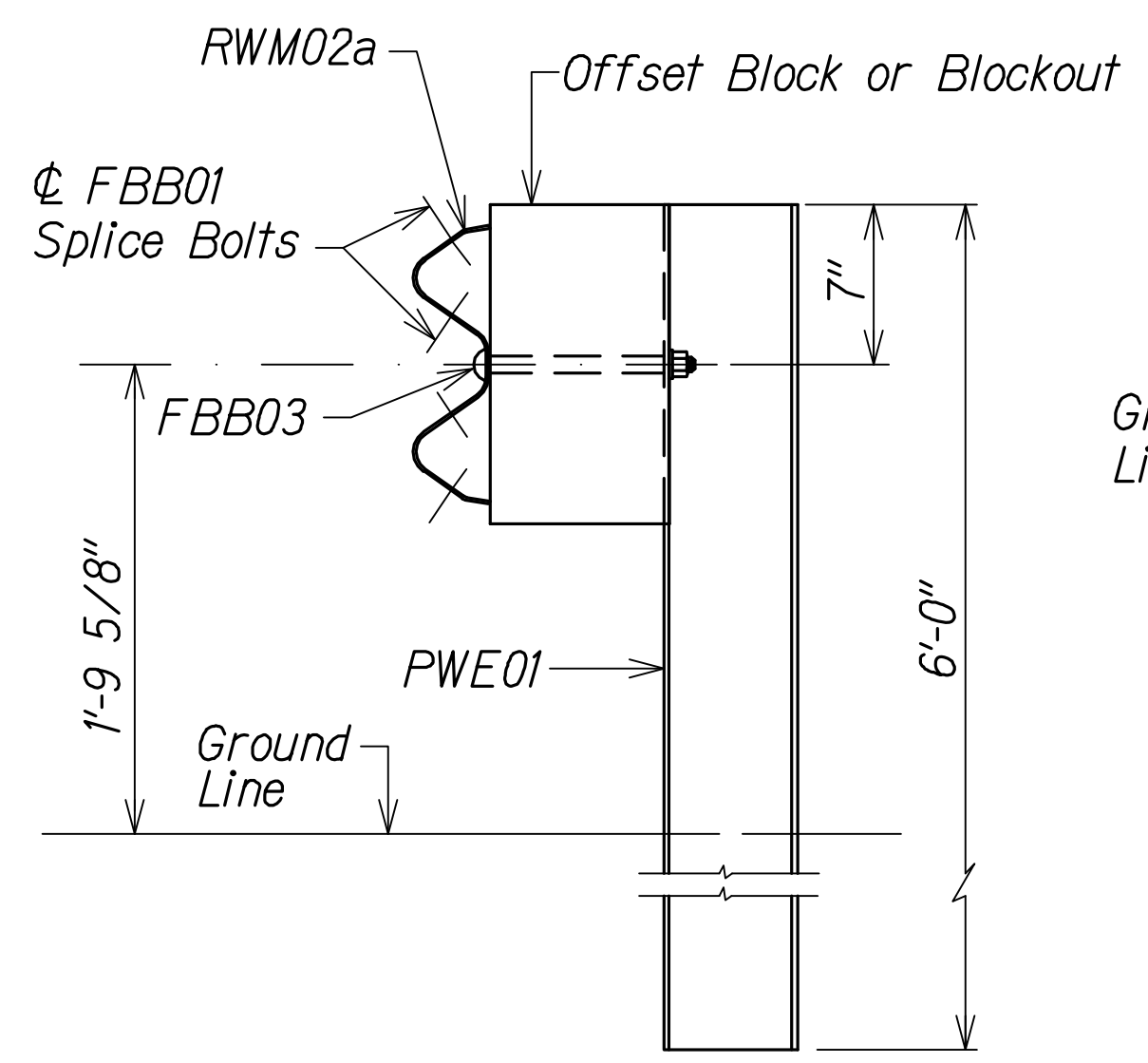
QC/QA REVIEW 100%
DATE: MARCH 23, 2016
BY: *[Signature]*
OBY: *[Signature]*
OBY: *[Signature]*
OBY: *[Signature]*

SURVEY PLOTTED BY: _____ DATE: _____
DESIGNED BY: _____
NOTED BY: _____
CHECKED BY: _____
ORIGINAL PLAN: _____
NOTE BOOK: _____
No. _____

FED. ROAD DIST. NO.	STATE	FED. AID PROJ. NO.	FISCAL YEAR	SHEET NO.	TOTAL SHEETS
HAWAII	HAW.	NH-HI-1 (260)	2014	199	605



PLAN

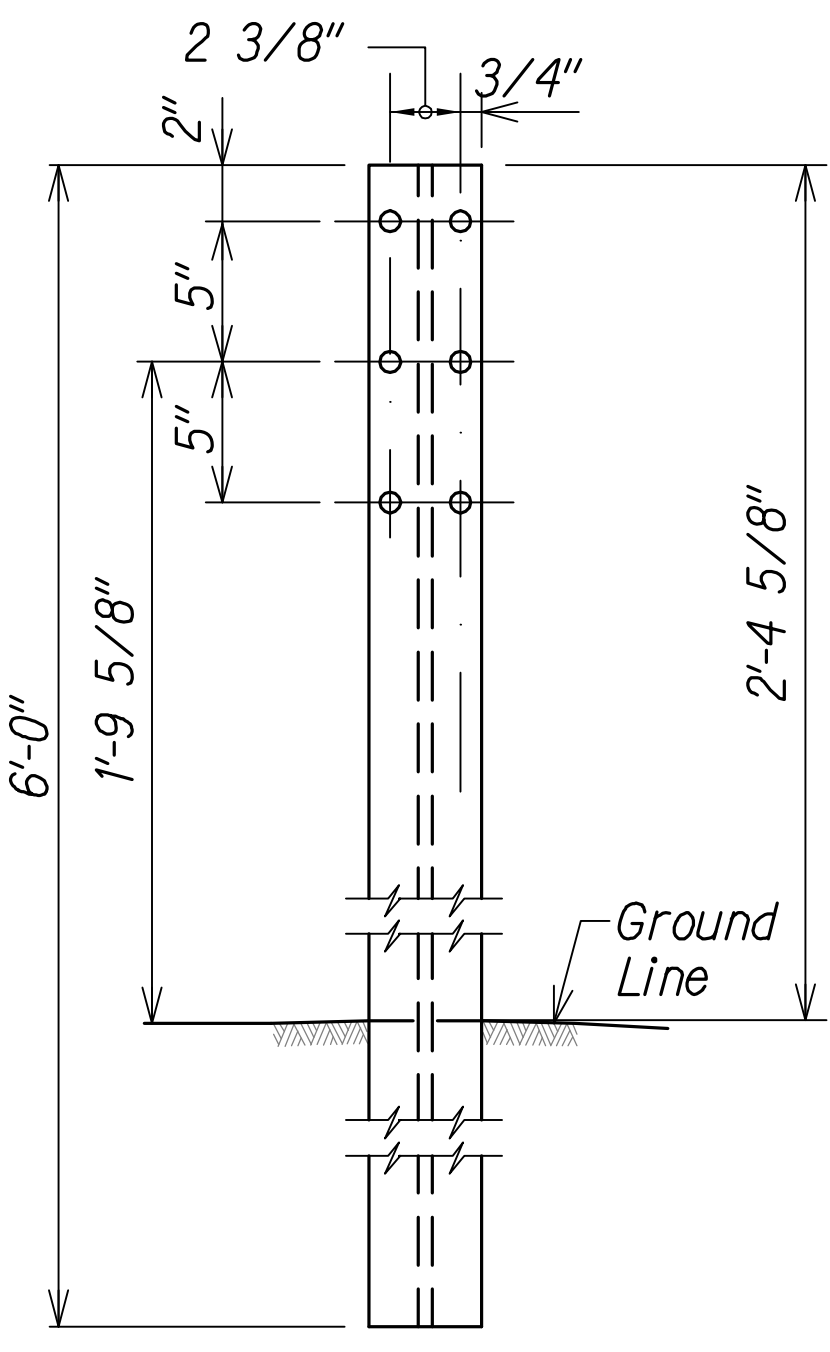
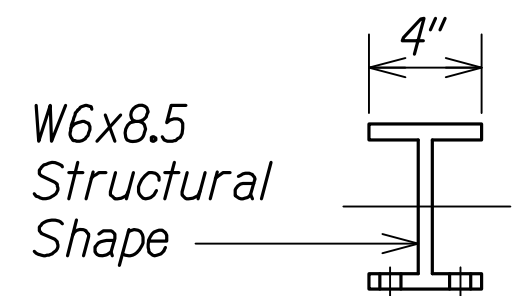


ELEVATION

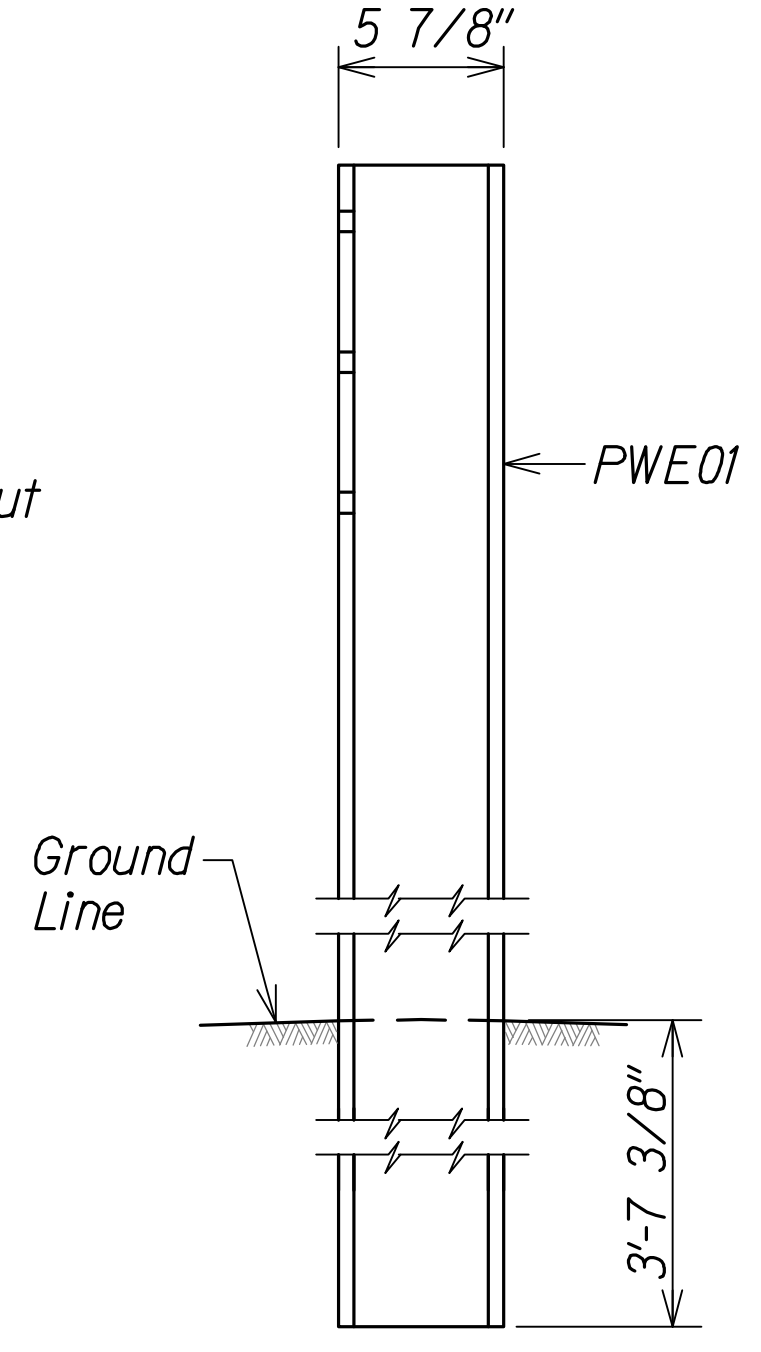
STRONG POST W-BEAM GUARDRAIL (SGR04a)

Not to Scale

Note:
All holes are
3/4" Dia.



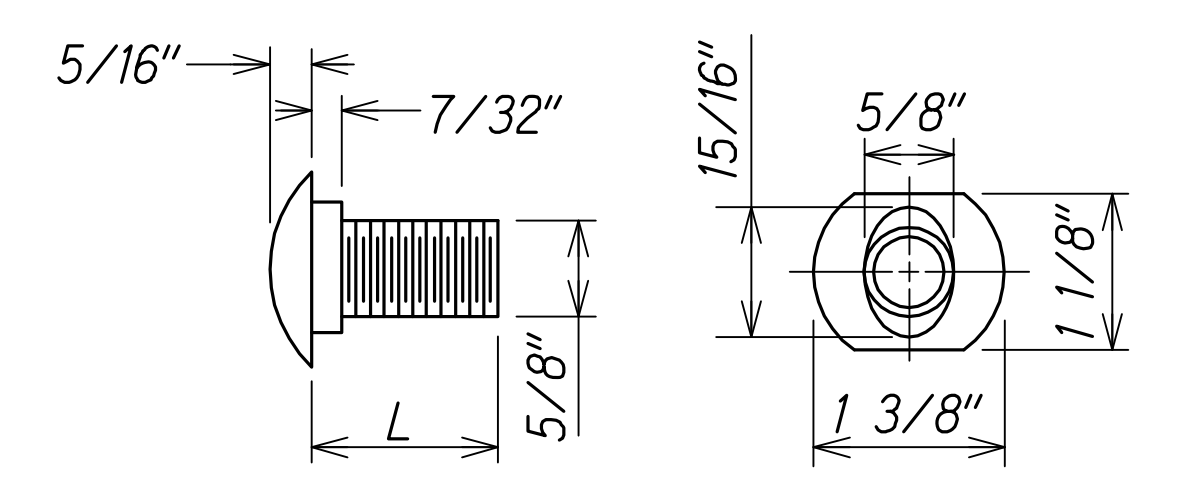
FRONT



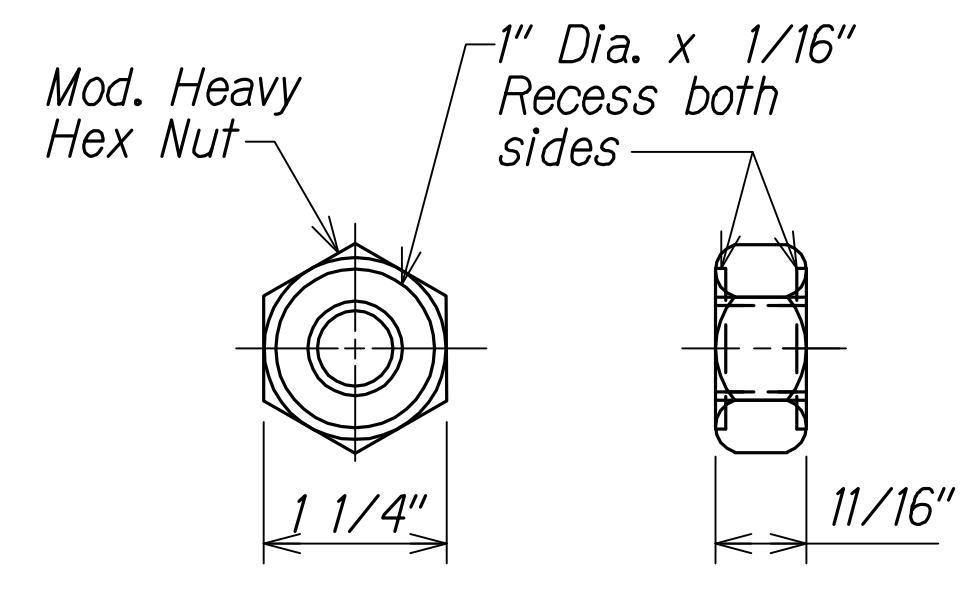
SIDE

W-BEAM STRONG POST (PWE01)

Not to Scale

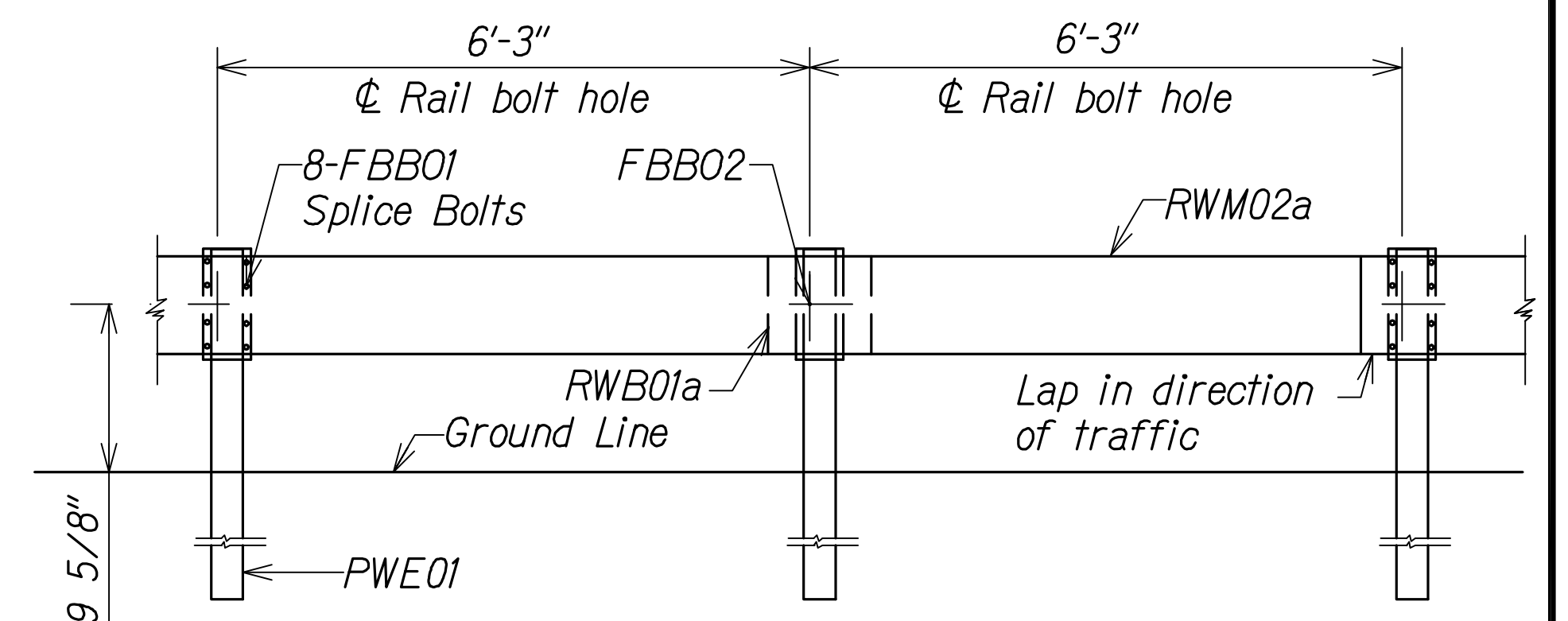


DESIGNATOR	L
FBB01	1 3/8"
FBB02	2"
FBB03	10"



GUARDRAIL BOLTS AND RECESSED NUT

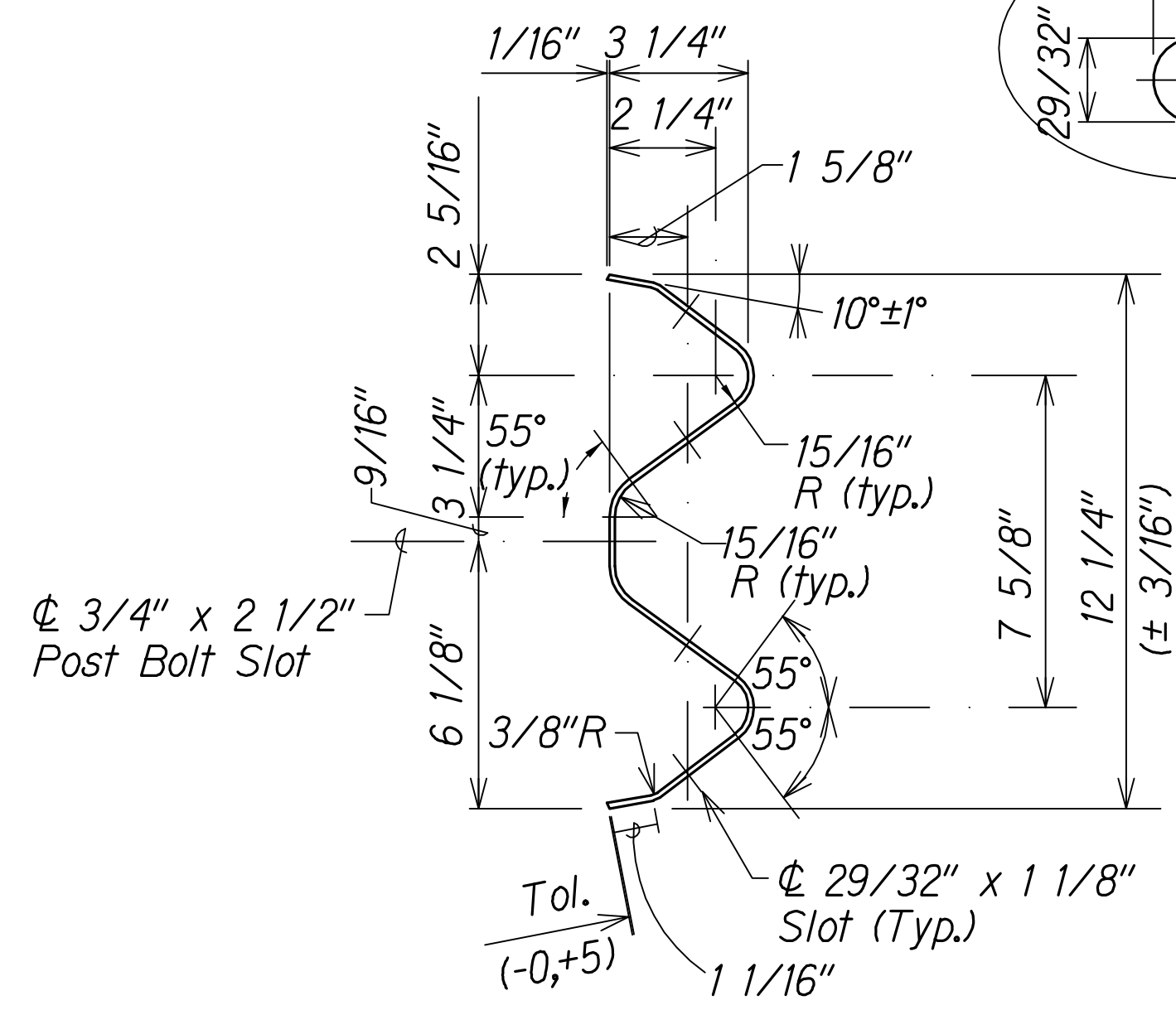
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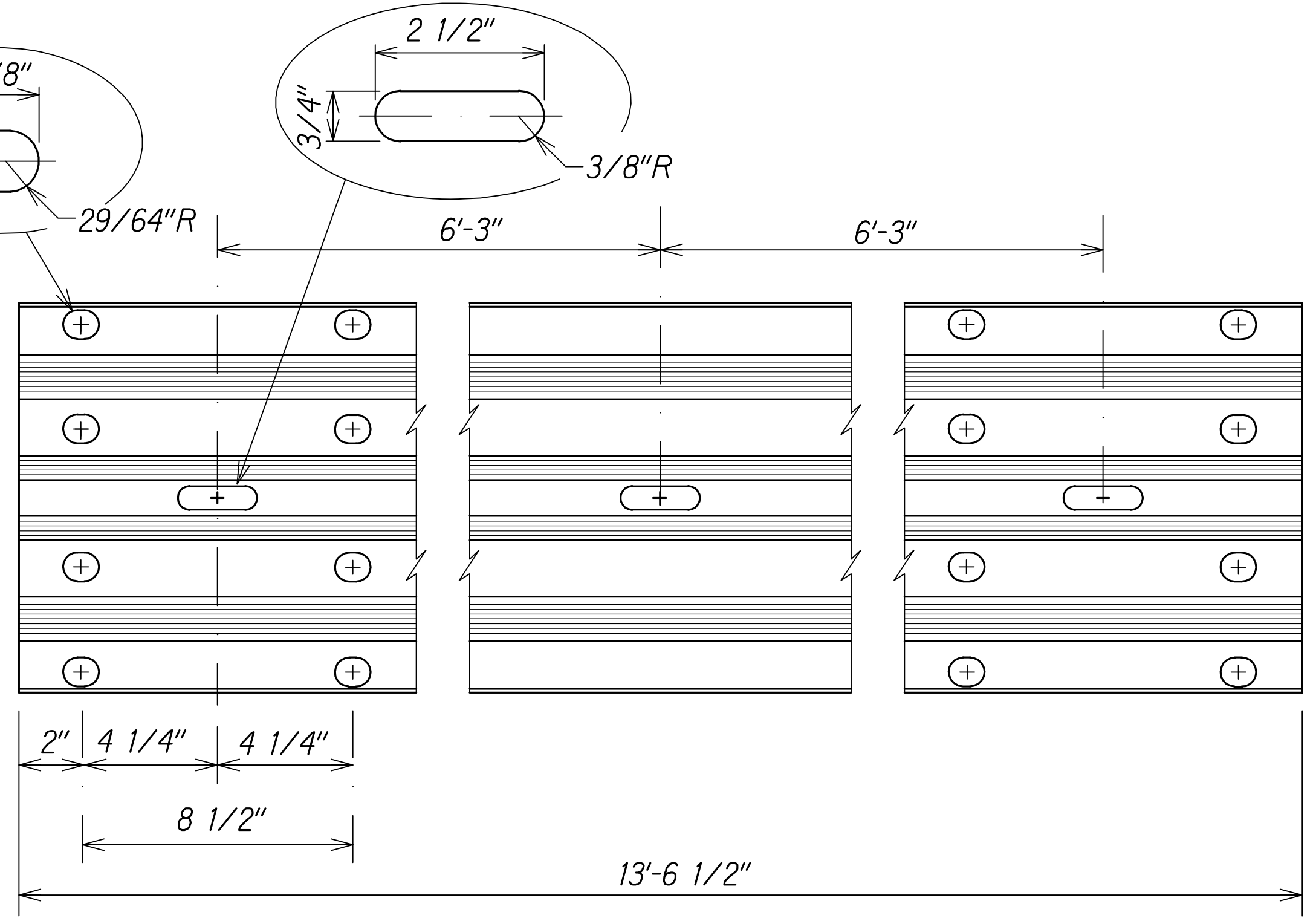
ELEVATION

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

Not to Scale



DESIGNATOR	BASE METAL THICKNESS
RWM02a	12 Gauge



2 SPACE W-BEAM GUARDRAIL (RWM02a)

Not to Scale

LEGEND FOR AS-BUILT POSTINGS

Squiggly line for as-built deletion

Double line for as-built deletion

Roadway Text for as-built posting



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Matthew K. Fujitaka
WILSON OKAMOTO CORPORATION APRIL 30, 2018 LIC. EXP. DATE

STATE OF HAWAII
DEPARTMENT OF TRANSPORTATION
HIGHWAYS DIVISION

GUARDRAIL DETAILS

INTERSTATE ROUTE H-1
PM CONTRAFLOW LANE, PHASE 1 & 2
FEDERAL AID PROJECT NO. NH-HI-1 (260)
Scale: None Date: July, 2016

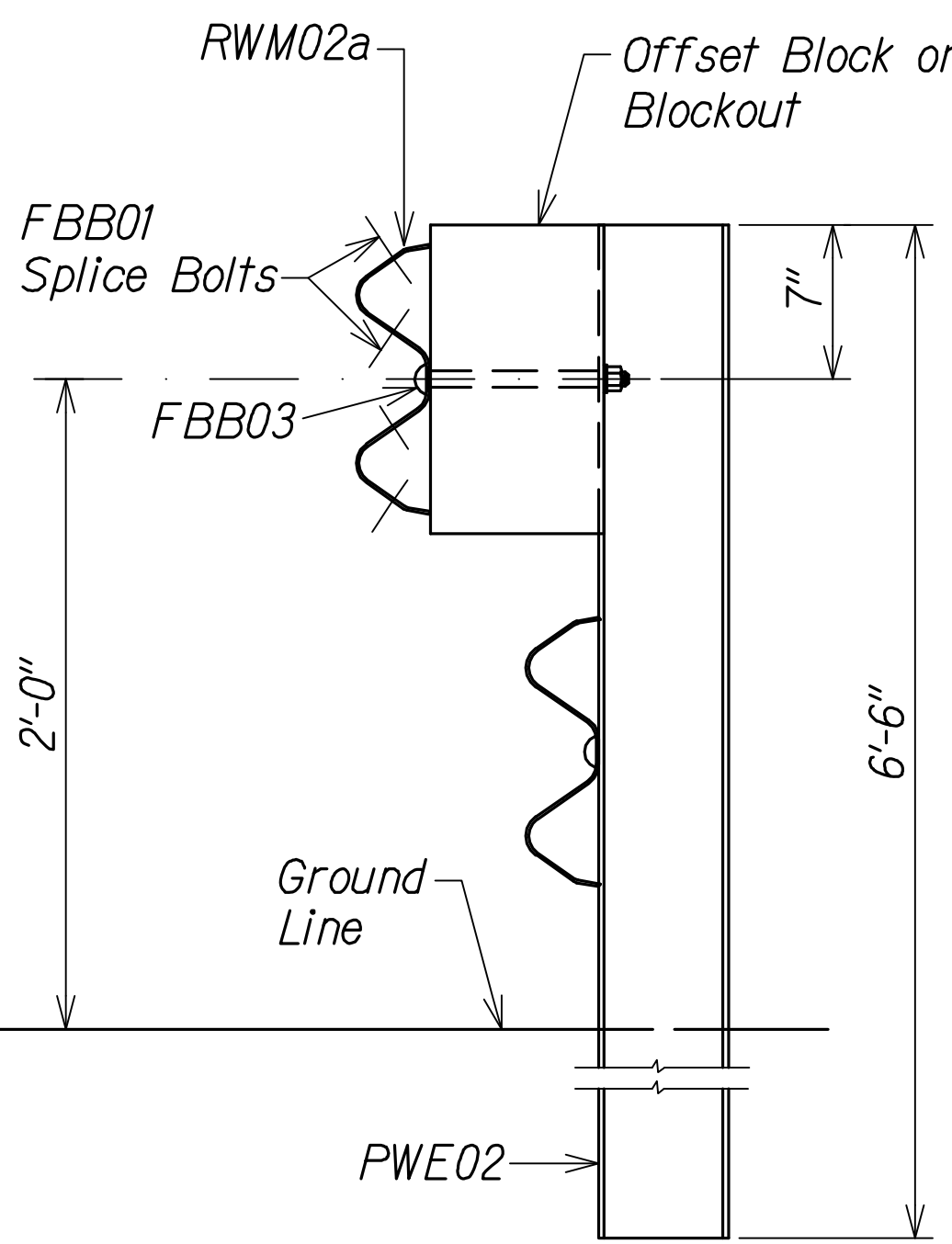
SHEET No. GRD-02 OF 12 SHEETS

QC/QA REVIEW 100%
DATE: MARCH 23, 2014
BY: *Matthew K. Fujitaka*
OBY: *Matthew K. Fujitaka*
OBY: *Matthew K. Fujitaka*
OBY: *Matthew K. Fujitaka*

SURVEY PLOTTED BY: _____ DATE: _____
DESIGNED BY: _____
NOTED BY: _____
QUANTITIES BY: _____
CHECKED BY: _____

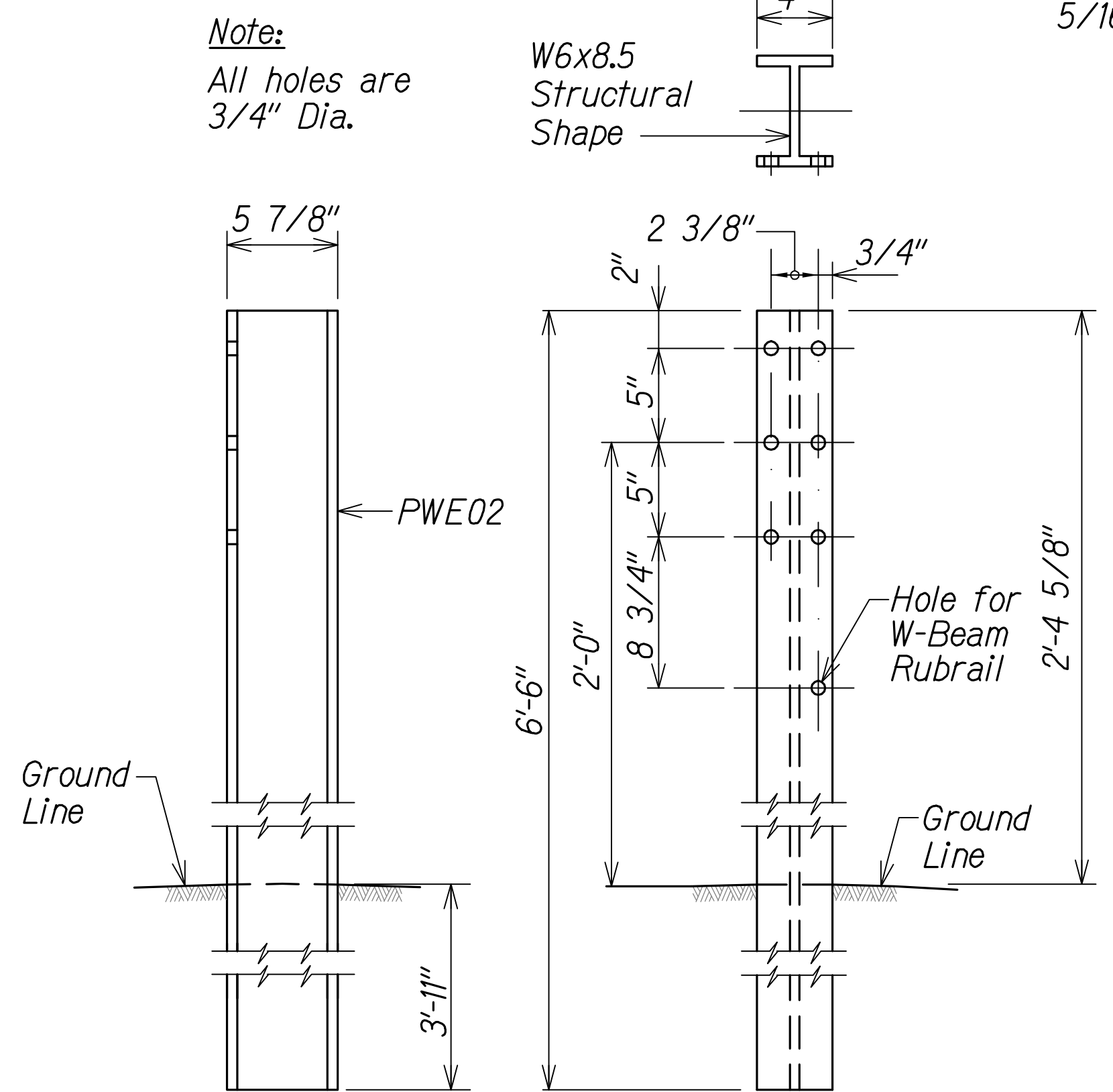
ORIGINAL PLAN: _____
NOTE BOOK: _____
No. _____

FED. ROAD DIST. NO.	STATE	FED. AID PROJ. NO.	FISCAL YEAR	SHEET NO.	TOTAL SHEETS
HAWAII	HAW.	NH-HI-1 (260)	2014	200	605



ELEVATION

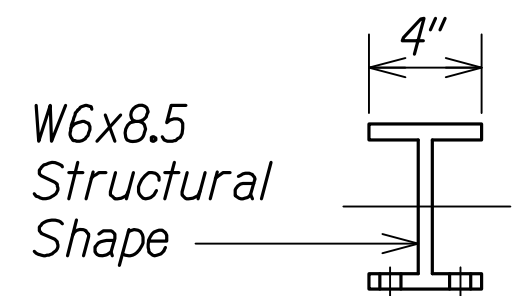
STRONG POST RUBRAIL
(W-BEAM) GUARDRAIL
Not to Scale



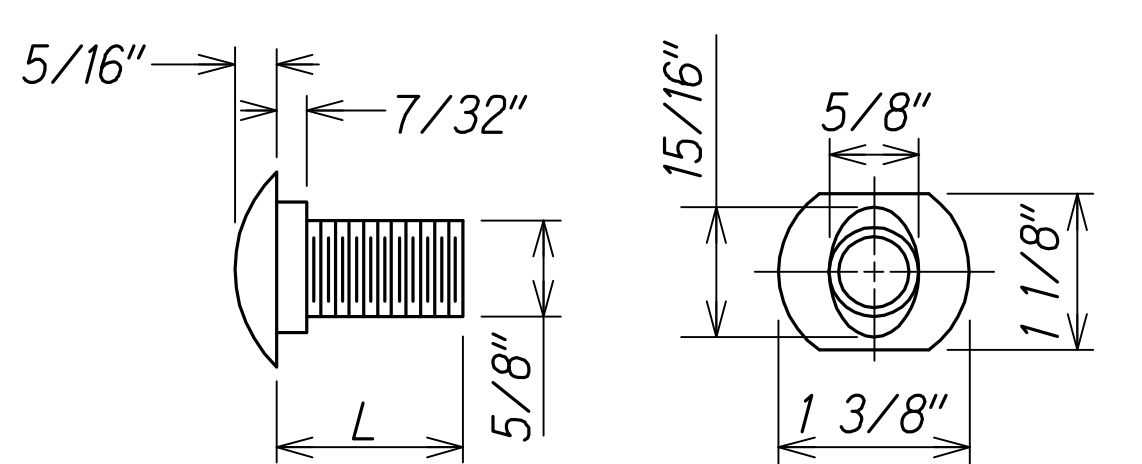
SIDE

FRONT

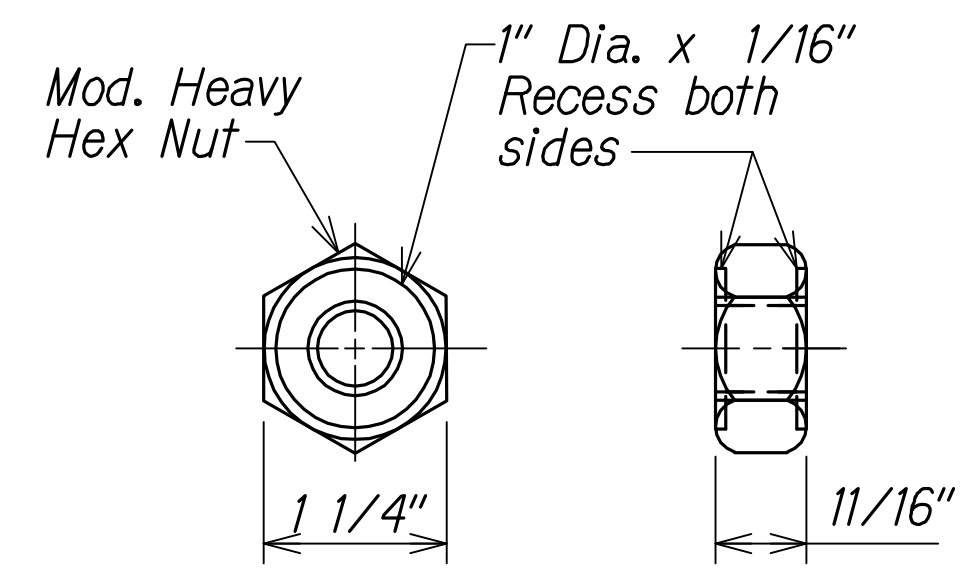
W-BEAM STRONG POST (PWE02)
Not to Scale



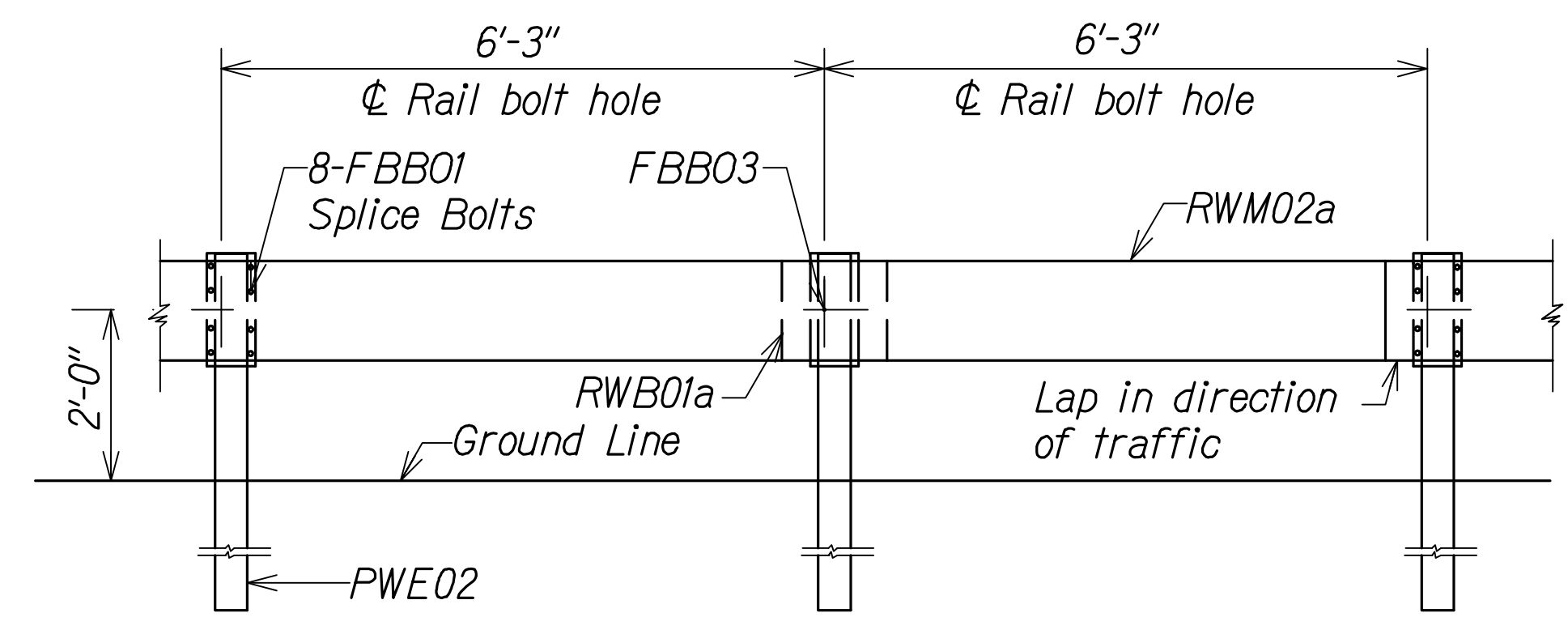
Note:
All holes are
3/4" Dia.



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

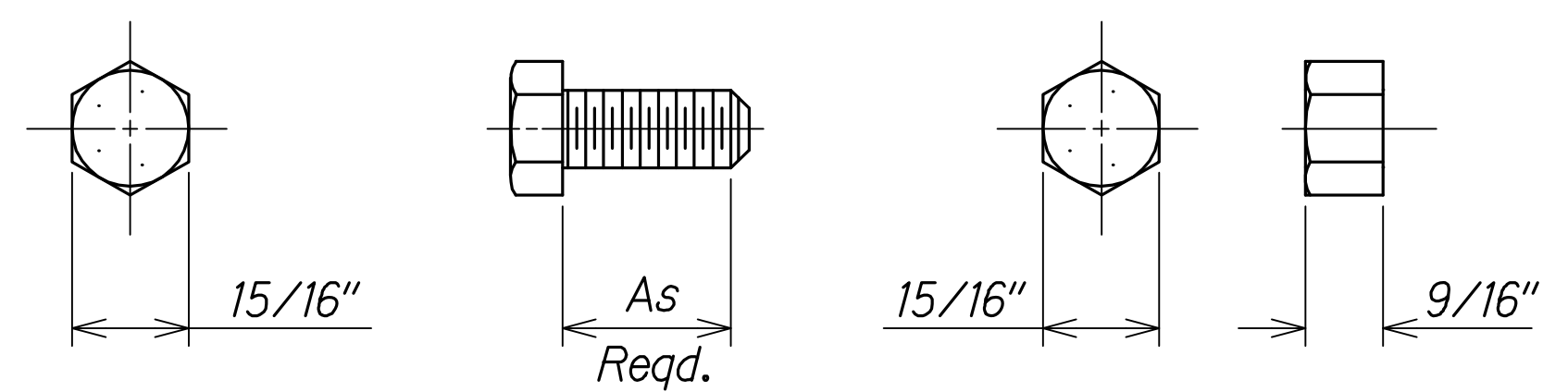


GUARDRAIL BOLTS AND
RECESSED NUT
Not to Scale

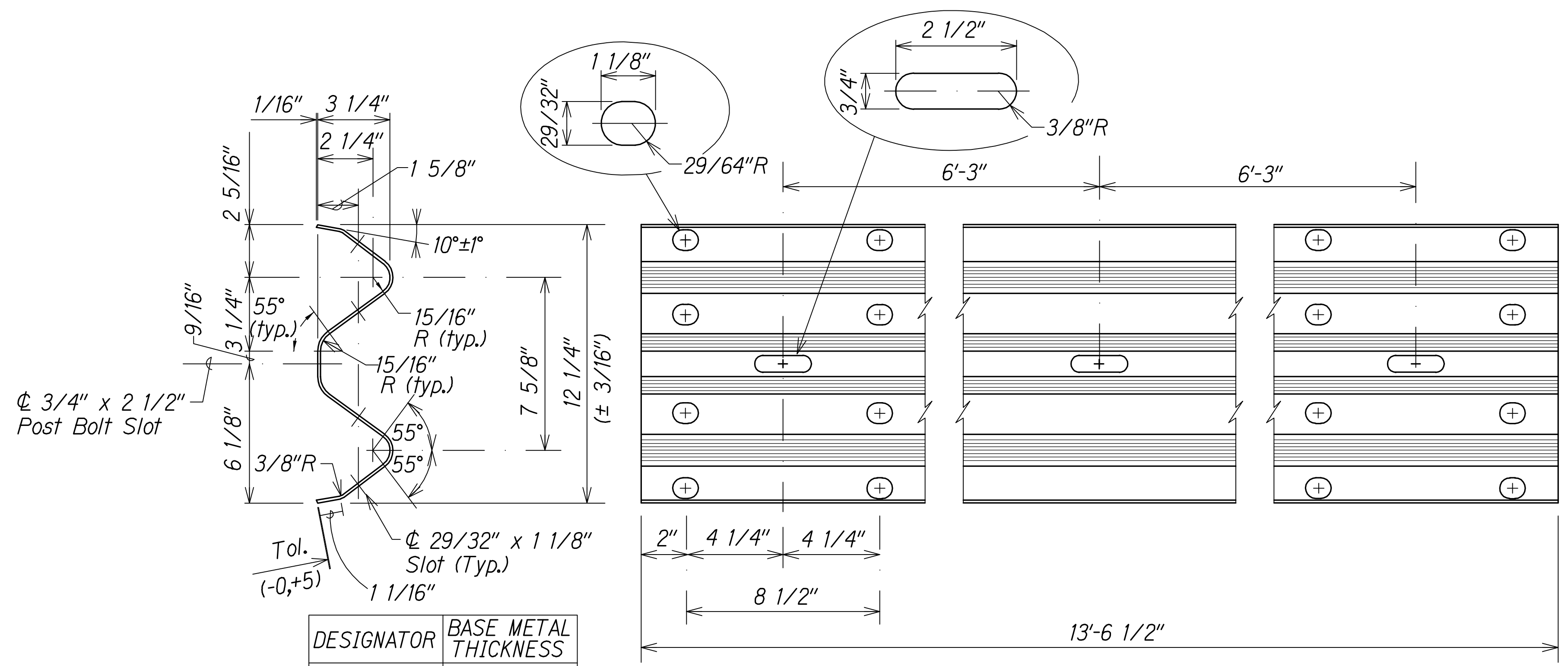


ELEVATION

STRONG POST RUBRAIL (W-BEAM) GUARDRAIL WITH
RECYCLED OFFSET BLOCK OR PLASTIC BLOCKOUT
Not to Scale



HEX BOLT & NUT (FBX16a)
Not to Scale



DESIGNATOR	BASE METAL THICKNESS
RWM02a	12 Gauge

2 SPACE W-BEAM GUARDRAIL (RWM02a)
Not to Scale

**LEGEND FOR
AS-BUILT POSTINGS**

~~~~~ Squiggly line for as-built deletion

==±0.00== Double line for as-built deletion

Roadway Text for as-built posting



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OR UNDER MY SUPERVISION.  
*Matthew K. Fujitaka*  
WILSON OKAMOTO CORPORATION APRIL 30, 2018  
LIC. EXP. DATE

STATE OF HAWAII  
DEPARTMENT OF TRANSPORTATION  
HIGHWAYS DIVISION

**GUARDRAIL DETAILS**

INTERSTATE ROUTE H-1  
PM CONTRAFLOW LANE, PHASE 1 & 2  
FEDERAL AID PROJECT NO. NH-HI-1 (260)  
Scale: None Date: July, 2016

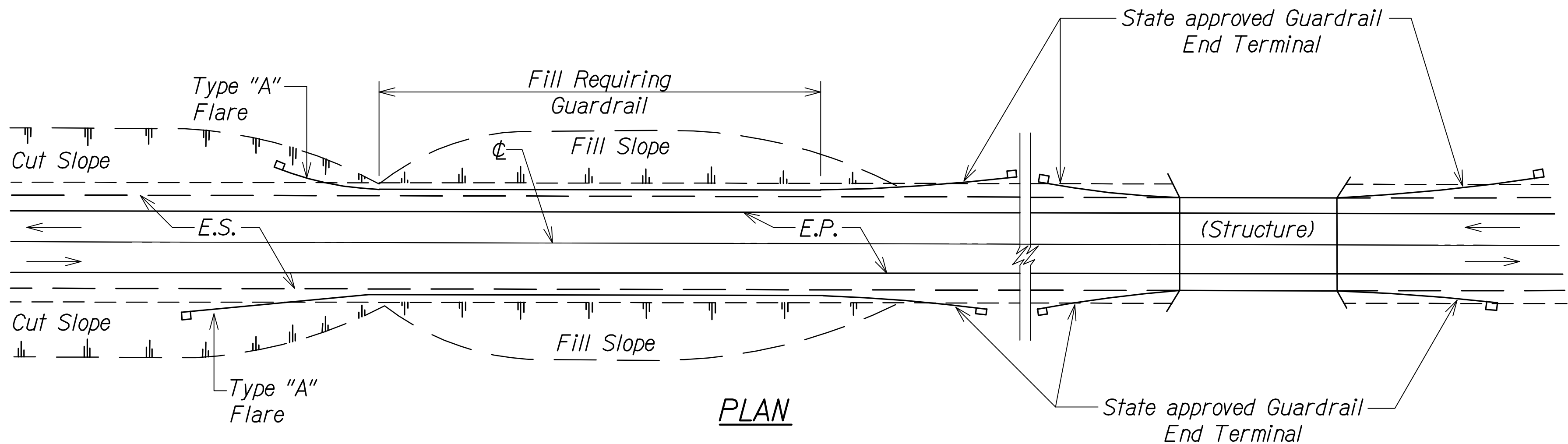
SHEET No. GRD-03 OF 12 SHEETS

|                   |                     |
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| QC/QA REVIEW 100% | DATE MARCH 23, 2014 |
| BY                |                     |
| BY                |                     |
| BY                |                     |
| BY                |                     |

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



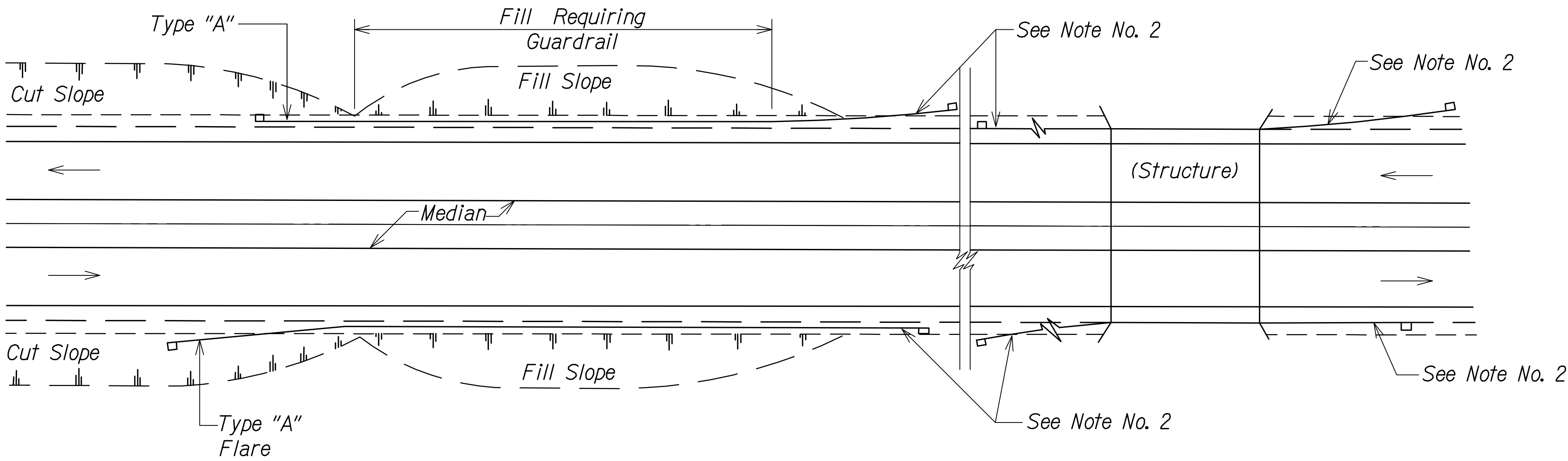
| FED. ROAD DIST. NO. | STATE | FED. AID PROJ. NO. | FISCAL YEAR | SHEET NO. | TOTAL SHEETS |
|---------------------|-------|--------------------|-------------|-----------|--------------|
| HAWAII              | HAW.  | NH-HI-1 (260)      | 2014        | 201       | 605          |



TWO WAY ROADWAY  
Not to Scale

GENERAL NOTES:

1. Metal Guardrail connection to concrete structures requires End Post Connection. See Structure Plans.
2. Depending on the existing field conditions, the Engineer shall determine which guardrail end terminal should be installed.
3. Refer to State's most current approved Product List for NCHRP 350 approved Guardrail End Terminals.



ONE WAY ROADWAY (DIVIDED HIGHWAY)  
Not to Scale

**LEGEND FOR AS-BUILT POSTINGS**

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== Double line for as-built deletion

Roadway Text for as-built posting



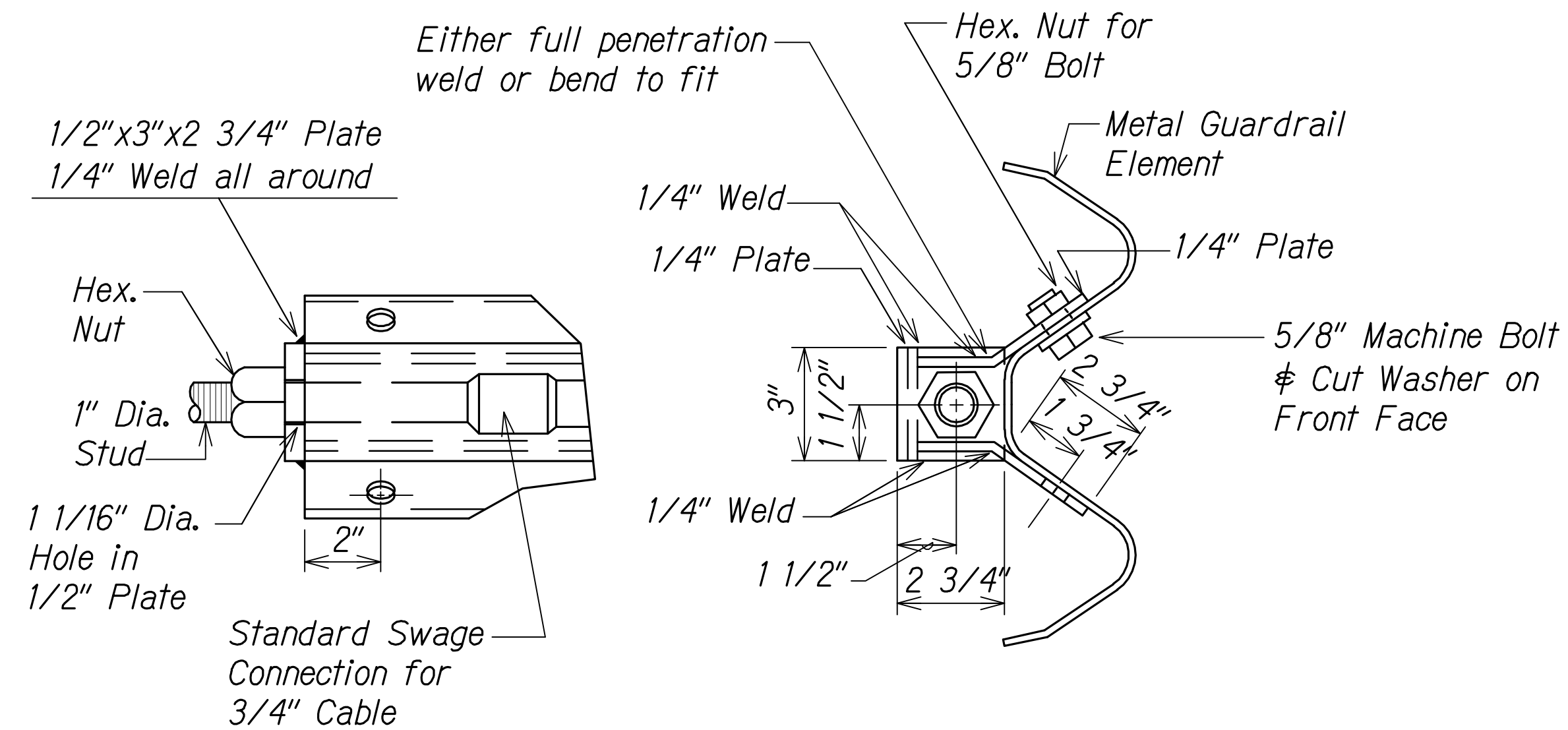
THIS WORK WAS PREPARED BY ME
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WILSON OKAMOTO CORPORATION APRIL 30, 2018 LIC. EXP. DATE

STATE OF HAWAII
DEPARTMENT OF TRANSPORTATION
HIGHWAYS DIVISION

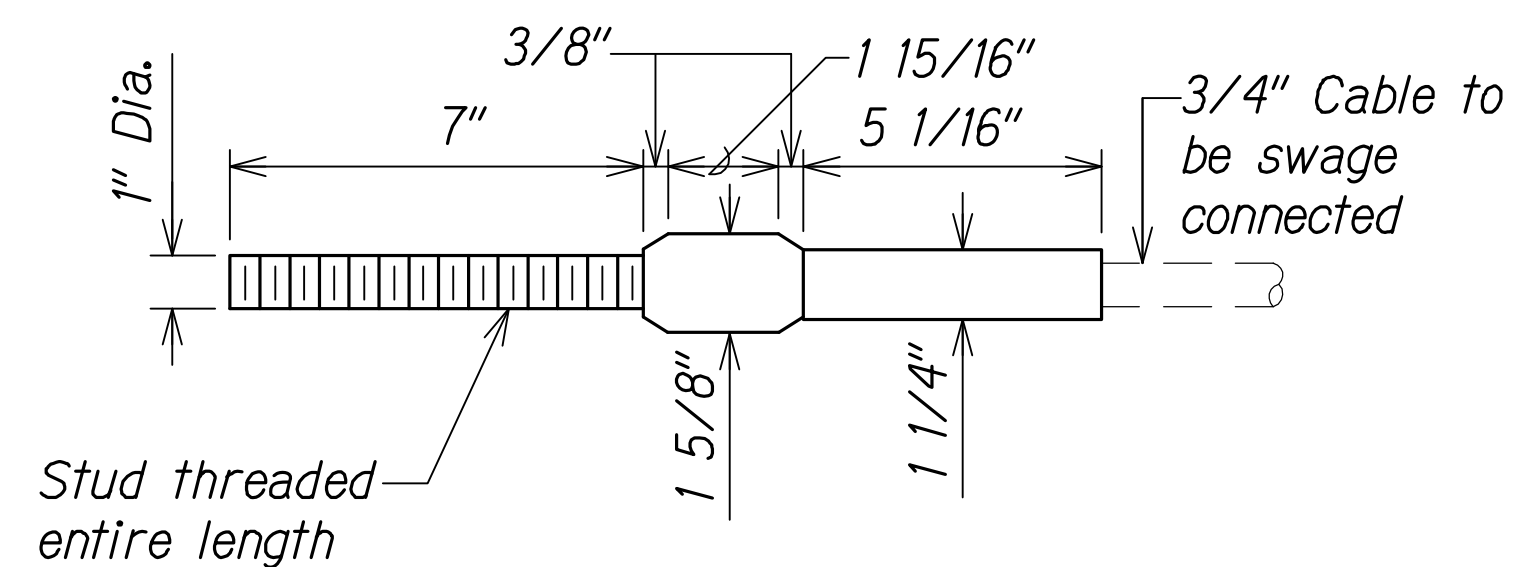
GUARDRAIL DETAILS

INTERSTATE ROUTE H-1
PM CONTRAFLOW LANE, PHASE 1 & 2
FEDERAL AID PROJECT NO. NH-HI-1 (260)
Scale: None Date: July, 2016

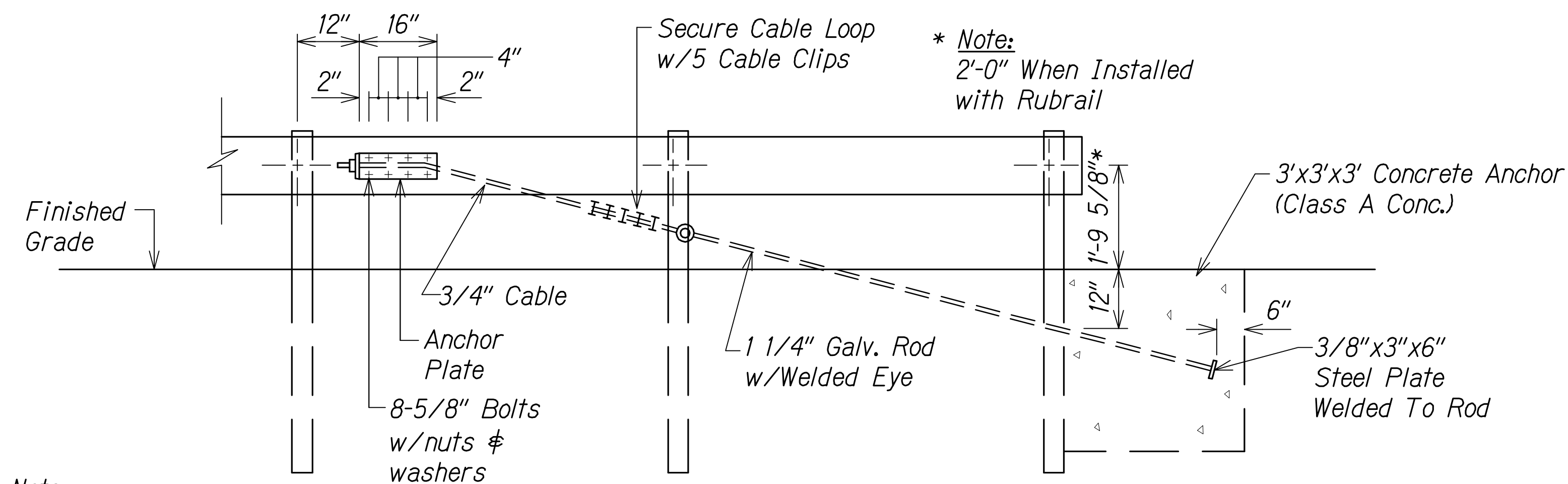
| FED. ROAD DIST. NO. | STATE | FED. AID PROJ. NO. | FISCAL YEAR | SHEET NO. | TOTAL SHEETS |
|---------------------|-------|--------------------|-------------|-----------|--------------|
| HAWAII | HAW. | NH-H1-1 (260) | 2014 | 202 | 605 |



ANCHOR PLATE DETAILS
Not to Scale



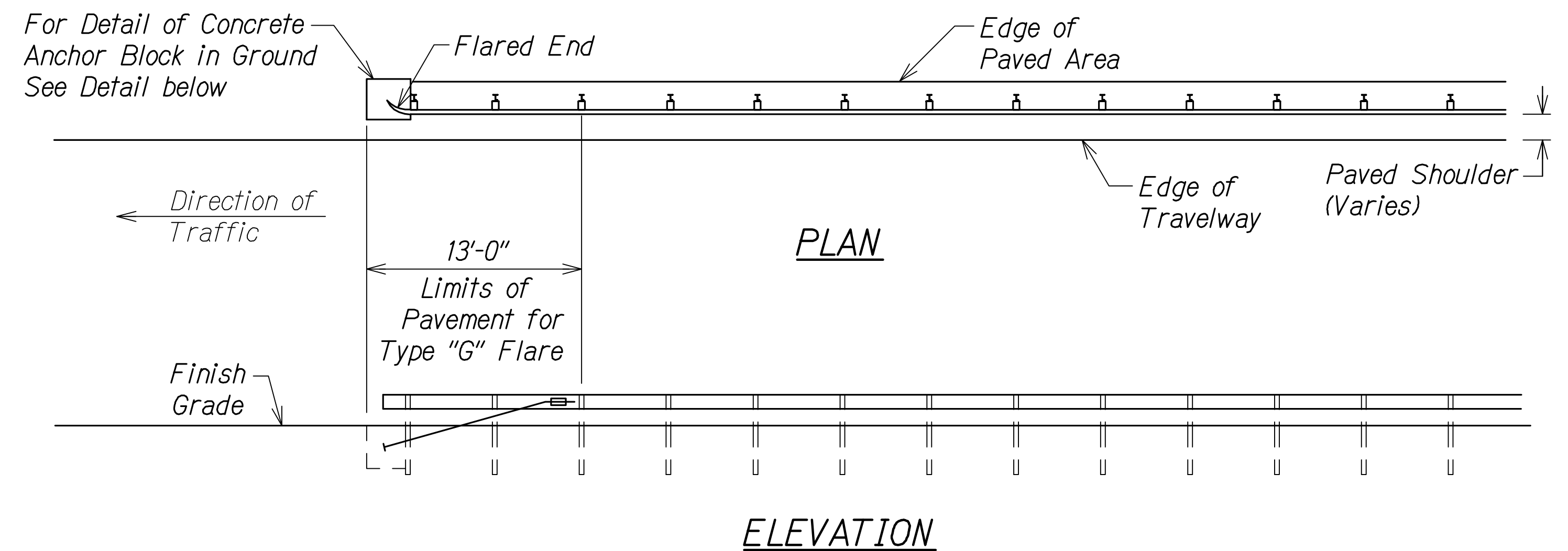
STANDARD SWAGED FITTING AND STUD
Not to Scale



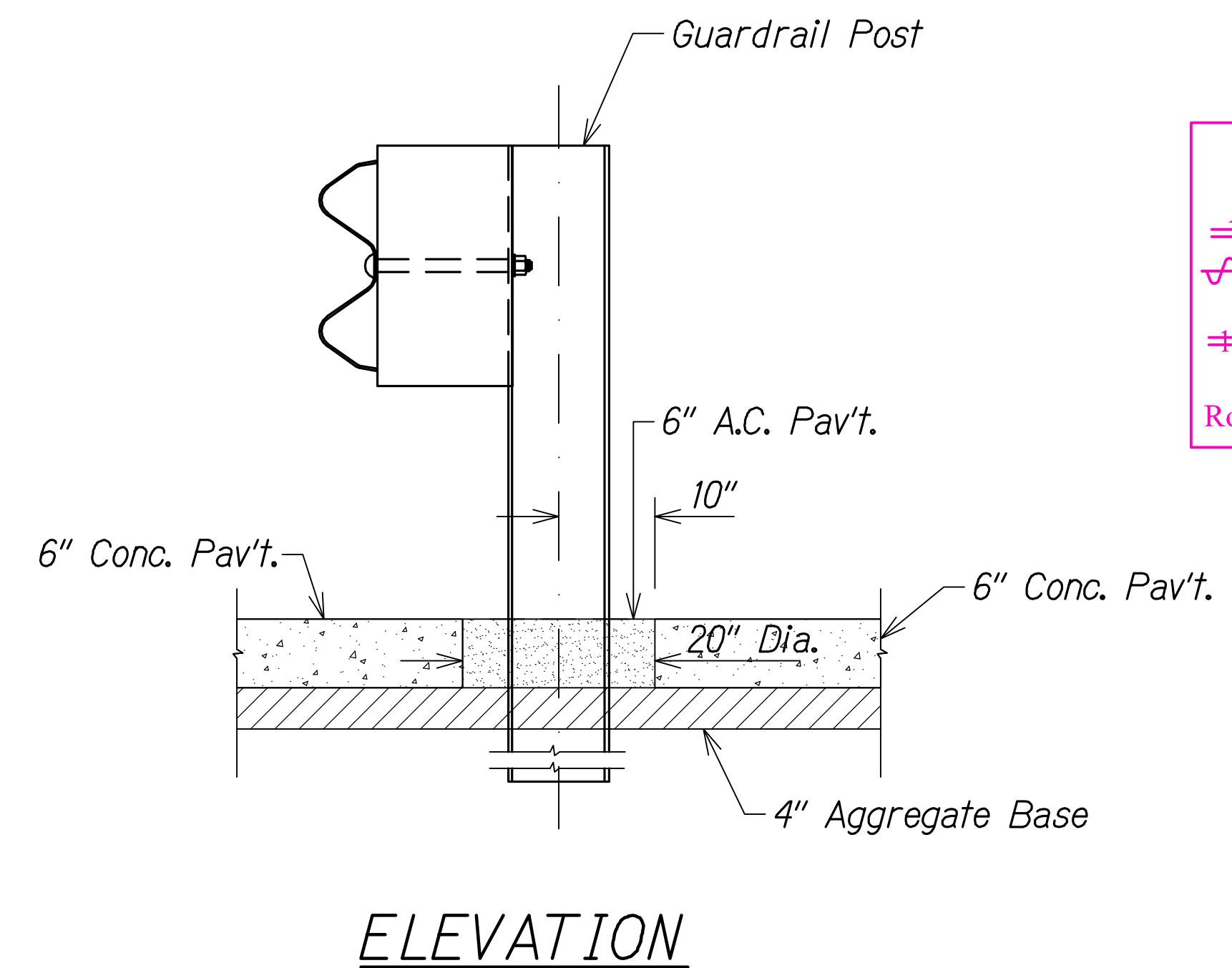
Note:

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

ANCHOR BLOCK DETAIL
Not to Scale



TYPE "G" FLARE END TERMINAL
Not to Scale



GUARDRAIL POST IN CONCRETE SWALE OR CONCRETE PAV'T. DETAIL
Not to Scale

LEGEND FOR AS-BUILT POSTINGS

~~~~~ Squiggly line for as-built deletion

==00.00== Double line for as-built deletion

Roadway Text for as-built posting



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*Matthew K. Fujitaka*

WILSON OKAMOTO CORPORATION APRIL 30, 2018 LIC. EXP. DATE

STATE OF HAWAII  
DEPARTMENT OF TRANSPORTATION  
HIGHWAYS DIVISION

**GUARDRAIL DETAILS**

INTERSTATE ROUTE H-1  
PM CONTRAFLOW LANE, PHASE 1 & 2  
FEDERAL AID PROJECT NO. NH-H1-1 (260)  
Scale: None Date: July, 2016

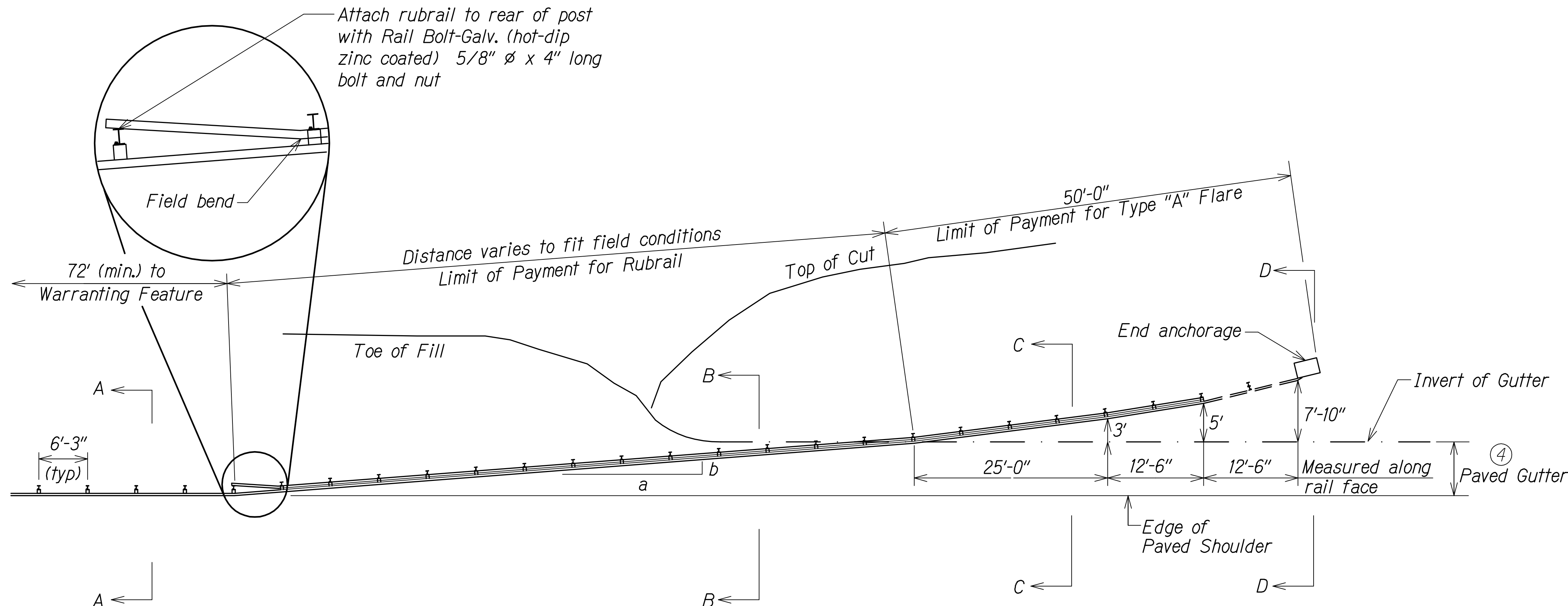
SHEET No. GRD-05 OF 12 SHEETS

"AS-BUILT"

202



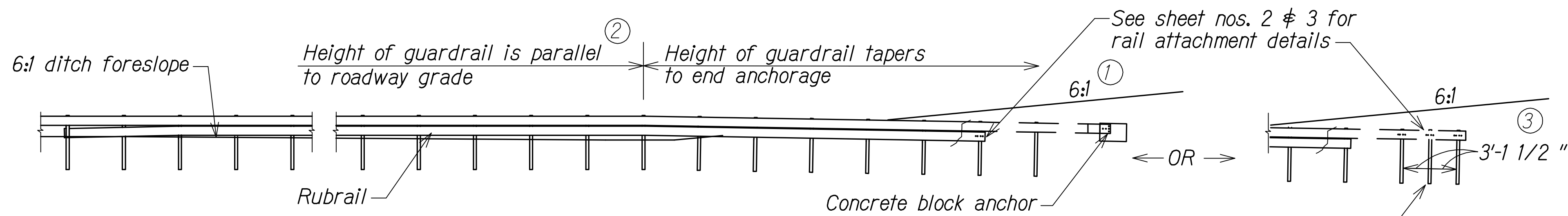
| FED. ROAD DIST. NO. | STATE | FED. AID PROJ. NO. | FISCAL YEAR | SHEET NO. | TOTAL SHEETS |
|---------------------|-------|--------------------|-------------|-----------|--------------|
| HAWAII              | HAW.  | NH-HI-1 (260)      | 2014        | 203       | 605          |



PLAN

- GENERAL NOTES**
1. A 6:1 or flatter slope is desirable. However, a steeper or flatter existing slope may be used.
  2. Height of guardrail may be tapered down in elevation to maintain 3'-8" maximum height.
  3. All posts are 8'-0" in length from where the guardrail flares away from the shoulder back to the post anchor. Posts for the post anchor are 6'-0" long.
  4. Variable Paved Gutter offsets may be used to fit field conditions.
  5. The Guardrail Posts shall be located away from the gutter/swale invert.
  6. All fasteners, posts, blocks and rail elements 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-AGCARTBA Joint Cooperative Committee.

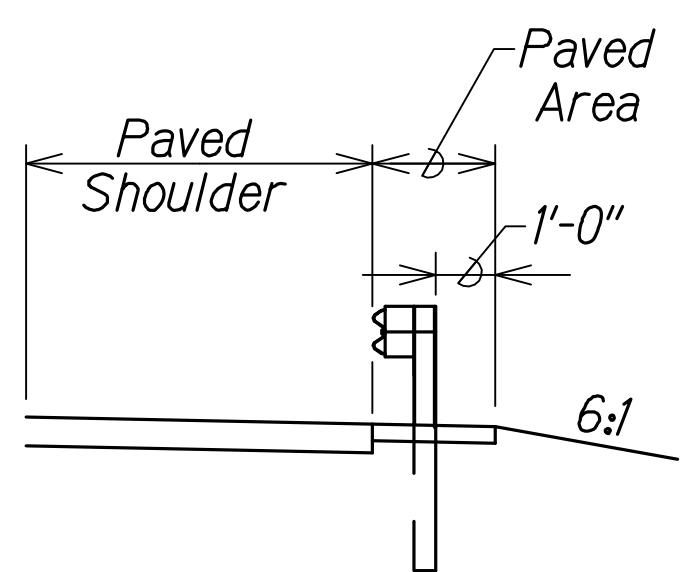
| Design speed mph | a:b  |
|------------------|------|
| 68               | 15:1 |
| 62               | 13:1 |
| 56               | 12:1 |
| 50               | 11:1 |
| 43               | 10:1 |
| 37               | 9:1  |
| 31               | 7:1  |



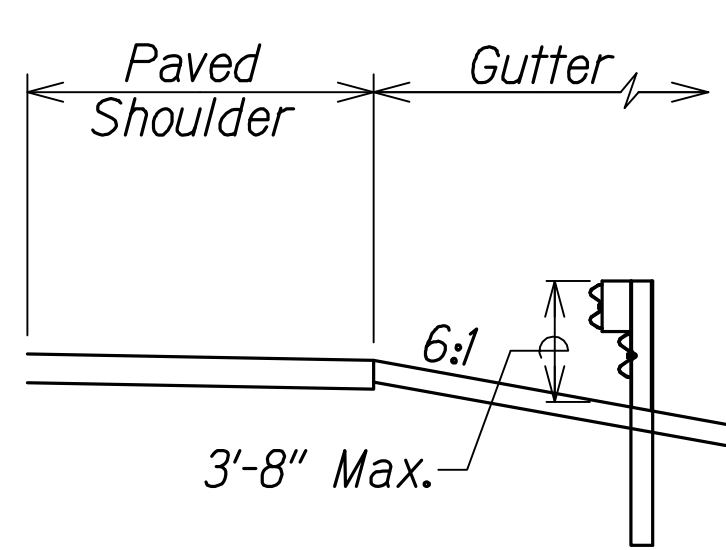
ELEVATION (PROFILE ALONG RAIL)

**LEGEND FOR AS-BUILT POSTINGS**

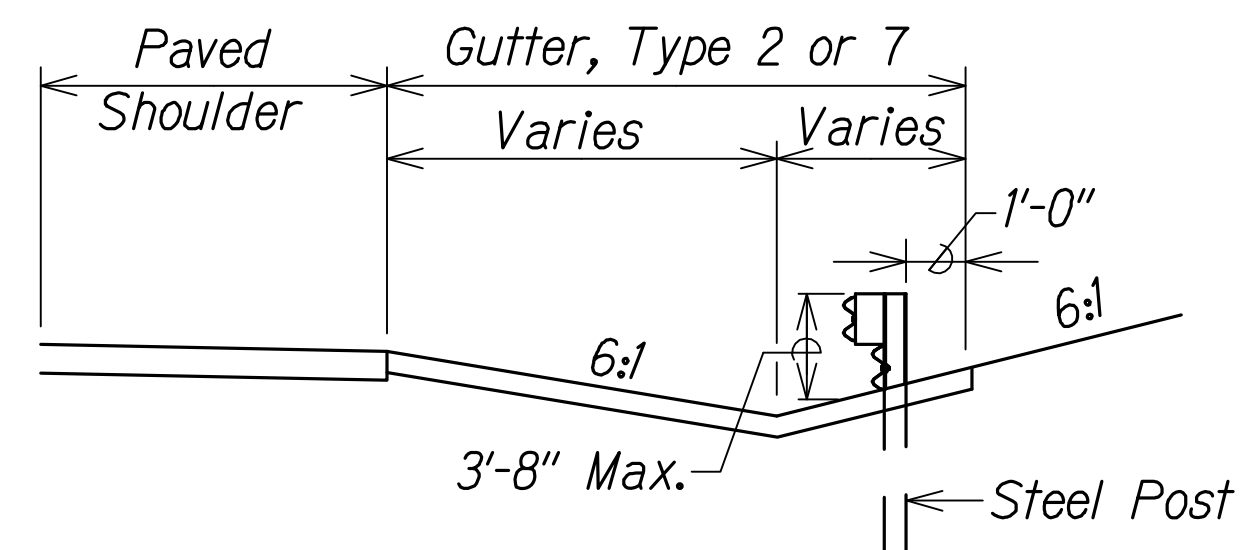
- Squiggly line for as-built deletion
- Double line for as-built deletion
- Roadway
- Text for as-built posting



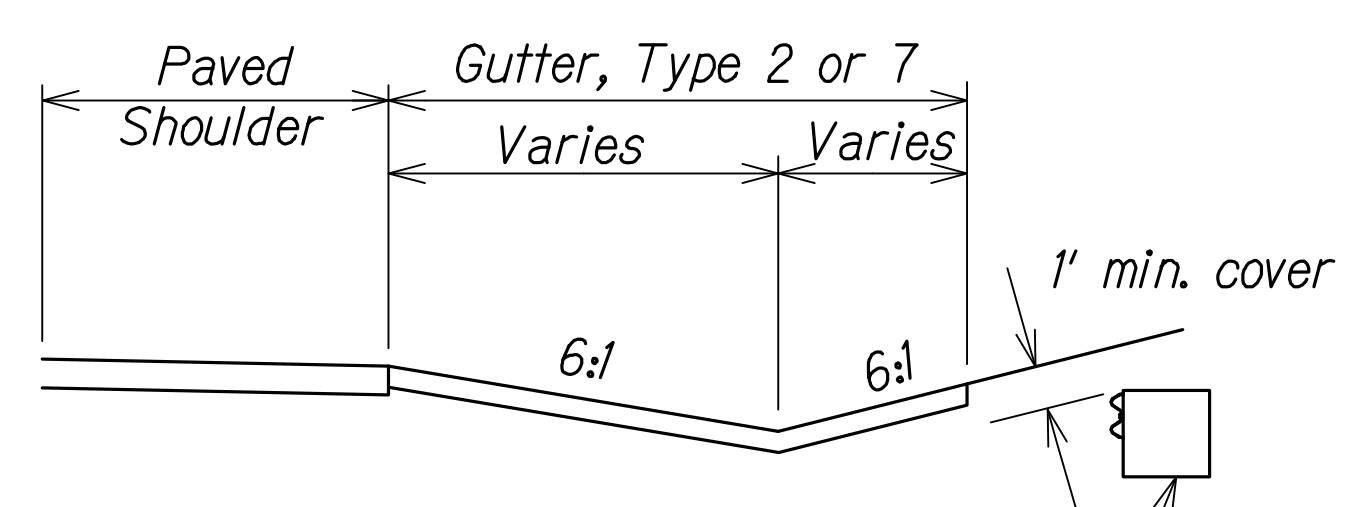
SECTION A-A



Section B-B  
(With Rubrail)



Section C-C  
(With Rubrail)



SECTION D-D

**BACKSLOPE ANCHOR TERMINAL (WITH 6:1 PAVED GUTTER AND TYPE "A" FLARE)**  
Not to Scale



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*Matthew K. Fujita*  
WILSON OKAMOTO CORPORATION APRIL 30, 2016 LIC. EXP. DATE

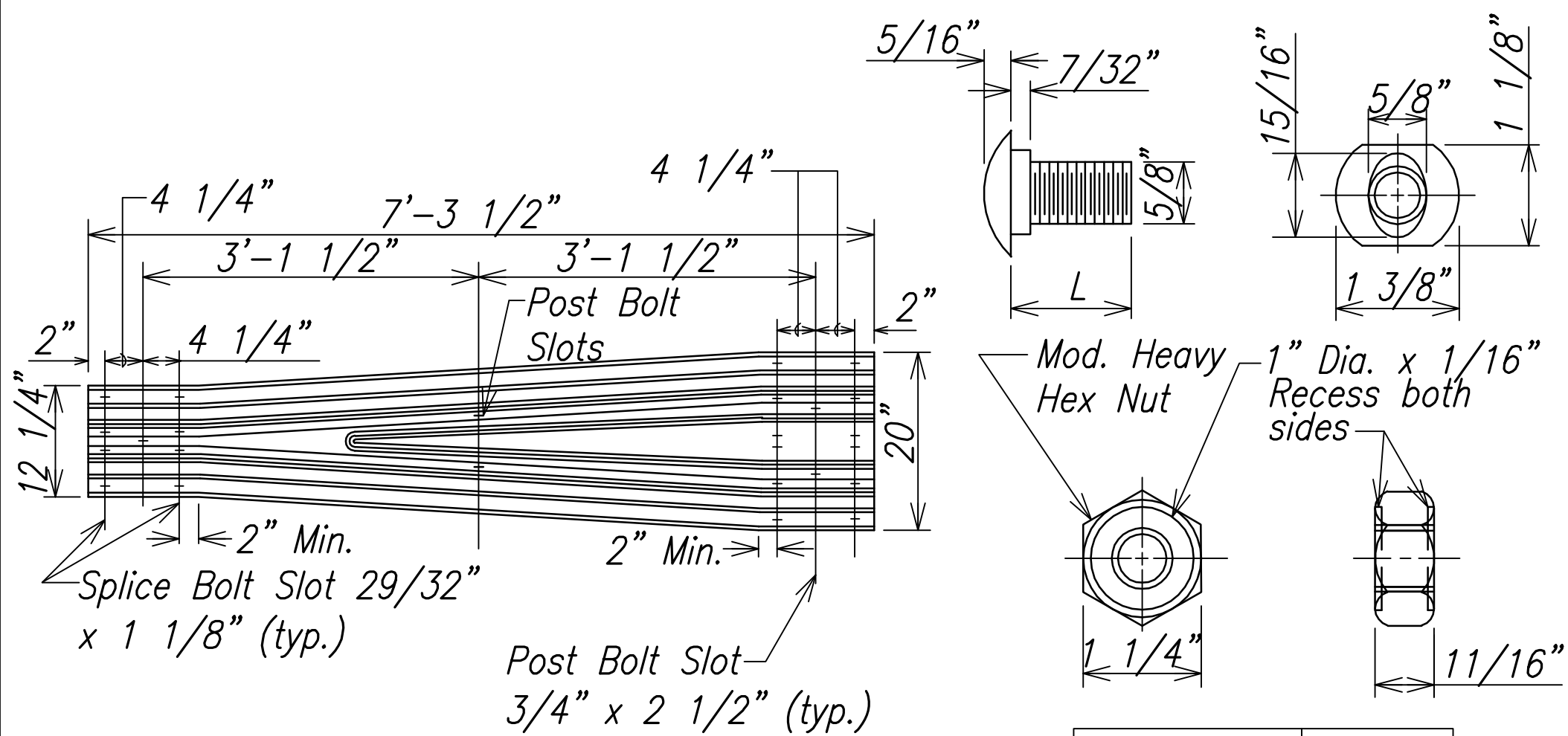
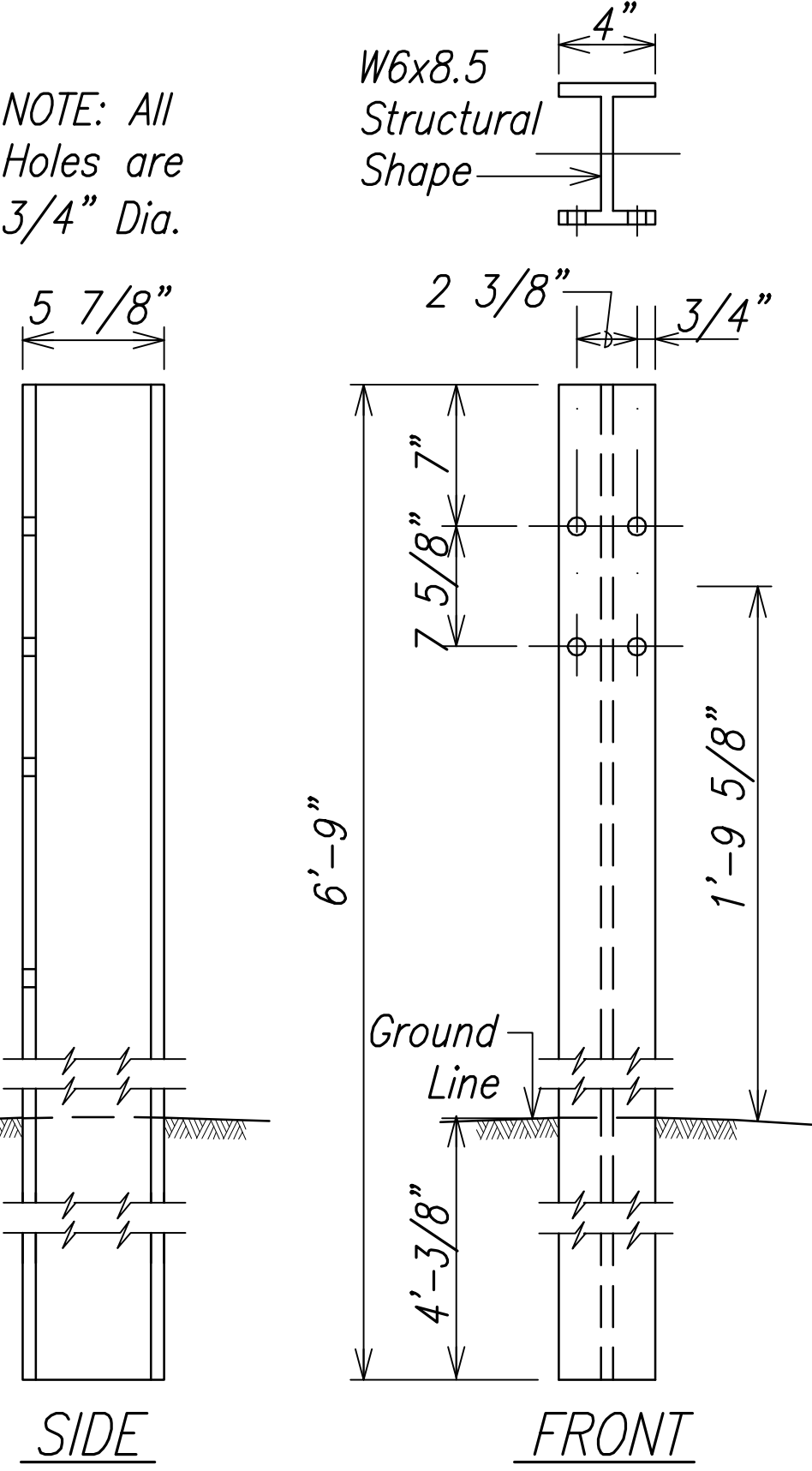
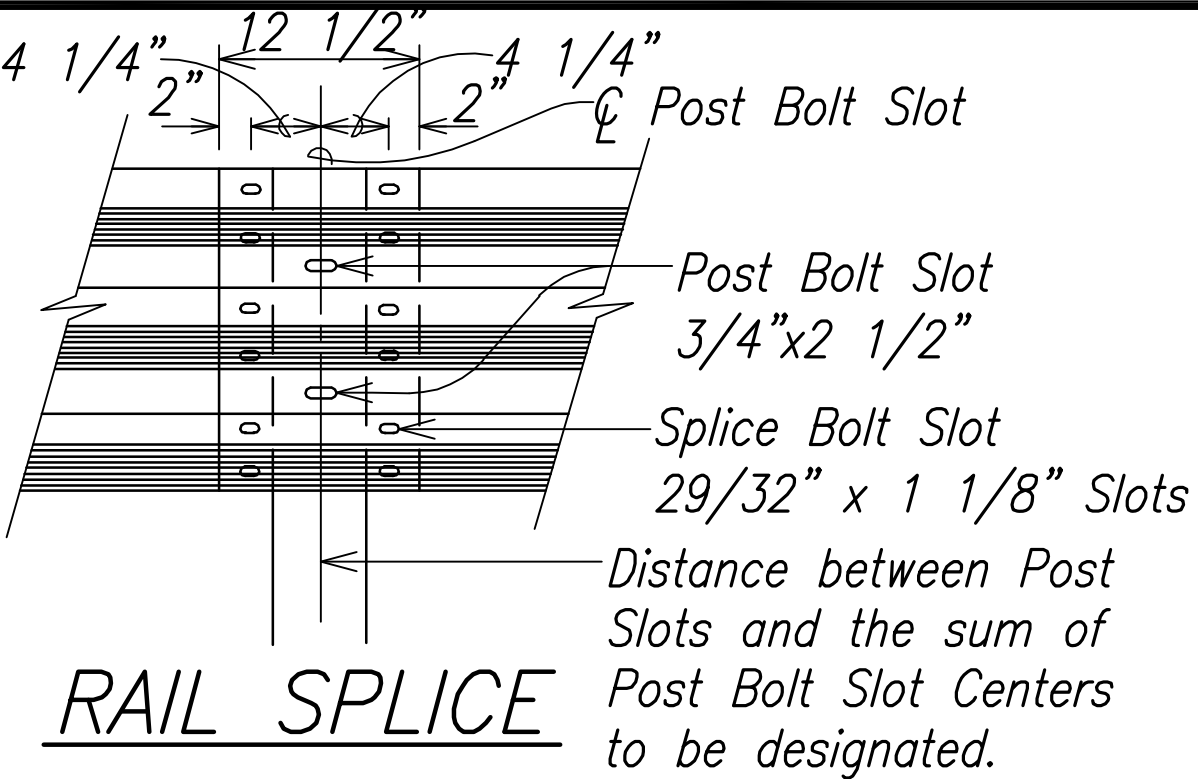
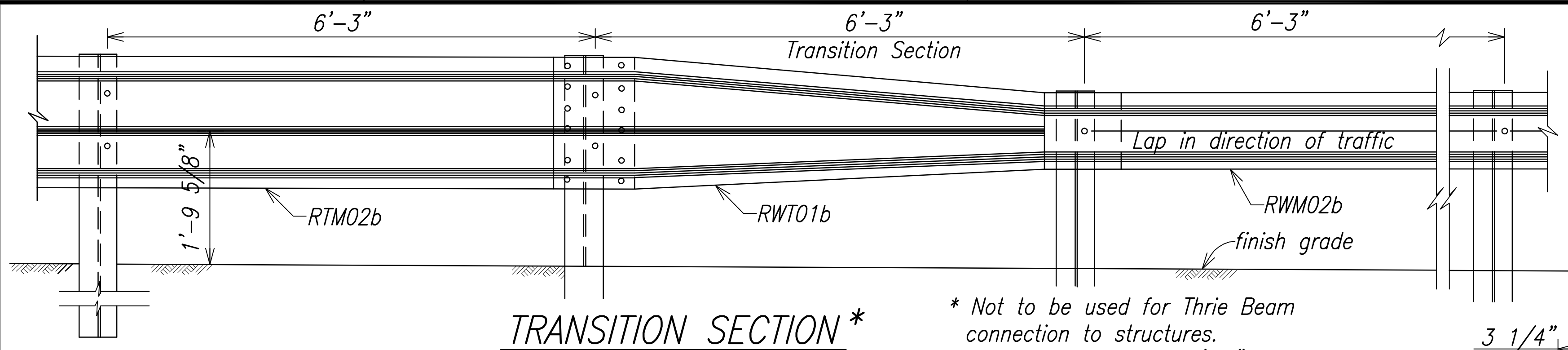
STATE OF HAWAII  
DEPARTMENT OF TRANSPORTATION  
HIGHWAYS DIVISION

**GUARDRAIL DETAILS**

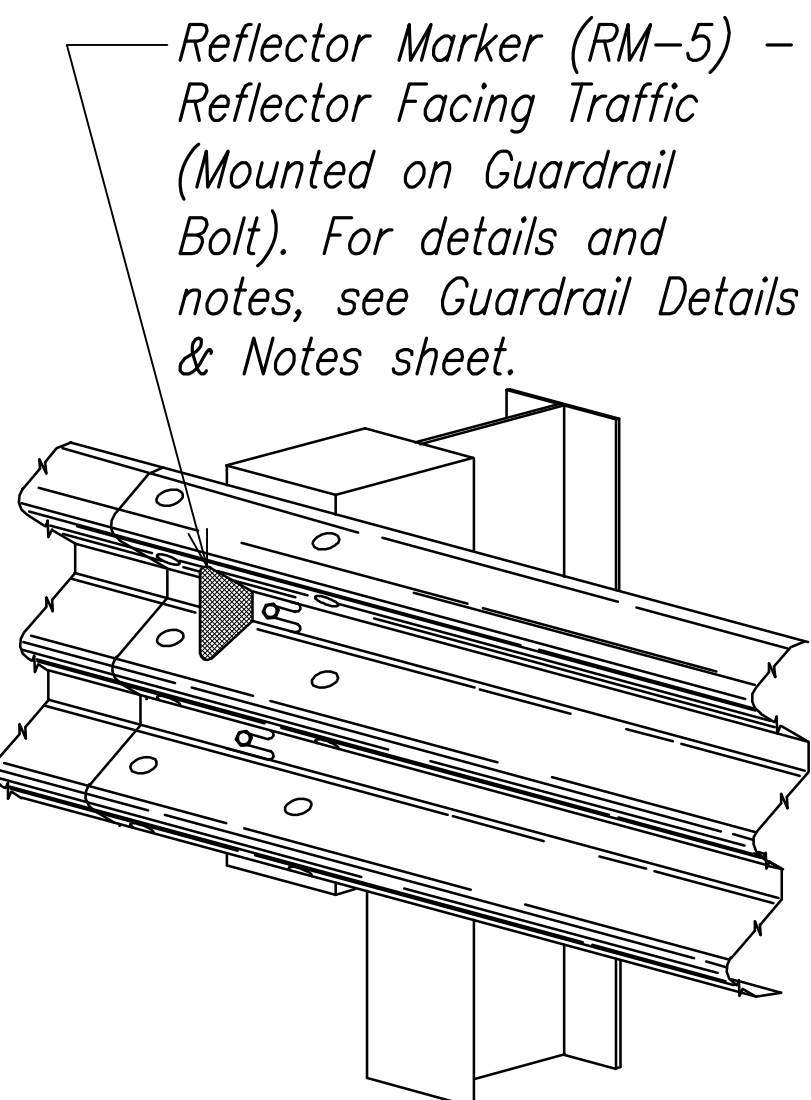
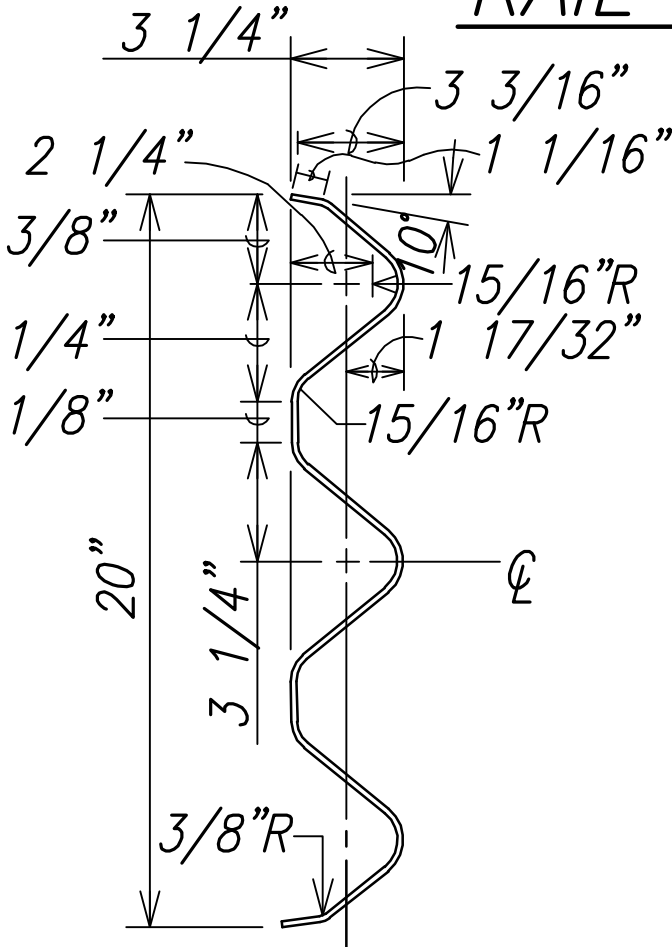
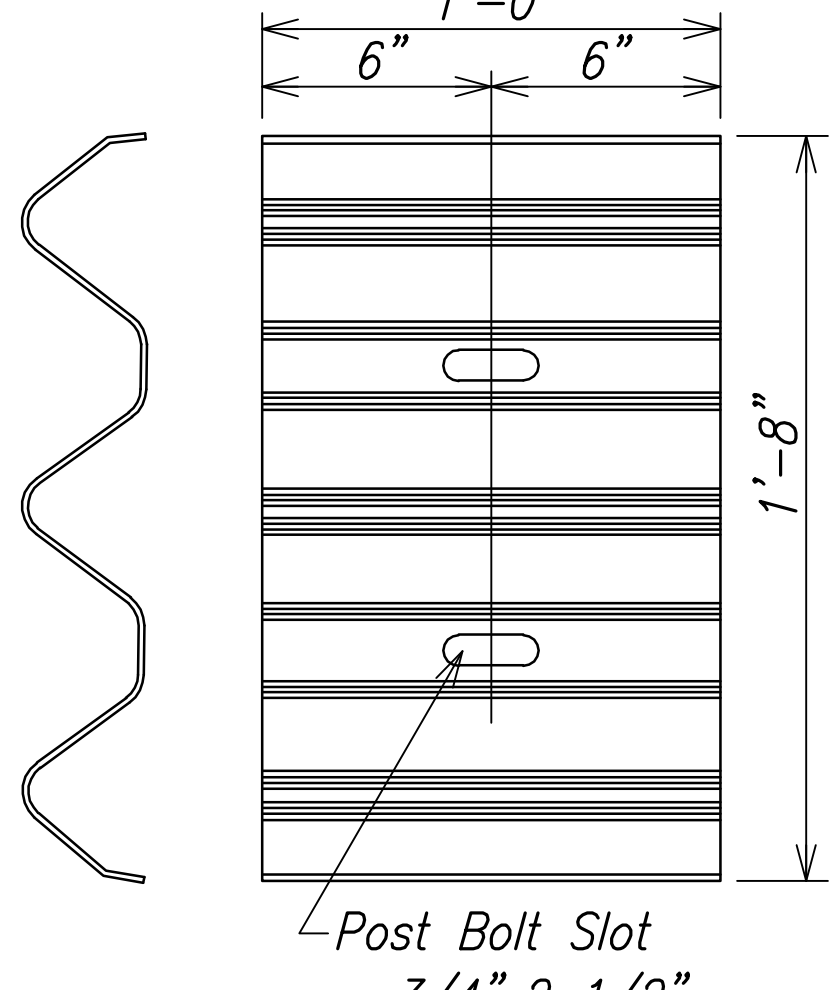
INTERSTATE ROUTE H-1  
PM CONTRAFLOW LANE, PHASE 1 & 2  
FEDERAL AID PROJECT NO. NH-HI-1 (260)  
Scale: None Date: July, 2016



| FED. ROAD DIST. NO. | STATE | FED. AID PROJ. NO. | FISCAL YEAR | SHEET NO. | TOTAL SHEETS |
|---------------------|-------|--------------------|-------------|-----------|--------------|
| HAWAII              | HAW.  | NH-HI-1 (260)      | 2014        | 204       | 605          |



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



TRANSITION SECTION (RWT01b)

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

**LEGEND FOR AS-BUILT POSTINGS**

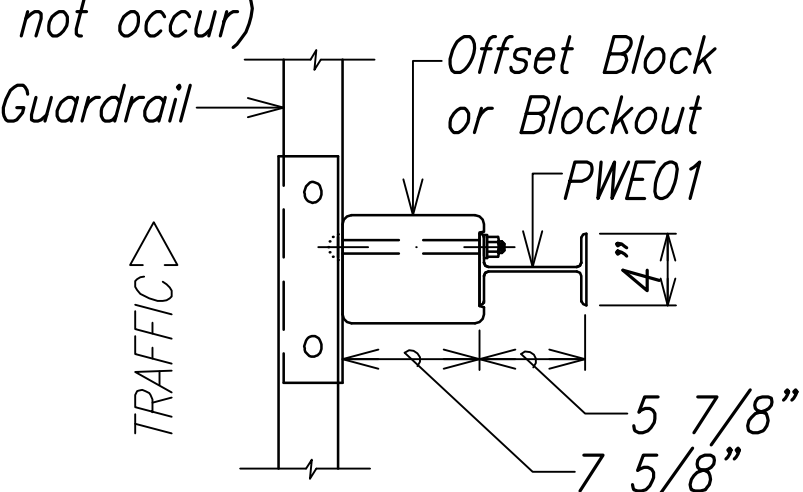
Squiggly line for as-built deletion

Double line for as-built deletion

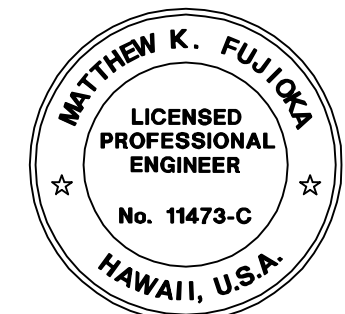
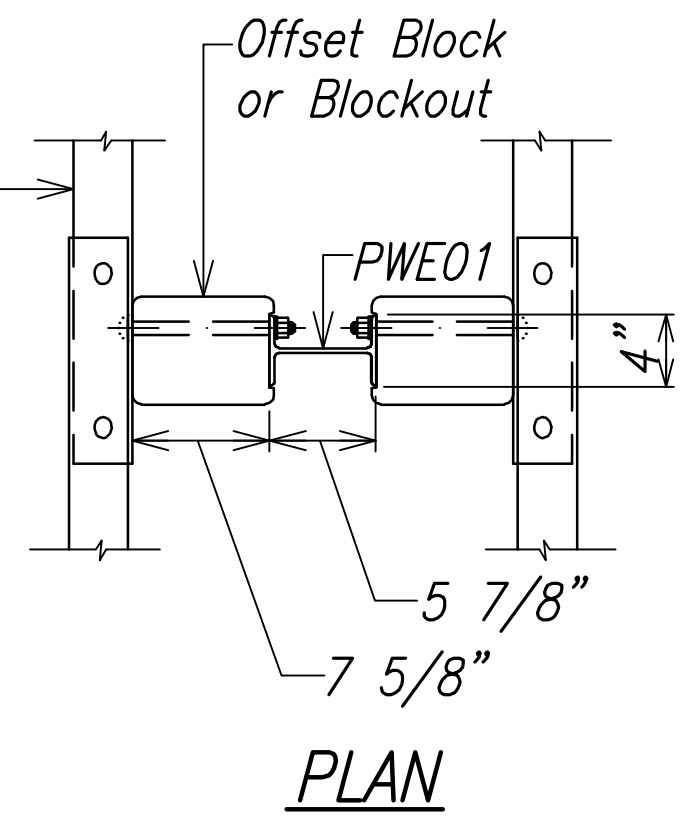
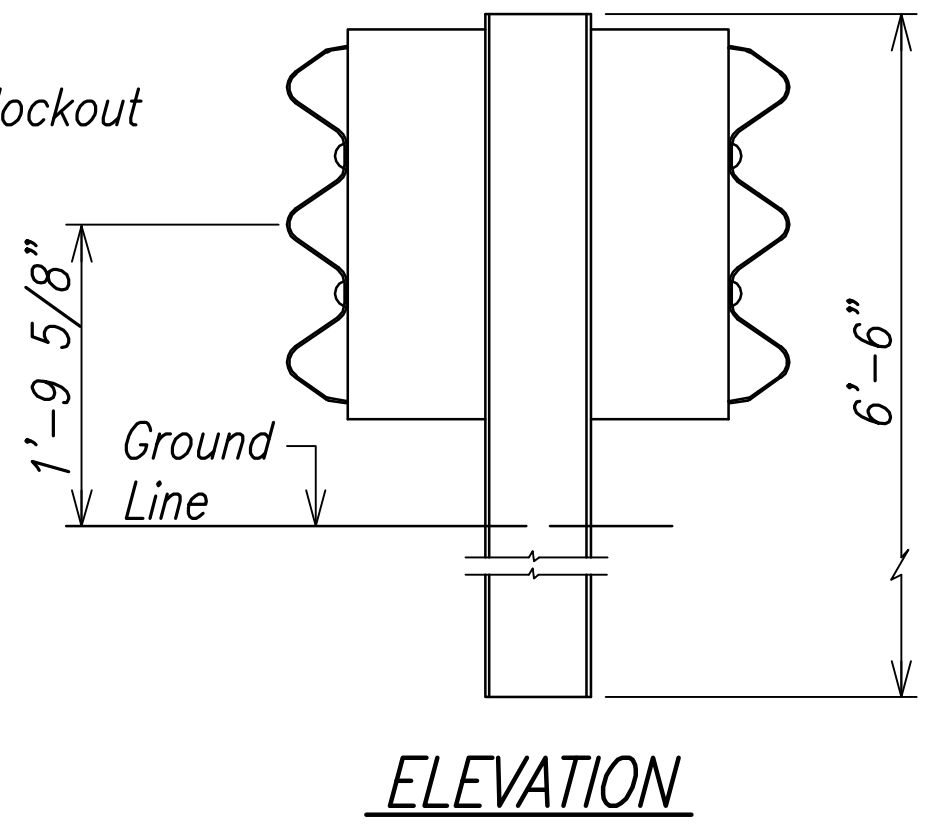
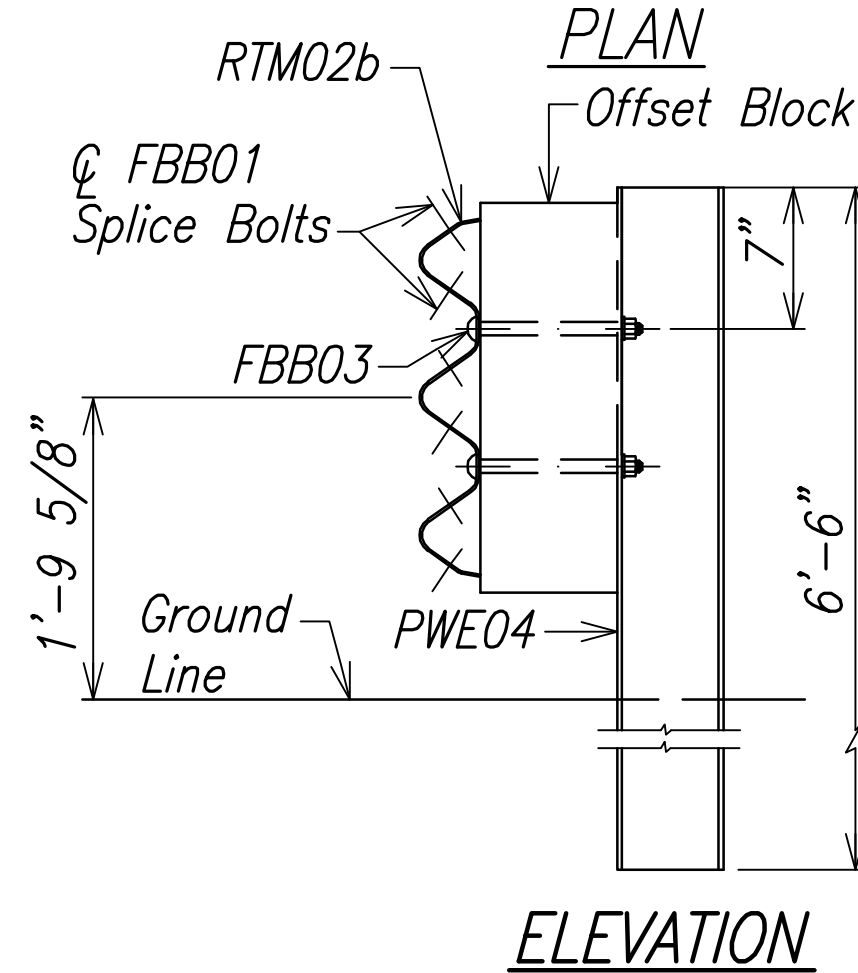
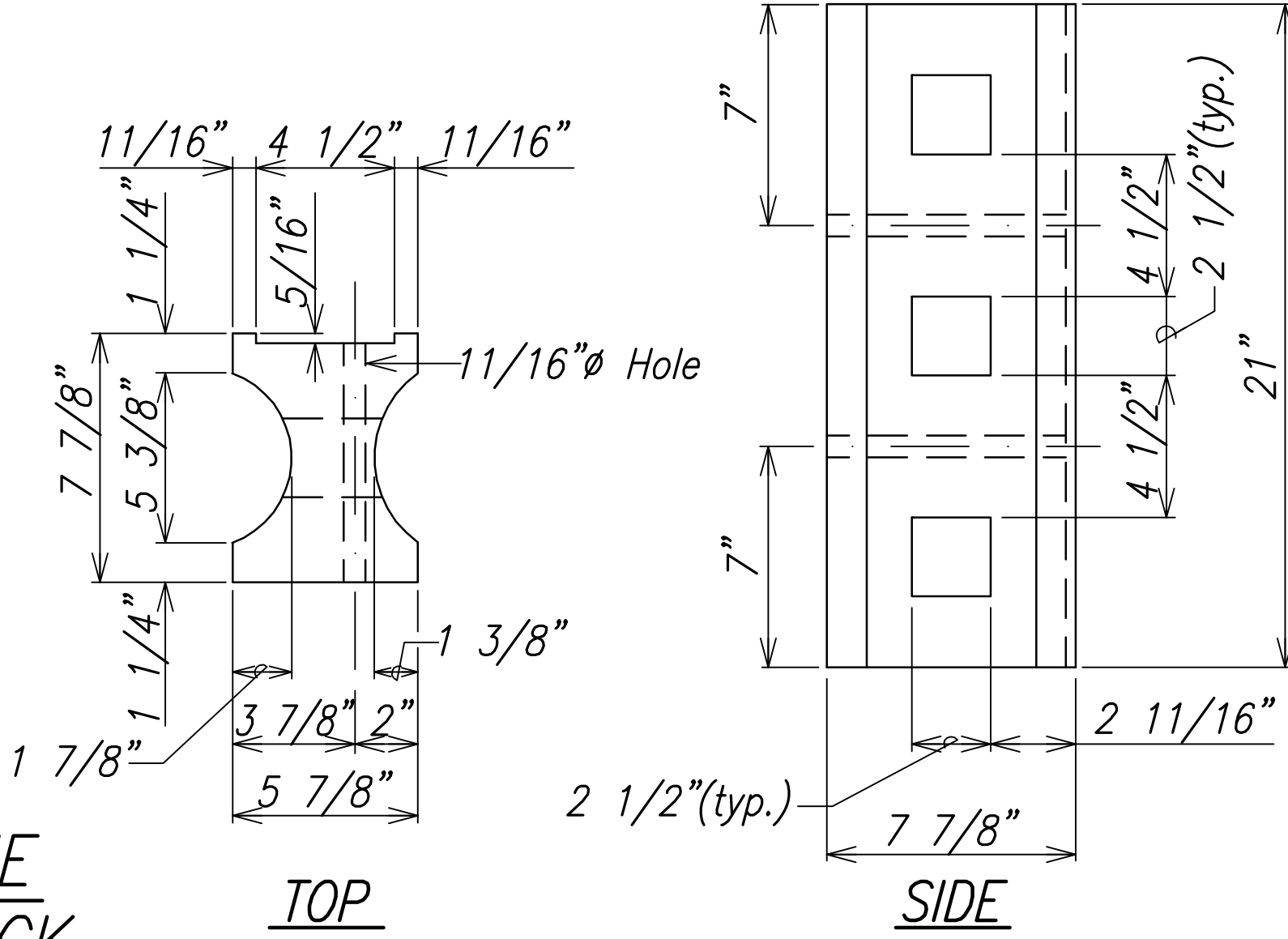
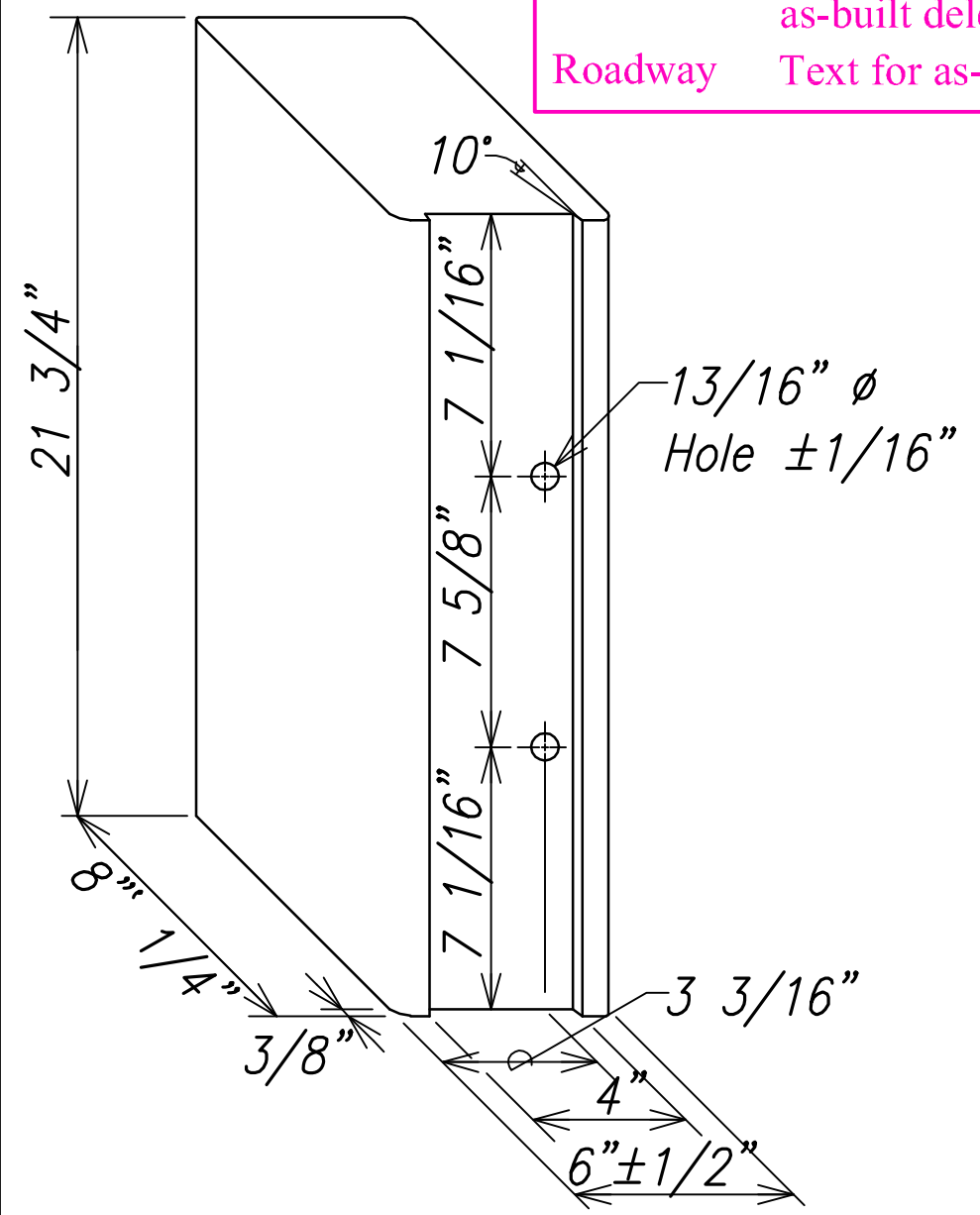
Roadway

Text for as-built posting

GUARDRAIL BOLTS AND RECESSED NUT (Use at Posts where Splices do not occur)



TYPICAL INSTALLATION OF REFLECTOR MARKER (RM-5)



THIS WORK WAS PREPARED BY ME OR UNDER MY SUPERVISION.

*Matthew K. Fujitaka*

APRIL 30, 2018  
WILSON OKAMOTO CORPORATION LIC. EXP. DATE

STATE OF HAWAII  
DEPARTMENT OF TRANSPORTATION  
HIGHWAYS DIVISION  
**GUARDRAIL DETAILS**

INTERSTATE ROUTE H-1  
PM CONTRAFLOW LANE, PHASE 1 & 2  
FEDERAL AID PROJECT NO. NH-HI-1 (260)  
Scale: None Date: July, 2016

SHEET No. GRD-07 OF 12 SHEETS



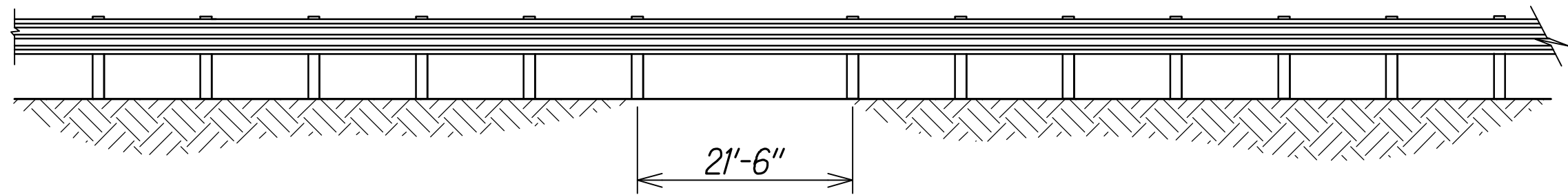






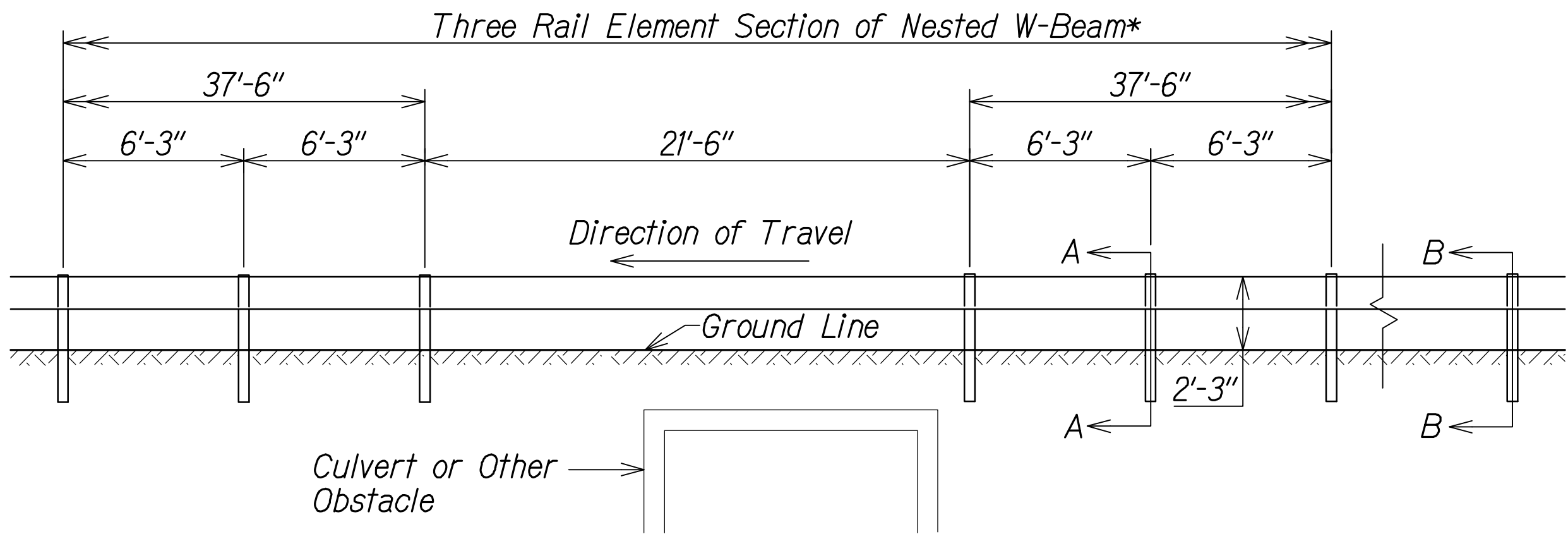


| FED. ROAD DIST. NO. | STATE | FED. AID PROJ. NO. | FISCAL YEAR | SHEET NO. | TOTAL SHEETS |
|---------------------|-------|--------------------|-------------|-----------|--------------|
| HAWAII              | HAW.  | NH-H1-1 (260)      | 2014        | 207       | 605          |

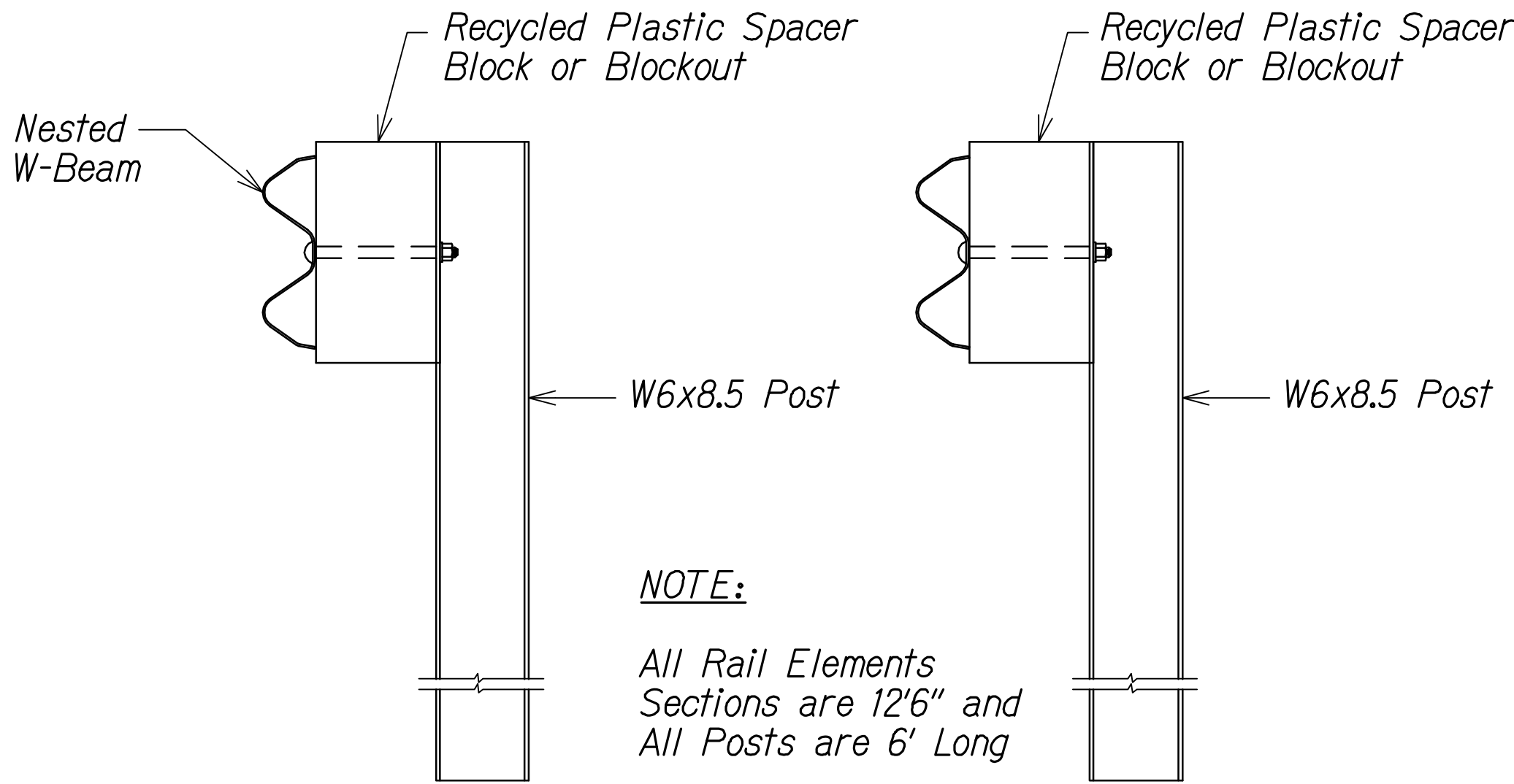


LONG SPAN OVER CULVERT

\*Note: All Nested W-Beam splices points shall be staggered.



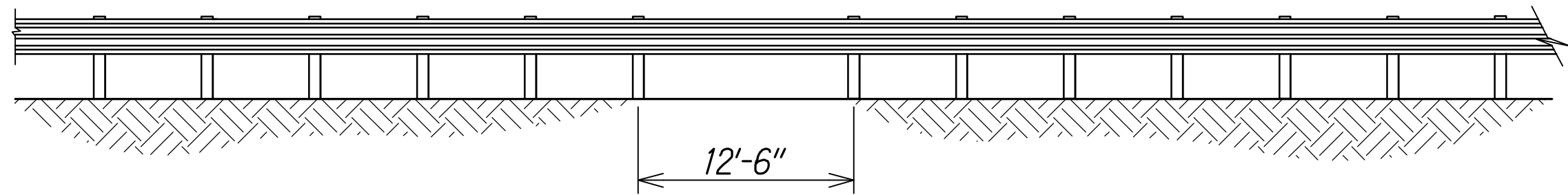
NESTED LONG SPAN STRONG POST  
W-BEAM GUARDRAIL OVER 21'-6" CULVERT  
(MAXIMUM DYNAMIC DEFLECTION OF 3.2 FT.)



**NOTE:**  
All Rail Elements  
Sections are 12'6" and  
All Posts are 6' Long

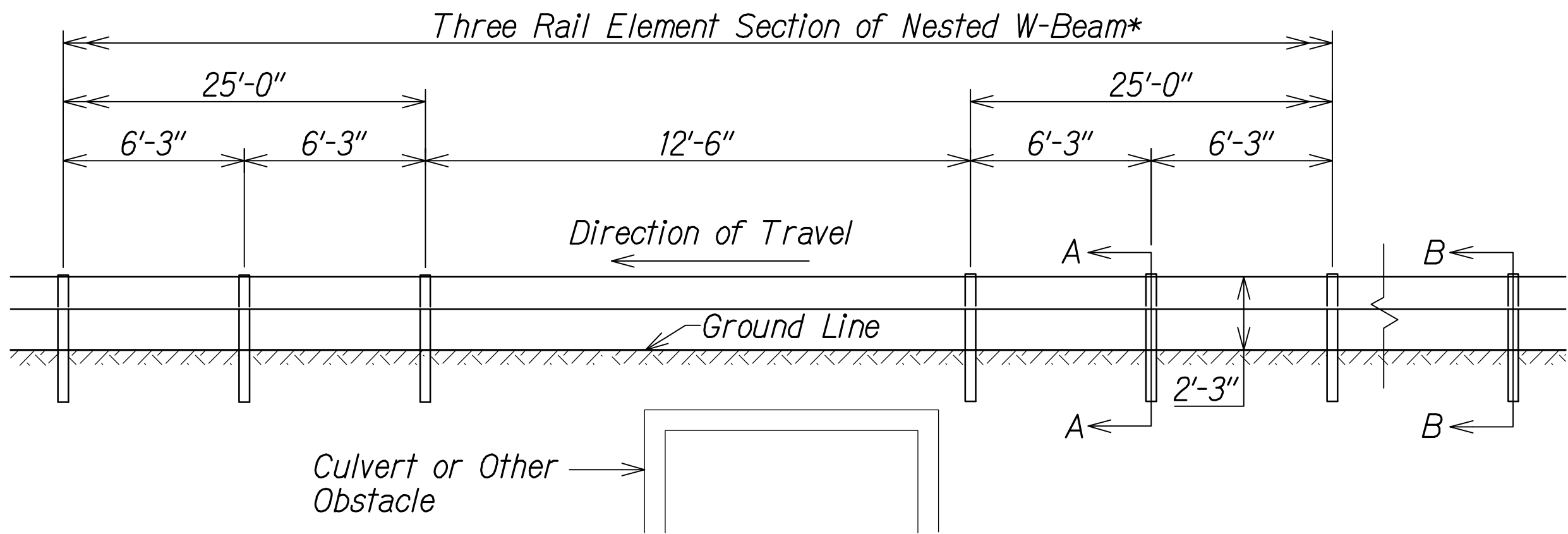
SECTION A-A

SECTION B-B



LONG SPAN OVER CULVERT

\*Note: All Nested W-Beam splices points shall be staggered.



NESTED LONG SPAN STRONG POST  
W-BEAM GUARDRAIL OVER 12'-6" CULVERT  
(MAXIMUM DYNAMIC DEFLECTION OF 3.1 FT.)

**LEGEND FOR  
AS-BUILT POSTINGS**

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



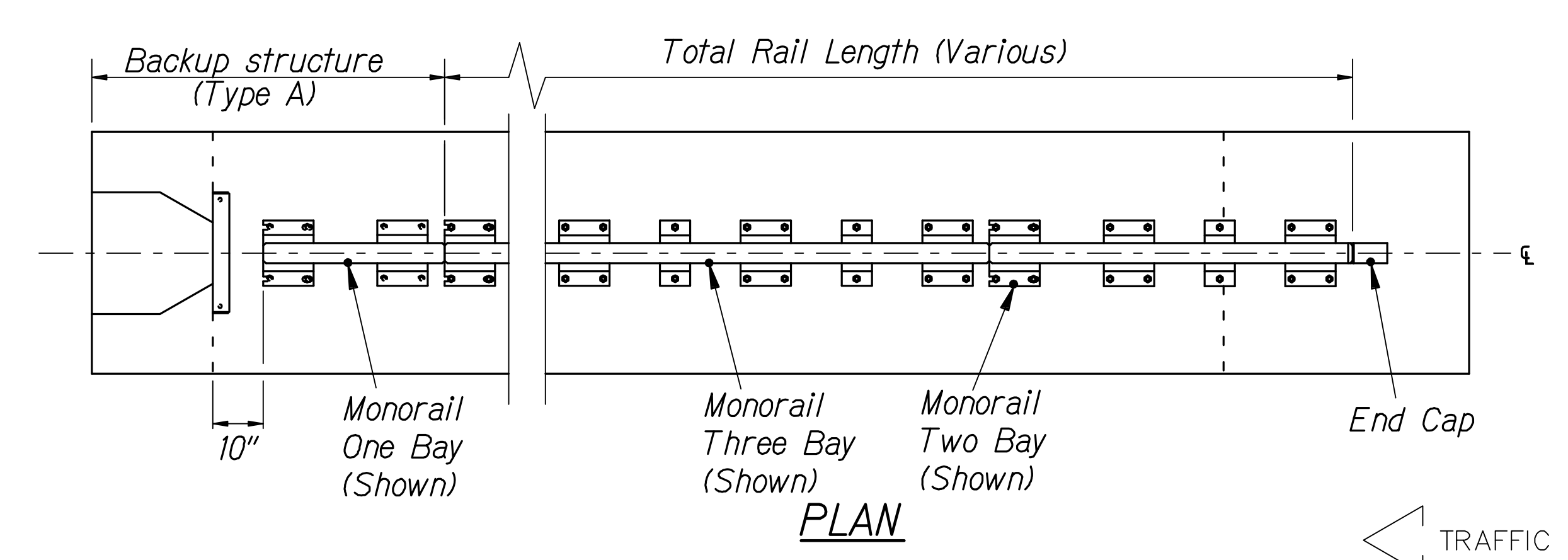
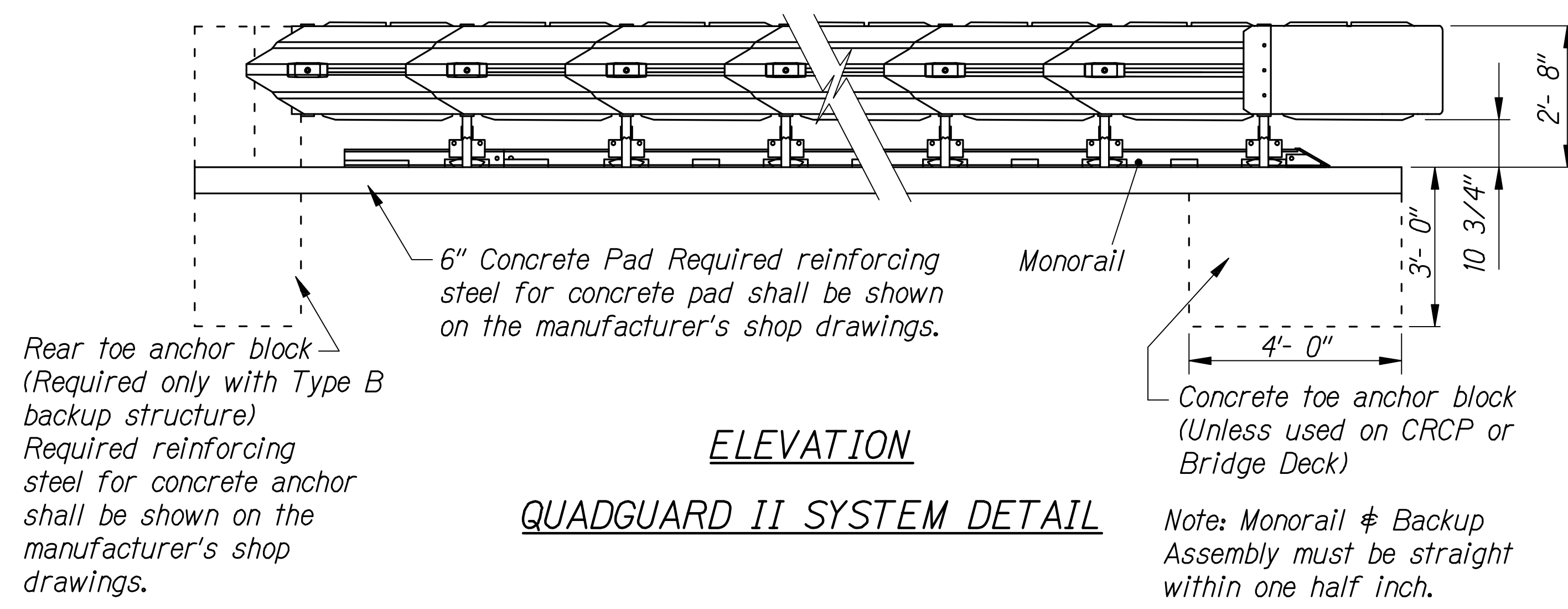
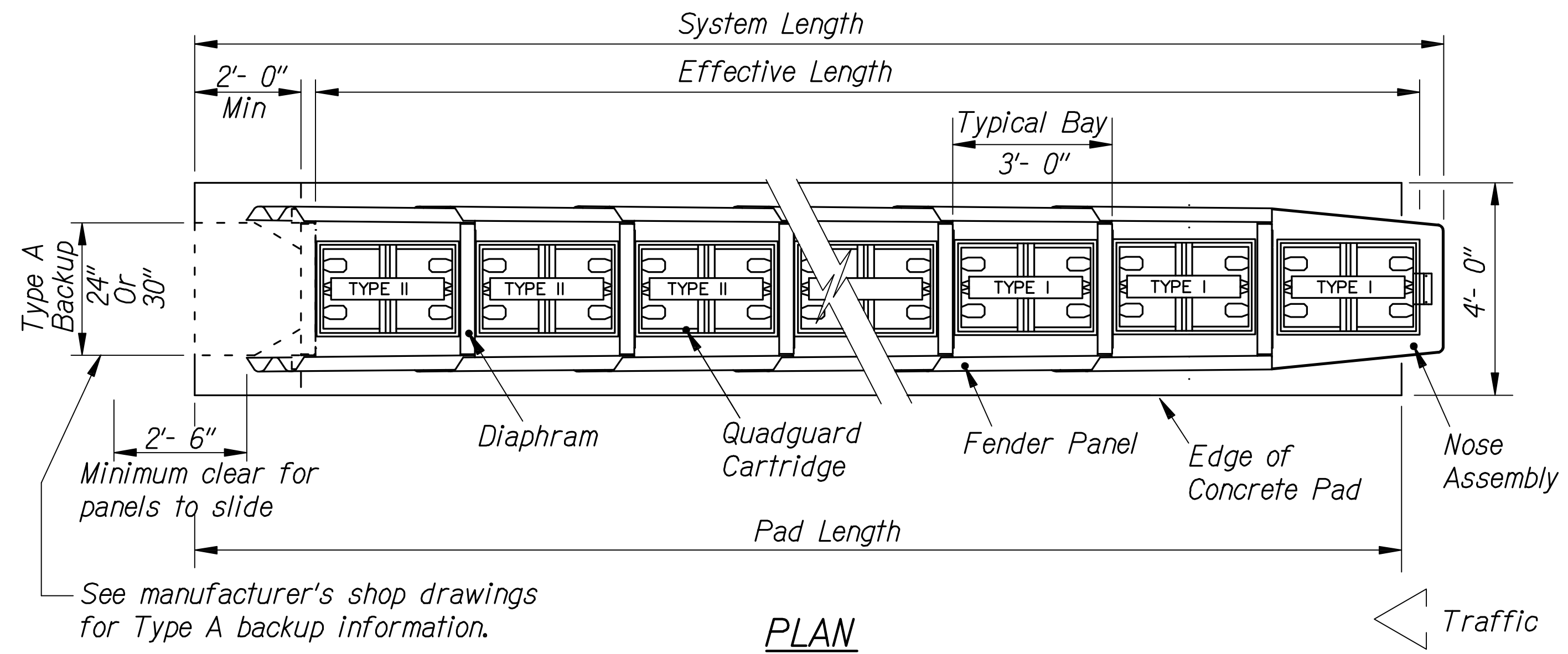
THIS WORK WAS PREPARED BY ME  
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*Matthew K. Fujitaka*  
WILSON OKAMOTO CORPORATION APRIL 30, 2016 LIC. EXP. DATE

STATE OF HAWAII  
DEPARTMENT OF TRANSPORTATION  
HIGHWAYS DIVISION  
GUARDRAIL DETAILS

INTERSTATE ROUTE H-1  
PM CONTRAFLOW LANE, PHASE 1 & 2  
FEDERAL AID PROJECT NO. NH-H1-1 (260)  
Scale: None Date: July, 2016



| FED. ROAD DIST. NO. | STATE | FED. AID PROJ. NO. | FISCAL YEAR | SHEET NO. | TOTAL SHEETS |
|---------------------|-------|--------------------|-------------|-----------|--------------|
| HAWAII              | HAW.  | NH-HI-1 (260)      | 2014        | 208       | 605          |



GENERAL NOTES

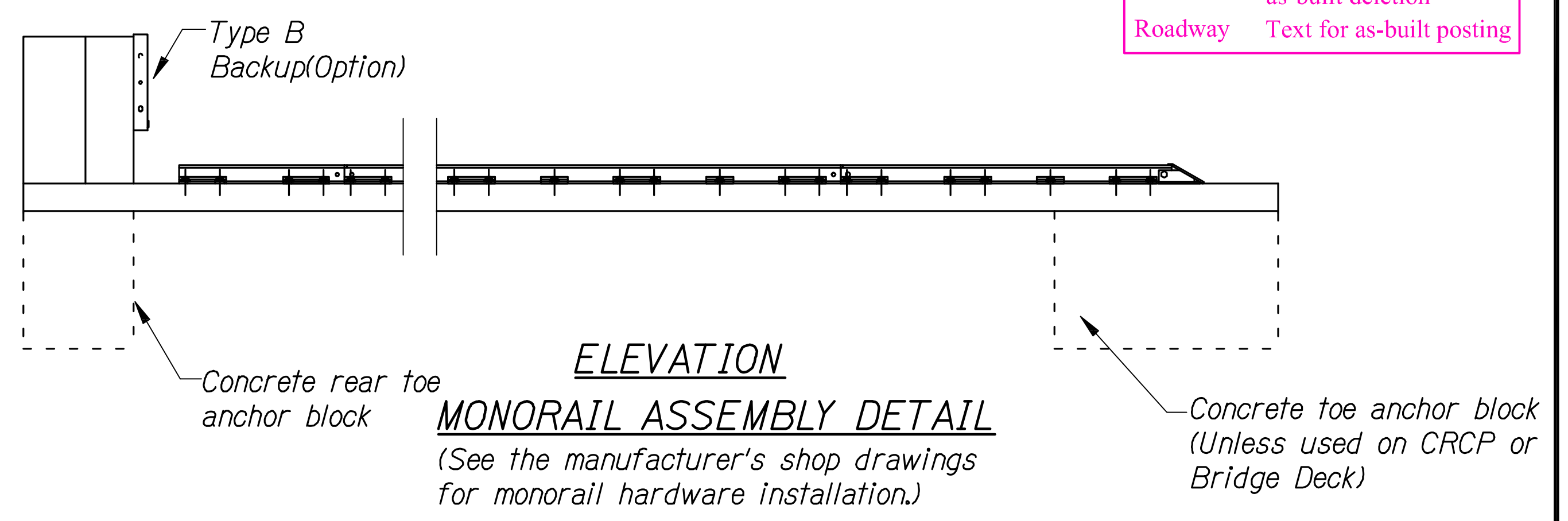
- Attenuator shall be the Quadguard System or equivalent.
- Additional designs and details required for the installation of the Quadguard System shall be provided by the manufacturer.
- The installation of the Quadguard System and all appurtenances shall be in accordance with the manufacturer's recommendations and requirements.
- Slope and grade of the concrete pad shall be determined in the field.

LEGEND FOR AS-BUILT POSTINGS

~~~~~ Squiggly line for as-built deletion

±00.00 Double line for as-built deletion

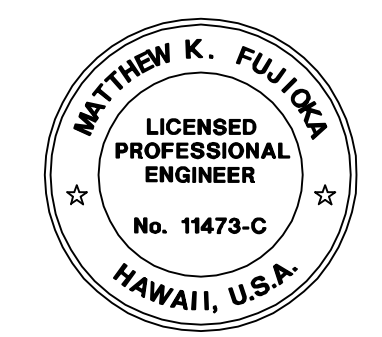
Roadway Text for as-built posting



| QUADGUARD II (NARROW) SYSTEM | | | | |
|------------------------------|------------|-----------------------|-------------------|-------------------|
| DESIGN SPEED (MPH) | NO.OF BAYS | UNIT EFFECTIVE LENGTH | PAD LENGTH TYPE A | PAD LENGTH TYPE B |
| 60 | 5 | 17'- 8" | 18'- 0" | 17'- 6" |

Additional bays may be added if special considerations warrant and site conditions will accommodate additional length.

QUAD(N) units are available in 24", 30", or 36" widths from 3 to 12 bays. Unit width, number of bays, and backup type shall be specified elsewhere in the plans.



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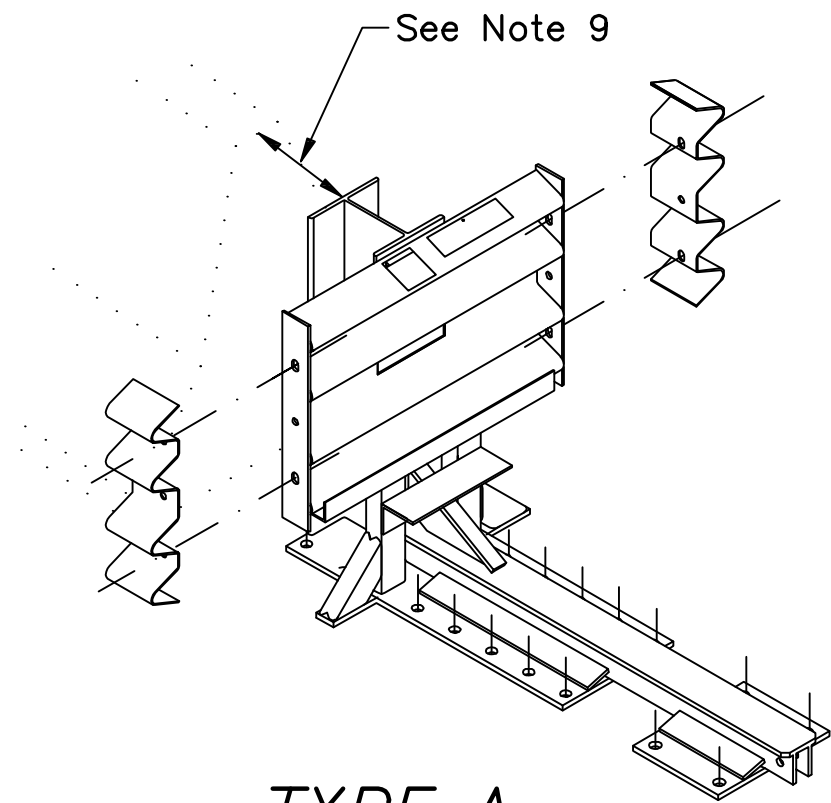
STATE OF HAWAII
DEPARTMENT OF TRANSPORTATION
HIGHWAYS DIVISION

QUADGUARD ATTENUATOR

INTERSTATE ROUTE H-1
PM CONTRAFLOW LANE, PHASE 1 & 2
FEDERAL AID PROJECT NO. NH-HI-1 (260)
Scale: None Date: July, 2016

SHEET No. GRD-11 OF 12 SHEETS

| FED. ROAD DIST. NO. | STATE | FED. AID PROJ. NO. | FISCAL YEAR | SHEET NO. | TOTAL SHEETS |
|---------------------|-------|--------------------|-------------|-----------|--------------|
| HAWAII | HAW. | NH-H1-1 (260) | 2014 | 209 | 605 |



TYPE A
TENSION STRUT BACKUP

TENSION STRUT: Consists of diagonal struts, connections, and accessories, as detailed by the Manufacturer, located at the rear of the QUAD unit. Typical application is for QUAD units attached to double-face quardrail. When used, a 4'-0" x 4'-0" x 3'-0" concrete toe anchor block shall be provided beneath the front portion of the concrete pad, except where the QUAD unit is to be placed on continuously reinforced concrete pavement or bridge deck (7" minimum, 4,000 p.s.i.) or non-reinforced concrete pavement (8" minimum, 4,000 p.s.i.)

| | | | |
|--------------|------|------|----------------|
| QC/QA REVIEW | 100% | DATE | MARCH 23, 2014 |
| BY | | BY | |
| BY | | BY | |
| BY | | BY | |

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



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OR UNDER MY SUPERVISION.

Matthew K. Fujitaka

WILSON OKAMOTO CORPORATION APRIL 30, 2018 LIC. EXP. DATE

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

QUADGUARD ATTENUATOR

*INTERSTATE ROUTE H-1
PM CONTRAFLOW LANE, PHASE 1 & 2
FEDERAL AID PROJECT NO. NH-H1-1 (260)
Scale: None Date: July, 2016*

SHEET No. GRD-12 OF 12 SHEETS