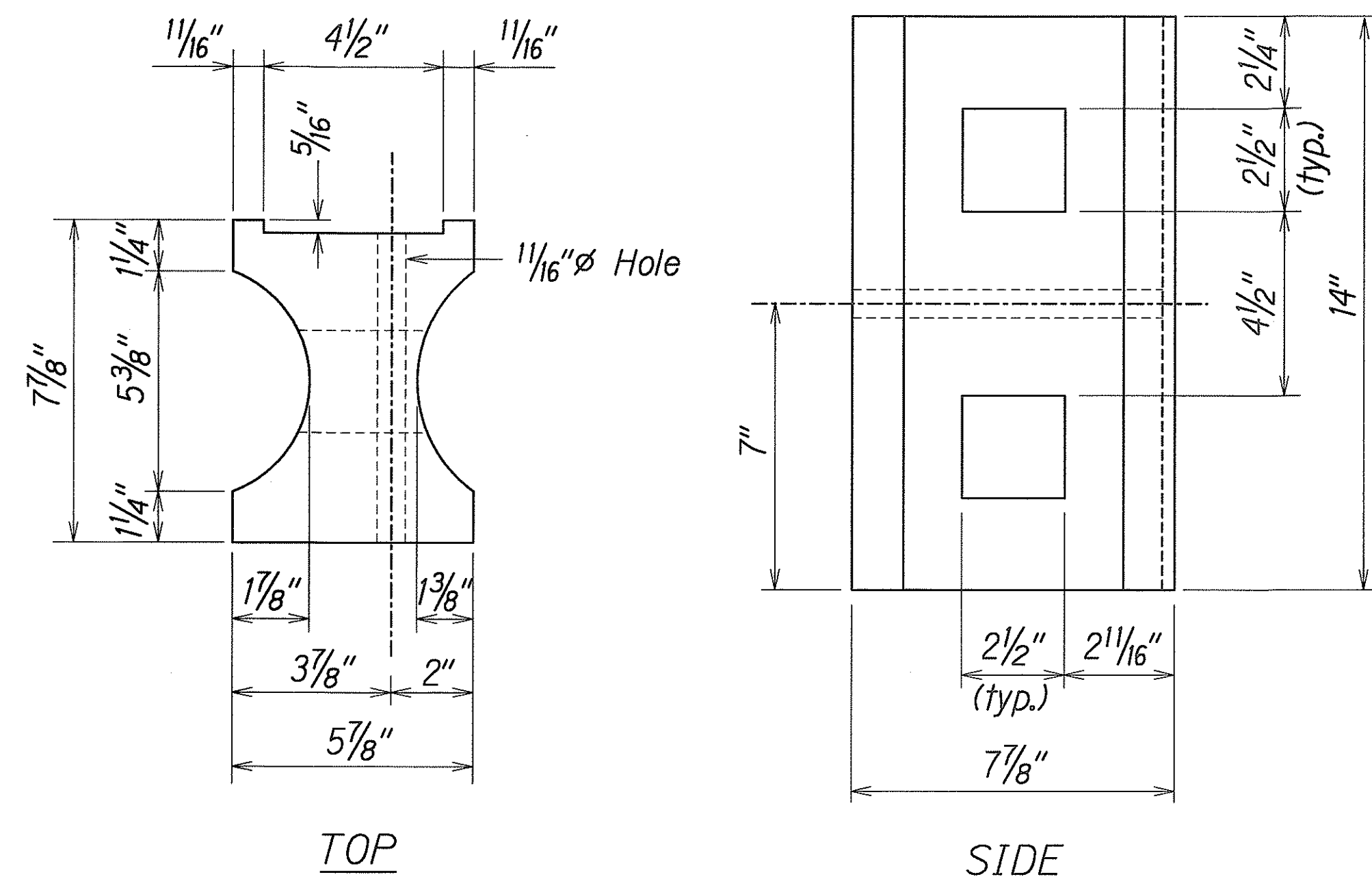
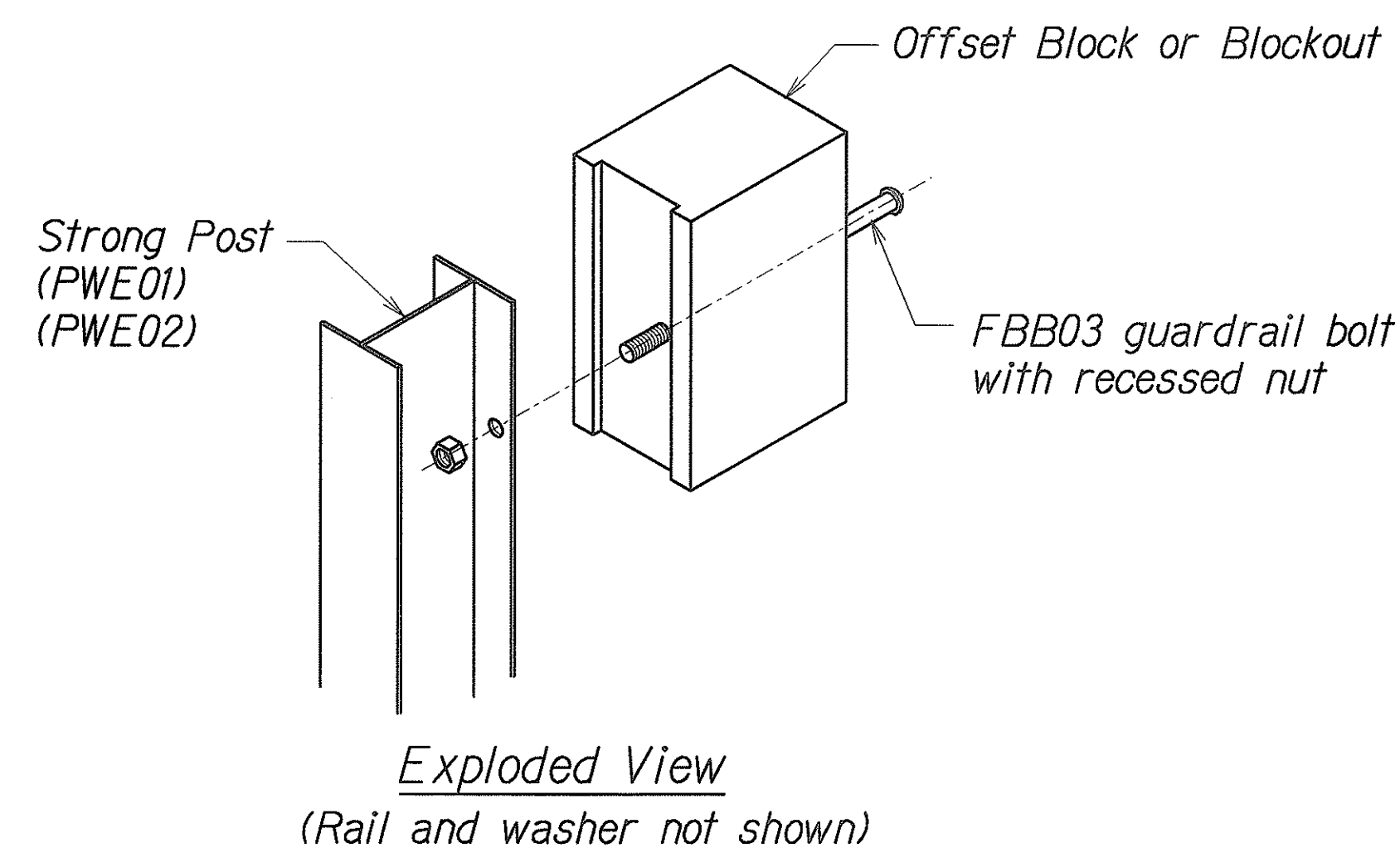


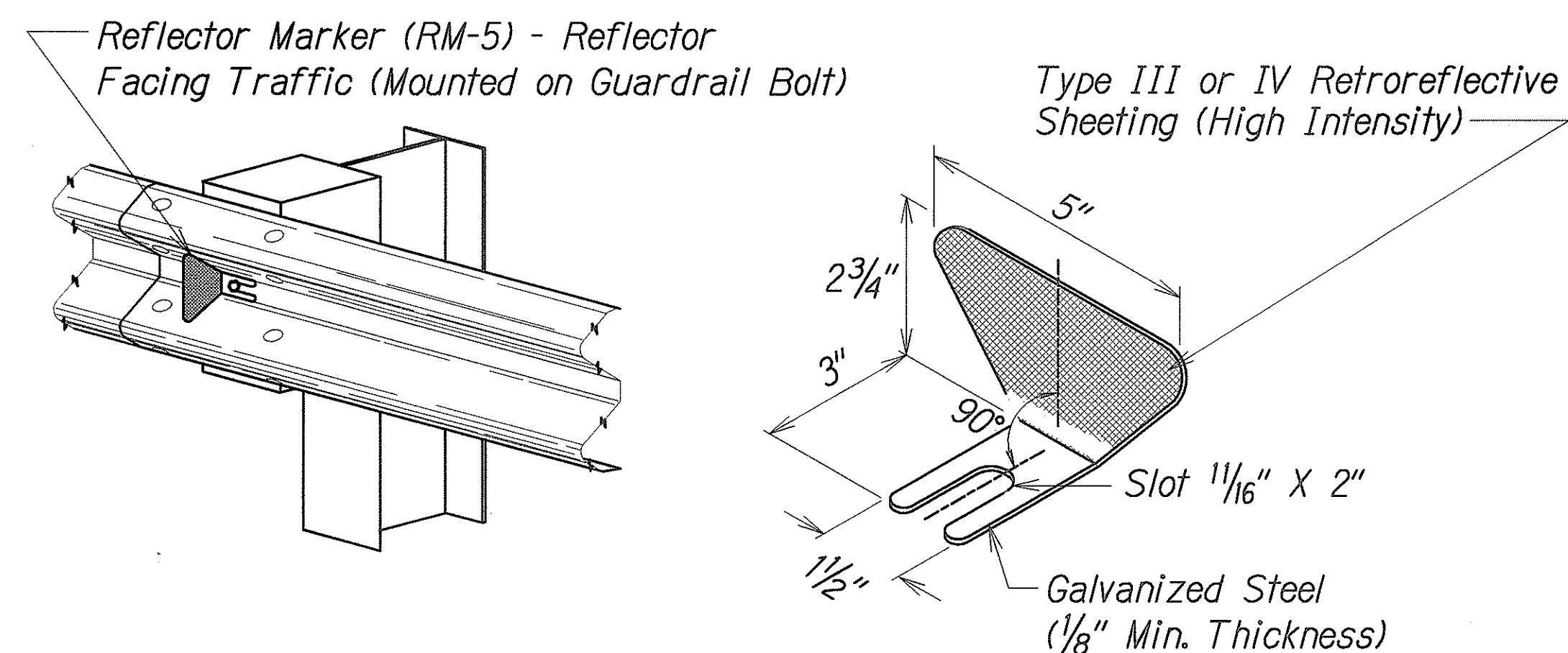
| FED. ROAD DIST. NO. | STATE | PROJ. NO.  | FISCAL YEAR | SHEET NO. | TOTAL SHEETS |
|---------------------|-------|------------|-------------|-----------|--------------|
| HAWAII              | HAW.  | 83F-02-00M | 2004        | 42        | 98           |



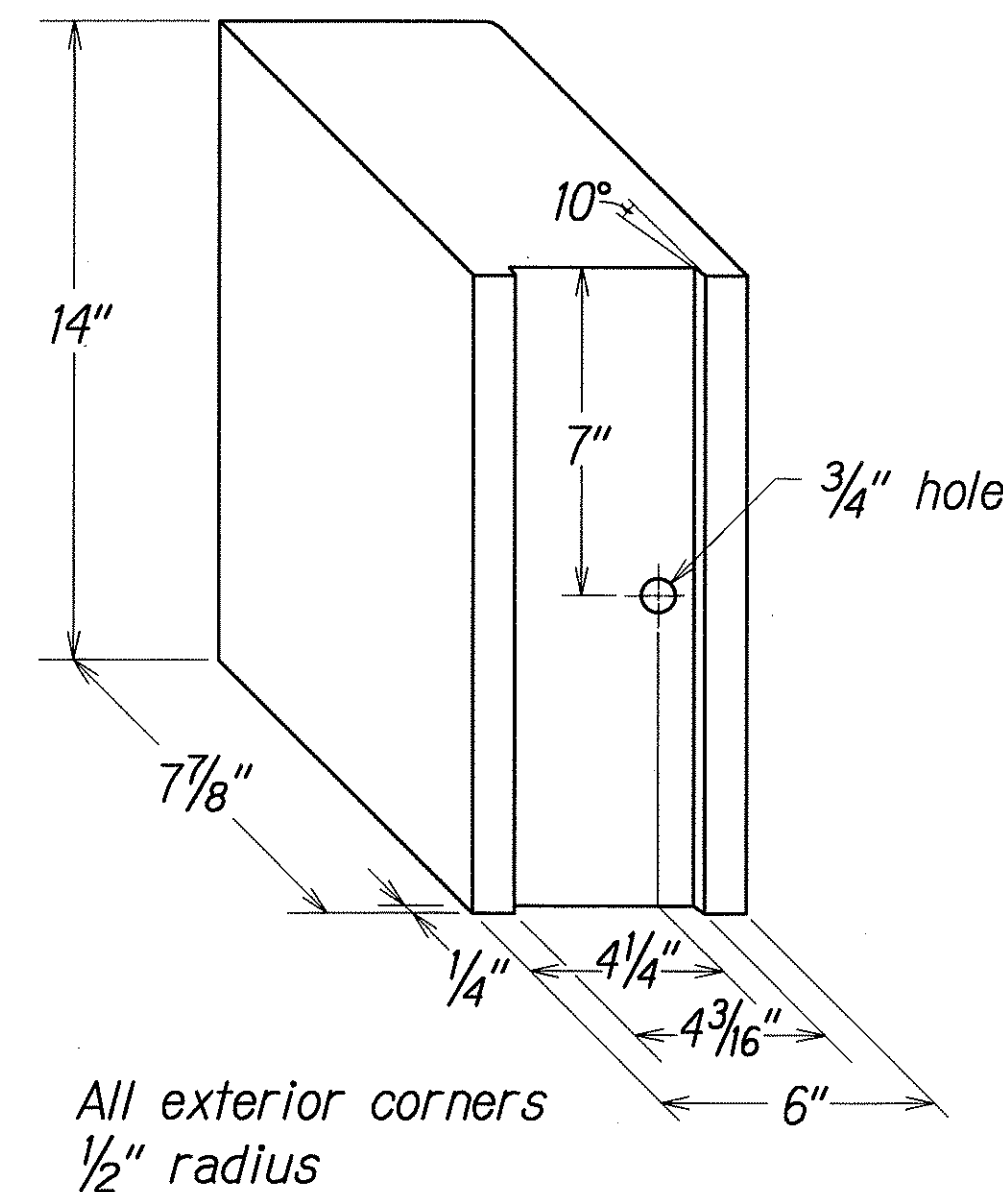
TOP  
SIDE  
RECYCLED PLASTIC BLOCKOUT (TYPE I)



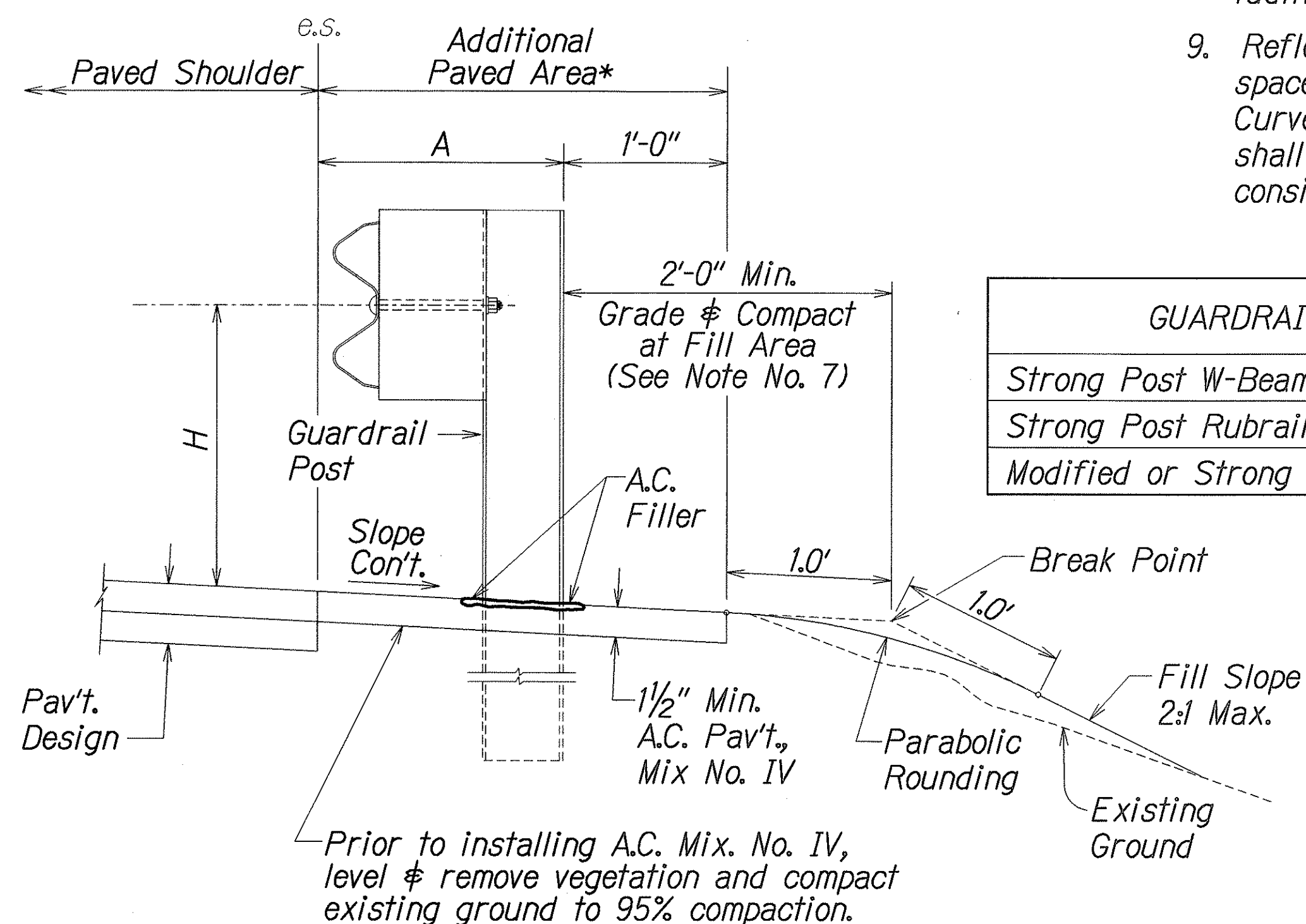
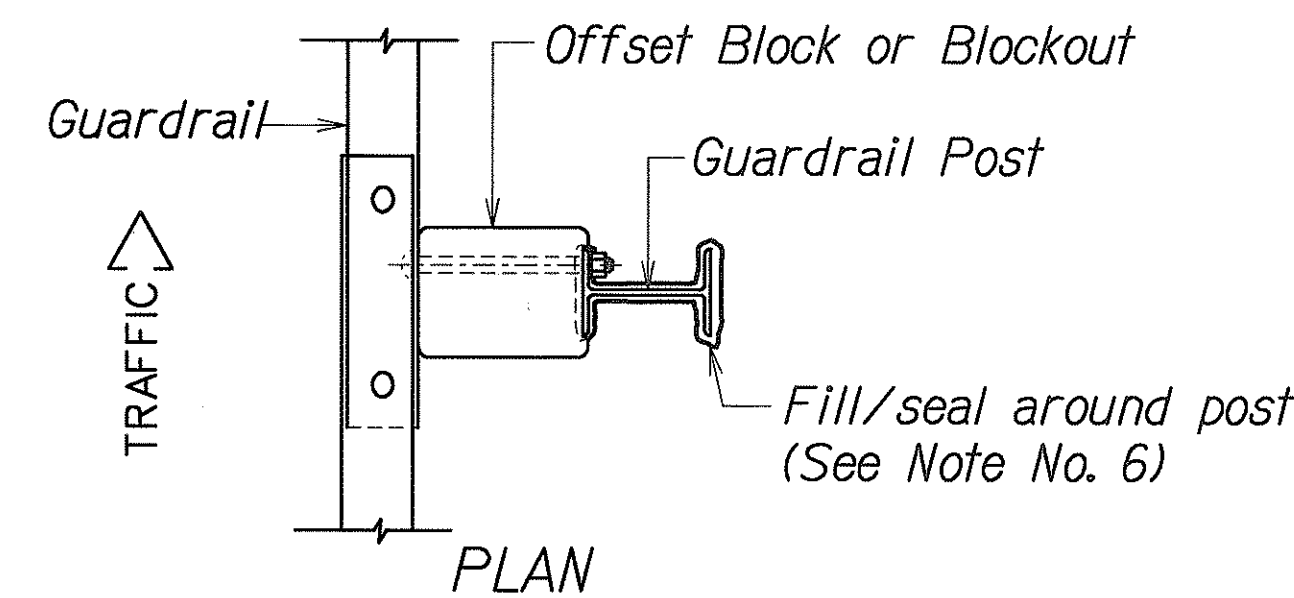
STEEL POST AND BLOCK DETAIL



REFLECTOR MARKER (RM-5) DETAIL AND TYPICAL INSTALLATION



RECYCLED POLYETHYLENE  
OFFSET BLOCK (TYPE II)



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. 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. RM-5's shall be considered incidental to the guardrails.

| 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" |

STATE OF HAWAII  
DEPARTMENT OF TRANSPORTATION  
HIGHWAYS DIVISION

### GUARDRAIL DETAILS & NOTES

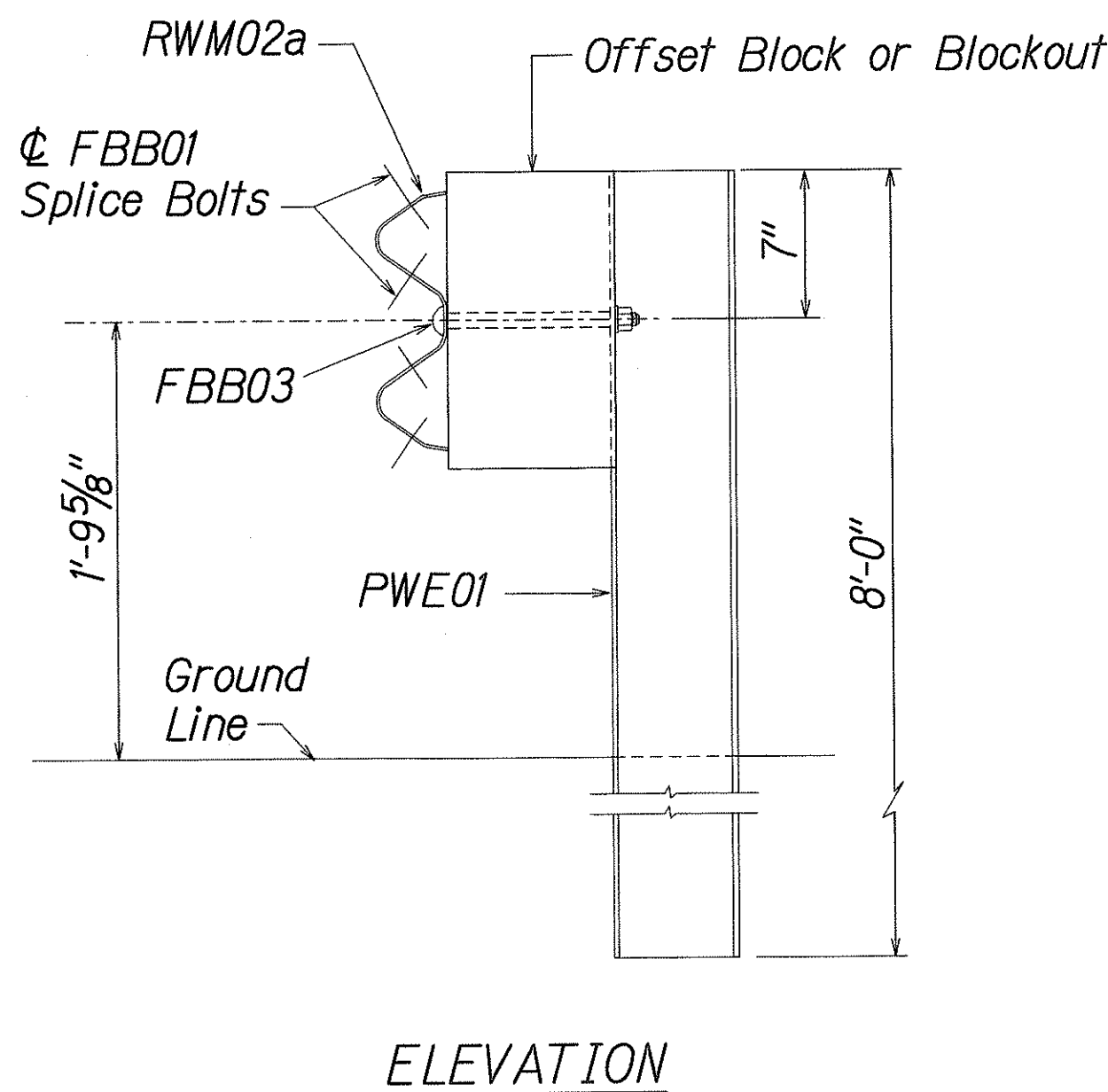
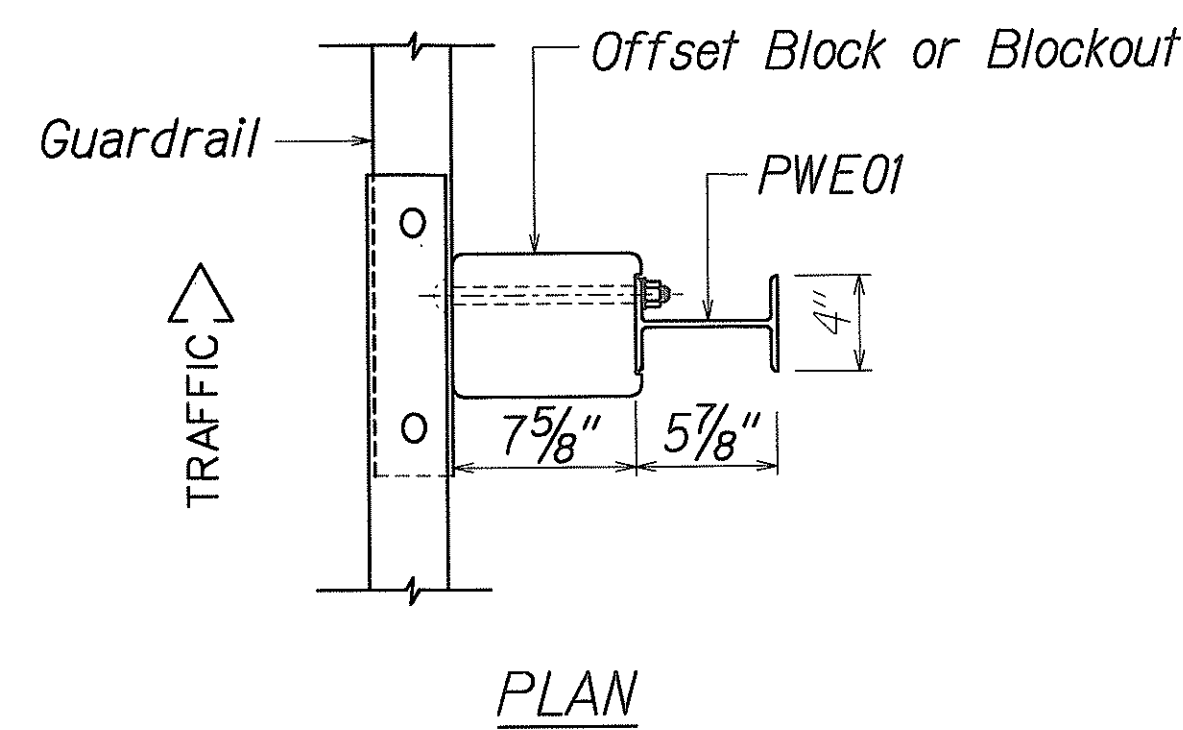
KAHEKILI HIGHWAY LIGHTING IMPROVEMENTS  
Haiku Road to Ahuimanu Place  
Project No. 83F-02-00M

Scale: None Date: Sept. 2002

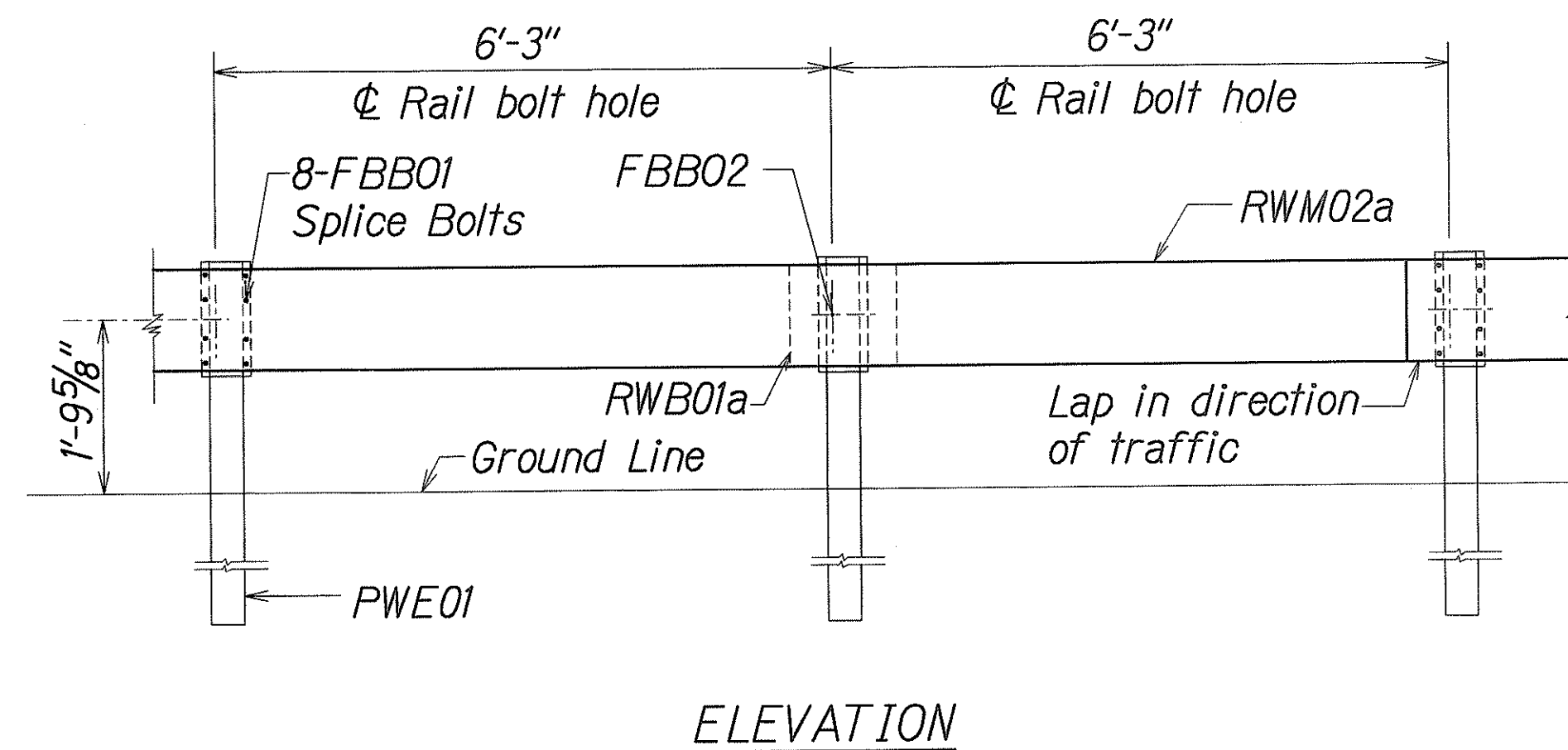
SHEET No. 1 OF 7 SHEETS

|                   |      |
|-------------------|------|
| SURVEY PLOTTED BY | DATE |
| DRAWN BY          |      |
| TRACED BY         |      |
| NOTED BY          |      |
| CHECKED BY        |      |
| APPROVED BY       |      |

18/2/01 tdruby/guardrail/rev0000 (Standard Plan T.E-50 r09/01/00)

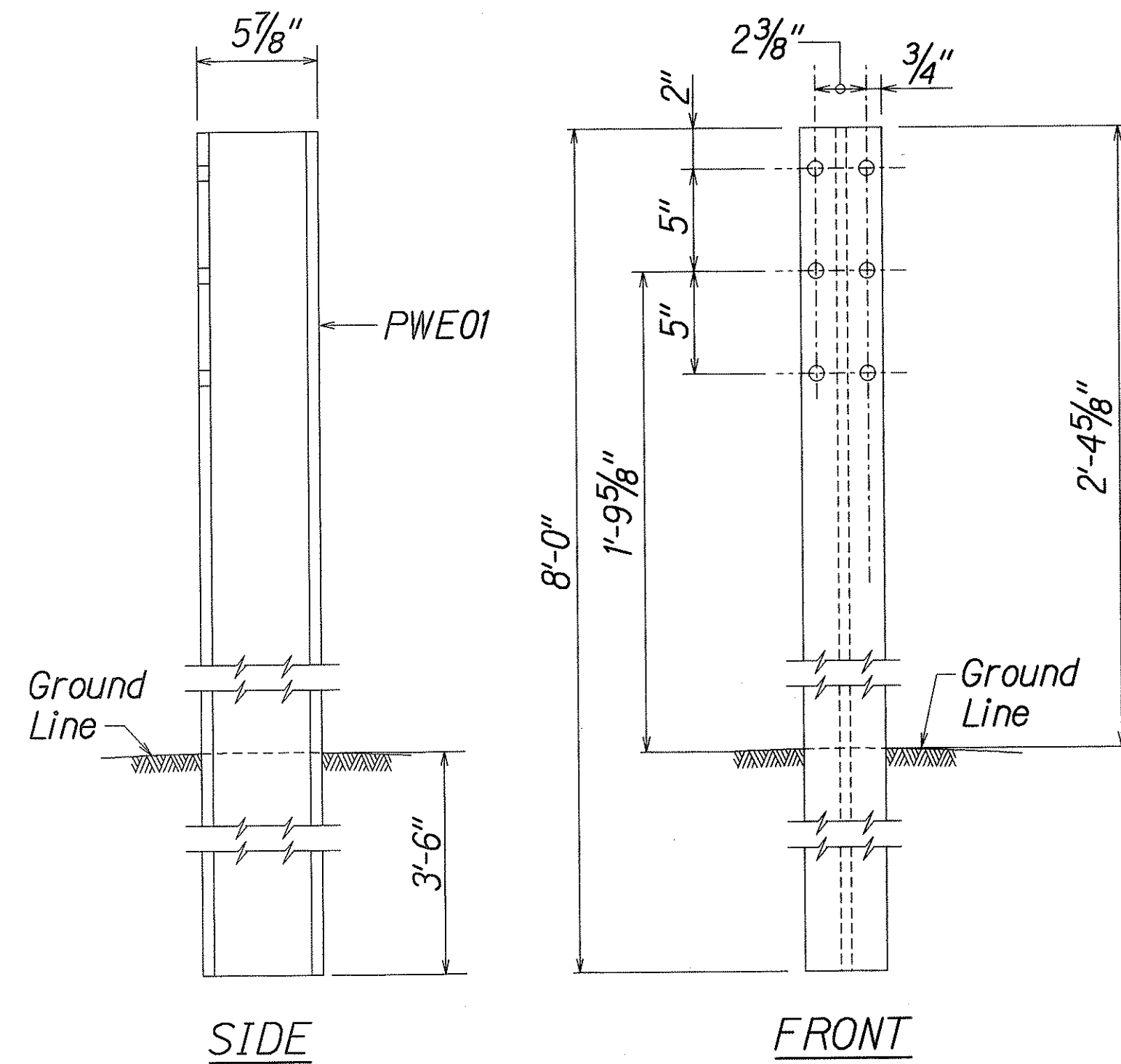


**STRONG POST W-BEAM GUARDRAIL (SGR04a)**

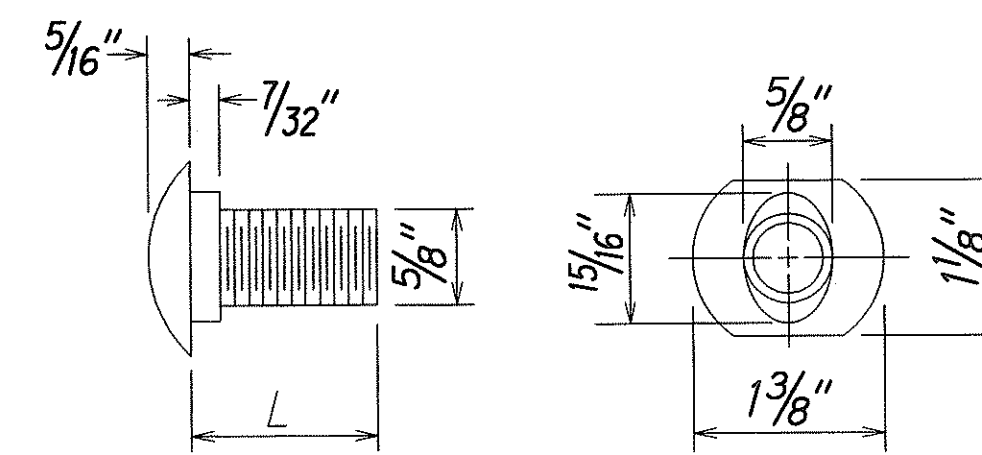


**STRONG POST W-BEAM GUARDRAIL WITH RECYCLED OFFSET BLOCK OR PLASTIC BLOCKOUT**

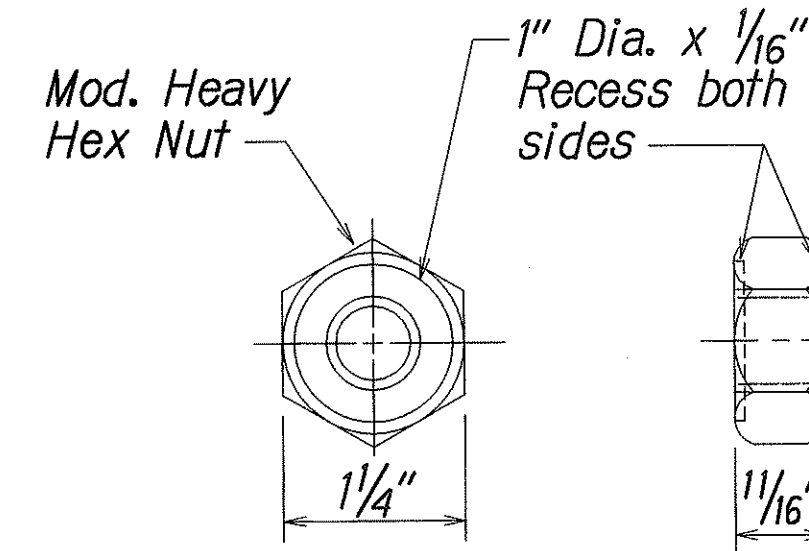
NOTE:  
All Holes are  
3/4" Dia.



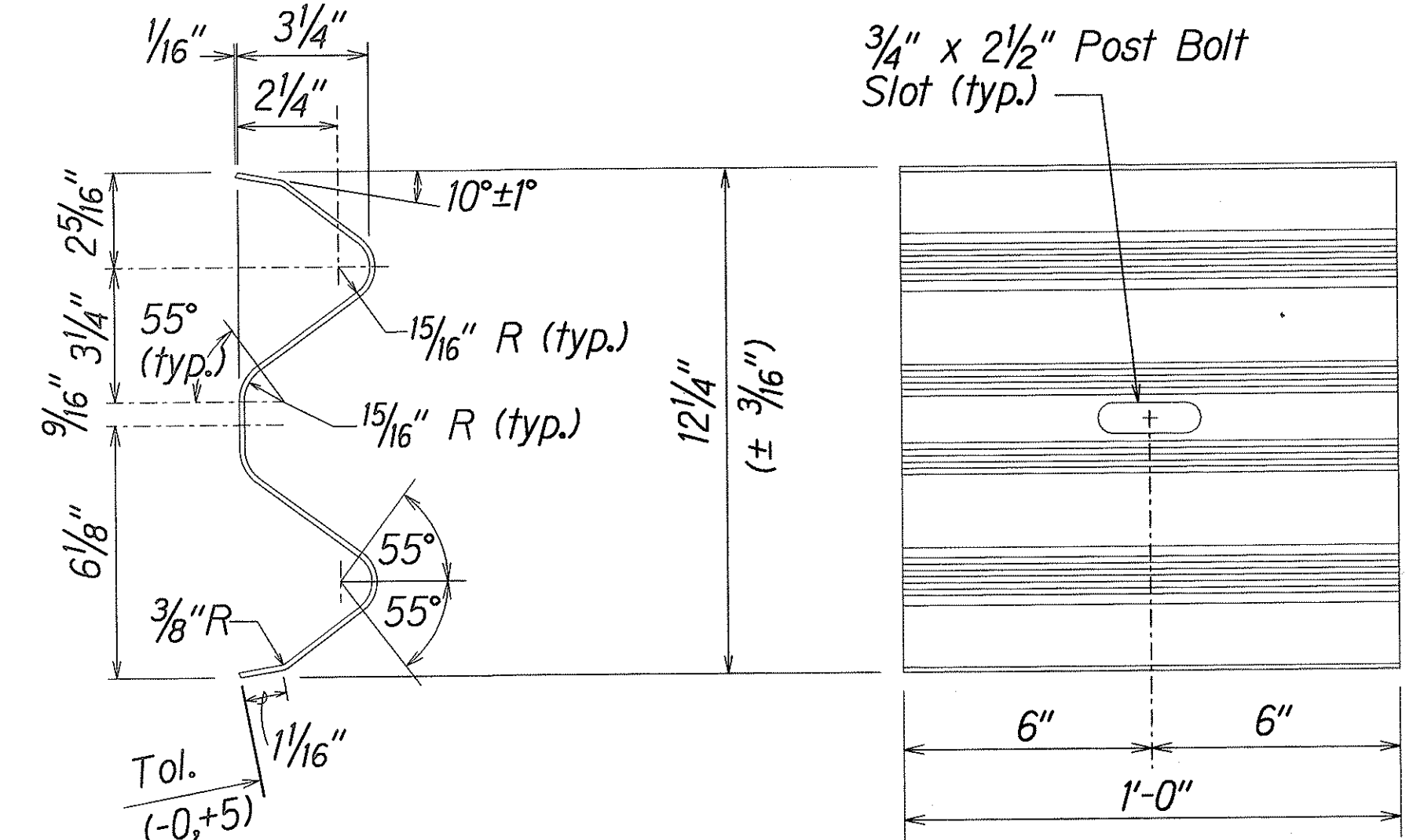
**W-BEAM STRONG POST (PWE01)**



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

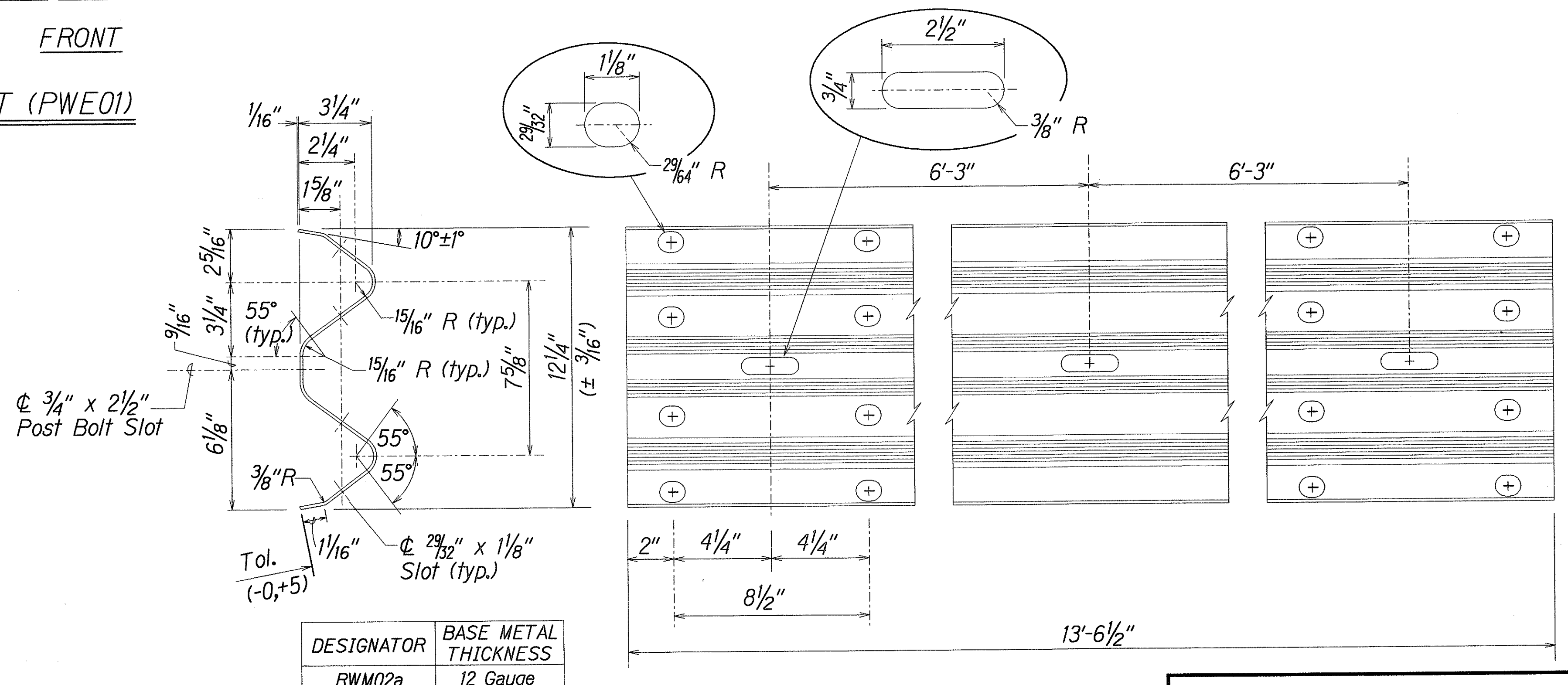


**GUARDRAIL BOLTS AND RECESSED NUT**



| 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)**

STATE OF HAWAII  
DEPARTMENT OF TRANSPORTATION  
HIGHWAYS DIVISION

**STRONG POST W-BEAM GUARDRAIL**

KAHEKILI HIGHWAY LIGHTING IMPROVEMENTS  
Haiku Road to Ahuimanu Place  
Project No. 83F-02-00M

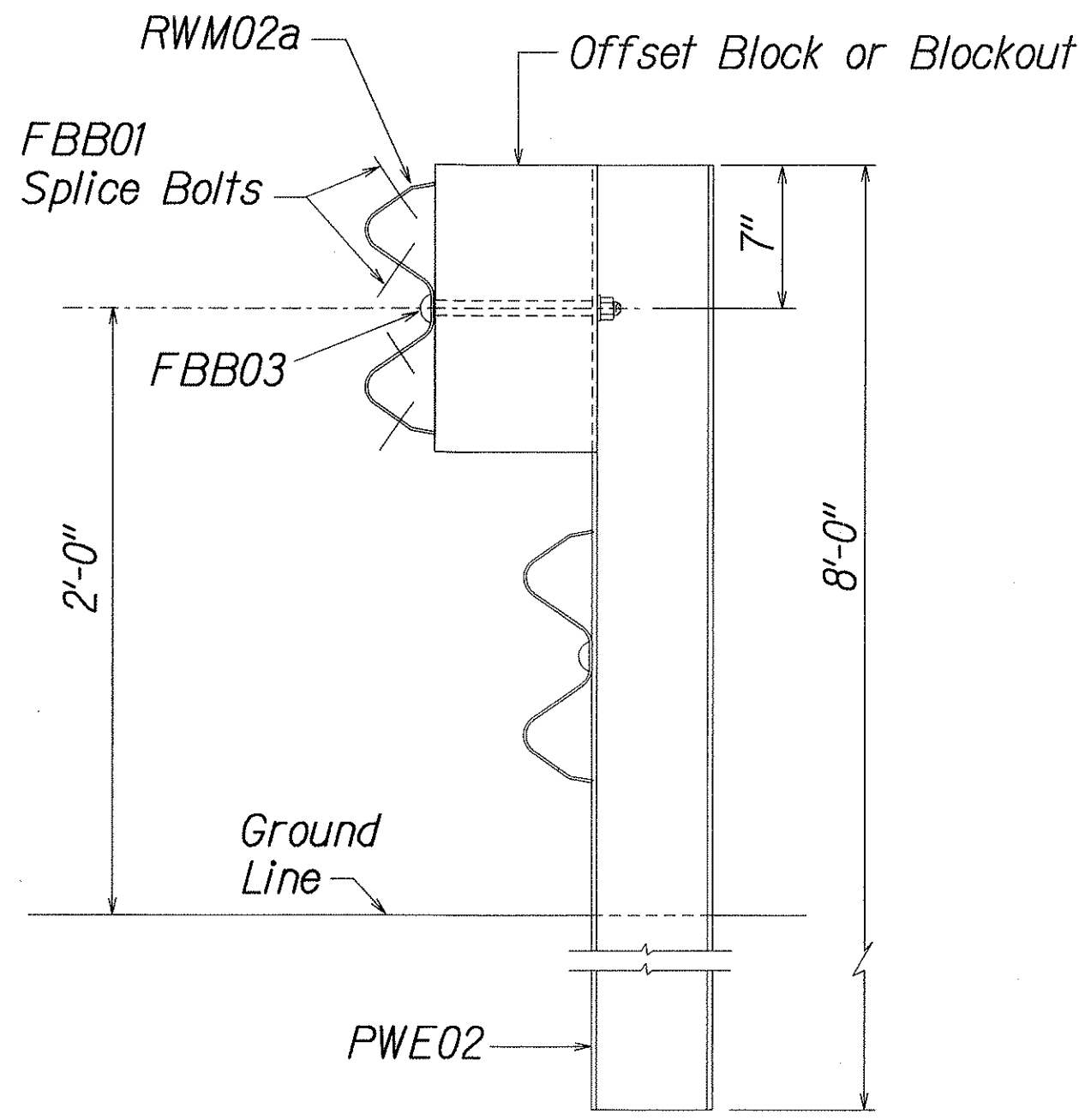
Scale: None Date: Sept. 2002

SHEET No. 2 OF 7 SHEETS

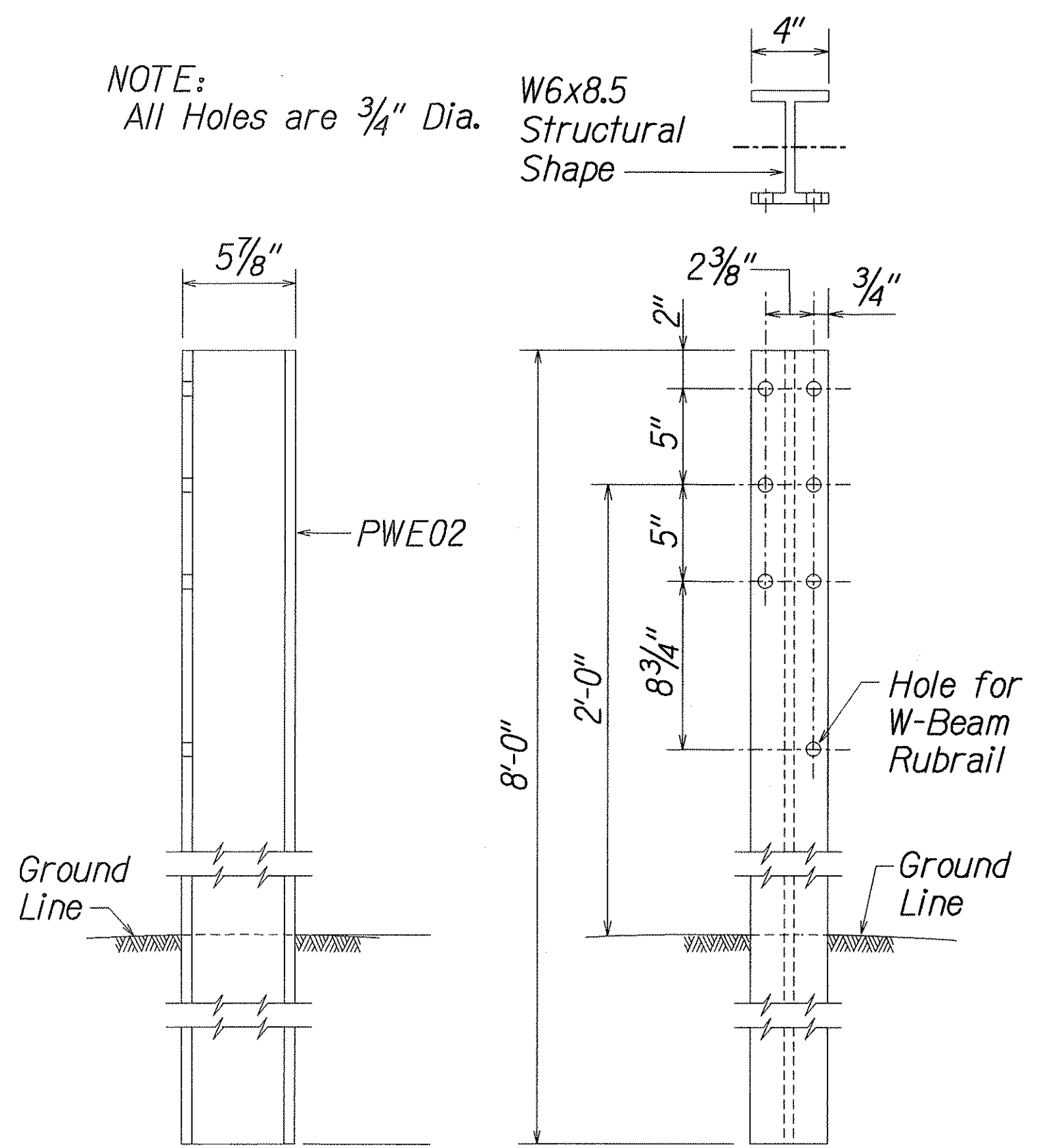
|                   |      |
|-------------------|------|
| ORIGINAL PLAN     | DATE |
| SURVEY PLATTED BY |      |
| DRAWN BY          |      |
| TRACED BY         |      |
| DESIGNED BY       |      |
| CHECKED BY        |      |
| NOTED BY          |      |
| QUANTITIES BY     |      |
| CHECKED BY        |      |

16/13/01 1drcub/guardrail/wbeamsdgn (Standard Plan TE-50-103.06/87)

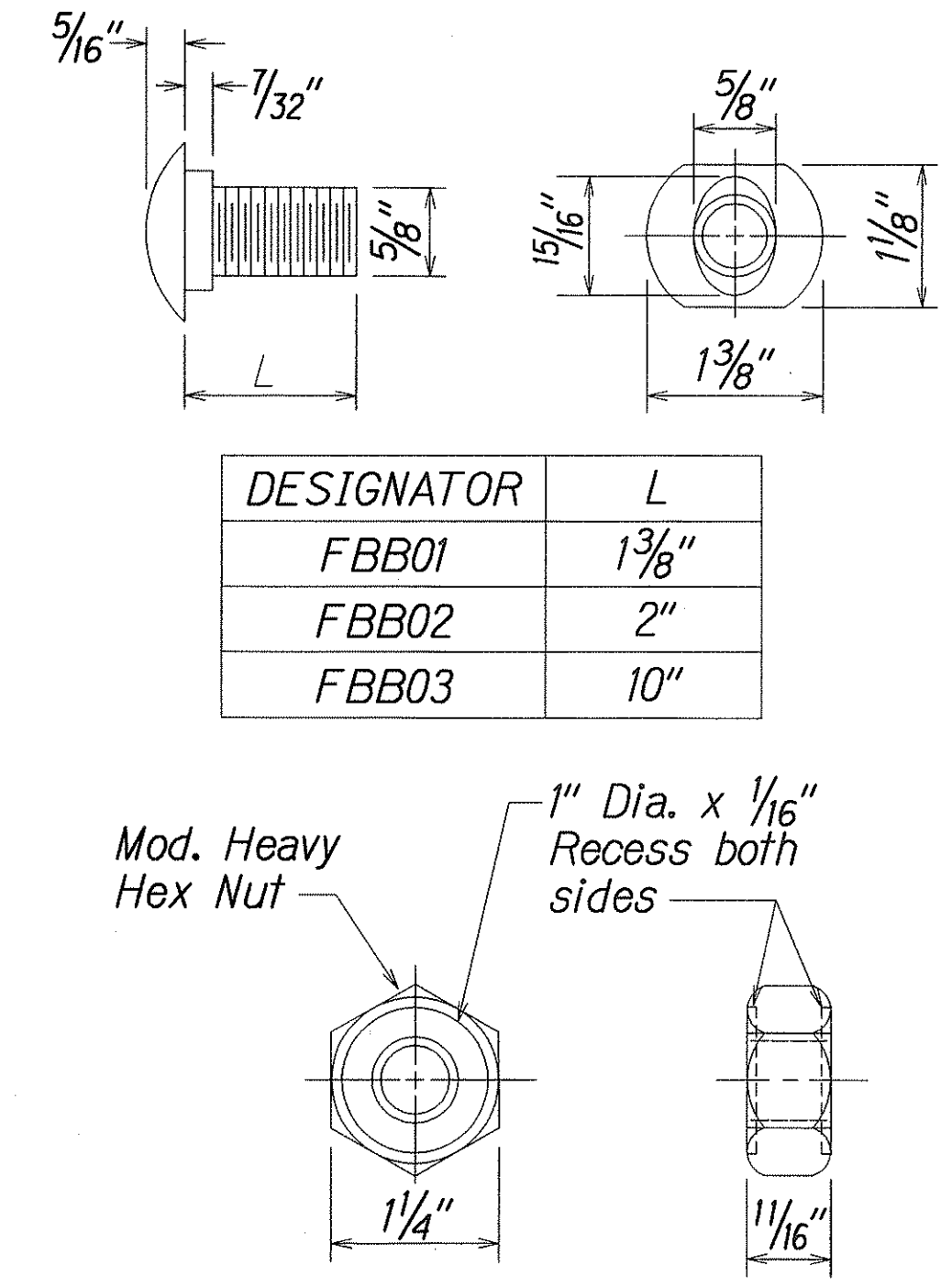
| FED. ROAD DIST. NO. | STATE | PROJ. NO.  | FISCAL YEAR | SHEET NO. | TOTAL SHEETS |
|---------------------|-------|------------|-------------|-----------|--------------|
| HAWAII              | HAW.  | 83F-02-00M | 2004        | 44        | 98           |



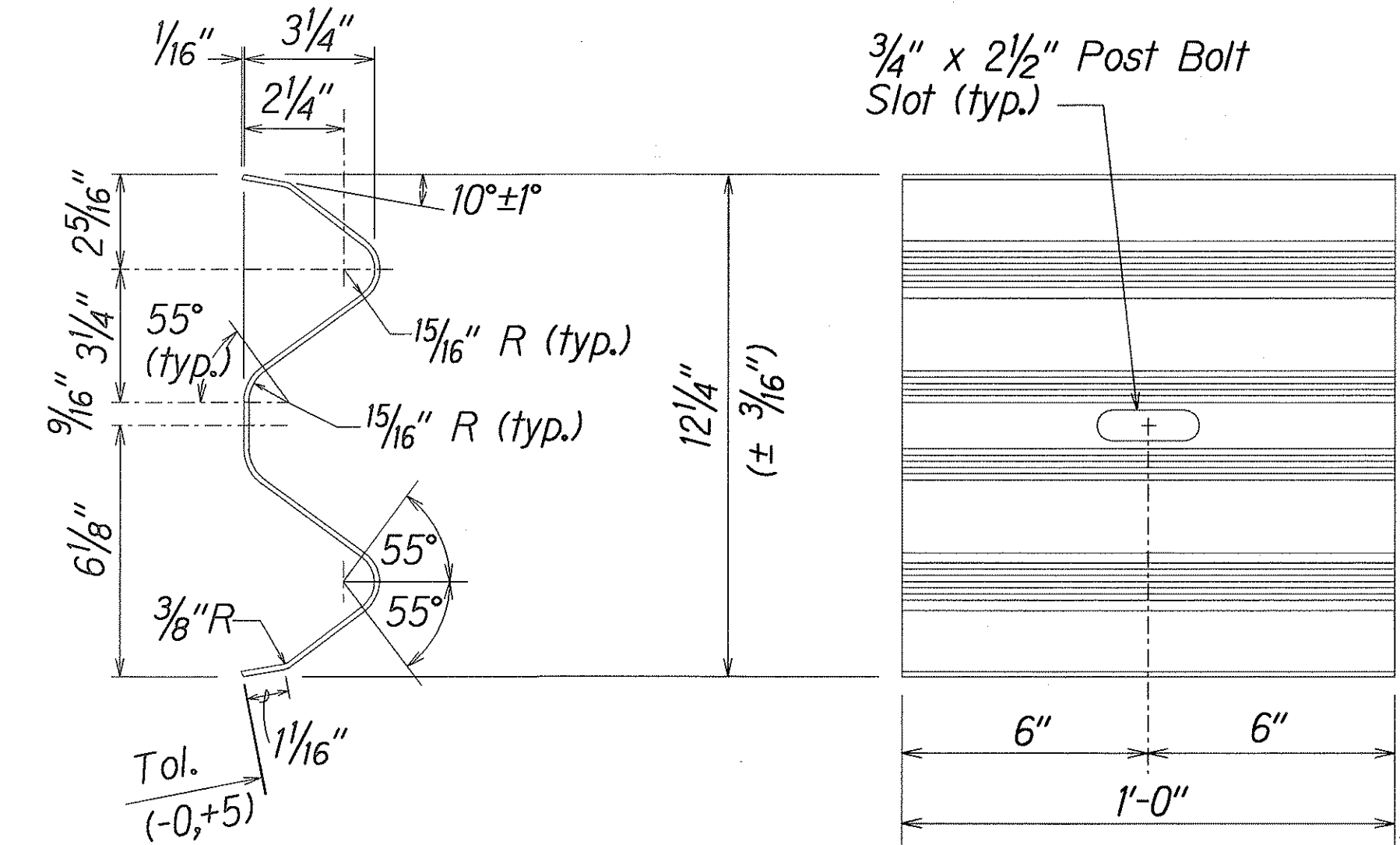
**ELEVATION**  
**STRONG POST RUBRAIL**  
**(W-BEAM) GUARDRAIL**



**SIDE**  
**FRONT**  
**W-BEAM STRONG POST (PWE02)**

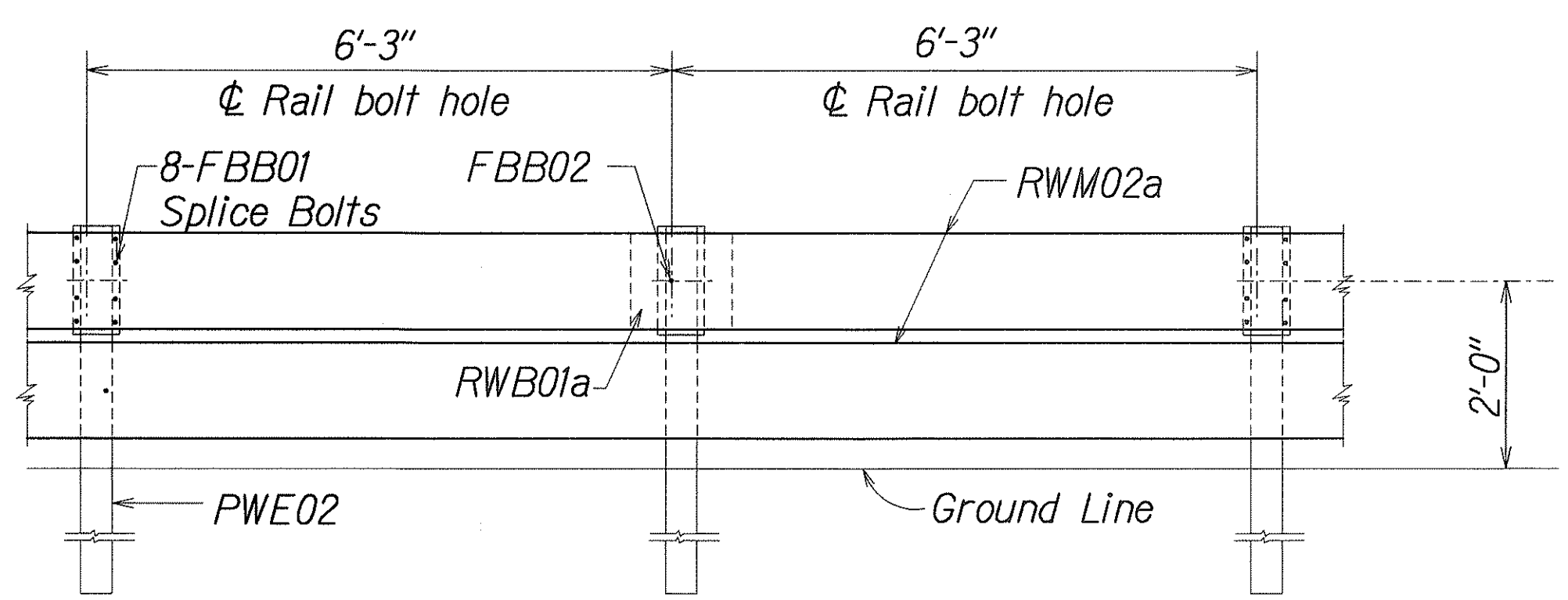


**GUARDRAIL BOLTS AND**  
**RECESSED NUT**

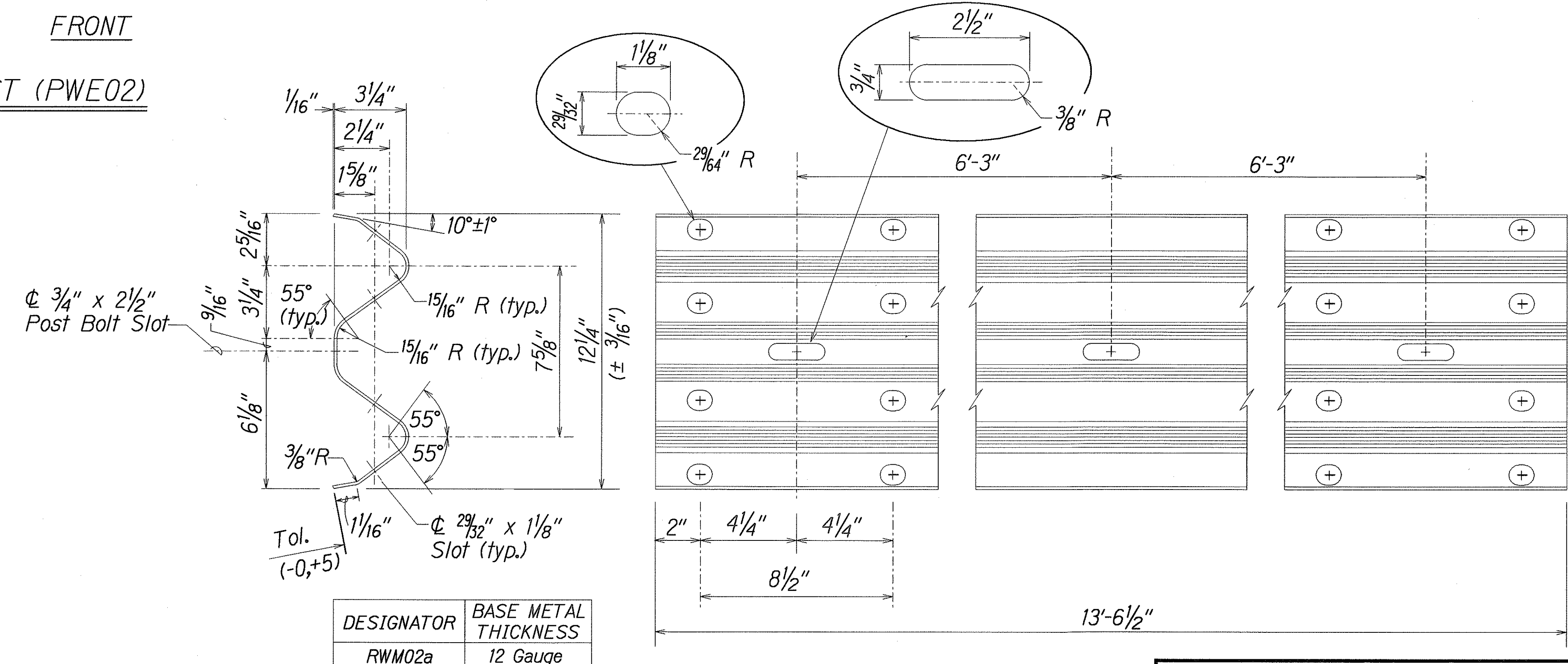


| DESIGNATOR | BASE METAL THICKNESS |
|------------|----------------------|
| RWB01a     | 12 Gauge             |

**W-BEAM BACK-UP-PLATE (RWB01a)**

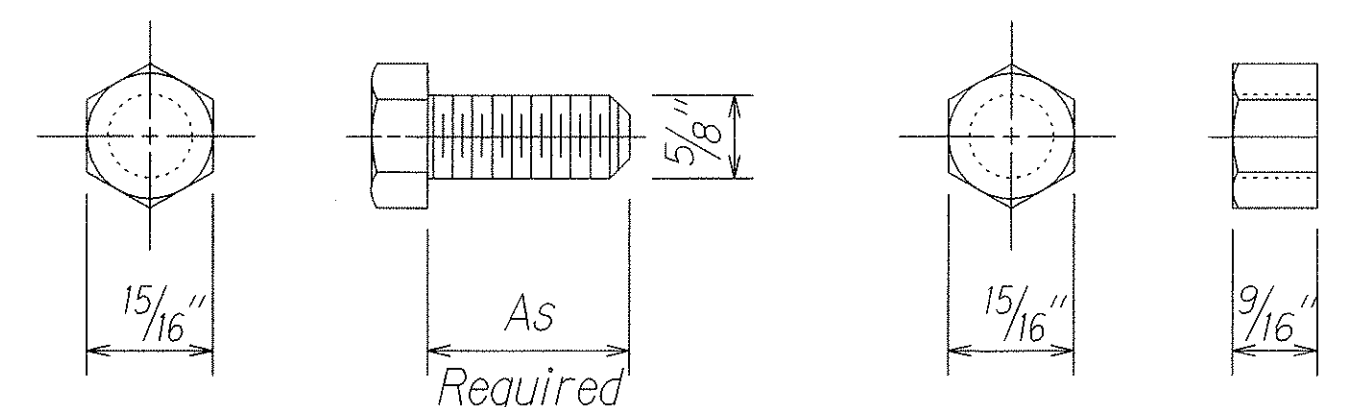


**ELEVATION**  
**STRONG POST RUBRAIL (W-BEAM) GUARDRAIL WITH**  
**RECYCLED OFFSET BLOCK OR PLASTIC BLOCKOUT**



| DESIGNATOR | BASE METAL THICKNESS |
|------------|----------------------|
| RWM02a     | 12 Gauge             |

**2 SPACE W-BEAM GUARDRAIL (RWM02a)**



**HEX BOLT & NUT (FBX16a)**

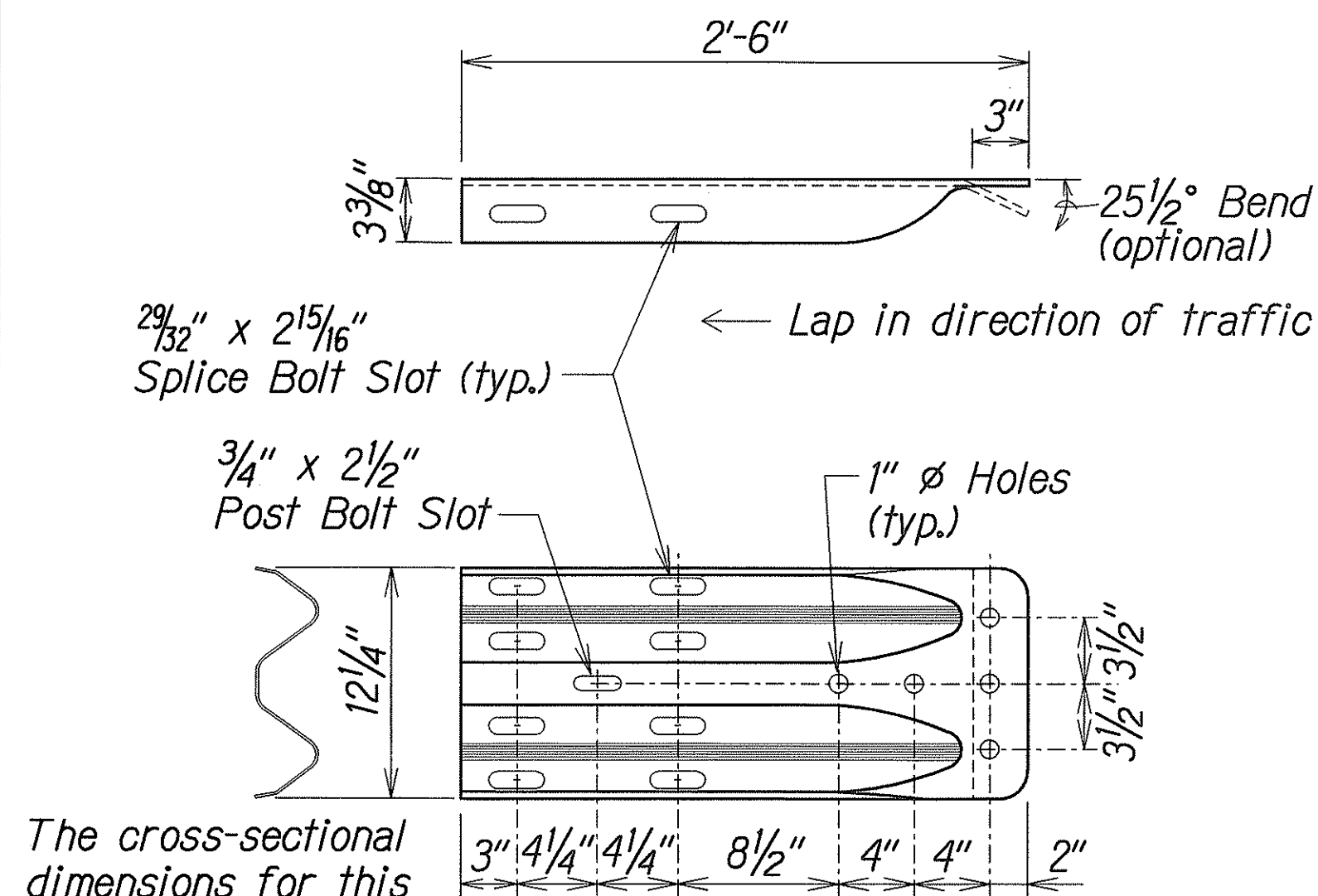
STATE OF HAWAII  
DEPARTMENT OF TRANSPORTATION  
HIGHWAYS DIVISION

**STRONG POST RUBRAIL**  
**(W-BEAM) GUARDRAIL**  
  
KAHEKILI HIGHWAY LIGHTING IMPROVEMENTS  
Haiku Road to Ahuimanu Place  
Project No. 83F-02-00M  
Scale: None Date: Sept. 2002

|                   |      |
|-------------------|------|
| SURVEY PLOTTED BY | DATE |
| DRAWN BY          |      |
| TRACED BY         |      |
| NOTED BY          |      |
| CHECKED BY        |      |
| APPROVED BY       |      |
| ORIGINAL PLAN     |      |
| NOTE BOOK         |      |
| FILE NO.          |      |

16/13/01 tdruby/guardrail/rubrail.dgn (standard plan TE-52 rll/03/89)

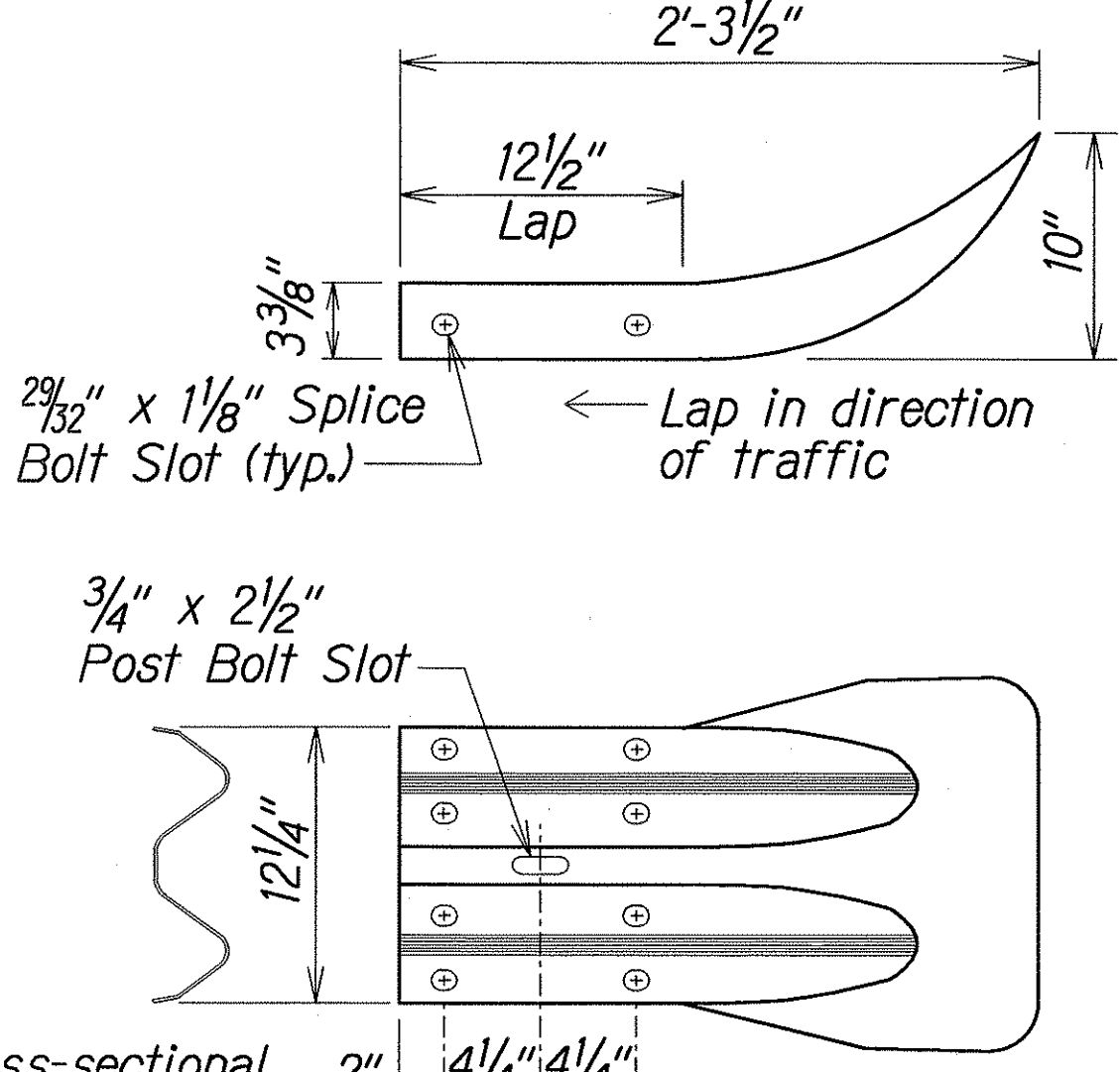
| FED. ROAD DIST. NO. | STATE | PROJ. NO.  | FISCAL YEAR | SHEET NO. | TOTAL SHEETS |
|---------------------|-------|------------|-------------|-----------|--------------|
| HAWAII              | HAW.  | 83F-02-00M | 2004        | 45        | 98           |



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

| DESIGNATOR | BASE METAL THICKNESS |
|------------|----------------------|
| RWE02b     | 10 Gauge             |

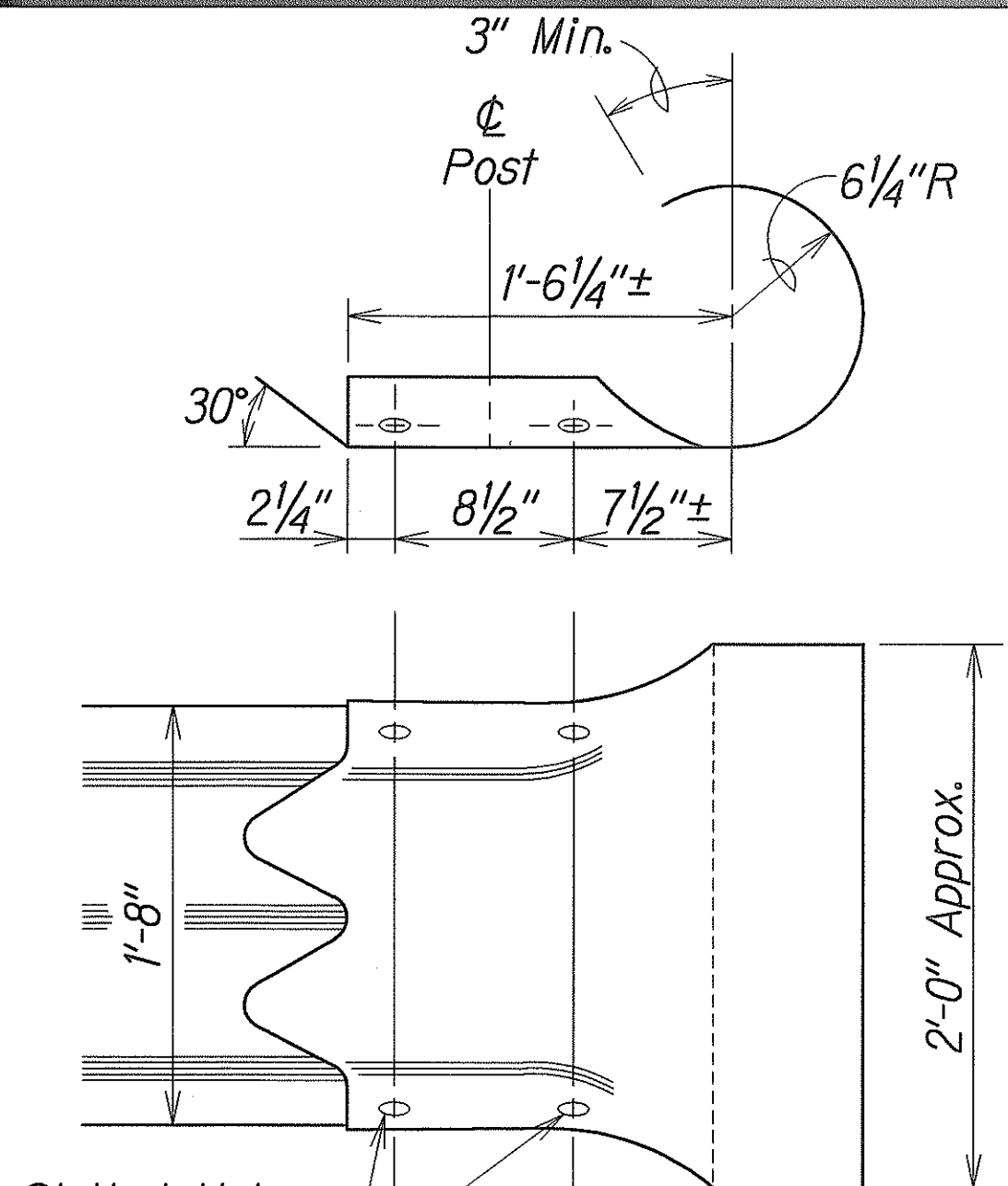
**W-BEAM TERMINAL CONNECTOR (RWE02b)**



The cross-sectional dimensions for this 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             |

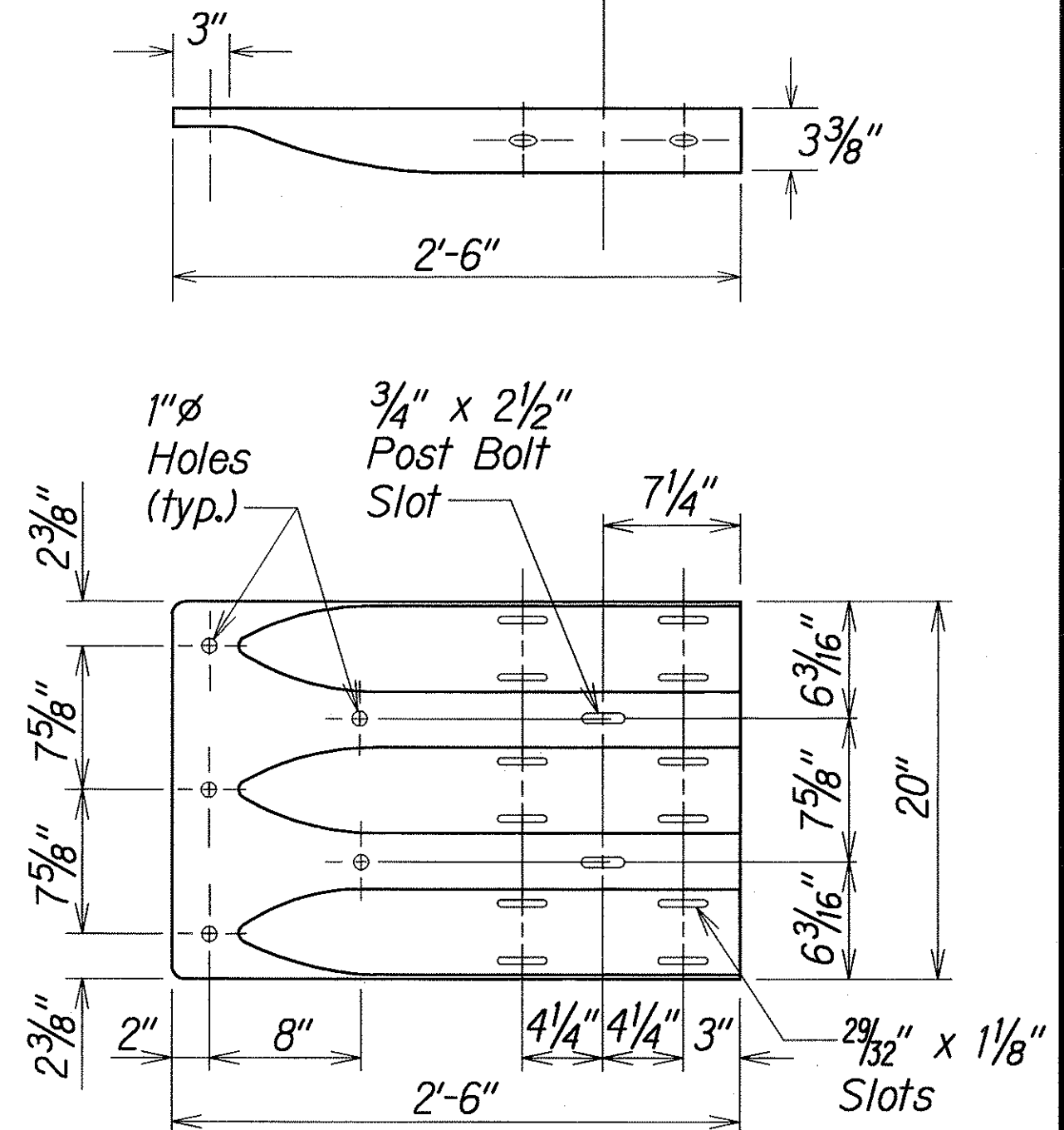
**W-BEAM END SECTION (FLARED RWE01a)**



Slotted Holes 29/32" x 1 1/8"

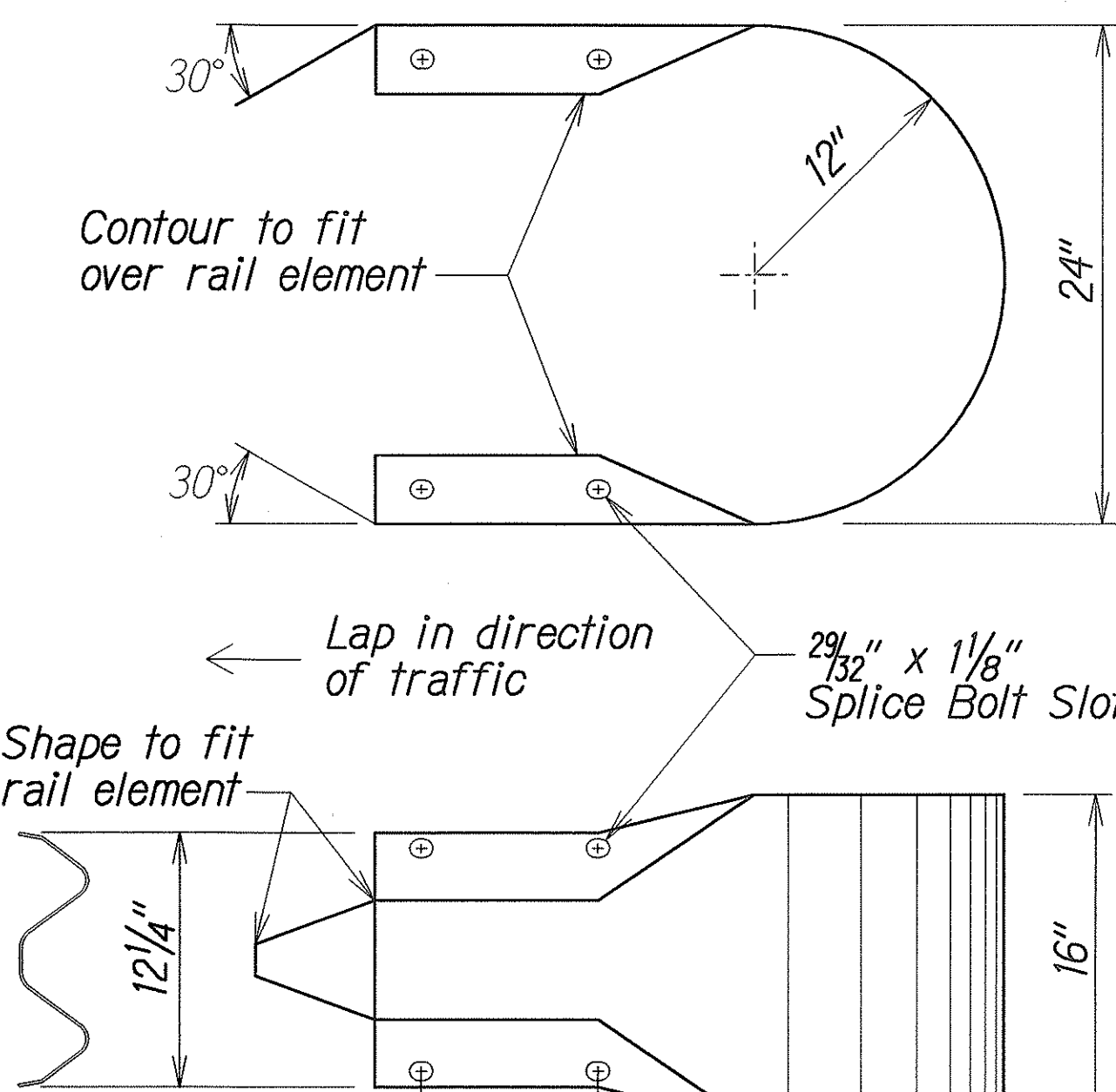
| DESIGNATOR | BASE METAL THICKNESS |
|------------|----------------------|
| RTE02b     | 10 Gauge             |

**THRIE-BEAM SECTION (ROUNDED) (RTE02b)**



| DESIGNATOR | BASE METAL THICKNESS |
|------------|----------------------|
| RTE01b     | 10 Gauge             |

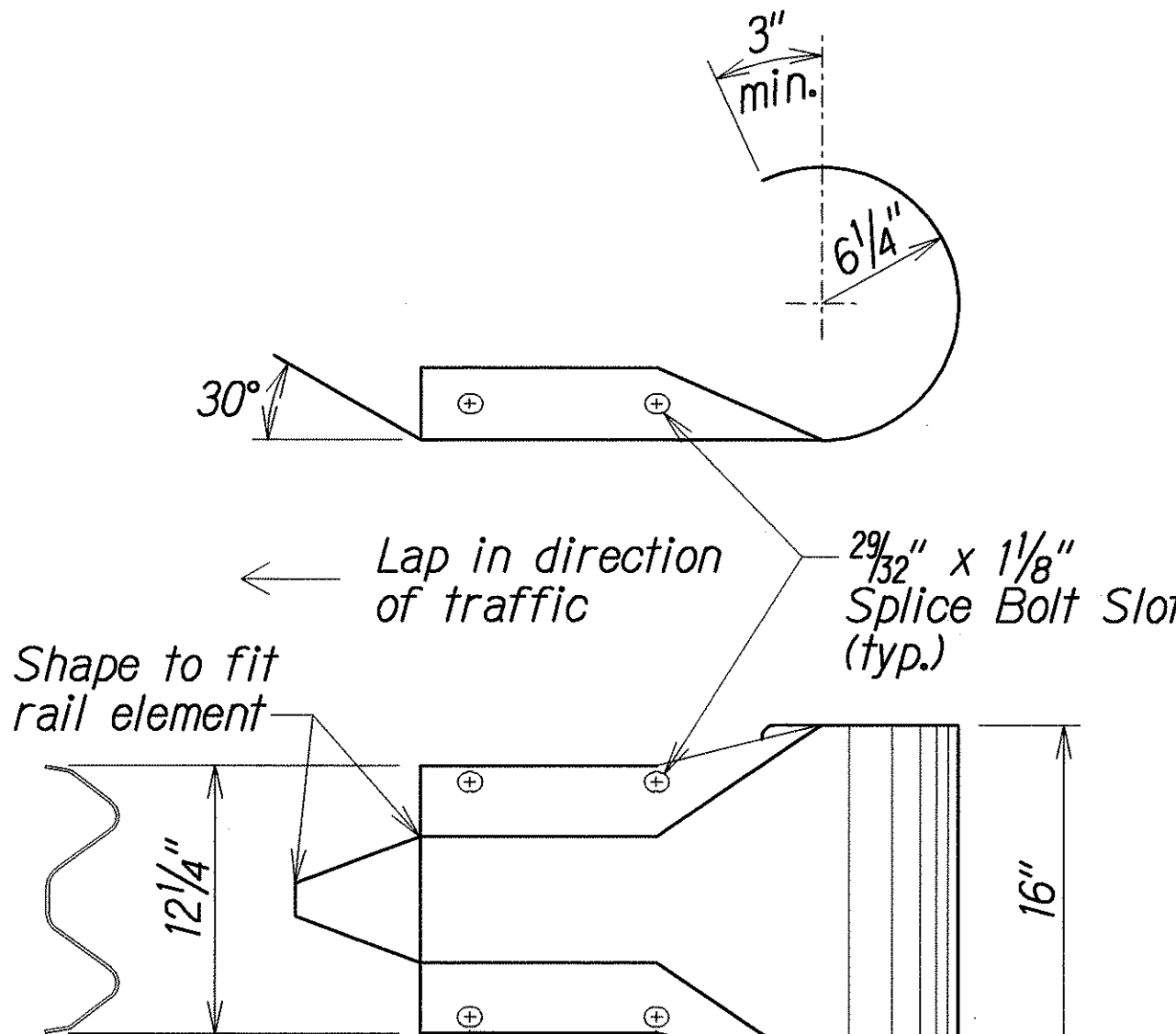
**THRIE-BEAM TERMINAL CONNECTOR (RTE01b)**



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

| DESIGNATOR | BASE METAL THICKNESS |
|------------|----------------------|
| RWE06a     | 12 Gauge             |

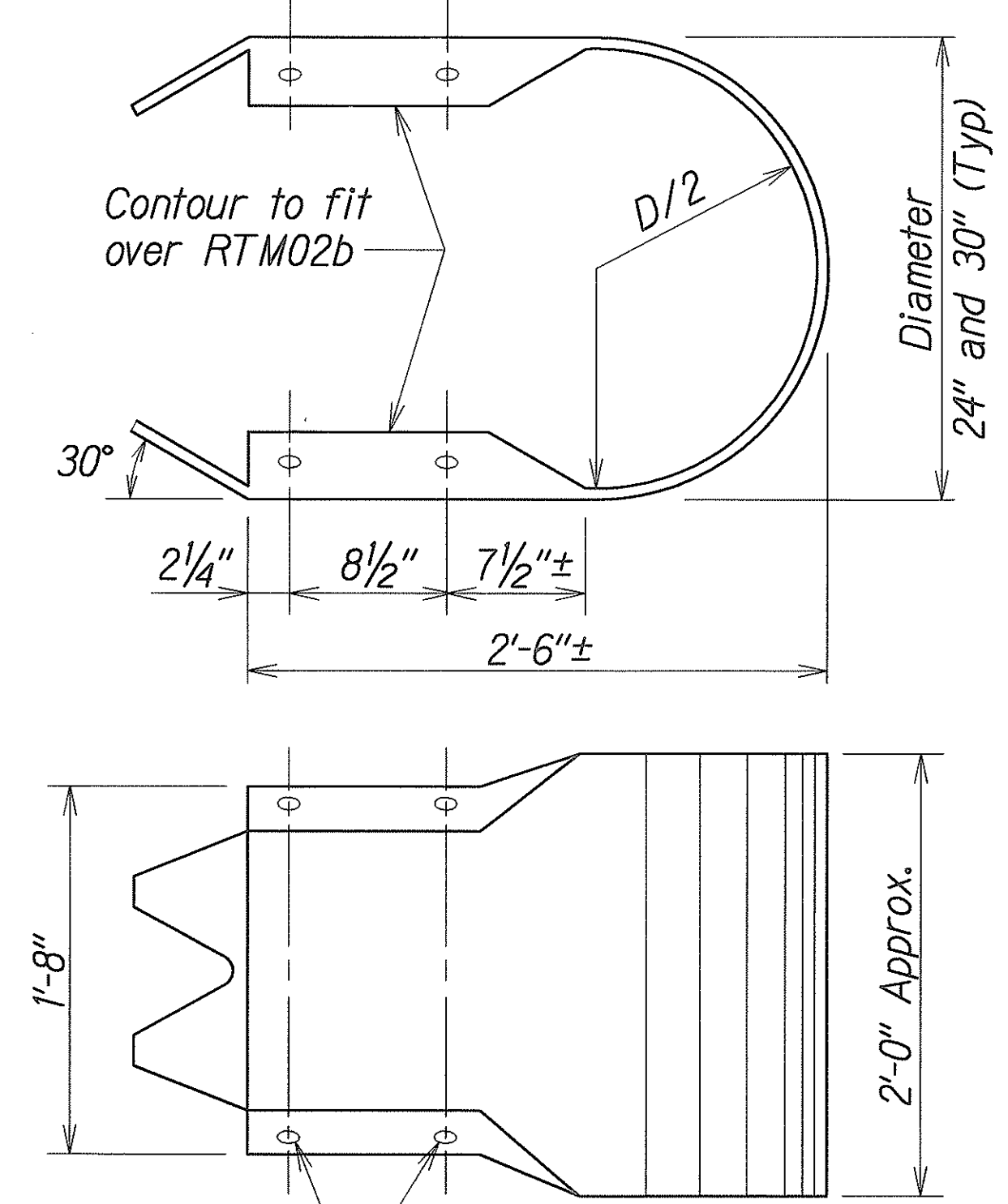
**W-BEAM END SECTION (BUFFER RWE06a)**



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

| DESIGNATOR | BASE METAL THICKNESS |
|------------|----------------------|
| RWE03a     | 12 Gauge             |

**W-BEAM END SECTION (ROUNDED RWE03a)**



Slotted Holes 29/32" x 1 1/8"

| DESIGNATOR      | BASE METAL THICKNESS |
|-----------------|----------------------|
| RTE03b & RTE04b | 10 Gauge             |

**THRIE-BEAM END SECTION (BUFFER RTE03b or RTE04b)**

STATE OF HAWAII  
DEPARTMENT OF TRANSPORTATION  
HIGHWAYS DIVISION

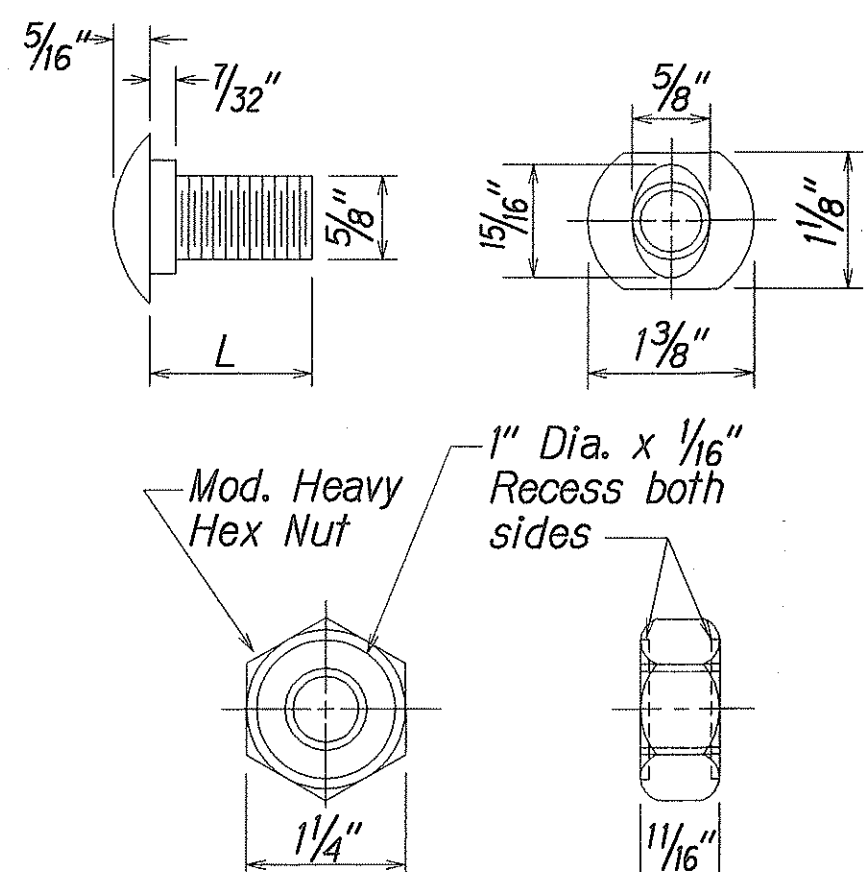
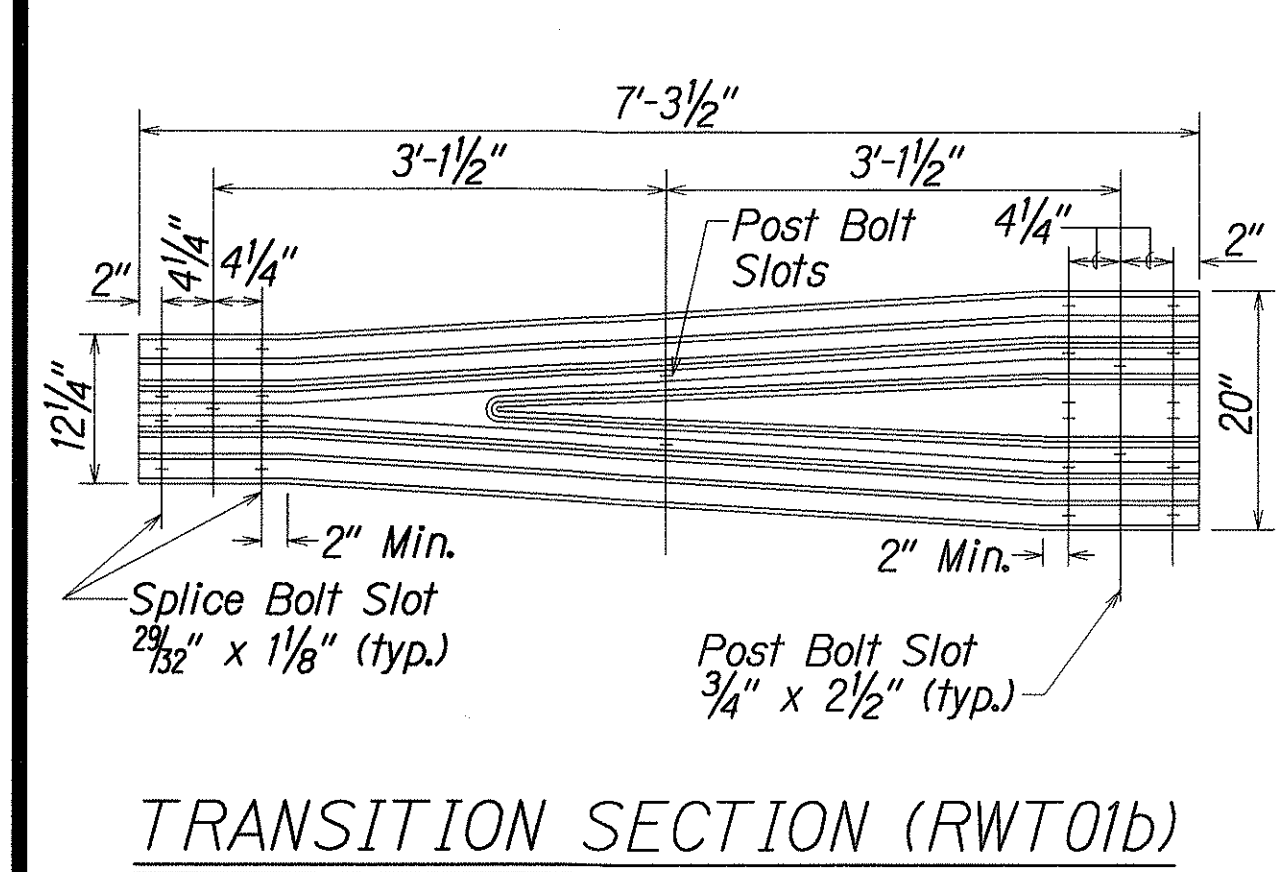
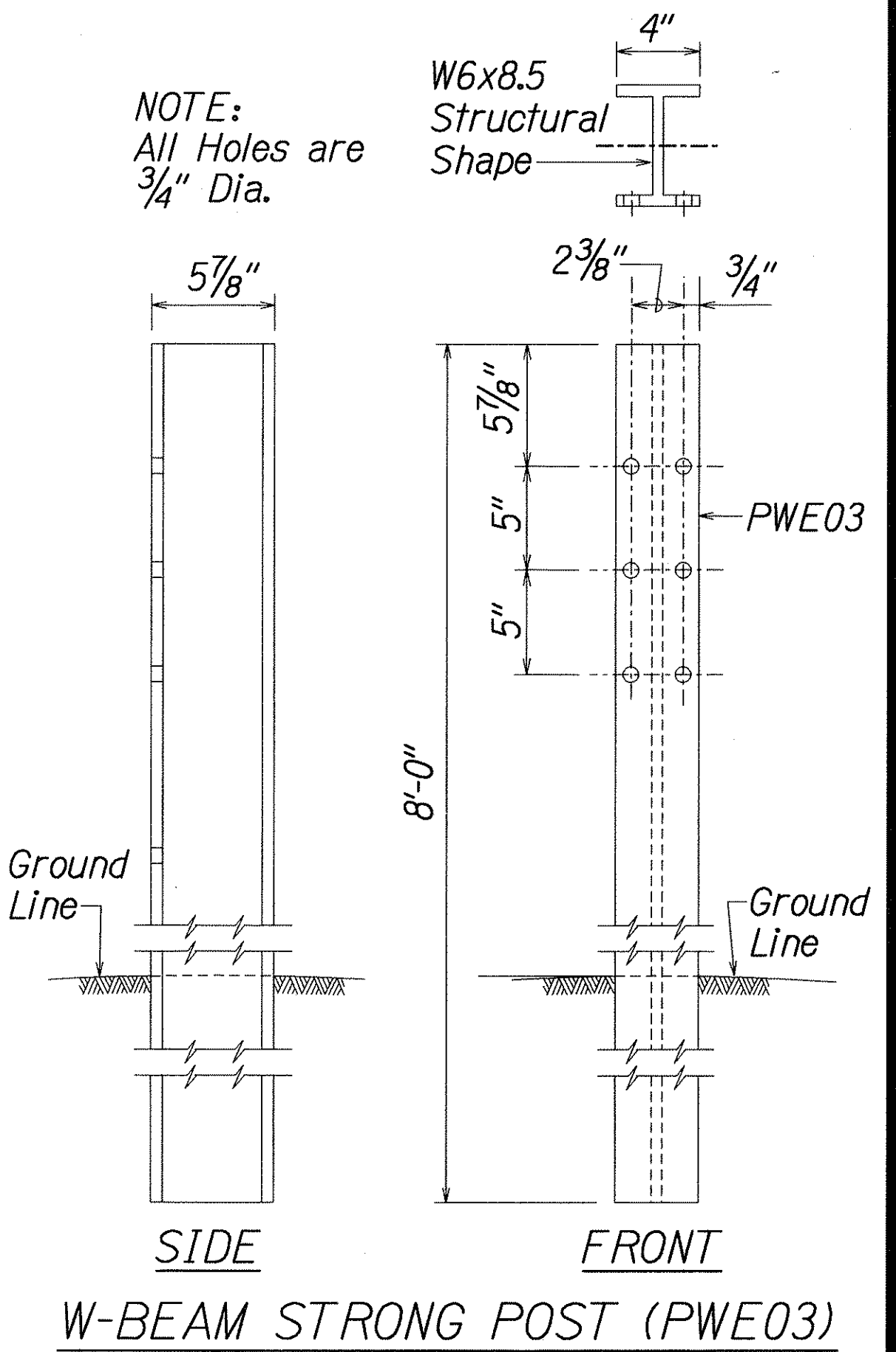
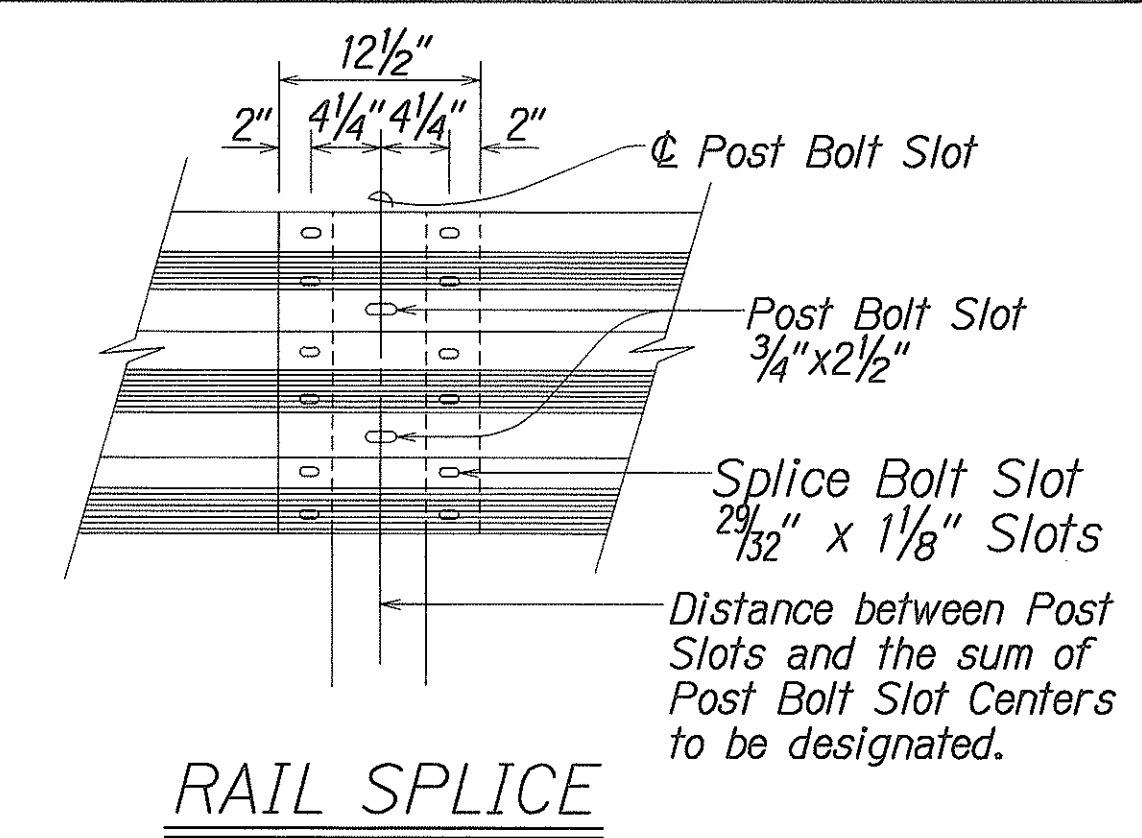
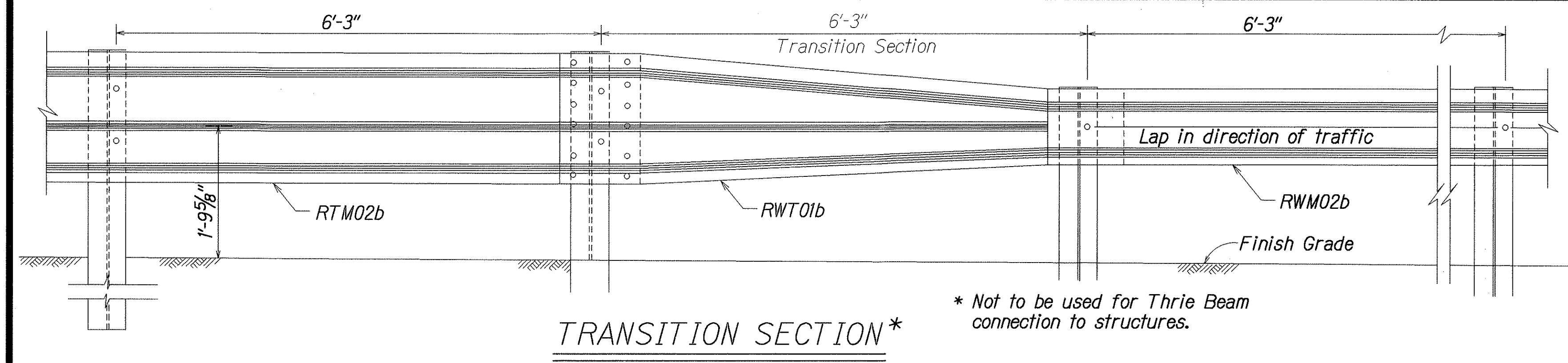
**GUARDRAIL TERMINAL CONNECTORS AND END SECTIONS**

KAHEKILI HIGHWAY LIGHTING IMPROVEMENTS  
Haiku Road to Ahuimanu Place  
Project No. 83F-02-00M

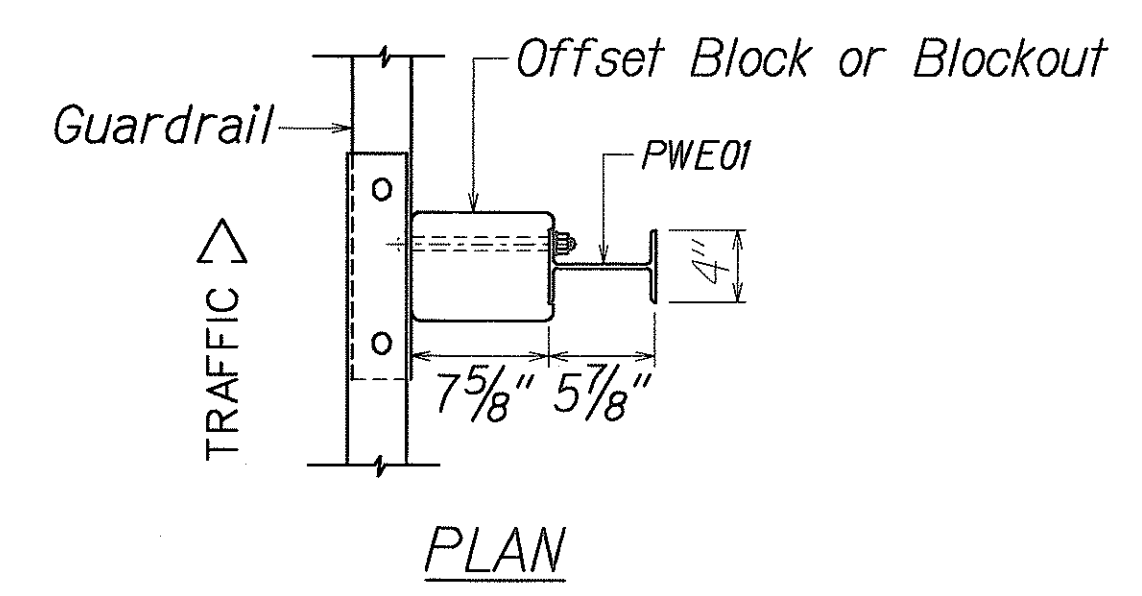
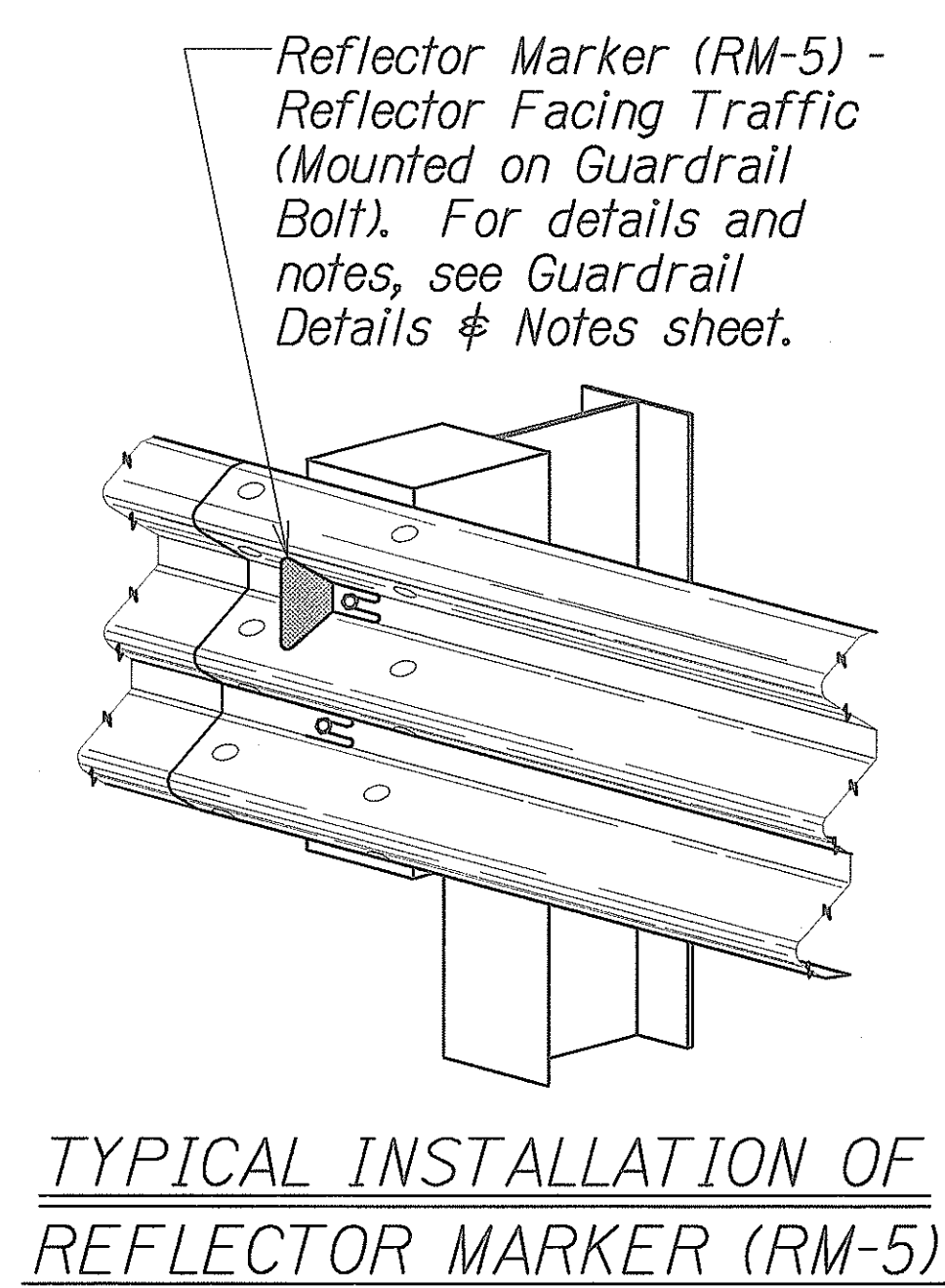
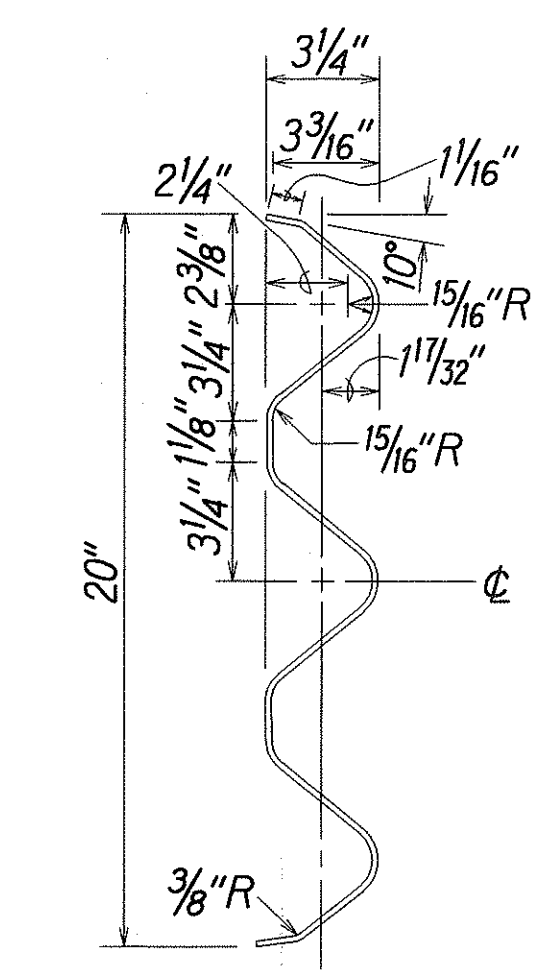
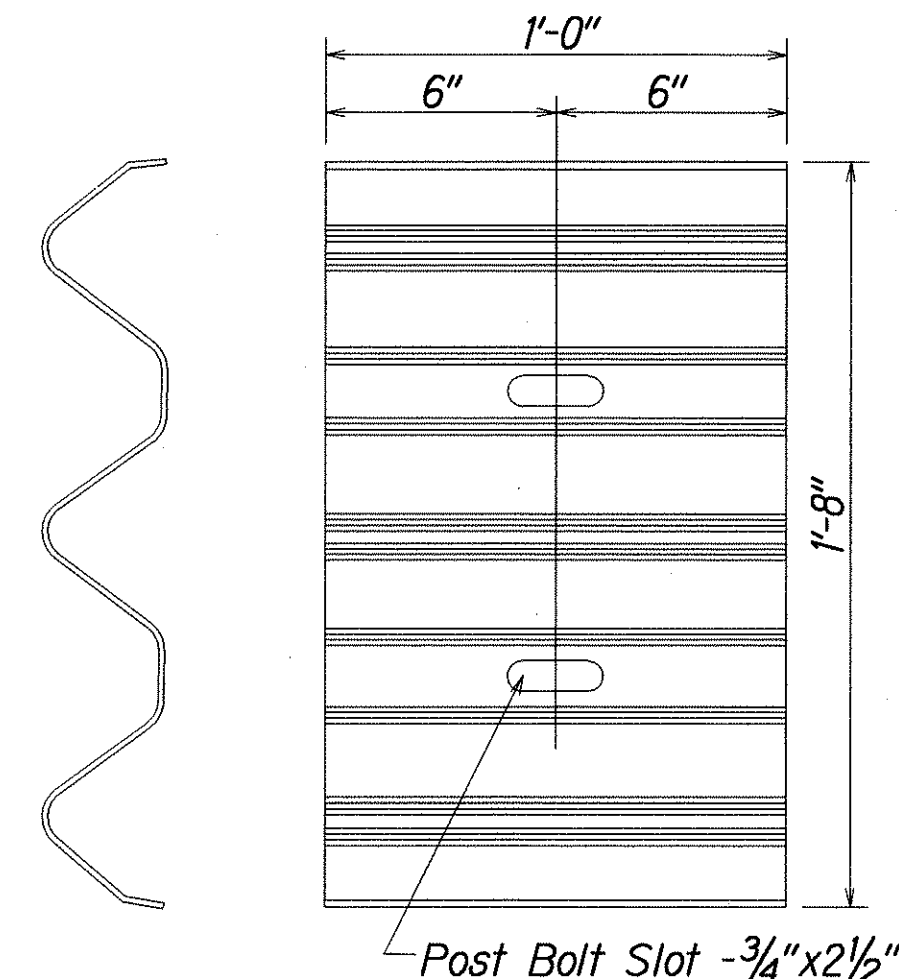
Scale: None Date: Sept. 2002

SHEET No. 4 OF 7 SHEETS

| FED. ROAD DIST. NO. | STATE | PROJ. NO.  | FISCAL YEAR | SHEET NO. | TOTAL SHEETS |
|---------------------|-------|------------|-------------|-----------|--------------|
| HAWAII              | HAW.  | 83F-02-00M | 2004        | 46        | 98           |



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

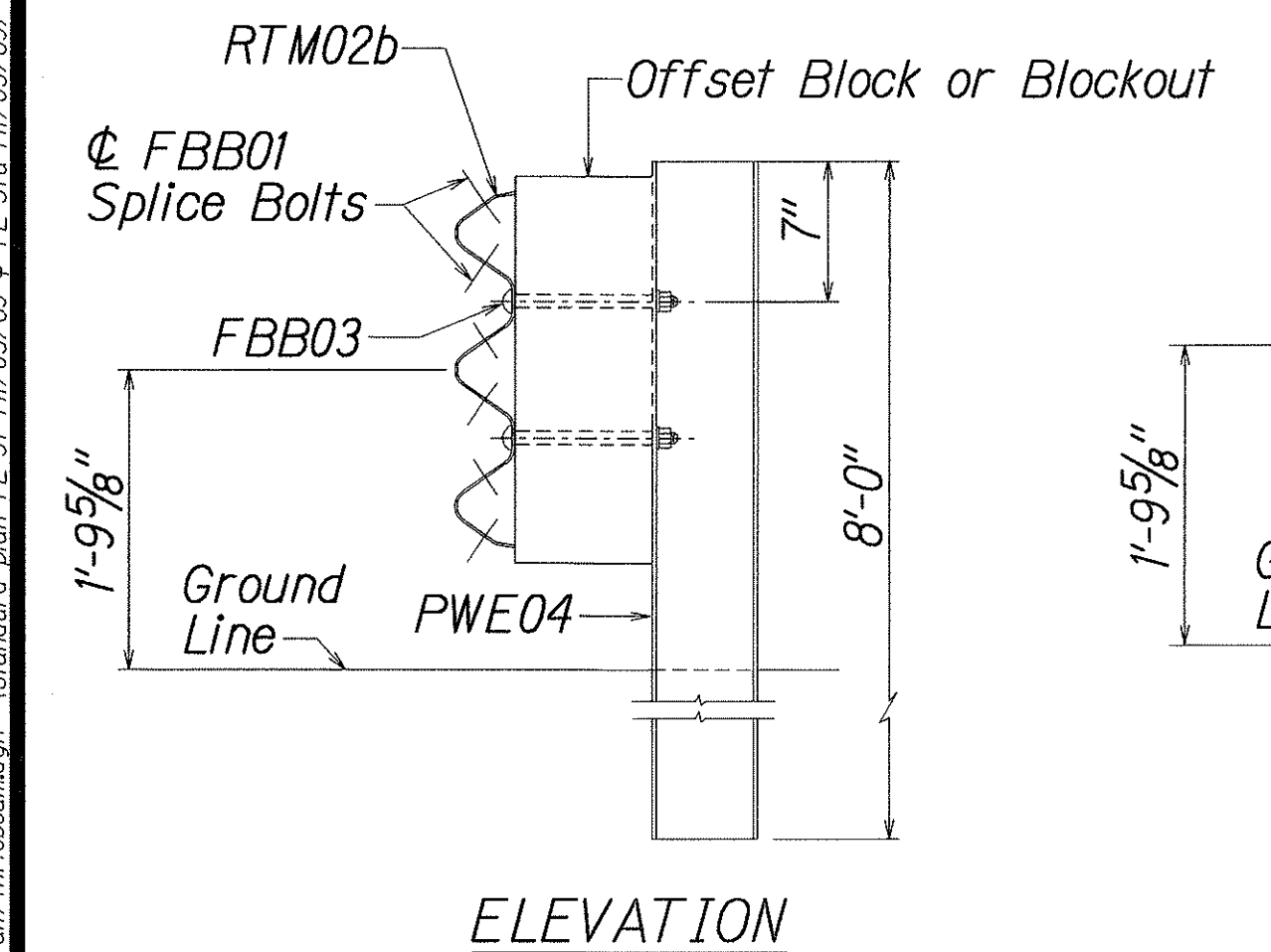


GUARDRAIL BOLTS AND RECESSED NUT

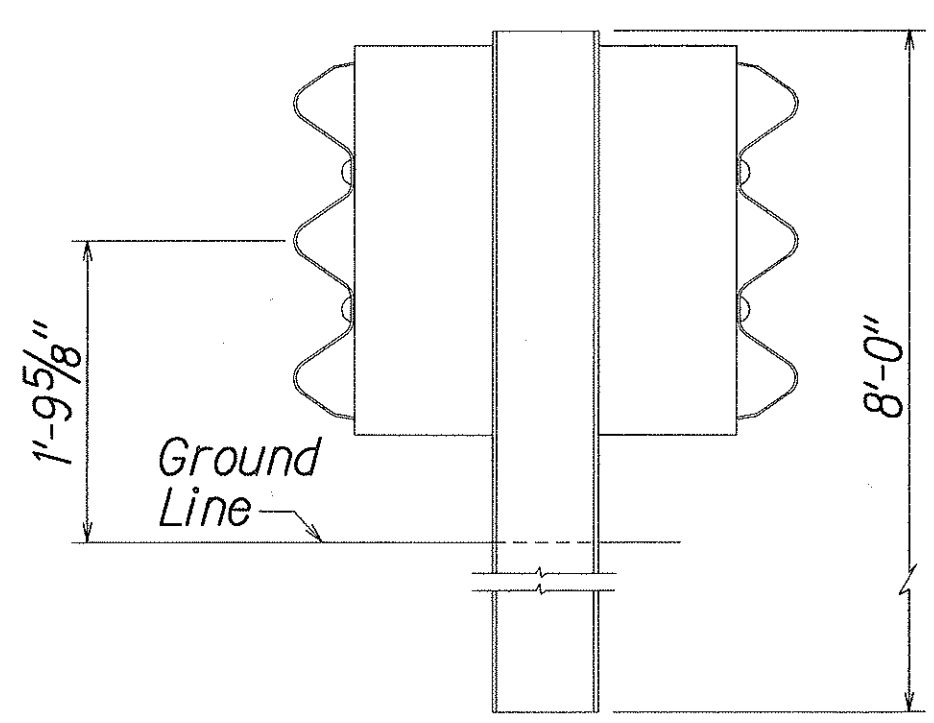
BACKUP PLATE (RTB01b)  
(Use at Posts where Splices do not occur)

SECTION THRU RAIL ELEMENT (RTM02b)

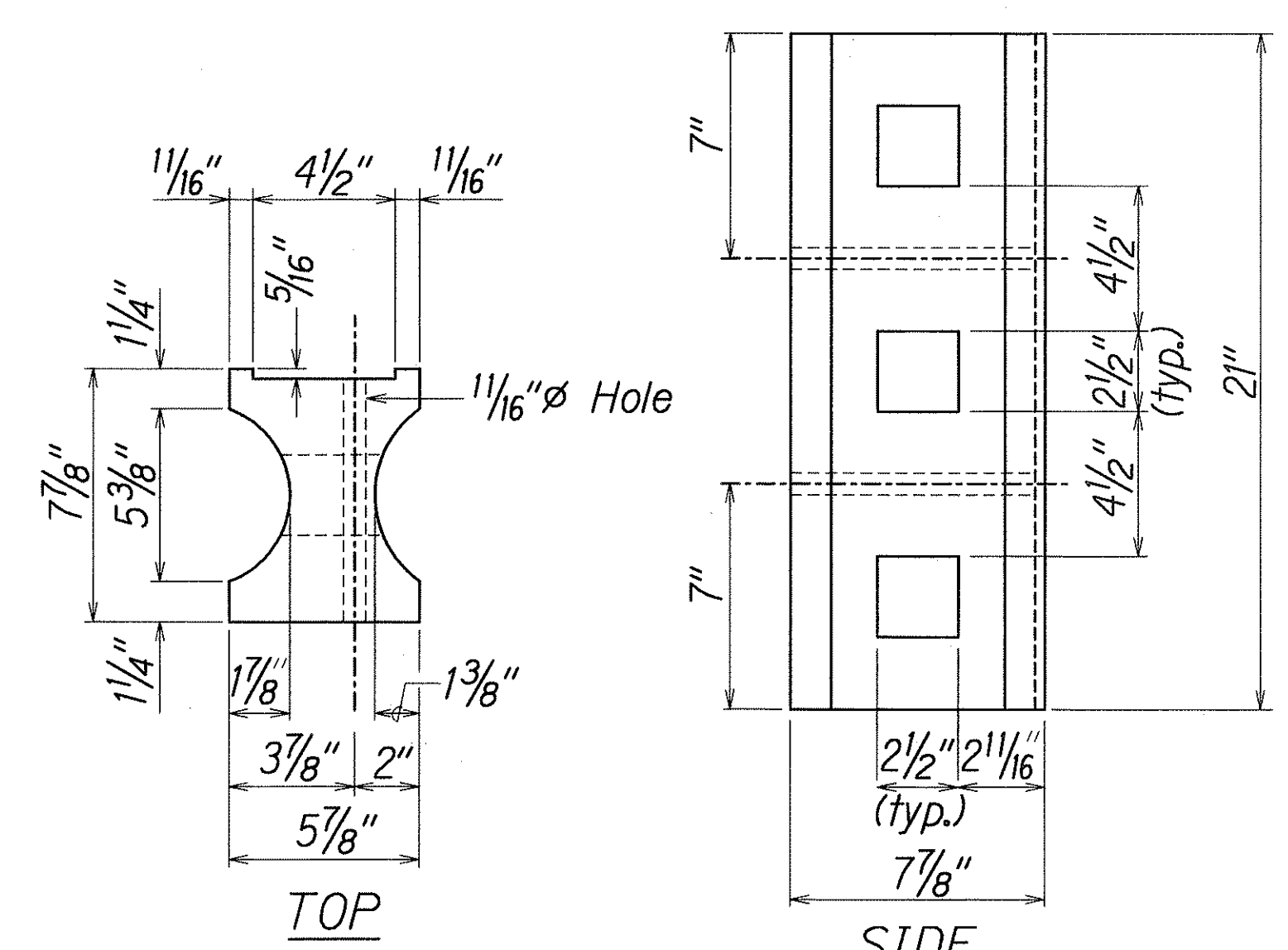
TYPICAL INSTALLATION OF REFLECTOR MARKER (RM-5)



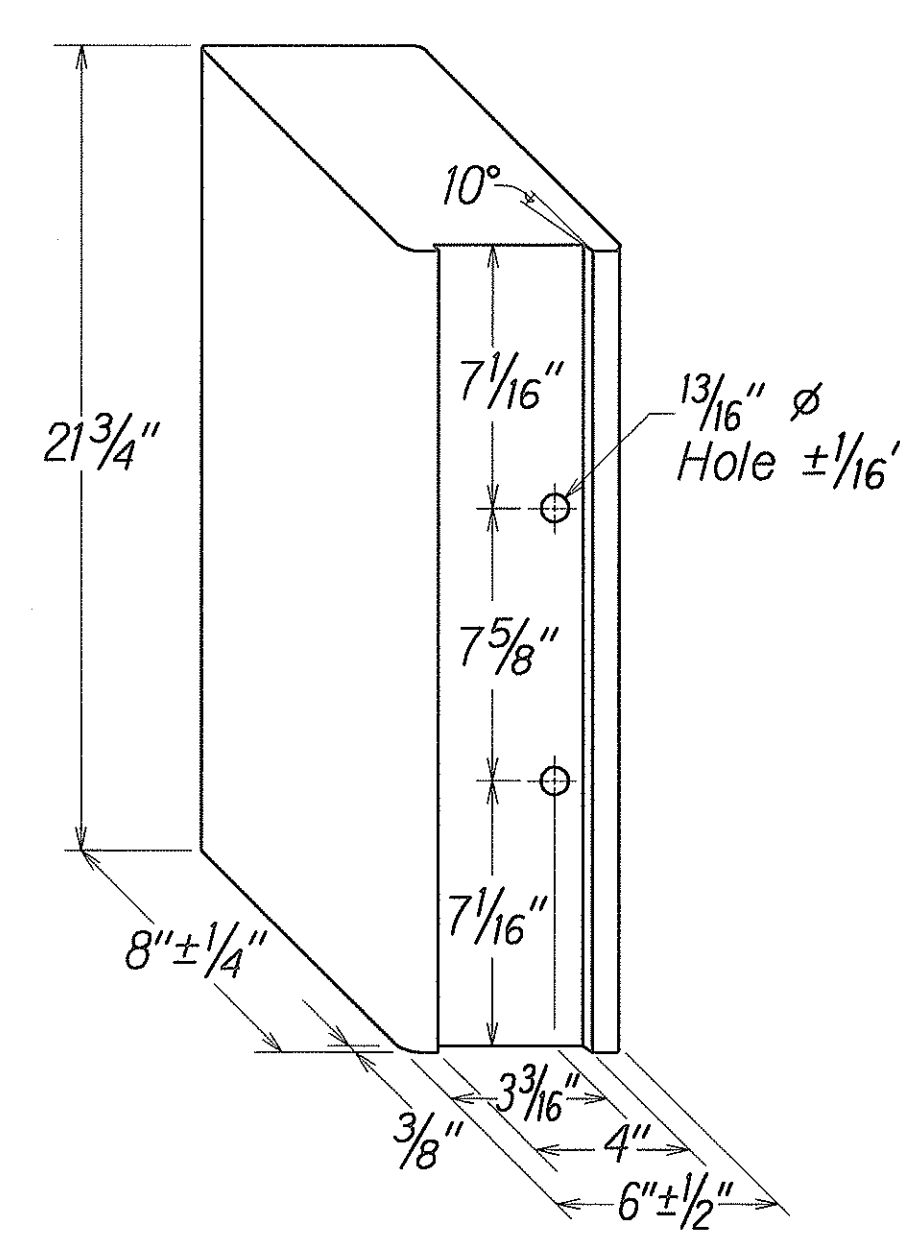
STRONG POST THRIE-BEAM GUARDRAIL (SGR09a)



STRONG POST THRIE-BEAM MEDIAN GUARDRAIL (SGM09a)



RECYCLED PLASTIC BLOCKOUT (TYPE I-THRIE)



RECYCLED POLYETHYLENE THRIE-BEAM OFFSET BLOCK (TYPE II - THRIE)

STATE OF HAWAII  
DEPARTMENT OF TRANSPORTATION  
HIGHWAYS DIVISION

STRONG POST  
THRIE-BEAM GUARDRAIL

KAHEKILL HIGHWAY LIGHTING IMPROVEMENTS  
Haiku Road to Ahulimanu Place  
Project No. 83F-02-00M

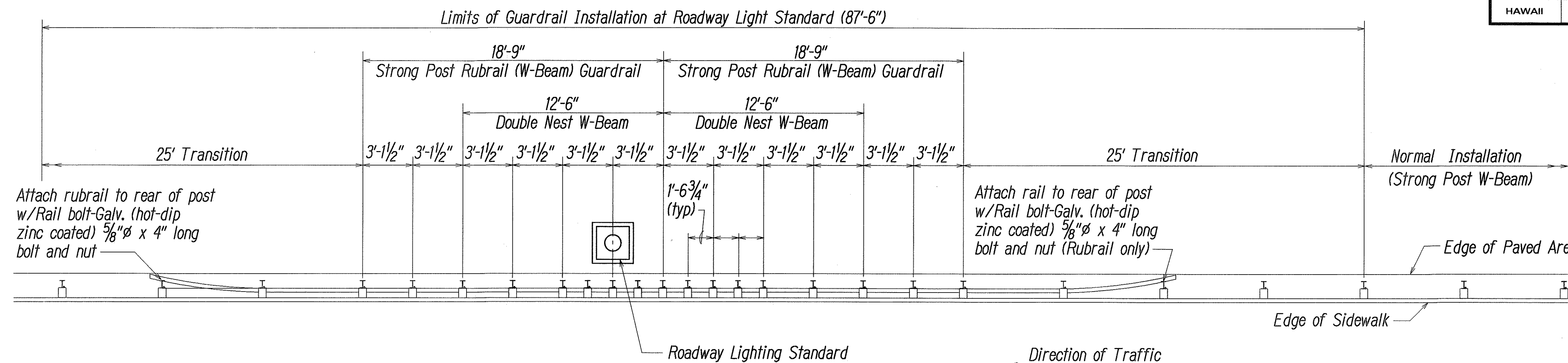
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SHEET No. 5 OF 7 SHEETS

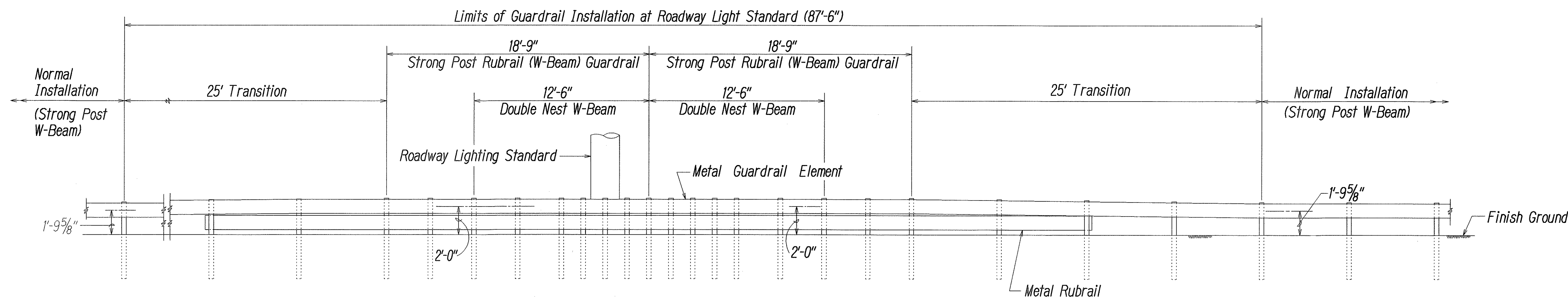
|               |      |
|---------------|------|
| ORIGINAL PLAN | DATE |
| NOTE BOOK     |      |
| QUANTITIES BY |      |
| CHECKED BY    |      |

18/2/01 idr/rub/guardrail/thriebeam.dgn (Standard plan TE-57, RI-03/89 & TE-57a RI-03/89)

| FED. ROAD DIST. NO. | STATE | PROJ. NO.  | FISCAL YEAR | SHEET NO. | TOTAL SHEETS |
|---------------------|-------|------------|-------------|-----------|--------------|
| HAWAII              | HAW.  | 83F-02-00M | 2004        | 47        | 98           |



PLAN

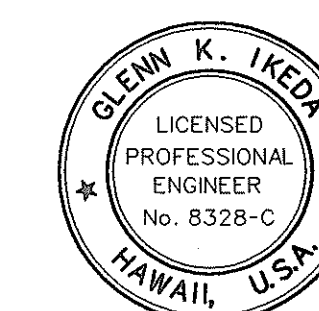


ELEVATION

DETAIL OF GUARDRAIL INSTALLATION AT ROADWAY LIGHT STANDARD

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

18/2/01 - fdruby/guardrail/tes4rev.dgn (standard plan TE-53 08/01/87 # TE-54 RI/03/88)



THIS WORK WAS PREPARED BY ME OR UNDER MY SUPERVISION AND CONSTRUCTION OF THIS PROJECT WILL BE UNDER MY OBSERVATION

*Glen K. Ikeda*  
Glen K. Ikeda  
dba PARK ENGINEERING  
LICENSE EXPIRES: 4-30-04

STATE OF HAWAII  
DEPARTMENT OF TRANSPORTATION  
HIGHWAYS DIVISION

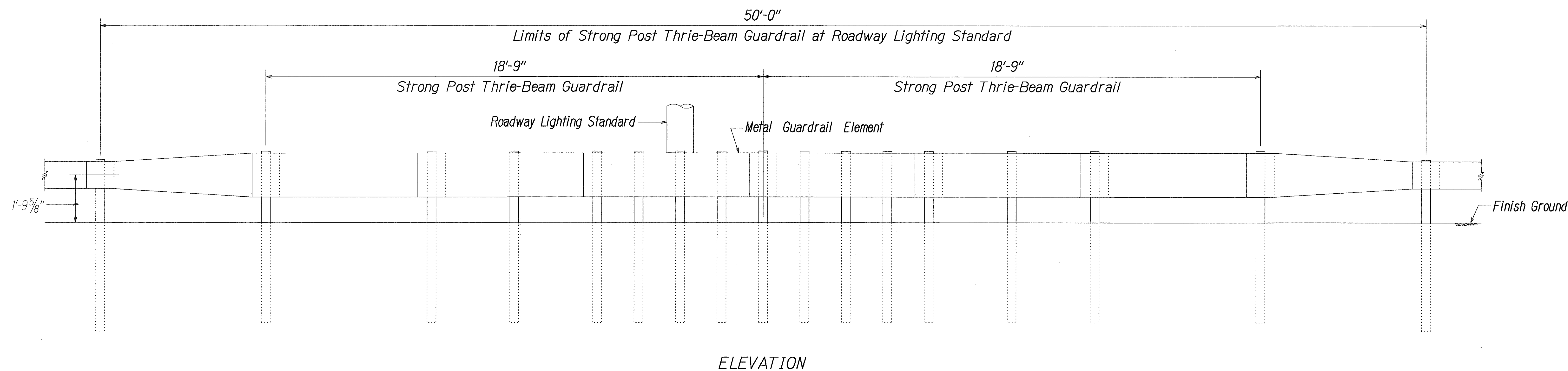
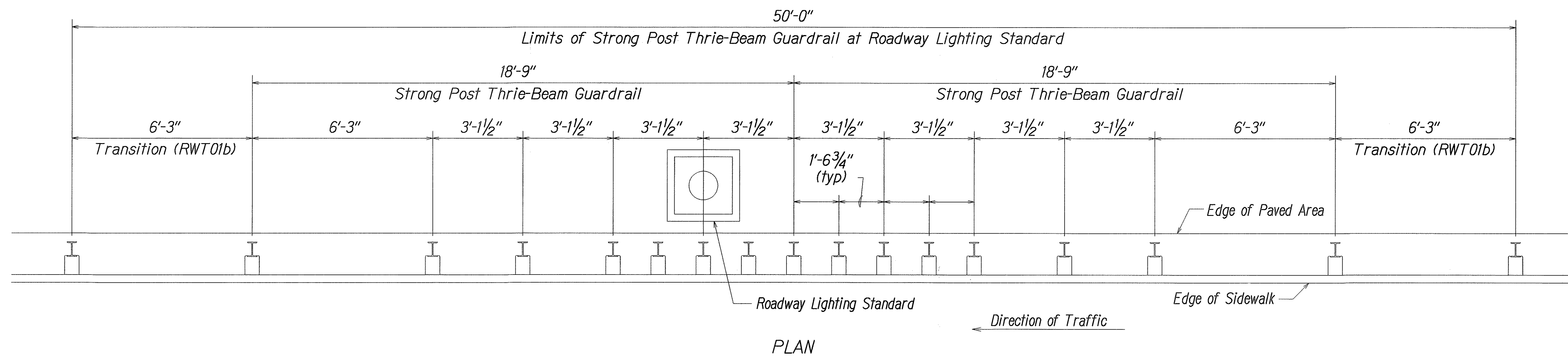
**GUARDRAIL DETAILS**  
(AT ROADWAY LIGHT STANDARD)

KAHEKILI HIGHWAY LIGHTING IMPROVEMENTS  
Haiku Road to Ahuimanu Place  
Project No. 83F-02-00M

Scale: None Date: Sept. 2002

SHEET No. 6 OF 7 SHEETS

| FED. ROAD DIST. NO. | STATE | PROJ. NO.  | FISCAL YEAR | SHEET NO. | TOTAL SHEETS |
|---------------------|-------|------------|-------------|-----------|--------------|
| HAWAII              | HAW.  | 83F-02-00M | 2004        | 48        | 98           |



# DETAIL OF THRIE-BEAM GUARDRAIL INSTALLATION AT ROADWAY LIGHT STANDARD

|               |                   |      |
|---------------|-------------------|------|
| ORIGINAL PLAN | SURVEY PLOTTED BY | DATE |
| NOTE BOOK     | DRAWN BY          |      |
|               | DESIGNED BY       |      |
|               | CHECKED BY        |      |
|               |                   |      |



THIS WORK WAS PREPARED BY ME OR UNDER MY SUPERVISION AND CONSTRUCTION OF THIS PROJECT WILL BE UNDER MY OBSERVATION

*Glen K. Ikeda*

Park, Inc.  
dba PARK ENGINEERING

LICENSE EXPIRES: 4-30-04

STATE OF HAWAII  
DEPARTMENT OF TRANSPORTATION  
HIGHWAYS DIVISION

**GUARDRAIL DETAILS**  
(AT ROADWAY LIGHT STANDARD)

KAHEKILI HIGHWAY LIGHTING IMPROVEMENTS  
Haiku Road to Ahuimanu Place  
Project No. 83F-02-00M

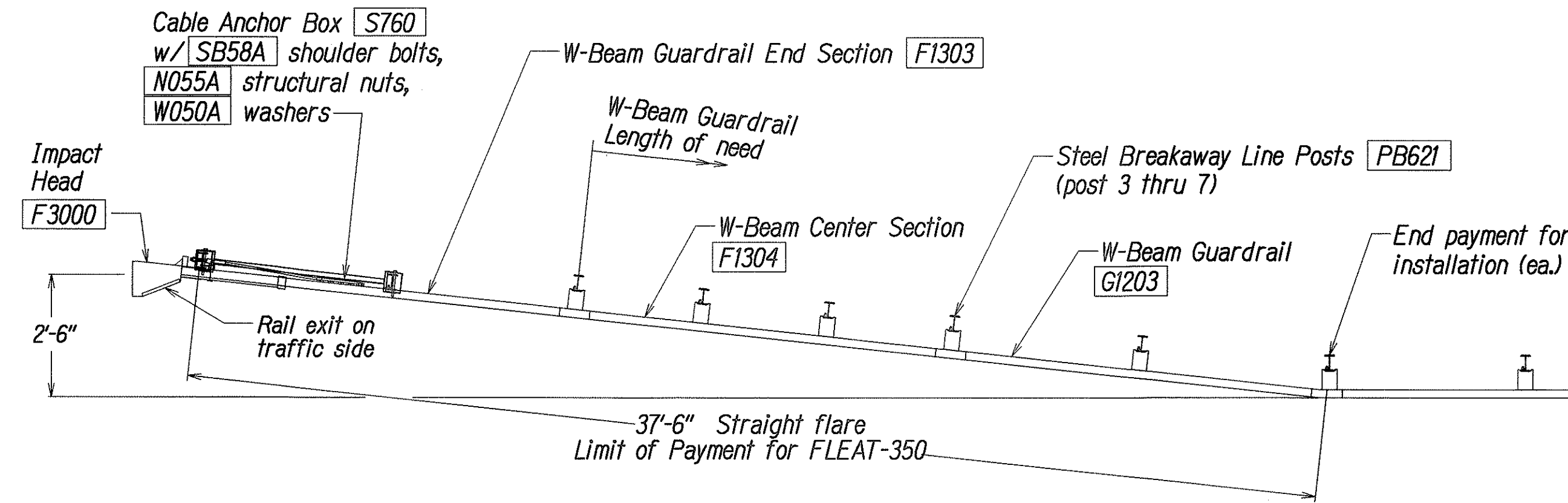
Scale: None Date: Sept. 2002

SHEET No. 7 OF 7 SHEETS

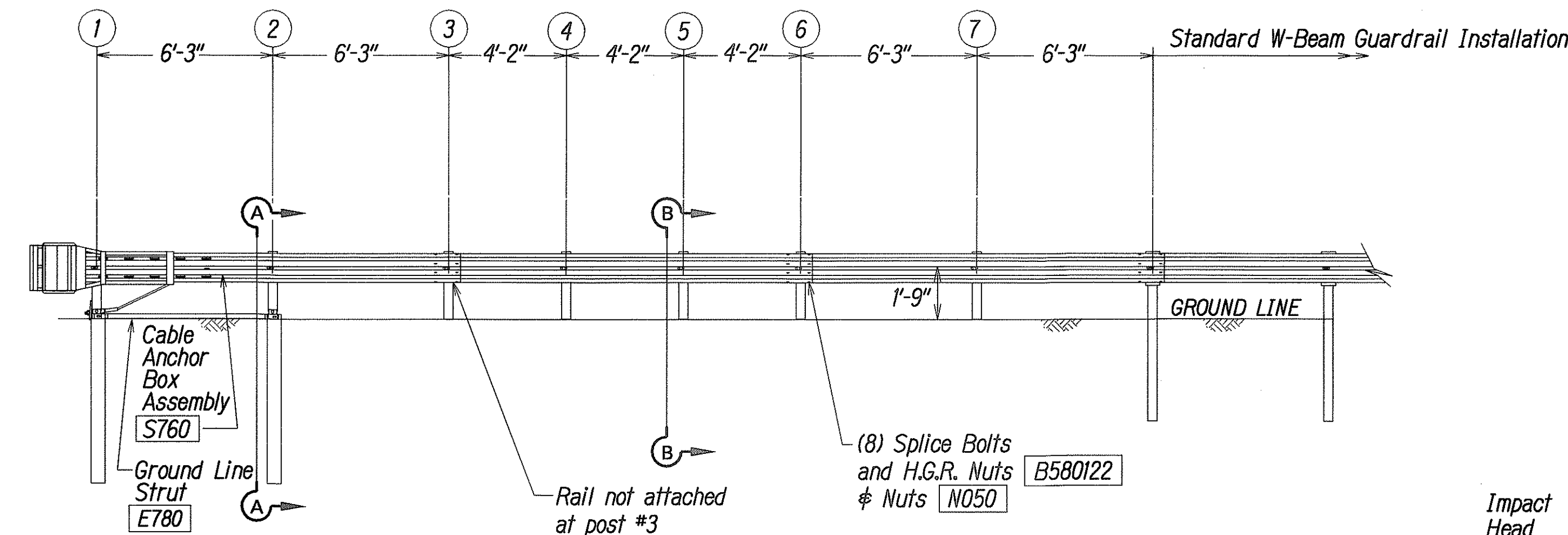




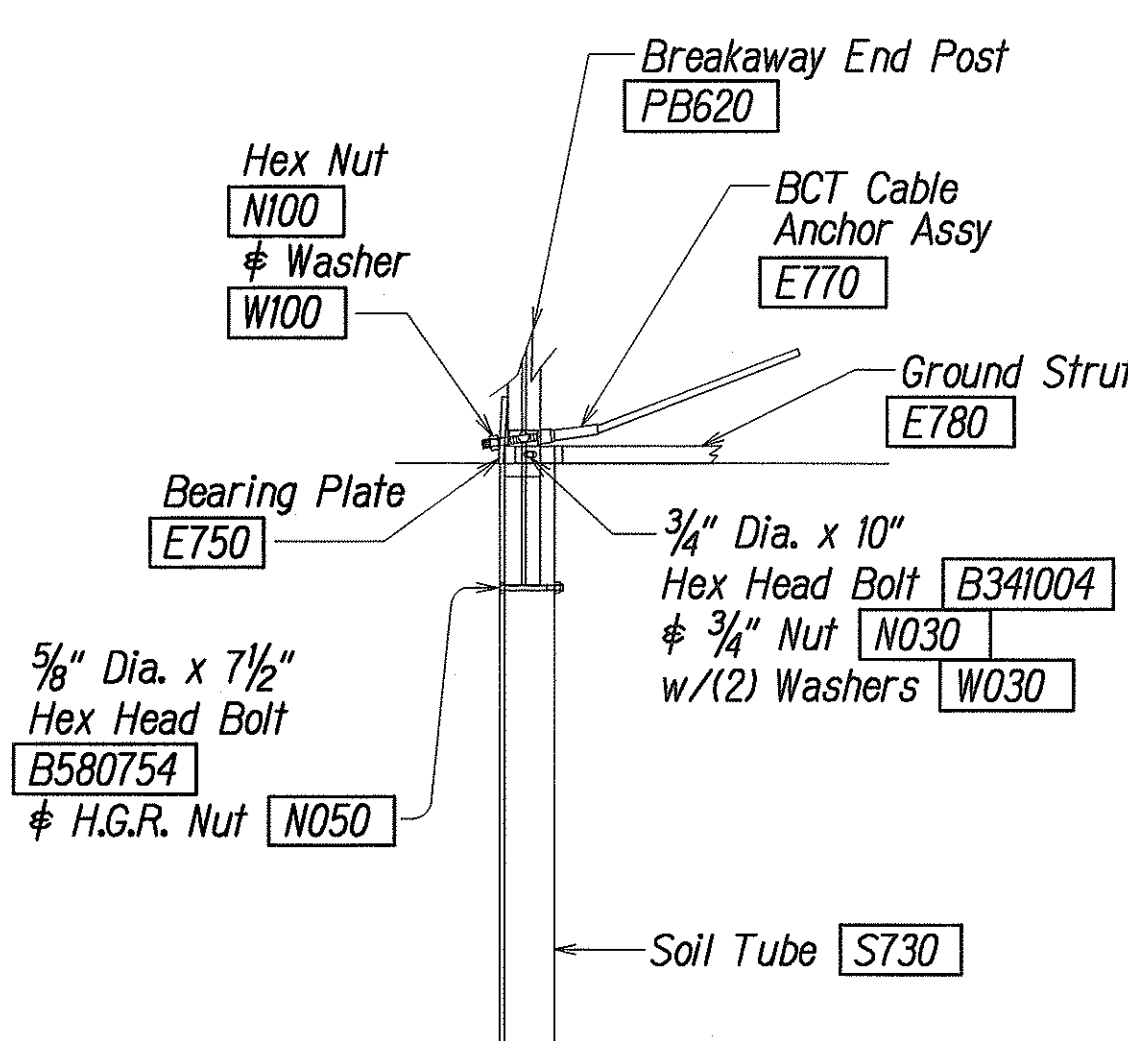
| FED. ROAD DIST. NO. | STATE | PROJ. NO.  | FISCAL YEAR | SHEET NO. | TOTAL SHEETS |
|---------------------|-------|------------|-------------|-----------|--------------|
| HAWAII              | HAW.  | 83F-02-00M | 2004        | 49        | 98           |



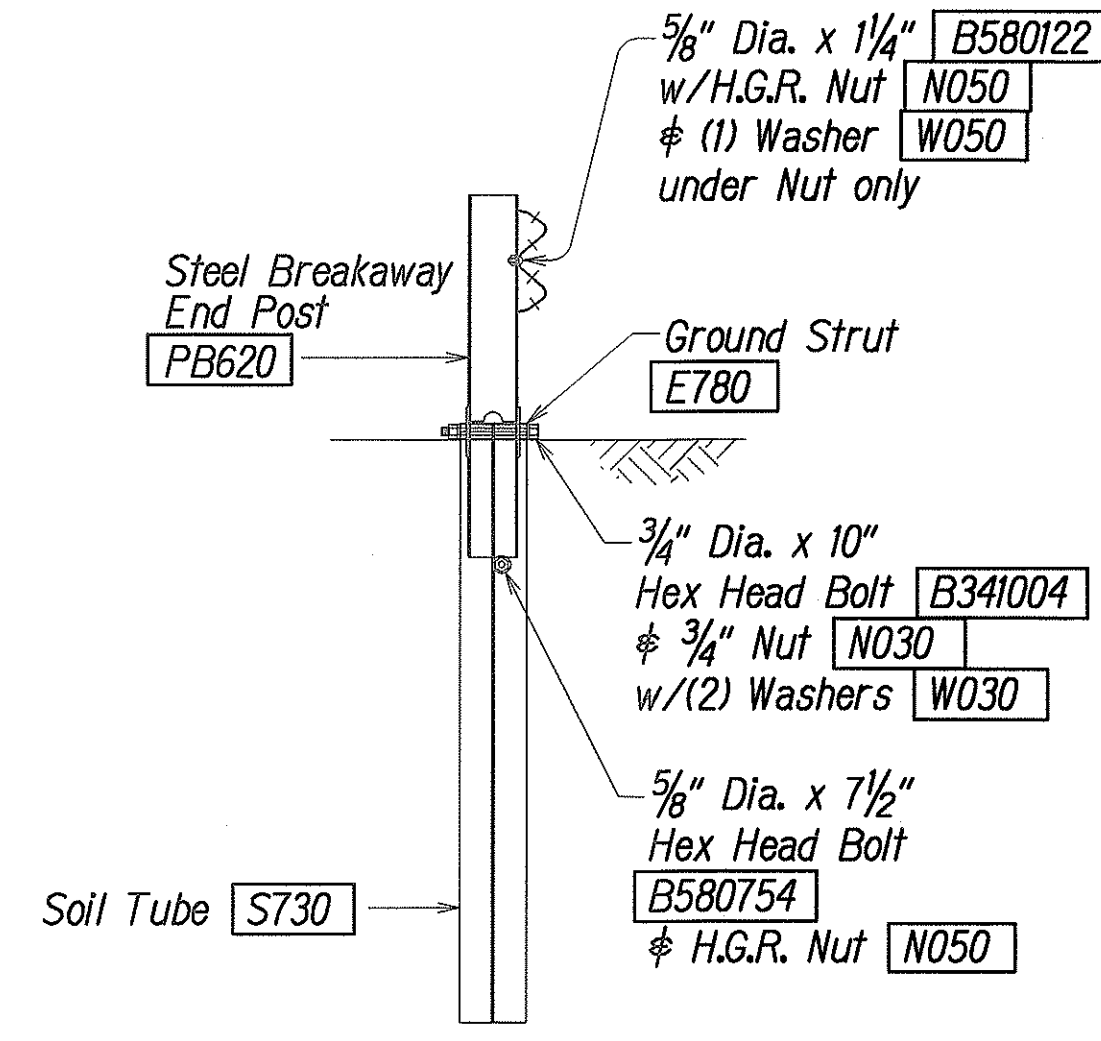
PLAN



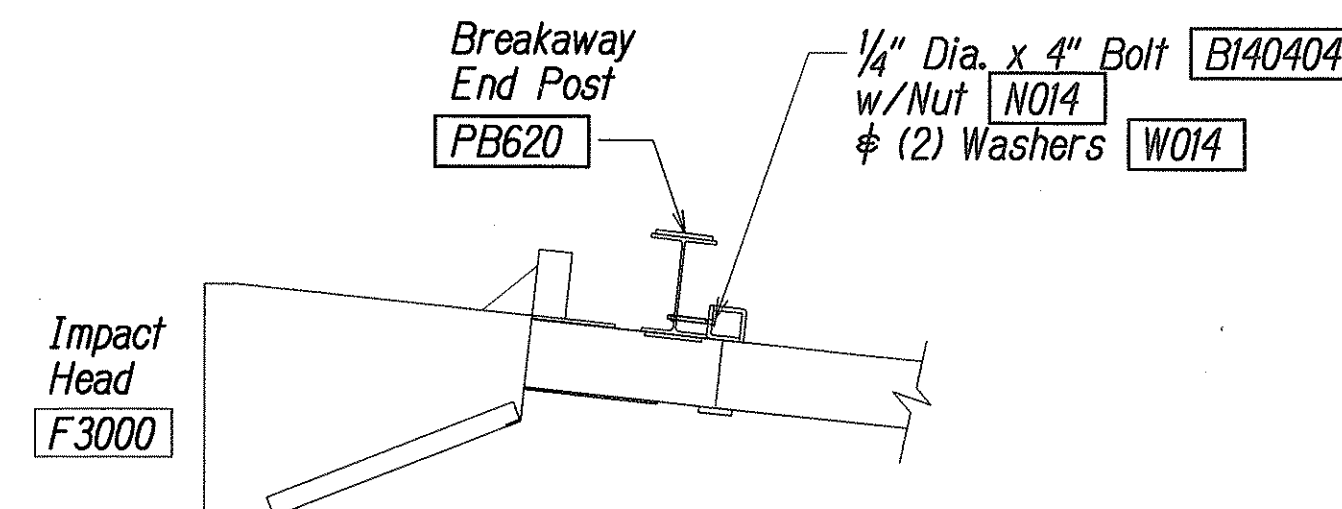
ELEVATION



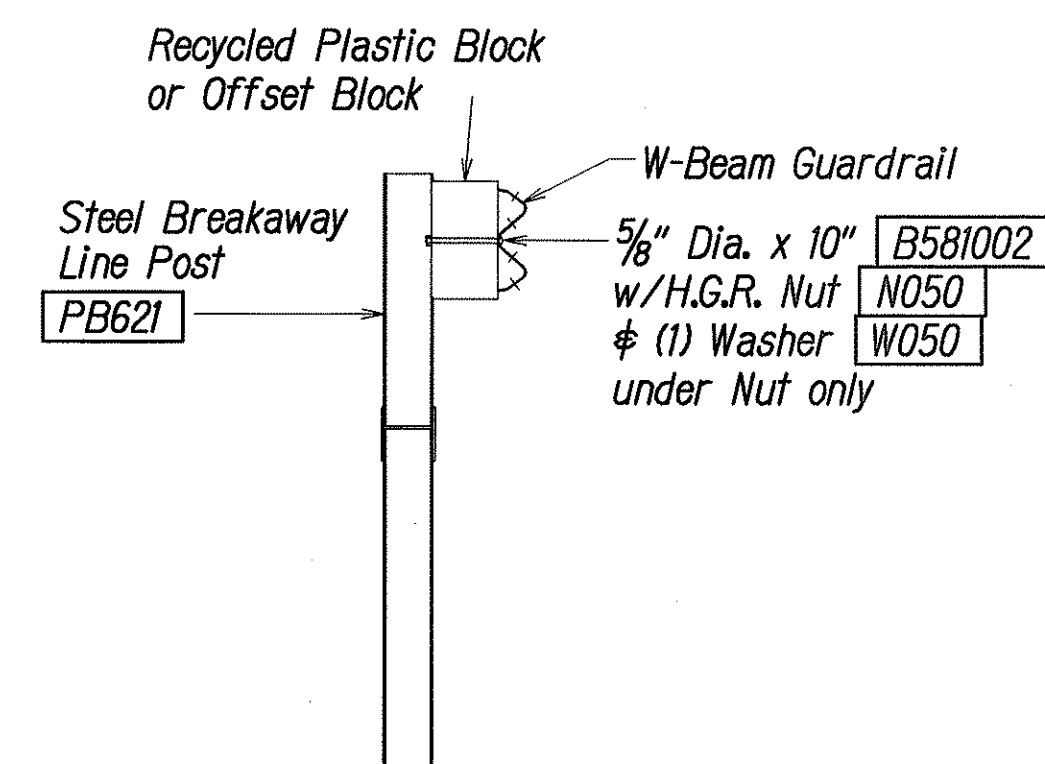
PARTIAL VIEW OF POST 1



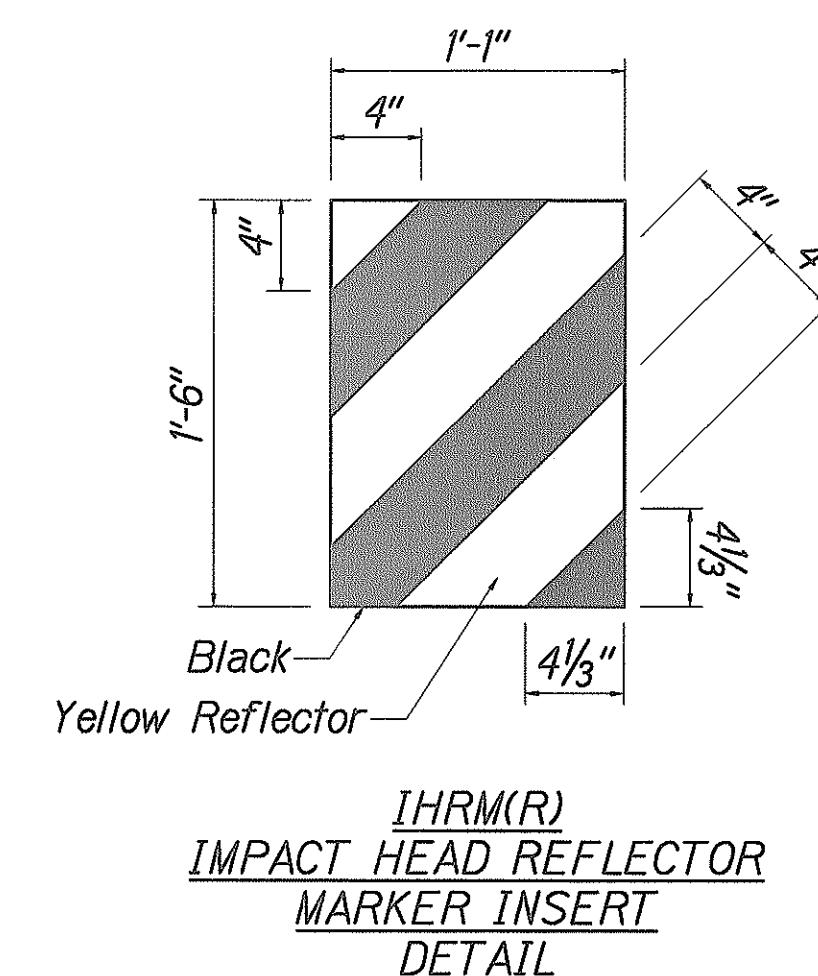
SECTION A-A  
(@ Post #2)



IMPACT HEAD CONNECTING DETAIL



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



| 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 3/16" 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

STATE OF HAWAII  
 DEPARTMENT OF TRANSPORTATION  
 HIGHWAYS DIVISION  
**FLEAT-350**  
**FLARED ENERGY ABSORBING TERMINAL**  
 KAHEKILI HIGHWAY LIGHTING IMPROVEMENTS  
 Haiku Road to Ahulimanu Place  
 Project No. 83F-02-00M  
 Scale: None Date: Sept. 2002  
 SHEET NO. 1 OF 1 SHEETS