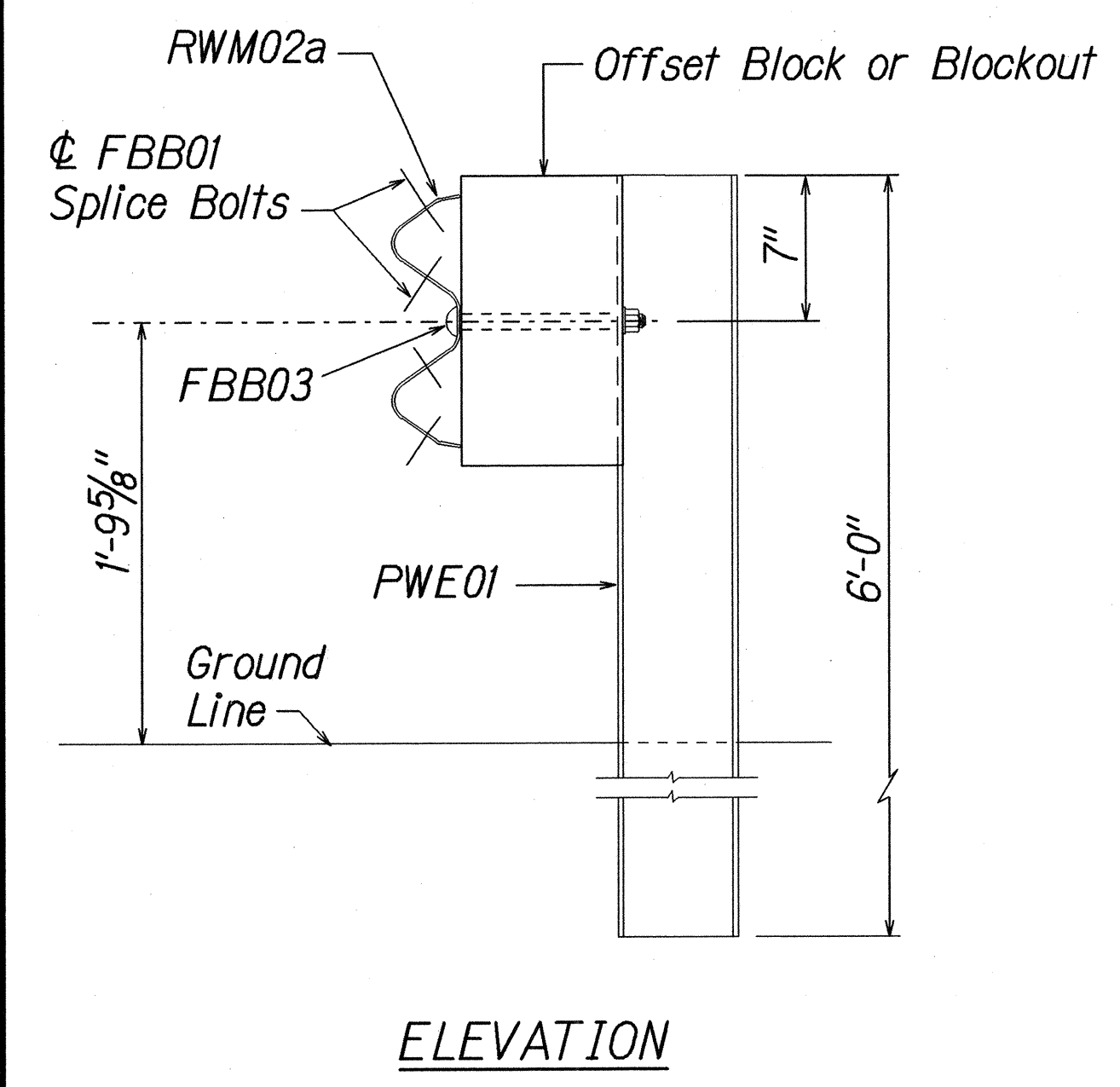
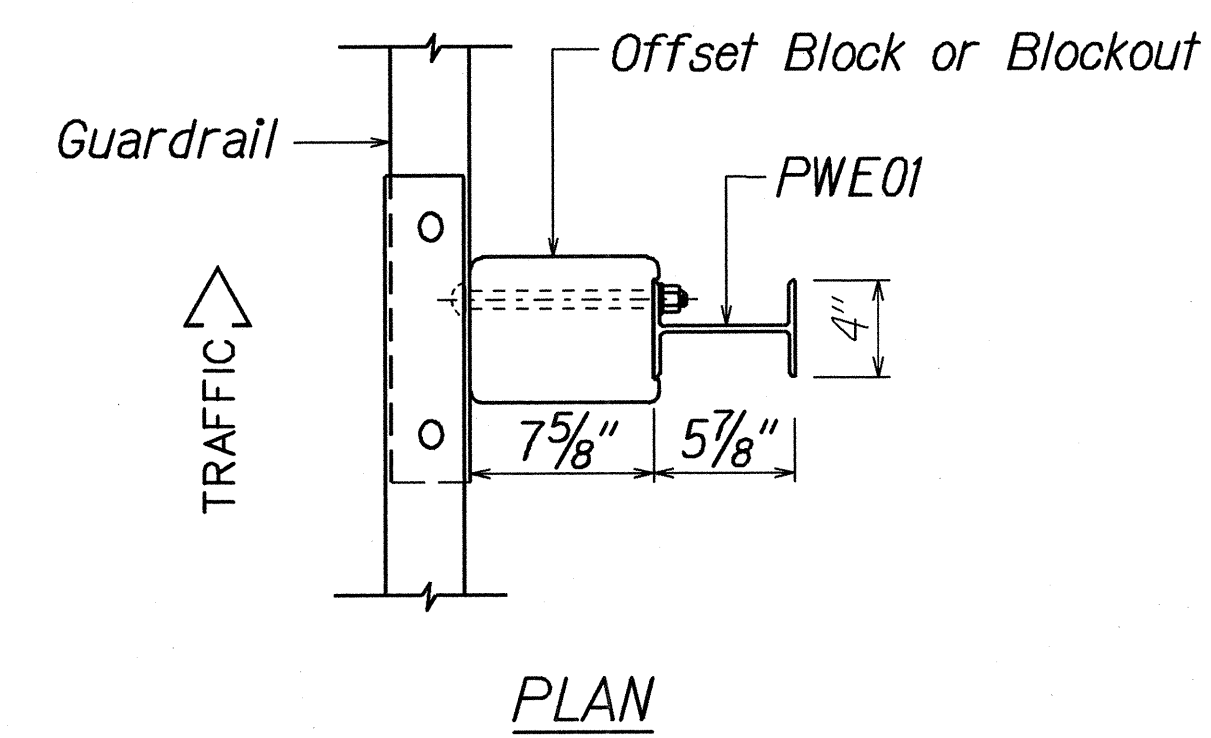
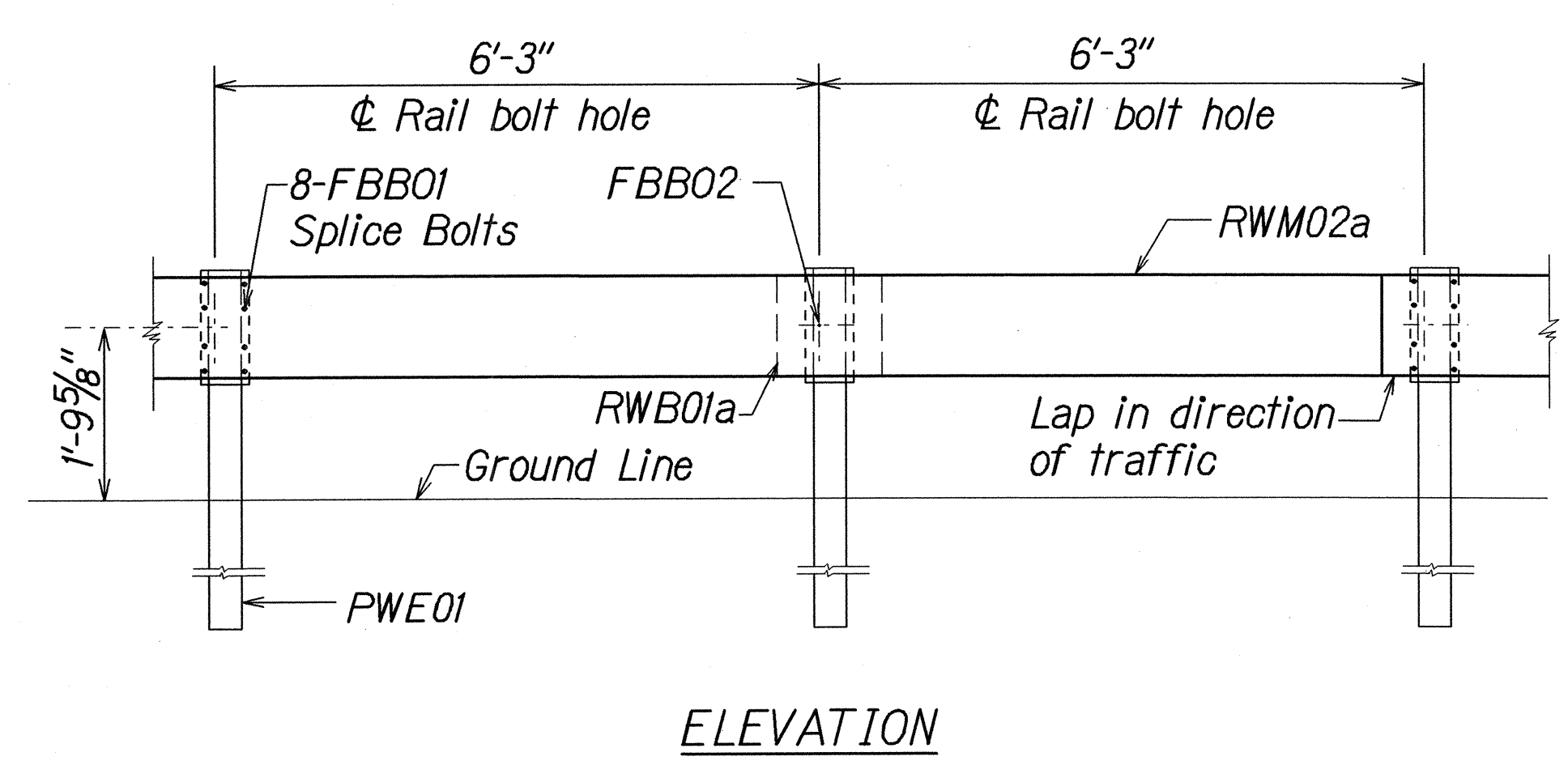




| FED. ROAD DIST. NO. | STATE | PROJ. NO.    | FISCAL YEAR | SHEET NO. | TOTAL SHEETS |
|---------------------|-------|--------------|-------------|-----------|--------------|
| HAWAII              | HAW.  | HWY-0-06-03M | 2004        | 14        | 51           |

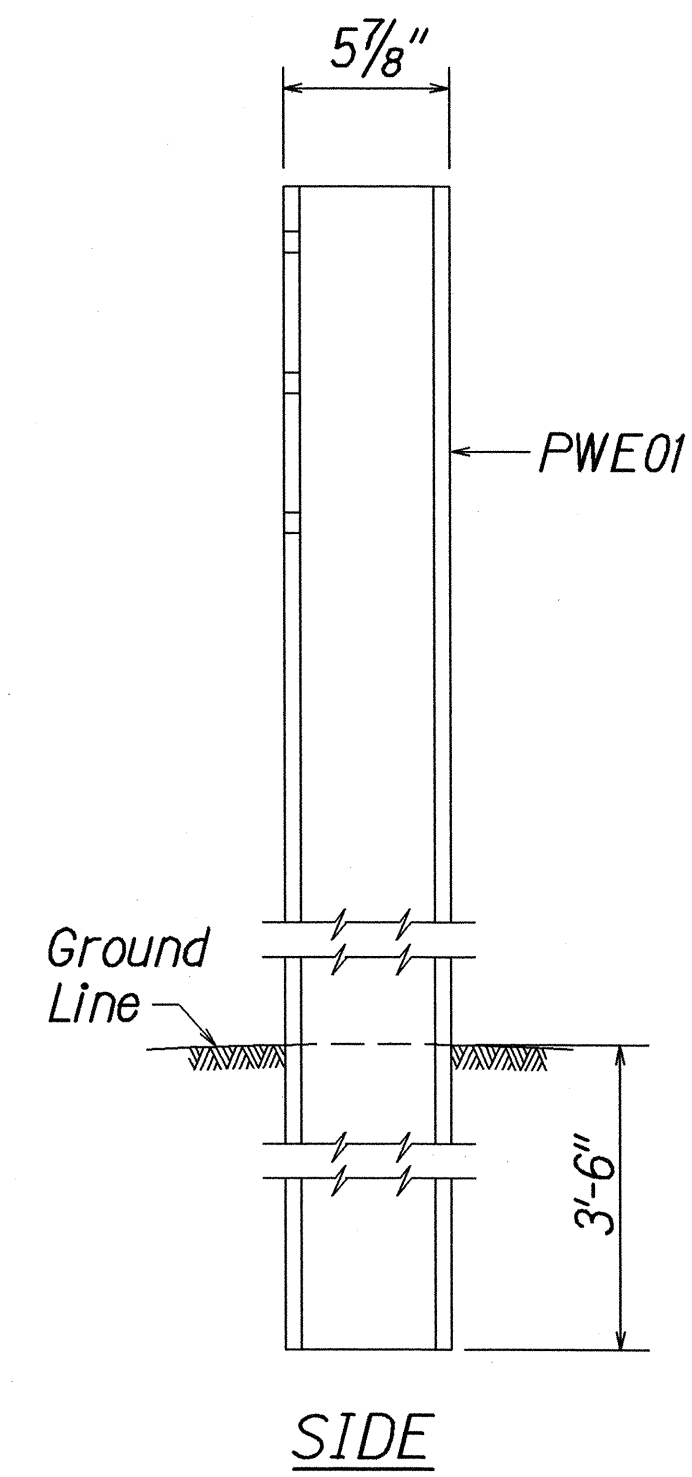


STRONG POST W-BEAM GUARDRAIL (SGR04a)

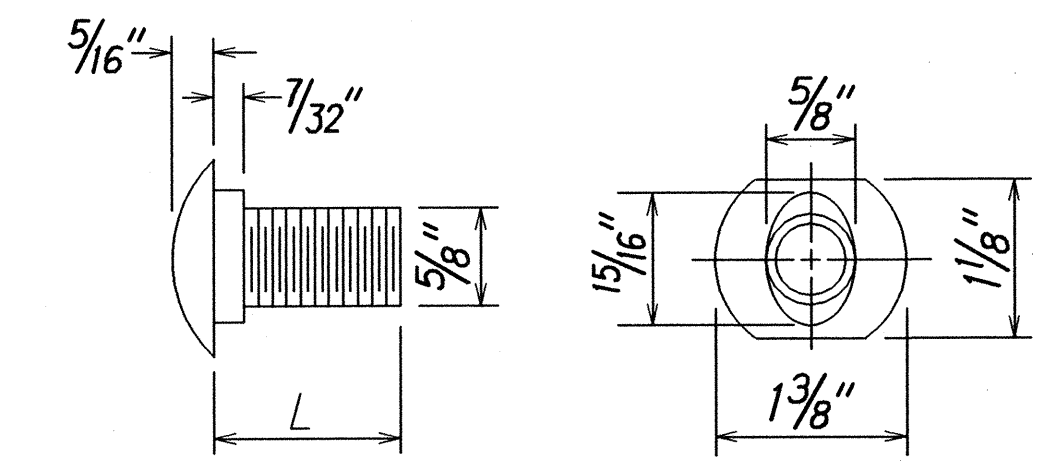
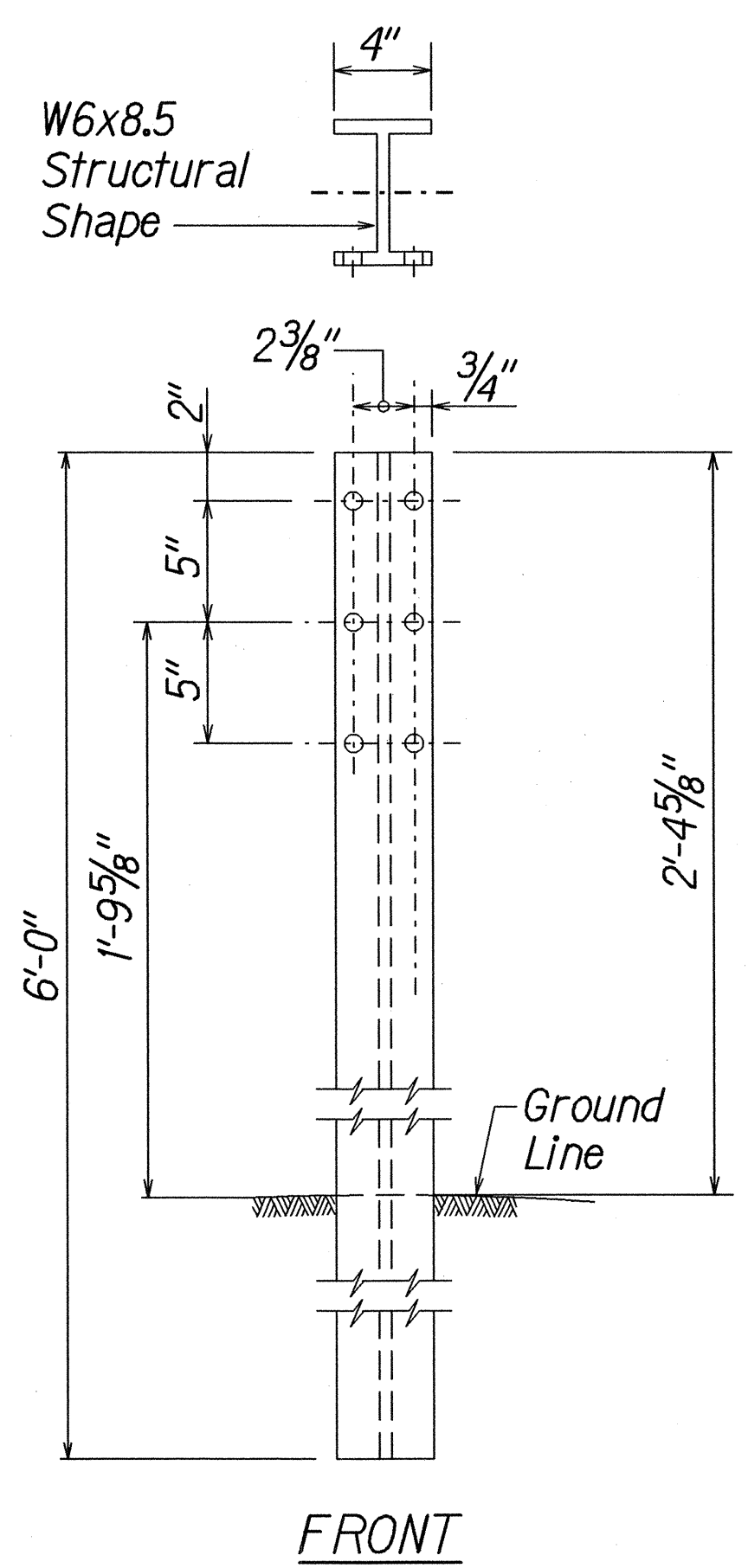


STRONG POST W-BEAM GUARDRAIL WITH RECYCLED OFFSET BLOCK OR PLASTIC BLOCKOUT

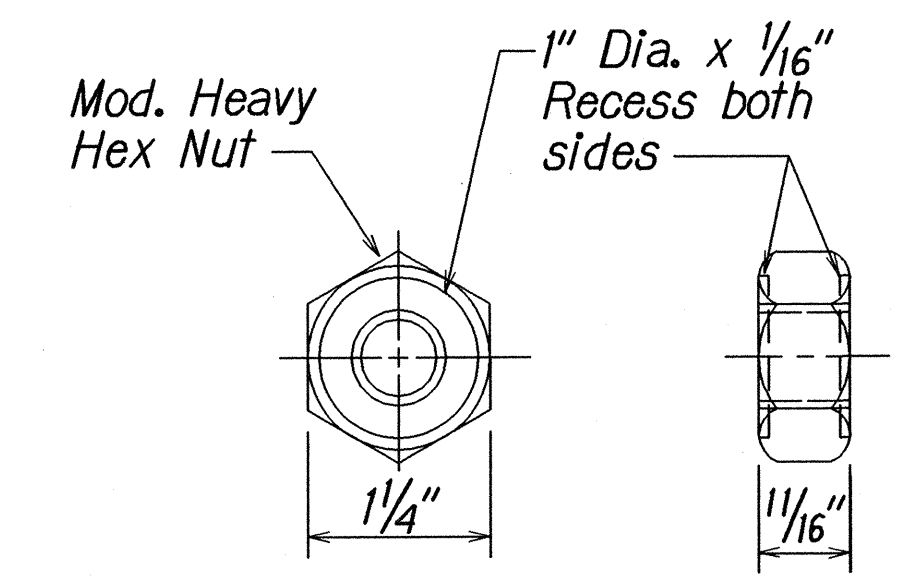
NOTE:  
All Holes are 3/4" Dia.



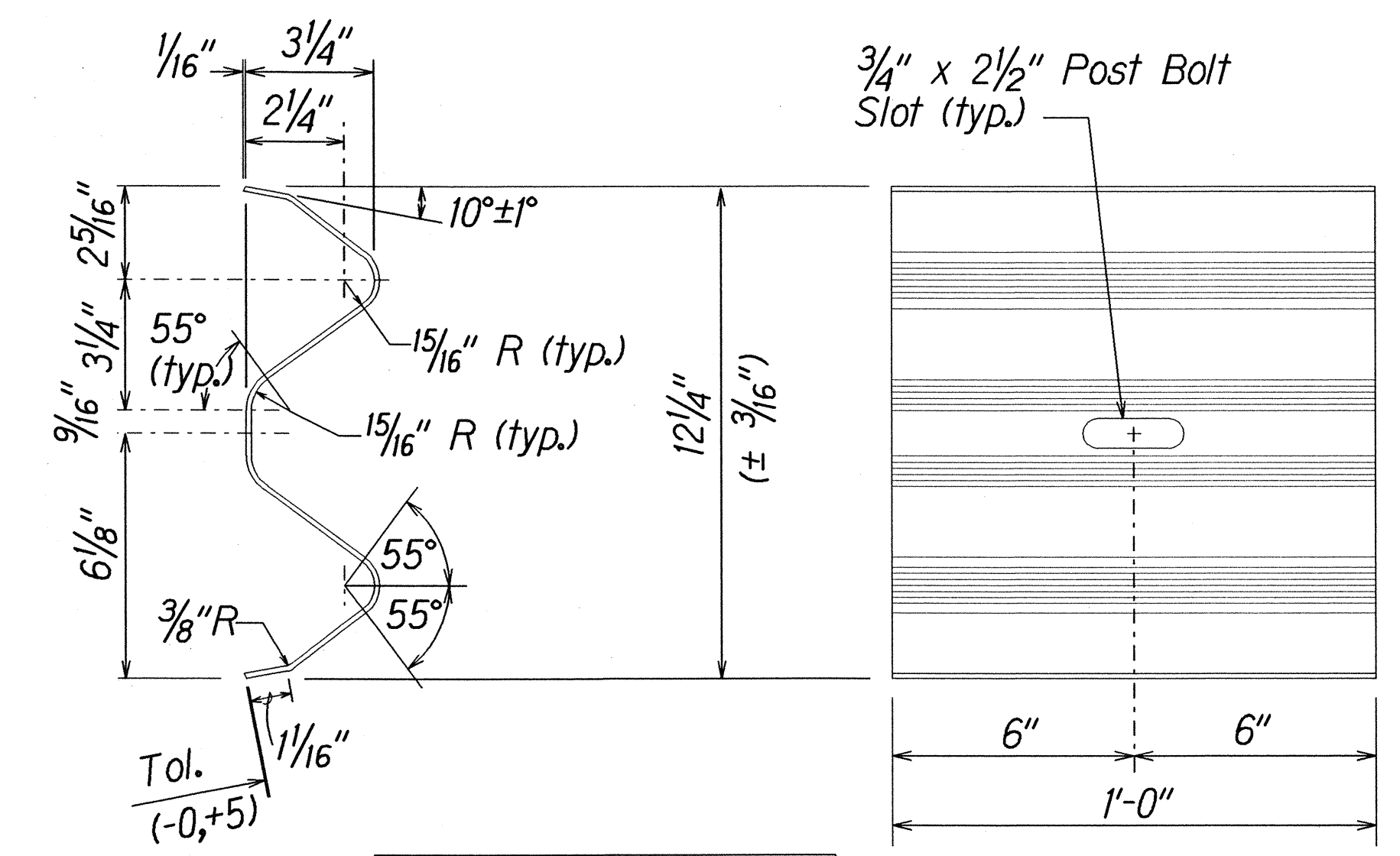
W-BEAM STRONG POST (PWE01)



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

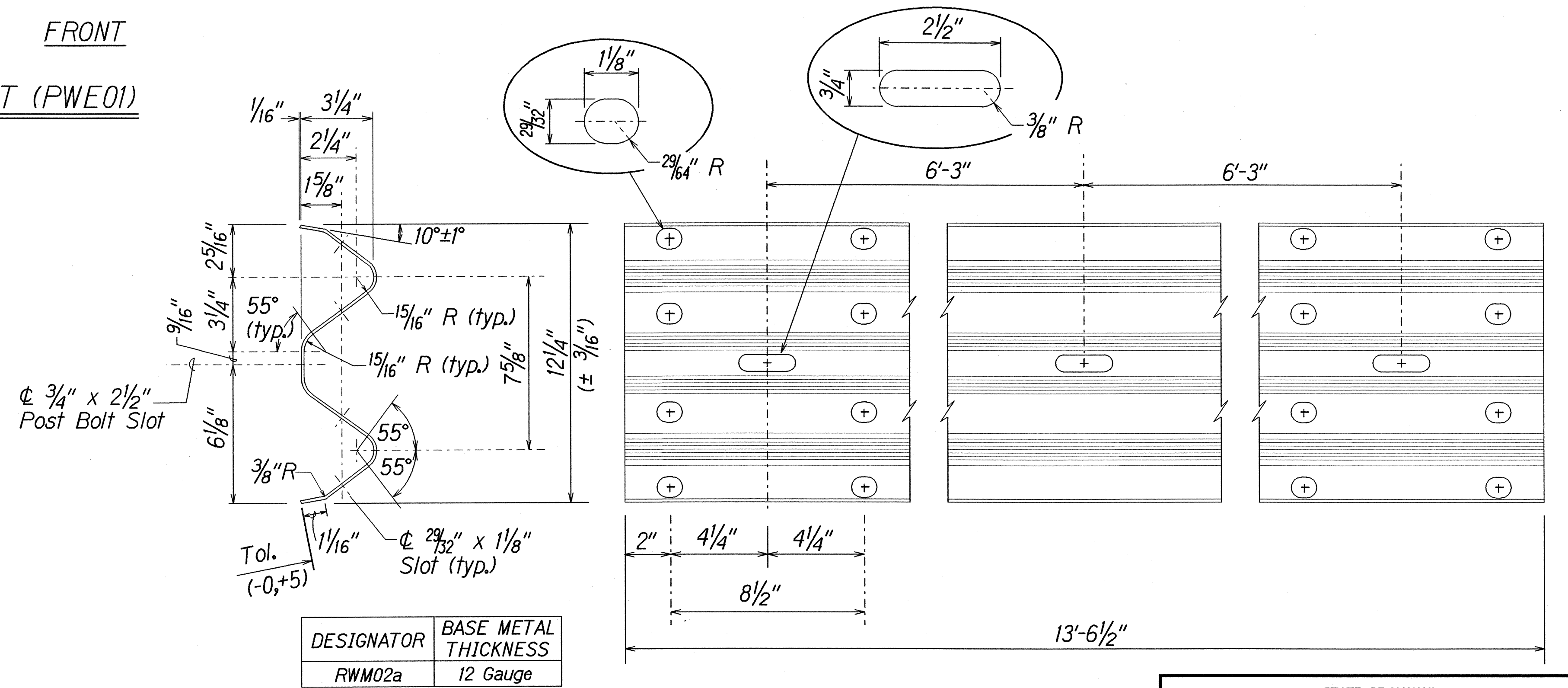


GUARDRAIL BOLTS AND RECESSED NUT



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

W-BEAM BACK-UP-PLATE (RWB01a)



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

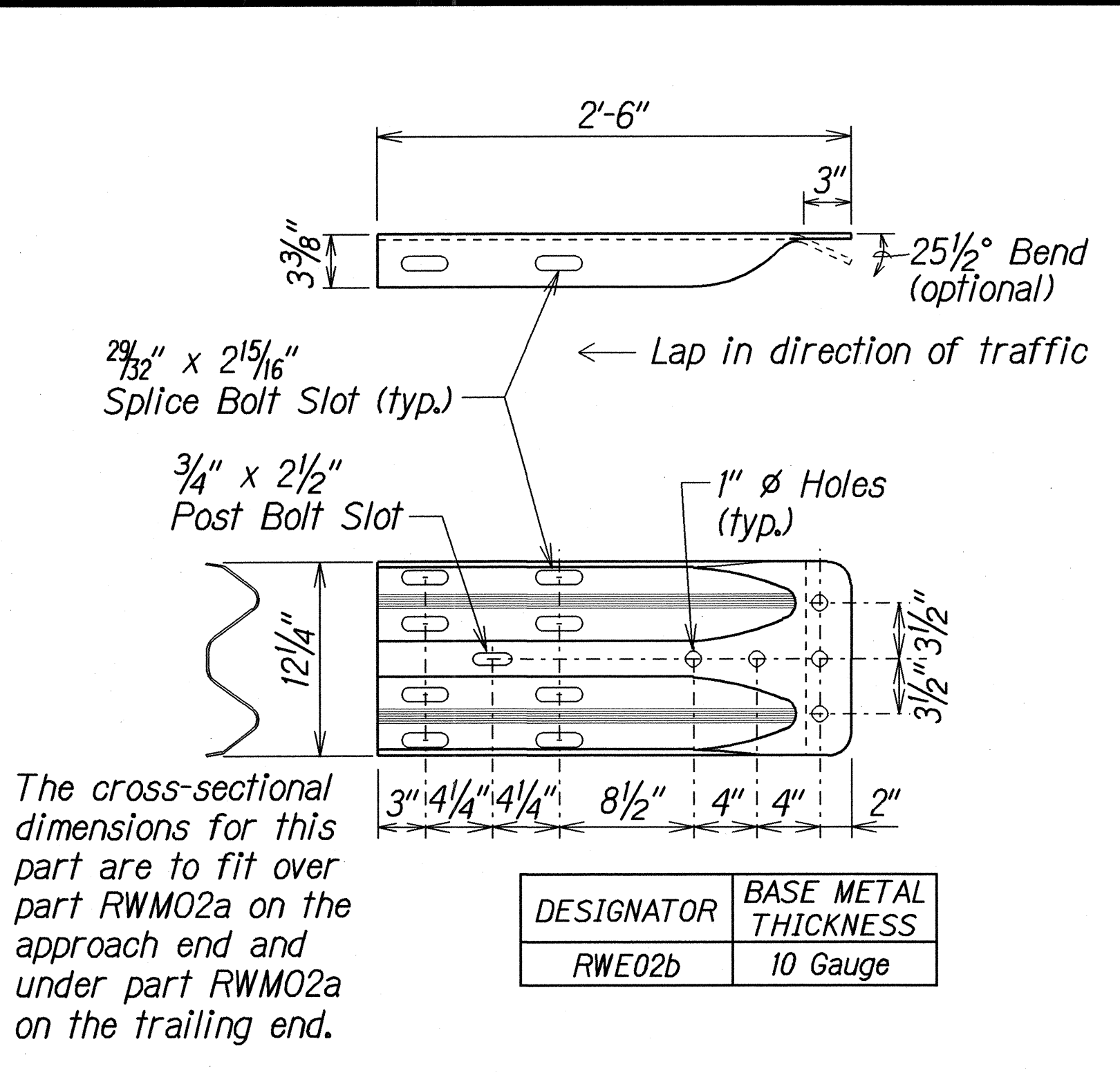
2 SPACE W-BEAM GUARDRAIL (RWM02a)

STATE OF HAWAII  
DEPARTMENT OF TRANSPORTATION  
HIGHWAYS DIVISION

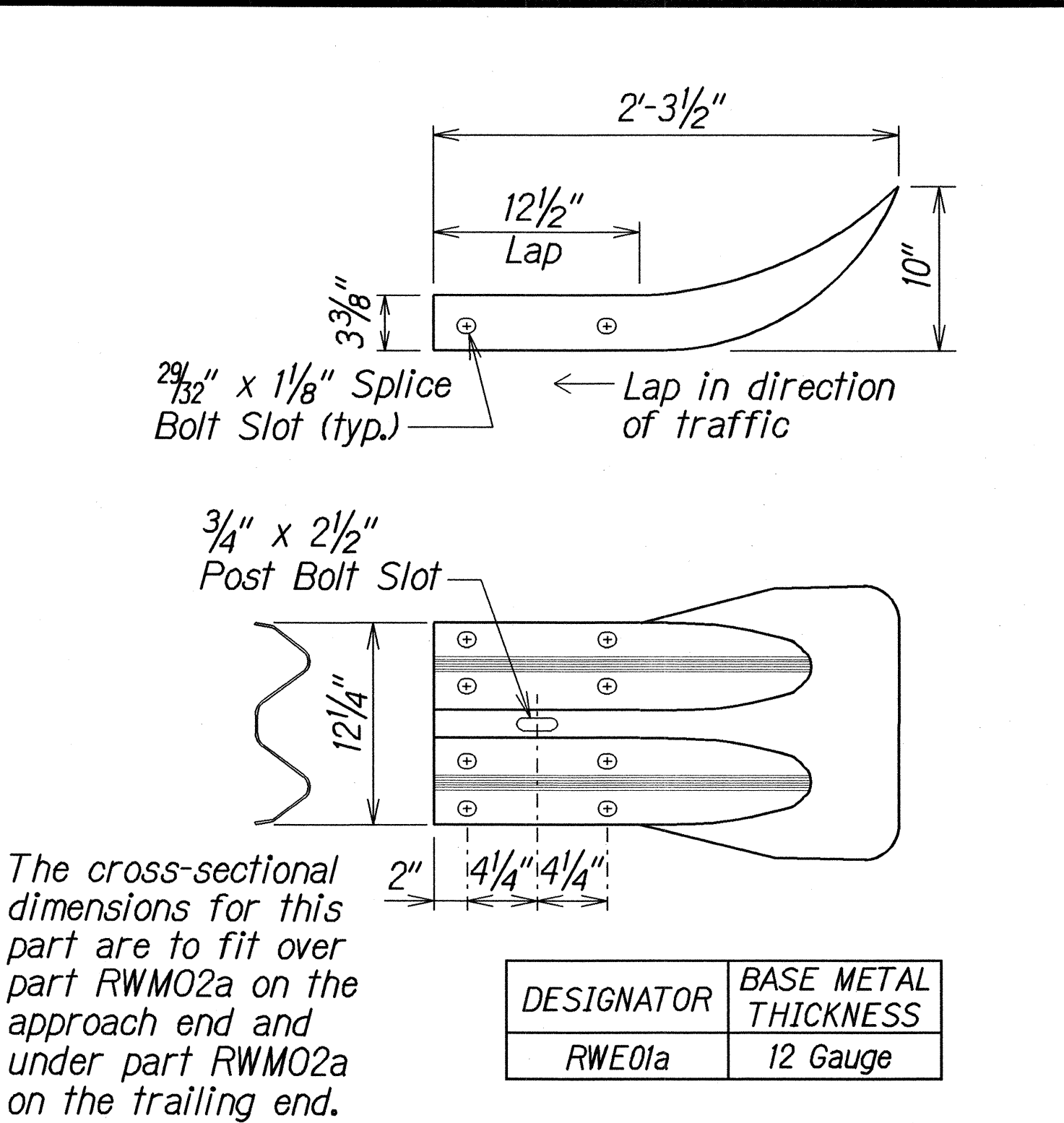
**STRONG POST W-BEAM GUARDRAIL**

**HALAWA HEIGHTS ROAD REHABILITATION**  
Kikania Street to Fernridge Place and Kahuapaani Interchange, Moanalua Freeway, H201  
Project No. HWY-0-06-03M  
Scale: NTS Date: April, 2004

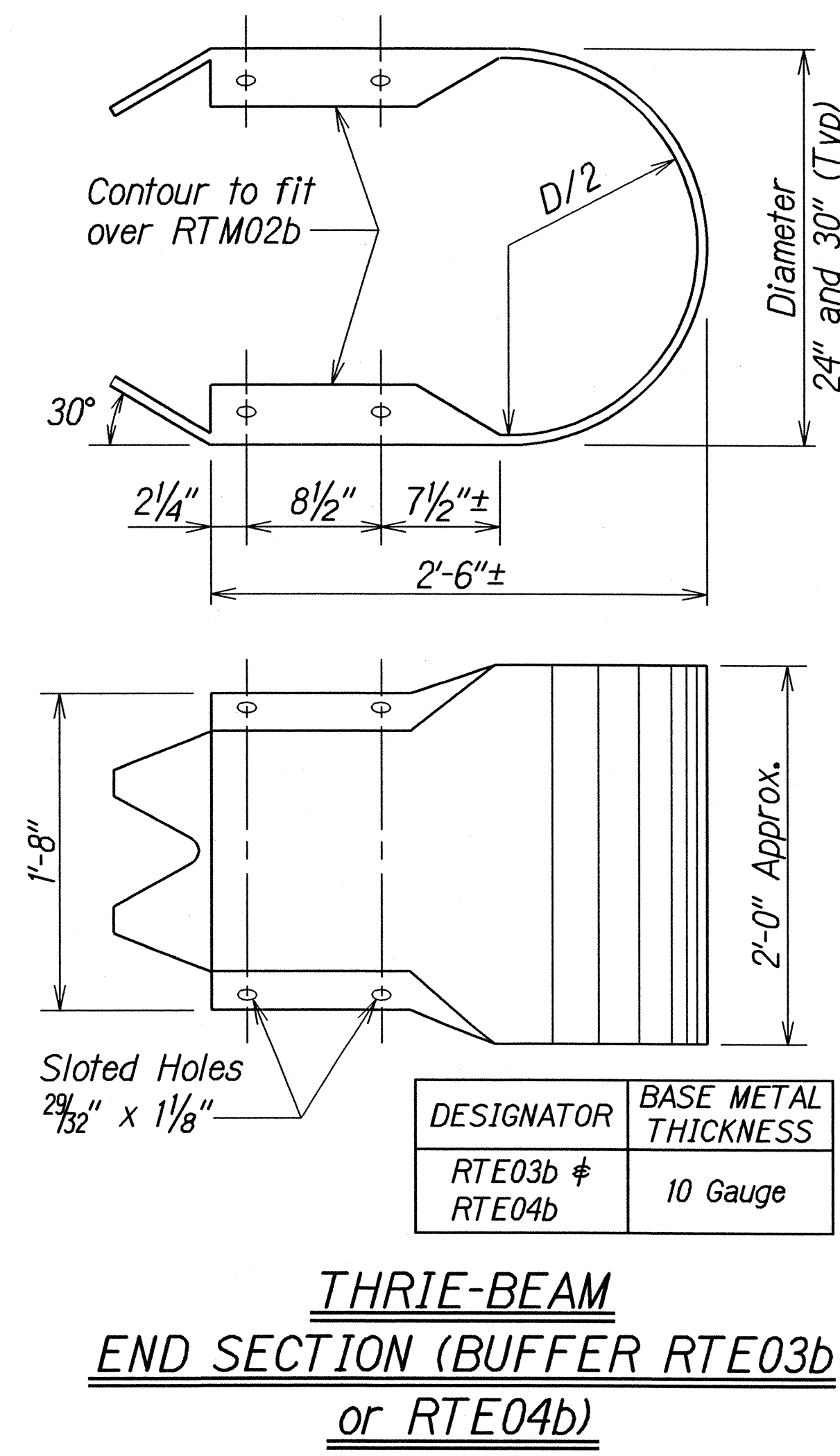
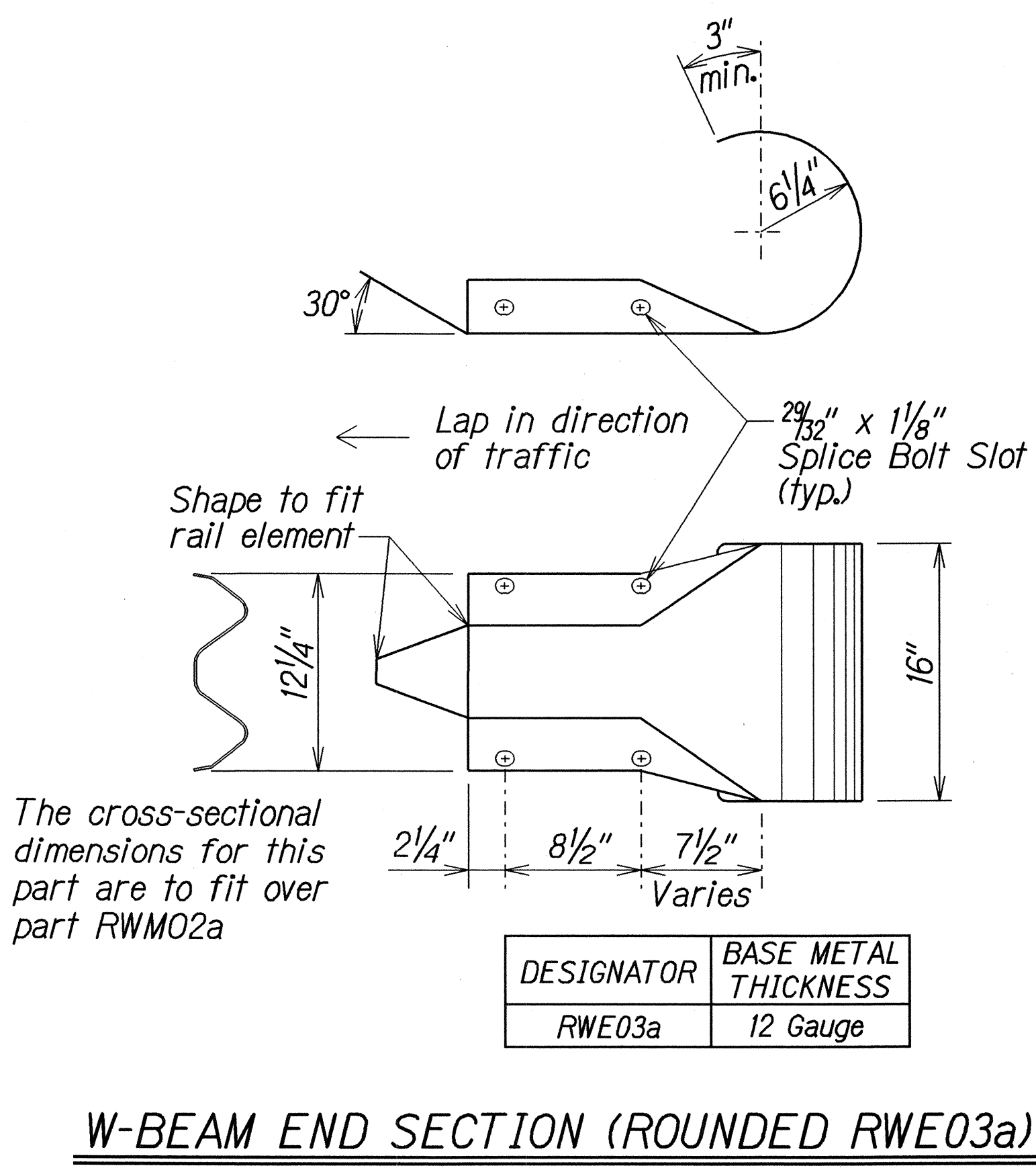
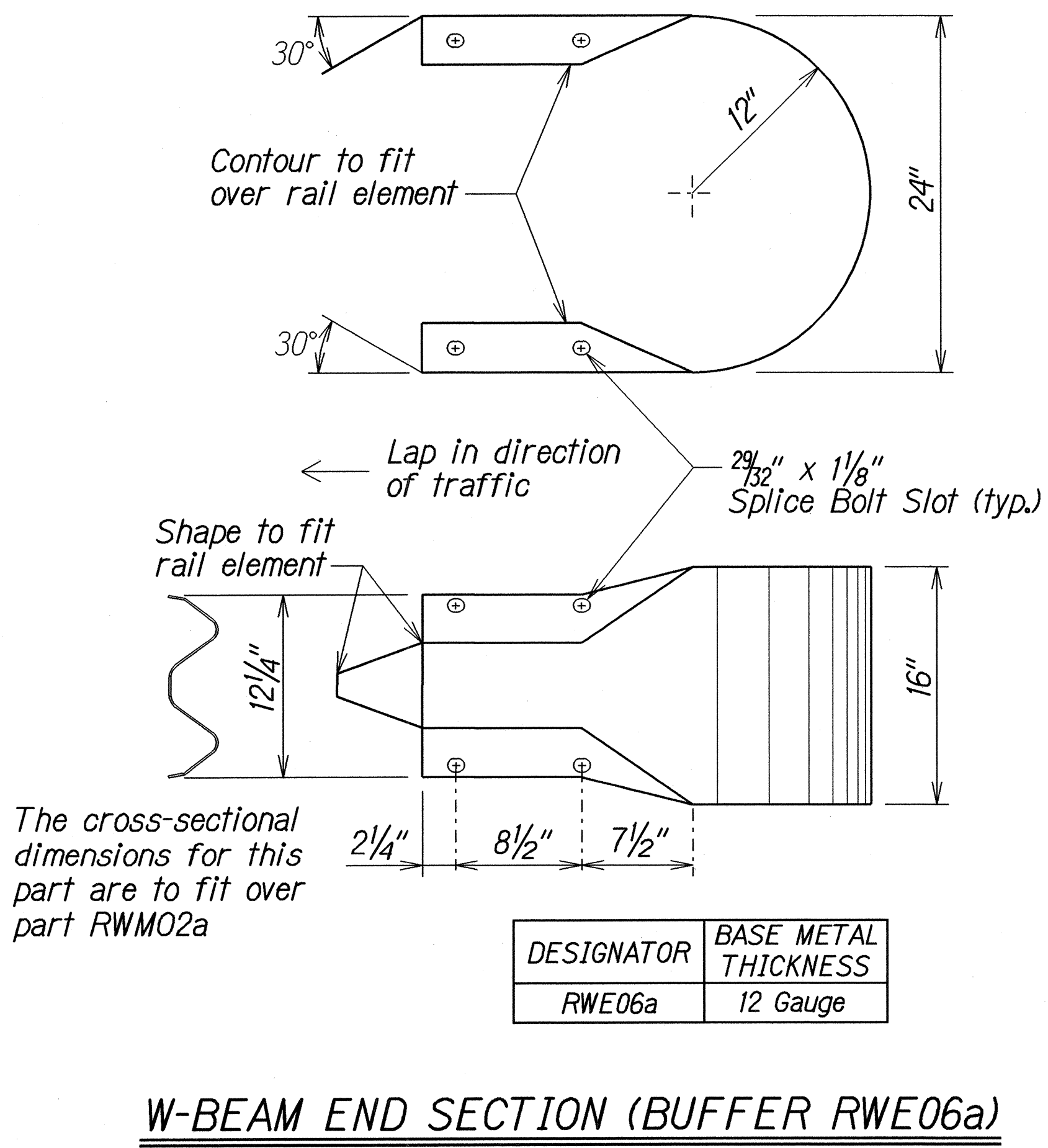
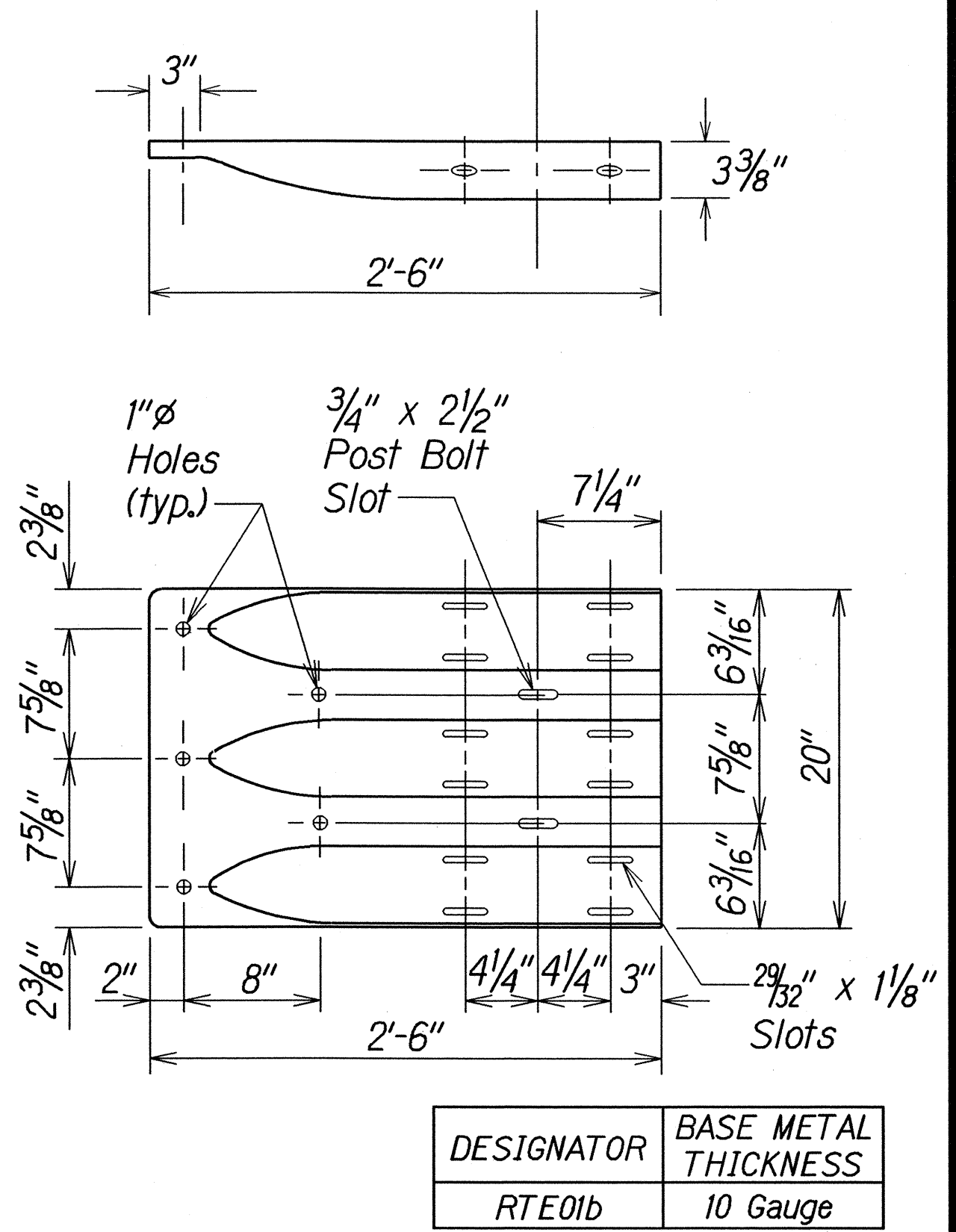
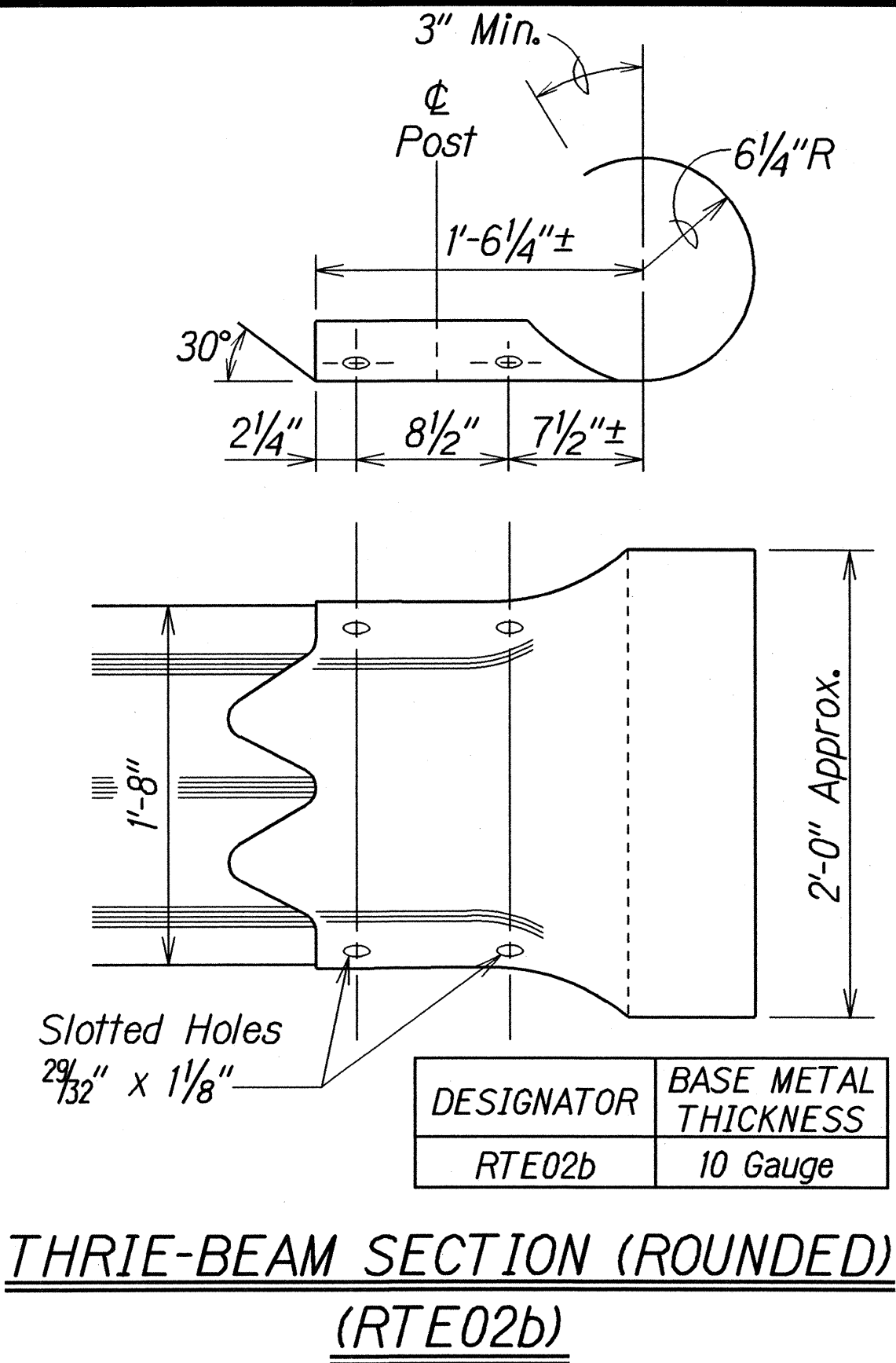
| FED. ROAD DIST. NO. | STATE | PROJ. NO.    | FISCAL YEAR | SHEET NO. | TOTAL SHEETS |
|---------------------|-------|--------------|-------------|-----------|--------------|
| HAWAII              | HAW.  | HWY-0-06-03M | 2004        | 15        | 51           |



W-BEAM TERMINAL CONNECTOR (RWE02b)



W-BEAM END SECTION (FLARED RWE01a)



STATE OF HAWAII

DEPARTMENT OF TRANSPORTATION

HIGHWAYS DIVISION

GUARDRAIL TERMINAL CONNECTORS AND END SECTIONS

HALAWA HEIGHTS ROAD REHABILITATION

Kikania Street to Fernridge Place and Kahuapaani Interchange, Moanalua Freeway, H201

Project No. HWY-0-06-03M

Scale: NTS

Date: April, 2004

SHEET No. 4 OF 7 SHEETS

15

|                   |      |
|-------------------|------|
| ORIGINAL PLAN     | DATE |
| SURVEY PLOTTED BY |      |
| DRAWN BY          |      |
| DESIGNED BY       |      |
| CHECKED BY        |      |
| NOTED BY          |      |
| DATE              |      |

16/21/01

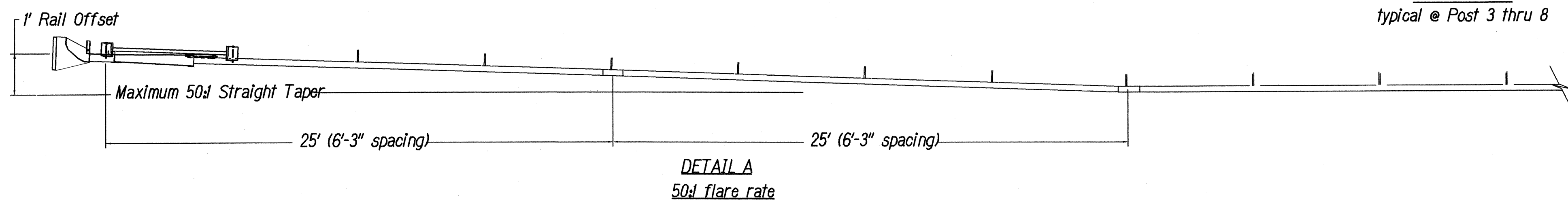
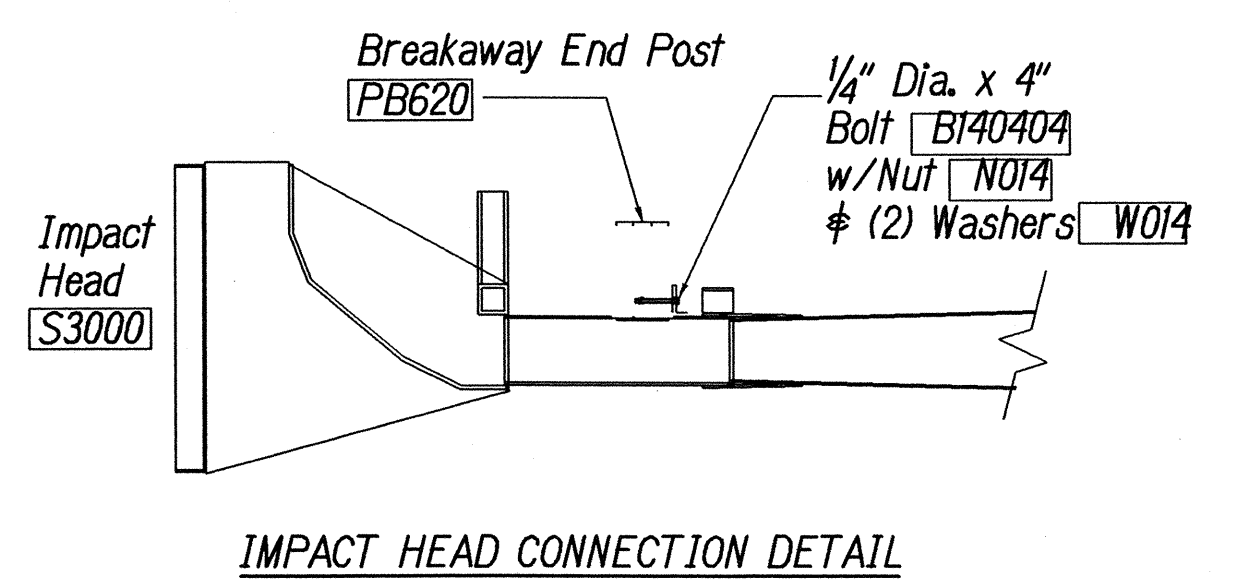
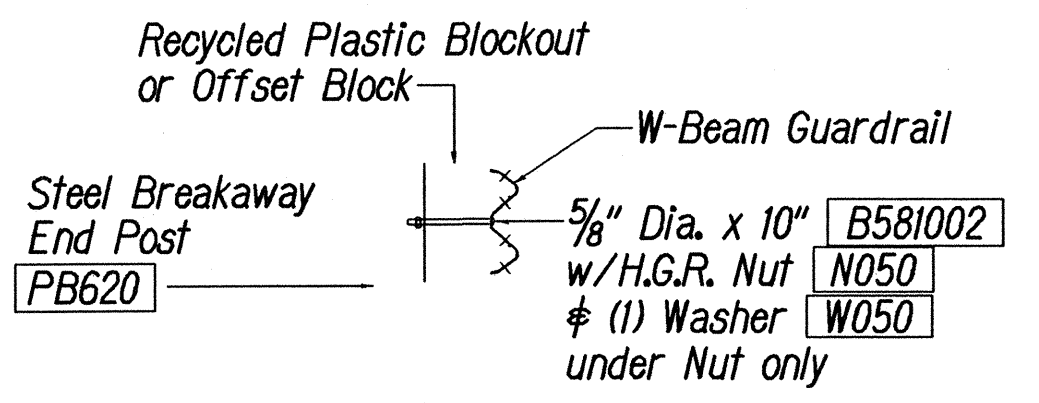
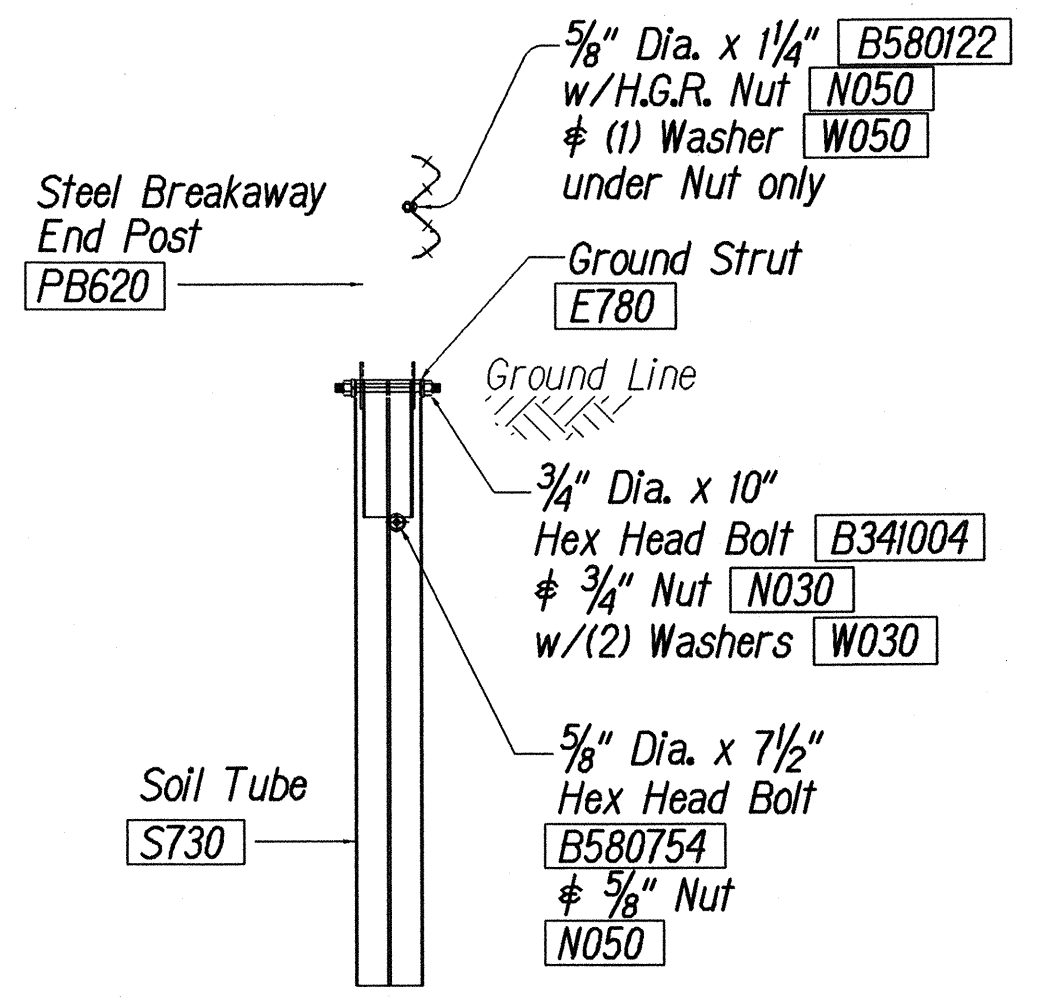
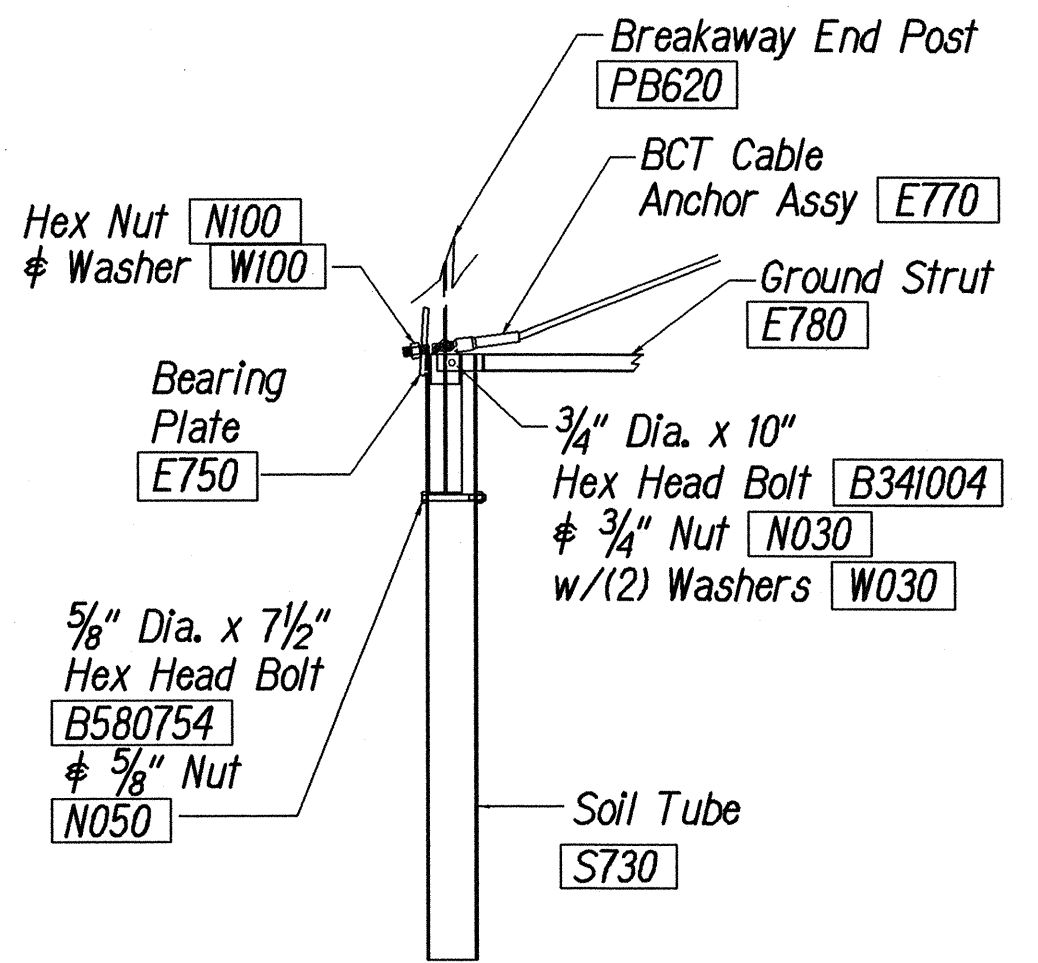
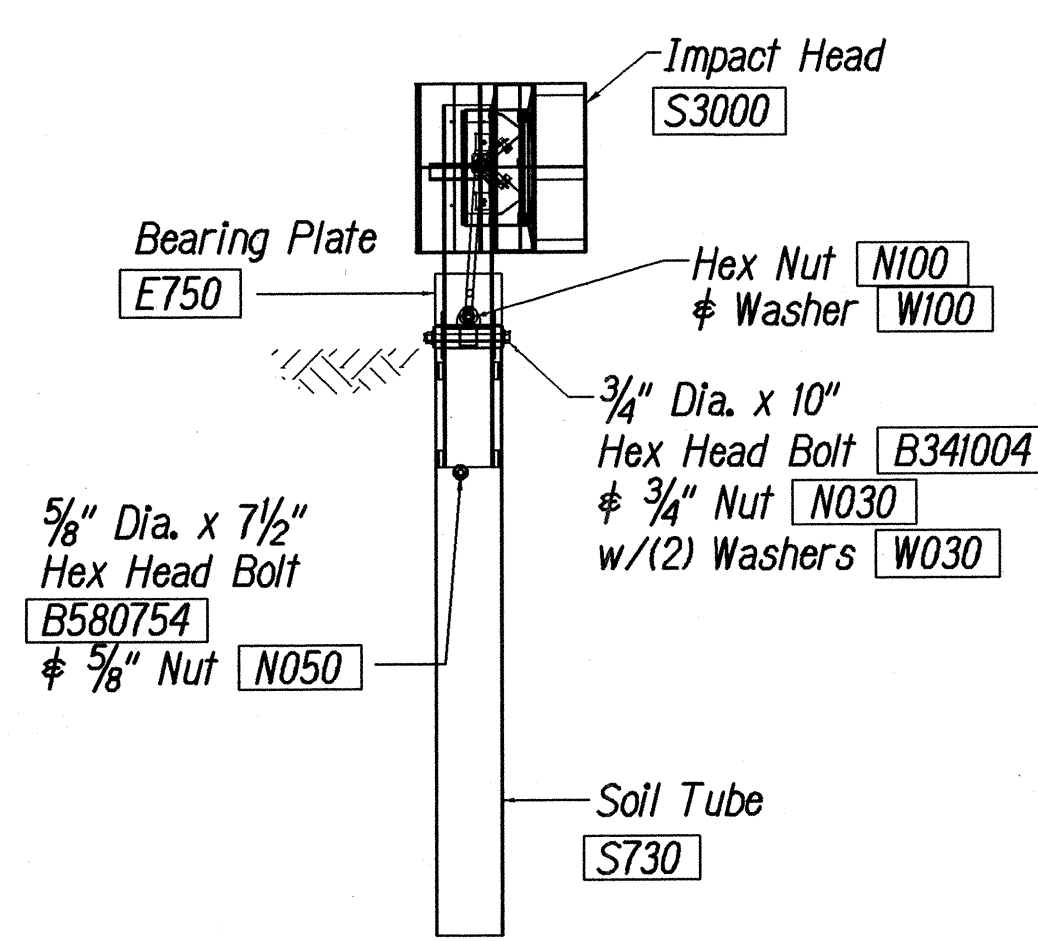
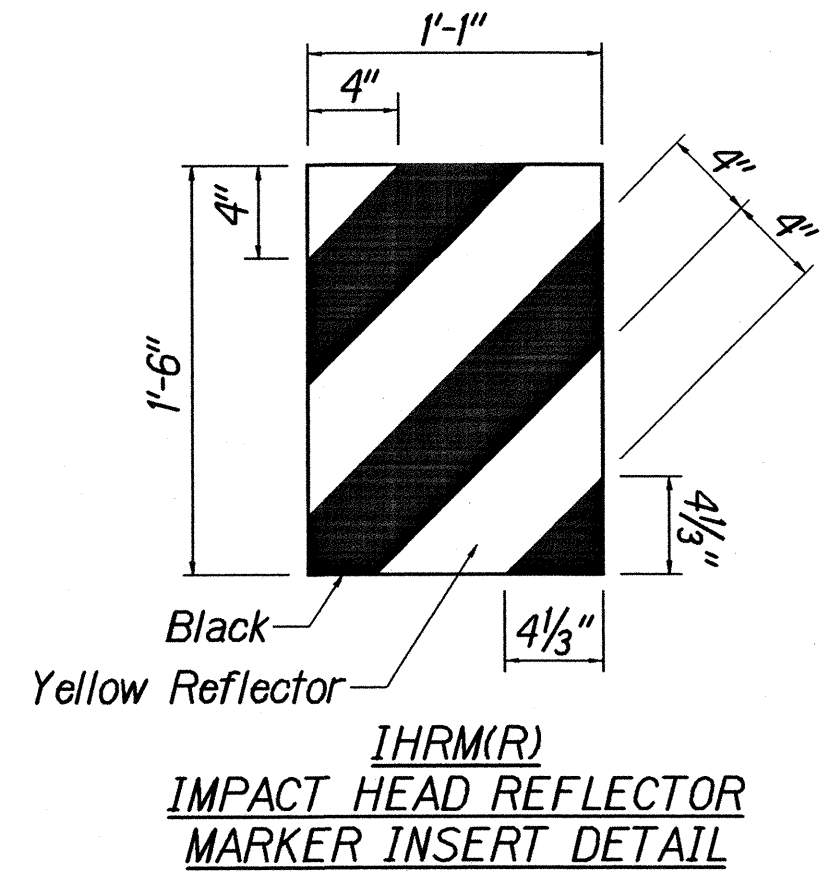
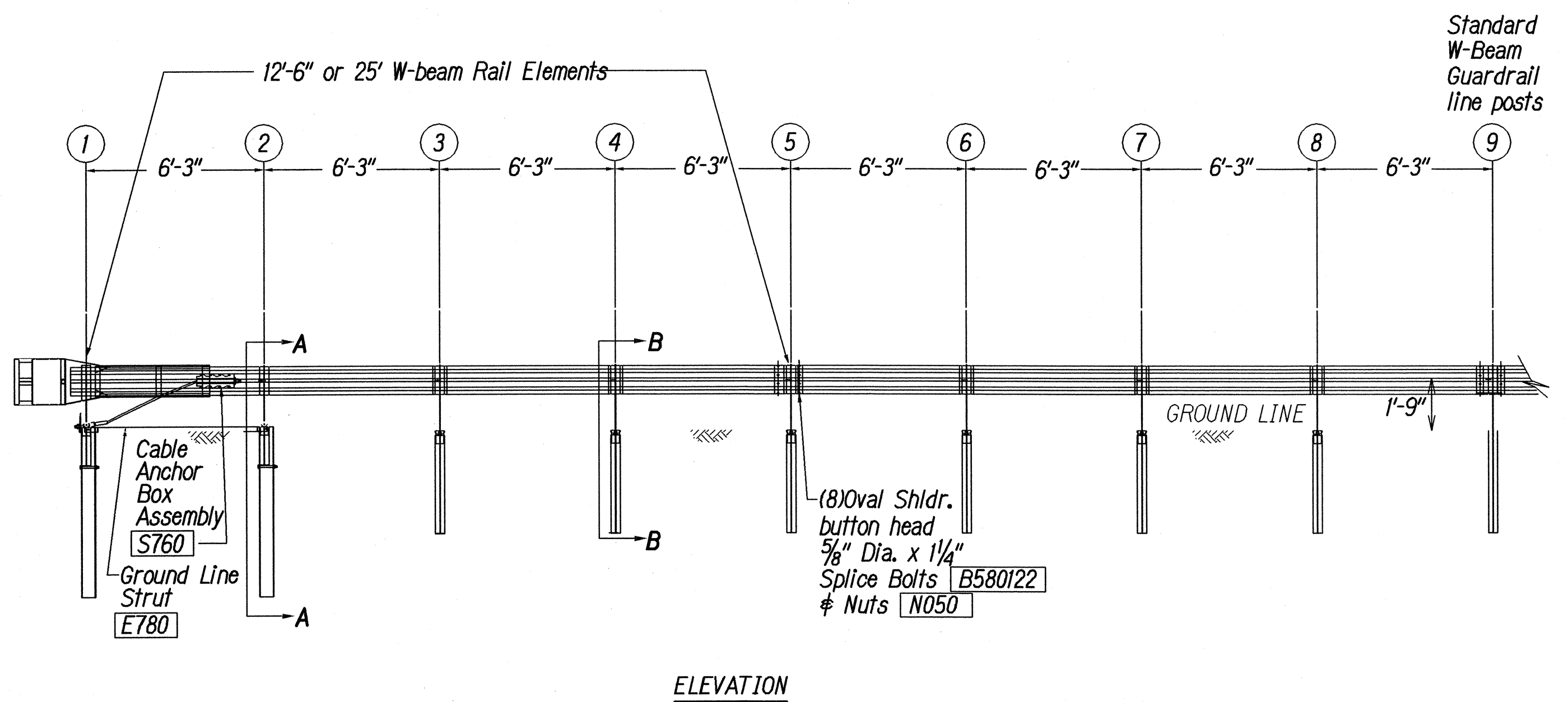
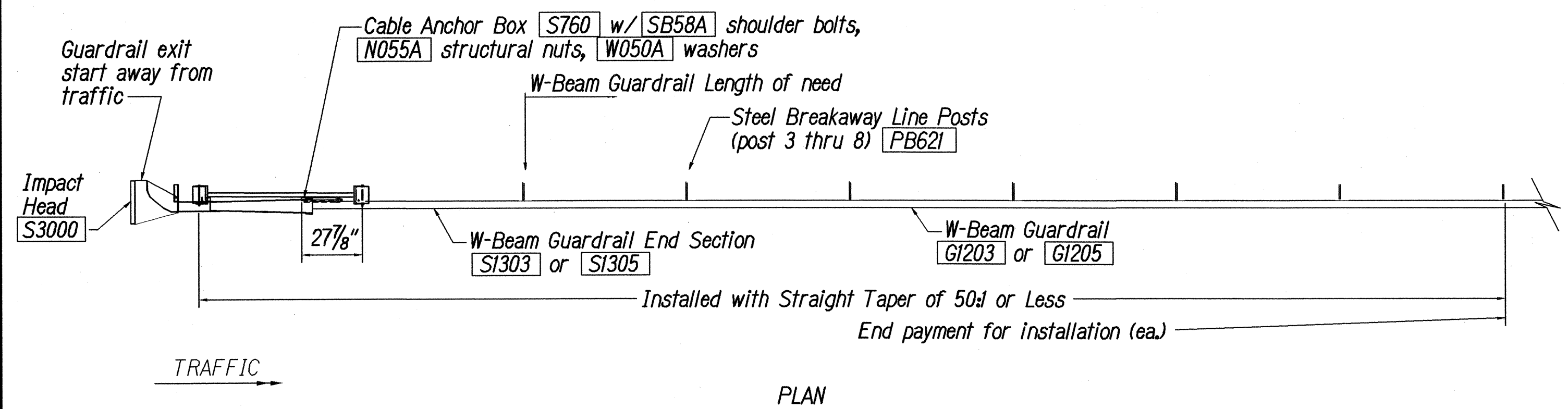
| FED. ROAD DIST. NO. | STATE | PROJ. NO.    | FISCAL YEAR | SHEET NO. | TOTAL SHEETS |
|---------------------|-------|--------------|-------------|-----------|--------------|
| HAWAII              | HAW.  | HWY-0-06-03M | 2004        | 16        | 51           |

| ITEM NO.    | QTY.  | BILL OF MATERIALS                                                |
|-------------|-------|------------------------------------------------------------------|
| S3000       | 1     | IMPACT HEAD                                                      |
| SI303/SI305 | 1     | W-BEAM GUARDRAIL END SECTION 12 GA. 12.5' or 25'                 |
| GI203/GI205 | 3/1   | W-BEAM GUARDRAIL, 12 GA., 12.5' or 25'                           |
| 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 POSTS                                        |
| PB621       | 6     | STEEL BREAKAWAY LINE POSTS                                       |
|             | 6     | RECYCLED PLASTIC BLOCKOUTS OR OFFSET BLOCK                       |
|             | 1     | IMPACT HEAD REFLECTOR MARKER - IHRM(R) OR (L)                    |
| HARDWARE    |       |                                                                  |
| B580122     | 17/33 | 5/8" Dia. x 1 1/4" SPLICE BOLTS, POST #2                         |
| B580754     | 2     | 5/8" Dia. x 7 1/2" HEX BOLTS                                     |
| B341004     | 2     | 3/4" Dia. x 10" HEX BOLTS                                        |
| B341002     | 6     | 5/8" Dia. x 10" H.G.R. BOLT (POST 2 ONLY)                        |
| B581802     | 6     | 5/8" Dia. x 18" H.G.R. BOLT (POST 3 THRU 8)                      |
| N050        | 26/42 | 5/8" Dia. H.G.R. NUT (SPLICE 17/33, SOIL TUBES 2, POST 2 THRU 8) |
| N030        | 2     | 3/4" Dia. HEX NUTS                                               |
| W050        | 7     | H.G.R. WASHER                                                    |
| W030        | 4     | 3/4" ID WASHER                                                   |
| N100        | 2     | 1" ANCHOR CABLE HEX NUT                                          |
| W100        | 2     | 1" ANCHOR CABLE WASHER                                           |
| BI40404     | 2     | 1/4" x 4" HEX BOLT                                               |
| N014        | 2     | 1/4" HEX NUT                                                     |
| W014        | 4     | 1/4" WASHER                                                      |
| SB58A       | 8     | CABLE ANCHOR BOX SHOULDER BOLTS                                  |
| N055A       | 8     | 1/2" A325 STRUCTURAL NUTS                                        |
| 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 Sequential Kinking Terminal.
- All bolts, nuts, cable assemblies, cable anchors and bearing plates shall be galvanized.
- When the Sequential Kinking Terminal is selected as the end treatment for W-Beam Guardrail installation, the W-Beam Guardrail will be flared at a rate of 50:1 to prevent the impact head from encroaching on the shoulder. The flare is not required and may be decreased or eliminated for specific installations.
- The soil tube 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. They shall not be driven with the post in the tube. If the soil 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.
- A special site evaluation should be considered prior to using the Sequential Kinking Terminal where there is less than 25' between the outlet side of the Sequential Kinking Terminal and any adjacent driving lane.
- (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.

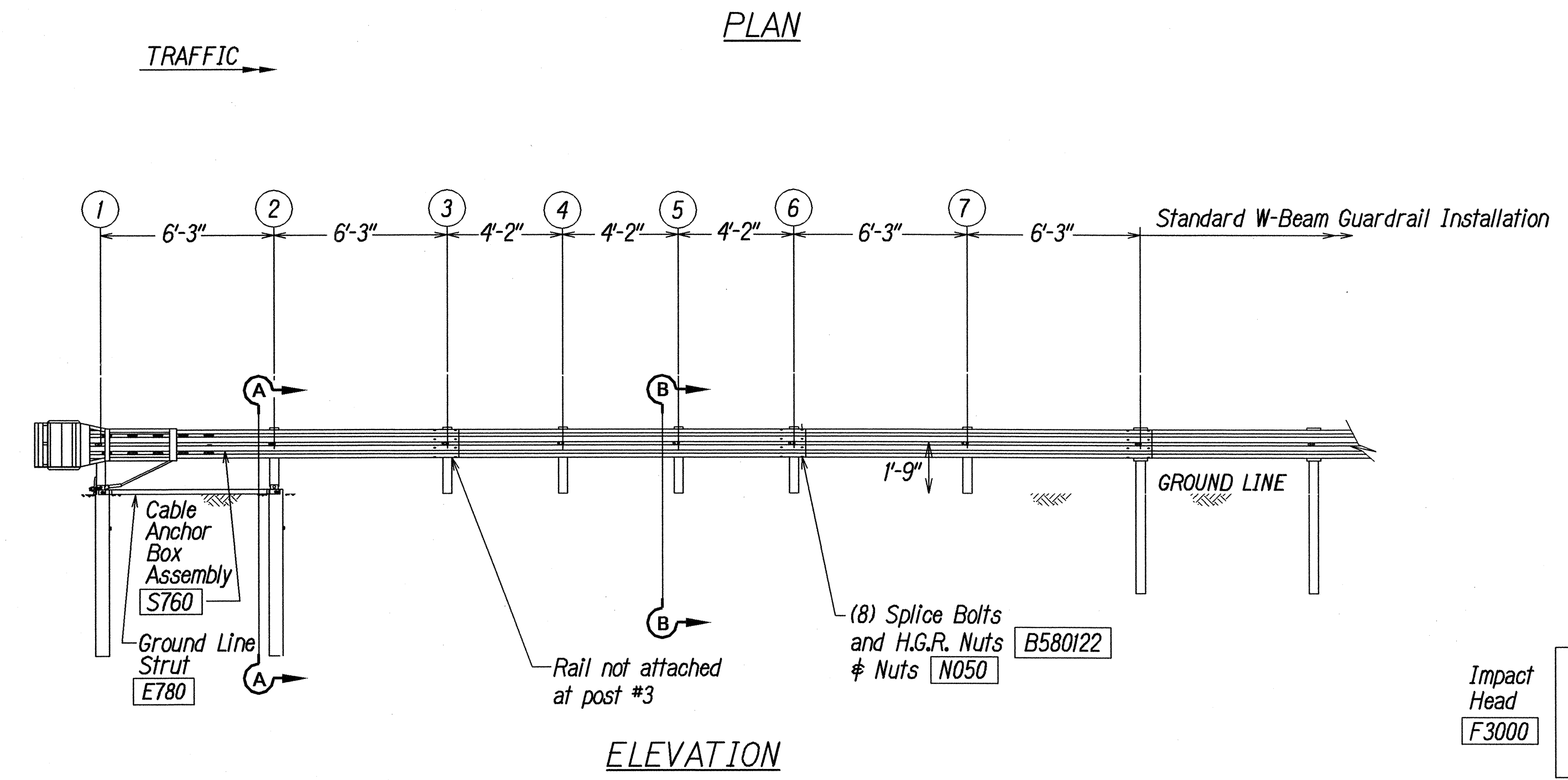
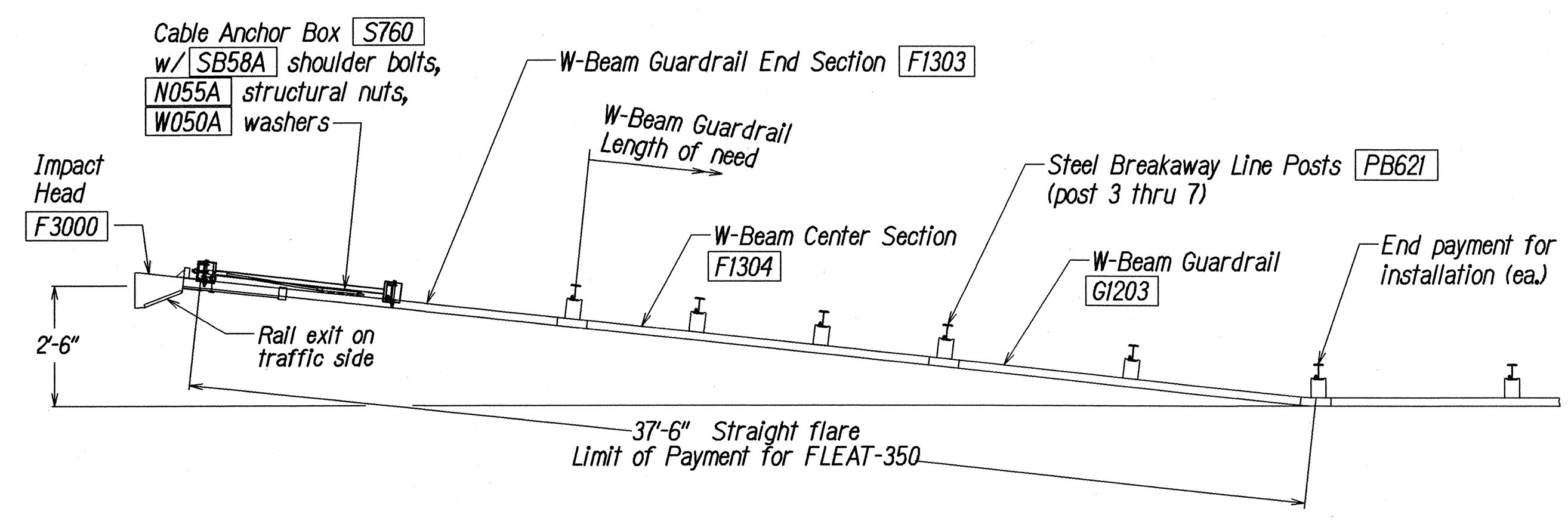


|               |      |
|---------------|------|
| ORIGINAL PLAN | DATE |
| DESIGNED BY   |      |
| CHECKED BY    |      |
| NOTED BY      |      |
| QUANTITIES BY |      |
| DATE          |      |

guardrail/sk350.dgn

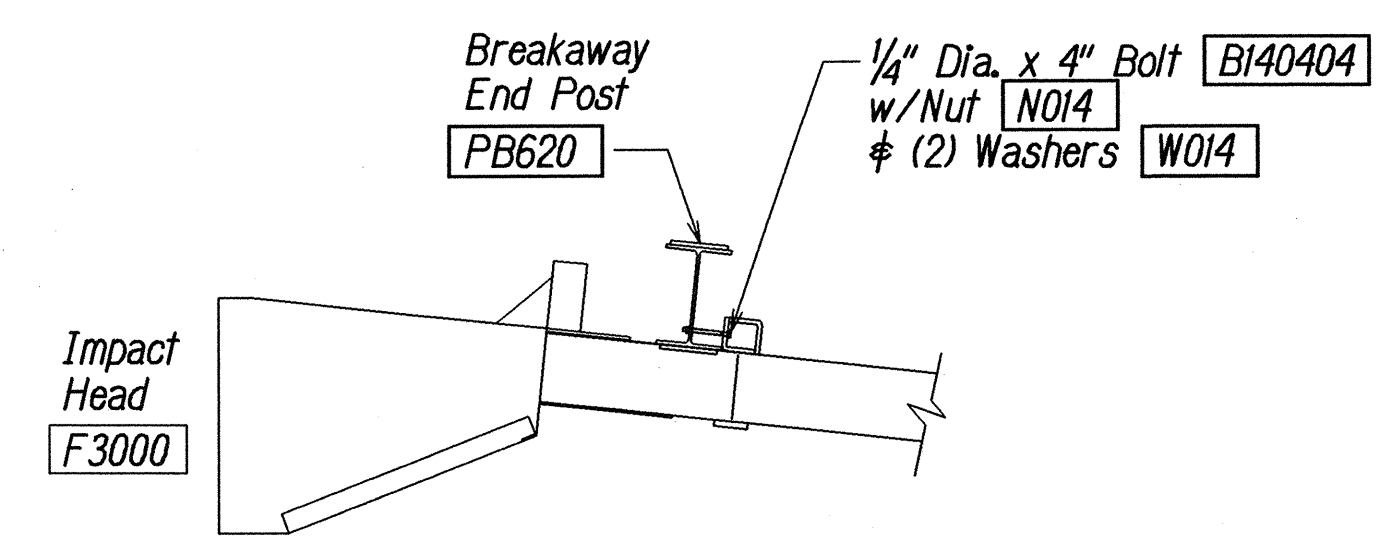
STATE OF HAWAII  
 DEPARTMENT OF TRANSPORTATION  
 HIGHWAYS DIVISION  
**SKT-350**  
**SEQUENTIAL KINKING TERMINAL**  
 HALAWA HEIGHTS ROAD REHABILITATION  
 Kikania Street to Fernridge Place and  
 Kahuapaani Interchange, Moanalua Freeway, H201  
 Project No. HWY-0-06-03M  
 Not to Scale Date: April, 2004  
 SHEET No. 4 OF 7 SHEETS

| FED. ROAD DIST. NO. | STATE | PROJ. NO.    | FISCAL YEAR | SHEET NO. | TOTAL SHEETS |
|---------------------|-------|--------------|-------------|-----------|--------------|
| HAWAII              | HAW.  | HWY-0-06-03M | 2004        | 17        | 51           |



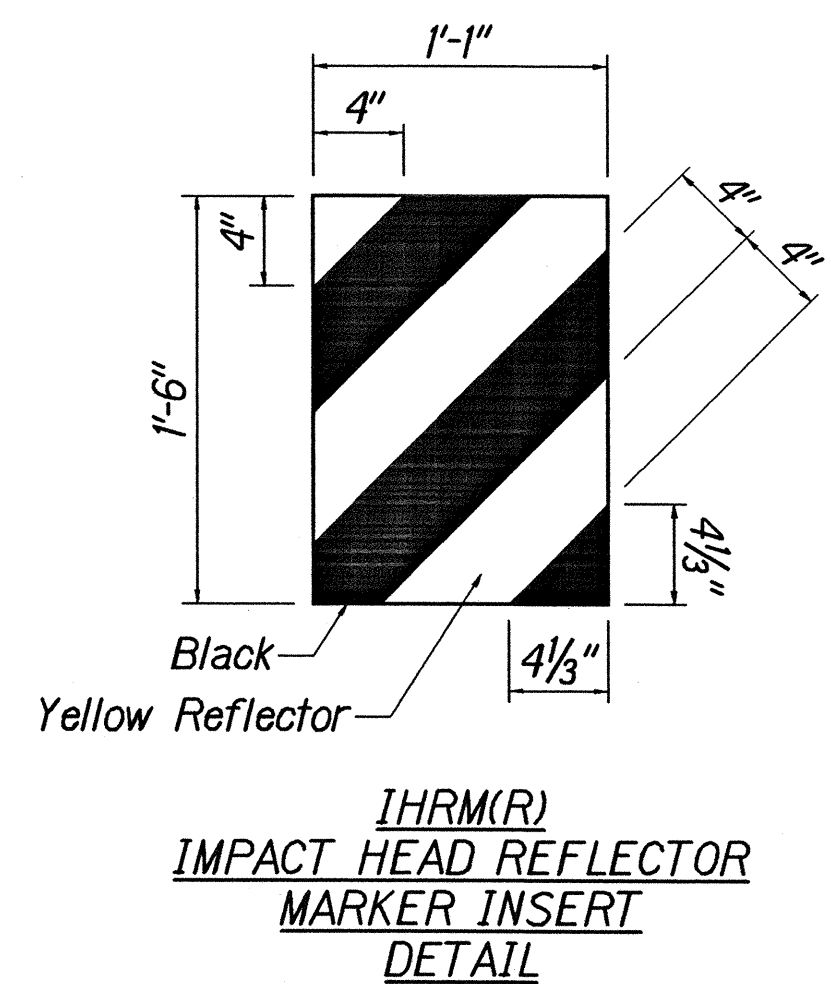
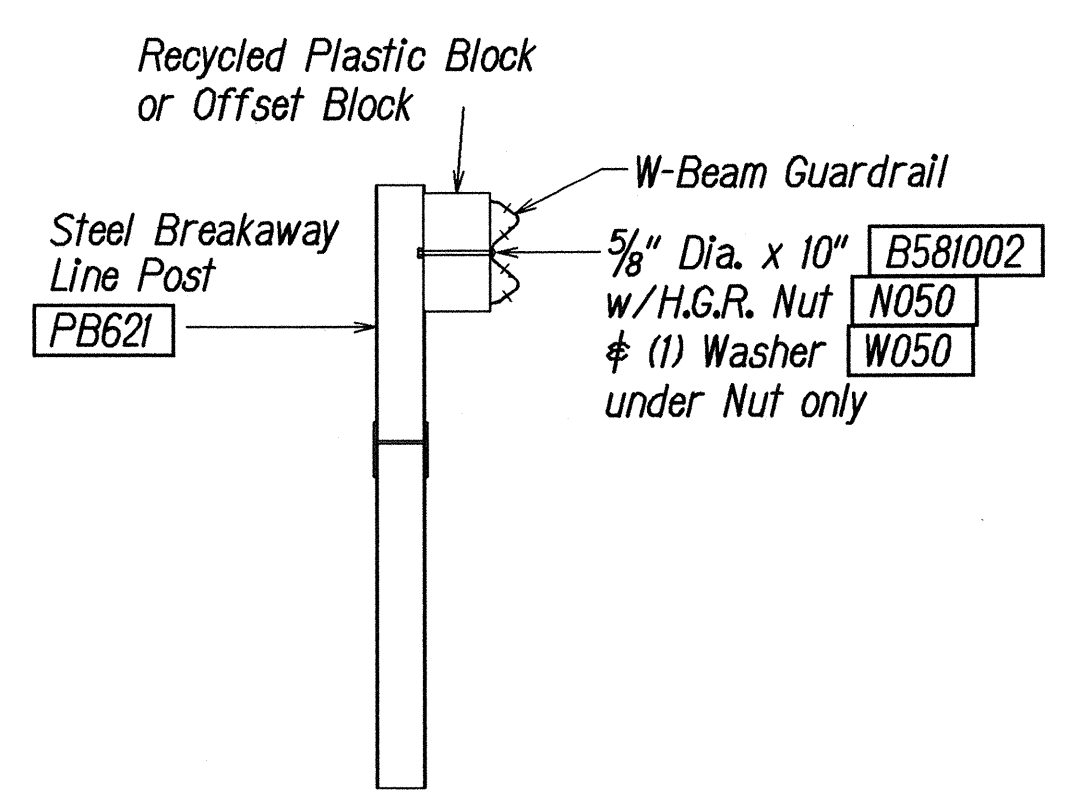
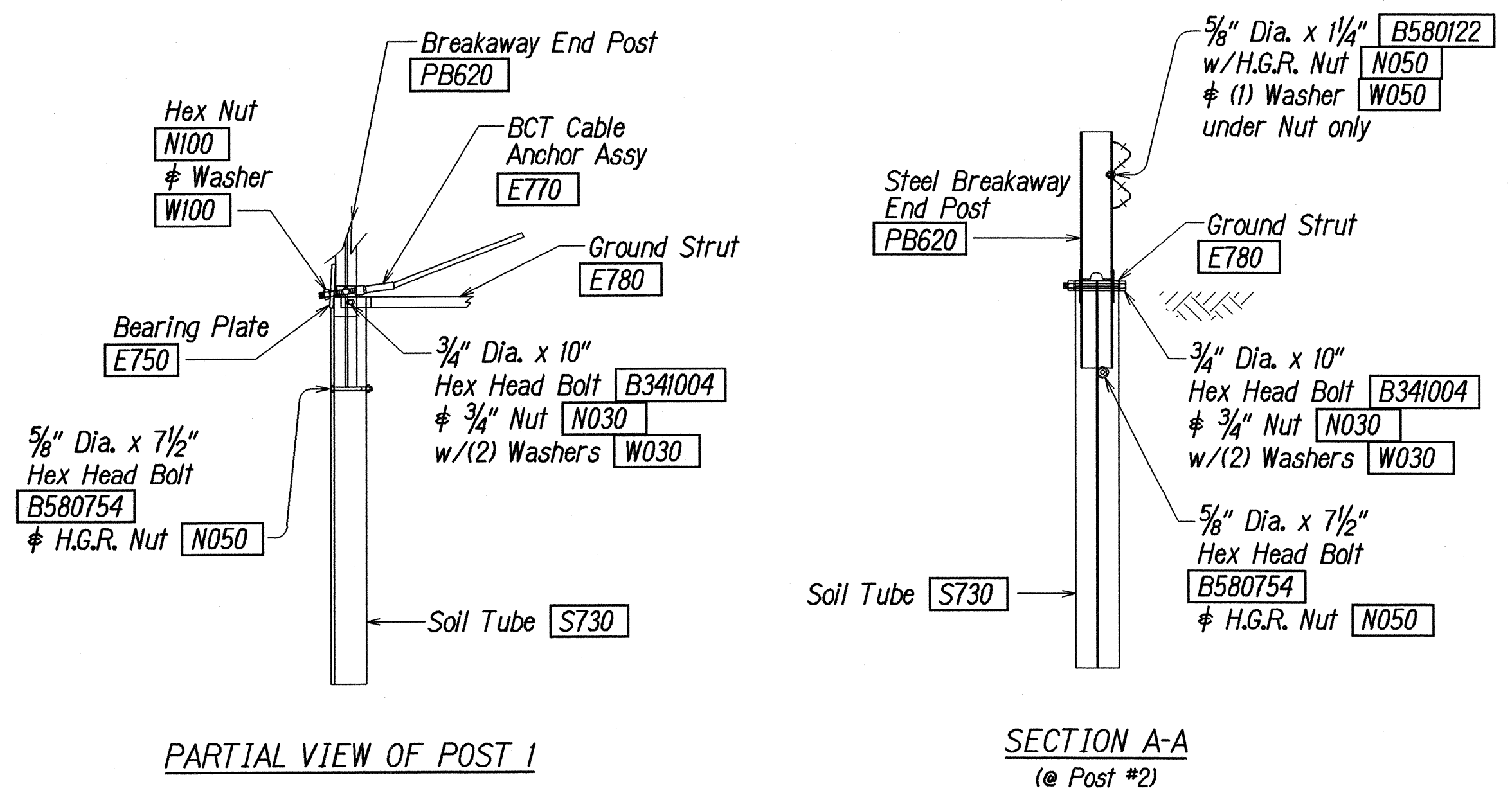
### GENERAL NOTES

- 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.



| ITEM NO. | QTY. | BILL OF MATERIALS                                                |
|----------|------|------------------------------------------------------------------|
| F3000    | 1    | IMPACT HEAD                                                      |
| F1303    | 1    | W-BEAM GUARDRAIL END SECTION, 12 GA.                             |
| F1304    | 1    | W-BEAM GUARDRAIL CENTER SECTION, 12 GA.                          |
| G1203    | 1    | W-BEAM GUARDRAIL, 12 GA.                                         |
| S730     | 2    | *FOUNDATION SOIL TUBE, 6" x 8" x 72"                             |
| E750     | 1    | BEARING PLATE                                                    |
| S760     | 1    | CABLE ANCHOR BOX                                                 |
| E770     | 1    | BCT CABLE ANCHOR ASSEMBLY                                        |
| E780     | 1    | GROUND STRUT                                                     |
| PB620    | 2    | STEEL BREAKAWAY END POST                                         |
| PB621    | 5    | STEEL BREAKAWAY LINE POST                                        |
|          | 5    | RECYCLED PLASTIC BLOCKOUT OR OFFSET BLOCK                        |
|          | 1    | IMPACT HEAD REFLECTOR MARKER - IHRM(R) OR (L)                    |
| HARDWARE |      |                                                                  |
| B580122  | 25   | 5/8" Dia. x 1 1/4" SPLICE BOLT, POST #2                          |
| B580754  | 2    | 5/8" Dia. x 7 1/2" HEX BOLT                                      |
| B341004  | 2    | 3/4" Dia. x 10" HEX BOLT                                         |
| B581002  | 5    | 5/8" Dia. x 10" H.G.R. BOLT (POST 3 THRU 7)                      |
| N050     | 32   | 5/8" Dia. H.G.R. NUT (SPLICE 24, SOIL TUBES 2, POST 2 THRU 7, 6) |
| N030     | 2    | 3/4" Dia. HEX NUT                                                |
| W050     | 6    | H.G.R. WASHER                                                    |
| W030     | 4    | 3/4" ID WASHER                                                   |
| N100     | 2    | 1" ANCHOR CABLE HEX NUT                                          |
| W100     | 2    | 1" ANCHOR CABLE WASHER                                           |
| B140404  | 2    | 1/4" x 4" HEX BOLT                                               |
| N014     | 2    | 1/4" HEX NUT                                                     |
| W014     | 4    | 1/4" WASHER                                                      |
| SB58A    | 8    | CABLE ANCHOR BOX SHOULDER BOLT                                   |
| N055A    | 8    | 1/2" A325 STRUCTURAL NUT                                         |
| W050A    | 16   | 1 1/16" OD x 9/16" ID A325 STR. WASHER                           |

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



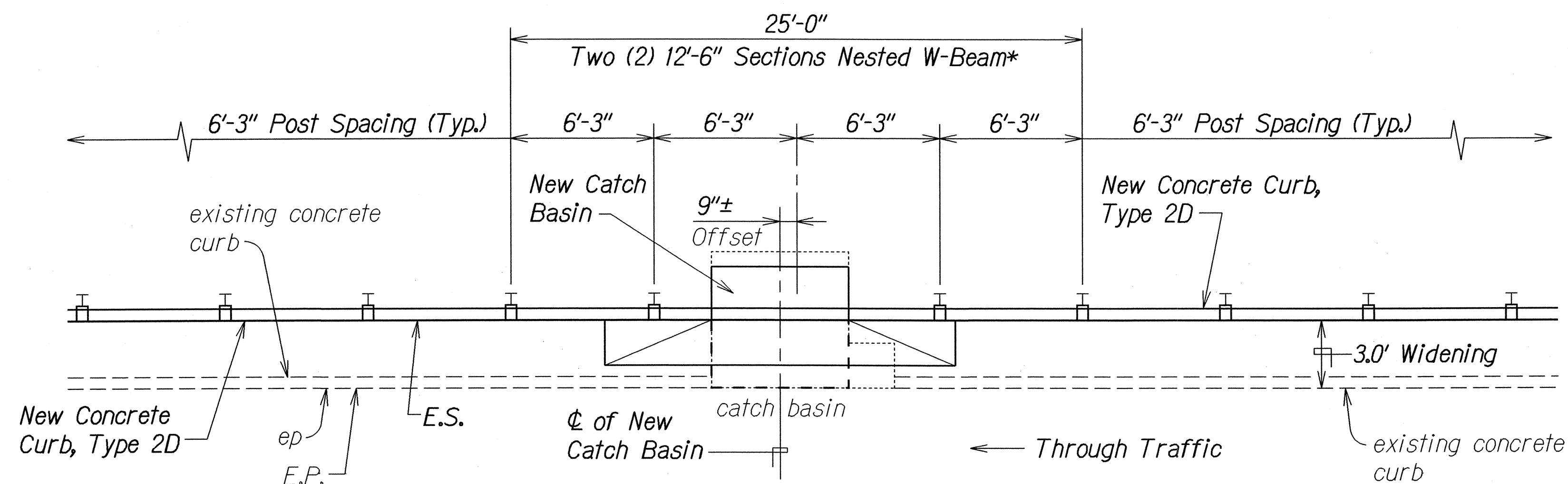
STATE OF HAWAII  
 DEPARTMENT OF TRANSPORTATION  
 HIGHWAYS DIVISION  
**FLEAT-350**  
**FLARED ENERGY ABSORBING TERMINAL**  
**HALAWA HEIGHTS ROAD REHABILITATION**  
 Kikania Street to Fernridge Place and  
 Kahuapaani Interchange, Moanalua Freeway, H201  
 Project No. HWY-0-06-03M  
 Not to Scale Date: April, 2004  
 SHEET No. 5 OF 7 SHEETS

|                  |      |
|------------------|------|
| SURVEY PLACED BY | DATE |
| DRAWN BY         |      |
| DESIGNED BY      |      |
| CHECKED BY       |      |
| NOTED BY         |      |

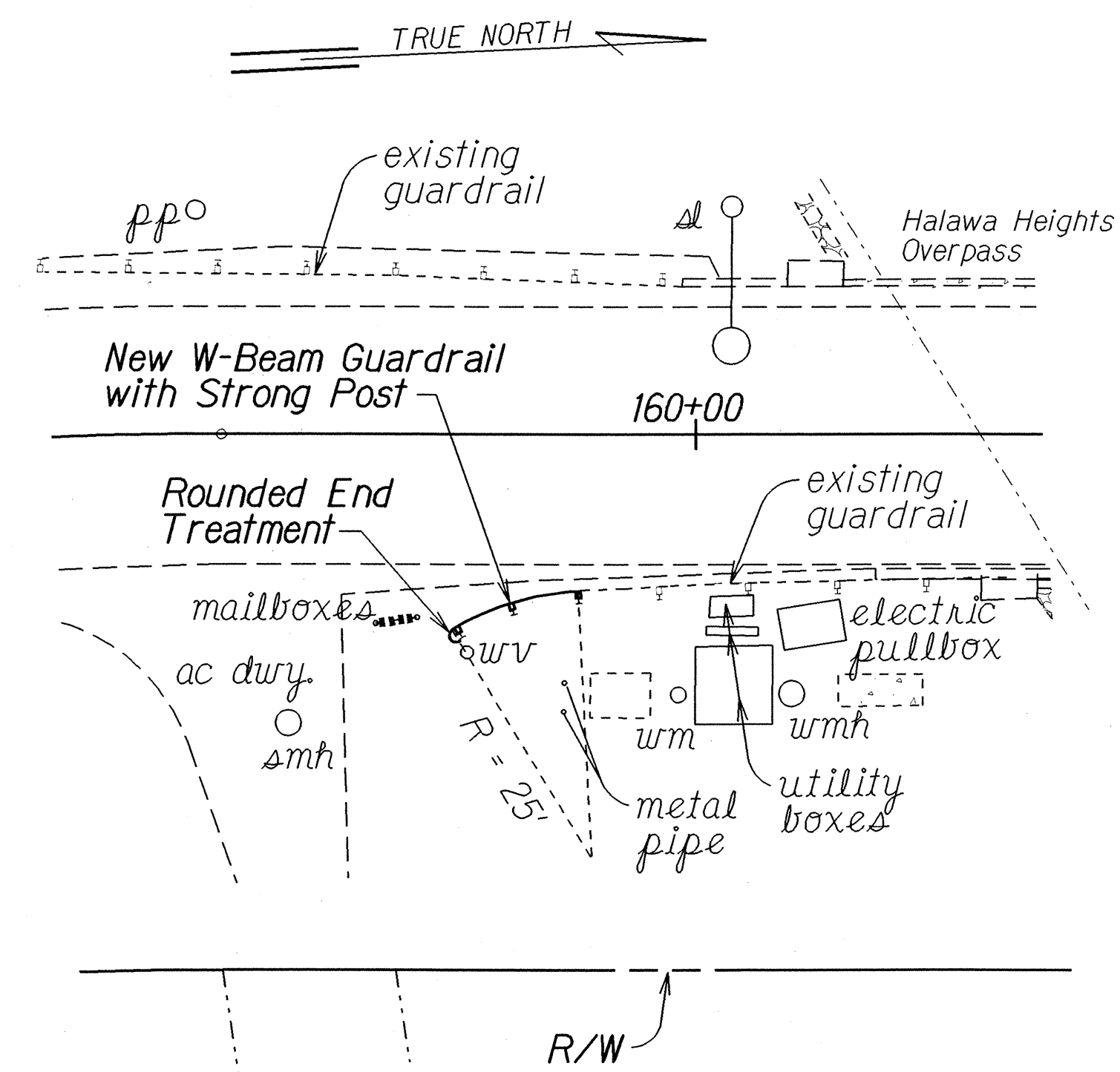
13/28/01



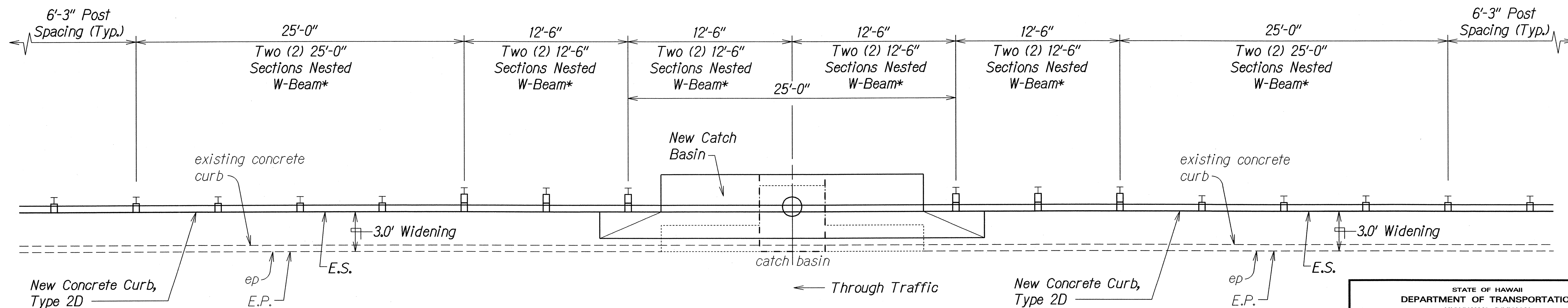
| FED. ROAD DIST. NO. | STATE | PROJ. NO.    | FISCAL YEAR | SHEET NO. | TOTAL SHEETS |
|---------------------|-------|--------------|-------------|-----------|--------------|
| HAWAII              | HAW.  | HWY-0-06-03M | 2004        | 19        | 51           |



**GUARDRAIL DETAIL OVER CATCH BASIN**  
**# STA. 187+91±, LT.**  
 Scale: 1/4"=1'-0"



**GUARDRAIL DETAIL**  
**# STA. 159+78± TO # STA. 159+89±, RT.**  
 Not to Scale



**GUARDRAIL DETAIL OVER CATCH BASIN**  
**# STA. 186+50±, LT.**  
 Scale: 1/4"=1'-0"

\*To be paid under Item No. 606.3100, W-Beam Guardrail w/Strong Post

|                   |      |
|-------------------|------|
| ORIGINAL PLAN     | DATE |
| SURVEY PLOTTED BY |      |
| DRAWN BY          |      |
| NOTED BY          |      |
| DESIGNED BY       |      |
| CHECKED BY        |      |
| APPROVED BY       |      |

STATE OF HAWAII  
 DEPARTMENT OF TRANSPORTATION  
 HIGHWAYS DIVISION

**GUARDRAIL DETAILS**  
**HALAWA HEIGHTS ROAD REHABILITATION**  
**Kikania Street to Fernridge Place and**  
**Kahuapaani Interchange, Moanalua Freeway, H201**  
**Project No. HWY-0-06-03M**

Scale: As Shown Date: April, 2004

SHEET No. 7 OF 7 SHEETS