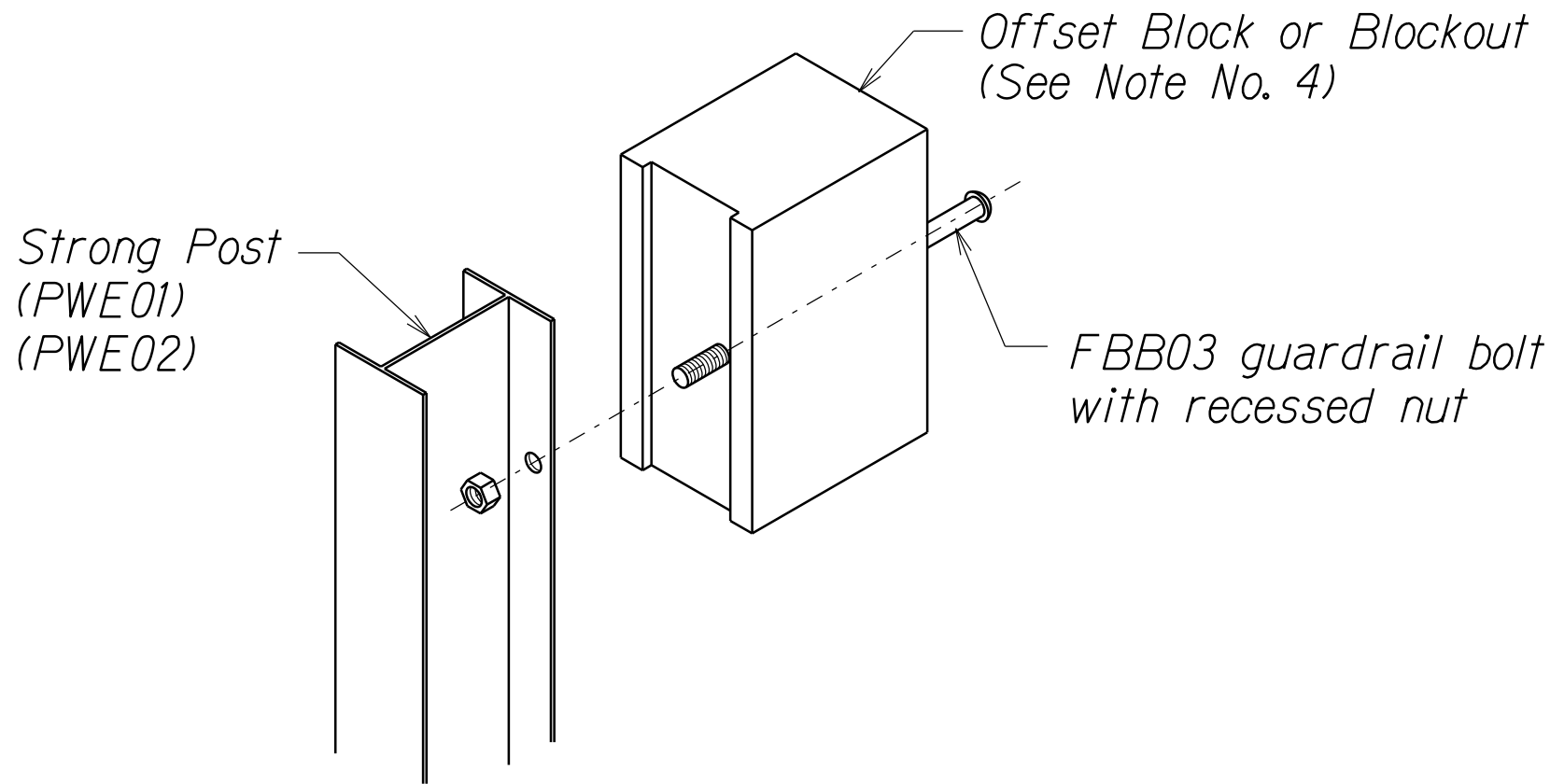


| FED. ROAD DIST. NO. | STATE | PROJ. NO.     | FISCAL YEAR | SHEET NO. | TOTAL SHEETS |
|---------------------|-------|---------------|-------------|-----------|--------------|
| HAWAII              | HAW.  | STP-0300(187) | 2023        | 23        | 27           |

GENERAL NOTES

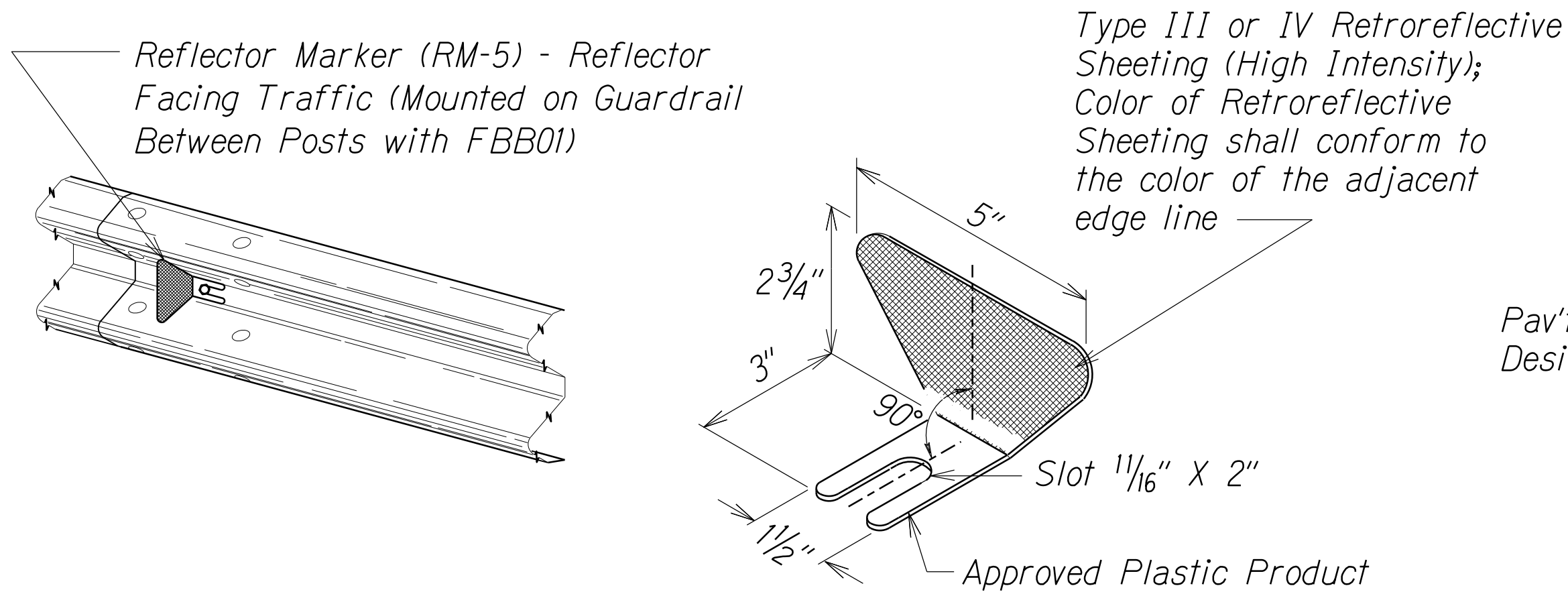
1. All hardware, posts and fasteners shall be hot-dip zinc coated galvanized after fabrication. No punching, drilling or cutting will be permitted after galvanizing.
2. Where conditions require, special post lengths in increments of 6 inches may be specified by the Engineer.
3. All fasteners, posts, and rail elements (i.e. FBB03, PWE01, RWM04b, 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 Blockout 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. Minimum working width (clear distance) between back of MGS post to any fixed object is 4'-1" (49").
9. New Hot Mix Asphalt (HMA) pavement at guardrails shall extend 6 feet longitudinally beyond terminal ends.
10. 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 guardrail system.

| GUARDRAIL TYPE                  | DIMENSION |        |
|---------------------------------|-----------|--------|
|                                 | H         | A      |
| MGS w/ Standard 8" Offset Block | 2'-1"     | 1'-6"  |
| MGS w/ No Blockout              | 2'-7/8"   | 9 1/4" |

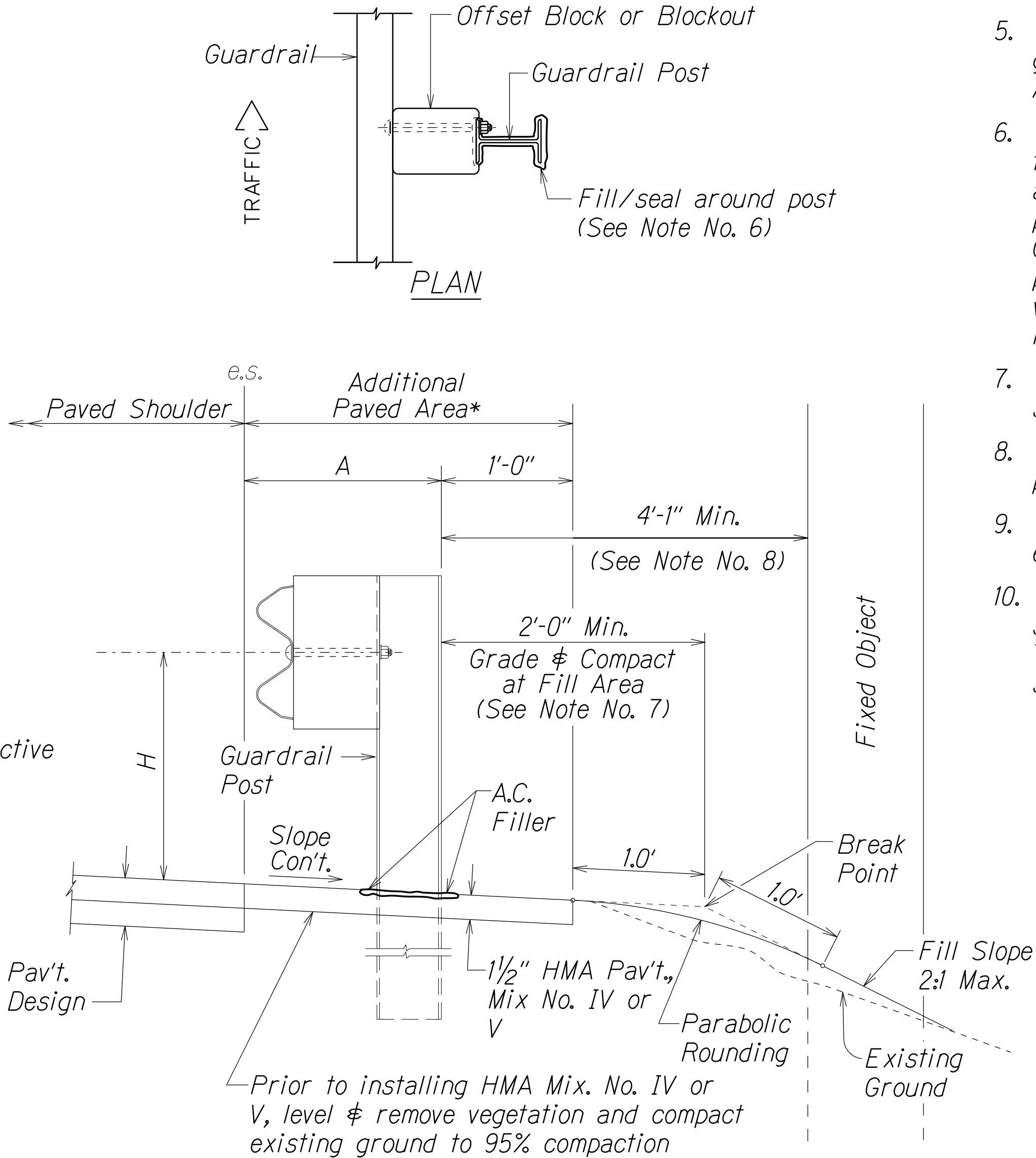


Exploded View  
(Rail and washer not shown)

STEEL POST AND BLOCK DETAIL



REFLECTOR MARKER (RM-5) DETAIL AND TYPICAL INSTALLATION



TYPICAL GUARDRAIL INSTALLATION

STATE OF HAWAII  
DEPARTMENT OF TRANSPORTATION  
HIGHWAYS DIVISION

**GUARDRAIL DETAILS & NOTES**

GUARDRAIL AND SHOULDER IMPROVEMENTS

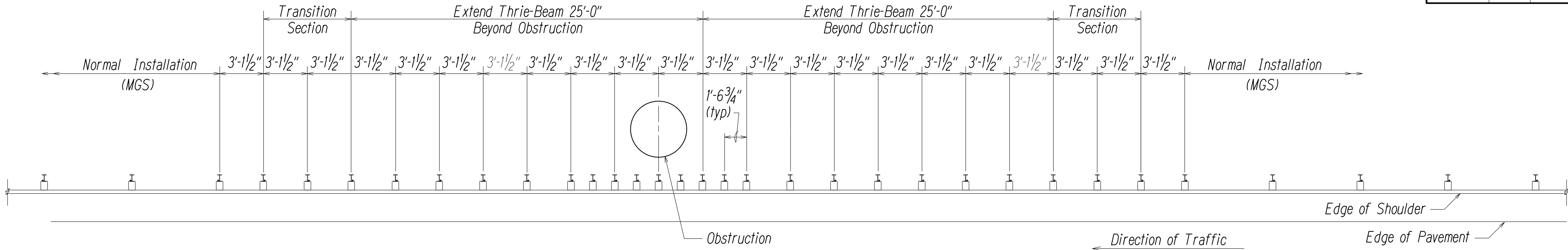
At Various Locations, Phase 3, Oahu

Federal Aid Project No. STP-0300(187)

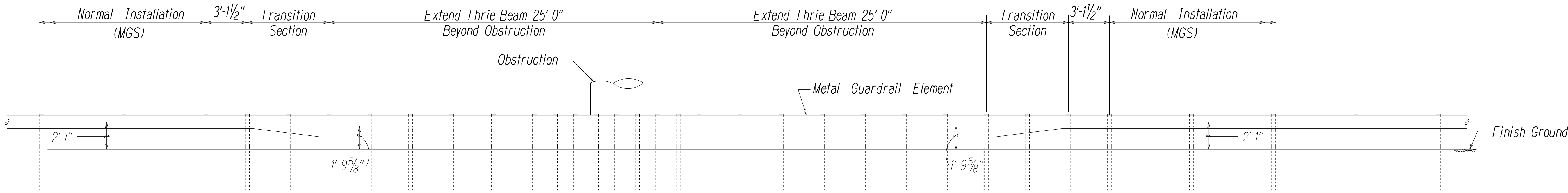
Scale: NTS Date: December, 2023

SHEET No. 1 OF 1 SHEETS

| FED. ROAD DIST. NO. | STATE | FED. AID PROJ. NO. | FISCAL YEAR | SHEET NO.  | TOTAL SHEETS |
|---------------------|-------|--------------------|-------------|------------|--------------|
| HAWAII              | HAW.  | STP-0300(187)      | 2023        | ADD. 23S-1 | 27           |



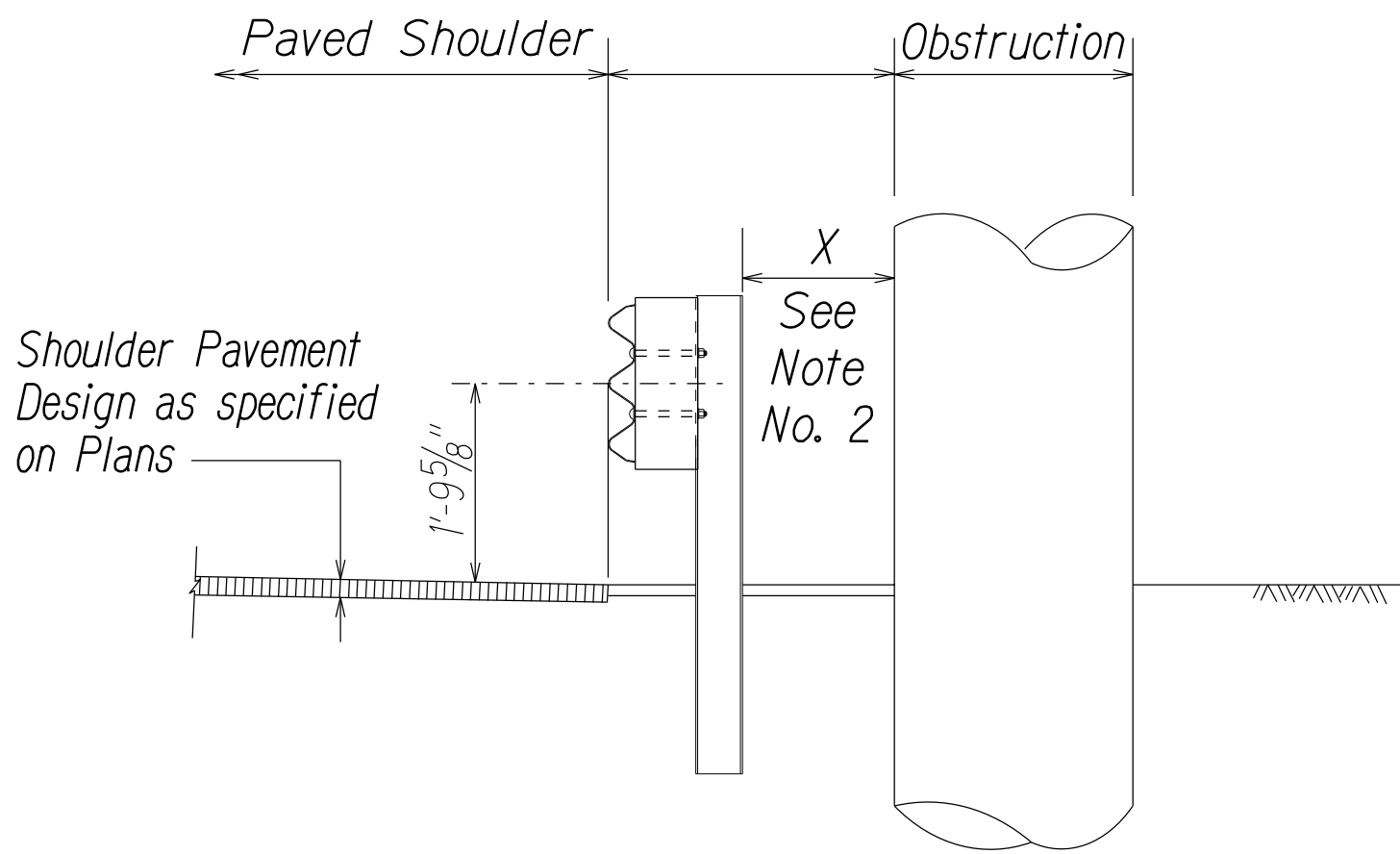
PLAN



ELEVATION

NOTES:

- All Guardrail and Concrete Barrier Designs at Obstructions shall be approved by the Engineer.
- If  $X < 2'-0''$ , Concrete Barrier or special guardrail design;  
 $2'-0'' \leq X < 4'-1''$ , Strong Post Thrie-Beam with reduced post spacing;  
 $4'-1'' \leq X$ , MGS with 6'-3" post spacing (Normal Installation).
- For Thrie-Beam and Transition Section Details, see sheet ADD. 23S-3.



TYPICAL SECTION AT OBSTRUCTION

DETAIL OF GUARDRAIL INSTALLATION AT OBSTRUCTION



1/25/2024

Added this sheet.

DATE

REVISION

STATE OF HAWAII  
DEPARTMENT OF TRANSPORTATION  
HIGHWAYS DIVISION

**THRIE-BEAM AT OBSTRUCTION**

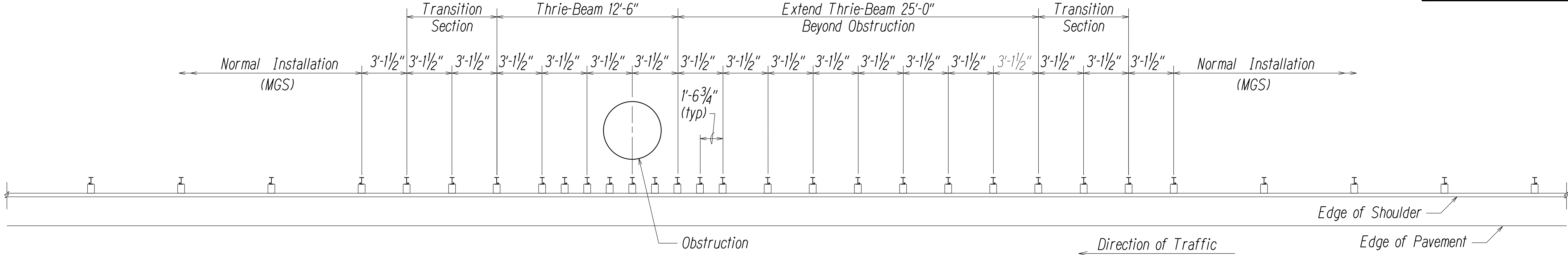
**# Sta. 1052+56.9 Rt.**

GUARDRAIL AND SHOULDER IMPROVEMENTS  
At Various Locations, Phase 3, Oahu  
Federal-Aid Project No. STP-0300(187)  
Scale: 1" = 40'      Date: DECEMBER, 2023

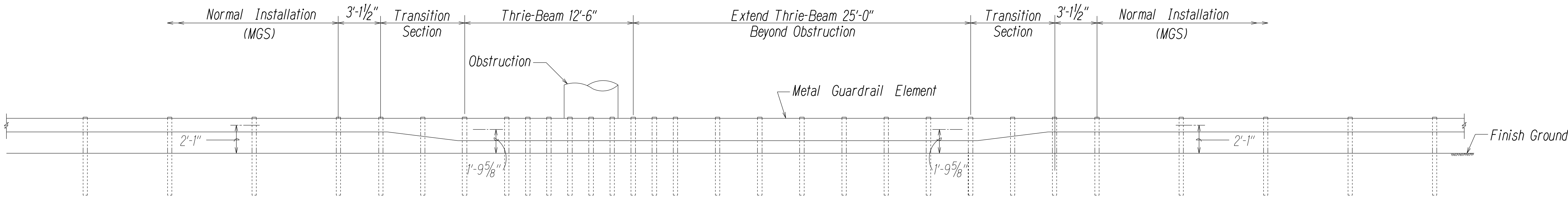
SHEET No. S-1 OF 4 SHEETS

ADD. 23S-1

| FED. ROAD DIST. NO. | STATE | FED. AID PROJ. NO. | FISCAL YEAR | SHEET NO.  | TOTAL SHEETS |
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| HAWAII              | HAW.  | STP-0300(187)      | 2023        | ADD. 23S-2 | 27           |



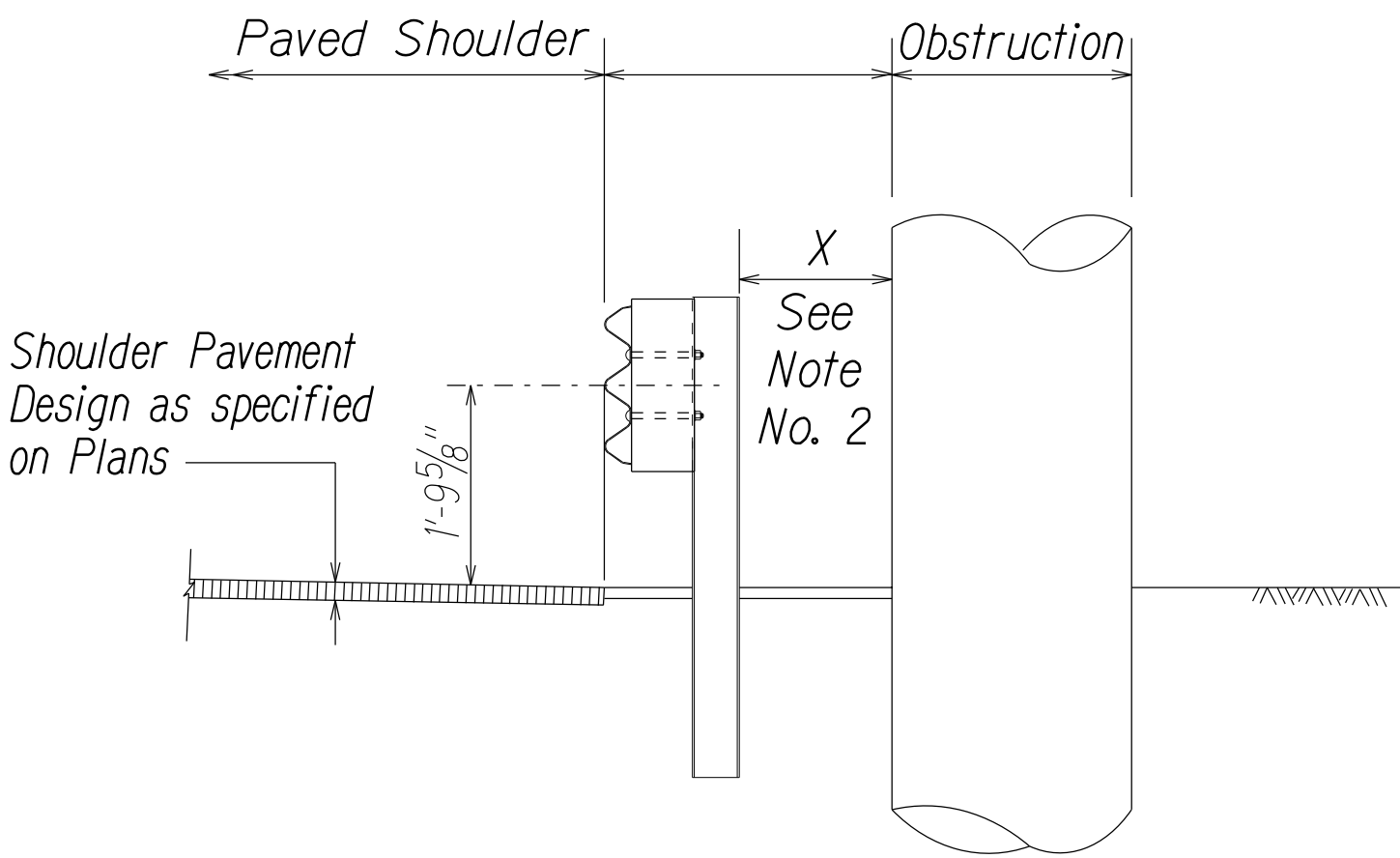
PLAN



ELEVATION

NOTES:

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- If  $X < 2'-0''$ , Concrete Barrier or special guardrail design;  
 $2'-0'' \leq X < 4'-1''$ , Strong Post Thrie-Beam with reduced post spacing;  
 $4'-1'' \leq X$ , MGS with 6'-3" post spacing (Normal Installation).
- For Thrie-Beam and Transition Section Details, see sheet ADD. 23S-3.



TYPICAL SECTION AT OBSTRUCTION

DETAIL OF GUARDRAIL INSTALLATION AT OBSTRUCTION



1/25/2024

Added this sheet.

DATE

REVISION

STATE OF HAWAII  
DEPARTMENT OF TRANSPORTATION  
HIGHWAYS DIVISION

**THRIE-BEAM AT OBSTRUCTION**

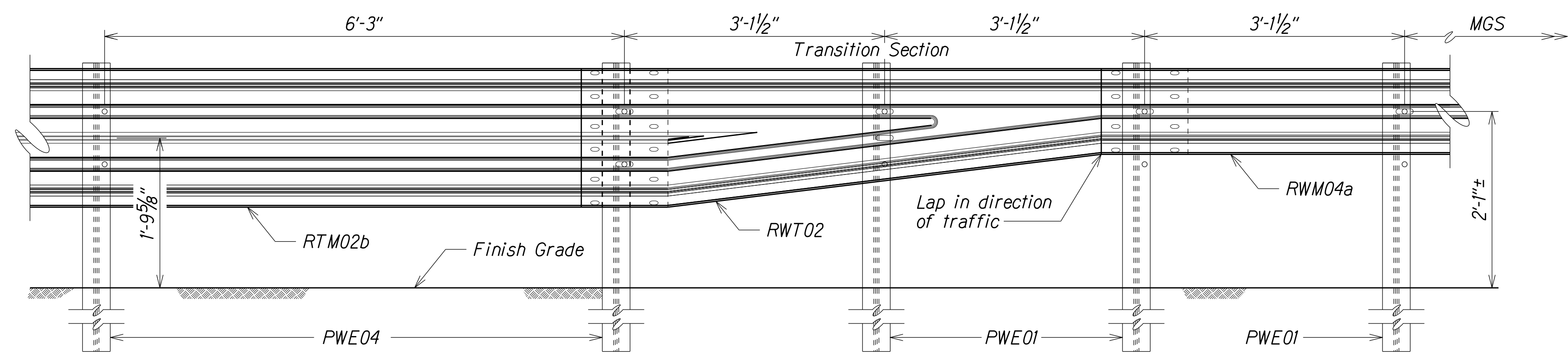
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GUARDRAIL AND SHOULDER IMPROVEMENTS  
At Various Locations, Phase 3, Oahu  
Federal-Aid Project No. STP-0300(187)  
Scale: 1" = 40'      Date: DECEMBER, 2023

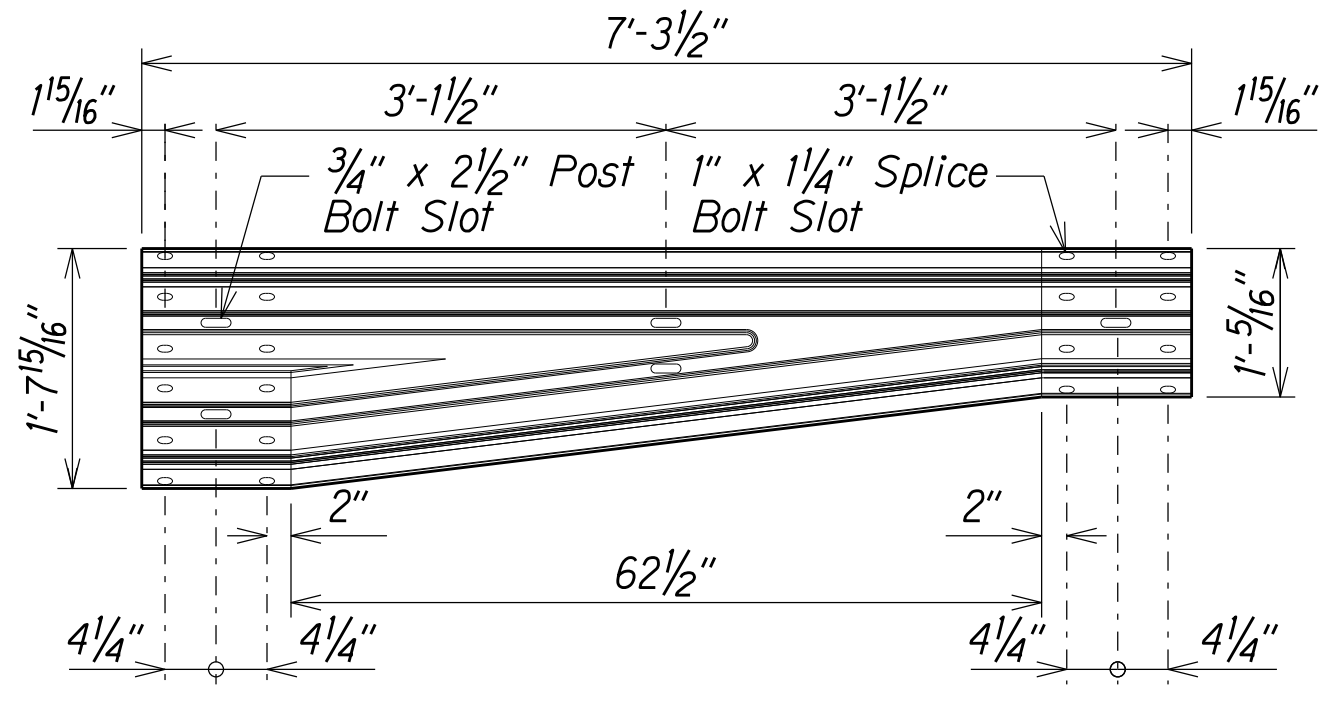
SHEET No. S-2 OF 4 SHEETS

ADD. 23S-2

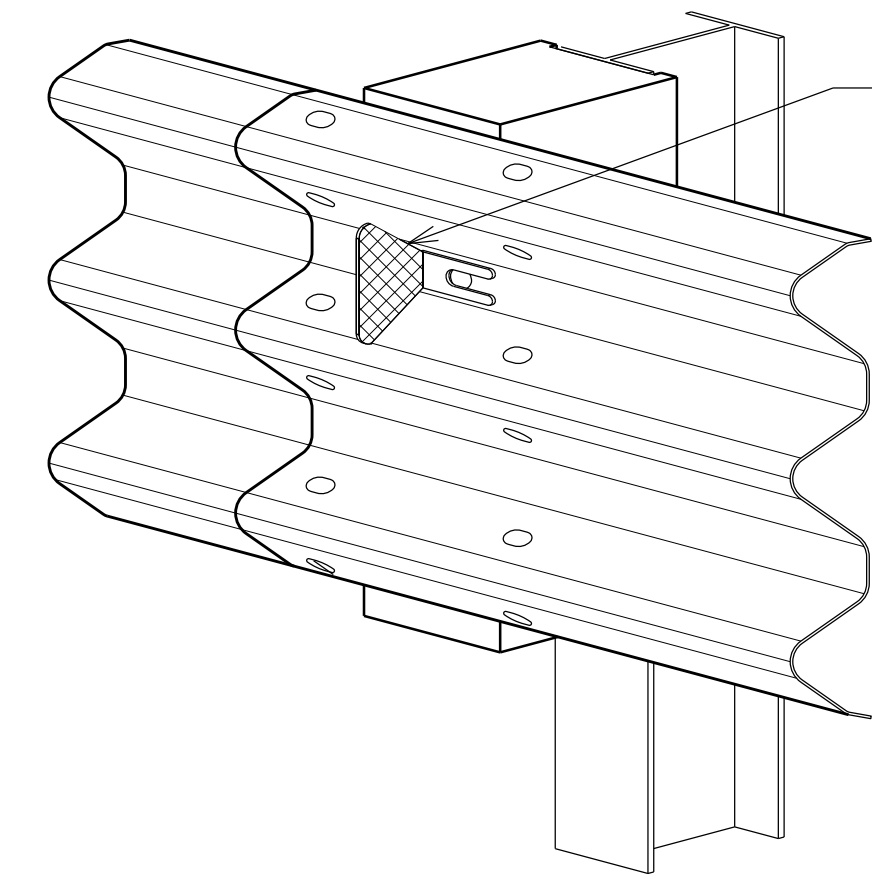
| FED. ROAD DIST. NO. | STATE | FED. AID PROJ. NO. | FISCAL YEAR | SHEET NO.  | TOTAL SHEETS |
|---------------------|-------|--------------------|-------------|------------|--------------|
| HAWAII              | HAW.  | STP-0300(187)      | 2023        | ADD. 23S-3 | 27           |



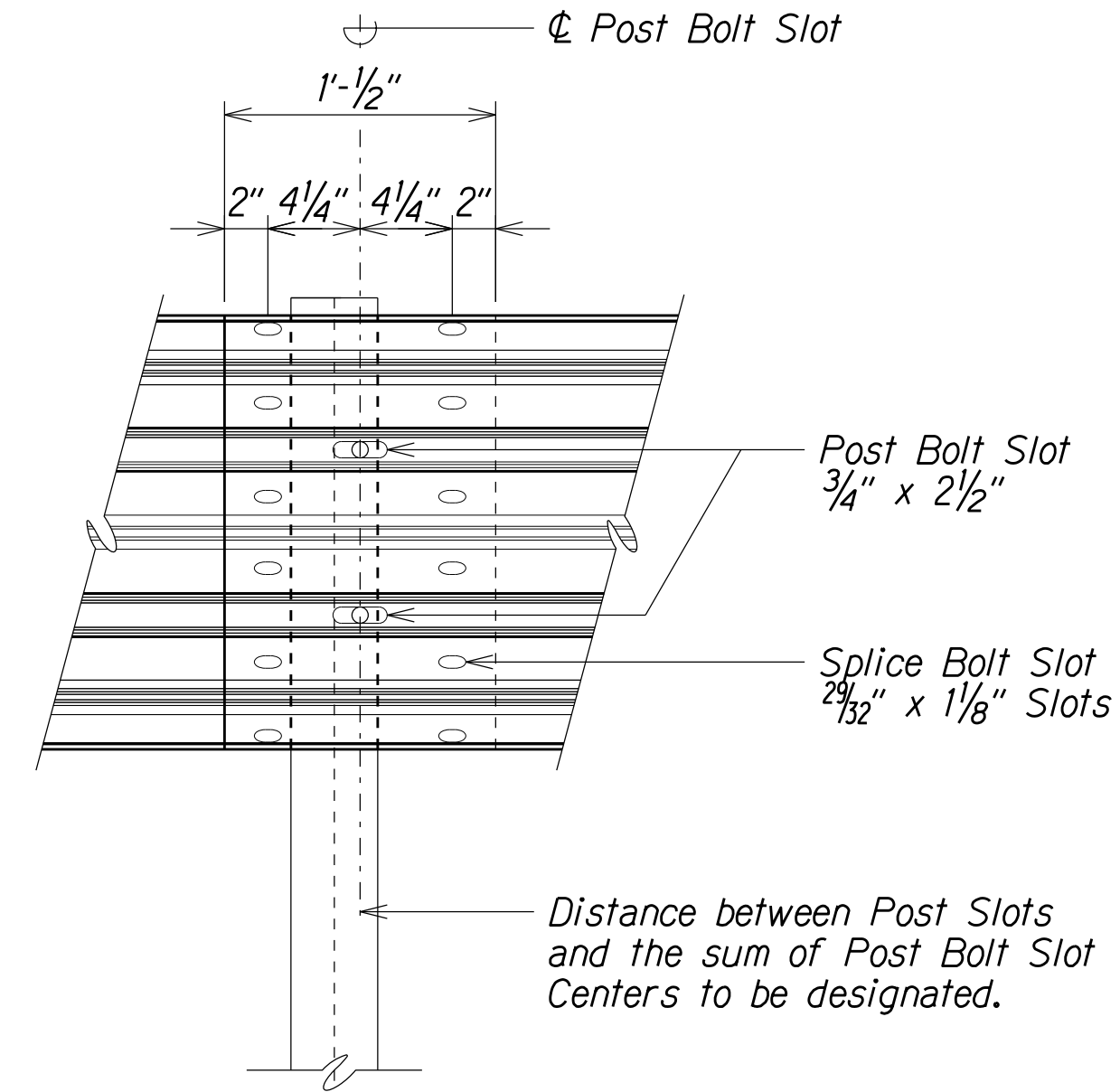
**TRANSITION SECTION\***



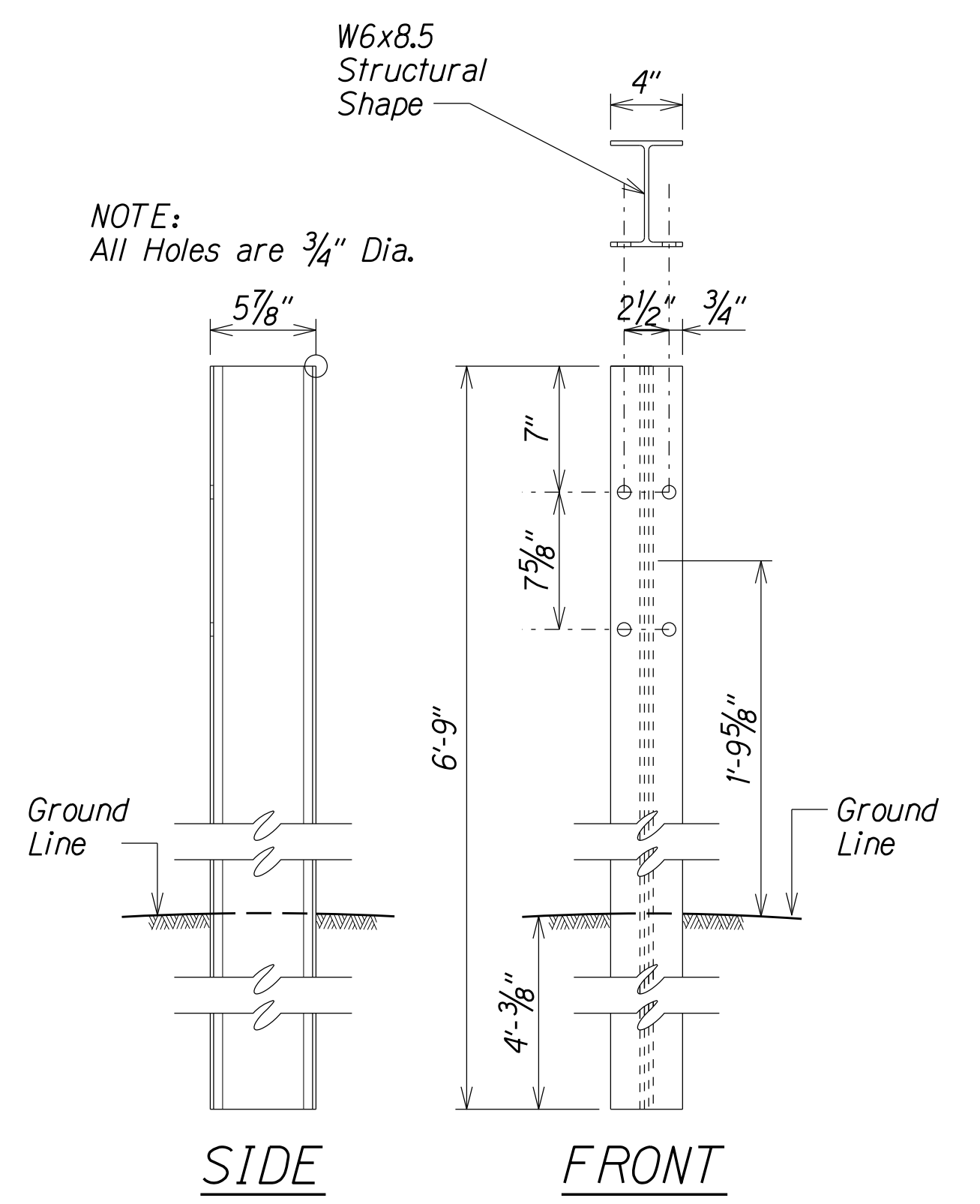
**TRANSITION SECTION (RWT02)**



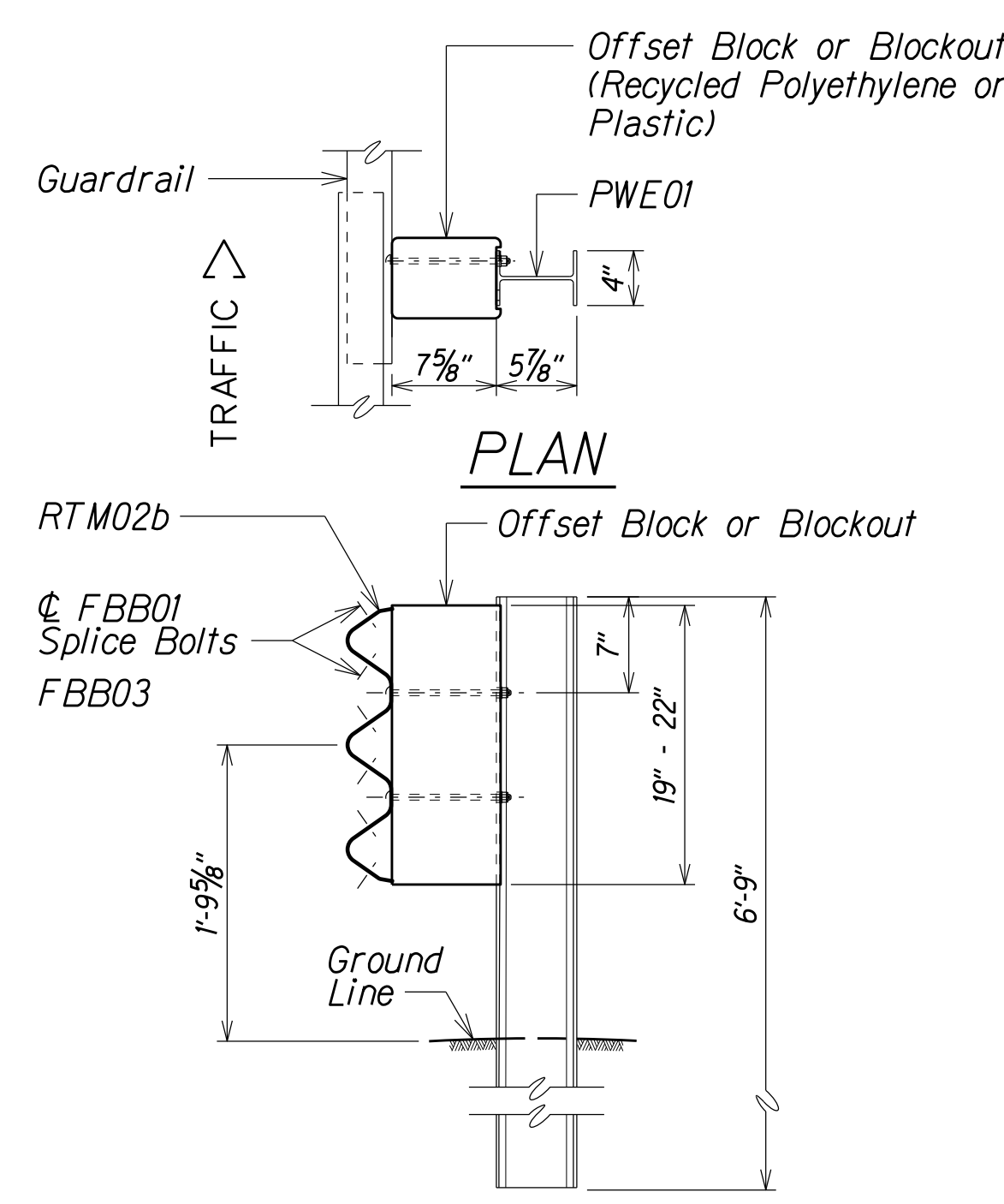
**TYPICAL INSTALLATION OF REFLECTOR MARKER (RM-5)**



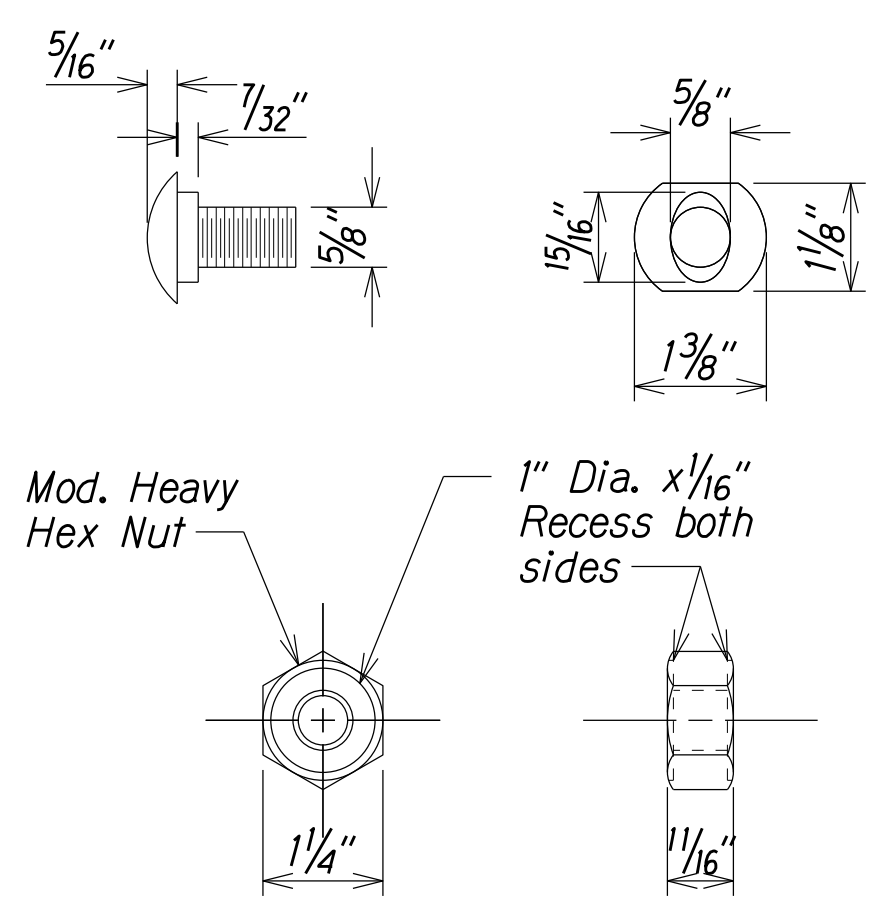
**RAIL SPLICE**



**THRIE-BEAM STRONG POST FOR PLASTIC SPACER BLOCKS PWE04**

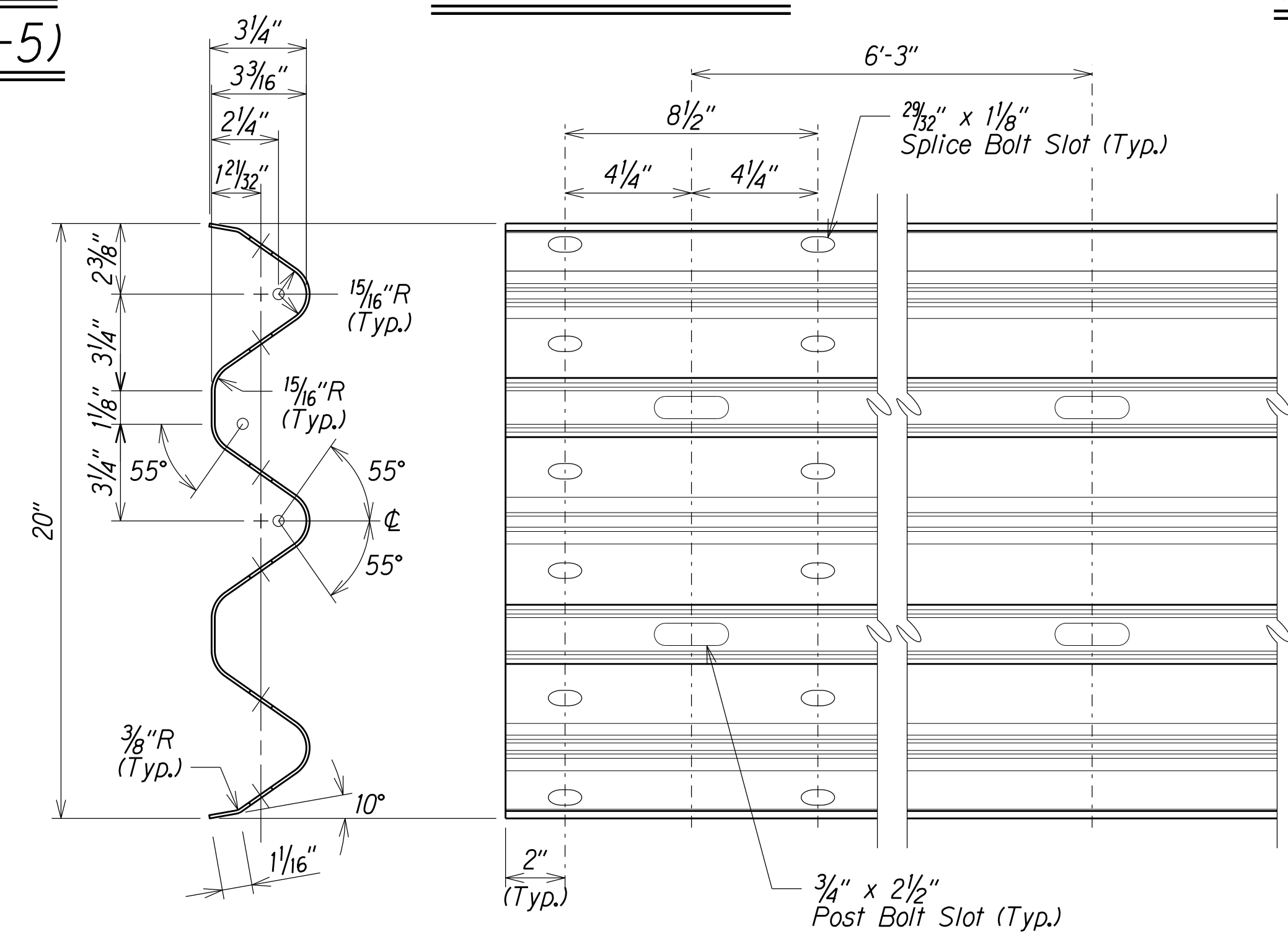


**STRONG POST THRIE-BEAM GUARDRAIL (SGR09a)**



**GUARDRAIL BOLTS AND RECESSED NUT**

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

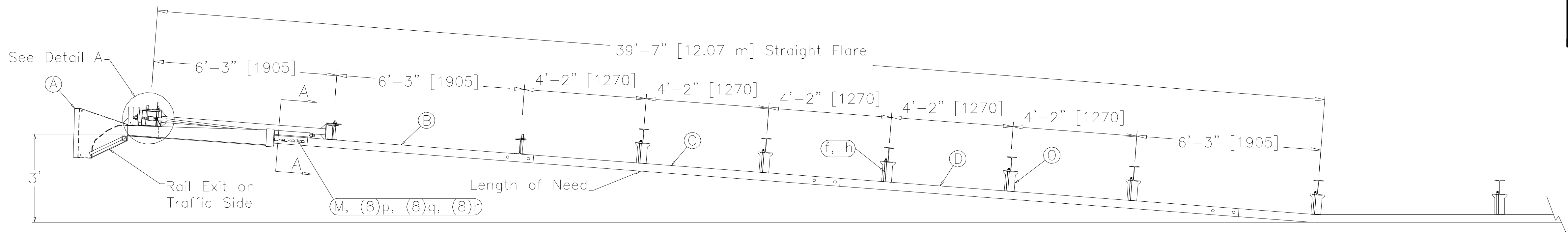


**1 & 2 SPACE THRIE-BEAM GUARDRAIL (RTM02b)**

| 1   | 1/25/2024 Added this sheet. |
|---|-----------------------------|
| DATE  | REVISION                    |
| STATE OF HAWAII<br>DEPARTMENT OF TRANSPORTATION<br>HIGHWAYS DIVISION<br><b>STRONG POST THRIE-BEAM GUARDRAIL</b><br>GUARDRAIL AND SHOULDER IMPROVEMENTS<br>At Various Locations, Phase 3, Oahu<br>Federal-Aid Project No. STP-0300(187)<br>Scale: NTS Date: DECEMBER, 2023 |                             |
| SHEET No. S-3 OF 4 SHEETS   |                             |

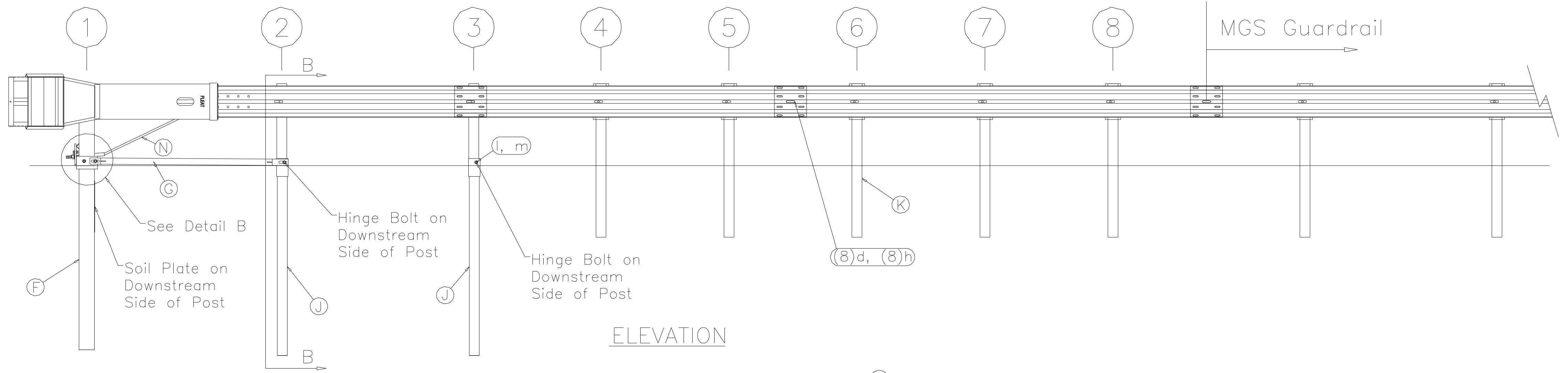


| FED. ROAD DIST. NO. | STATE | FED. AID PROJ. NO. | FISCAL YEAR | SHEET NO.  | TOTAL SHEETS |
|---------------------|-------|--------------------|-------------|------------|--------------|
| HAWAII              | HAW.  | STP-0300(187)      | 2023        | ADD. 23S-4 | 27           |



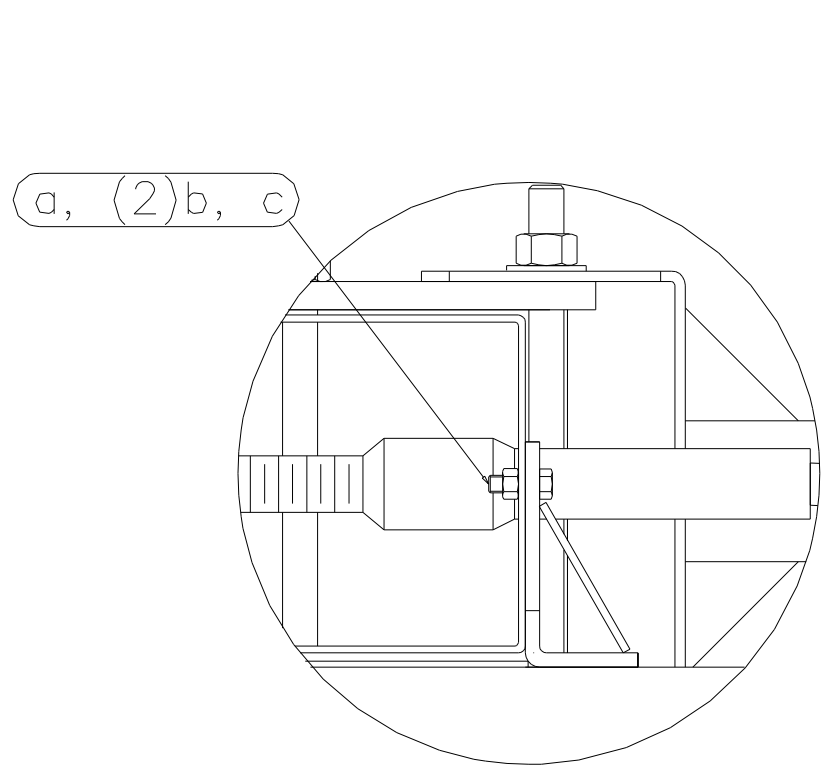
TRAFFIC

PLAN

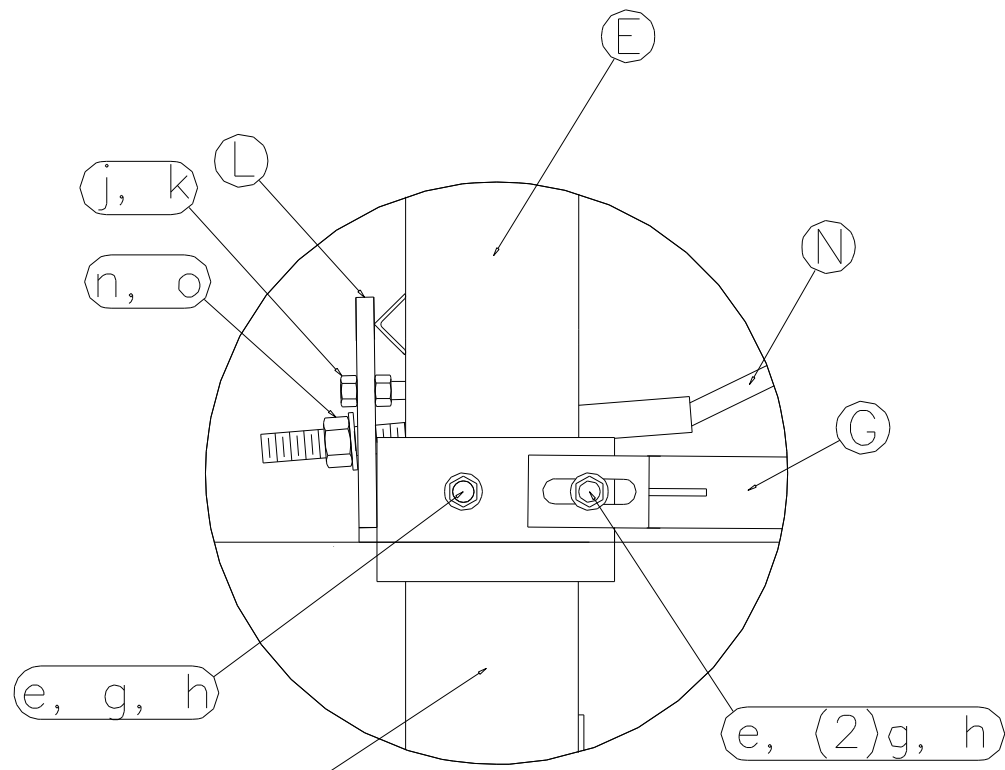


ELEVATION

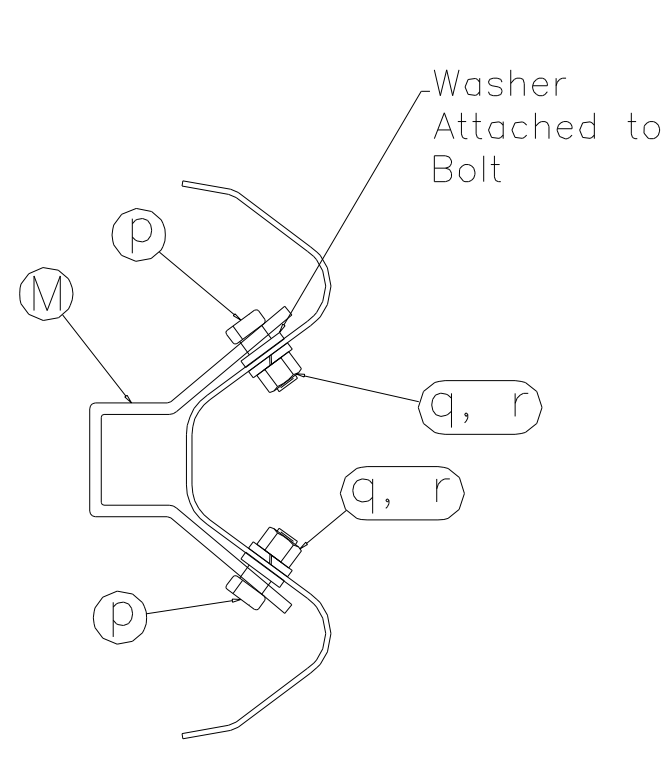
| ITEM                                | QTY | BILL OF MATERIALS                          | ITEM NO.  |
|-------------------------------------|-----|--|-----------|
| A                                   | 1   | FLEAT IMPACT HEAD                          | MF3000    |
| B                                   | 1   | FLEAT ANCHOR RAIL 12'-6"                   | SF1303    |
| C                                   | 1   | FLEAT SECOND RAIL 10'-5"                   | F1324     |
| D                                   | 1   | FLEAT THIRD RAIL 13'-6 1/2"                | F1334     |
| E                                   | 1   | FIRST POST TOP (6X6X $\frac{1}{2}$ " Tube) | MP1A      |
| F                                   | 1   | FIRST POST BOTTOM (6' W6X15)               | MP1B      |
| G                                   | 1   | GROUND STRUT                               | MS785     |
| H                                   | 2   | HINGE POST UPPER                           | MHP2A     |
| J                                   | 2   | HINGED POST LOWER                          | HP2B      |
| K                                   | 5   | STEEL LINE POST 6'                         | P621      |
| L                                   | 1   | MASH BEARING PLATE                         | ME750     |
| M                                   | 1   | CABLE ANCHOR BOX                           | S760      |
| N                                   | 1   | BCT CABLE ANCHOR ASSEMBLY                  | E770      |
| O                                   | 5   | RECYCLED PLASTIC BLOCK OR EQUIV.           | CBSP-14   |
| HARDWARE (ALL DIMENSIONS IN INCHES) |     |  |           |
| a                                   | 2   | 5/16 x 1 HEX BOLT GRD 5                    | B5160104A |
| b                                   | 4   | 5/16 WASHER                                | W0516     |
| c                                   | 2   | 5/16 HEX NUT                               | N0516     |
| d                                   | 18  | 5/8 x 1 1/4 SPLICE BOLT                    | B580122   |
| e                                   | 2   | 5/8 x 9 HEX BOLT GRD 5                     | B580904A  |
| f                                   | 5   | 5/8 x 10 H.G.R. BOLT                       | B581002   |
| g                                   | 3   | 5/8 WASHER                                 | W050      |
| h                                   | 25  | 5/8 H.G.R. NUT                             | N050      |
| j                                   | 1   | 5/8 x 5" BOLT FULL THREAD GRD A449         | B580504A  |
| k                                   | 1   | 5/8 HEX NUT                                | N055      |
| l                                   | 2   | 3/4 x 8 1/2 HEX BOLT GRD A449              | B340854A  |
| m                                   | 2   | 3/4 HEX NUT                                | N030      |
| n                                   | 2   | 1 ANCHOR CABLE HEX NUT                     | N100      |
| o                                   | 2   | 1 ANCHOR CABLE WASHER                      | W100      |
| p                                   | 8   | 1/2 RSI SHOULDER BOLT W/WASHER             | SB12A     |
| q                                   | 8   | 1/2 STRUCTURAL NUT                         | N012A     |
| r                                   | 8   | 1/2 STRUCTURAL WASHER                      | W012A     |



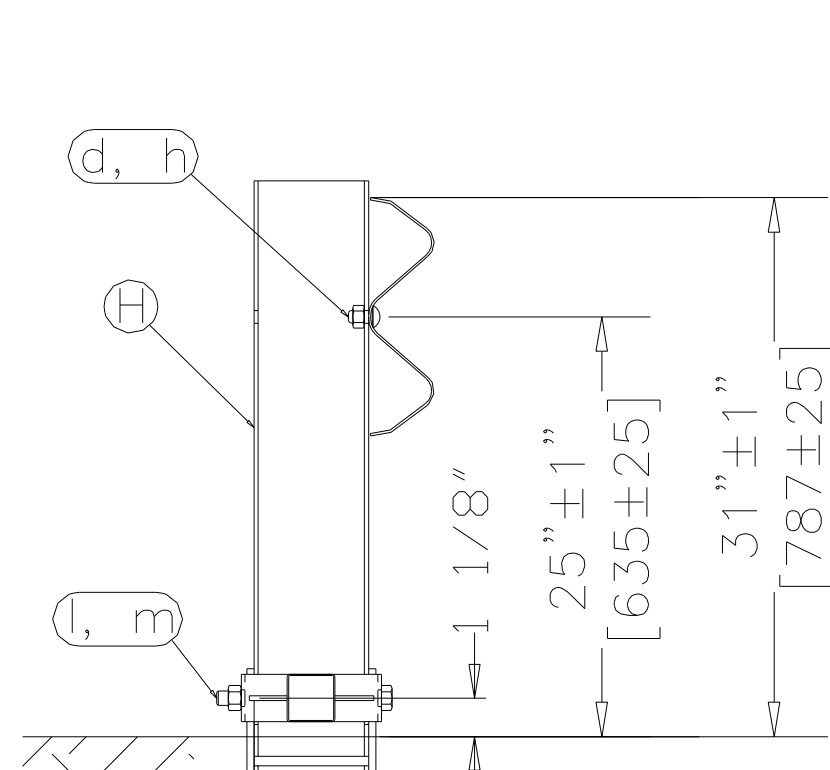
Detail A  
Impact Head Connection



Detail B  
Post #1 Connection



SECTION A-A  
Anchor Bracket



SECTION B-B  
Post #2

GENERAL NOTES:

- All bolts, nuts, cable assemblies, cable anchors and bearing plates shall be galvanized.
- The lower sections of the Posts 1, 2 & 3 shall not protrude more than 4 in above the ground (measured along a 5' cord). Site grading may be necessary to meet this requirement.
- The lower sections of the hinged posts should not be driven with the upper post attached. If the post is placed in a drilled hole, the backfill material must be satisfactorily compacted to prevent settlement.
- When competent rock is encountered, a 12" Ø post hole, 20 in. deep cored into the rock surface may be used if approved by the engineer for Posts 1 and/or 2. Granular material will be placed in the bottom of the hole, approximately 2.5" deep to provide drainage. The first and/or second post can be field cut to length, placed in the hole and backfilled with suitable backfill. The soil plate may be trimmed if required.
- 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.



1/25/2024 Added this sheet.

DATE

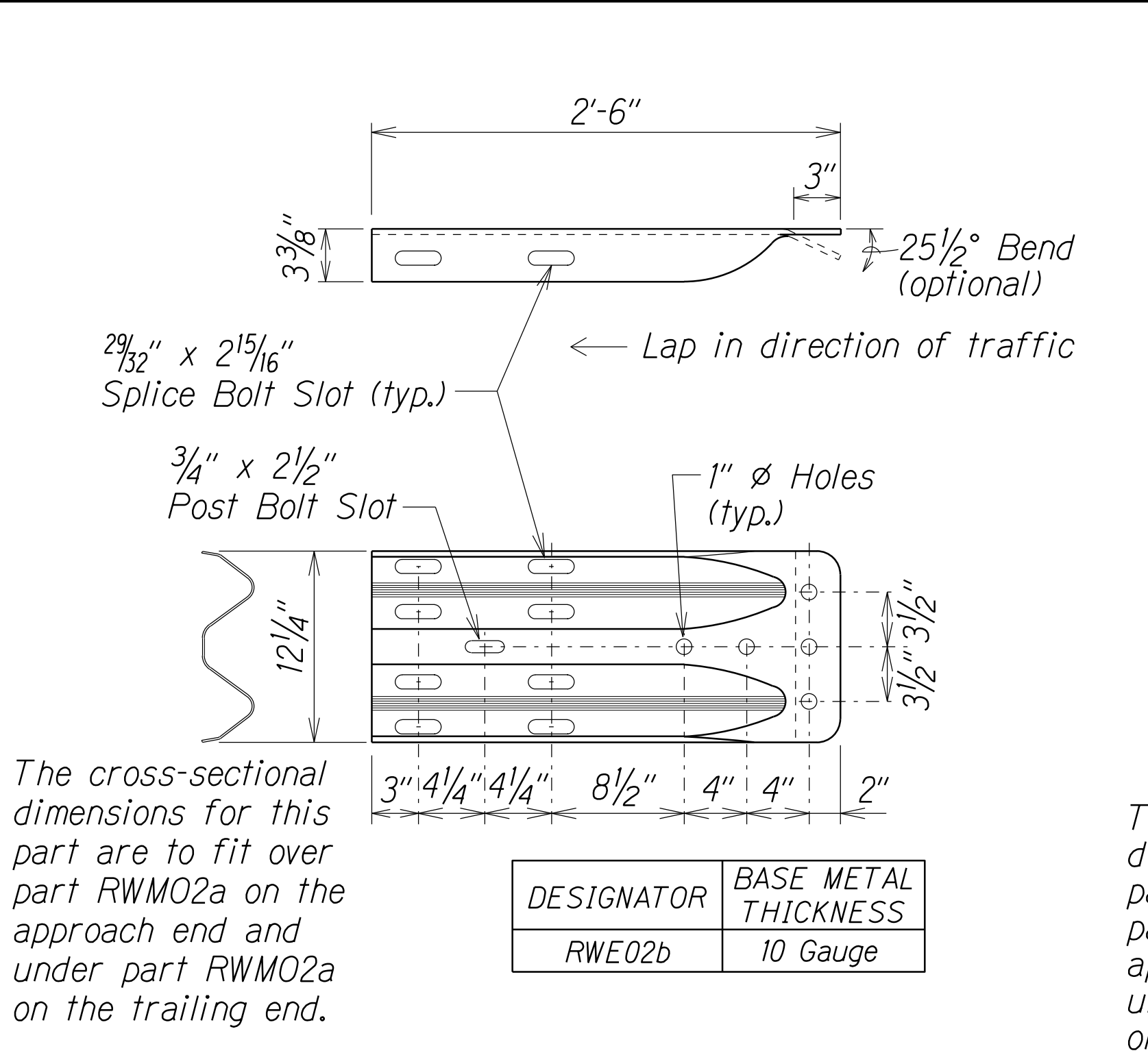
REVISION

STATE OF HAWAII  
DEPARTMENT OF TRANSPORTATION  
HIGHWAYS DIVISION  
***MASH FLEAT TERMINAL***  
***TL-3 STANDARD POST SYSTEM***  
*GUARDRAIL AND SHOULDER IMPROVEMENTS*  
*At Various Locations, Phase 3, Oahu*  
*Federal-Aid Project No. STP-0300(187)*  
Scale: NTS Date: DECEMBER, 2023

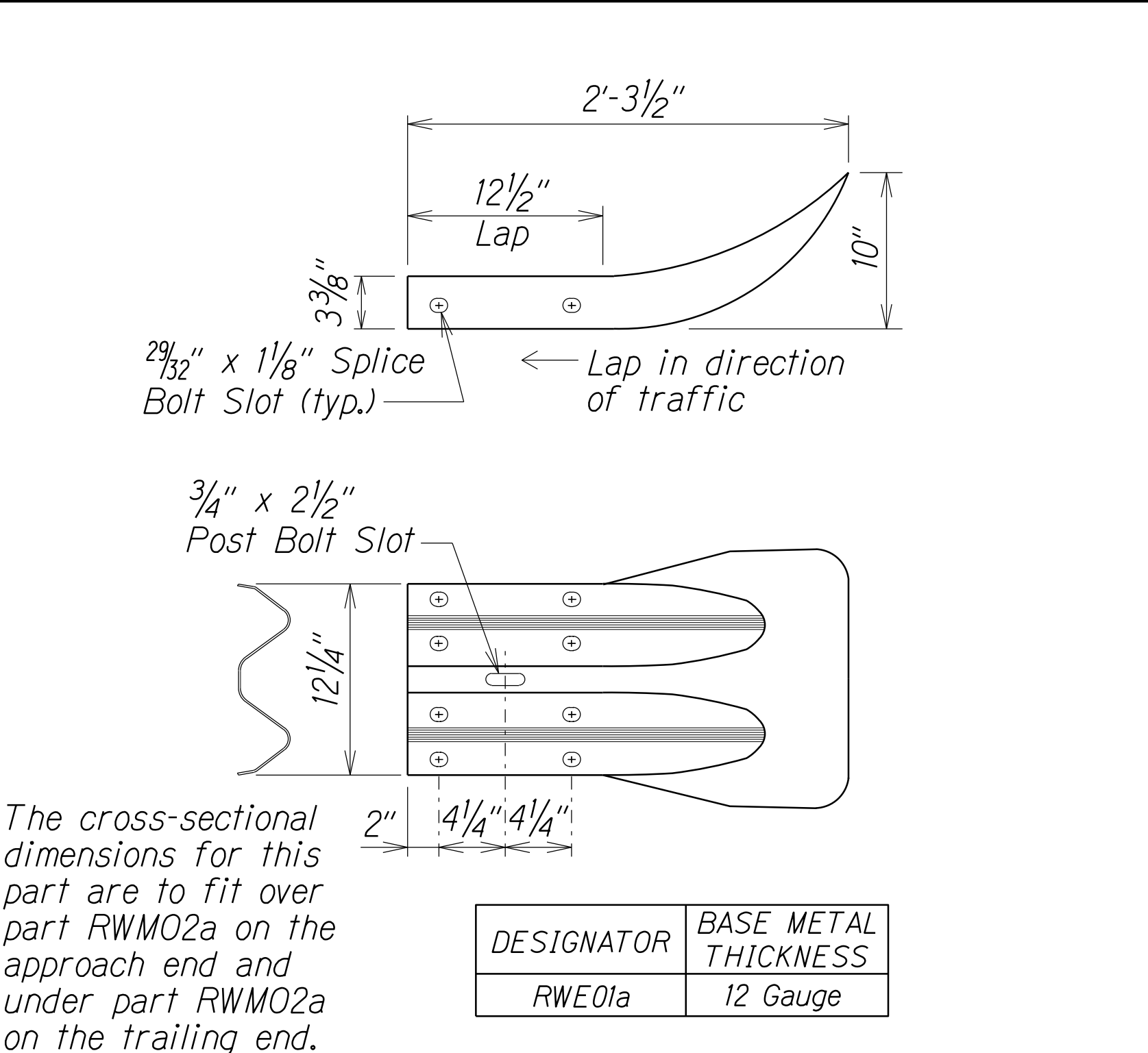
SHEET No. S-4 OF 4 SHEETS

ADD. 23S-4

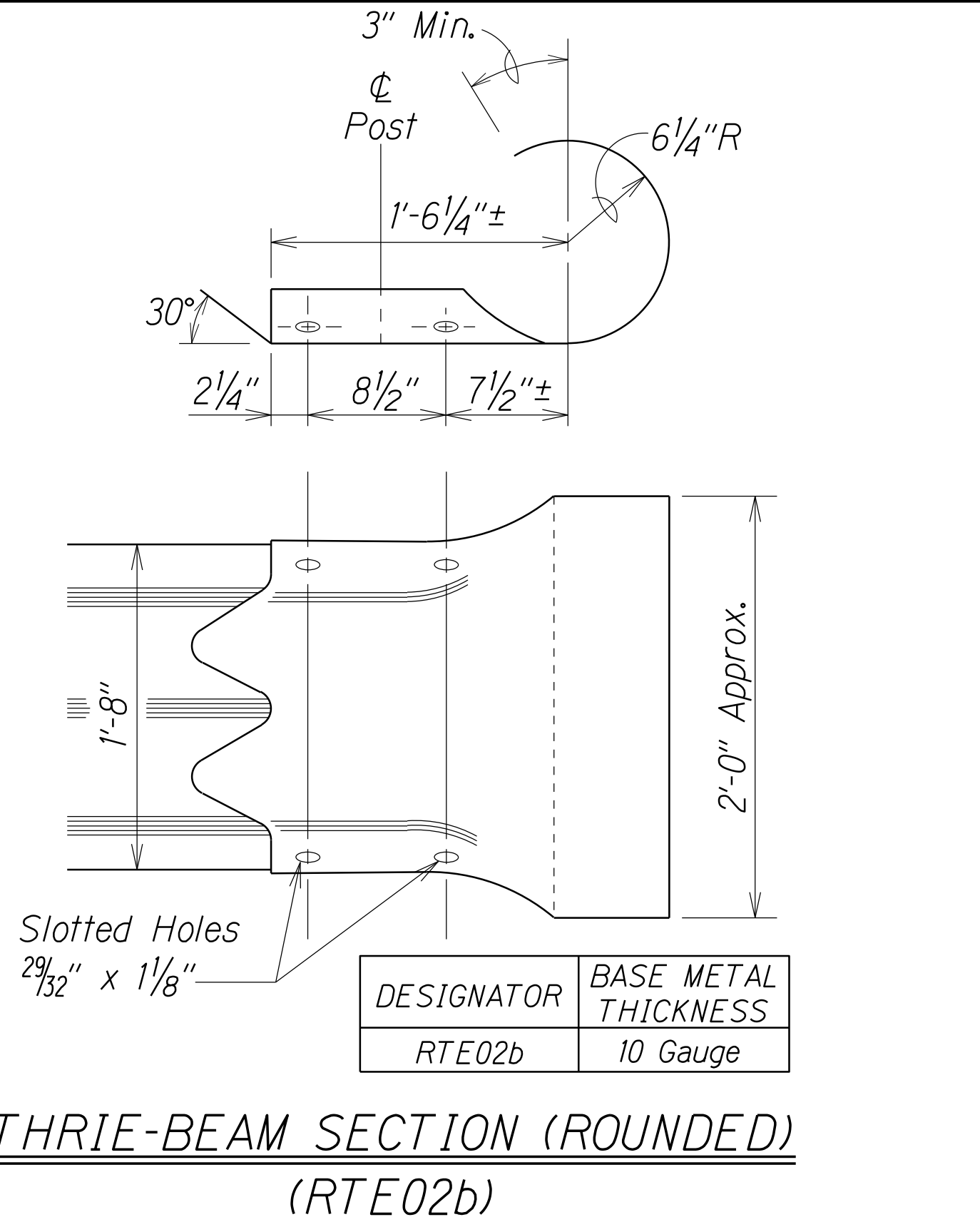
| FED. ROAD DIST. NO. | STATE | PROJ. NO.     | FISCAL YEAR | SHEET NO. | TOTAL SHEETS |
|---------------------|-------|---------------|-------------|-----------|--------------|
| HAWAII              | HAW.  | STP-0300(187) | 2023        | 24        | 27           |



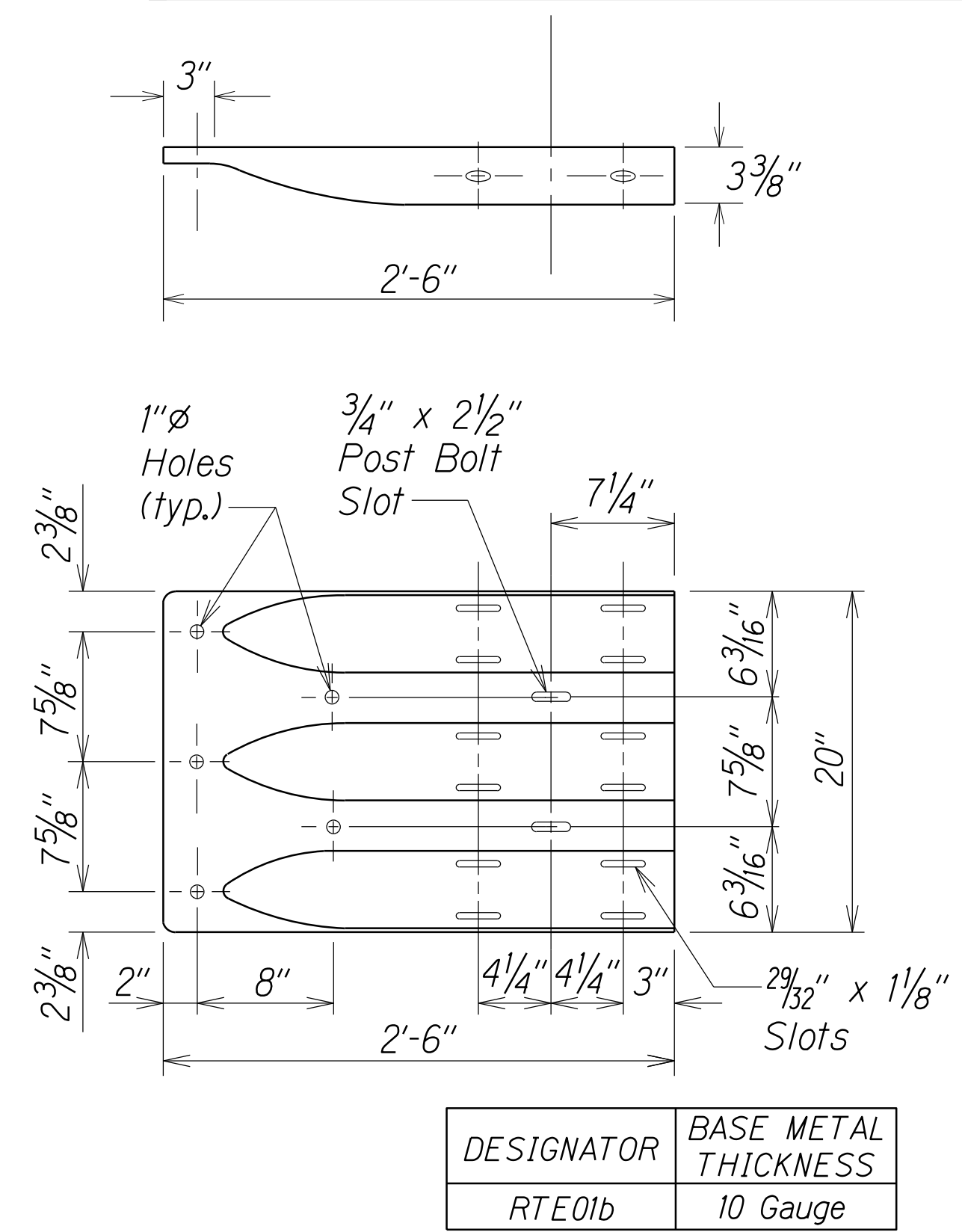
W-BEAM TERMINAL CONNECTOR (RWE02b)



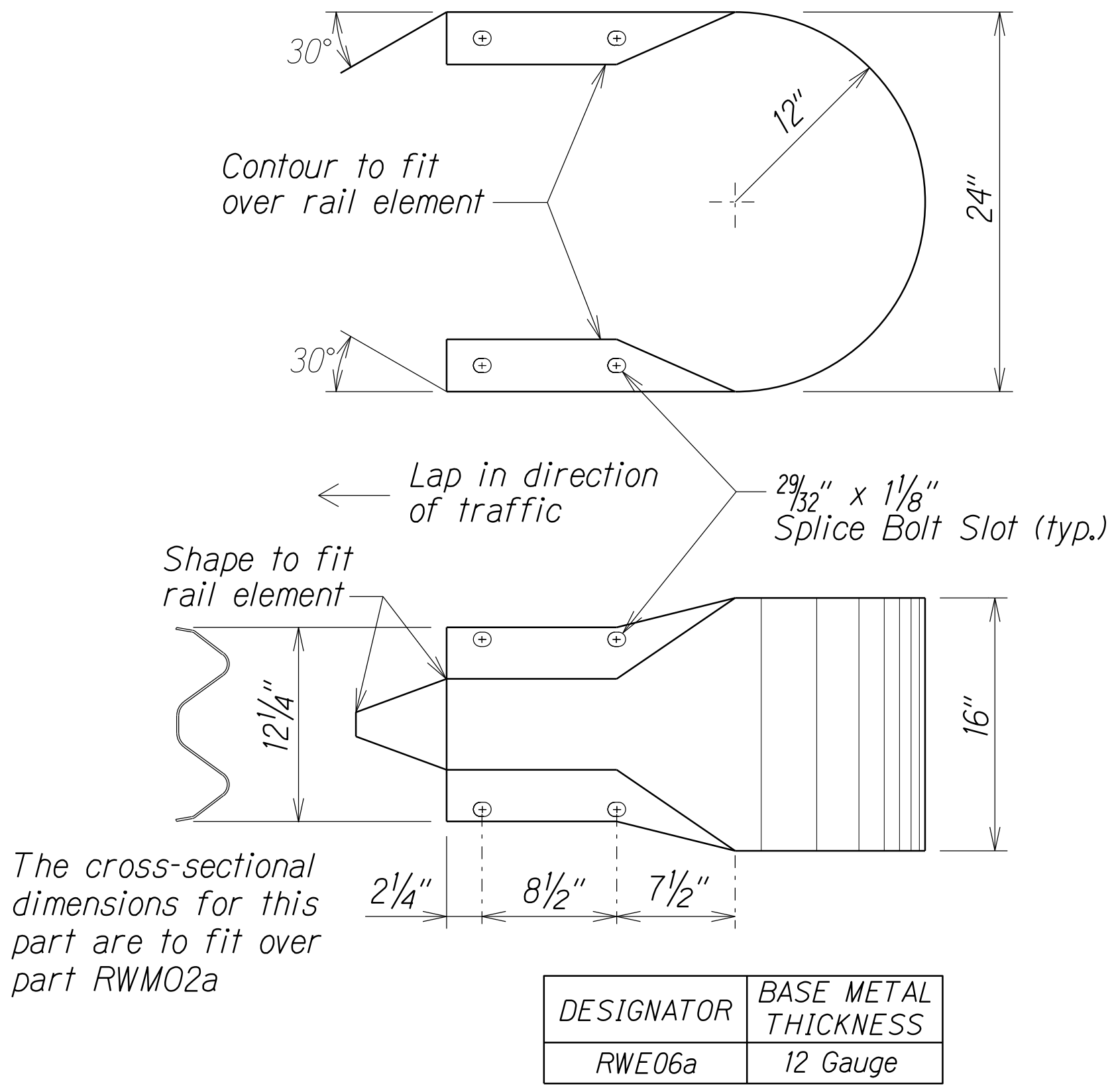
W-BEAM END SECTION (FLARED RWE01a)



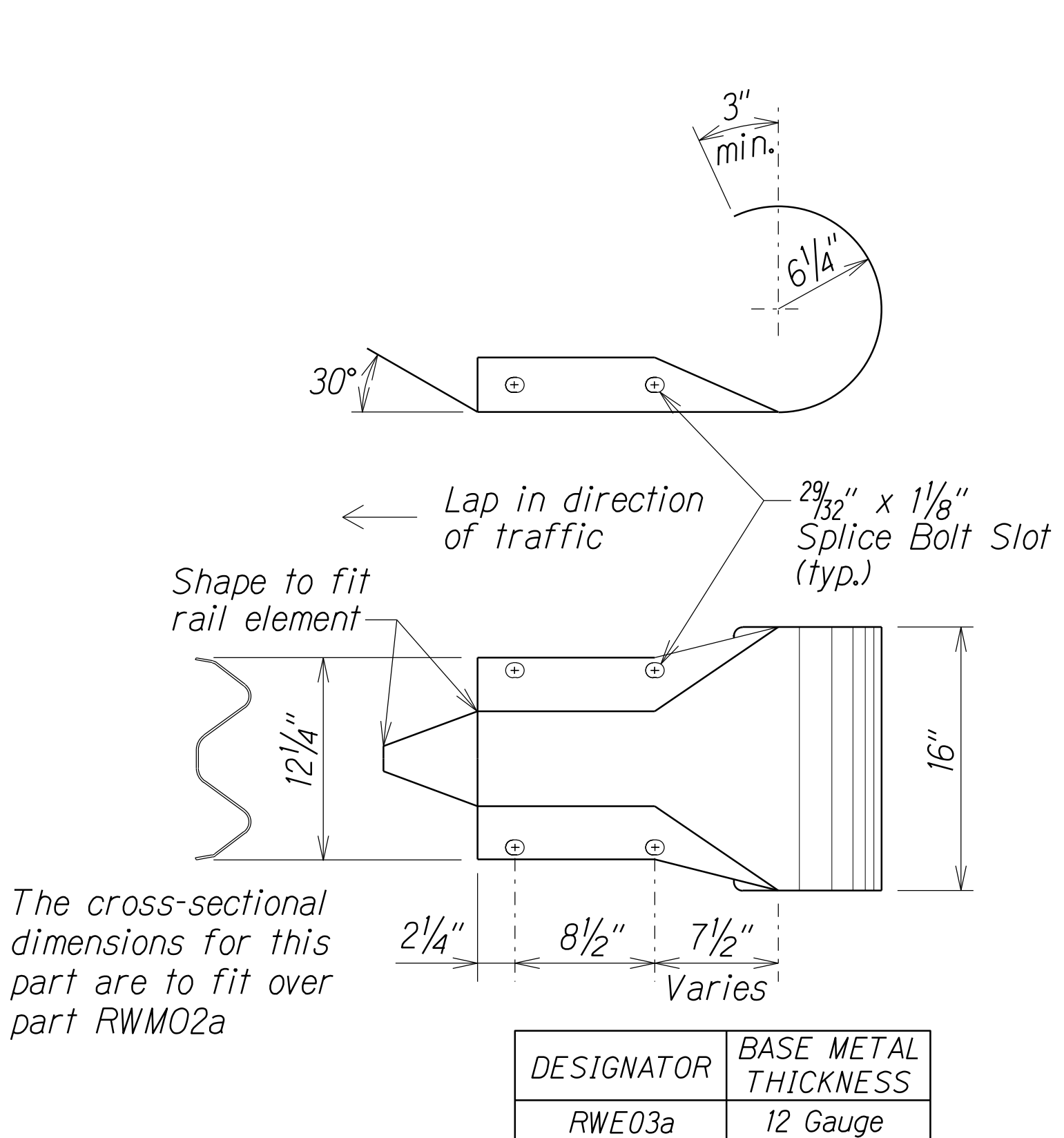
THRIE-BEAM SECTION (ROUNDED) (RTE02b)



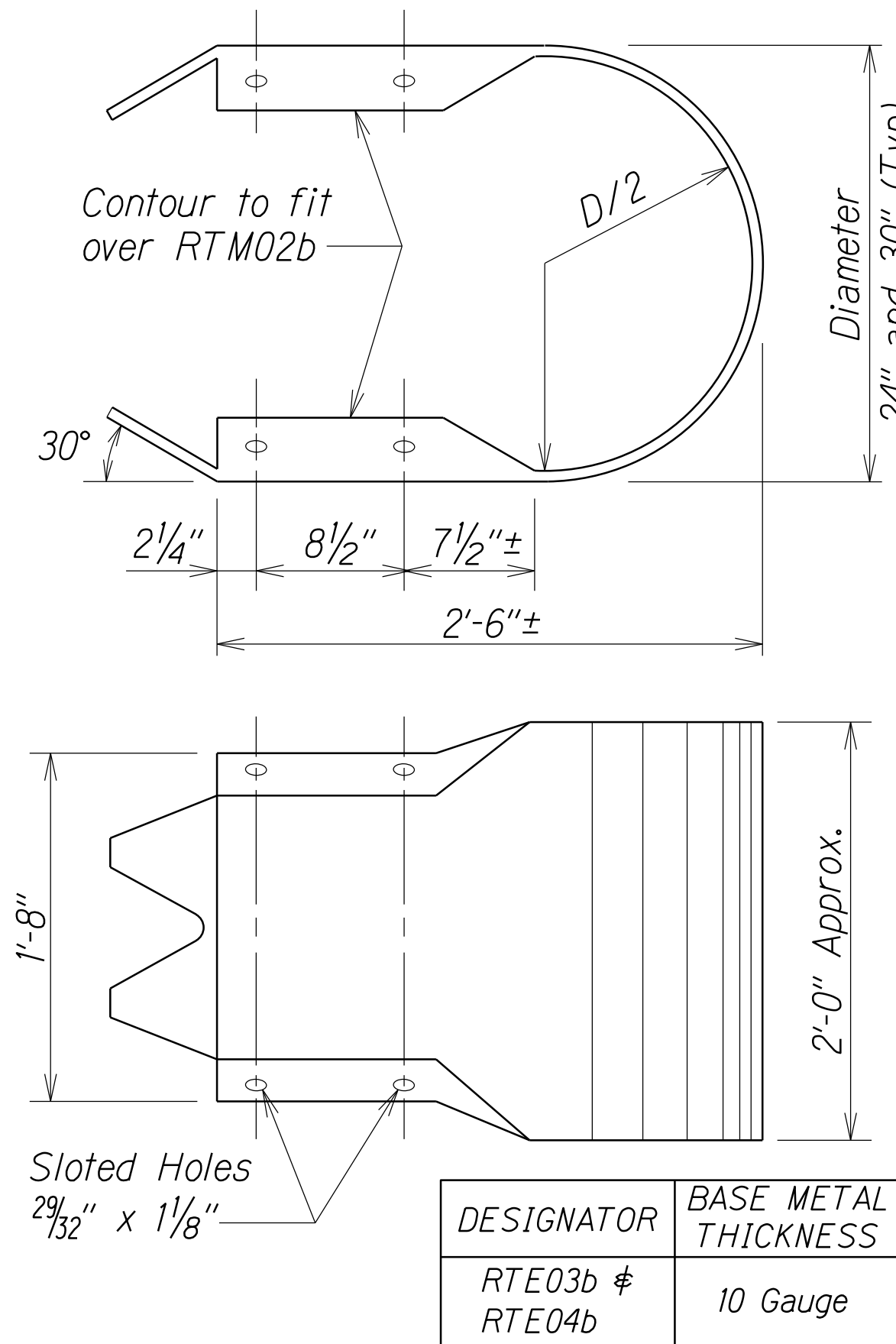
THRIE-BEAM TERMINAL CONNECTOR (RTE01b)



W-BEAM END SECTION (BUFFER RWE06a)



W-BEAM END SECTION (ROUNDED RWE03a)



THRIE-BEAM END SECTION (BUFFER RTE03b or RTE04b)

STATE OF HAWAII  
DEPARTMENT OF TRANSPORTATION  
HIGHWAYS DIVISION

**GUARDRAIL TERMINAL CONNECTORS  
AND END SECTIONS**

GUARDRAIL AND SHOULDER IMPROVEMENTS  
At Various Locations, Phase 3, Oahu  
Federal Aid Project No. STP-0300(187)  
Scale: Not To Scale      Date: December, 2023

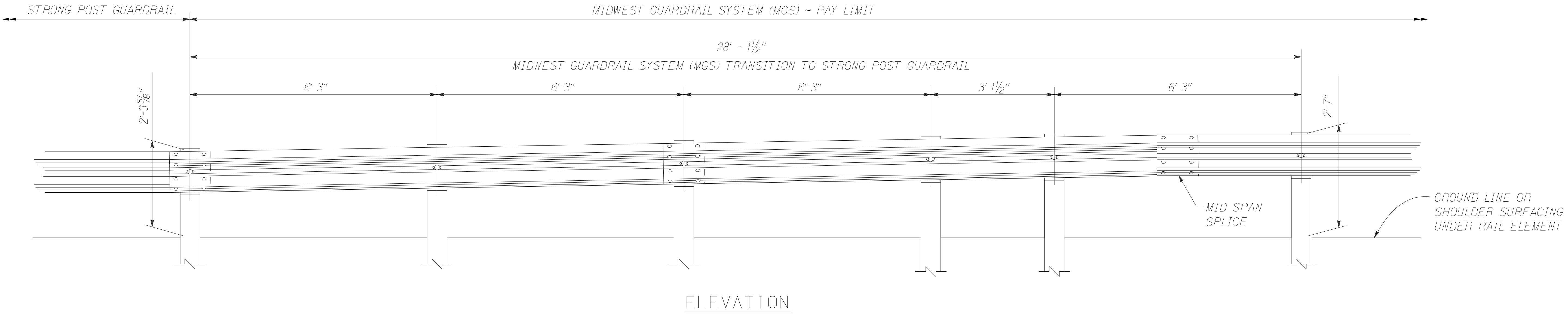
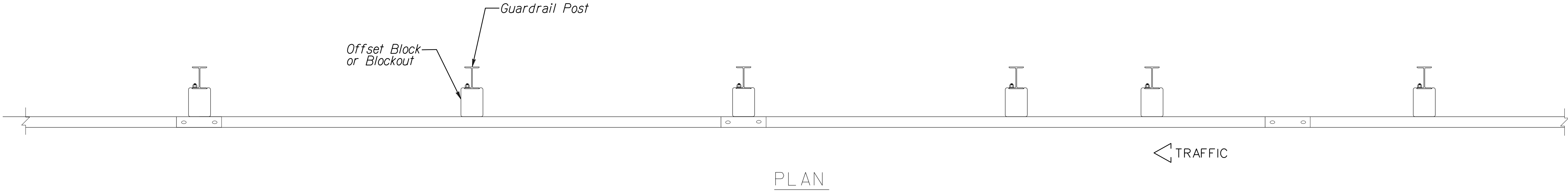
SHEET No. 1 OF 1 SHEETS

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

ROT/28/17 Quer2/Ernest/Standards/Traffic Guardrail Standards/m4\_b51reudon



| FED. ROAD DIST. NO. | STATE | PROJ. NO.     | FISCAL YEAR | SHEET NO. | TOTAL SHEETS |
|---------------------|-------|---------------|-------------|-----------|--------------|
| HAWAII              | HAW.  | STP-0300(187) | 2023        | 26        | 27           |



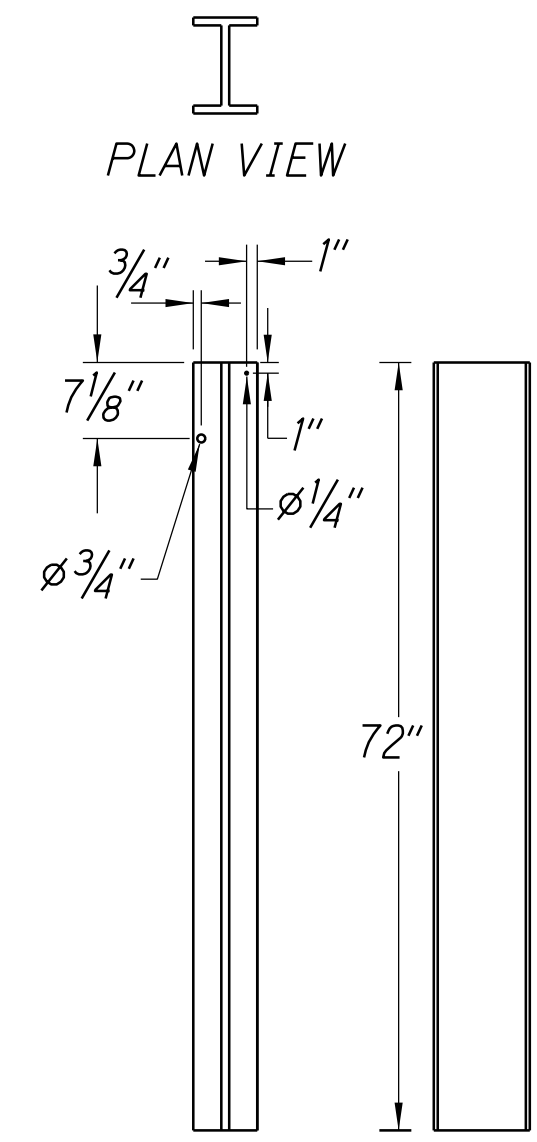
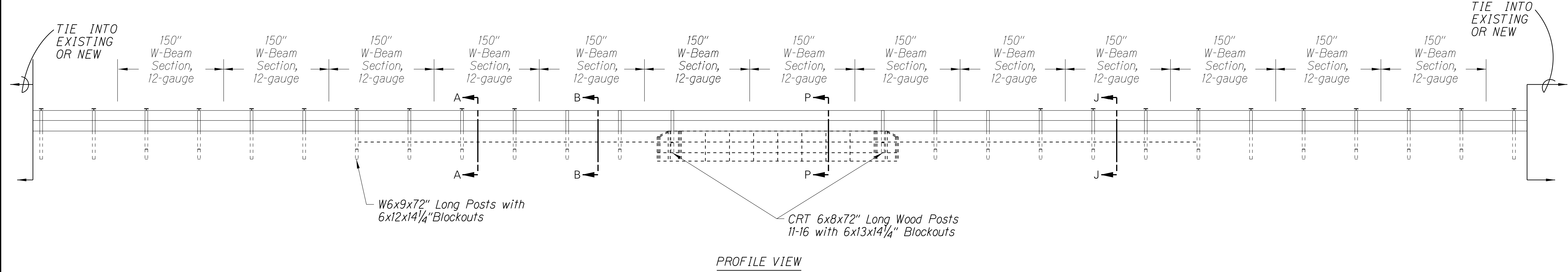
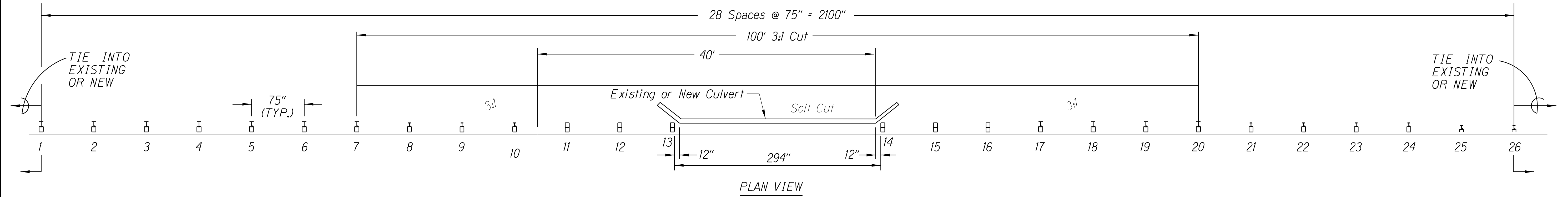
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| ORIGINAL PLAN | SURVEY PLOTTED BY | DATE |
| NOTE BOOK     | DRAWN BY          | X    |
| DESIGNED BY   | DESIGNED BY       | X    |
| CHECKED BY    | CHECKED BY        | X    |

r09/06/16 D:\usr2\Ernest\standards\Traffic Guardrail Standards\mT\_midwest.dgn

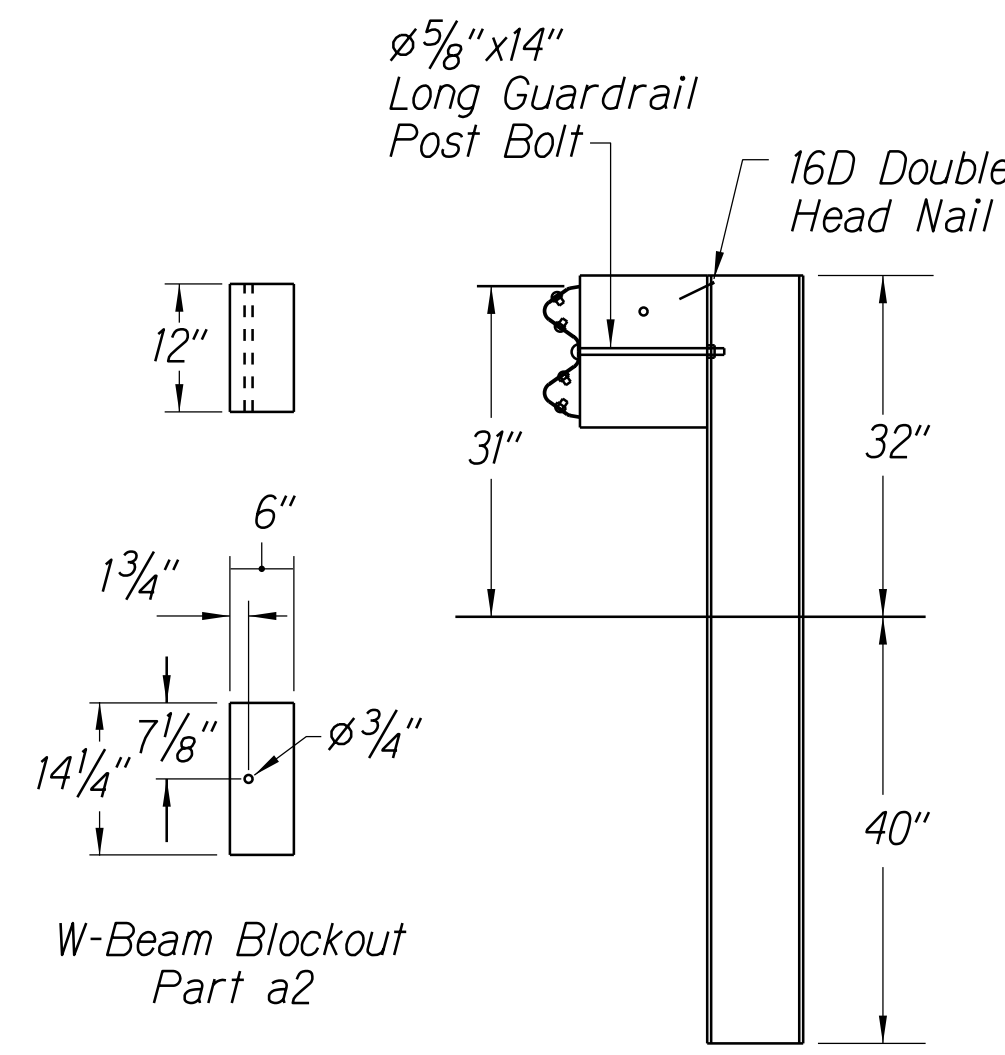
STATE OF HAWAII  
DEPARTMENT OF TRANSPORTATION  
HIGHWAYS DIVISION  
**MGS TRANSITION TO  
STRONG POST GUARDRAIL**  
**GUARDRAIL AND SHOULDER IMPROVEMENTS**  
At Various Locations, Phase 3, Oahu  
Federal-Aid Project No. STP-0300(187)  
Scale: Not to Scale Date: December, 2023



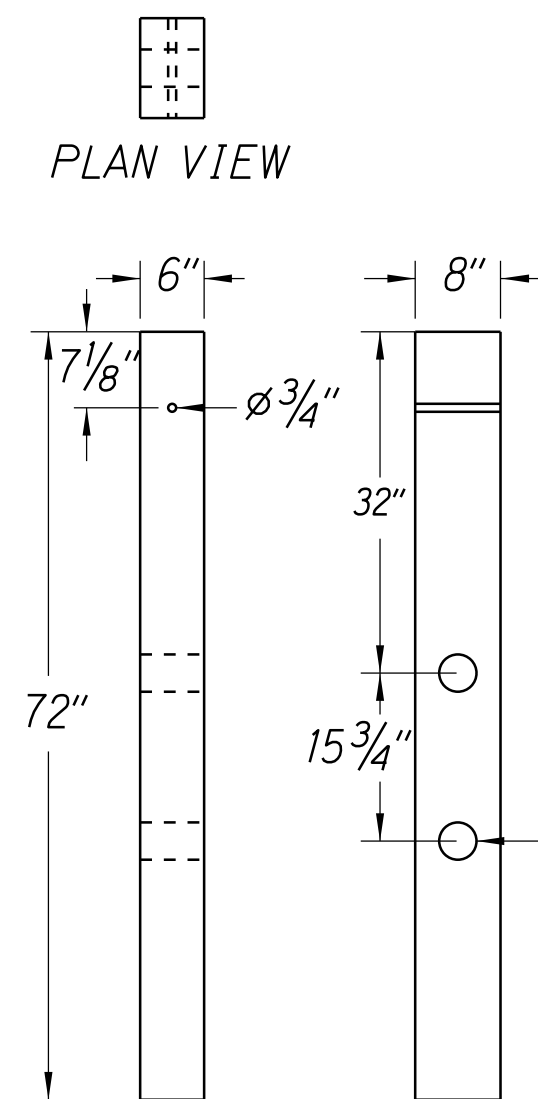
| FED. ROAD DIST. NO. | STATE | PROJ. NO.     | FISCAL YEAR | SHEET NO. | TOTAL SHEETS |
|---------------------|-------|---------------|-------------|-----------|--------------|
| HAWAII              | HAW.  | STP-0300(187) | 2023        | 27        | 27           |



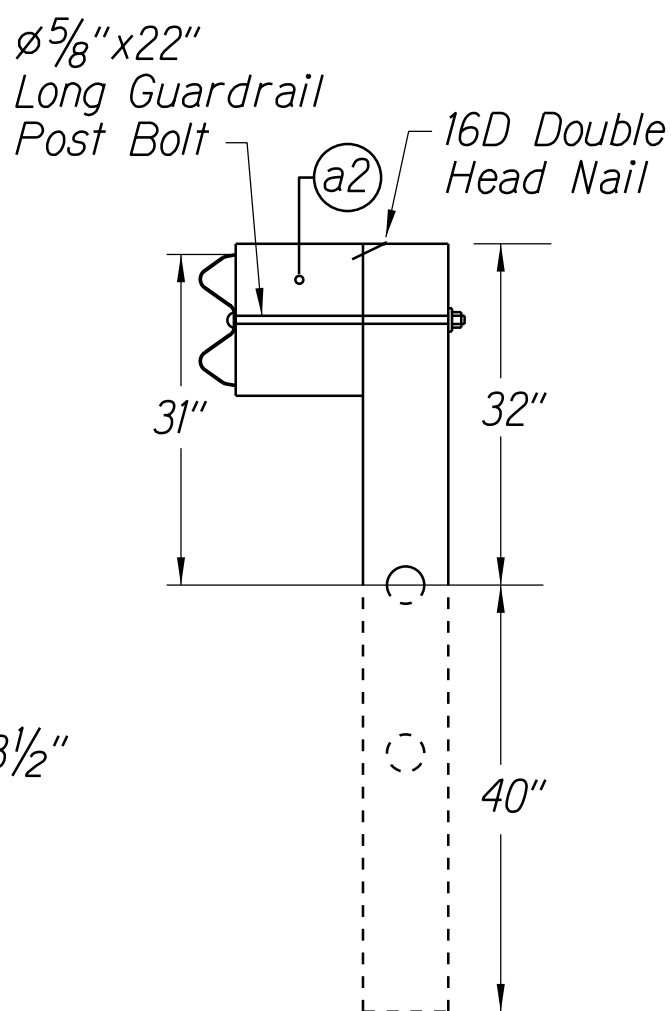
W6x9-Beam Post  
Part a1



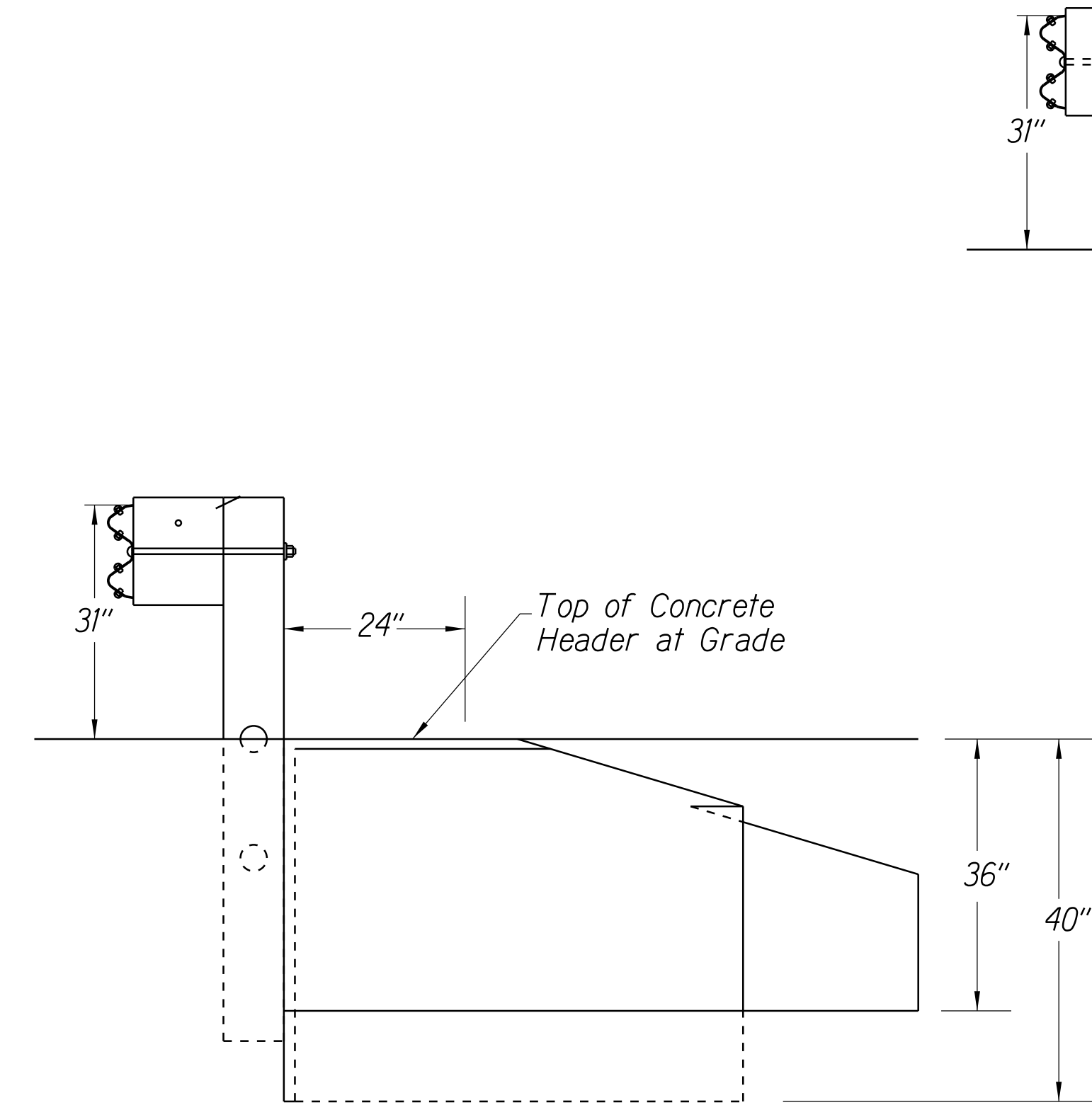
SECTION A-A



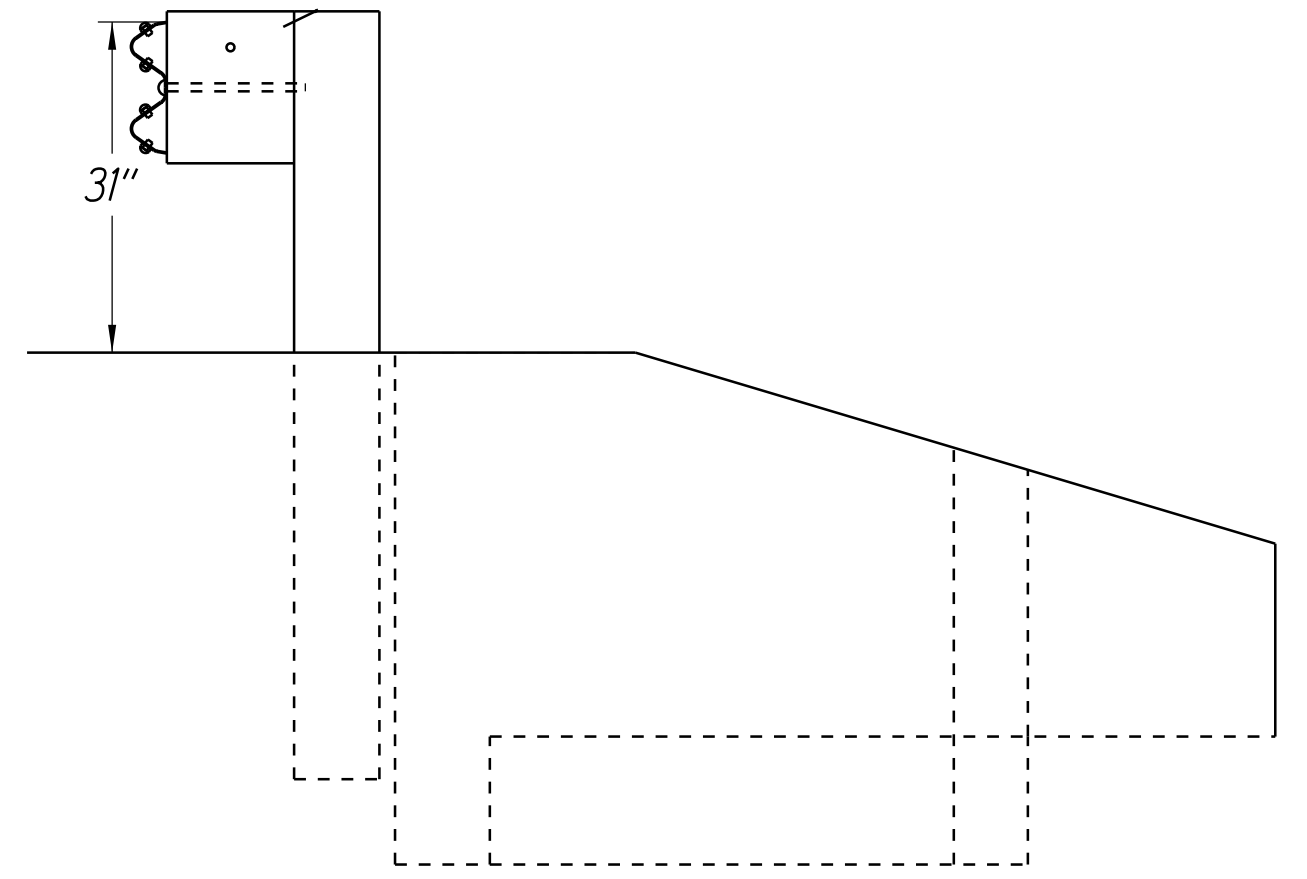
CRT WOOD POST  
Part e1



SECTION B-B



SECTION P-P



SECTION J-J

STATE OF HAWAII  
DEPARTMENT OF TRANSPORTATION  
HIGHWAYS DIVISION

**MGS LONG SPAN LSC-2**

GUARDRAIL AND SHOULDER IMPROVEMENTS

At Various Locations, Phase 3, Oahu

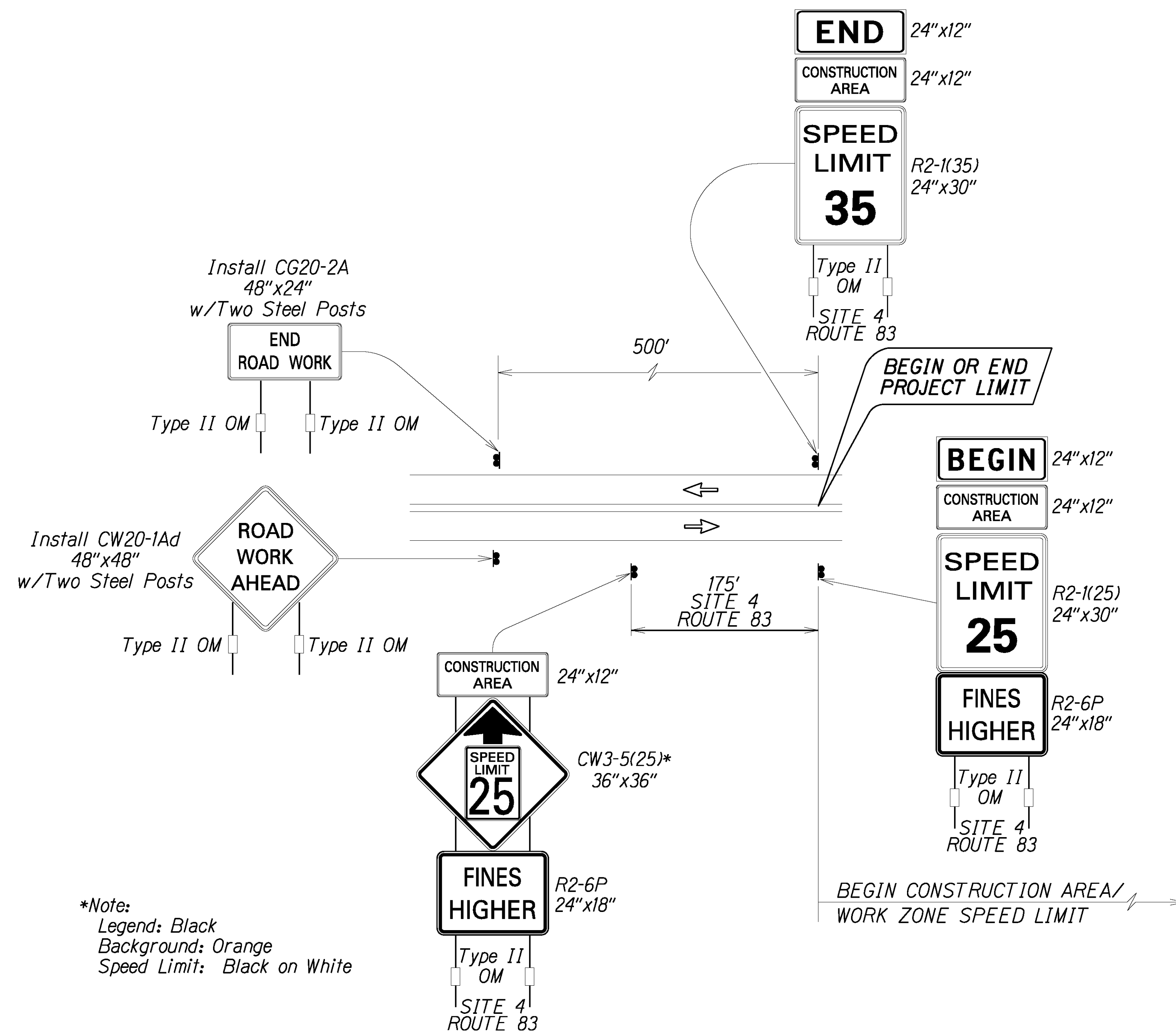
Federal-Aid Project No. STP-0300(187)

Scale: NTS

Date: December, 2023

SHEET No. 1 OF 1 SHEETS

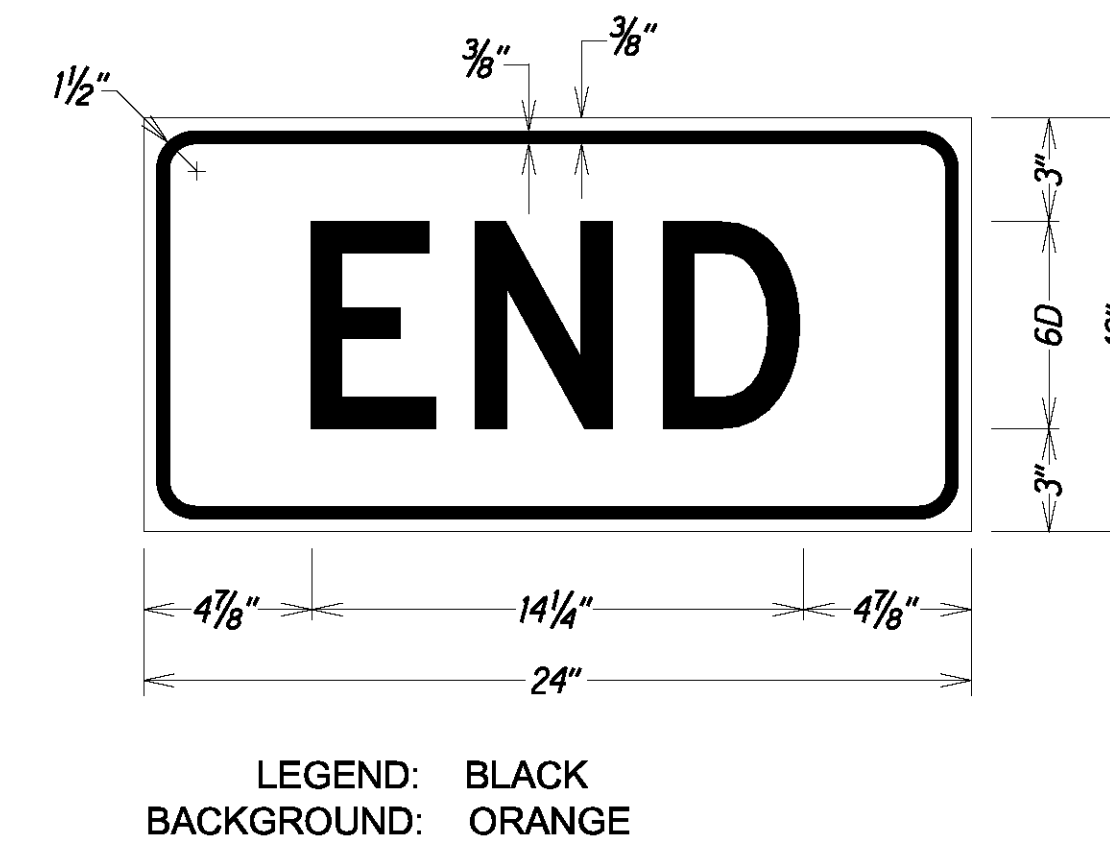
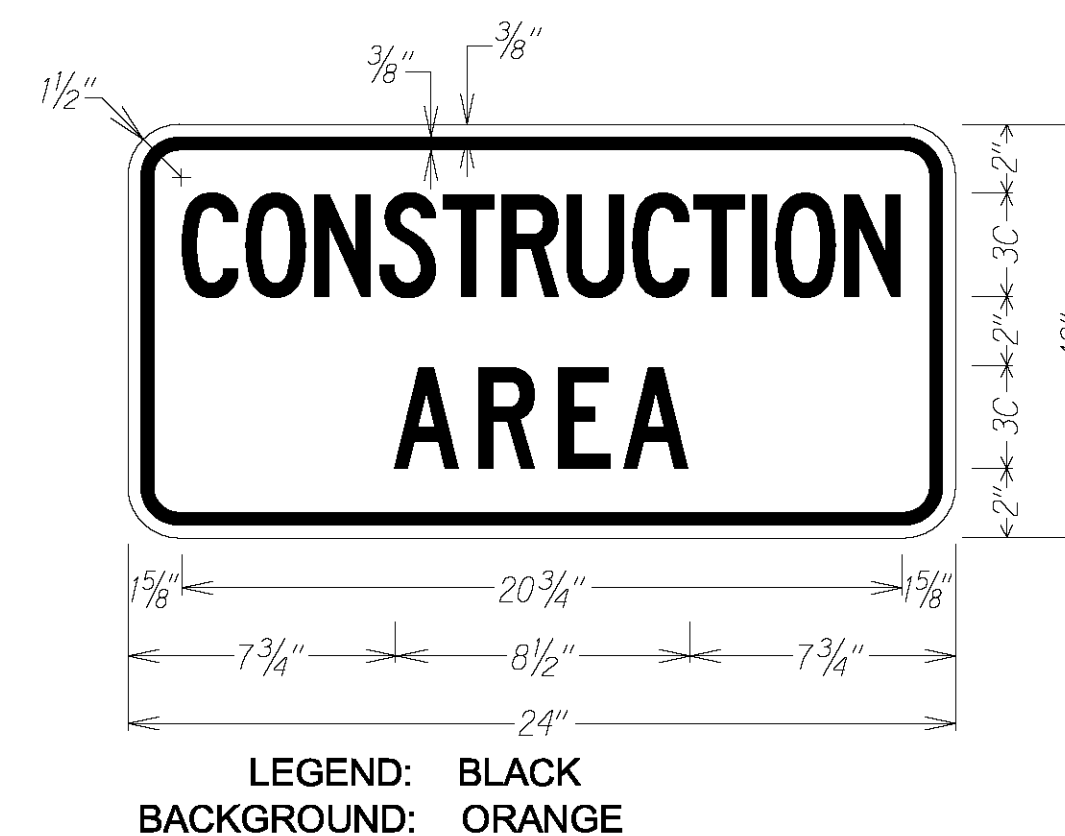
| FED. ROAD<br>DIST. NO. | STATE | FED. AID<br>PROJ. NO. | FISCAL<br>YEAR | SHEET<br>NO. | TOTAL<br>SHEETS |
|------------------------|-------|-----------------------|----------------|--------------|-----------------|
| HAWAII                 | HAW.  | STP-0300(187)         | 2023           | ADD. 275-1   | 27              |



Work Zone Notes:

1. *This Work Zone Sign Plan is intended for use on long-term stationary work zones/construction phases (3 days or more). All work zones or construction phases less than 3 days duration will use Traffic Control Plans shown in Section 645 of the Special Provisions.*
2. *All existing regulatory speed limit signs within the work zone/project limits shall be covered and work zone speed limit sign assemblies (R2-1(35) and CW3-5(25) with "CONSTRUCTION AREA" and R2-6P, "FINES HIGHER" Supplemental Signs) shall be displayed during lane closure hours.*
3. *Upon the removal of the lane closure, all work zone speed limit signs shall be covered and existing speed limit signs within the work zone/project limits shall be restored.*
4. *Construction signs shall be installed on both the approaching and trailing ends of each work zone.*
5. *Each construction sign and work zone speed limit assembly shall have a minimum of two (2) Type II OM. Installation of each Type II OM shall be considered incidental to Item No. 645.0100 - Traffic Control.*
6. *The contractor shall maintain a log of the covering and uncovering of the existing regulatory speed limit signs, as well as the covering and uncovering of the work zone speed limit sign assemblies. The log will be submitted weekly to the engineer and indicate the daily times of when each existing regulatory speed limit sign and work zone speed limit assembly are covered and uncovered. The log will also include the installation and removal dates, times, and locations of the work zone speed limit sign assemblies at the start and end of the project.*
7. *The daily covering and uncovering of existing regulatory speed limit signs along with the installation, maintenance, removal, daily covering and uncovering of work zone speed limit sign assemblies and weekly log shall be considered incidental to Item No. 645.0100 - Traffic Control. Sign covers shall not allow any portion of the sign being covered to be visible. If the sign has more than one side, cover shall completely cover each side. "Homemade" or "field made" covers shall not be used or accepted.*
8. *Placement of construction signs shall not obstruct the path of pedestrians and bicyclists.*

TYPICAL DETAIL FOR CONSTRUCTION SIGNS  
ON TWO LANE OR MULTILANE UNDIVIDED LOW SPEED HIGHWAY



|   |           |                   |
|---|-----------|-------------------|
| 1 | 1/10/2024 | Added this sheet. |
|   | DATE      | REV.              |

STATE OF HAWAII  
DEPARTMENT OF TRANSPORTATION  
HIGHWAYS DIVISION

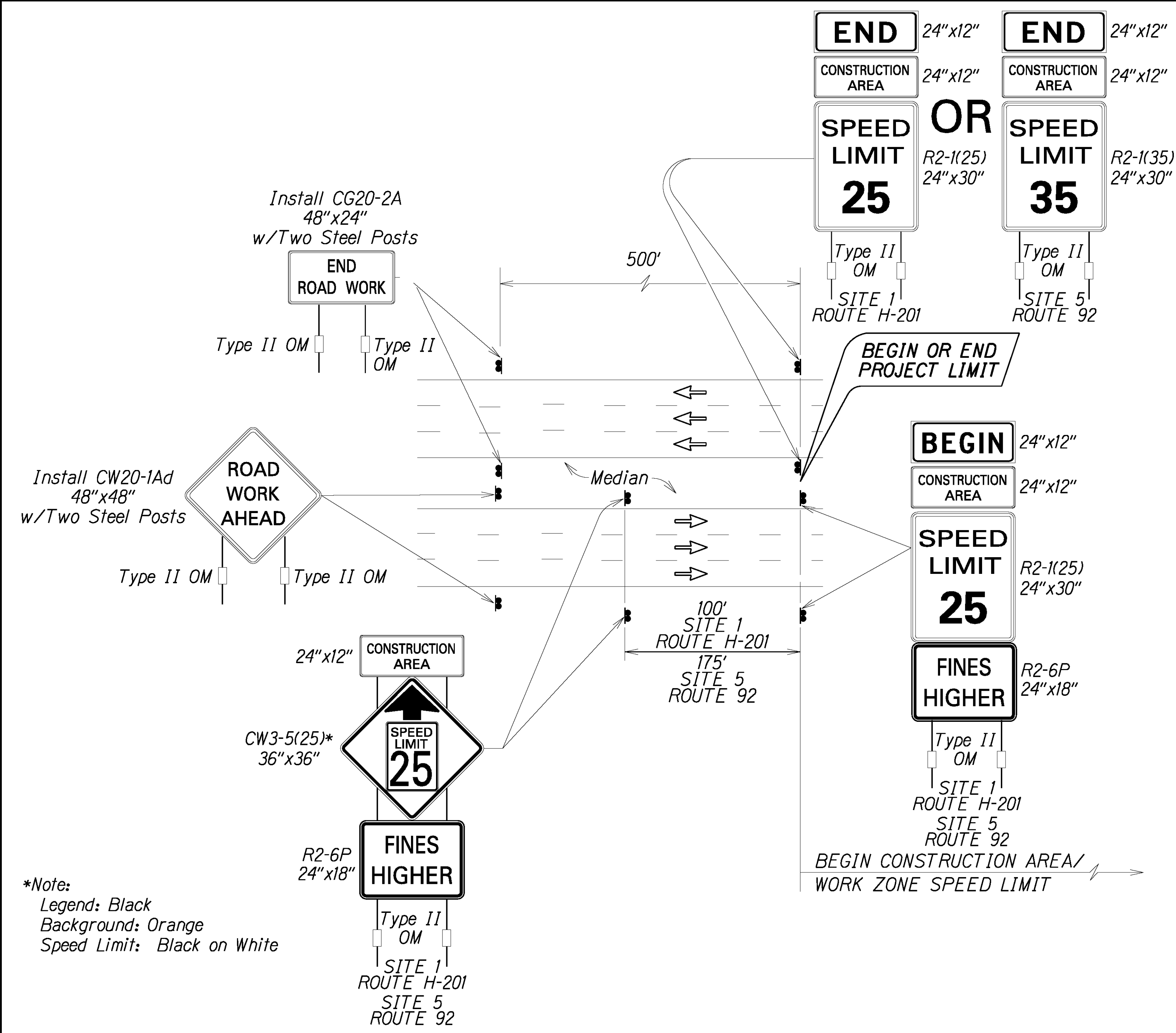
LOW SPEED UNDIVIDED HIGHWAY  
WORK ZONE SIGNING PLAN, NOTES & DETAILS  
GUARDRAIL AND SHOULDER IMPROVEMENTS

*At Various Locations, Phase 3, Oahu*  
*Federal Aid Project No. STP-0300(187)*  
*Not To Scale* *Date: JAN, 2024*

SHEET No. 1 OF 3 SHEETS

ADD. 27S-1

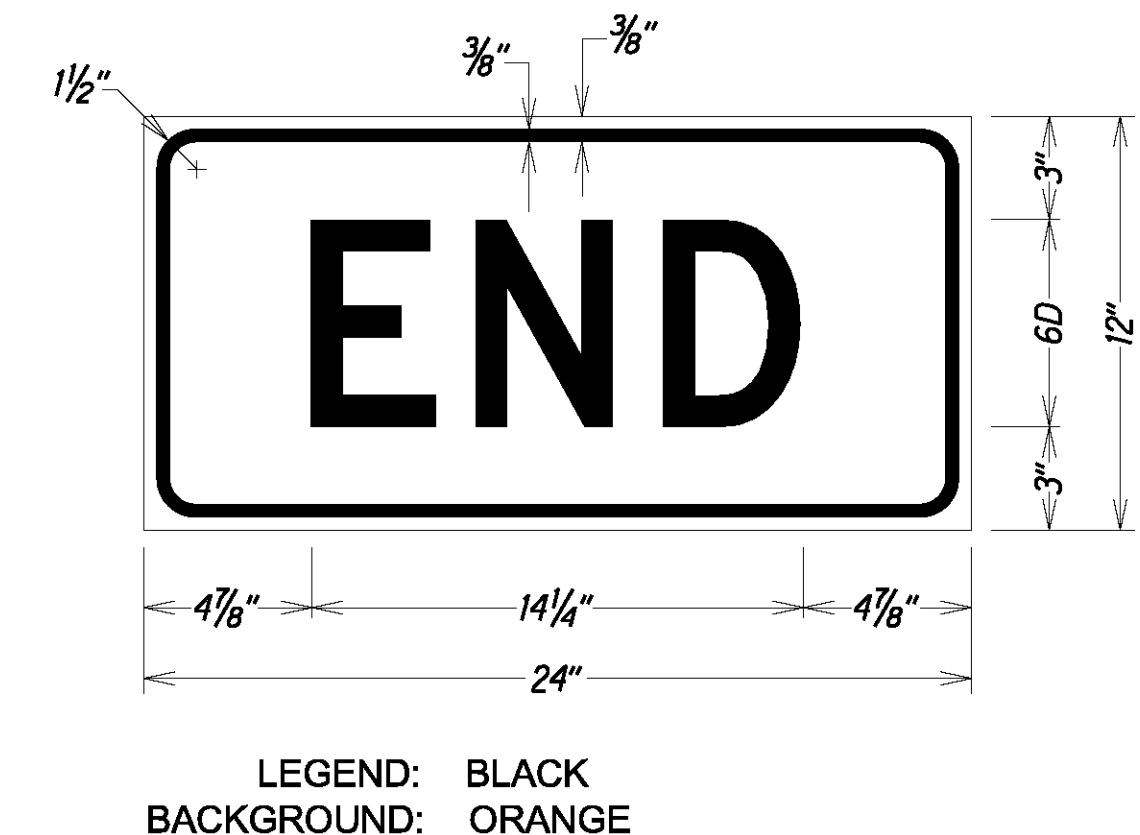
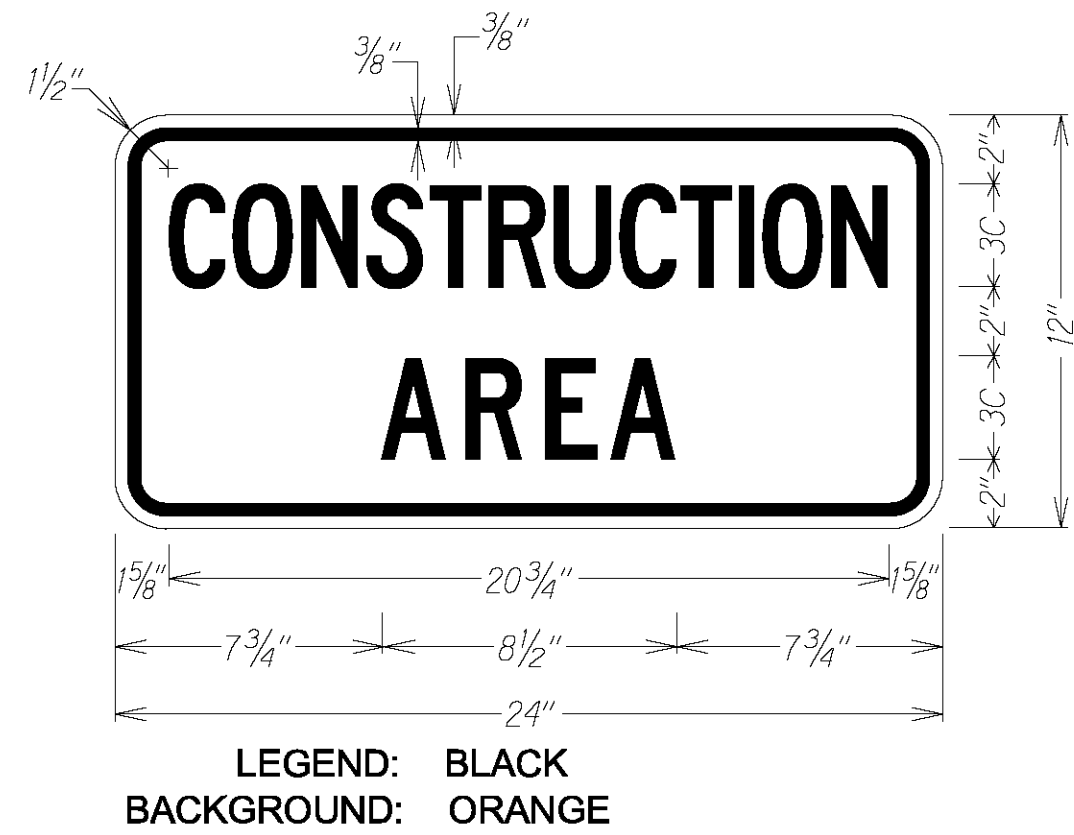
| FED. ROAD DIST. NO. | STATE | FED. AID PROJ. NO. | FISCAL YEAR | SHEET NO.  | TOTAL SHEETS |
|---------------------|-------|--------------------|-------------|------------|--------------|
| HAWAII              | HAW.  | STP-0300(187)      | 2023        | ADD. 27S-2 | 27           |



- Work Zone Notes:**
1. This Work Zone Sign Plan is intended for use on long-term stationary work zones/construction phases (3 days or more). All work zones or construction phases less than 3 days duration will use Traffic Control Plans shown in Section 645 of the Special Provisions.
  2. All existing regulatory speed limit signs within the work zone/project limits shall be covered and work zone speed limit sign assemblies (R2-1(35) and or R2-1(25), and CW3-5(25) with "CONSTRUCTION AREA" and R2-6P, "FINES HIGHER" Supplemental Signs) shall be displayed during lane closure hours.
  3. Upon the removal of the lane closure, all work zone speed limit signs shall be covered and existing speed limit signs within the work zone/project limits shall be restored.
  4. Construction signs shall be installed on both the approaching and trailing ends of each work zone.
  5. Each construction sign and work zone speed limit assembly shall have a minimum of two (2) Type II OM. Installation of each Type II OM shall be considered incidental to Item No. 645.0100 - Traffic Control.
  6. The contractor shall maintain a log of the covering and uncovering of the existing regulatory speed limit signs, as well as the covering and uncovering of the work zone speed limit sign assemblies. The log will be submitted weekly to the engineer and indicate the daily times of when each existing regulatory speed limit sign and work zone speed limit assembly are covered and uncovered. The log will also include the installation and removal dates, times, and locations of the work zone speed limit sign assemblies at the start and end of the project.
  7. The daily covering and uncovering of existing regulatory speed limit signs along with the installation, maintenance, removal, daily covering and uncovering of work zone speed limit sign assemblies and weekly log shall be considered incidental to Item No. 645.0100 - Traffic Control. Sign covers shall not allow any portion of the sign being covered to be visible. If the sign has more than one side, cover shall completely cover each side. "Homemade" or "field made" covers shall not be used or accepted.
  8. Placement of construction signs shall not obstruct the path of pedestrians and bicyclists.

**\*Note:**  
Legend: Black  
Background: Orange  
Speed Limit: Black on White

**TYPICAL DETAIL FOR CONSTRUCTION SIGNS  
ON MULTILANE DIVIDED LOW SPEED HIGHWAY**



|      |           |                   |
|------|-----------|-------------------|
| 1    | 1/10/2024 | Added this sheet. |
| DATE | REVISION  |                   |

STATE OF HAWAII  
DEPARTMENT OF TRANSPORTATION  
HIGHWAYS DIVISION

**LOW SPEED DIVIDED HIGHWAY**  
**WORK ZONE SIGNING PLAN, NOTES&DETAILS**  
**GUARDRAIL AND SHOULDER IMPROVEMENTS**

At Various Locations, Phase 3, Oahu  
Federal Aid Project No. STP-0300(187)  
Not To Scale Date: JAN, 2024

SHEET No. 2 OF 3 SHEETS

