

STATE OF NEW HAMPSHIRE
INTRA-DEPARTMENT COMMUNICATION

DATE: June 6, 2023

FROM: Kirk Mudgett *KOM*
Chief of Specialty Section

AT (OFFICE): Department of Transportation
Bureau of Highway Design

SUBJECT: Attachment of Guardrail Transitions, Associated Pay Items, and Revised Special Attention to Existing Barrier.

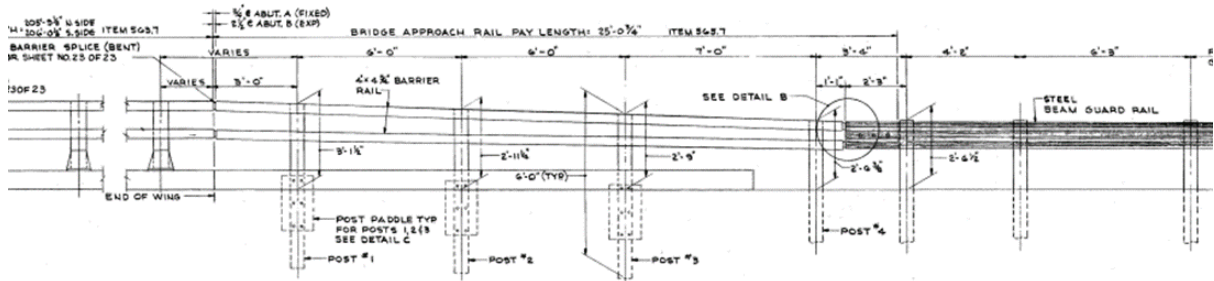
TO: All Project Development Bureaus and Design Consultants

MEMORANDUM

The purpose of this memo is to provide designers guidance on the methods of attaching new standard beam guardrail to existing bridge railing or concrete parapet and the associated pay items.

1) Existing Aluminum Bridge Approach Rail:

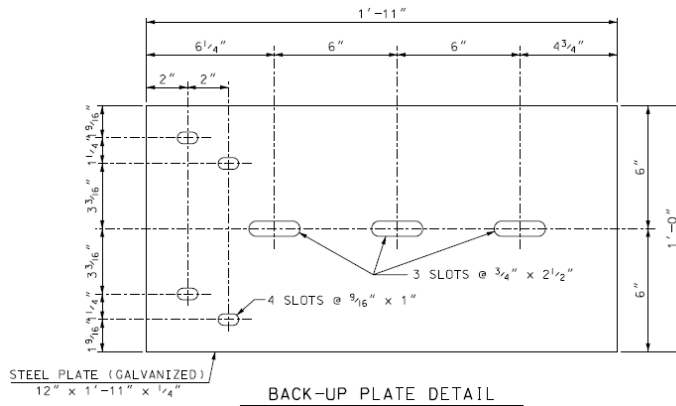
Existing aluminum bridge approach rail units cannot be adjusted in the field to the standard guardrail height of 31-in. because adjusting the bridge approach rail height would change the parameters for which it was crash tested, and the elements are typically too old to reattach. The Contractor is advised through the W-Beam Guardrail Special Attention in the Proposal, to make up the height difference between the bridge approach rail and the standard beam guardrail by transitioning the height of the new standard beam guardrail over 50-ft. This work is subsidiary to the beam guardrail item. **See attached Special Attention.**



Aluminum Bridge Approach Rail

Figure 1

Designers need to determine if the back-up plate at the aluminum bridge approach rail and beam guardrail connection is damaged or has large areas of corrosion. If the back-up plate needs to be replaced, Item 565.001 - Miscellaneous Bridge Approach Rail Components, should be added to the estimate along with the details for a replacement back-up plate. See **Figure 2 and attachments for details.**

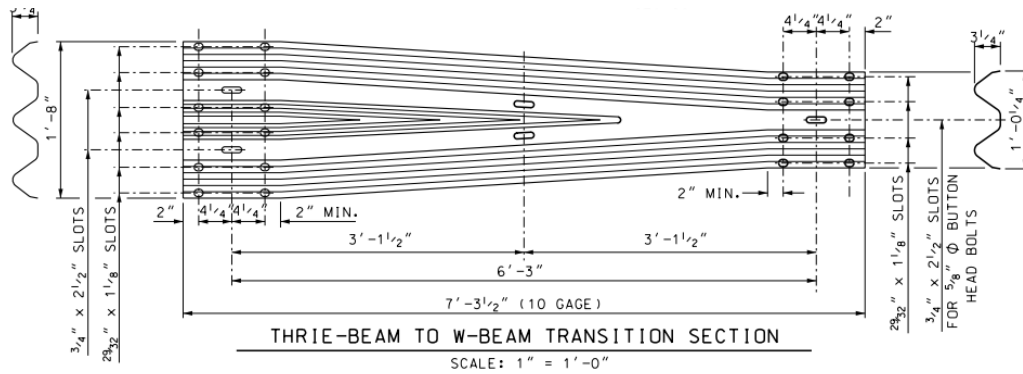


Aluminum Bridge Back-up Plate

Figure 2

2) Existing Steel Bridge Approach Rail and Concrete Parapets 32-in. to 34-in. Height:

When attaching new standard beam guardrail to existing steel bridge approach railing or concrete parapets with heights between 32-in. and 34-in., a symmetrical w-beam to thrie-beam transition panel should be used. Item 606.332 - Single-Faced Thrie Beam Transition Rail, Steel Post, should be added to the contract along with *Standard Plan GR-14*. See **Figure 3 and attachment for details**.

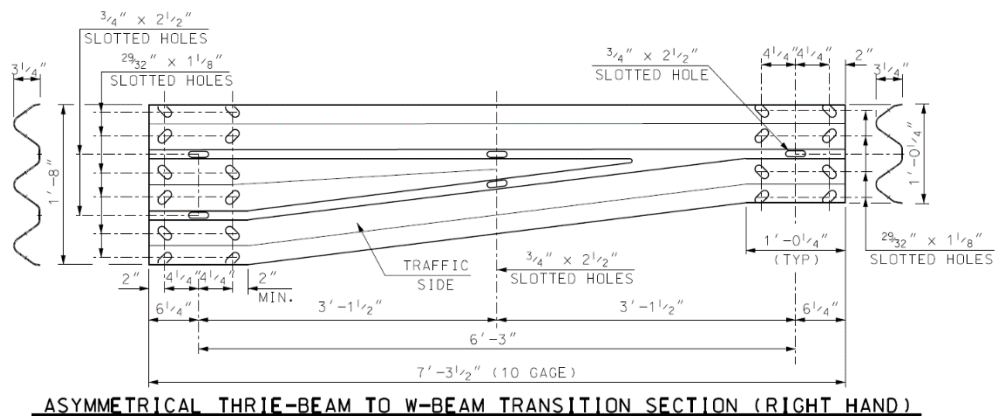


Thrie-Beam Transition Rail Section

Figure 3

3) Existing Steel Bridge Approach Rail and Concrete Parapets < 32-in. Height:

When attaching new standard beam guardrail to existing steel bridge approach railing or concrete parapets with heights < 32-in., an asymmetrical w-beam to thrie-beam transition panel should be used to transition the height difference. Item 606.34201 - Single-Faced Asymmetrical Transition Rail, Left (Steel Post), for the left side and Item 606.34202 - Single-Faced Asymmetrical Transition Rail, Right (Steel Post), for the right side should be added to the estimate along with Detail – “Single Faced Asymmetrical Transition Rail, Steel Post”. **See Figure 4 and attachment for details (contact Bureau of Highway Design Specialty Section for the CADD detail).** The asymmetrical transition panel will accommodate up to a 4-in. height differential. If additional height is needed, the difference can be obtained by transitioning the new standard beam guardrail. **See attached Special Attention.**

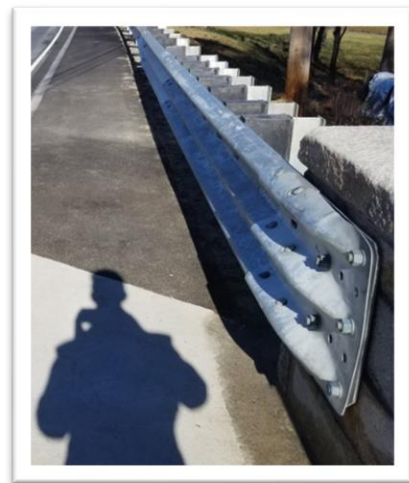
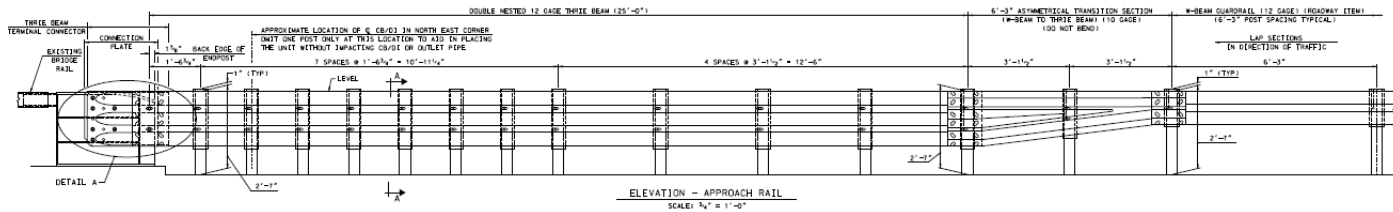


Asymmetrical Transition Rail Section

Figure 4

4) Existing Steel or Existing/New Stone Masonry Bridge Rail:

When attaching new standard beam guardrail to existing steel or stone masonry bridge railing *without* steel bridge approach railing, use Item 565.92, Bridge Approach Rail, Asymmetrical Thrie Beam Transition (Steel Posts) or Item 565.91, Bridge Approach Rail, Thrie Beam Transition (Steel Posts) for a symmetrical transition section. These items include both the approach section and the asymmetrical/symmetrical thrie beam transition for a total length of 33'-1 3/4". See Figure 5 and attachment for details (contact Bureau of Bridge Design for the CADD details).

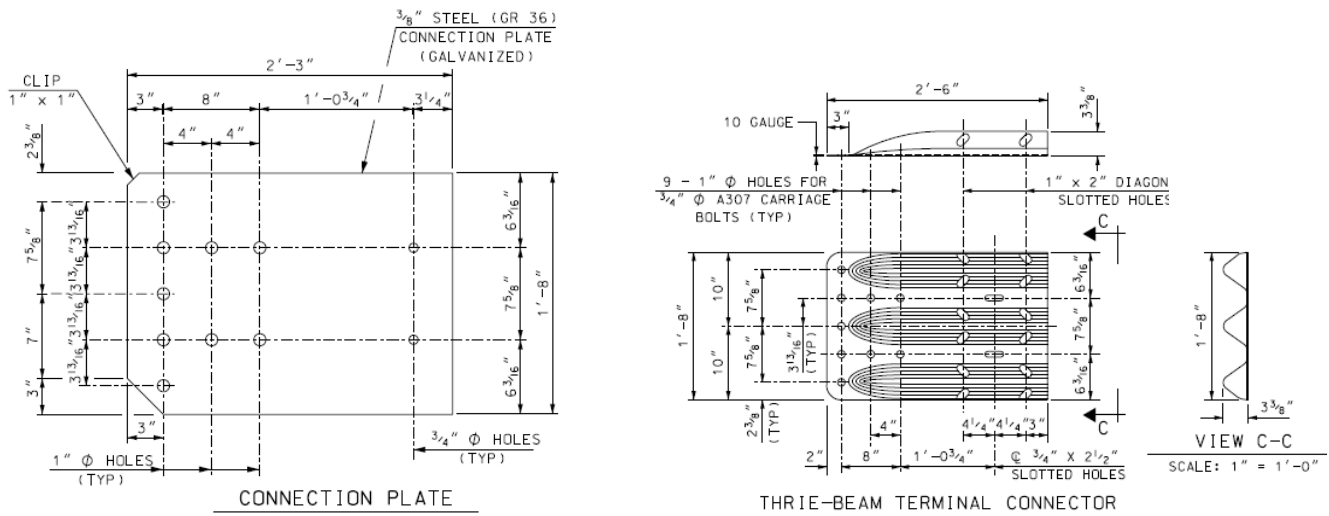


Connection Plate and Thrie-Beam Terminal Connector

Figure 5

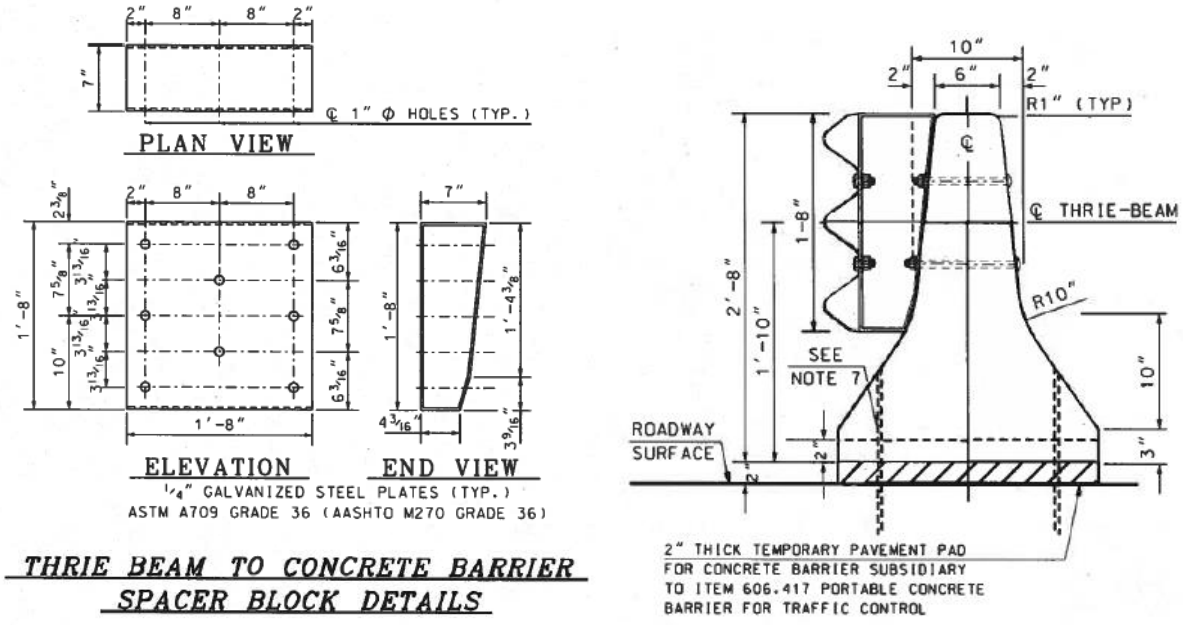
5) Connector Components:

Designers need to determine if there is an existing connection plate, spacer block, and/or a thrie-beam terminal connector, and assess their condition, to determine if new components are needed. If new or replacement components are needed, the detail(s) should be included in the contract plans with the thrie-beam transition or asymmetrical transition rail detail and is subsidiary to the corresponding transition section. **See Figures 6 & 7.** These plates allow for attachment of rail to the plate, and then, plate to the structure or other hardware, where direct attachment of rail to structure could not be made. The re-use or fabrication of new plates/spacer blocks/connectors should be noted in the guardrail notes. The components can vary in size, shape, and bolt pattern. See the As-Built plans for the existing plate or spacer block dimensions.



Connection Plate and Thrie-Beam Terminal Connector

Figure 6



Example of Spacer Block
Figure 7

Noted by: A. Hubbard

Attachments: Section 606 Special Attention, Aluminum Rail Back Up Plate Details, Standard GR-14, Asymmetrical Transition Section, Bridge Approach Rail-Asymmetrical

05/03/23

SSD: 09/01/05, 04/07/09, 11/30/10, 06/01/13, 06/11/20

SPECIAL ATTENTION**SECTION 606 – GUARDRAIL****W-BEAM GUARDRAIL**

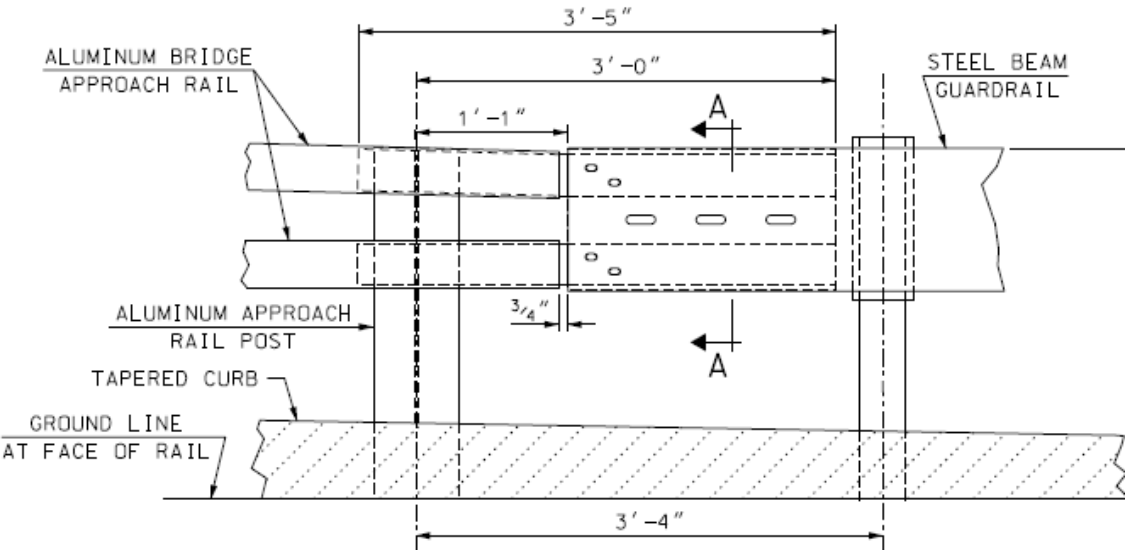
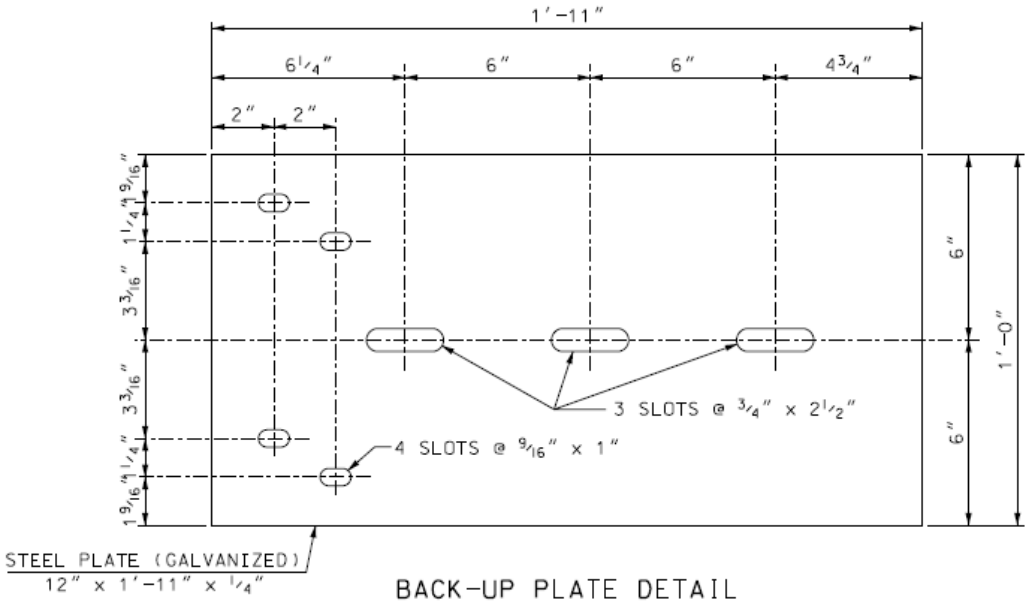
Situations for connecting new standard beam guardrail to existing guardrail installations may include:

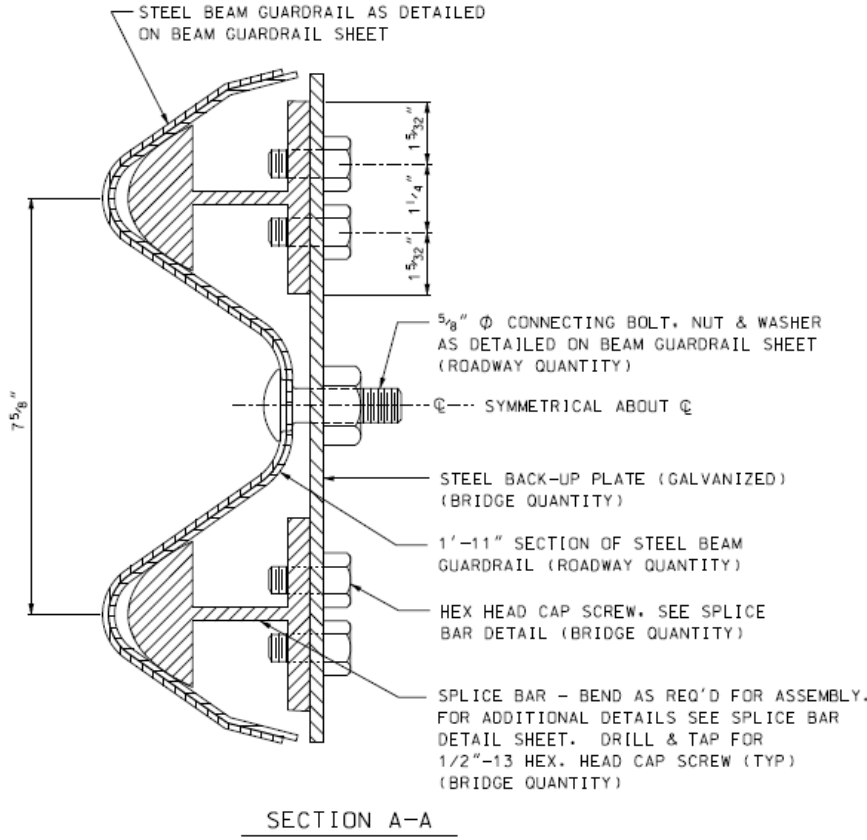
- 1) New standard beam guardrail, set at 31 inches high as required by the mid-splice guardrail system, to be connected to beam guardrail terminals that have been crash tested at 27 inches high or bridge approach units that were designed at a lower height.
- 2) New standard beam guardrail to be connected to existing beam guardrail that is not at the same height.

Additional items may be included in the contract to make up the height difference (e.g., three-beam transition panel shape unit, etc.), or to aid in connection between systems (e.g., back-up plate for aluminum approach railing, etc.). These items will be noted on the contract plans. Another means for making up the height difference is transitioning the height of the new standard beam guardrail over 50 feet to connect to the existing rail, terminal unit, or bridge approach unit.

Set the EAGRT heights according to the manufacturer's recommendation, as accepted under the Manual for Assessing Safety Hardware (MASH) - 2016 criteria. All other terminals, including, but not limited to, ELT, MELT, and CRT, shall be set at the crash acceptance height of 27-inch unless otherwise accepted under crash test acceptance for a higher height.

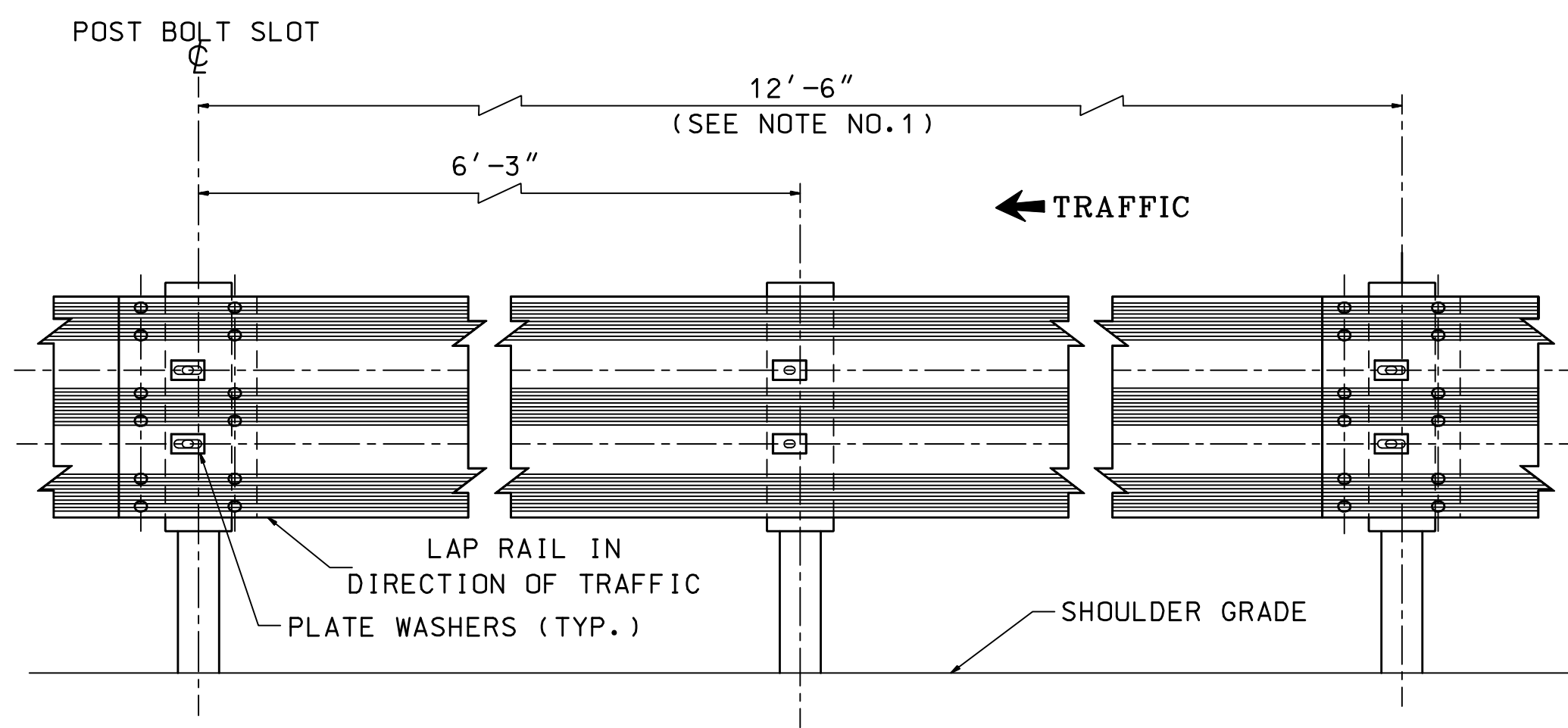
Steel Back-Up Plate Details for Aluminum Bridge Approach Rail



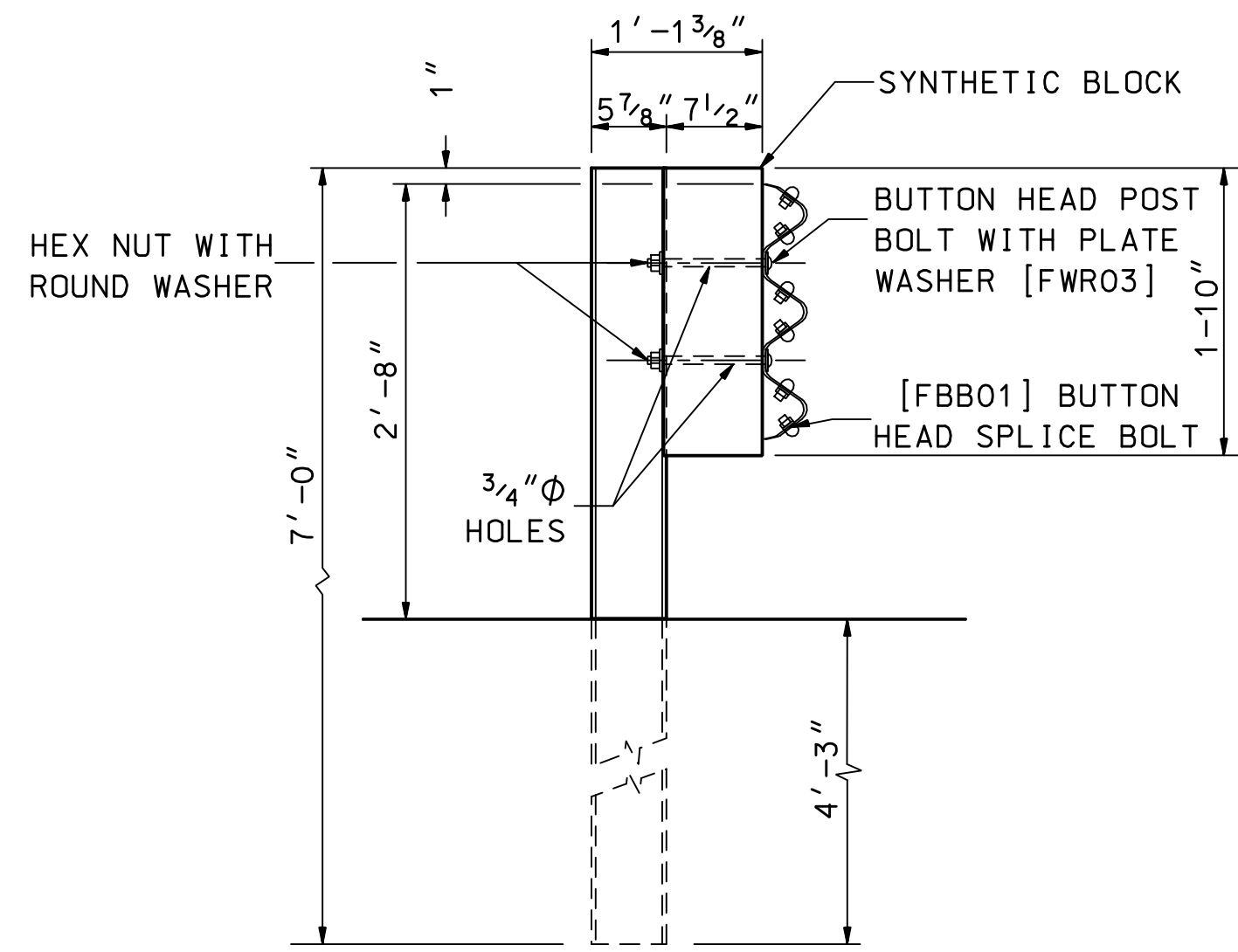


REVISION DATE
06-16-2010
11-05-2010
05-03-2011

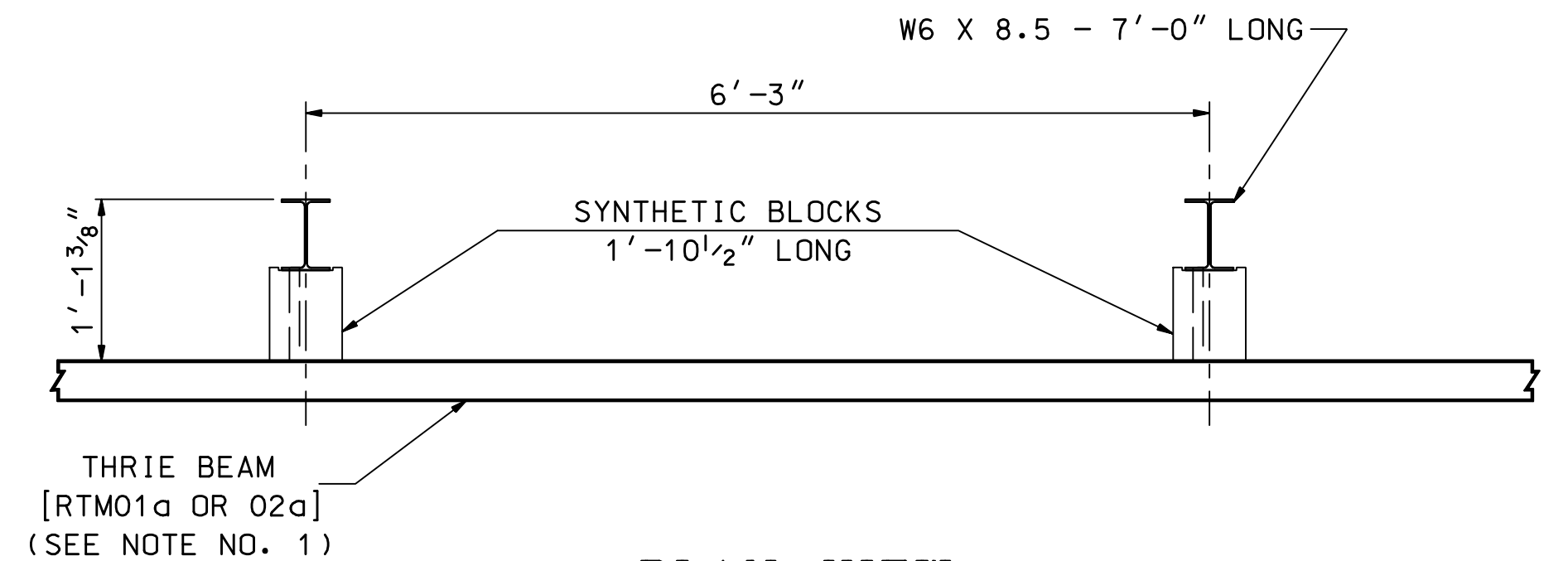
*DGN FILE NAME
GR-14



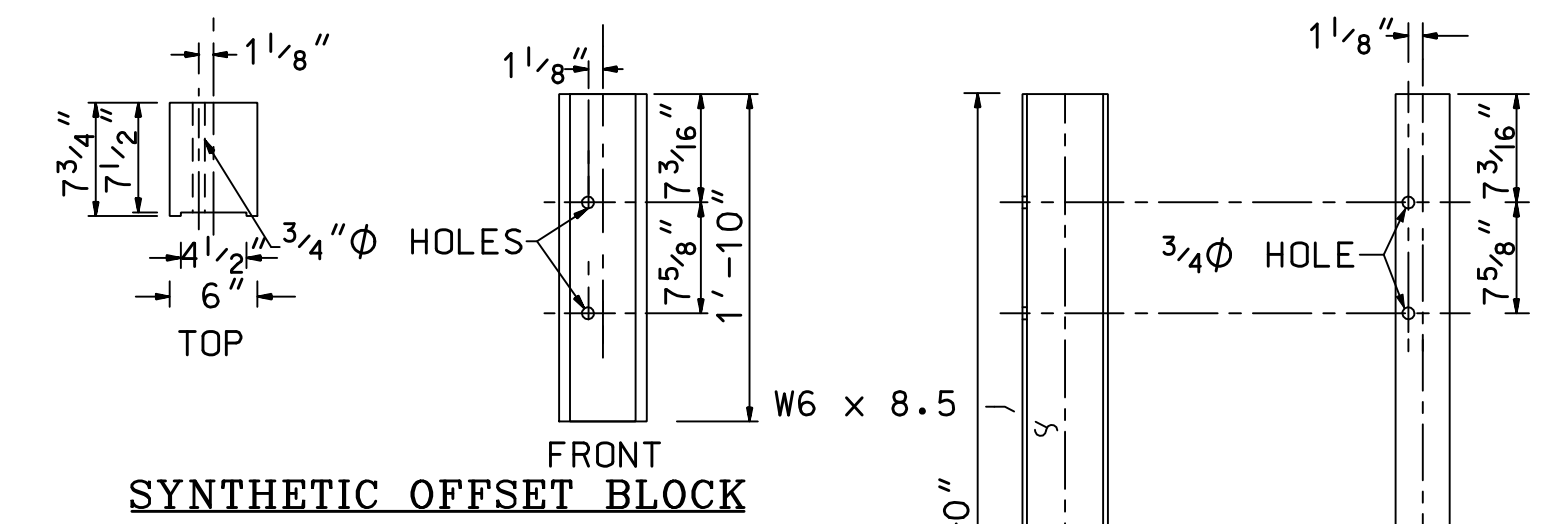
ELEVATION VIEW



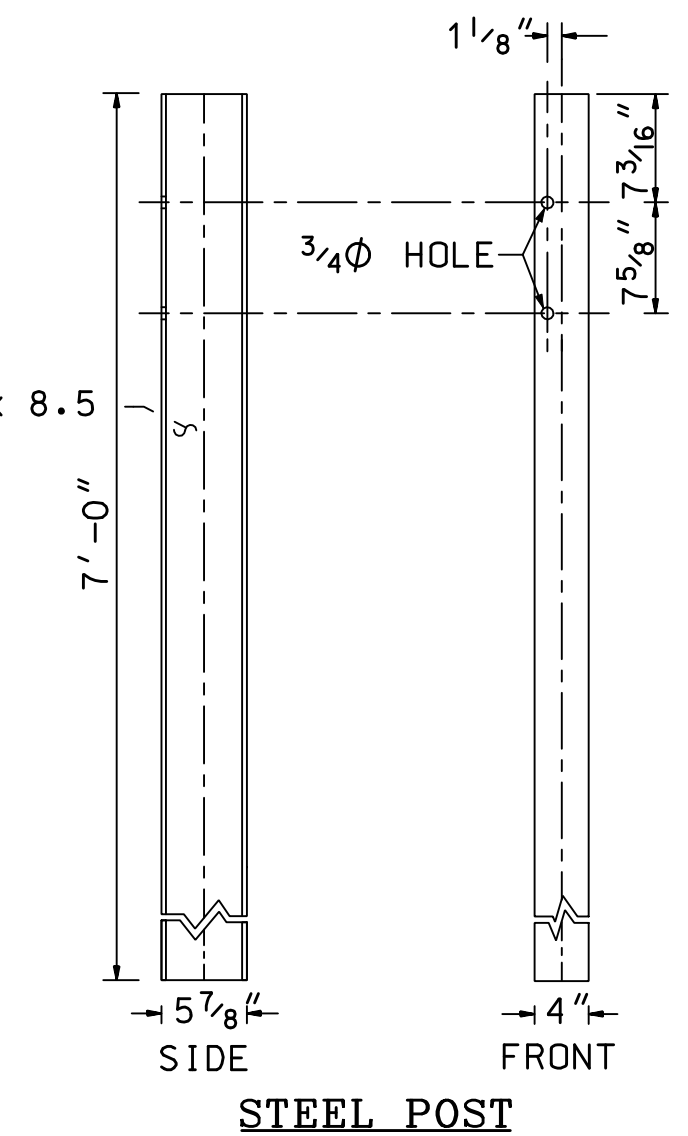
SIDE VIEW AT SPLICE POST



PLAN VIEW

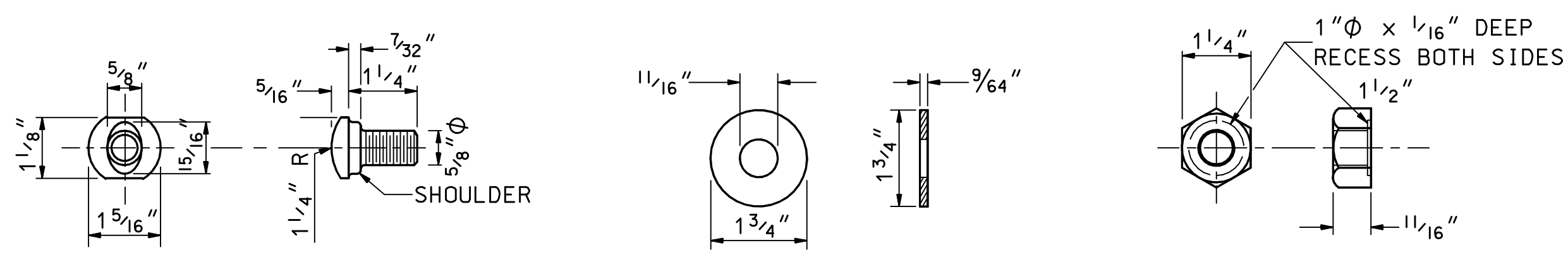


SYNTHETIC OFFSET BLOCK



STEEL POST

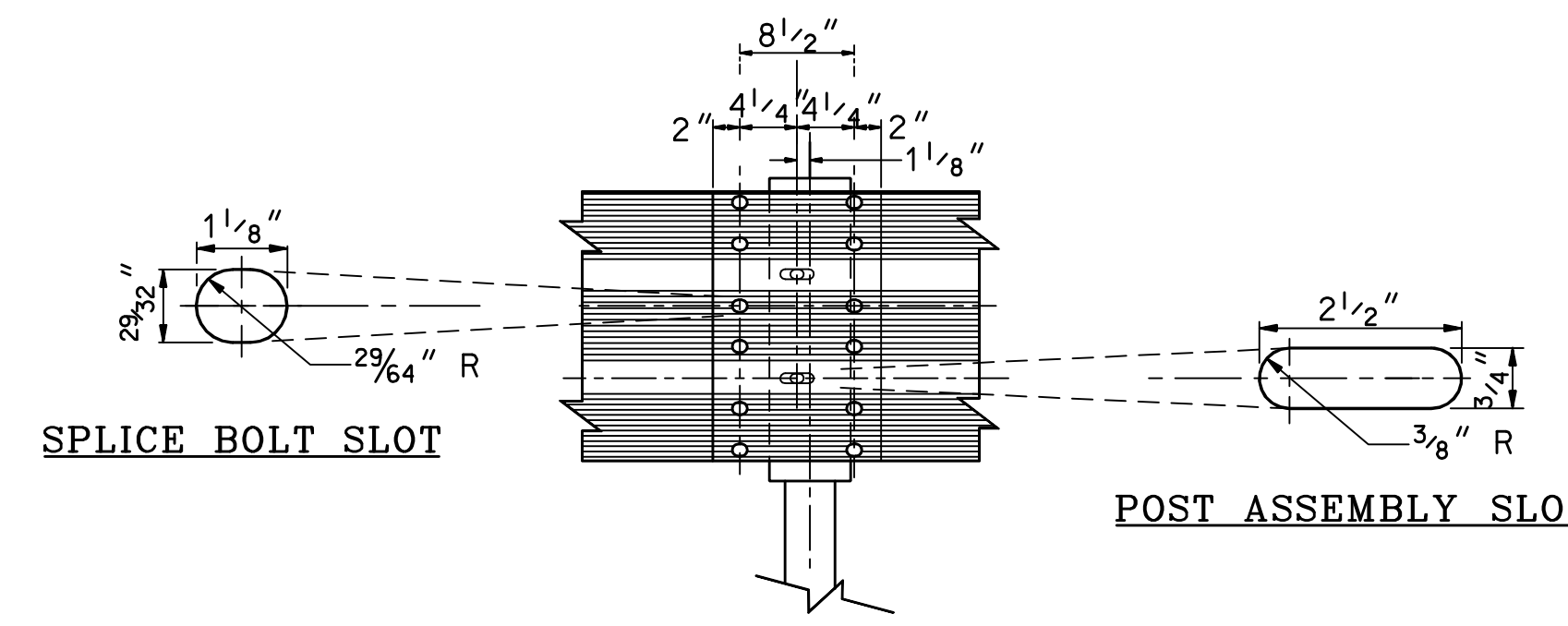
STRUCTURAL SHAPE STEEL POST & BLOCK



SPLICE BOLT [FBB01]
(12 REQ'D PER SPLICE)

ROUND WASHER [FWR03]

NUT FOR SPLICE & POST BOLTS [FBB01]



SPLICE BOLT SLOT

POST ASSEMBLY SLOT

BEAM SPLICE

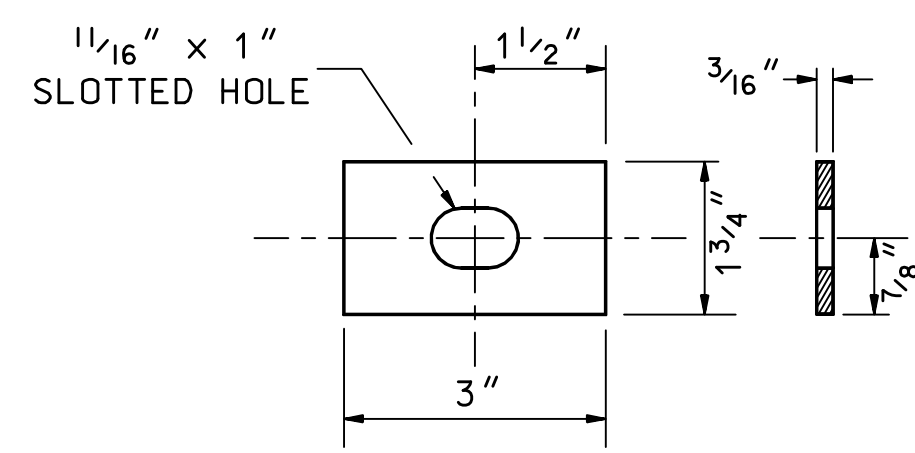
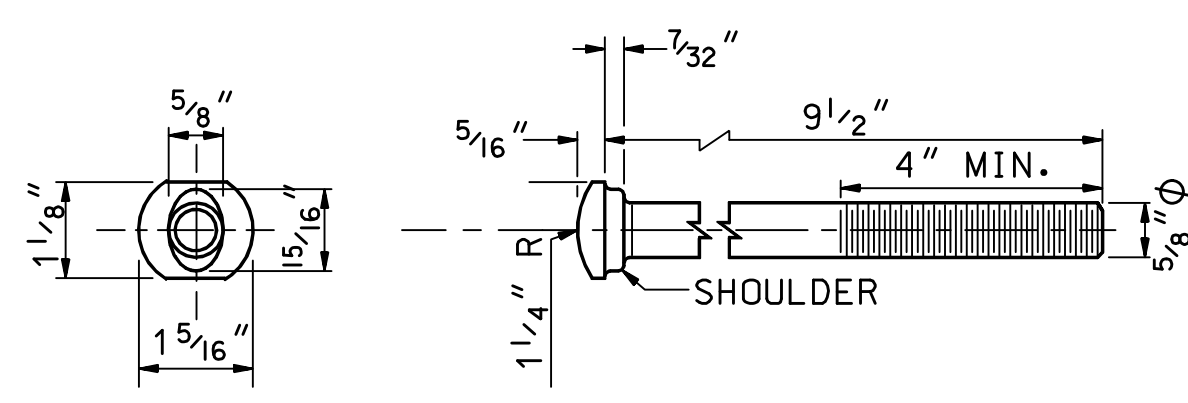
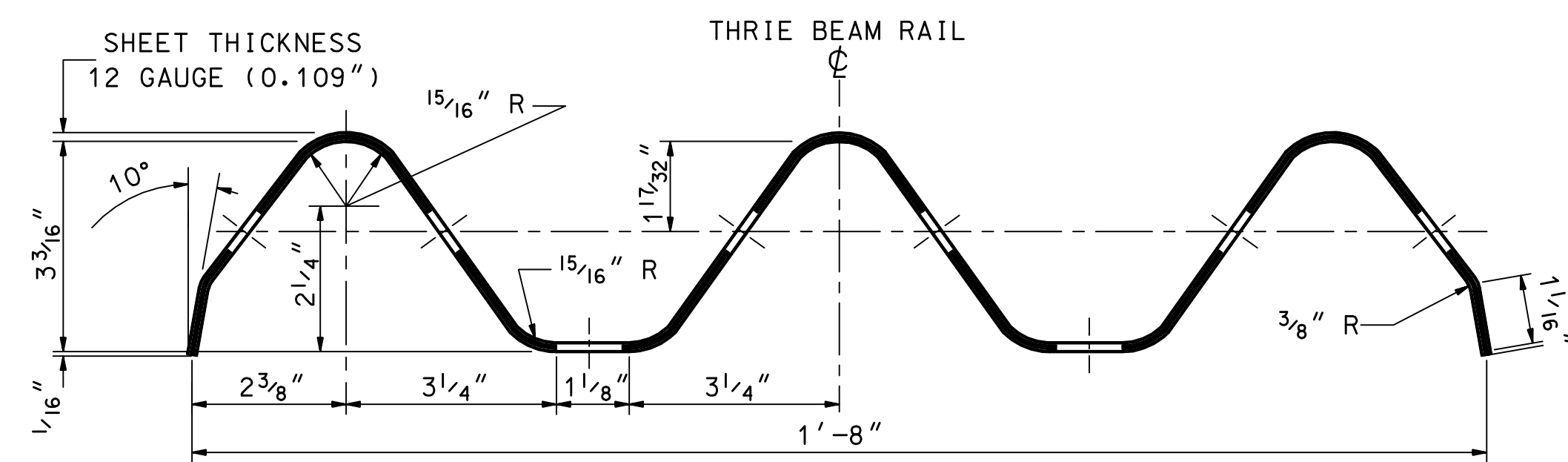


PLATE WASHER [FWR03]

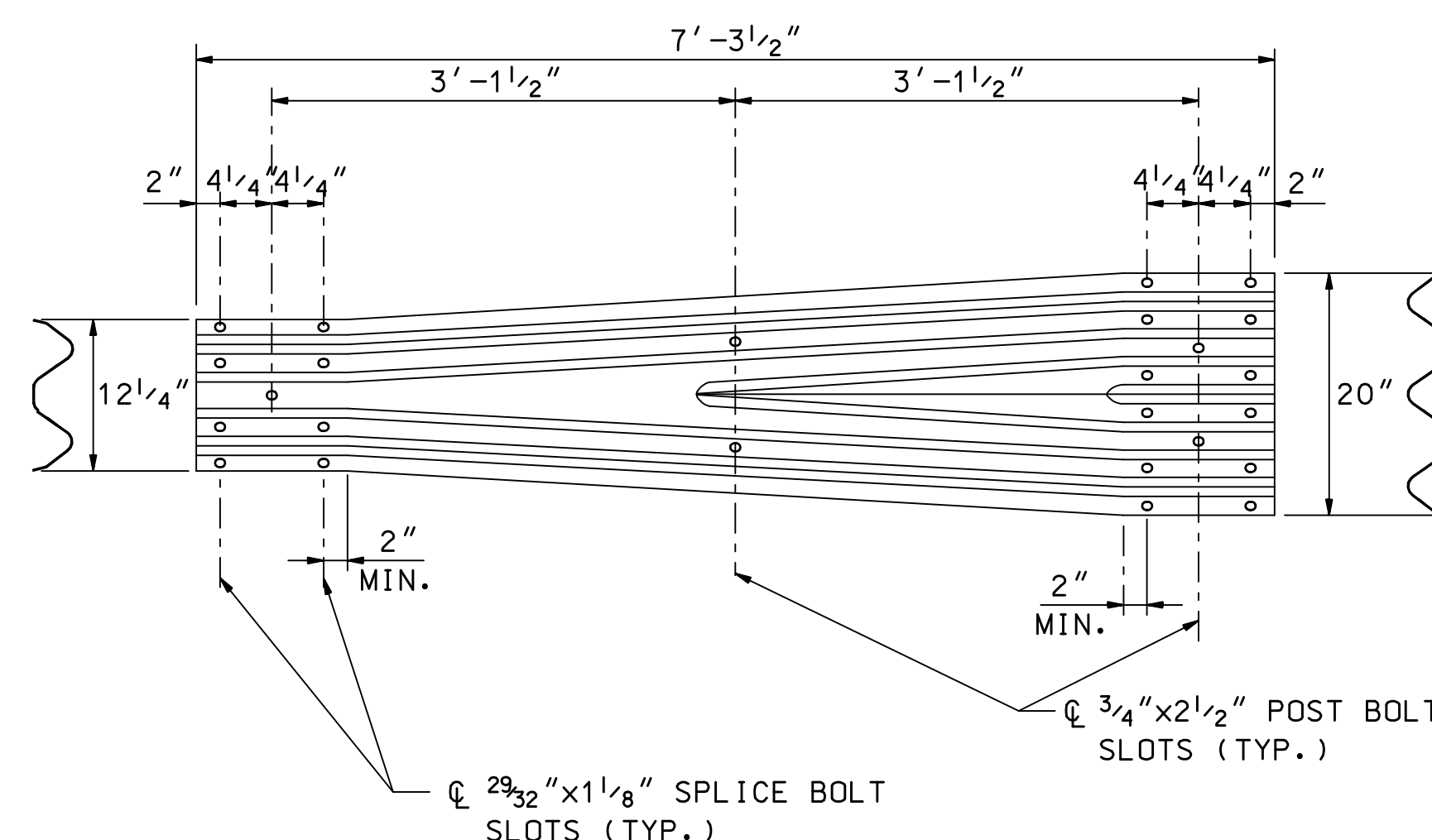


POST BOLT

NOTE: LONGER ERECTION BOLTS MAY BE REQUIRED.



THRIE BEAM RAIL SECTION
[RTM01a & RTM02a]

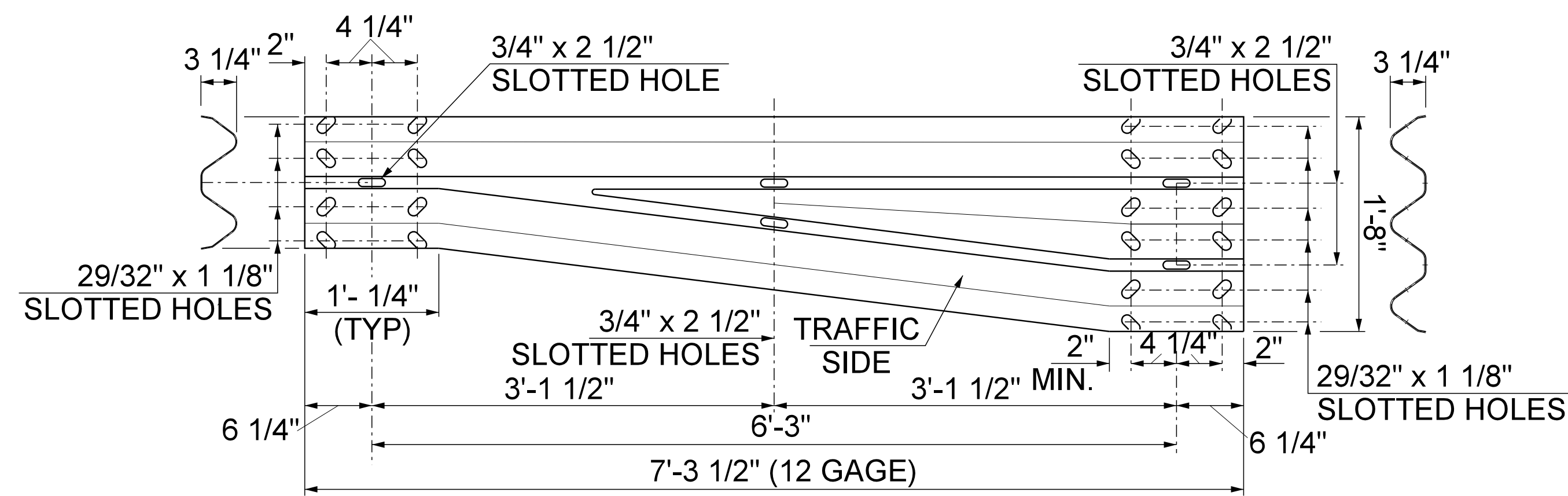


W-THRIE BEAM TRANSITION SECTION
[RWT01a]

GENERAL NOTES

- 25'-0" RAIL PANELS MAY BE USED IN PLACE OF 12'-6" PANELS, EXCEPT ON CURVES WITH A RAIL RADIUS OF LESS THAN 300 FT.
- GUARDRAIL HEIGHT SHALL BE SET FROM THE GRADE AT THE FACE OF RAIL.
- DESIGNATIONS PROVIDED IN BRACKETS [] REFERENCE STANDARD ELEMENTS DETAILED IN A *GUIDE TO STANDARDIZED HIGHWAY BARRIER HARDWARE*, LATEST ADOPTED VERSION, AASHTO-AGC-ARTBA JOINT COOPERATIVE COMMITTEE.
- SEE STD. NO. DL-1 FOR BEAM GUARDRAIL DELINEATORS.
- PAID FOR UNDER APPROPRIATE 606 ITEMS, OR AS SHOWN ON PLANS.
- DIMENSIONS OF PLASTIC AND SYNTHETIC BLOCKOUTS ARE AS SHOWN ON MANUFACTURER'S DRAWINGS.
- POSTS SHORTER THAN THE 7'-0" INDICATED ON THE DETAIL, BUT NOT LESS THAN 6'-6", MAY ONLY BE USED WHEN
 - THE SLOPE BEHIND THE GUARDRAIL IS NO STEEPER THAN 4:1
 - WHERE THE DISTANCE FROM THE BACK OF THE POST TO THE BREAK OF THE SLOPE IS A MINIMUM OF 2'-0"
 - AND THEN ONLY AS APPROVED OR SPECIFICALLY SHOWN ON THE PLANS.

GUARDRAIL STANDARD
BEAM GUARDRAIL THRIE
BEAM SINGLE-FACED (STEEL)



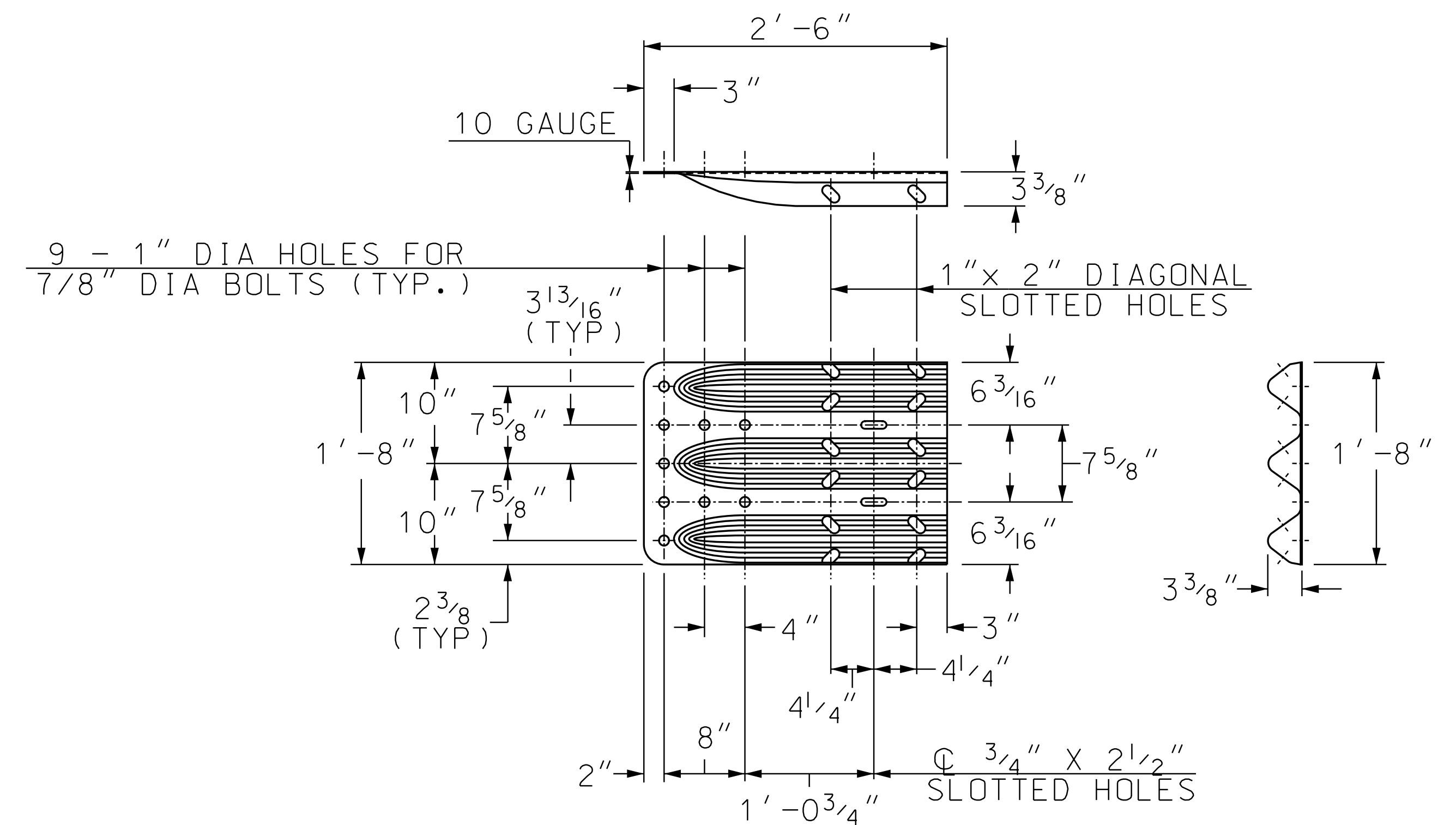
**SINGLE FACED ASYMMETRICAL
TRANSITION RAIL, LEFT
STEEL POST
ITEM 606.34201**



**SINGLE FACED ASYMMETRICAL
TRANSITION RAIL, RIGHT
STEEL POST
ITEM 606.34202**

NOTES:

- (1) ITEM 606.3420(1,2), SINGLE FACED ASYMMETRICAL THRIE BEAM TRANSITION (STEEL POSTS) SHALL INCLUDE RAIL POSTS, OFFSET BLOCKS, ASYMMETRICAL THRIE BEAM TRANSITION SECTIONS AND ALL BOLTS, NUTS, AND WASHERS.
- (2) WHEN NECESSARY, ONE (1) THRIE-BEAM TERMINAL CONNECTOR IS SUBSIDIARY TO EACH SINGLE FACED ASYMMETRICAL TRANSITION RAIL ITEM AND SHALL INCLUDE ALL REQUIRED BOLTS, NUTS, AND WASHERS.
- (3) ALL STEEL COMPONENTS SHALL BE GALVANIZED AFTER FABRICATION IN CONFORMANCE TO AASHTO M232 (ASTM A153) AND AASHTO M111 (ASTM A123). THE GALVANIZING KETTLE SHALL HAVE 0.05 TO 0.09 PERCENT NICKEL. GALVANIZED SURFACES SHALL BE PROPERLY STORED. IF PAINTING IS REQUIRED SEE SPECIAL PROVISIONS FOR 708.
- (4) ANCHOR BOLTS SHALL BE ASTM A325, AND NUTS SHALL BE ASTM A563 GRADE A OR BETTER (GALVANIZED). HOLES TO RECEIVE ANCHOR BOLTS SHALL BE CORE DRILLED.
- (5) RAIL POSTS SHALL CONFORM TO THE REQUIREMENTS OF ASTM A572 GR 50.
- (6) ALL DIMENSIONS SUBJECT TO MANUFACTURER'S TOLERANCES.



THRIE-BEAM TERMINAL CONNECTOR

NOT TO SCALE

STATE OF NEW HAMPSHIRE
DEPARTMENT OF TRANSPORTATION • BUREAU OF HIGHWAY DESIGN
**SINGLE FACED ASYMMETRICAL
TRANSITION RAIL, STEEL POST**

REVISION DATE	DGN	STATE PROJECT NO.	SHEET NO.	TOTAL SHEETS
A 1/17/09	asym-trans-sect	00000	12	

