OS-299 (7-18)

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TRANSMITTAL LETTER

PUBLICATION:

Publication 72M
June 2010 Edition Change #4

DATE:
2/8/2019

SUBJECT:

Revisions to
Standards for Roadway Construction
June 2010 Edition, Change No. 4

INFORMATION AND SPECIAL INSTRUCTIONS:

Incorporate the attached revisions into the June 2010 Edition of Publication 72M.

These revised Standard Drawings should be adopted on all new and existing projects as soon as practical without affecting any letting schedules and in conjunction with the current Publication 408 Specifications.

2019-1

STANDARD	SHEET	DESCRIPTION OF CHANGES
Revised Sheets	RC-22M RC-23M RC-30M RC-40M RC-43M RC-74M RC-83M	Removed all metric units. Revised title and signature blocks as follows: Changed "DIRECTOR, BUREAU OF DESIGN" to "DIRECTOR, BUREAU OF PROJECT DELIVERY". Changed "CHIEF, HWY. QA DIVISION" to "CHIEF, HWY. DELIVERY DIVISION". Removed Notes indicating all dimensions are in millimeters unless otherwise noted and U.S. customary units in parentheses. Renumbered all subsequent Notes.
RC-12M	Sheet 2	Revised Note 2, fifth sentence by changing "CLASS 2, TYPE B GEOTEXTILE BLANKET" to "GEOTEXTILE, CLASS 4, TYPE A BLANKET".
RC-22M	All Sheets	Deleted all Notes stating, "DEVIATIONS FROM THESE SPECIFICATIONS AND GUIDELINES MAY BE CONSIDERED IN ORDER TO SUIT FIELD CONDITIONS, PROVIDED THAT THE BUREAU OF HIGHWAY SAFETY AND TRAFFIC ENGINEERING HAS APPROVED." Revised multiple Notes to coincide with updated details.

	Sheets 1-5	Added more description to name of Details (previously called Figures).
	Sheet 1	Changed the width of rumble strip Detail "B" (previously Figure 2) from 14" - 18" to 16".
	Sheet 2	Deleted Figures 1 and 2 that provided a 1" different spacing for CLRS for speeds over/under 55 mph. Replaced Figures 1 and 2 with Detail "E": -Rumble strip spacing of 7" provides a 12" cycle. -Shows a gap spacing of 12'-0" after 48'-0" of rumble strips. Changed "BTSRS" (Bicycle Tolerable Shoulder Rumble Strips) to "SRS" (Shoulder Rumble Strips) and added Legend for "SRS". Deleted Table with Lane Shoulder Conditions and BTSRS Figure. Added Detail "H" for SRS Typical T-Intersection.
	Sheet 3	Increased the width of edgeline rumble strips from 6" to 8". Revised Detail "L" to show edgeline rumble strips stopping 25' minimum before guide rail reduces the shoulder to less than 4' (was previously 50' minimum). Added Detail "M" showing a 12' gap after 48' of rumble strips. Added Detail "P" for Edgeline Rumble Strip on a Typical T-Intersection.
	Sheet 4	Established this sheet for milled shoulder rumble strips on interstates, freeways, and expressways (was previously RC-25M, Sheet 4). Added Note 6.
	Sheet 5	Established this sheet for milled rumble strips / shoulder rumble strips in gore areas (was previously RC-25M, Sheet 6). Added Note 6.
	Sheet 6	Established this sheet for temporary bituminous rumble strip patterns (was previously RC-22M, Sheet 4). Added Note 2.
RC-23M	Sheet 1	Revised to clarify construction of longitudinal construction and contraction joints to prevent random cracking on a wide bridge approach slab. BD-628M will also be updated. Removed Note 1; renumbered remaining Notes. Revised Note 7 (was Note 8) to provide additional clarity for construction/contraction joint requirements. Added Notes on the Plan view and removed centerline notation.

		Added Detail C, Detail D, and Joint Sealing Detail for construction/ contraction joints.
	Sheet 3	Changed Detail C to Detail E.
RC-25M	Sheet 1	Revised Type 1, 1-F, 1-S, and 1-SP Shoulder details to include reference for 1" depth to 6.3 mm HMA or WMA wearing course incidental to Type 1-F shoulders. Revised Note 6 and Note 8.
	Sheet 2	Revised Type 6, 6-F, 6-S, and 6-SP Shoulder detail by deleting callout of bituminous surface, FJ-1, incidental to Type 6-F Shoulders, 1" depth. Updated Type 6, 6-F, 6-S, and 6-SP Shoulder detail by indicating Superpave, 4.75 mm HMA or WMA Wearing Course, 9.5 mm Superpave FG HMA or WMA Wearing Course, or 6.3 mm HMA or WMA Wearing Course, incidental to Type 6-F Shoulders, 1" Depth. Revised Note 8.
	Sheet 3	Revised Note 9 and Note 10.
	Sheet 4	Moved the previous contents of this sheet to RC-22M, Sheet 4. Moved the previous contents of RC-25M, Sheet 7 to this sheet. Updated contents of revised RC-25M, Sheet 4 to be consistent with RC-20M and RC-22M.
	Sheet 5	Deleted this sheet.
	Sheet 6	Moved the previous contents of this sheet to RC-22M, Sheet 5.
	Sheet 7	Moved the previous contents of this sheet to RC-25M, Sheet 4.
RC-28M	Sheet 2	Added three details of Mill and Fill Transition for Bonded Concrete Overlays: -Over an Existing Asphalt-Surfaced to an Existing Asphalt-Surfaced Pavement Where the Depth of the Overlay Equals the Depth of the Milling -Over an Existing Asphalt-Surfaced to an Existing Asphalt-Surfaced Pavement Where the Depth of the Overlay Exceeds the Depth of the Milling (with reference to see Table 1) -Over an Existing Asphalt-Surfaced to an Existing Concrete Pavement (with reference to see Table 1) Added Table 1, Required Transition Slope. Added Legend for Mill and Fill Transition for Bonded Concrete Overlays.

RC-30M	Sheet 1	Revised title of detail for Pipe Underdrain from "TYPE I BACKFILL ROCK AND SHALE" to "TYPE I PIPE UNDERDRAIN IN ROCK AND SHALE". Revised Type I Pipe Underdrain in Rock and Shale detail to indicate Geotextile, Class 1 wrapped around No. 57 Coarse Aggregate. Revised title of detail for Pipe Underdrain from "TYPE II BACKFILL SOIL" to "TYPE II PIPE UNDERDRAIN IN SOIL". Revised Type II Pipe Underdrain in Soil detail as follows: -Replaced Fine Aggregate Filter Blanket (Tamped) with No. 8 Coarse Aggregate (Tamped). -Changed "CLASS 1 GEOTEXTILE MATERIAL, WHEN INDICATED" to "GEOTEXTILE, CLASS 1". -Deleted asterisk symbol with callouts for Class 1 Geotextile and for dimension of 15" typical width. Revised Extra Depth detail as follows: -Changed callout from No. 57 Coarse Aggregate with Type I Backfill, Fine Aggregate with Type II Backfill to No. 57 Coarse Aggregate with Type I Pipe Underdrain, No. 8 Coarse Aggregate with Type II Pipe Underdrain. -Removed fill pattern for aggregate and replaced with cross hatch pattern. -Added Geotextile, Class 1 around the coarse aggregate and pipe underdrain. Deleted the asterisk Note from Legend. Revised Pavement Base Drain details by changing "CLASS 1 GEOTEXTILE MATERIAL" to "GEOTEXTILE, CLASS 1".
	Sheet 2	Revised Note 1. Revised Pavement Base Drain (Rehabilitation) detail, Subgrade Drain detail, and Combination Storm Sewer and Underdrain detail by changing "CLASS 1 GEOTEXTILE MATERIAL" to "GEOTEXTILE, CLASS 1".
	Sheet 5	Revised Note 1. Added Elliptical Pipe Geotextile Wrap detail to incorporate the usage of a filter fabric jacket at the joint of elliptical concrete pipes and round metal pipes when the corrugated band dimples do not properly index into each corrugated valley (Refer to Strike-off Letter 481-17-02.).
RC-40M	Sheet 1	Changed "CLASS 2, TYPE B GEOTEXTILE MATERIAL" to "GEOTEXTILE, CLASS 4, TYPE A". Changed "CLASS A CONCRETE" to "CLASS A CEMENT CONCRETE" for consistency with reference in Publication 408, Section 667.

		Spelled out "GCL" as "GEOSYNTHETIC CLAY LINER".
RC-43M	Sheet 1	Changed "CLASS 2, TYPE B GEOTEXTILE MATERIAL" to "GEOTEXTILE, CLASS 4, TYPE A".
	Sheet 3	Changed "CLASS 4, TYPE A GEOTEXTILE" to "GEOTEXTILE, CLASS 4, TYPE A".
RC-50M	Sheet 1	Revised Note 1.
	Sheet 3	Revised W6 x 8.5 or 9 Post Details by increasing diameter of holes through the posts from 3/4" to 13/16" and adding reference to Note 4. Added Note 4 to state that a 3/4" diameter hole is permissible through the posts.
	Sheet 7 Sheet 9 Sheet 14	Revised Post Details by increasing diameter of holes through the posts from 3/4" to 13/16" and adding reference to Note 3. Added Note 3 to state that a 3/4" diameter hole is permissible through the posts.
RC-51M	Sheet 1	Revised / added details to clarify differences in rail types (Type 31-S, Type 31-SC and Type 31-SCC) for 12'-6" W-Beam Rail Element. Revised Typical Hardware Arrangement with Post/Routed Offset Bracket/Rail detail by removing Type "I" Plain Round Washer. The washer is only required for connection to wood posts. Revised Isometric View detail by removing Type "I" Plain Round Washer. The washer is only required for connection to wood posts. Revised Detail A by adding "(OPTIONAL FOR TYPE 31-S)" for 3/4" R x 2 1/2" slotted holes. Revised Note 4 by deleting references to washers. Revised Note 7, second sentence by removing the words "FOR A TRANSITION SECTION".
	Sheet 2	Revised W6X9 or W6X8.5 Post Details as follows: -Increased diameter of hole through the posts from 3/4" to 13/16" and added reference to Note 3 (three locations). -Clarified to field punch a 1/4" diameter hole for 16d double head nail if wood routed offset bracket is to be used (two locations). -Deleted references to Type "I" Plain Round Washers (three locations). Added Note 2 to clarify that the 1/4" diameter hole is not required if plastic or composite routed offset brackets are to be installed. Added Note 3 to state that a 3/4" diameter hole is permissible through the posts.

	Sheet 3	Revised Typical End View Post and Splice Bolts detail as follows: -Added circular head bolt. -Relabeled existing "clip head" bolt as an "ALTERNATE BOLT HEAD". Revised Type "I" Plain Round Washer detail by adding "(WOOD POSTS ONLY)" under title.
	Sheet 6	Revised the Terminal Rail Element detail by adding two 3/4" radius x 2 1/2" slotted holes. These two added slotted holes are located 3'-1 1/2" from the slotted holes that belong with the splice holes. These slotted holes accommodate an extra post when needed, as shown on Sheet 4 of 14 for the Type 31-Strong Post Anchor Terminal and the Type 31-Strong Post In-Line Anchor.
	Sheet 12	Changed "CLASS A CONCRETE" to "CLASS A CEMENT CONCRETE" for consistency with reference in Publication 408, Section 620.
RC-54M	General	Revised to be consistent with the test report, "MASH Tests 3-34 and 3-35 on the 31-Inch Buried-in-Backslope Terminal Compatible with MGS Guardrail", published in October 2018 and sponsored by the Roadside Safety Pooled Fund. The report described crash testing related to the Department's Anchored Backslope Terminal, Double Rail. The purpose of this research was to evaluate the safety performance of a 31-inch Buried-in-Backslope (BIB) terminal attached to a Midwest Guardrail System (MGS) in accordance with the AASHTO Manual for Assessing Safety Hardware (MASH) evaluation criteria. The proposed BIB terminal design with double rail successfully met the MASH evaluation criteria for Test Level 3 conditions. Wording has been changed throughout from "Anchored Backslope Terminal" to "Buried-in-Backslope Terminal" for consistency with national terminology. Increased total number of sheets from 11 to 12.
	Sheets 1-2	Revised title for details from "TYPICAL TYPE 2 WEAK POST GUIDE RAIL TREATMENTS WHEN THE MINIMUM UNOBSTRUCTED DISTANCE TO OBSTRUCTION IS AVAILABLE" to "TYPICAL TYPE 2 WEAK POST GUIDE RAIL TREATMENTS FOR VARIOUS UNOBSTRUCTED DISTANCES."
	Sheet 2	Revised all details to indicate "SEE NOTE 2" instead of "SEE SHEET 1, NOTE 2". Copied Table 1 from Sheet 1 to this sheet.
	Sheet 3	Replaced the title of details for "TYPICAL TYPE 31 STRONG POST GUIDE RAIL TREATMENTS WHEN THE MINIMUM UNOBSTRUCTED DISTANCE TO OBSTRUCTION IS AVAILABLE" and the title of detail for "TYPICAL TYPE 31 STRONG POST GUIDE RAIL TREATMENTS WHEN THE MINIMUM UNOBSTRUCTED DISTANCE TO OBSTRUCTION IS NOT AVAILABLE" with the title "TYPICAL TYPE 31 STRONG POST GUIDE RAIL TREATMENTS FOR VARIOUS UNOBSTRUCTED DISTANCES." Revised all details to indicate "SEE NOTE 2" instead of "SEE SHEET 1, NOTE 2".

Copied Table 1 from Sheet 1 to this sheet.

Revised third detail from top of sheet to delete reference to "SEE NOTE 4" with the callout of a minimum unobstructed distance of 1'-6".

Revised bottom detail for Type 31-SCC Nested Guide Rail as follows:

-Added splices between W-beam rail elements.

-Updated types of guide rail.

-Revised range of minimum unobstructed distance for Type 31-SCC Nested Guide Rail.

Sheet 4 Inserted Note 2.

Renumbered Note 2 as Note 3.

Revised text in upper detail to indicate "SEE NOTE 3" instead of "SEE NOTE 2".

Revised text in lower detail to indicate "SEE NOTE 2" instead of "SEE SHEET 1, NOTE 2".

Copied Table 1 from Sheet 1 to this sheet.

Sheet 5 Copied Table 2, Flare Rates for Barrier Design, from Sheet 4 to this sheet.

Revised text in three details on left side of sheet to indicate "SEE TABLE 2" instead of "SEE SHEET 4, TABLE 2".

Sheet 6 Added Note 1.

Copied Table 1 from Sheet 1 to this sheet.

Revised Grading Detail for Tangent Terminals and Grading Detail for Flared Terminals details as follows:

-Updated graphics to appear more generic and current.

-Changed references from "SEE SHEET 1, NOTE 3" to "SEE NOTE 1".

-Increased minimum distance to hinge point from 3'-0" to 5'-0" for consistency with the 2011 AASHTO Roadside Design Guide.

Revised Grading Detail for Tangent Terminals detail as follows:

-Revised dimensions over the entire length of the tangent terminal from "1'-0" TO 2'-0" STRAIGHT TAPER OFFSET" to "25:1 MAXIMUM FLARE RATE".

Revised Section C-C and Section D-D as follows:

-Changed "PAV'T EDGE" to "EDGE OF TRAVELED WAY".

-Changed minimum distance from 3'-0" to 5'-0" from rear face of post to hinge point.

-Revised / deleted dimensions between typical front face of guide rail and the front face of the post for consistency with the Grading Details.

Sheets 7-10 Revised "ANCHORED BACKSLOPE TERMINAL" to "BURIED-IN-BACKSLOPE TERMINAL" for consistency with national terminology.

Removed all references to concrete block anchorages because they have not been crash tested for MASH compliance.

Sheet 7 Copied Table 2, Flare Rates for Barrier Design, from Sheet 4 to this sheet.

Deleted Notes 1 and 5; renumbered all remaining Notes.

Revised Note 3 by changing "SWALE LINE" to "BOTTOM OF DITCH (SWALE LINE)".

Added Note 5.

Revised Plan View detail for Buried-in-Backslope Terminal, Single Rail for consistency with the Buried-in-Backslope Terminal, Double Rail and as follows:

-Added symbology for mid-span splices.

-Added callouts for field bends of guide rail.

-Changed text with 2'-0" offset dimension from "SEE SHEET 1, NOTE 3" to "SEE SHEET 6, NOTE 1".

-Added labels for Posts 1, 2, and 3 that are buried in the backslope.

-Added callout to see Detail "L" on Sheet 10 that includes Posts 1, 2, and 3.

-Revised text to indicate "SEE TABLE 2" instead of "SEE SHEET 4, TABLE 2".

-Added "(SWALE LINE)" after "BOTTOM OF DITCH" for consistency with Note 3.

Revised Sections E-E, F-F, and G-G to add "OR FLATTER" after "10:1".

Revised double asterisk note from "CONCRETE OR POST BACKSLOPE ANCHORAGE INTO ROCK..." to "PLACEMENT INTO ROCK...".

Revised Elevation View (Profile Along Rail) detail as follows:

-Added symbology for mid-span splices.
-Added dimension line for Type 31-S Guide Rail.
-Changed reference from "SEE NOTE 2" to "SEE NOTES 1 & 5".
-Added callout to see Sheet 9 for Post Anchor Detail and Posts 1-3.

Sheet 8	Revised Plan View detail and Elevation View (Profile Along Rail) detail for Buried-in-Backslope Terminal, Double Rail to be consistent with the test report, *MASH Tests 3-34 and 3-35 on the 31-Inch Buried-in-Backslope Terminal Compatible with MGS Guardrail*. -Added "(SWALE LINE)" after "BOTTOM OF DITCH" for consistency with Note 5. Revised Notes 1, 2, 3, and 4. Revised Note 5 by changing "SWALE LINE" to "BOTTOM OF DITCH (SWALE LINE)". Deleted Note 6. Relabeled Note 7 as Note 6 and revised the Note. Added Note 7. Added photo of a typical layout for the Buried-in-Backslope Terminal, Double Rail. Added "10:1 OR FLATTER" in Section H-H. Revised Sections J-J and K-K from "NOT STEEPER THAN 4:1, 6:1" to "4:1 OR FLATTER". Copied Table 2, Flare Rates for Barrier Design, from Sheet 4 to this sheet. Revised double asterisk note from "CONCRETE OR POST BACKSLOPE ANCHORAGE INTO ROCK..." to "PLACEMENT INTO ROCK...".
Sheet 9	Added "W6x8.5 OR W6x9" before "STEEL POST". Added details for Posts 1-3, Post 4, and Posts 5-21 (refer to Sheets 7 and 8). Revised Note 1 by adding ", SHEET 2" after "RC-51M". Added Notes 2 and 3. Revised title of detail from "STEEL POST W6x8.5" to "W6x8.5 or W6x9 STEEL POSTS, POSTS 5-20". Revised W6x8.5 or W6x9 Steel Posts, Posts 5-20 detail to indicate a vertical dimension of 1'-10 1/2" rather than 2'-10" between the top of the post and the center of the second W-beam rail. Revised dimensions for Steel Plate – 1/2" detail as follows: -Changed width from 8" to 7 7/8" left of the post centerline. -Changed width from 6" to 6 1/8" right of the post centerline. -Changed width from 2" to 2 1/4" between 3/4" diameter holes. -Changed width from 2" to 1 3/4" left of the leftmost 3/4" diameter holes.

	Added "(POSTS 1-3)" after "POST ANCHOR DETAIL".
	Revised dimensions for Post Anchor Detail (Posts 1-3) as follows:
	-Changed width from 8" to 7 7/8" left of the post centerline (Plan).
	-Changed width from 6" to 6 1/8" right of the post centerline (Plan).
	-Changed vertical dimension from 6" to 9" between upper and lower holes in bolt plate (Front View).
	-Changed vertical dimension from 9" to 3" between upper holes and top of bolt plate (Front View).
	Added "(POST 4)" after "W-BEAM RAIL ATTACHMENT".
	Revised dimensions for W-Beam Rail Attachment (Post 4) as follows:
	-Changed width in Partial Plan from 8" to 7 7/8" left of the post centerline.
	-Changed width in Partial Plan from 6" to 6 1/8" right of the post centerline.
	-Changed vertical dimension in Elevation from 1'-6" to 1'-10 1/4" between top of post and center of second W-beam rail.
	-Changed vertical dimension in Elevation from 2" to 3" between top bolt through second W-beam rail and top of 1/2" steel plate.
	-Changed vertical dimension in Elevation from 3" to 2 3/4" between bottom of guide rail and top of second W-beam rail.
	Revised Square Washer Detail to indicate decrease in thickness from 1/4" to 3/16".
Sheet 10	Inserted this new sheet; carried over Note 1 from Sheet 9 to this sheet.
	Added End Anchorage Details to be consistent with the test report, *MASH Tests 3-34 and 3-35 on the 31-Inch Buried-in-Backslope Terminal Compatible with MGS Guardrail*, including 9'-4 1/2" W-beam Rail Element, Detail "L", Detail "M", and Detail "N".
	Added Note 2 pertaining to pay limit for Buried-in-Backslope Terminal.
Sheet 11	Moved Treatment at Intersections and Driveway detail to new Sheet 12.
	Deleted Notes 5 & 6 since they are not relevant on this sheet.
	Renumbered Note 7 to Note 5.
	Added Notes 6 and 7.

Revised Curved W-Beam Guide Rail at Intersections details, Plan views as follows:

-Updated Curved W-Beam Guide Rail at Intersections detail, Plan view with 8'-6" radius to depict five long breakaway timber posts.

-Added Curved W-Beam Guide Rail at Intersections detail, Plan view with 35'-0" radius to depict eleven long breakaway timber posts.

-Adjusted locations of guide rail posts, Type 31 Strong Post In-Line Anchors, and Pay Limits for Curved W-Beam Guide Rail at Intersections.

-Changed reference from Section A-A to Section Q-Q.

-Added locations for splices along guide rail.

-Updated wording for guide rail placement along intersecting roadway beyond pay limit for curved w-beam guide rail at intersections.

-Deleted "FOR INTERSECTIONS" from callouts for Type 31 Strong Post In-Line Anchors.

Added the title "TABLE 3" for table with typical number of long breakaway timber posts for a given guide rail radius.

Revised double asterisk to single asterisk in Table 3 to see Note 1 for 8'-6" radius.

Added double asterisk in Table 3 to see Note 5 for 35'-0" radius.

Sheet 12 Moved Treatment at Intersections and Driveway Detail from Sheet 11.

Copied Notes 4 through 7 from Sheet 11 and renumbered them as Notes 1 through 4 on this sheet.

Added Note 5.

Revised Note 2 by adding driveways and access points as locations where a Terminal Section, Single may be used coming to a stop condition, excluding signals, with an Average Daily Traffic (ADT) $\leq$ 2000 vehicles per day and cannot be used beyond the immediate intersection.

Revised Treatment at Intersections and Driveways detail as follows:

-Decreased radii from 17'-0" minimum to 8'-6" minimum.

-Added callout for Long Breakaway Timber Post and to see Notes 4 and 5.

-Revised guide rail in lower right quadrant to steel posts with offset blocks since a Terminal Section, Single is not a suitable anchor for long breakaway timber posts.

		-Added graphic for guide rail post and offset block to appear with the Terminal Section, Single in lower left and lower right quadrants. -Updated spacing of guide rail posts in all four quadrants to be more consistent with field installations. -Updated upper left and upper right quadrants for consistency with the Curved W-Beam Guide Rail at Intersections detail on Sheet 11. -Added callouts to indicate "MAIN HIGHWAY" (2 locations).
RC-70M	Sheet 1	Revised Silt Barrier Fence, 30" Height detail to indicate "WIRE" before "MESH SUPPORT". Updated Table A as follows: -Added "MAX" before the column heading "POST SPACING WITHOUT MESH SUPPORT". -Revised 4'-0" to "NA" for Max Post Spacing Without Mesh Support for Silt Barrier Fence, 18" Height and Geotextile, Class 3, Type B. -Revised "NA" to 4'-0" for Max Post Spacing with Mesh Support for Silt Barrier Fence, 18" Height and Geotextile, Class 3, Type B.
RC-72M	Sheets 6-7	Changed "CLASS 4 GEOTEXTILE, TYPE AS INDICATED" to "GEOTEXTILE, CLASS 4, TYPE A".
RC-73M	Sheet 4	Changed "CLASS 4 GEOTEXTILE, TYPE AS REQUIRED" to "GEOTEXTILE, CLASS 4, TYPE A".
RC-74M	Sheet 1	Revised Detail A, Section by changing "GEOTEXTILE, CLASS 2, TYPE B" to "GEOTEXTILE, CLASS 4, TYPE A". Revised Detail A, Plan by changing "CLASS 2, TYPE B GEOTEXTILE" to "GEOTEXTILE, CLASS 4, TYPE A".
RC-78M	Sheet 1	Revised Typical Section – Soil Filled (Grass) detail by changing "NONWOVEN GEOTEXTILE" to "GEOTEXTILE, CLASS 4, TYPE A". Revised Expanded Section detail by changing "GEOTEXTILE, CLASS 2, TYPE B, NON-WOVEN" to "GEOTEXTILE, CLASS 4, TYPE A".
	Sheets 3-4	Deleted ", NON-WOVEN" after "GEOTEXTILE, CLASS 4, TYPE A".

RC-83M	Sheet 1	Revised Table 1 to indicate the following "X" distances: -Type 2-WCC Guide Rail: 5'-6" (was 4.0') -Type 2-WC Guide Rail: 6'-6" (was 5.0') -Type 2-W Guide Rail: 9'-0" (was 7.0') Revised / added to Table 2 to indicate the following "X" distances: -Type 31-SCC Guide Rail: 1'-6" (new entry) -Type 31-SC Guide Rail: 3'-0" (was Type 2-SC and 2'-0") -Type 31-S Guide Rail: 4'-0" (was Type 2-S and 3'-0") Removed rubbing rail from Strong Post Guide Rail detail (typically not used with Type 31-S, 31-SC, or 31-SCC).

Gender neutral language has been updated in all revised Standard Drawings, i.e., RC-12M, RC-22M, RC-23M, RC-25M, RC-28M, RC-30M, RC-40M, RC-43M, RC-50M, RC-51M, RC-54M, RC-70M, RC-72M, RC-73M, RC-74M, RC-78M, and RC-83M.

Any comments or questions regarding the above revisions should be directed to the Highway Design and Technology Section, Highway Delivery Division, Bureau of Project Delivery.

CANCEL AND DESTROY THE FOLLOWING:

Index Sheet - Aug. 28, 2017
RC-12M - Sept. 15, 2016
RC-22M - June 1, 2010
RC-23M - June 1, 2010
RC-25M - Sept. 15, 2016
RC-28M - Sept. 15, 2016
RC-30M - June 1, 2010
RC-40M - June 1, 2010
RC-43M - June 1, 2010
RC-50M - Aug. 4, 2017
RC-51M - Aug. 4, 2017
RC-54M - Aug. 4, 2017
RC-70M - Sept. 15, 2016
RC-72M - Aug. 4, 2017
RC-73M - Aug. 4, 2017
RC-74M - June 1, 2010
RC-78M - Aug. 4, 2017
RC-83M - June 1, 2010

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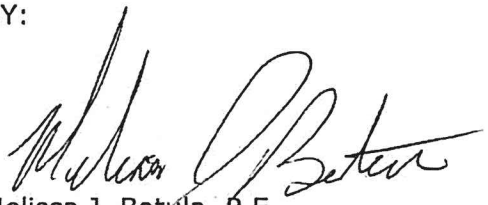
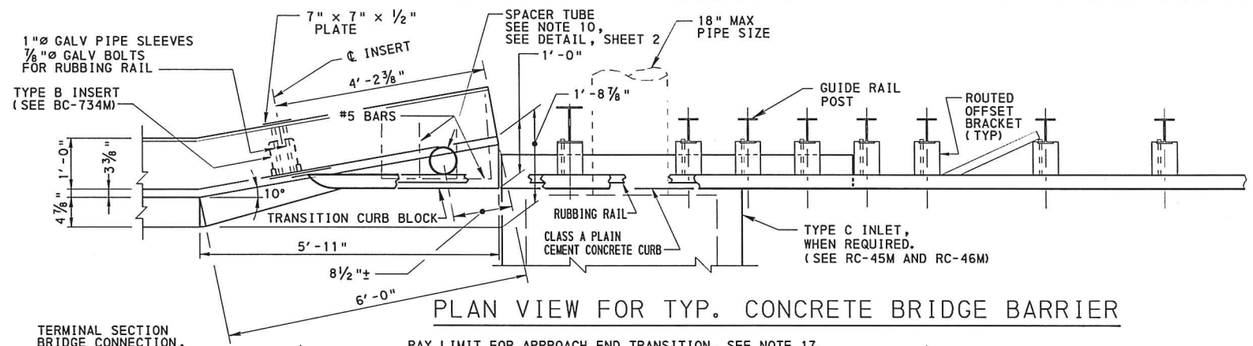
APPROVED FOR ISSUANCE BY:

LESLIE S. RICHARDS
Secretary of Transportation

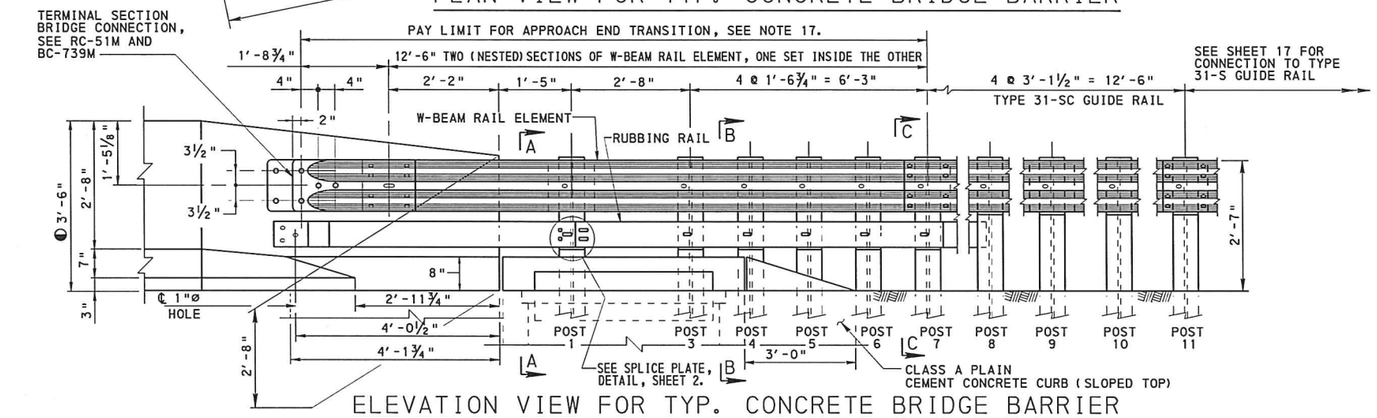
BY:



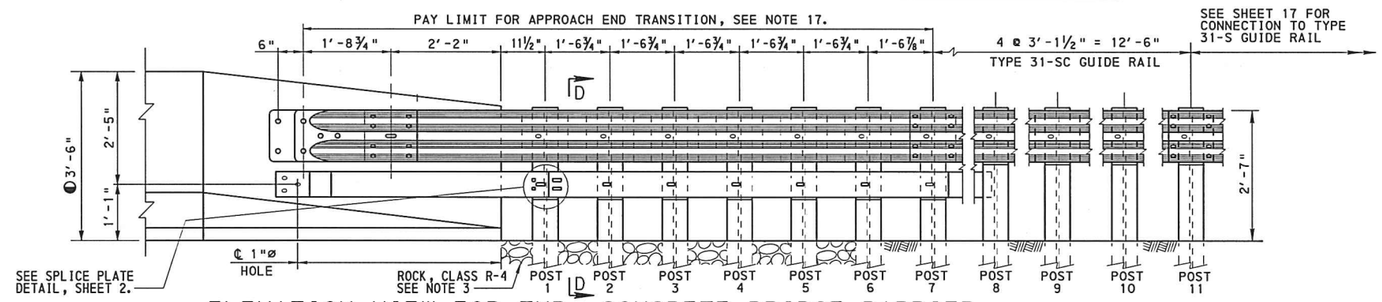
Melissa J. Batula, P.E.
Acting Director, Bureau of Project Delivery,
Highway Administration



PLAN VIEW FOR TYP. CONCRETE BRIDGE BARRIER



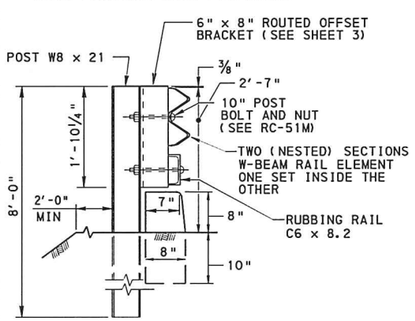
ELEVATION VIEW FOR TYP. CONCRETE BRIDGE BARRIER



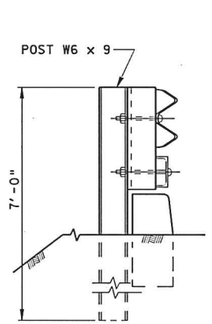
ELEVATION VIEW FOR TYP. CONCRETE BRIDGE BARRIER

(WITHOUT INLET PLACEMENT)

NOTE:
TYPICAL TO ELEVATION VIEW WITH
INLET PLACEMENT EXCEPT AS NOTED.

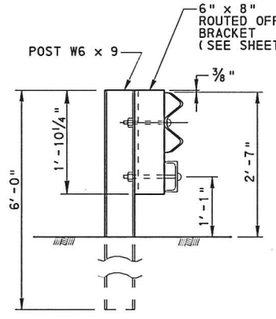


SECTION A-A

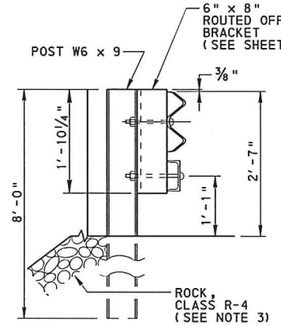


SECTION B-B

(SECTION B-B IS TYPICAL
TO SECTION A-A EXCEPT
AS SHOWN OTHERWISE)



SECTION C-C



SECTION D-D

NOTES

1. PROVIDE MATERIALS AND CONSTRUCTION IN ACCORDANCE WITH PUBLICATION 408.
2. ALL REINFORCEMENT STEEL BARS SHOWN ARE TO MEET THE REQUIREMENTS OF ASTM A615, A996 OR A706.
3. PLACE ROCK, CLASS R-4 WITH A NOMINAL THICKNESS OF 18" TO PROTECT EMBANKMENT MATERIAL FROM EROSION BEHIND GUIDE RAIL POSTS WITHOUT INLET PLACEMENT.
4. W-BEAM RAIL ELEMENT IS BOLTED TO ALL POSTS.
5. USE PLAN DIMENSIONS WHEN DIFFERENT FROM THOSE SHOWN ON THIS STANDARD.
6. REINFORCED CONCRETE BARRIER AND EMBEDDED INSERTS ARE BRIDGE ITEMS.
7. BOLT RUBBING RAIL TO POST WITHOUT WASHER.
8. POSTS WITH RUBBING RAIL ATTACHMENT REQUIRE AN ADDITIONAL HOLE.
9. TERMINAL SECTION AND RUBBING RAIL END MUST BE ATTACHED FLUSH WITH BRIDGE BARRIER. INSTALLATION CAN BE GREATLY SIMPLIFIED BY FABRICATING OR SHOP TWISTING TO BE CONSISTENT WITH THE SLOPE OF THE BARRIER.
10. STEEL SPACER TUBE, SCHEDULE 40 GALVANIZED PIPE, 6" ID x 12". CONNECT TO THE W-BEAM RAIL ELEMENTS USING SPLICE BOLT.
11. GALVANIZE ALL HARDWARE, W-BEAM RAIL ELEMENTS, THRIE-BEAM RAIL ELEMENTS, RUBBING RAIL, W-BEAM TO THRIE-BEAM TRANSITION SECTION, TERMINAL SECTION BRIDGE CONNECTIONS, ANGLES, PLATES, BOLTS AND ANY OTHER FABRICATED STEEL COMPONENTS.
12. REINFORCEMENT BAR SIZES ARE SHOWN FOR CLARITY ONLY. USE ACTUAL BAR DESIGNATION INDICATED IN THE CONTRACT DRAWINGS.
13. SEE BC-739M AND RC-51M FOR DETAILS AND HARDWARE NOT SHOWN.
14. PROVIDE 2" CLEARANCE ON ALL REINFORCEMENT EXCEPT AS NOTED.
15. PROVIDE STEEL POST SIZE AND LENGTH AS SHOWN IN TABLES A, B, C, AND D AS APPROPRIATE.
16. ON TWO-LANE HIGHWAYS WITH TWO-LANE TRAFFIC, BOTH THE ADJACENT TRAFFIC AND OPPOSING TRAFFIC COULD IMPACT THE GUIDE RAIL ENDS. THEREFORE, IF EITHER OF THE ENDS ARE WITHIN THE CLEAR ZONE AND/OR LIKELY TO BE HIT BY AN ERRANT VEHICLE, A CRASHWORTHY END TREATMENT IS REQUIRED. REGARDLESS IF CRASHWORTHY END TREATMENTS ARE REQUIRED, BOTH GUIDE RAIL ENDS STILL REQUIRE APPROVED END TREATMENTS IN ORDER TO ANCHOR THE SYSTEM. ON DIVIDED HIGHWAYS, GUIDE RAIL TRANSITION IS NOT REQUIRED ON TRAILING ENDS OF BARRIERS UNLESS WARRANTED BY THE LENGTH OF NEED OR OTHER OBSTRUCTIONS.
17. PAYMENT FOR THE APPROACH END TRANSITION, EITHER WITH OR WITHOUT INLET PLACEMENT, INCLUDES TWO 12'-6" SECTIONS OF EITHER W-BEAM OR THRIE-BEAM RAIL ELEMENTS, W-BEAM TO THRIE-BEAM TRANSITION SECTION FABRICATED STEEL ITEMS, TERMINAL SECTION BRIDGE CONNECTION, RUBBING RAIL, RUBBING RAIL CONNECTIONS, BOLTS, POSTS, ROUTED OFFSET BRACKETS, STEEL SPACER TUBE AND ASSOCIATED HARDWARE. END TRANSITIONS ARE ROADWAY ITEMS.
18. FOR THE PA BRIDGE BARRIER TRANSITION CONNECTION, CONNECTION PLATES SHALL MEET THE REQUIREMENTS OF ASTM A709 GRADE 36 KsI STEEL. BOLTS, NUTS, AND WASHERS SHALL MEET THE REQUIREMENTS OF PUBLICATION 408, SECTION 1105.02(c).
19. REFER TO SHEET 3 FOR PHOTOS OF: GUIDE RAIL TO TYPICAL CONCRETE BRIDGE BARRIER TRANSITION (WITHOUT INLET PLACEMENT); ELEVATION VIEW FOR TYPICAL CONCRETE BRIDGE BARRIER TRANSITION (WITHOUT INLET PLACEMENT); AND TYPICAL STEEL SPACER TUBE INSTALLATION.
20. AN INSTALLATION HEIGHT TOLERANCE OF PLUS 1" FOR THE W-BEAM OR THRIE-BEAM GUIDE RAIL SECTIONS IS PERMITTED.

TABLE A		
POST	LENGTH	SIZE
1 THRU 3	8'-0"	W8x21
4 THRU 6	7'-0"	W6x9
7 THRU 11	6'-0"	W6x9

LEGEND

◐ SEE BC-739M, SHEET 1 FOR BRIDGE BARRIER HEIGHT.

REFERENCE DRAWINGS	
RC-45M	INLET TOPS, GRATES, AND FRAMES
RC-46M	INLET BOXES
RC-51M	TYPE 31 STRONG POST GUIDE RAIL
RC-59M	CONCRETE GLARE SCREEN
BC-703M	THRIE-BEAM TO VERTICAL WALL TRANSITION CONNECTION
BC-708M	THRIE-BEAM TO PA TYPE 10M BRIDGE TRANSITION CONNECTION
BC-709M	PA TYPE 10M BRIDGE BARRIER
BC-712M	THRIE-BEAM TO PA BRIDGE BARRIER TRANSITION CONNECTION
BC-713M	PA BRIDGE BARRIER
BC-734M	STANDARD ANCHOR SYSTEMS
BC-739M	TYPE F-BRIDGE BARRIER TO GUIDE RAIL TRANSITION

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GUIDE RAIL TO BRIDGE BARRIER TRANSITIONS

TYPICAL CONCRETE BRIDGE BARRIER

RECOMMENDED FEB. 8, 2019
CHIEF, HWY. DELIVERY DIVISION

RECOMMENDED FEB. 8, 2019
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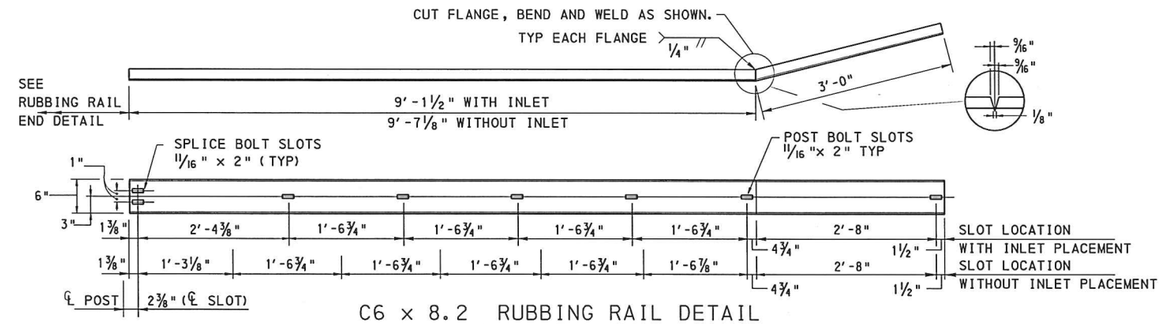
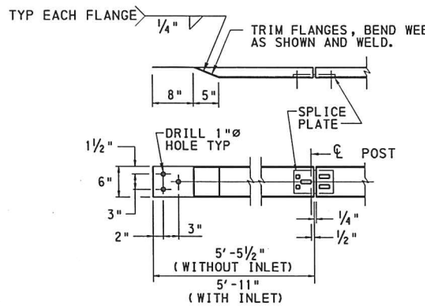
SHT 1 OF 18

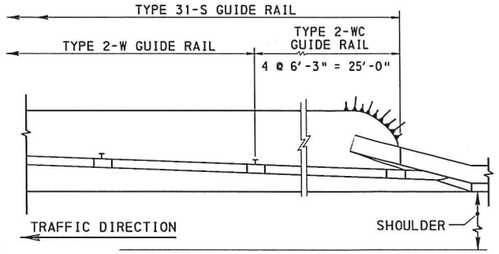
RC-50M



C6 x 8.2 RUBBING RAIL DETAIL

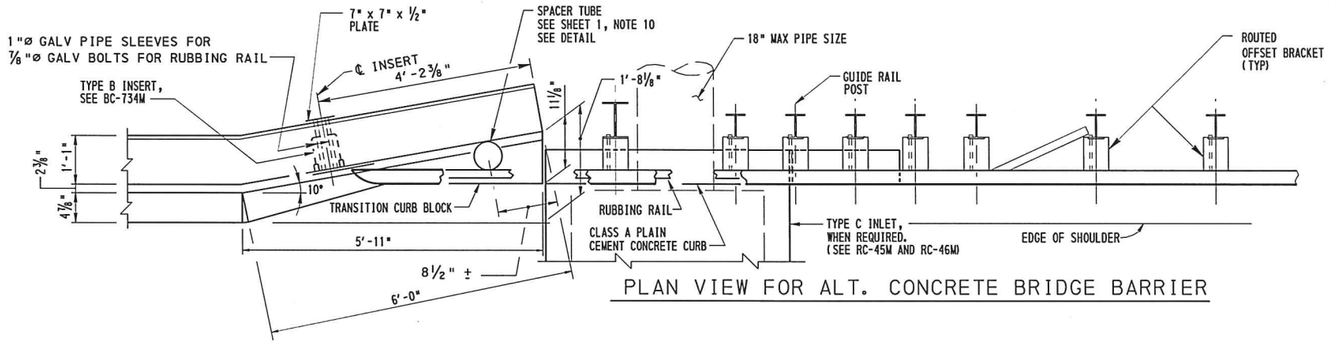


C6 x 8.2 RUBBING RAIL END DETAIL

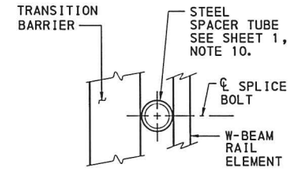


TRAILING END GUIDE RAIL AT STRUCTURE BARRIER

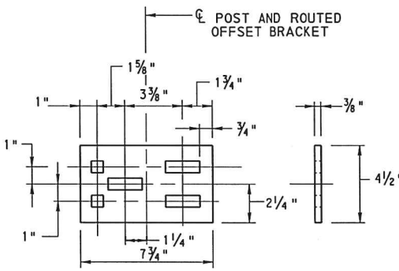
(FOUR-LANE DIVIDED HIGHWAY)



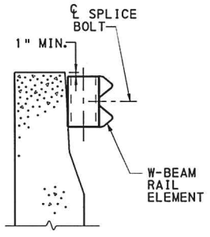
PLAN VIEW FOR ALT. CONCRETE BRIDGE BARRIER



PLAN

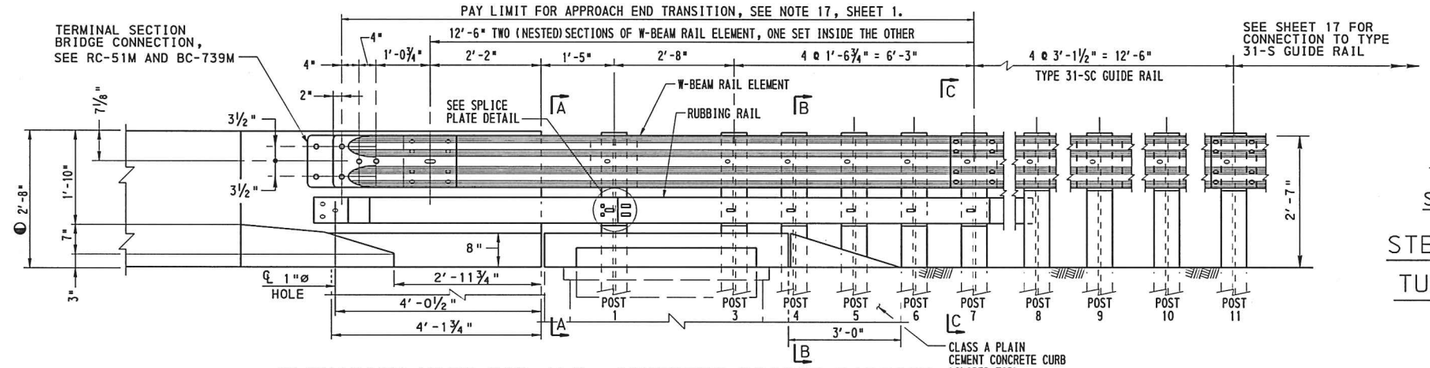


SPLICE PLATE DETAIL



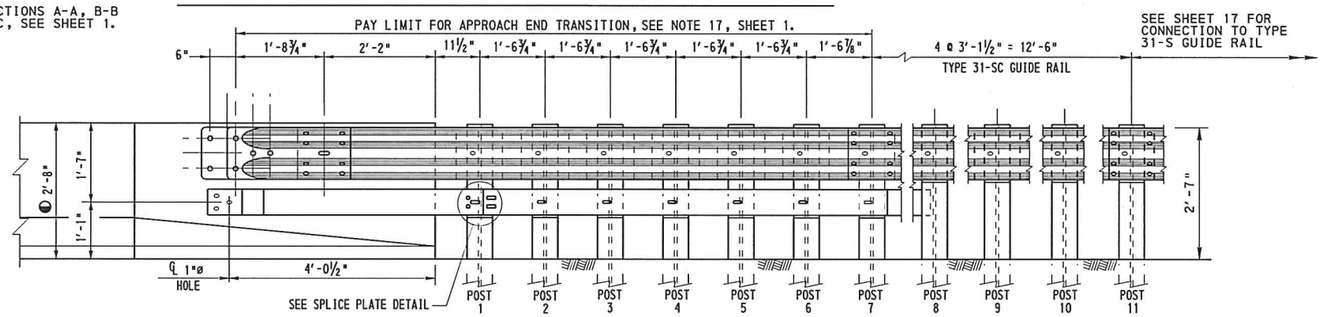
SECTION

STEEL SPACER TUBE DETAIL



ELEVATION VIEW FOR ALT. CONCRETE BRIDGE BARRIER

NOTE:
FOR SECTIONS A-A, B-B AND C-C, SEE SHEET 1.



ELEVATION VIEW FOR ALT. CONCRETE BRIDGE BARRIER

(WITHOUT INLET PLACEMENT)

NOTE:
TYPICAL TO ELEVATION VIEW WITH INLET PLACEMENT EXCEPT AS NOTED.

NOTES

1. THE GUIDE RAIL TRANSITION DETAILS ON THIS SHEET ARE ALSO TO BE USED FOR TRANSITIONS TO THE PA HT BRIDGE BARRIERS.
2. FOR APPROACH TRANSITION POST SIZE AND LENGTH, SEE TABLE A, SHEET 1.
3. FOR ADDITIONAL NOTES AND LEGEND, SEE SHEET 1.
4. FOR PHOTO OF TYPICAL STEEL SPACER TUBE INSTALLATION, SEE SHEET 3.

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GUIDE RAIL TO BRIDGE BARRIER TRANSITIONS

ALTERNATE CONCRETE BRIDGE BARRIER

RECOMMENDED FEB. 8, 2019
CHIEF, HWY. DELIVERY DIVISION

RECOMMENDED FEB. 8, 2019
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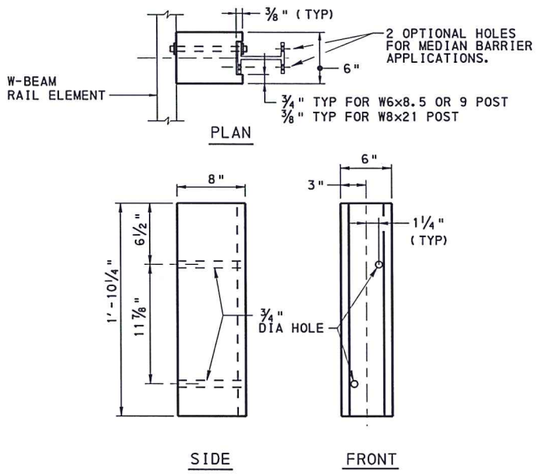
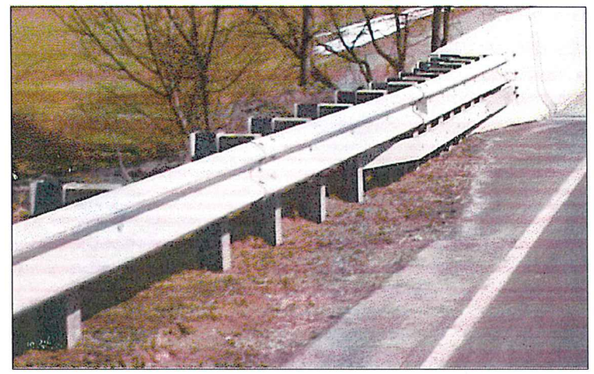
RC-50M



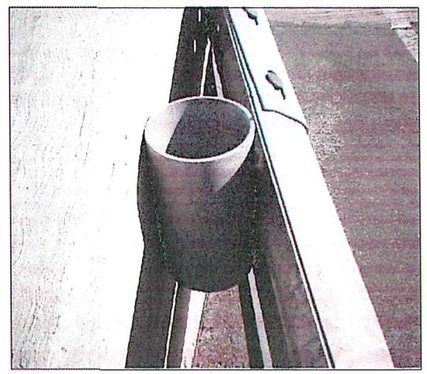
ROUTED OFFSET BRACKET

TYPICAL AND ALTERNATE CONCRETE BRIDGE BARRIER TRANSITION POSTS 1 THRU 7, SEE SHEETS 1 AND 2.



GUIDE RAIL TO TYPICAL CONCRETE BRIDGE BARRIER TRANSITION
(WITHOUT INLET PLACEMENT)

FOR DETAILS, SEE SHEET 1

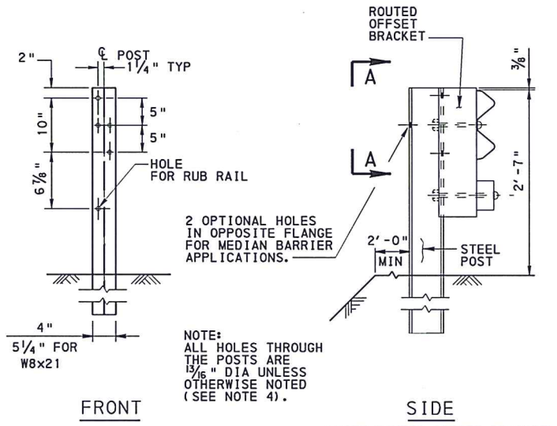


TYPICAL STEEL SPACER TUBE INSTALLATION

FOR DETAILS, SEE SHEETS 1 AND 2

ELEVATION VIEW FOR TYPICAL CONCRETE BRIDGE BARRIER TRANSITION
(WITHOUT INLET PLACEMENT)

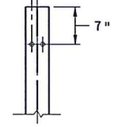
FOR DETAILS, SEE SHEET 1



W6 x 8.5 or 9 POST DETAILS

TYPICAL AND ALTERNATE CONCRETE BRIDGE BARRIER TRANSITION POSTS 4 THRU 7.

NOTE: W8x21 POSTS 1 THRU 3 SIMILAR, SEE DETAILS ON SHEETS 1 AND 2.



NOTES

1. FOR APPROACH TRANSITION POST HEIGHTS, SEE SHEETS 1 AND 2.
2. FOR ADDITIONAL NOTES, SEE SHEET 1.
3. FOR APPROACH TRANSITION POST SIZE AND LENGTH, SEE TABLE A, ON SHEET 1.
4. A ¾" DIAMETER HOLE IS PERMISSIBLE THROUGH THE POSTS.

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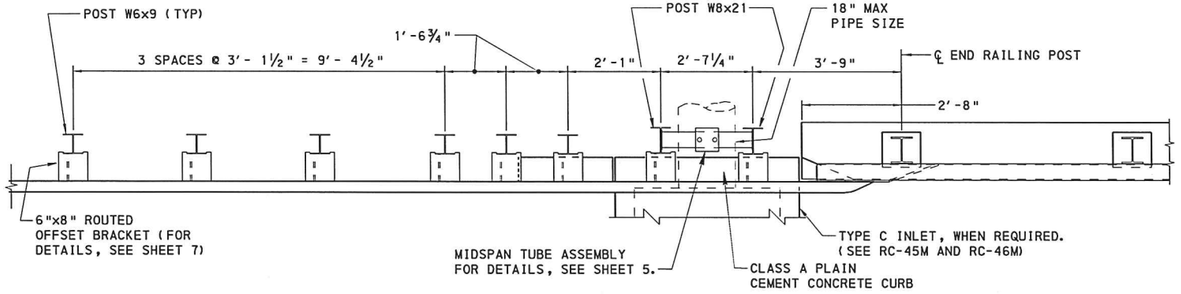
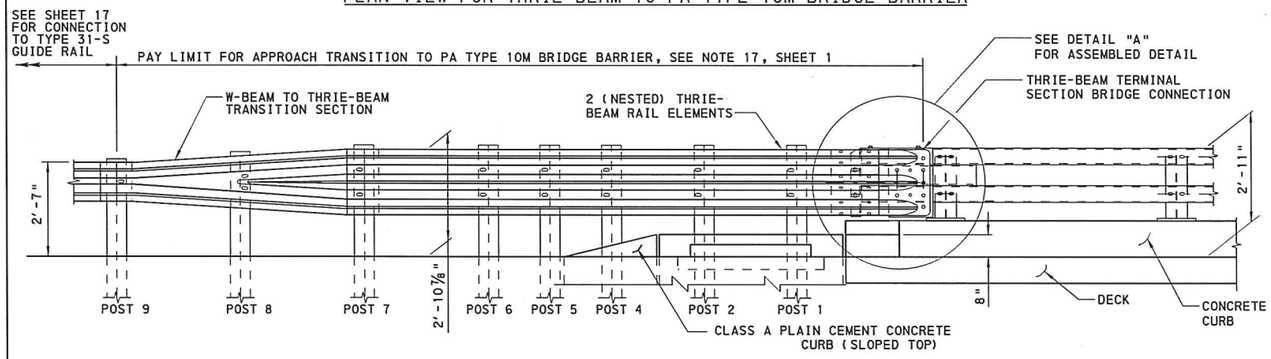
GUIDE RAIL TO BRIDGE BARRIER TRANSITIONS

TYPICAL AND ALTERNATE CONCRETE BRIDGE BARRIER POST AND OFFSET BRACKET DETAILS

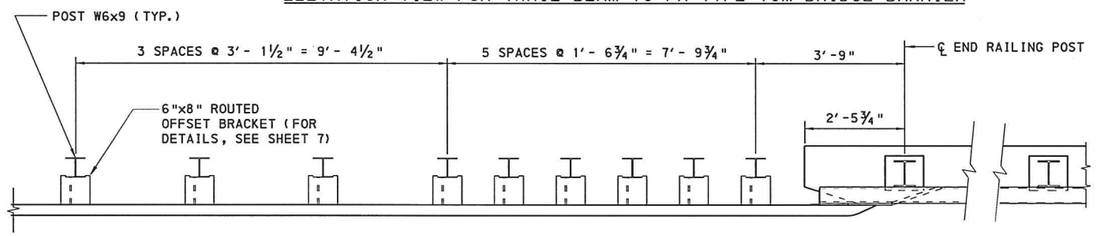
RECOMMENDED FEB. 8, 2019	RECOMMENDED FEB. 8, 2019	SHT 3 OF 18
CHIEF, HWY. DELIVERY DIVISION	DIRECTOR, BUREAU OF PROJECT DELIVERY	RC-50M



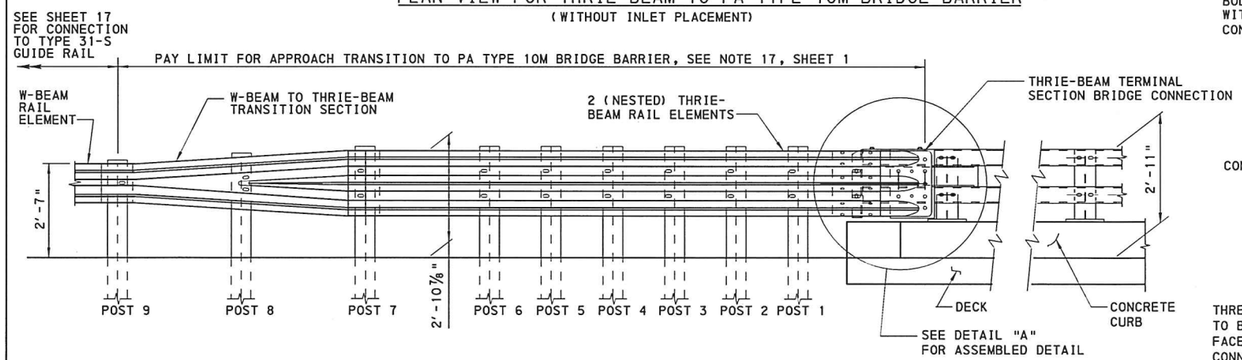
PLAN VIEW FOR THRIE-BEAM TO PA TYPE 10M BRIDGE BARRIER



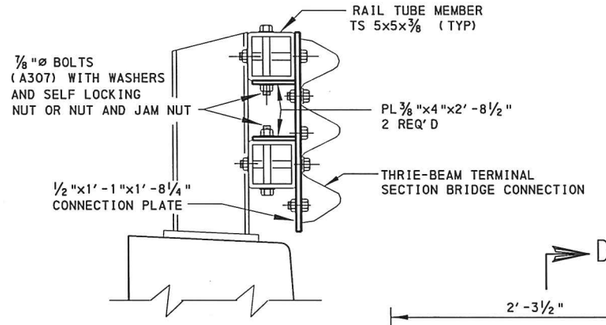
ELEVATION VIEW FOR THRIE-BEAM TO PA TYPE 10M BRIDGE BARRIER



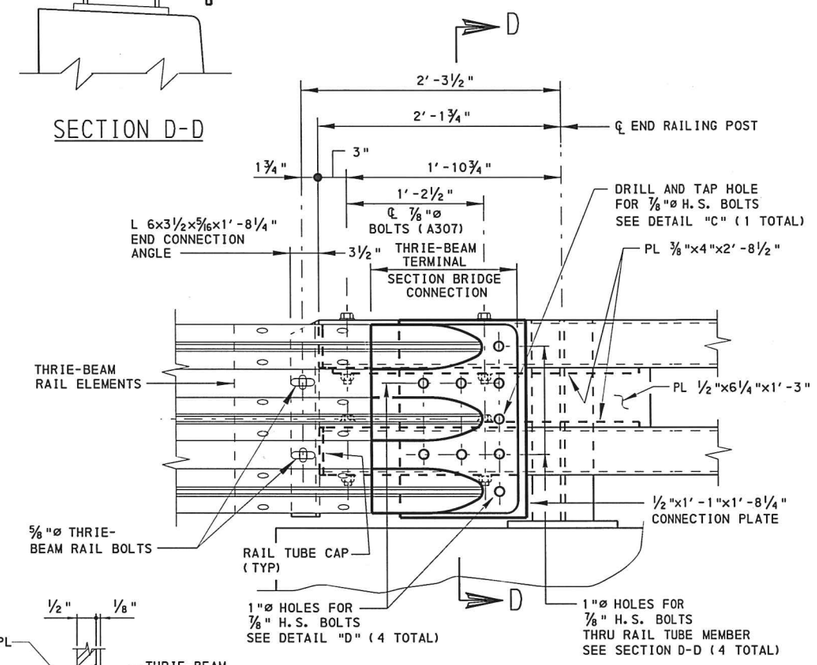
PLAN VIEW FOR THRIE-BEAM TO PA TYPE 10M BRIDGE BARRIER
(WITHOUT INLET PLACEMENT)



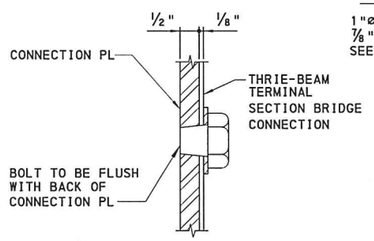
ELEVATION VIEW FOR THRIE-BEAM TO PA TYPE 10M BRIDGE BARRIER
(WITHOUT INLET PLACEMENT)



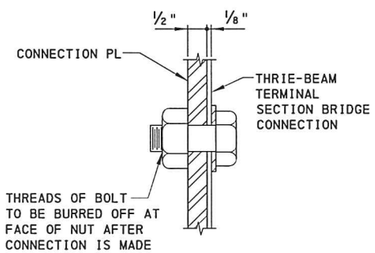
SECTION D-D



DETAIL A
(FOR UNASSEMBLED DETAILS, SEE SHEET 6)



DETAIL "C"



DETAIL "D"

NOTES

1. W-BEAM RAIL ELEMENT, TRANSITION SECTION AND THRIE-BEAM RAIL ELEMENT ARE BOLTED TO ALL POSTS.
2. FOR APPROACH TRANSITION POST DETAILS, SEE SHEET 7.
3. FOR LOCATION WITH INLET PLACEMENT, POST 3 IS OMITTED.
4. FOR ADDITIONAL NOTES, SEE SHEET 1.

BC-708M	THRIE-BEAM TO PA TYPE 10M BRIDGE TRANSITION CONNECTION
BC-709M	PA TYPE 10M BRIDGE BARRIER

REFERENCE DRAWINGS

COMMONWEALTH OF PENNSYLVANIA
DEPARTMENT OF TRANSPORTATION
BUREAU OF PROJECT DELIVERY

GUIDE RAIL TO BRIDGE BARRIER TRANSITIONS

THRIE-BEAM TO PA TYPE 10M BRIDGE BARRIER

RECOMMENDED FEB. 8, 2019
CHIEF, HWY. DELIVERY DIVISION

RECOMMENDED FEB. 8, 2019
DIRECTOR, BUREAU OF PROJECT DELIVERY

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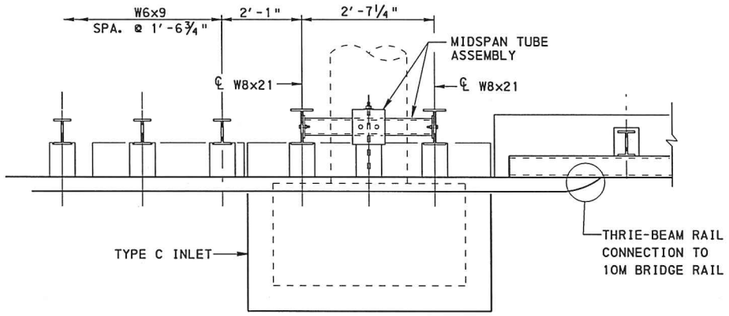
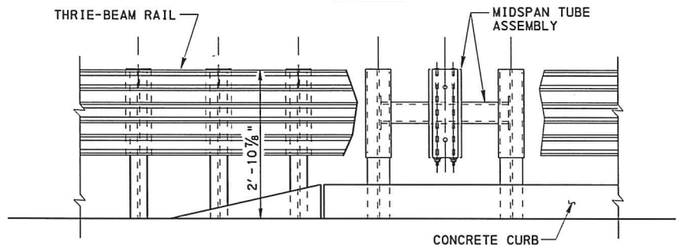
RC-50M

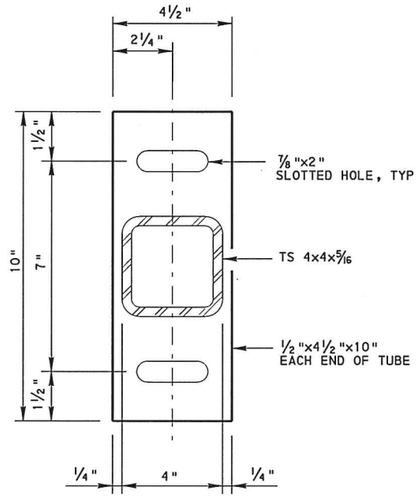


PLAN

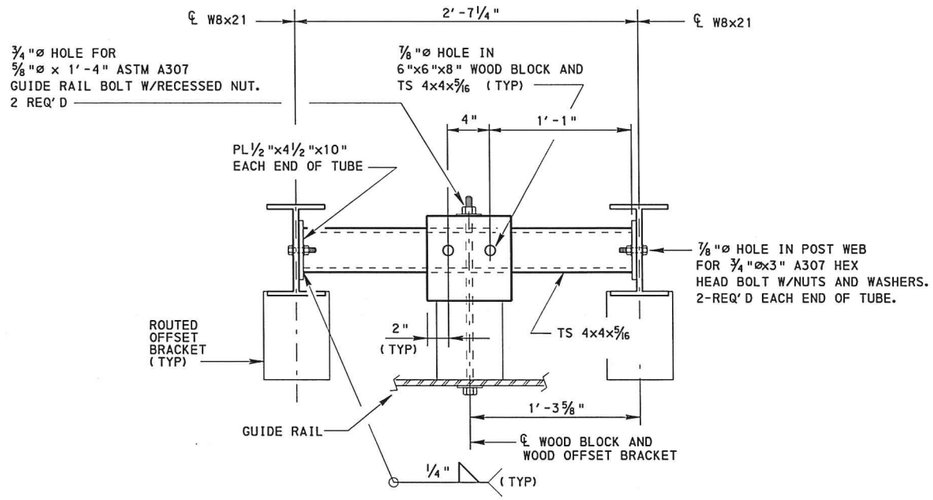


ELEVATION

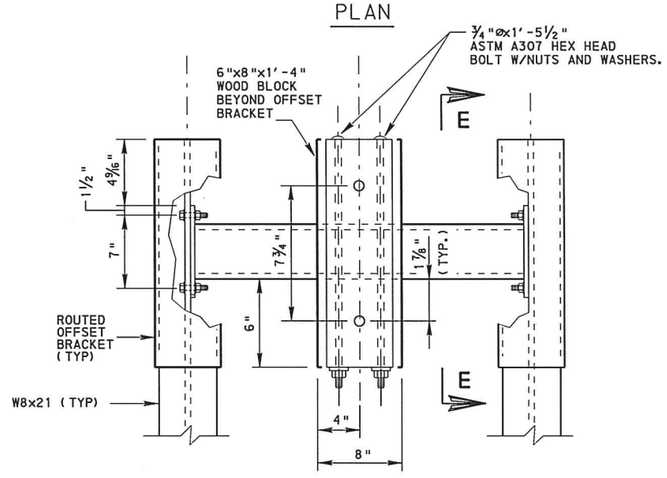
THRIE-BEAM TO PA TYPE 10M BRIDGE BARRIER CONNECTION DETAILS



SECTION E-E



PLAN



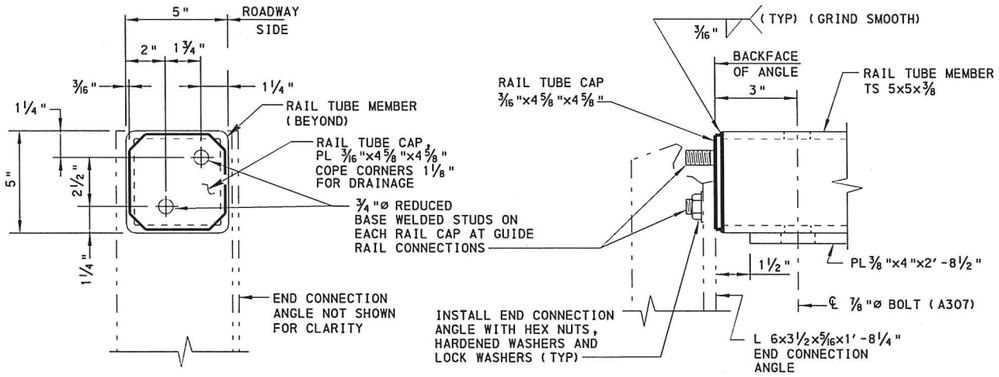
ELEVATION

MIDSPAN TUBE ASSEMBLY DETAILS

COMMONWEALTH OF PENNSYLVANIA
DEPARTMENT OF TRANSPORTATION
BUREAU OF PROJECT DELIVERY

GUIDE RAIL TO BRIDGE BARRIER TRANSITIONS
THRIE-BEAM TO PA TYPE 10M BRIDGE BARRIER
MIDSPAN TUBE ASSEMBLY DETAILS

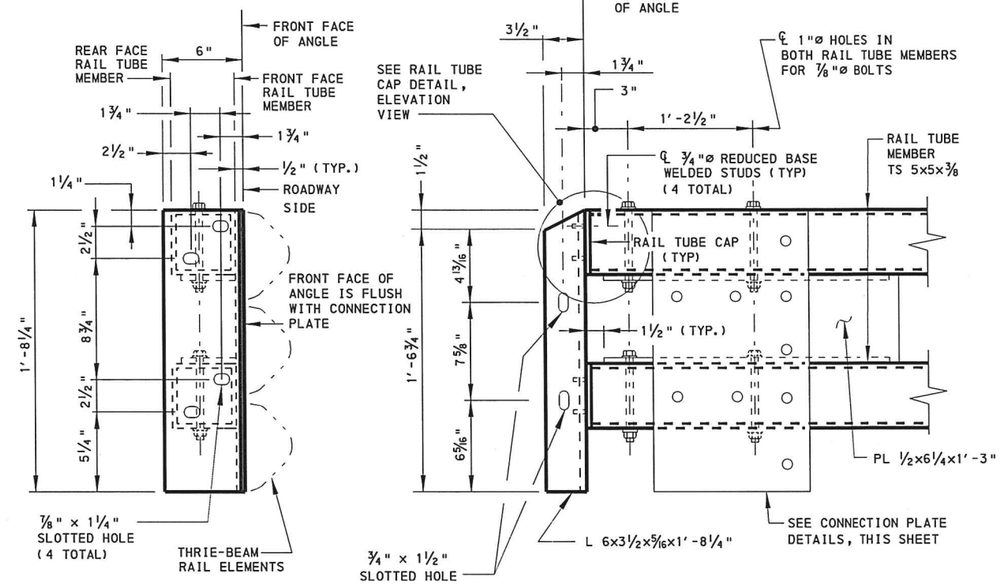
RECOMMENDED FEB. 8, 2019	RECOMMENDED FEB. 8, 2019	SHT 5 OF 18
CHIEF, HWY. DELIVERY DIVISION	DIRECTOR, BUREAU OF PROJECT DELIVERY	RC-50M



END VIEW

ELEVATION VIEW

TOP RAIL TUBE MEMBER SHOWN, BOTH TUBES (TYP)



END VIEW

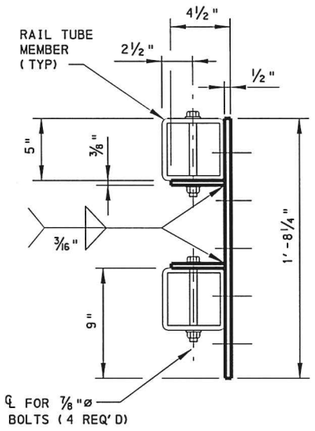
ELEVATION VIEW

THRIE-BEAM RAIL ELEMENTS NOT SHOWN FOR CLARITY.

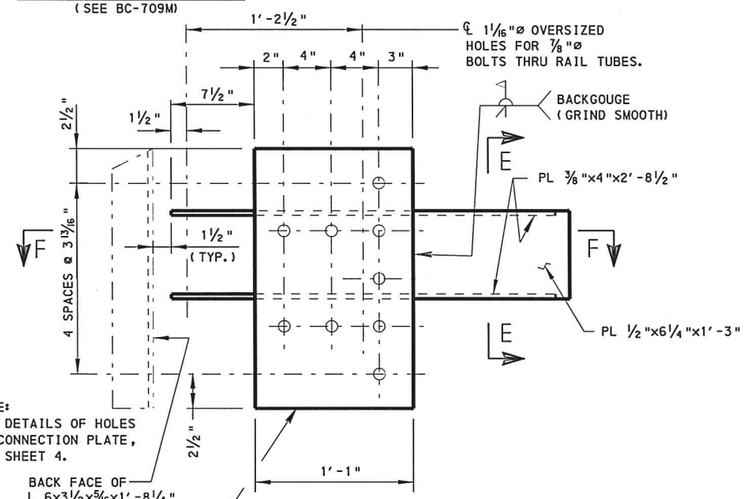
END CONNECTION ANGLE DETAILS

RAIL TUBE CAP DETAIL

(SEE BC-709M)



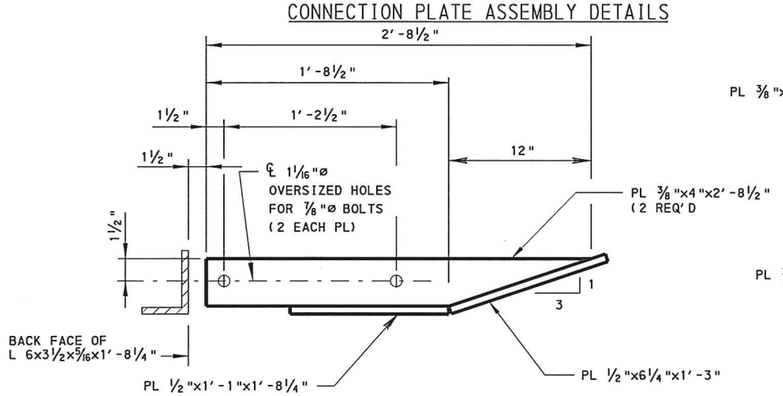
END VIEW



ELEVATION VIEW

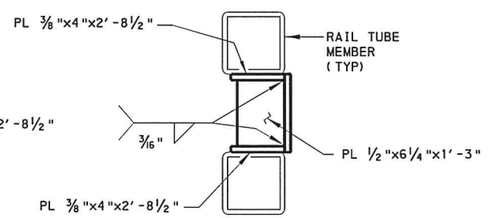
(RAIL TUBES NOT SHOWN FOR CLARITY)

CONNECTION PLATE ASSEMBLY DETAILS



SECTION F-F

(RAIL TUBES NOT SHOWN FOR CLARITY)



SECTION E-E

NOTES

1. USE THIS SHEET WITH SHEET 4.
2. FOR ADDITIONAL NOTES, SEE SHEET 1 AND SHEET 4.

BC-708M	THRIE-BEAM TO PA TYPE 10M BRIDGE TRANSITION CONNECTION
BC-709M	PA TYPE 10M BRIDGE BARRIER
REFERENCE DRAWINGS	

COMMONWEALTH OF PENNSYLVANIA
DEPARTMENT OF TRANSPORTATION
BUREAU OF PROJECT DELIVERY

GUIDE RAIL TO BRIDGE BARRIER TRANSITIONS

THRIE-BEAM TO PA TYPE 10M BRIDGE BARRIER CONNECTION PLATE DETAILS

RECOMMENDED FEB. 8, 2019
CHIEF, ENV. DELIVERY DIVISION

RECOMMENDED FEB. 8, 2019
DIRECTOR, BUREAU OF PROJECT DELIVERY

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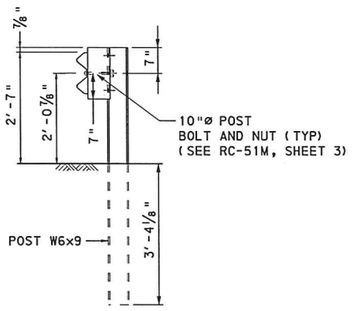
RC-50M

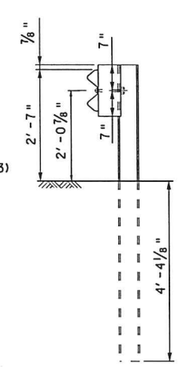
TABLE B

WITHOUT INLET PLACEMENT		
POSTS	LENGTH	SIZE
1 THRU 9	7'-0"	W6x9
BEYOND 9	6'-0"	W6x9
WITH INLET PLACEMENT		
POSTS	LENGTH	SIZE
1 THRU 2	8'-0"	W8x21
4 THRU 9	7'-0"	W6x9
BEYOND 9	6'-0"	W6x9



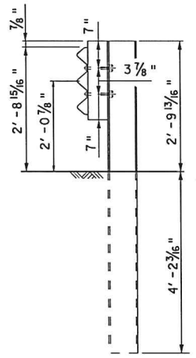
BEYOND POST 9
(AT W-BEAM RAIL ELEMENT)

- SEE SHEET 17.
- FOR POST DETAILS SEE RC-51M, SHEET 2.



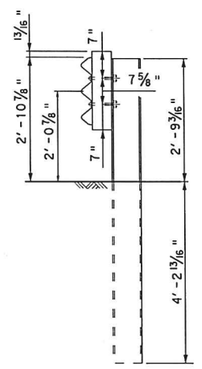
W6x9 STEEL POST 7'-0" LONG
w/6"x8"x1'-2" ROUTED OFFSET BRACKET

POST 9



W6x9 STEEL POST 7'-0" LONG
w/6"x8"x1'-5 7/8" ROUTED OFFSET BRACKET

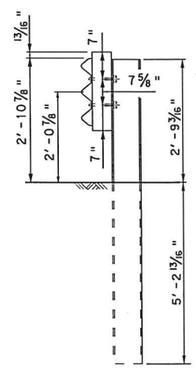
POST 8



W6x9 STEEL POST
7'-0" LONG w/ROUTED OFFSET
BRACKET (SEE DETAIL)

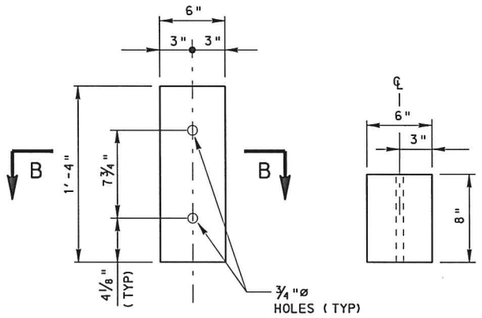
POSTS 1 THRU 7
(WITHOUT INLET PLACEMENT)

POSTS 4 THRU 7 ✳
(WITH INLET PLACEMENT)



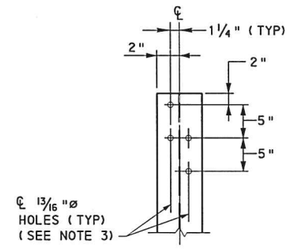
W8x21 STEEL POSTS
8'-0" LONG w/ROUTED OFFSET
BRACKET (SEE DETAIL)

POSTS 1 AND 2
(WITH INLET PLACEMENT)

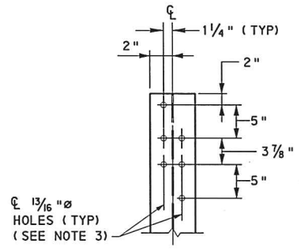


ELEVATION SECTION B-B

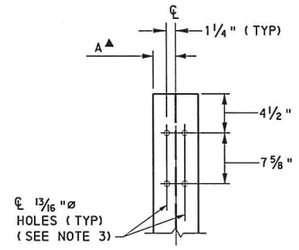
MIDSPAN TUBE
WOOD OFFSET BRACKET



POST 9



POST 8



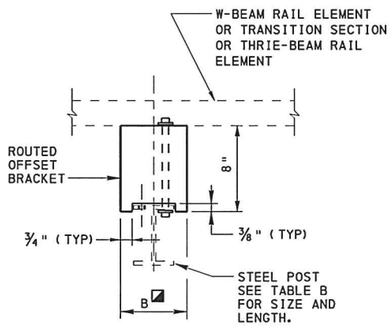
POSTS 1 THRU 7 ✳

✳ AT LOCATIONS WITH INLET PLACEMENT POST 3 IS OMITTED AND POSTS 1 AND 2 ARE W8x21 (SEE TABLE B).

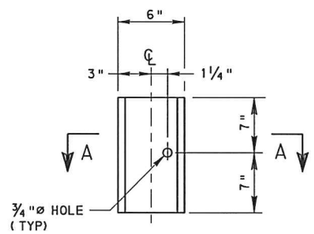
▲ A= 2" FOR W6x9
A= 2 5/8" FOR W8x21

◪ B= 6" FOR W6x9
B= 7 1/4" FOR W8x21

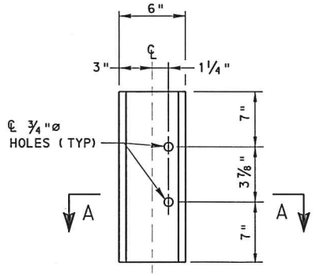
POST DETAILS



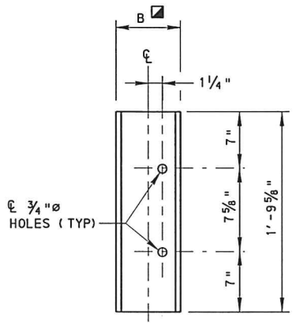
SECTION A-A



POST 9



POST 8



POSTS 1 THRU 7 ✳

ROUTED OFFSET BRACKET DETAILS

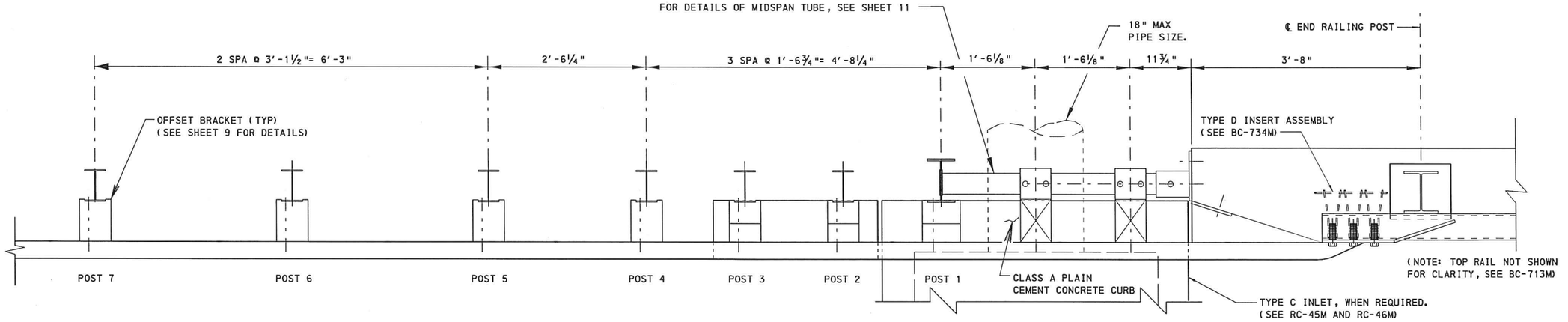
NOTES

1. FOR LOCATION OF POSTS, SEE SHEET 4.
2. FOR ADDITIONAL NOTES, SEE SHEET 1.
3. A 3/4" DIAMETER HOLE IS PERMISSIBLE THROUGH THE POSTS.

COMMONWEALTH OF PENNSYLVANIA
DEPARTMENT OF TRANSPORTATION
BUREAU OF PROJECT DELIVERY

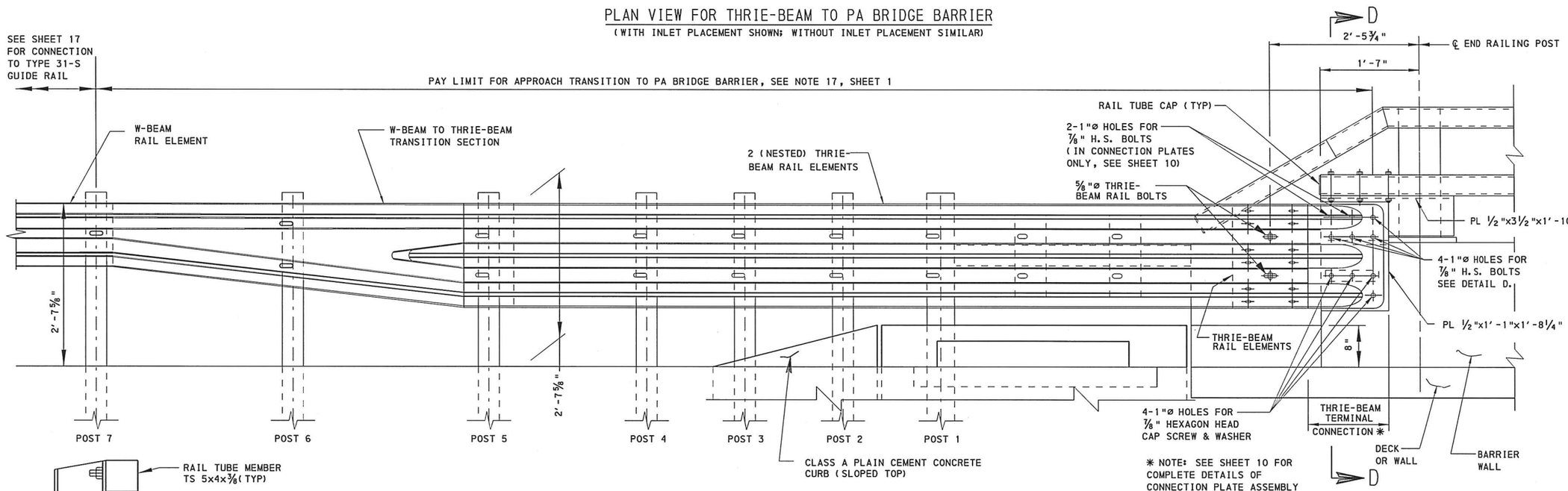
GUIDE RAIL TO BRIDGE BARRIER TRANSITIONS
THRIE-BEAM TO PA TYPE 10M BRIDGE BARRIER
POST AND OFFSET BRACKET DETAILS

RECOMMENDED FEB. 8, 2019 CHIEF, ENGR. DELIVERY DIVISION	RECOMMENDED FEB. 8, 2019 DIRECTOR, BUREAU OF PROJECT DELIVERY	SHT 7 OF 18 RC-50M



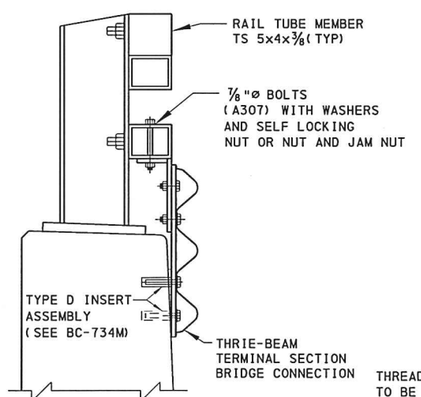
PLAN VIEW FOR THRIE-BEAM TO PA BRIDGE BARRIER

(WITH INLET PLACEMENT SHOWN; WITHOUT INLET PLACEMENT SIMILAR)

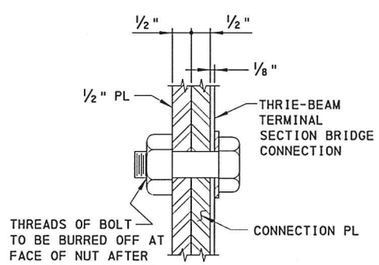


ELEVATION VIEW FOR THRIE-BEAM TO PA BRIDGE BARRIER

(WITH INLET PLACEMENT SHOWN; WITHOUT INLET PLACEMENT SIMILAR)



SECTION D-D



DETAIL "D"

NOTES

1. W-BEAM RAIL ELEMENT, TRANSITION SECTION AND THRIE-BEAM RAIL ELEMENT ARE BOLTED TO ALL POSTS.
2. FOR APPROACH TRANSITION POST DETAILS, SEE SHEET 9.
3. FOR ADDITIONAL PA BRIDGE BARRIER NOTES, SEE SHEET 1.
4. SEE BC-712M AND BC-713M FOR PA BRIDGE BARRIER DETAILS AND HARDWARE NOT SHOWN.

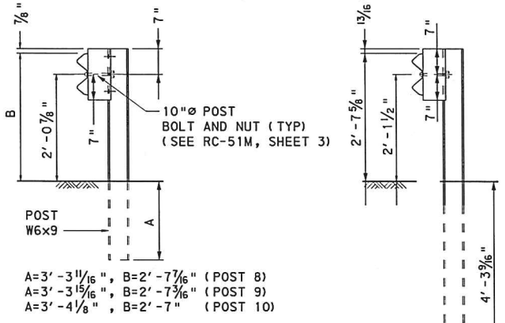
COMMONWEALTH OF PENNSYLVANIA
DEPARTMENT OF TRANSPORTATION
BUREAU OF PROJECT DELIVERY

GUIDE RAIL TO BRIDGE BARRIER TRANSITIONS

THRIE-BEAM TO PA BRIDGE BARRIER

RECOMMENDED FEB. 8, 2019
CHIEF, HWY. DELIVERY DIVISION

RECOMMENDED FEB. 8, 2019
DIRECTOR, BUREAU OF PROJECT DELIVERY

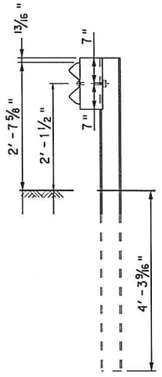


BEYOND POST 7

(AT W-BEAM RAIL ELEMENT)

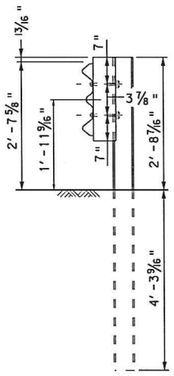
SEE NOTE 7, SHEET 1.

FOR POST DETAILS SEE RC-51M, SHEET 2.



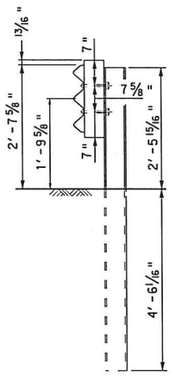
W6x9 STEEL POST 7'-0" LONG
w/6"x8"x1'-2" ROUTED OFFSET BRACKET

POST 7



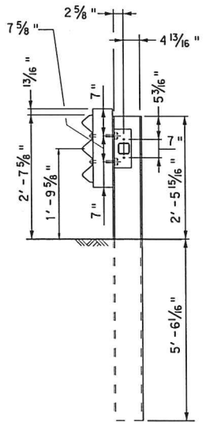
W6x9 STEEL POST 7'-0" LONG
w/6"x8"x1'-5 7/8" ROUTED OFFSET BRACKET

POST 6



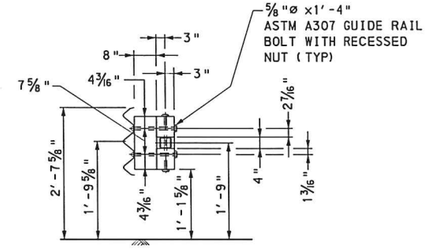
W6x9 STEEL POST
7'-0" LONG w/ROUTED OFFSET
BRACKET (SEE DETAIL)

POSTS 2 THRU 5



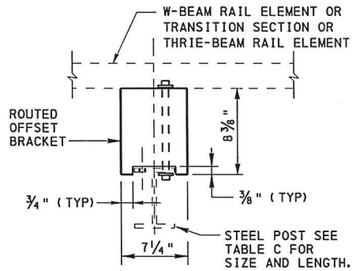
W8x21 STEEL POSTS
8'-0" LONG w/ROUTED OFFSET
BRACKET (SEE DETAIL)

POST 1

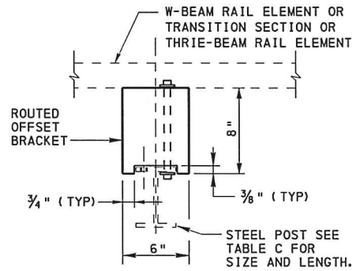


MIDSPAN TUBE SUPPORT

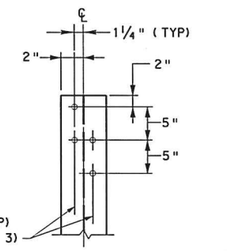
TWO 6"x6"x8" WOOD BLOCKS
ATTACHED TO 4"x4"x5/16" SQUARE TUBE
w/6"x8"x1'-4" WOOD BRACKET



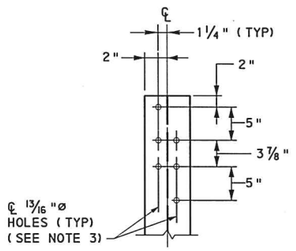
SECTION A-A



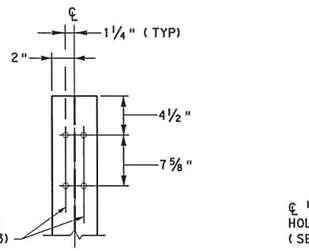
SECTION B-B



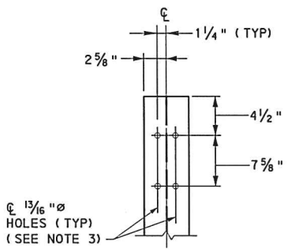
POST 7



POST 6



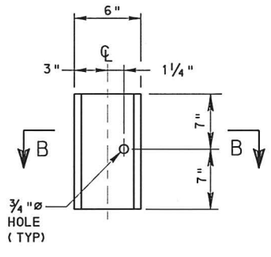
POSTS 2 THRU 5



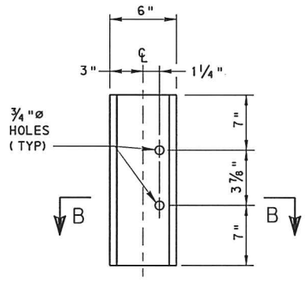
POST 1

POST DETAILS

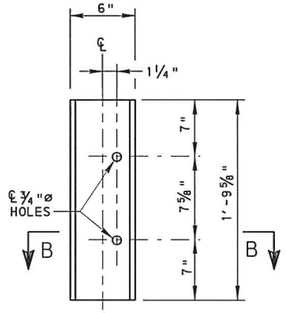
TABLE C		
POSTS	LENGTH	SIZE
1	8'-0"	W8x21
2 THRU 7	7'-0"	W6x9
BEYOND 7	6'-0"	W6x9



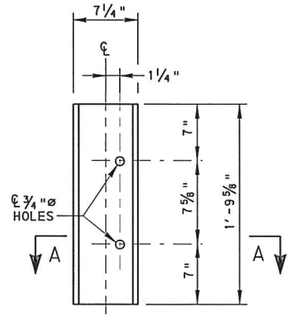
POST 7



POST 6



POSTS 2 THRU 5



POST 1

ROUTED OFFSET BRACKET DETAILS

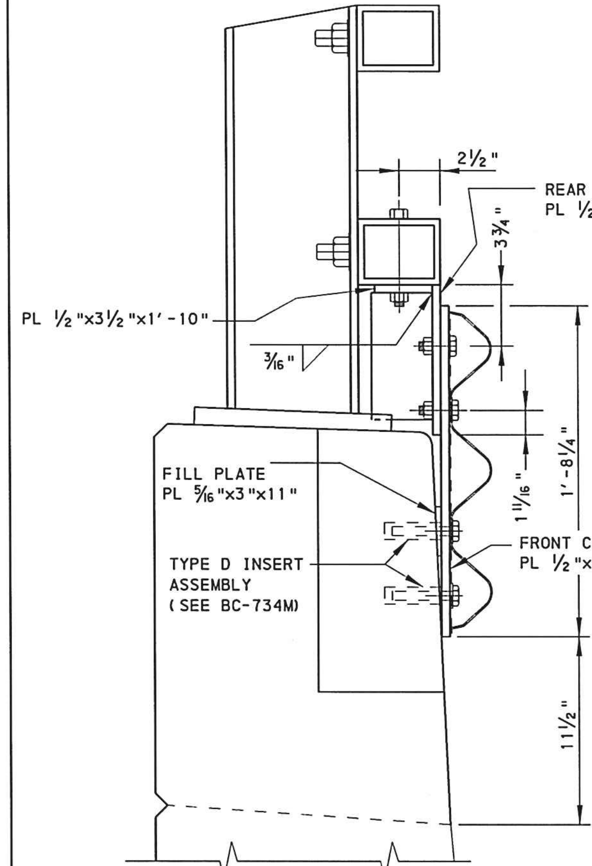
NOTES

1. FOR LOCATION OF POSTS, SEE SHEET 8.
2. FOR ADDITIONAL NOTES, SEE SHEET 1.
3. A 3/4" DIAMETER HOLE IS PERMISSIBLE THROUGH THE POSTS.

COMMONWEALTH OF PENNSYLVANIA
DEPARTMENT OF TRANSPORTATION
BUREAU OF PROJECT DELIVERY

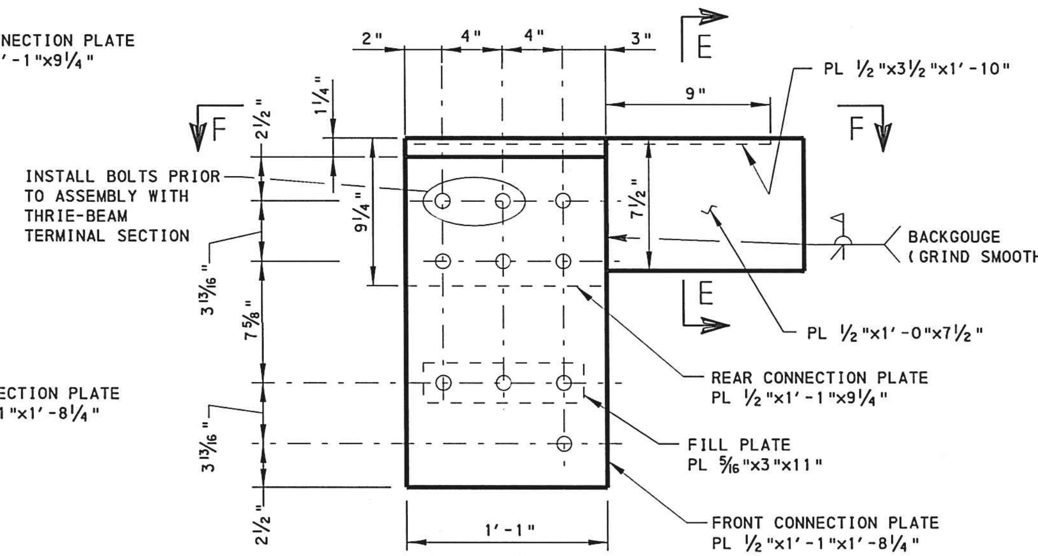
GUIDE RAIL TO BRIDGE BARRIER TRANSITIONS
THRIE-BEAM TO PA BRIDGE BARRIER
POST AND OFFSET BRACKET DETAILS

RECOMMENDED FEB. 8, 2019	RECOMMENDED FEB. 8, 2019	SHT 9 OF 18
CHIEF, HWY. DELIVERY DIVISION	DIRECTOR, BUREAU OF PROJECT DELIVERY	RC-50M



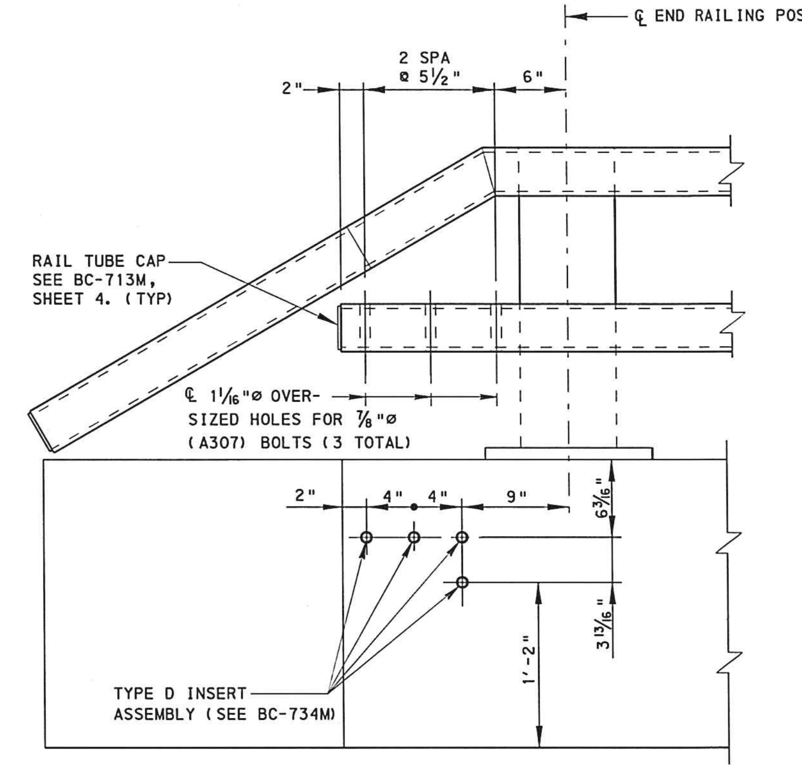
END VIEW

(DELINEATOR NOT SHOWN FOR CLARITY)



ELEVATION VIEW

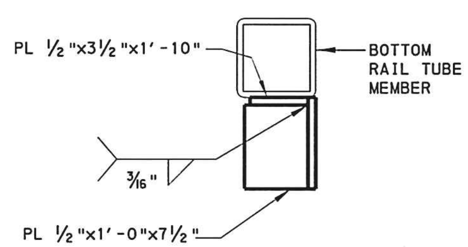
(RAIL TUBES NOT SHOWN FOR CLARITY)



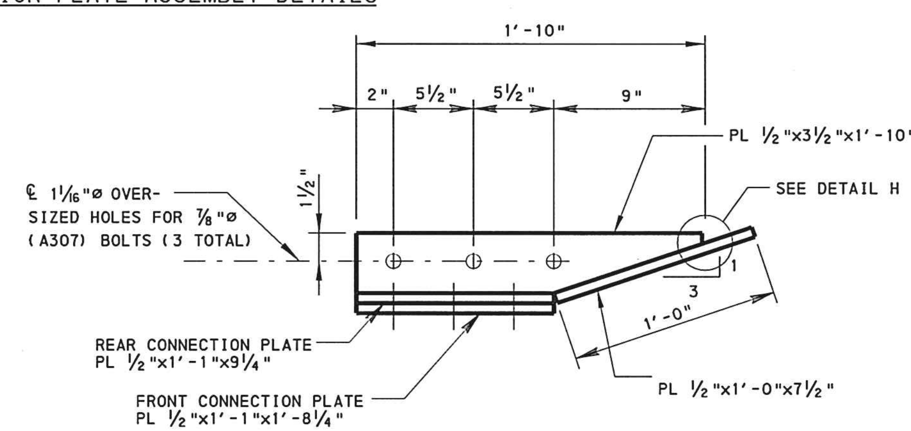
END OF RAIL DETAIL

(CONNECTION PLATES NOT SHOWN)

CONNECTION PLATE ASSEMBLY DETAILS

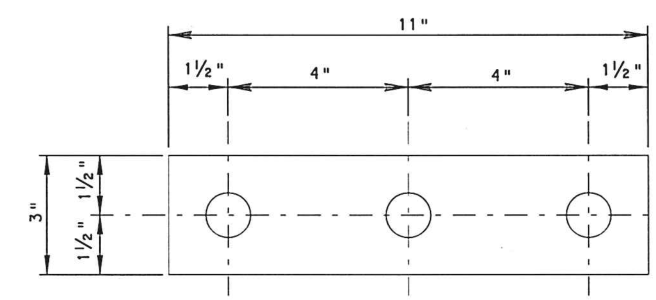


SECTION E-E

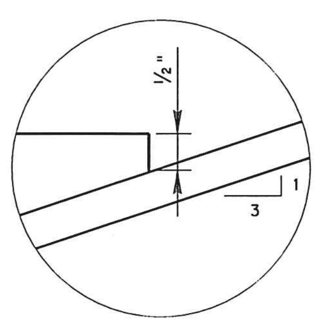


SECTION F-F

(RAIL TUBES NOT SHOWN FOR CLARITY)



FILL PLATE DETAIL



DETAIL H

NOTES

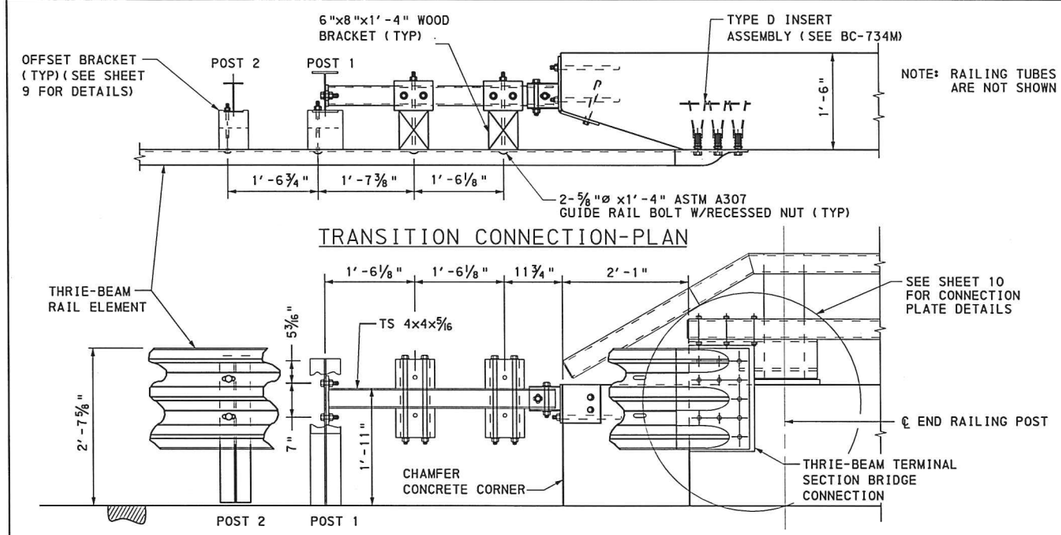
1. USE THIS SHEET WITH SHEET 8.
2. FOR ADDITIONAL NOTES, SEE SHEET 1 AND SHEET 8.
3. FOR BRIDGE BARRIER DETAILS AND DIMENSIONS, SEE BC-712M AND BC-713M.

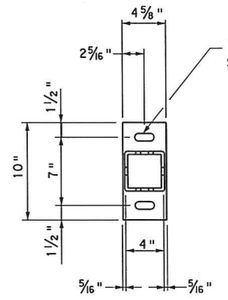
COMMONWEALTH OF PENNSYLVANIA
DEPARTMENT OF TRANSPORTATION
BUREAU OF PROJECT DELIVERY

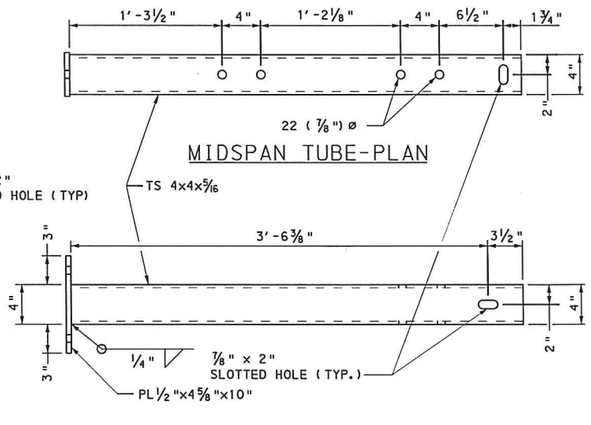
GUIDE RAIL TO BRIDGE BARRIER TRANSITIONS

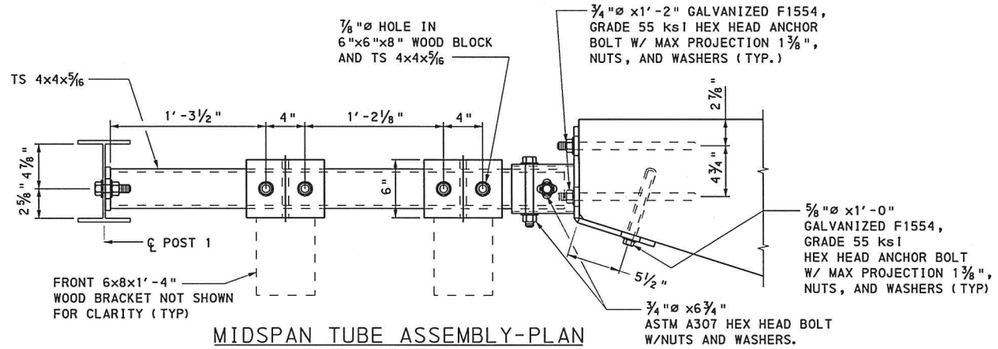
THRIE-BEAM TO PA BRIDGE BARRIER CONNECTION PLATE DETAILS

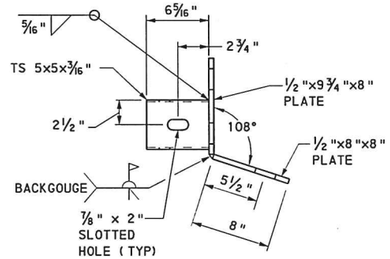
RECOMMENDED FEB. 8, 2019	RECOMMENDED FEB. 8, 2019	SHT 10 OF 18
CHIEF, HWY. DELIVERY DIVISION	DIRECTOR, BUREAU OF PROJECT DELIVERY	RC-50M

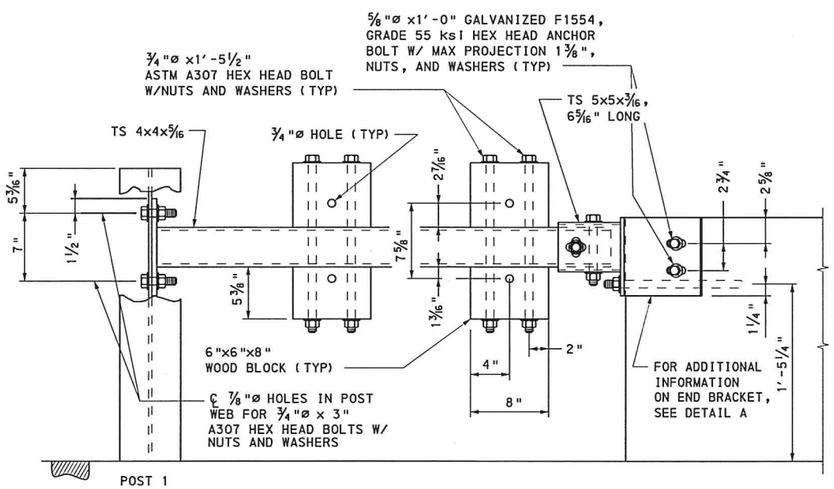


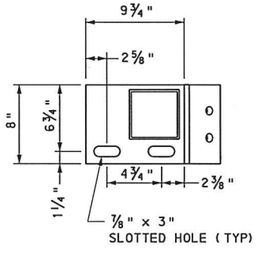


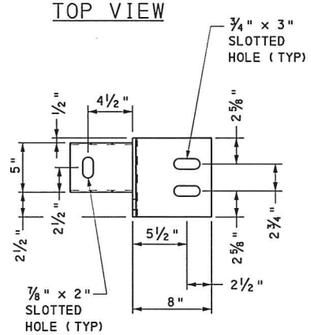












DETAIL A - END BRACKET

NOTES

1. FOR APPROACH TRANSITION POST DETAILS, SEE SHEET 9.
2. FOR APPROACH TRANSITION POST LOCATIONS, SEE SHEET 8.
3. SEE BC-734M FOR ANCHOR ASSEMBLIES.
4. FOR BRIDGE BARRIER DETAILS AND DIMENSIONS, SEE BC-712M, BC-713M, AND THE STRUCTURE PLANS.
5. FOR ADDITIONAL NOTES, SEE SHEET 1.

COMMONWEALTH OF PENNSYLVANIA
DEPARTMENT OF TRANSPORTATION
BUREAU OF PROJECT DELIVERY

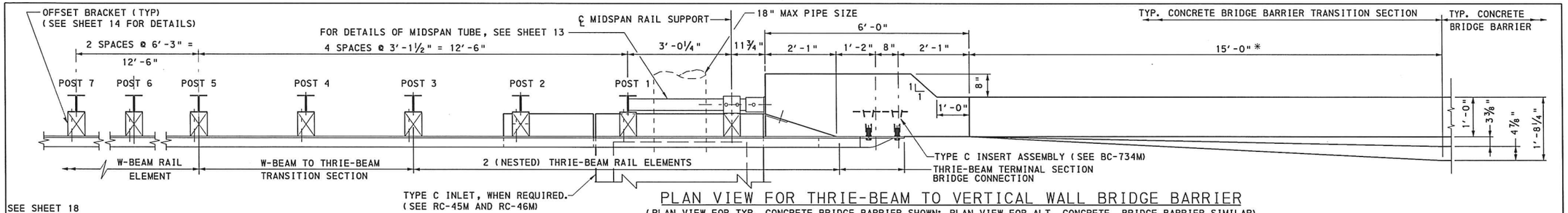
GUIDE RAIL TO BRIDGE BARRIER TRANSITIONS

THRIE-BEAM TO PA BRIDGE BARRIER MIDSPAN TUBE ASSEMBLY DETAILS

RECOMMENDED FEB. 8, 2019
CHIEF, ENGR. DELIVERY DIVISION

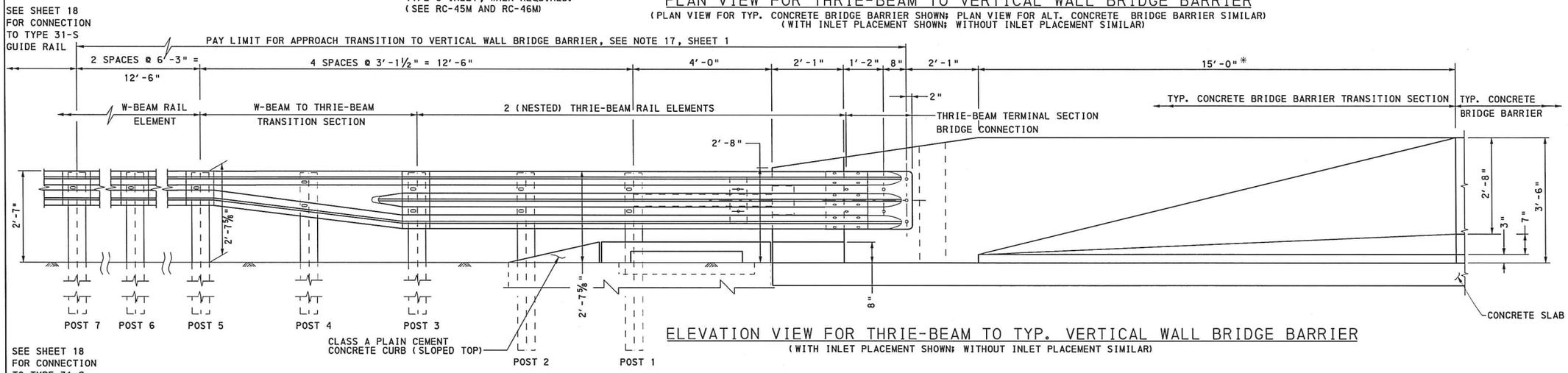
RECOMMENDED FEB. 8, 2019
DIRECTOR, BUREAU OF PROJECT DELIVERY

RC-50M



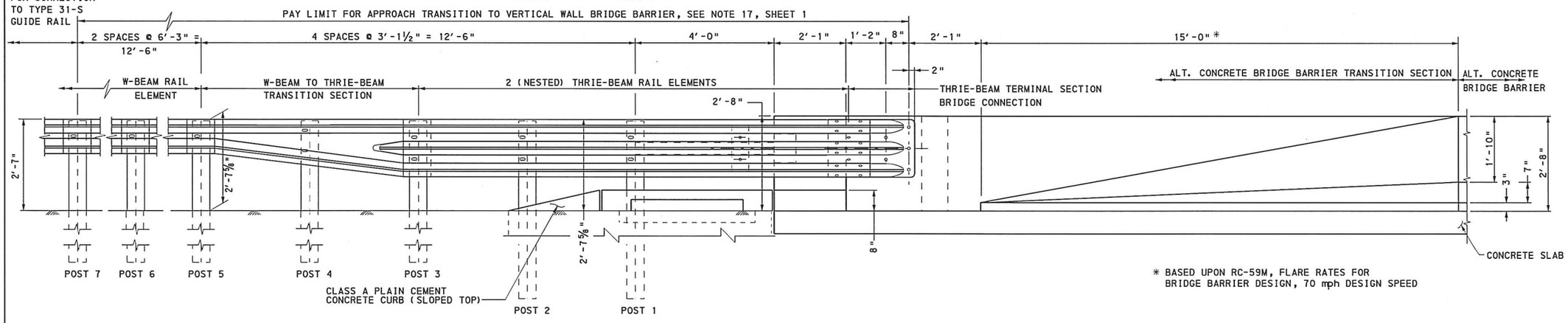
PLAN VIEW FOR THRIE-BEAM TO VERTICAL WALL BRIDGE BARRIER

(PLAN VIEW FOR TYP. CONCRETE BRIDGE BARRIER SHOWN; PLAN VIEW FOR ALT. CONCRETE BRIDGE BARRIER SIMILAR)
(WITH INLET PLACEMENT SHOWN; WITHOUT INLET PLACEMENT SIMILAR)



ELEVATION VIEW FOR THRIE-BEAM TO TYP. VERTICAL WALL BRIDGE BARRIER

(WITH INLET PLACEMENT SHOWN; WITHOUT INLET PLACEMENT SIMILAR)



* BASED UPON RC-59M, FLARE RATES FOR BRIDGE BARRIER DESIGN, 70 mph DESIGN SPEED

ELEVATION VIEW FOR THRIE-BEAM TO ALT. VERTICAL WALL BRIDGE BARRIER

(WITH INLET PLACEMENT SHOWN; WITHOUT INLET PLACEMENT SIMILAR)

NOTES

1. W-BEAM RAIL ELEMENT, TRANSITION SECTION AND THRIE-BEAM RAIL ELEMENT ARE BOLTED TO ALL POSTS.
2. FOR APPROACH TRANSITION POST DETAILS, SEE SHEET 14.
3. SEE BC-703M FOR BRIDGE BARRIER DETAILS AND HARDWARE NOT SHOWN.
4. SEE STRUCTURE DRAWINGS FOR OTHER BRIDGE BARRIER DETAILS AND DIMENSIONS.
5. FOR ADDITIONAL NOTES, SEE SHEET 1.

COMMONWEALTH OF PENNSYLVANIA
DEPARTMENT OF TRANSPORTATION
BUREAU OF PROJECT DELIVERY

GUIDE RAIL TO BRIDGE BARRIER TRANSITIONS

THRIE-BEAM TO VERTICAL WALL BRIDGE BARRIER

RECOMMENDED FEB. 8, 2019
CHIEF, ANY. DELIVERY DIVISION

RECOMMENDED FEB. 8, 2019
DIRECTOR, BUREAU OF PROJECT DELIVERY

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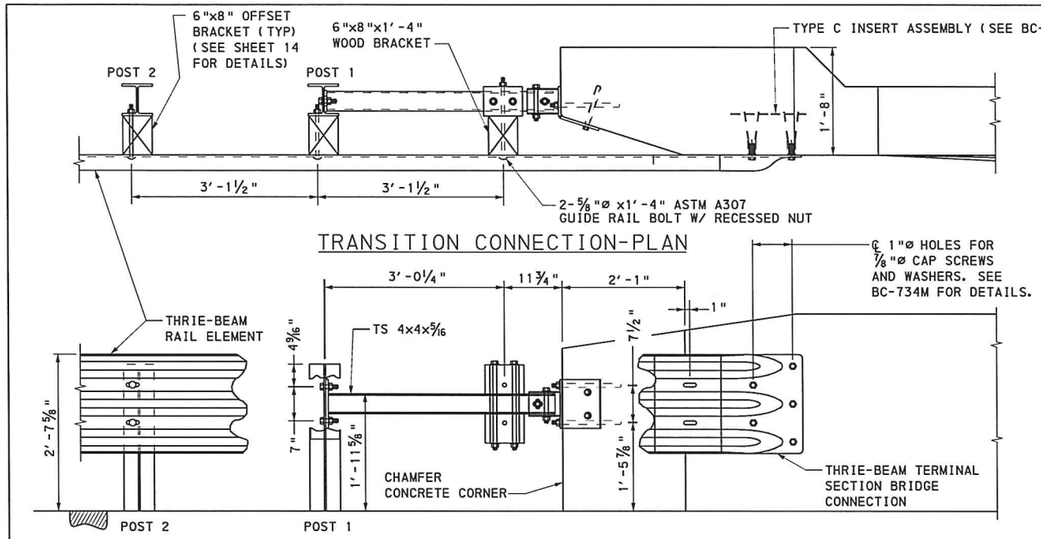
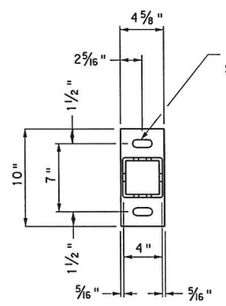
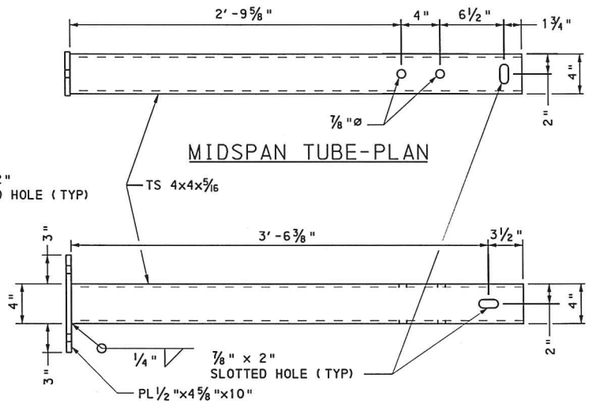
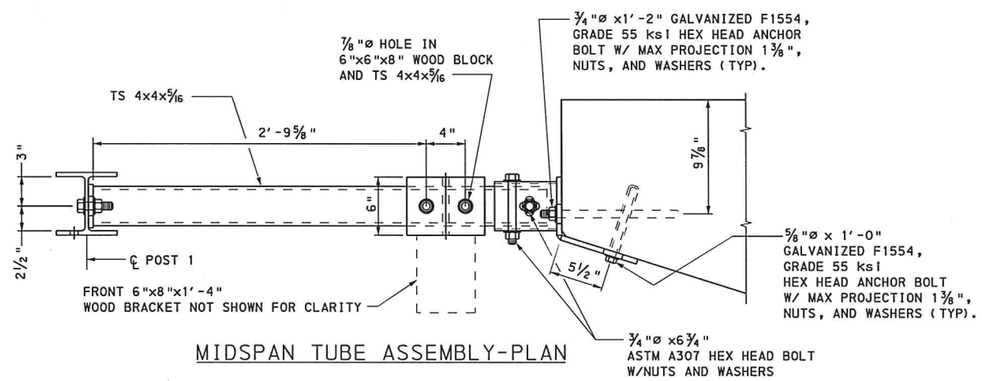
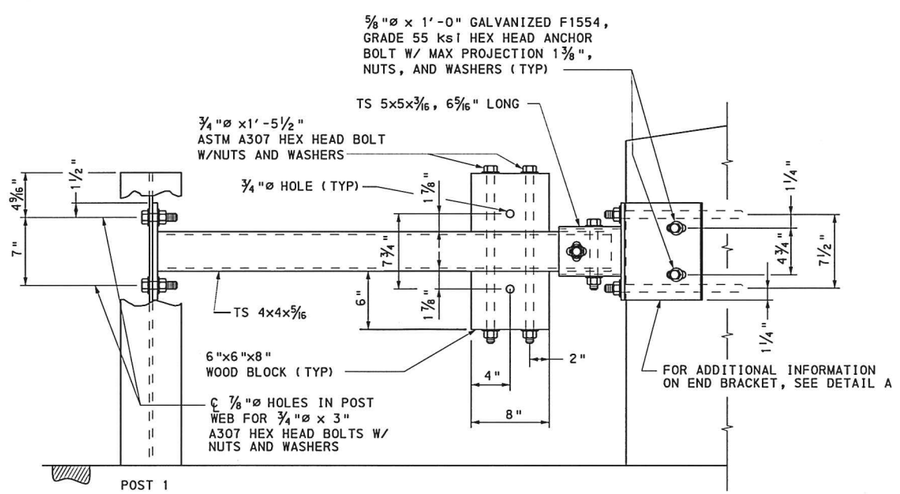
RC-50M

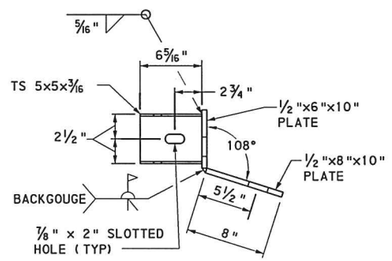


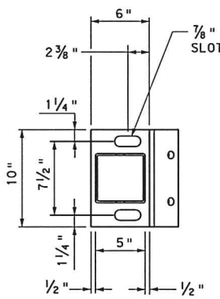


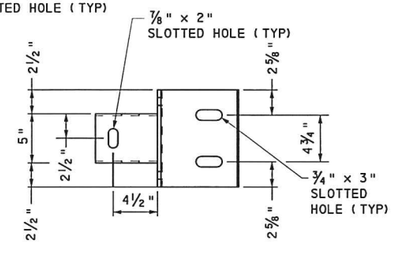












DETAIL A - END BRACKET

NOTES

1. FOR APPROACH TRANSITION POST DETAILS, SEE SHEET 14.
2. FOR APPROACH TRANSITION POST LOCATIONS, SEE SHEET 12.
3. SEE BC-734M FOR ANCHOR ASSEMBLIES.
4. FOR BRIDGE BARRIER DETAILS AND DIMENSIONS, SEE STRUCTURE PLANS.
5. FOR ADDITIONAL NOTES, SEE SHEET 1.

COMMONWEALTH OF PENNSYLVANIA
DEPARTMENT OF TRANSPORTATION
BUREAU OF PROJECT DELIVERY

GUIDE RAIL TO BRIDGE BARRIER TRANSITIONS
THRIE-BEAM TO VERTICAL WALL BRIDGE BARRIER
MIDSPAN TUBE ASSEMBLY DETAILS

RECOMMENDED FEB. 8, 2019
CHIEF, HWY. DELIVERY DIVISION

RECOMMENDED FEB. 8, 2019
DIRECTOR, BUREAU OF PROJECT DELIVERY

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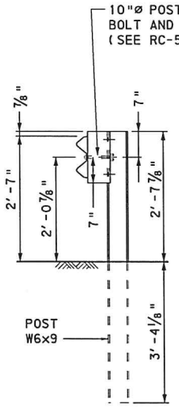
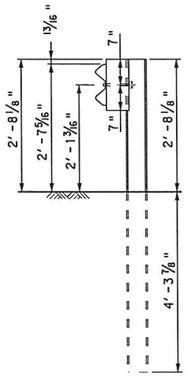
RC-50M

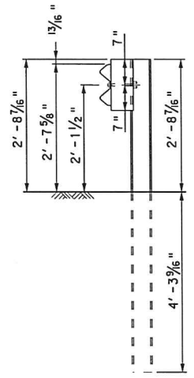


BEYOND POST 6
(AT W-BEAM RAIL ELEMENT)

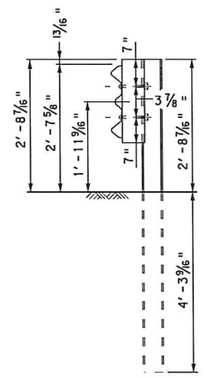
- SEE NOTE 7, SHEET 1.
- FOR POST DETAILS SEE RC-51M, SHEET 2.



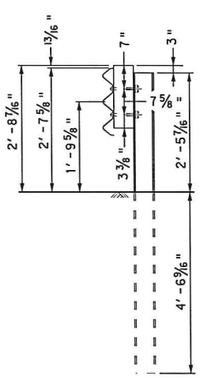
POST 6
W6x15 STEEL POST 7'-0" LONG
w/6"x8"x1'-2" ROUTED OFFSET BRACKET



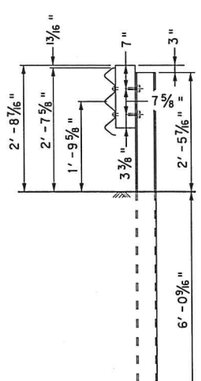
POST 5
W6x15 STEEL POSTS 7'-0" LONG
w/6"x8"x1'-2" ROUTED OFFSET BRACKET



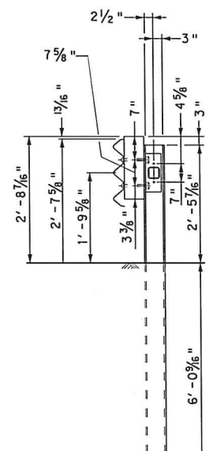
POST 4
W6x15 STEEL POST 7'-0" LONG
w/6"x8"x1'-6" ROUTED OFFSET BRACKET



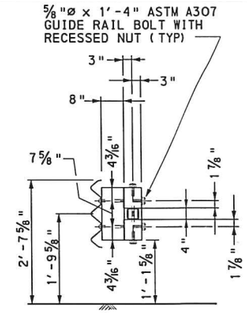
POST 3
W6x15 STEEL POST 7'-0" LONG
w/6"x8"x1'-6" OFFSET BRACKET



POST 2
W6x25 STEEL POST 8'-6" LONG
w/6"x8"x1'-6" OFFSET BRACKET

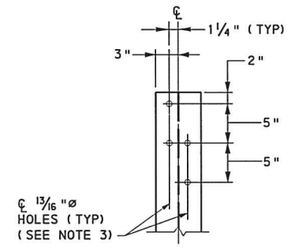


POST 1
W6x25 STEEL POST 8'-6" LONG
w/6"x8"x1'-6" OFFSET BRACKET

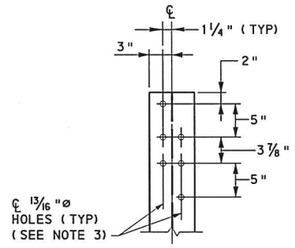


MIDSPAN
TUBE SUPPORT

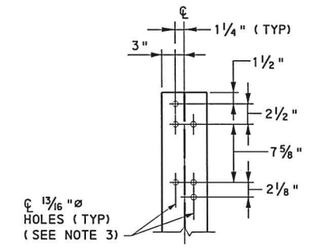
TWO 6"x6"x8" WOOD BLOCKS
ATTACHED TO 4"x4"x5/16" SQUARE TUBE
W/6"x8"x1'-4" WOOD BRACKET



POSTS 5 AND 6



POST 4



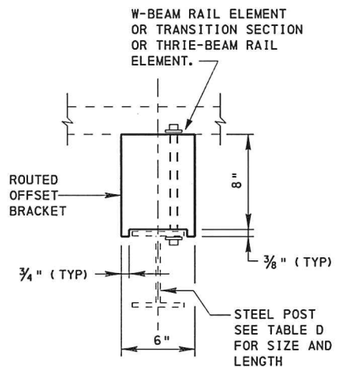
POSTS 1 THRU 3

POST DETAILS

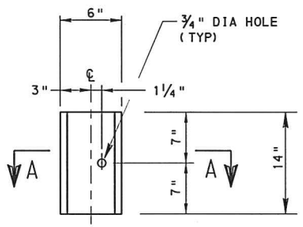
TABLE D		
POST	LENGTH	SIZE
1 THRU 2	8'-6"	W6x25
3 THRU 6	7'-0"	W6x15
BEYOND 6	6'-0"	W6x9

NOTES

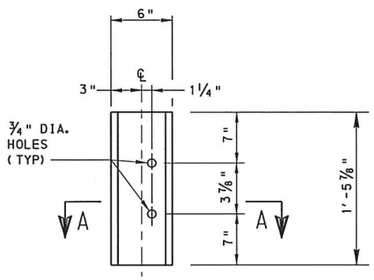
1. FOR LOCATION OF POSTS, SEE SHEET 12.
2. FOR ADDITIONAL NOTES, SEE SHEET 1.
3. A 3/4" DIAMETER HOLE IS PERMISSIBLE THROUGH THE POSTS.



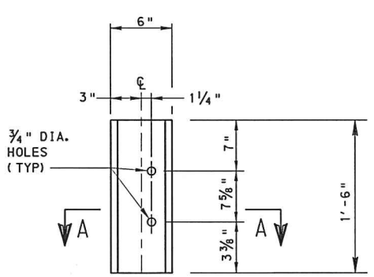
SECTION A-A



POSTS 5 AND 6



POST 4



POSTS 1 THRU 3

OFFSET BRACKET DETAILS

COMMONWEALTH OF PENNSYLVANIA
DEPARTMENT OF TRANSPORTATION
BUREAU OF PROJECT DELIVERY

GUIDE RAIL TO BRIDGE BARRIER TRANSITIONS

THRIE-BEAM TO VERTICAL WALL BRIDGE BARRIER
POST AND OFFSET BRACKET DETAILS

RECOMMENDED FEB. 8, 2019
CHIEF, PRJ. DELIVERY DIVISION

RECOMMENDED FEB. 8, 2019
DIRECTOR, BUREAU OF PROJECT DELIVERY

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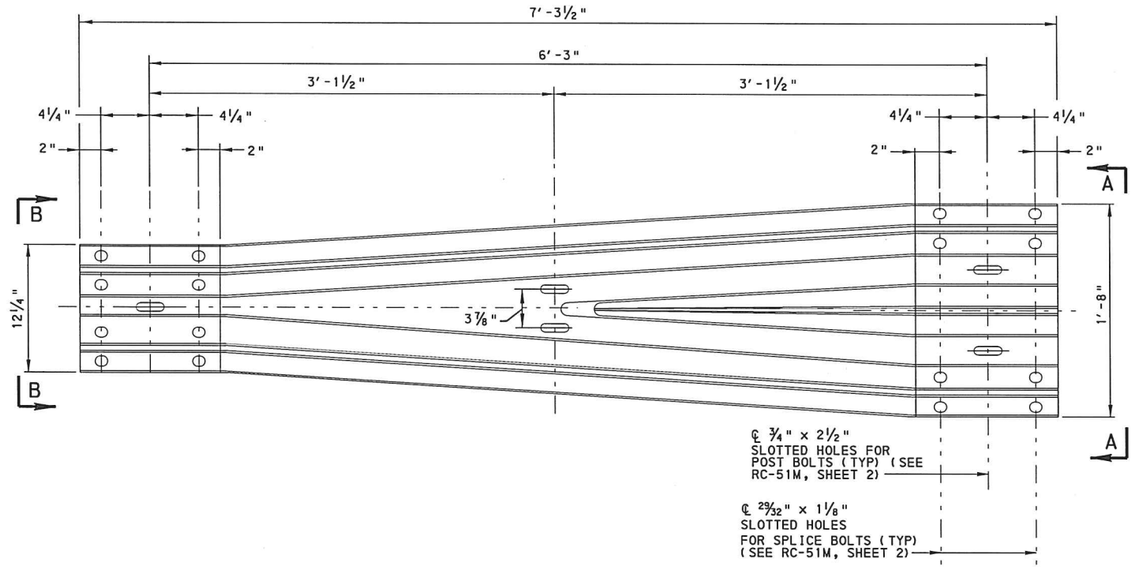
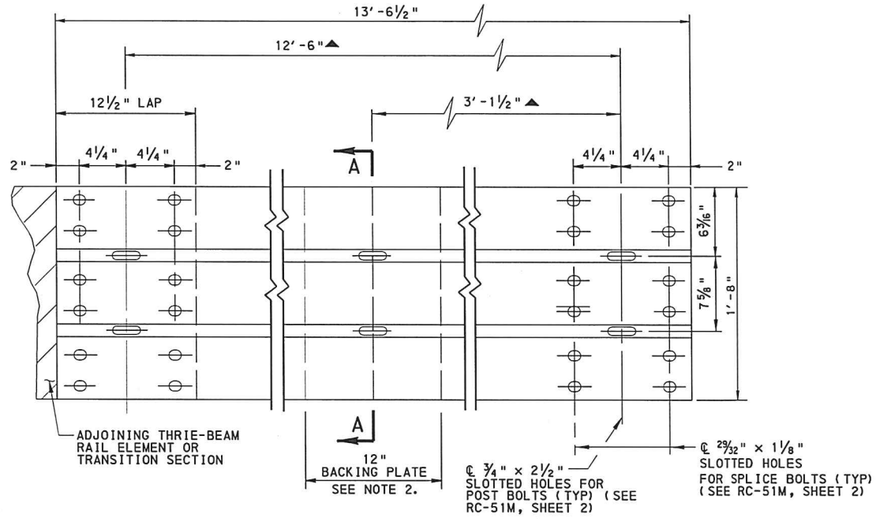
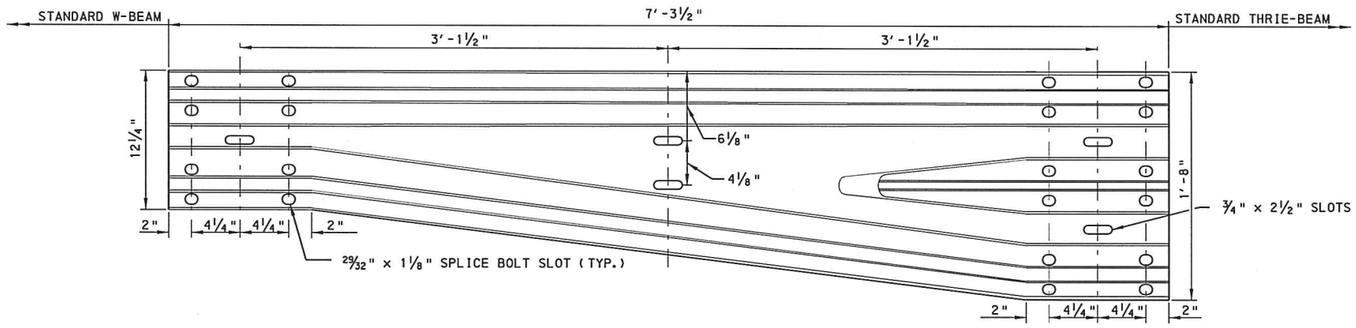


TRANSITION SECTION

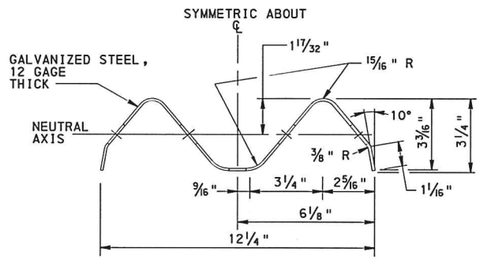


THRIE-BEAM RAIL ELEMENT

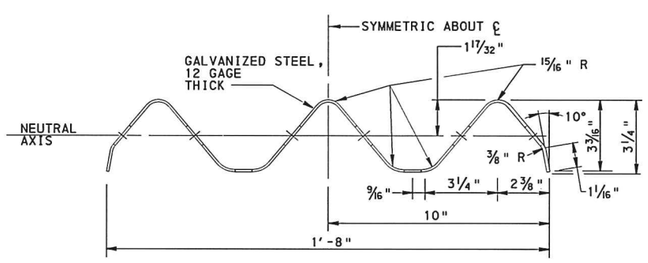
▲ AT TYPICAL THRIE-BEAM RAIL ELEMENT SHOWN; AT THRIE-BEAM TO VERTICAL WALL TRANSITION, SEE BC-703M, AT THRIE-BEAM TO PA TYPE 10M BRIDGE BARRIER TRANSITION, SEE BC-708M, AT THRIE-BEAM TO PA BRIDGE BARRIER TRANSITION, SEE BC-712M.



ASYMMETRIC W-BEAM TO THRIE BEAM TRANSITION SECTION



RAIL ELEMENT SECTION B-B



THRIE-BEAM RAIL ELEMENT SECTION A-A

(BACKING PLATE NOT SHOWN FOR CLARITY)

NOTES

1. THE THRIE-BEAM RAIL ELEMENTS AND TRANSITION SECTIONS ARE ONLY USED IN THRIE-BEAM TO PA TYPE 10M BRIDGE BARRIER, THRIE-BEAM TO PA BRIDGE BARRIER, AND THRIE-BEAM TO VERTICAL WALL TRANSITION CONNECTIONS.
2. USE 12" BACKING PLATE FOR THE THRIE-BEAM RAIL ELEMENTS AT ALL INTERMEDIATE POSTS WITH THE SAME SECTION AS ON THE THRIE-BEAM RAIL ELEMENT.
3. FOR ADDITIONAL NOTES, SEE SHEET 1.

COMMONWEALTH OF PENNSYLVANIA
DEPARTMENT OF TRANSPORTATION
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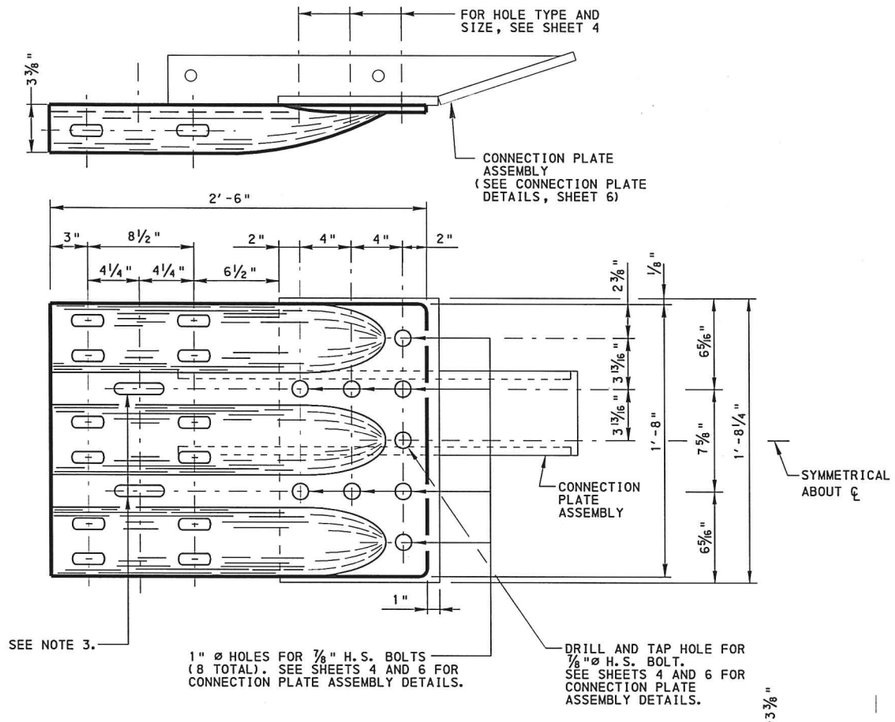
GUIDE RAIL TO BRIDGE BARRIER TRANSITIONS

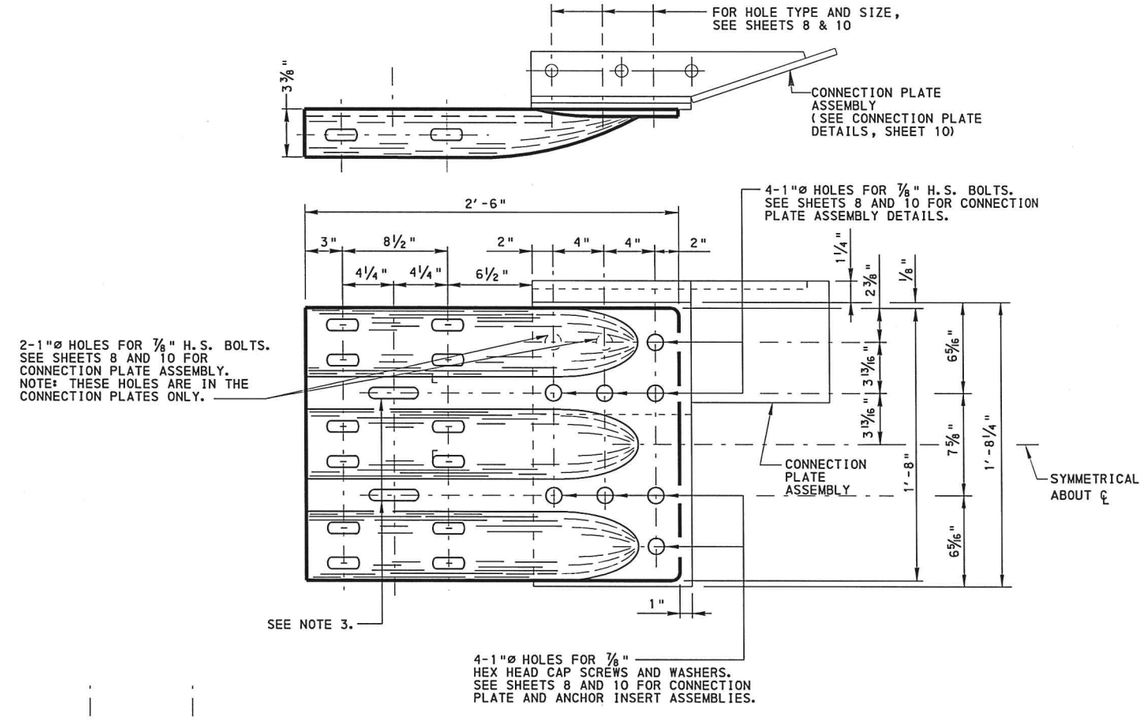
THRIE-BEAM TRANSITION SECTION AND RAIL ELEMENT DETAILS

RECOMMENDED FEB. 8, 2019	RECOMMENDED FEB. 8, 2019	SHT 15 OF 18
CHIEF, ENV. DELIVERY DIVISION	DIRECTOR, BUREAU OF PROJECT DELIVERY	RC-50M



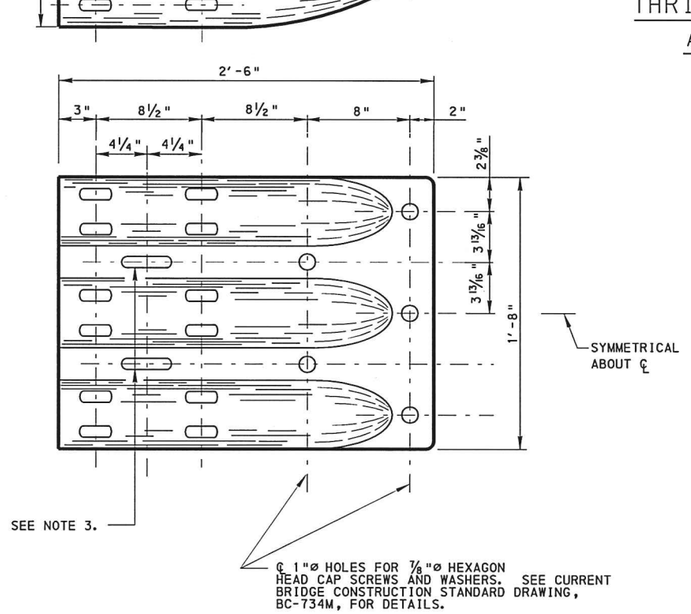
THRIE-BEAM TERMINAL SECTION AT PA TYPE 10M BRIDGE BARRIER

SHOWN WITH CONNECTION PLATE ASSEMBLY



THRIE-BEAM TERMINAL SECTION AT PA BRIDGE BARRIER

SHOWN WITH CONNECTION PLATE ASSEMBLY



NOTES

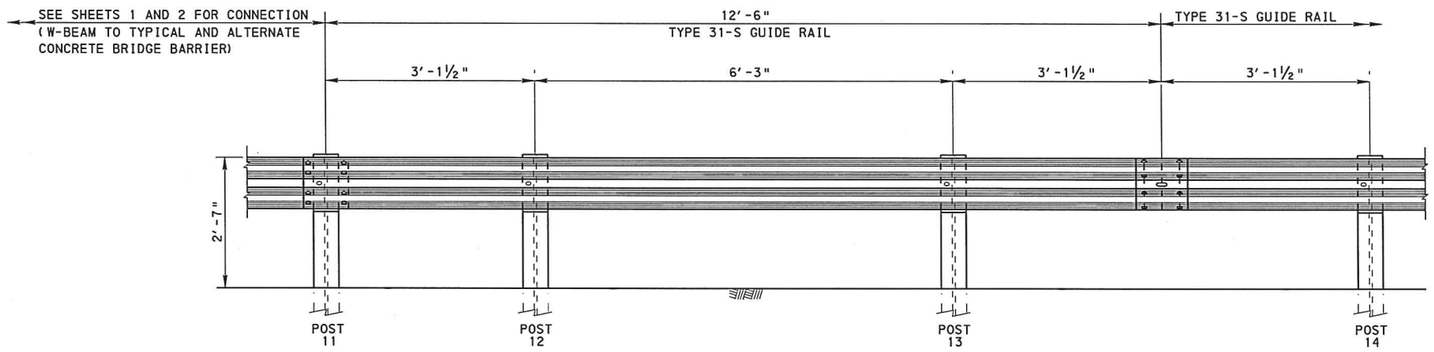
1. USE THIS SHEET WITH SHEETS 4-15.
2. FOR ADDITIONAL NOTES, SEE SHEET 1.
3. PROVIDE ⅝"ø SPLICE BOLTS WITH A LOCK NUT OR DOUBLE NUT AND TIGHTEN ONLY TO A POINT THAT ALLOWS GUIDE RAIL TO BE FREE TO MOVE. CENTER SPLICE BOLTS IN THE SLOTTED HOLES.

COMMONWEALTH OF PENNSYLVANIA
DEPARTMENT OF TRANSPORTATION
BUREAU OF PROJECT DELIVERY

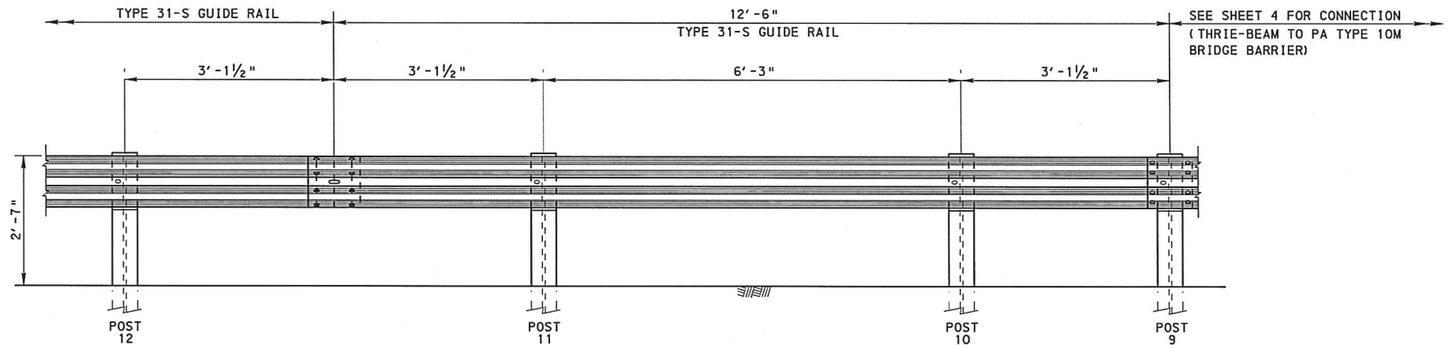
GUIDE RAIL TO BRIDGE BARRIER TRANSITIONS

THRIE-BEAM TERMINAL SECTION BRIDGE CONNECTION DETAILS

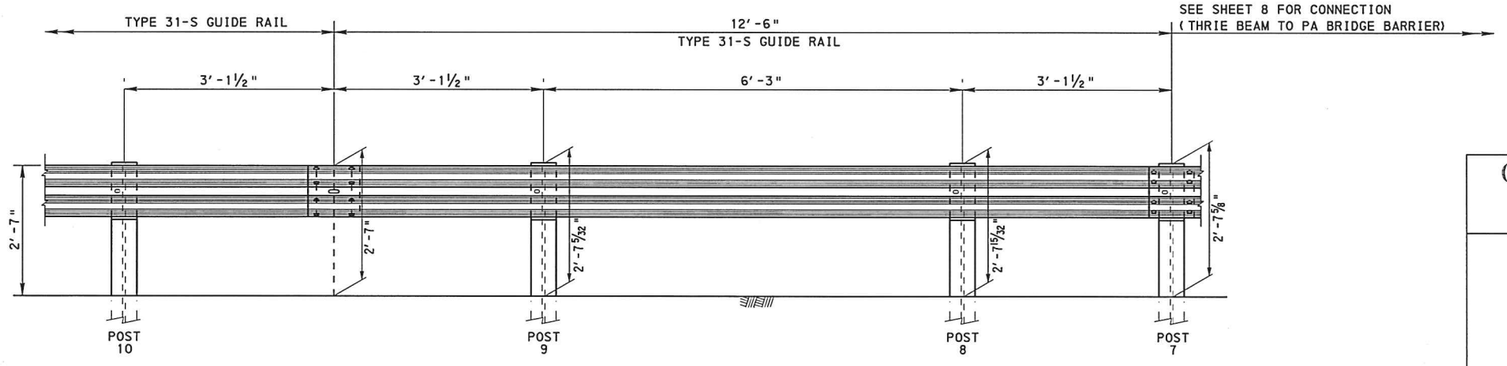
RECOMMENDED FEB. 8, 2019	RECOMMENDED FEB. 8, 2019	SHT 16 OF 18
CHIEF, HWY. DELIVERY DIVISION	DIRECTOR, BUREAU OF PROJECT DELIVERY	RC-50M



TYPE 31-S GUIDE RAIL CONNECTION WITH TYPICAL AND ALTERNATE CONCRETE BRIDGE BARRIER TRANSITIONS



TYPE 31-S GUIDE RAIL CONNECTION WITH THRIE-BEAM TO PA TYPE 10M BRIDGE BARRIER



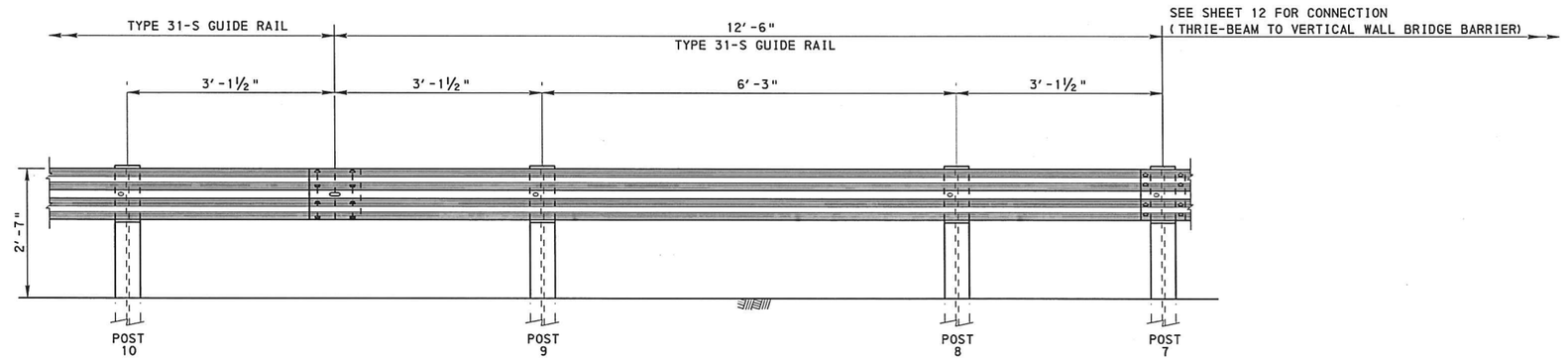
TYPE 31-S GUIDE RAIL CONNECTION WITH THRIE-BEAM TO PA BRIDGE BARRIER

COMMONWEALTH OF PENNSYLVANIA
DEPARTMENT OF TRANSPORTATION
BUREAU OF PROJECT DELIVERY

GUIDE RAIL TO BRIDGE BARRIER TRANSITIONS

CONNECTIONS TO TYPE 31-S GUIDE RAIL

RECOMMENDED FEB. 8, 2019 CHIEF, ENGR. DELIVERY DIVISION	RECOMMENDED FEB. 8, 2019 DIRECTOR, BUREAU OF PROJECT DELIVERY	SHT 17 OF 18 RC-50M



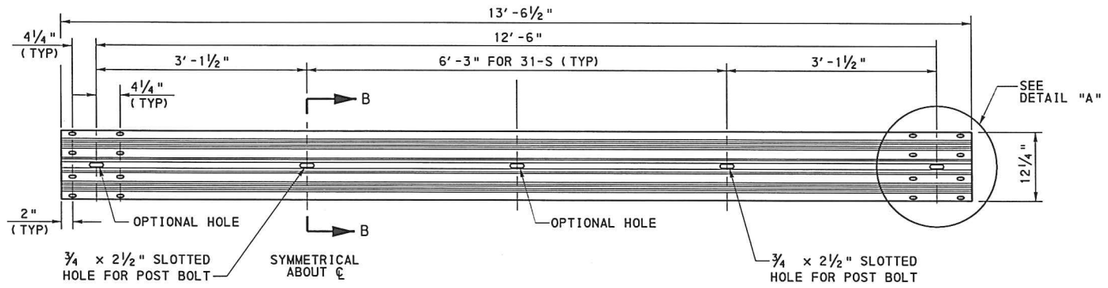
TYPE 31-S GUIDE RAIL CONNECTION WITH THRIE-BEAM TO VERTICAL WALL BRIDGE BARRIER

COMMONWEALTH OF PENNSYLVANIA
DEPARTMENT OF TRANSPORTATION
BUREAU OF PROJECT DELIVERY

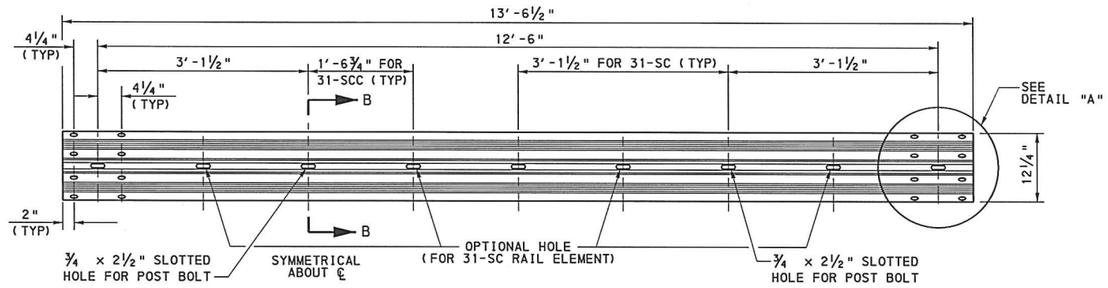
GUIDE RAIL TO BRIDGE BARRIER TRANSITIONS

CONNECTIONS TO TYPE 31-S GUIDE RAIL

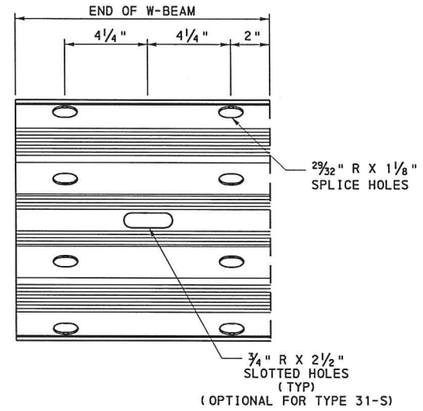
RECOMMENDED FEB. 8, 2019 CHIEF, HWY. DELIVERY DIVISION	RECOMMENDED FEB. 8, 2019 DIRECTOR, BUREAU OF PROJECT DELIVERY	SHT 18 OF 18 RC-50M



12′-6" W-BEAM RAIL ELEMENT (TYPE 31-S)



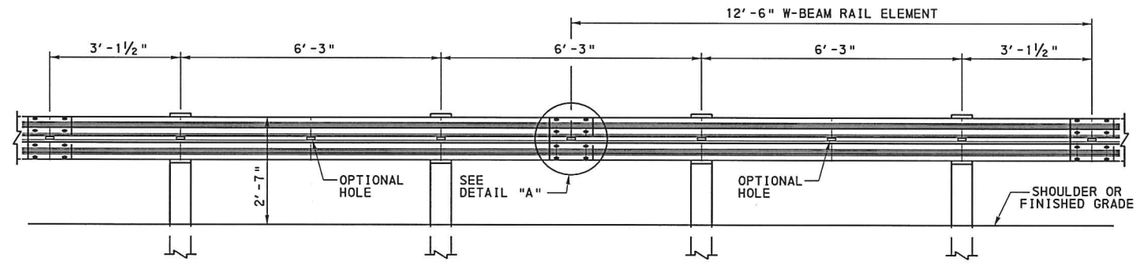
12′-6" W-BEAM RAIL ELEMENT (TYPE 31-SC AND TYPE 31-SCC)



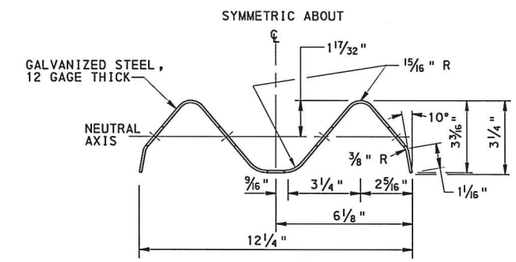
DETAIL "A"

NOTES

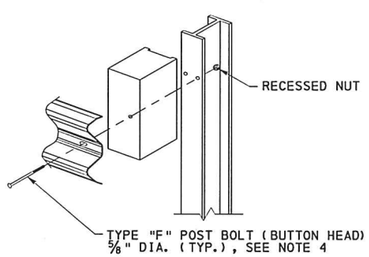
1. PROVIDE MATERIALS AND CONSTRUCTION MEETING THE REQUIREMENTS OF PUBLICATION 408, SECTION 620.
2. PROVIDE STEEL I-BEAM POSTS (W6x9 OR W6x8.5) WITH ROUTED WOOD, PLASTIC, OR COMPOSITE OFFSET BRACKETS LISTED IN BULLETIN 15.
3. ATTACH W-BEAM RAIL ELEMENTS TO EACH POST. SPLICE RAIL ELEMENTS MID-SPAN ONLY AND LAP IN THE DIRECTION OF TRAFFIC.
4. PROVIDE TYPE "F" POST BOLTS (BUTTON HEAD) (ASTM A307) OF SUFFICIENT LENGTH TO EXTEND THROUGH THE FULL THICKNESS OF THE NUT (ASTM A563) AND NOT MORE THAN 1" BEYOND. TYPE "G" SPLICE BOLTS (BUTTON HEAD) (ASTM A307) ARE ⅝" X 1¼" (OR TYPE "H" SPLICE BOLTS (BUTTON HEAD) 2" LONG AT TRIPLE RAIL SPLICES)) WITH A ⅝" DOUBLE RECESSED NUT (ASTM A563). PROVIDE THRIE BEAM "CONNECTION" ⅞" DIA. (ASTM A325) HEX BOLTS OF SUFFICIENT LENGTH TO EXTEND THROUGH THE FULL THICKNESS OF THE RAIL AND NUTS.
5. INSTALL GUIDE RAIL DELINEATORS IN ACCORDANCE WITH TC-8604.
6. A SPECIAL LENGTH OF RAIL MAY BE MANUFACTURED TO ACCOMMODATE TERMINAL AND TRANSITION SECTIONS.
7. BURNING THROUGH POSTS OR RAIL ELEMENTS FOR HOLES IS NOT PERMITTED. USE A MECHANICAL PUNCH TO PRODUCE SPLICE HOLES IN RAIL ELEMENTS IF NEEDED. COAT ALL EXPOSED/CUT EDGES WITH 2 COATS OF APPROVED GALVANIZING PAINT.
8. WHEN CONNECTING TO TYPE 2-S OR TYPE 2-W GUIDE RAIL, PROVIDE HEIGHT TRANSITION OVER A LENGTH OF 25′-0". REFER TO RC-53M FOR HEIGHT TRANSITION FROM TYPE 31-S GUIDE RAIL TO TYPE 2 WEAK POST GUIDE RAIL.
9. THE INSTALLATION TOLERANCE IN THE 31" HEIGHT FOR TYPE 31 STRONG POST GUIDE RAIL RANGES FROM 0" TO +1".
10. WHEN THE 2′-0" MINIMUM CLEARANCE FROM THE REAR FACE OF THE GUIDE RAIL POST TO THE FILL SLOPE BREAK CANNOT BE MAINTAINED, PROVIDE STRONG POSTS THAT ARE A MINIMUM OF 1′-0" LONGER.



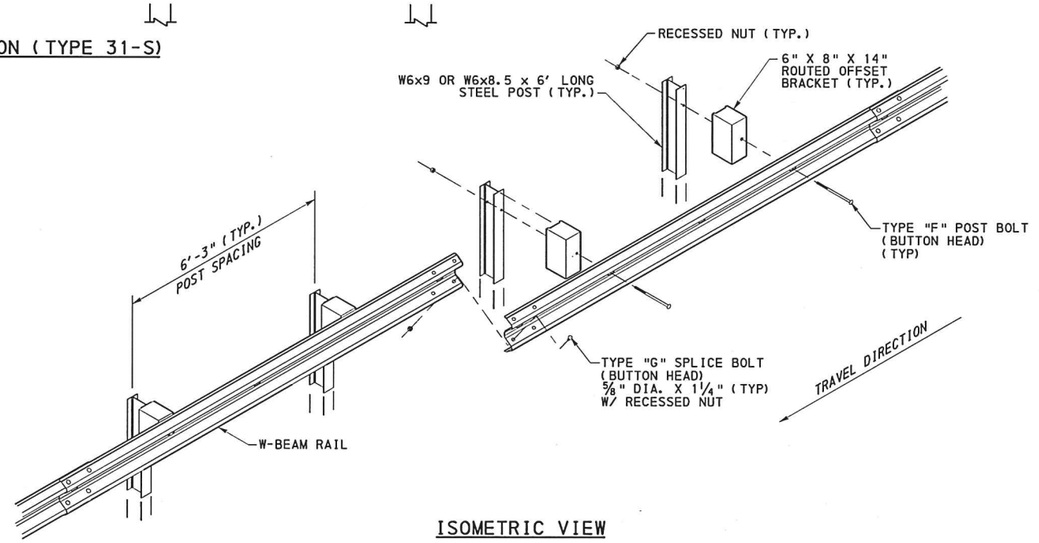
ELEVATION (TYPE 31-S)



RAIL ELEMENT SECTION B-B



TYPICAL HARDWARE ARRANGEMENT WITH POST/ROUTED OFFSET BRACKET/RAIL



ISOMETRIC VIEW

COMMONWEALTH OF PENNSYLVANIA
DEPARTMENT OF TRANSPORTATION
BUREAU OF PROJECT DELIVERY

TYPE 31 STRONG POST GUIDE RAIL

W-BEAM RAIL ELEMENT

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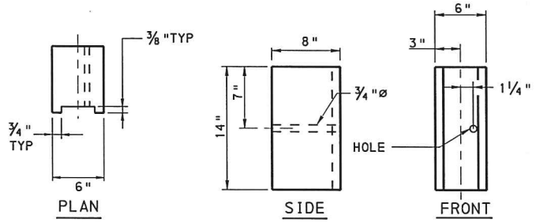
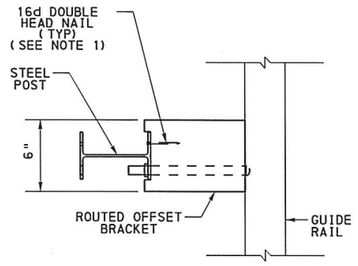
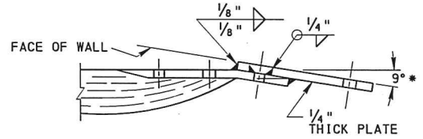


ROUTED OFFSET BRACKET

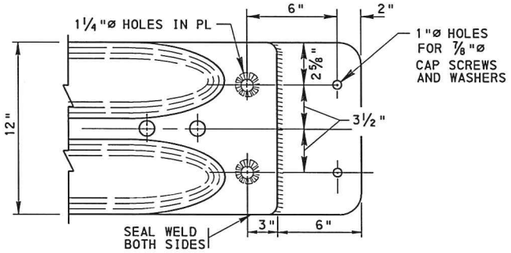
(WOOD, PLASTIC OR COMPOSITE) TO BE USED WITH STEEL POSTS



PLAN

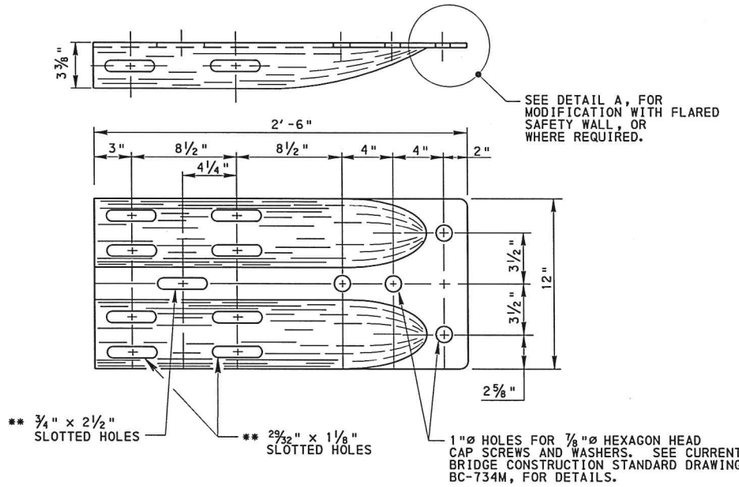


* OR TO BE DETERMINED BY ENGINEER.



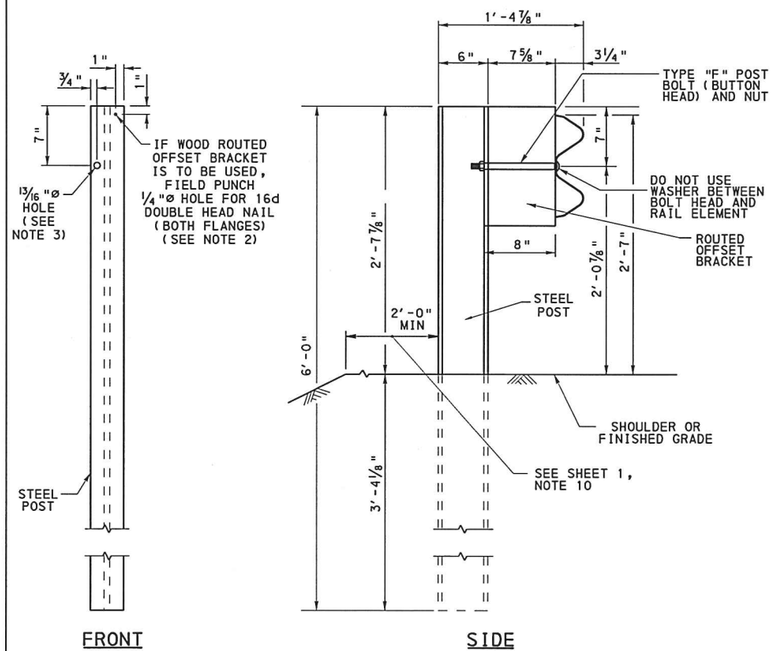
(THE BRIDGE CONNECTION TERMINAL MODIFICATION MAY BE FABRICATED AS ONE PIECE TO ELIMINATE WELDING.)

DETAIL A



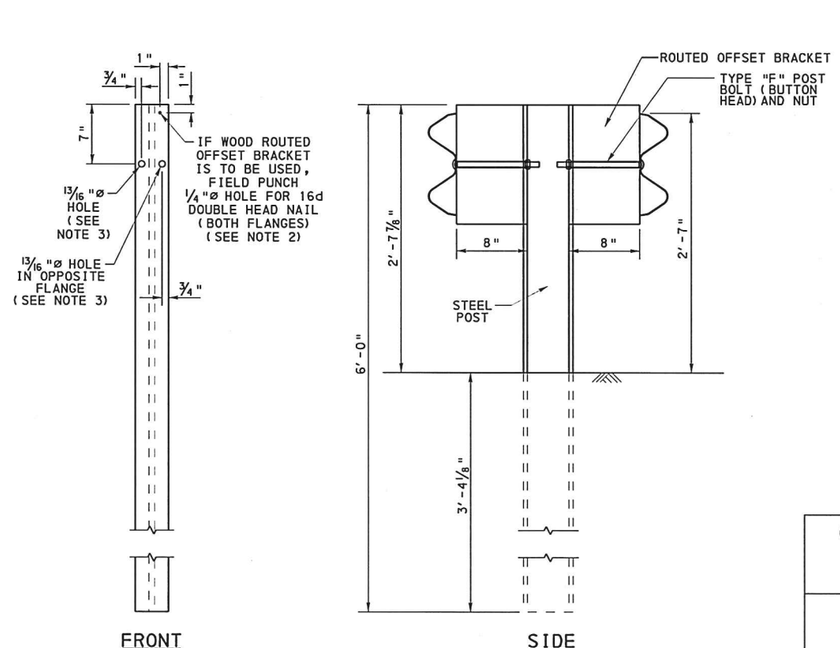
** PROVIDE SPLICE BOLTS WITH A LOCK NUT OR DOUBLE NUT AND TIGHTEN ONLY TO A POINT THAT ALLOWS GUIDE RAIL TO BE FREE TO MOVE. CENTER SPLICE BOLTS IN THE SLOTTED HOLES.

TERMINAL SECTION BRIDGE CONNECTION



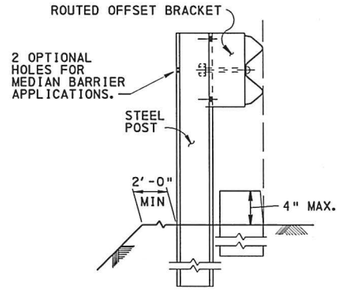
FRONT SIDE

W6X9 OR W6X8.5 POST DETAILS



FRONT SIDE

TYPE 31-SM MEDIAN BARRIER
W6X9 OR W6X8.5 POST DETAILS



GUIDE RAIL
WITH CURB

NOTES

1. THE 16d DOUBLE HEAD NAIL IS FOR WOOD ROUTED OFFSET BRACKETS ONLY.
2. THE 1/4" DIAMETER HOLE IS NOT REQUIRED IF PLASTIC OR COMPOSITE ROUTED OFFSET BRACKETS ARE TO BE INSTALLED.
3. A 3/4" DIAMETER HOLE IS PERMISSIBLE THROUGH THE POSTS.

COMMONWEALTH OF PENNSYLVANIA
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TYPE 31 STRONG POST GUIDE RAIL

POSTS ROUTED OFFSET BRACKETS BRIDGE CONNECTIONS

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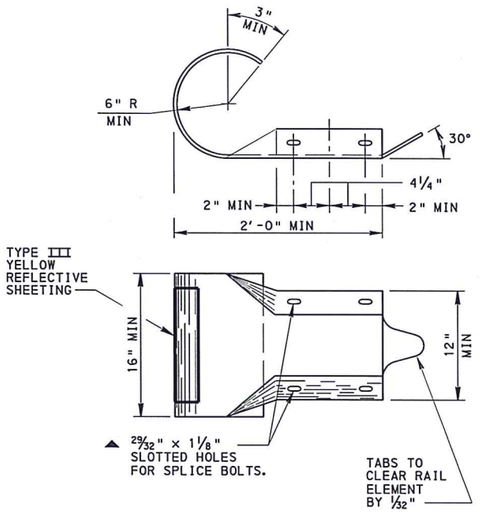
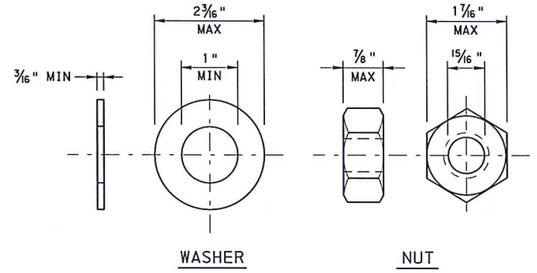
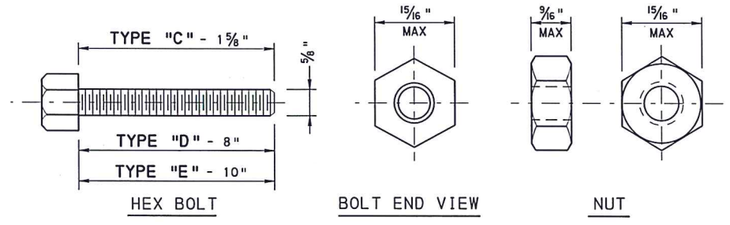


TERMINAL SECTION TO BE PLACED ON FACE OF RAIL ELEMENT

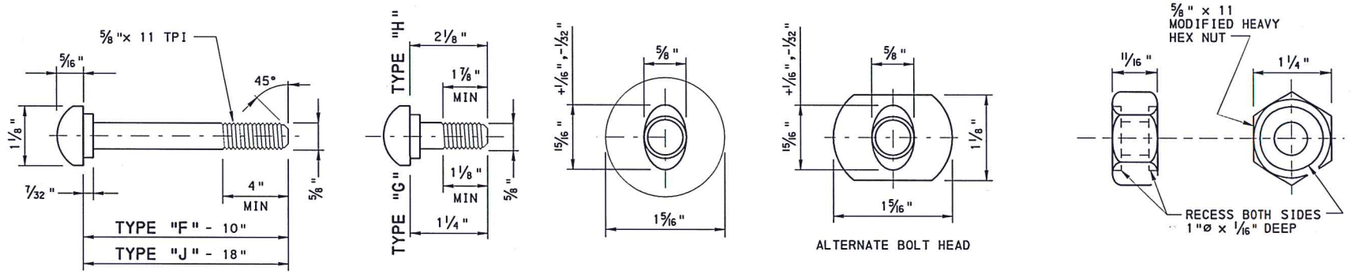
REFER TO RC-54M, SHEET 10 FOR APPLICATIONS



TYPE "B" HEX NUT AND WASHER



TYPE "C", TYPE "D" AND TYPE "E" HEX BOLT DETAILS



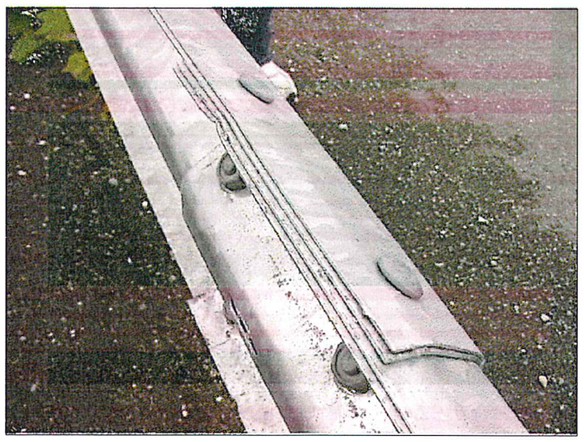
POST BOLT

SPLICE BOLT
FOR DIMENSIONS NOT SHOWN, SEE POST BOLT

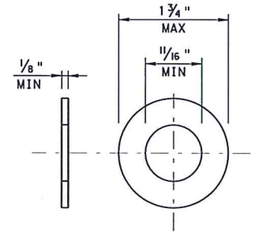
TYPICAL END VIEW
POST AND SPLICE BOLTS

RECESSED NUT

TYPE "F" AND TYPE "J" POST BOLT AND TYPE "G" AND TYPE "H" SPLICE BOLT AND NUT



TYPICAL NESTED PANEL
MID-SPAN SPLICE
(SEE NOTES 2, 3, AND 4)



TYPE "I"
PLAIN ROUND WASHER
(WOOD POSTS ONLY)

NOTES

1. USE SPLICE BOLTS TO DEVELOP THE DESIGN STRENGTH OF THE RAIL ELEMENT.
2. CUTTING OF W-BEAM RAIL ELEMENT IS NOT PERMITTED.
3. NESTED SECTIONS, INCLUDING ALL RAIL ELEMENT AND ANCILLARY HARDWARE, ARE PAID FOR AT THE CONTRACT UNIT PRICE PER LINEAR FOOT OF TYPE 31-S GUIDE RAIL.
4. PROVIDE A MINIMUM OF 200' OF STRONG POST GUIDE RAIL BETWEEN NESTED RUNS.

COMMONWEALTH OF PENNSYLVANIA
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TYPE 31 STRONG POST GUIDE RAIL

TERMINAL SECTIONS BOLTS, NUTS AND WASHERS

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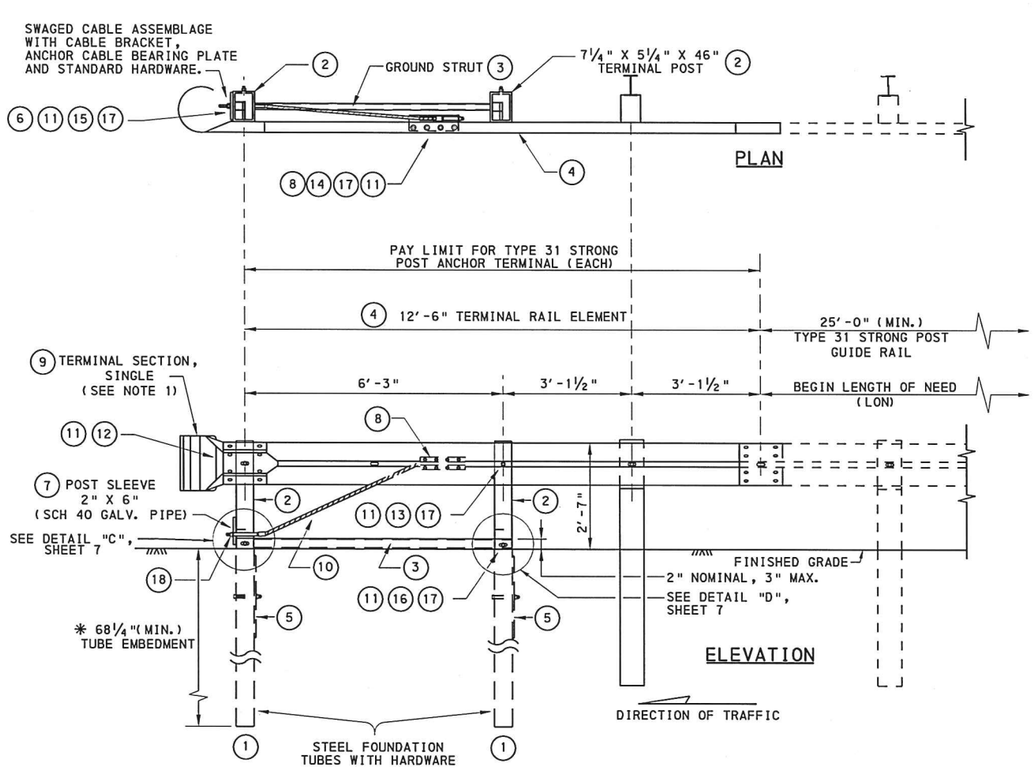
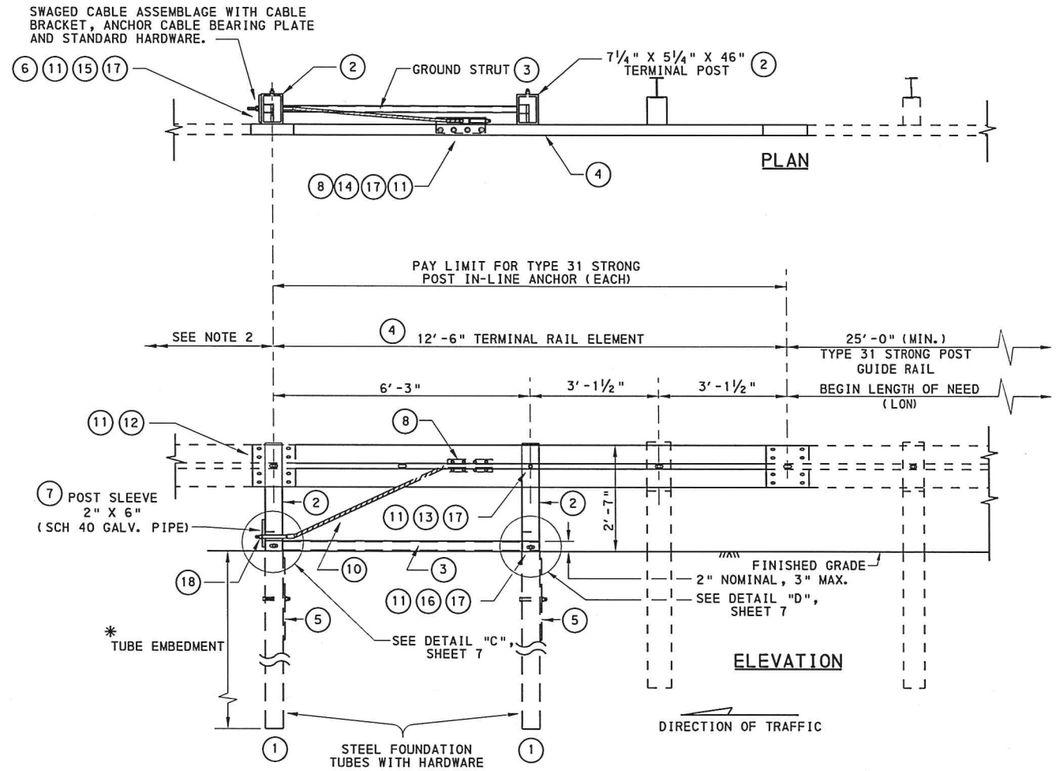


TYPE 31 STRONG POST ANCHOR TERMINAL

(AT TRAILING END)



TYPE 31 STRONG POST IN-LINE ANCHOR

(SEE NOTE 2)

#	PARTS LIST	SHEET #	QTY
1	STEEL FOUNDATION TUBE	4, 6	2
2	SHORT BREAKAWAY TIMBER POST	4, 6	2
3	GROUND STRUT	4, 7	1
4	TERMINAL RAIL ELEMENT	4, 6	1
5	SOIL PLATE	4, 6	2
6	ANCHOR CABLE BEARING PLATE	4, 5	1
7	POST SLEEVE	4, 5	1
8	ANCHOR PLATE	4, 5	1
9	TERMINAL SECTION, SINGLE	3, 4	1
10	SWAGED CABLE ASSEMBLAGE	4, 5	1
11	RECESSED NUT	3, 4	20
12	TYPE "G" POST BOLT	3, 4	4
13	TYPE "F" POST BOLT	3, 4	2
14	TYPE "C" HEX HEAD BOLT & NUT	3, 4	8
15	TYPE "D" HEX HEAD BOLT & NUT	3, 4	4
16	TYPE "E" HEX HEAD BOLT & NUT	3, 4	2
17	TYPE "I" PLAIN ROUND WASHER	3, 4	18
18	TYPE "B" HEX NUT AND WASHER	3, 4	1

NOTES

1. TERMINAL SECTION, SINGLE IS PAID FOR SEPARATELY FROM THE TYPE 31 STRONG POST ANCHOR TERMINAL.
2. REFER TO RC-54M, GUIDE RAIL WITH SHORT RADIUS, FOR EXAMPLES OF THE INSTALLATION OF THE TYPE 31 STRONG POST IN-LINE ANCHOR AT INTERSECTIONS WITH SIDE ROADS AND DRIVEWAYS.

COMMONWEALTH OF PENNSYLVANIA
DEPARTMENT OF TRANSPORTATION
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TYPE 31 STRONG POST GUIDE RAIL

TYPE 31 STRONG POST ANCHOR TERMINAL & IN-LINE ANCHOR

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CHIEF, HWY. DELIVERY DIVISION

RECOMMENDED FEB. 8, 2019
DIRECTOR, BUREAU OF PROJECT DELIVERY

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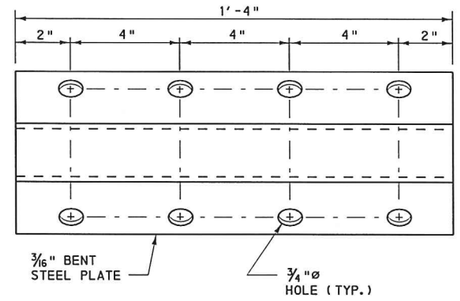
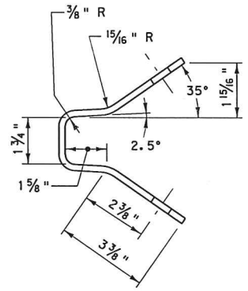
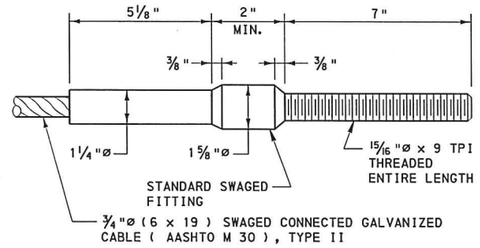


ELEVATION

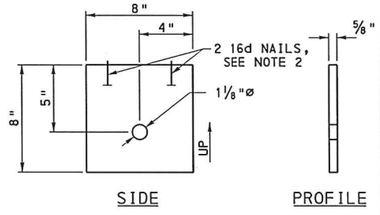


SECTION A-A

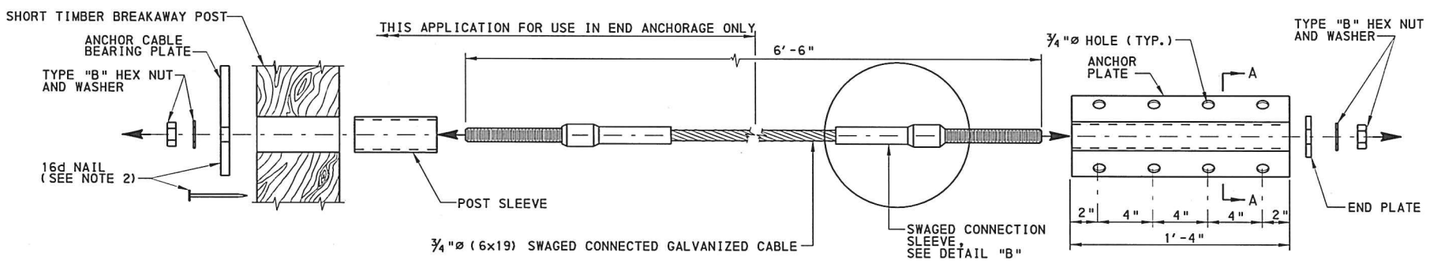
ANCHOR PLATE



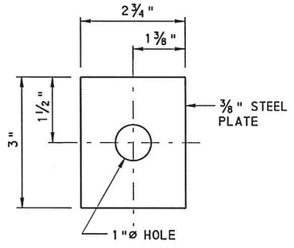
DETAIL "B"
STANDARD SWAGED FITTING AND STUD CABLE ASSEMBLY



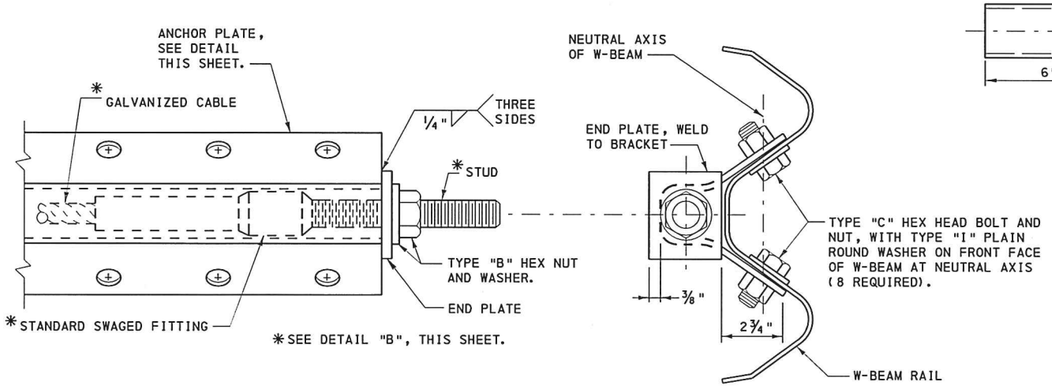
ANCHOR CABLE BEARING PLATE



SWAGED CABLE ASSEMBLAGE AND RELATED HARDWARE ASSEMBLY



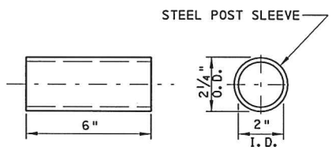
END PLATE



ELEVATION

BOLTS AND W-BEAM NOT SHOWN FOR CLARITY.

END VIEW



POST SLEEVE

ANCHOR PLATE ASSEMBLY DETAIL

NOTES

1. USE SPLICE BOLTS TO DEVELOP THE DESIGN STRENGTH OF THE RAIL ELEMENT.
2. DRIVE TWO 16d NAILS AND BEND OVER TO PREVENT PLATE ROTATION.

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TYPE 31 STRONG POST GUIDE RAIL

TYPE 31 STRONG POST ANCHOR TERMINAL SWAGED CABLE ASSEMBLAGE

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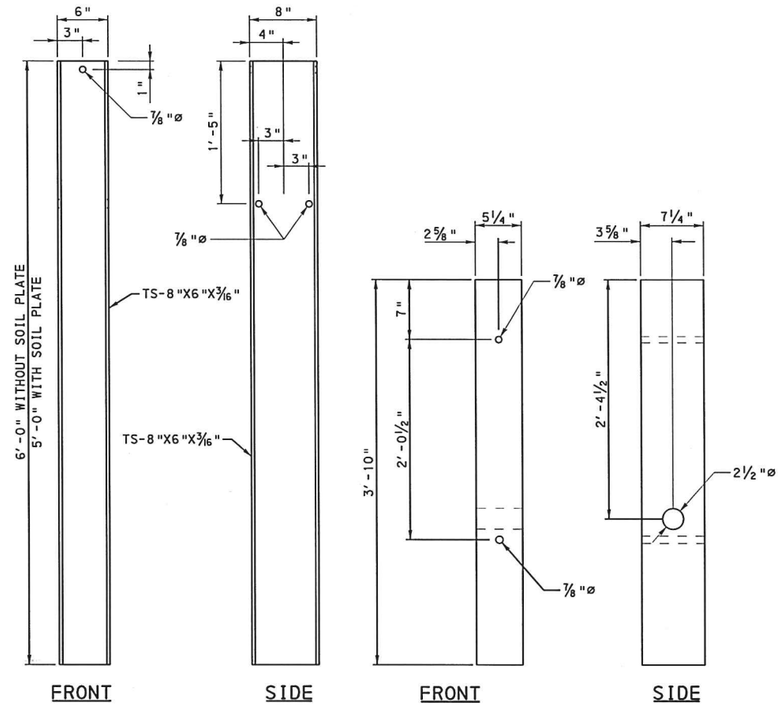
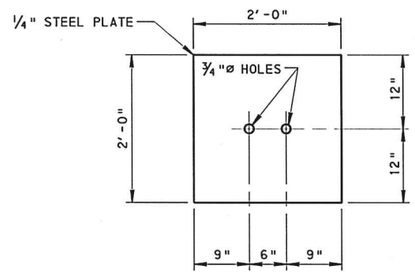
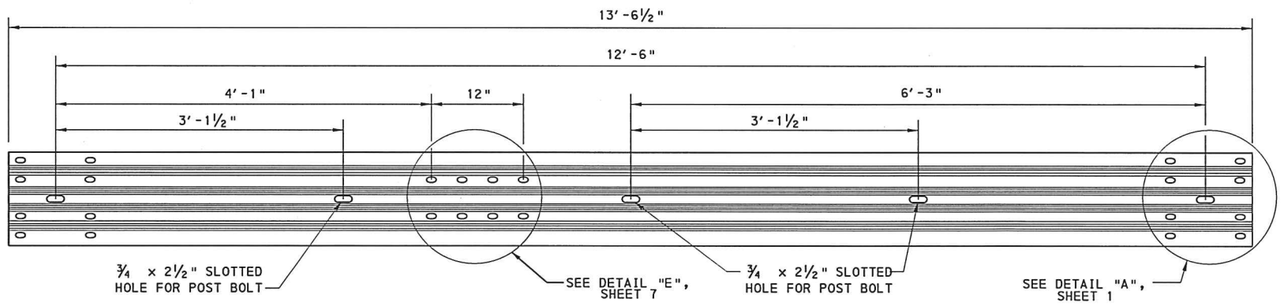


① STEEL FOUNDATION TUBE

SHORT BREAKAWAY ② TIMBER POST



⑤ SOIL PLATE



④ TERMINAL RAIL ELEMENT

COMMONWEALTH OF PENNSYLVANIA
DEPARTMENT OF TRANSPORTATION
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TYPE 31 STRONG POST GUIDE RAIL

TYPE 31 STRONG POST ANCHOR TERMINAL COMPONENT PARTS

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CHIEF, HWY. DELIVERY DIVISION

RECOMMENDED FEB. 8, 2019
DIRECTOR, BUREAU OF PROJECT DELIVERY

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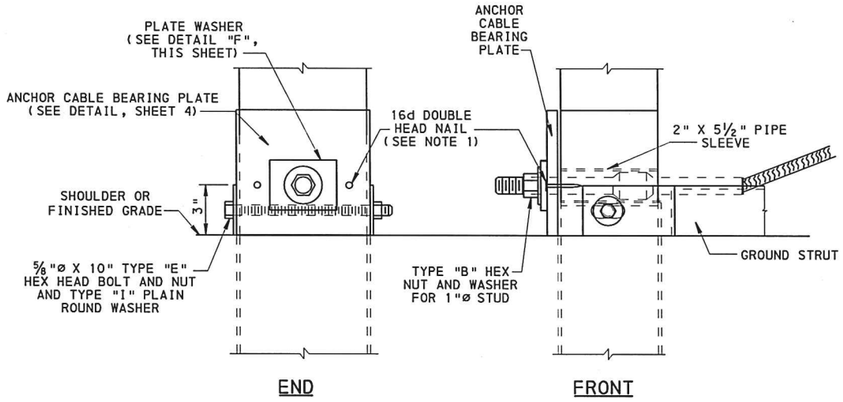
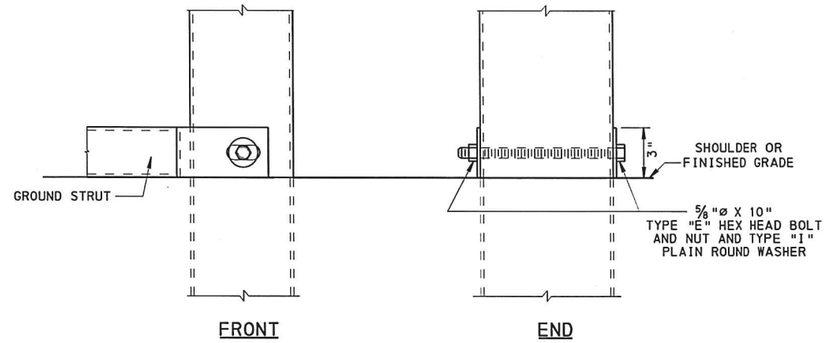
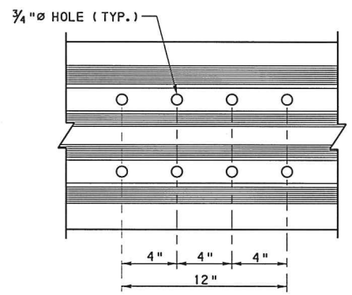


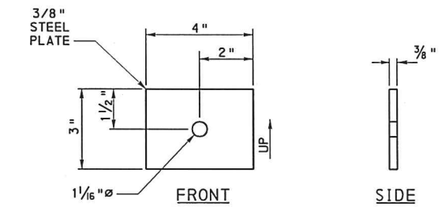
DETAIL "C"
BEARING PLATE ASSEMBLY



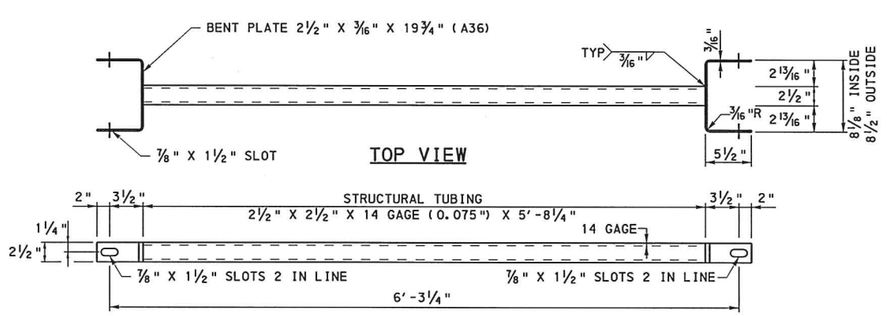
DETAIL "D"



DETAIL "E"



DETAIL "F"
PLATE WASHER

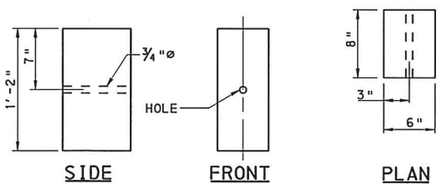


FRONT VIEW

GROUND STRUT

NOTE

1. TOENAIL TO WOOD POST TO PREVENT PLATE ROTATION.



NON-ROUTED OFFSET BRACKET

WOOD, PLASTIC, OR COMPOSITE
TO BE USED WITH WOOD POSTS

COMMONWEALTH OF PENNSYLVANIA
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TYPE 31 STRONG POST GUIDE RAIL

TYPE 31 STRONG POST ANCHOR TERMINAL COMPONENT PARTS

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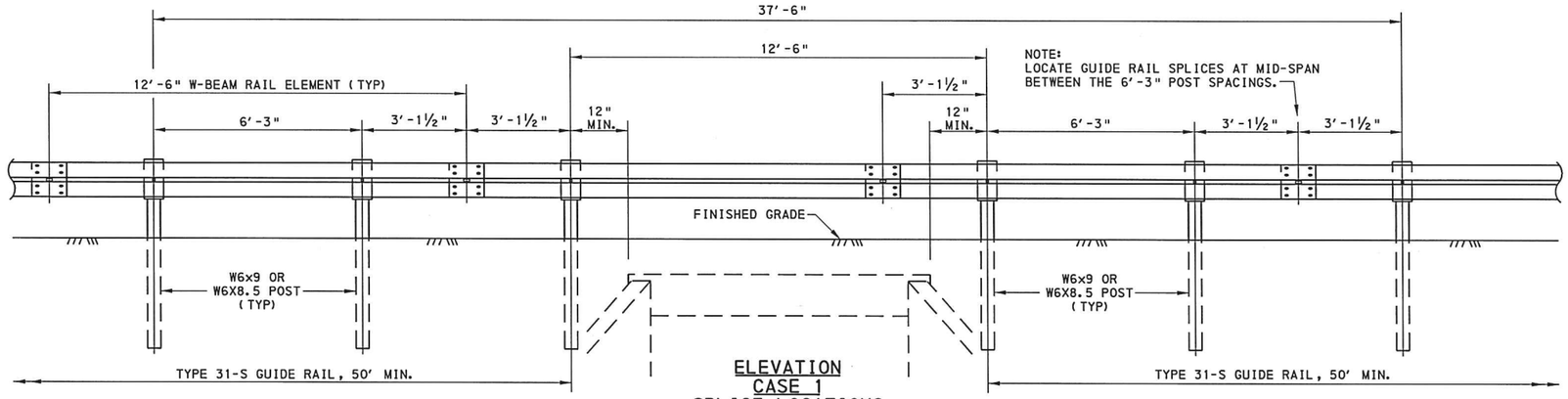
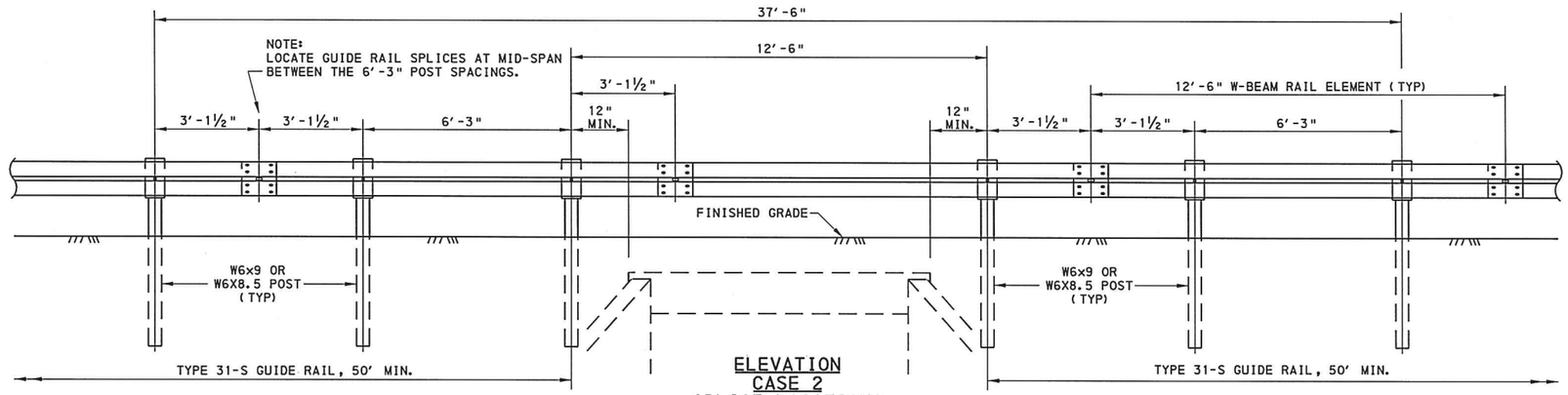
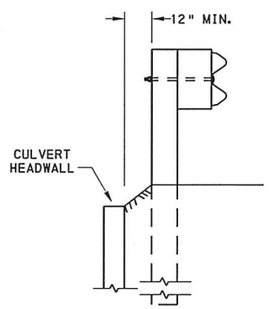


ELEVATION
CASE 1
SPLICE LOCATIONS



ELEVATION
CASE 2
SPLICE LOCATIONS



LATERAL OFFSET BETWEEN THE
BACK OF POST AND A CULVERT HEADWALL

NOTES

1. DO NOT SET POSTS IN CONCRETE, OF ANY DEPTH.
2. BURNING THROUGH POSTS OR RAIL ELEMENTS FOR HOLES IS NOT PERMITTED. USE A MECHANICAL PUNCH TO PRODUCE SPLICE HOLES IN RAIL ELEMENTS IF NEEDED FOR A TRANSITION SECTION. COAT ALL EXPOSED/CUT EDGES WITH 2 COATS OF APPROVED GALVANIZING PAINT.
3. FOR A 12′-6" LONG SPAN, WHEN ONLY ONE STEEL STRONG POST IS OMITTED, PROVIDE A MINIMUM UNOBSTRUCTED DISTANCE OF 5′-6" BEHIND THE REAR FACE OF THE GUIDE RAIL POST TO THE FRONT FACE OF THE OBSTRUCTION.

COMMONWEALTH OF PENNSYLVANIA
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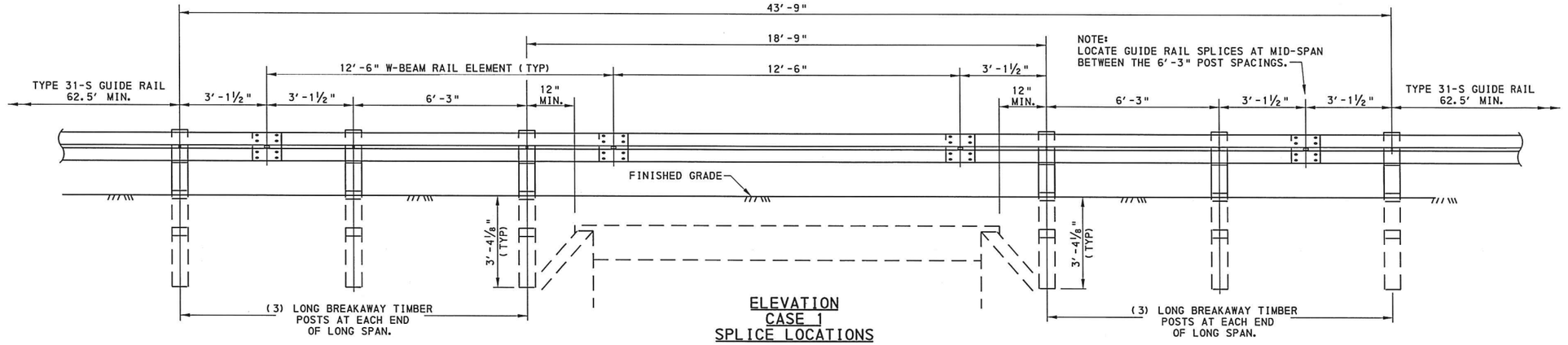
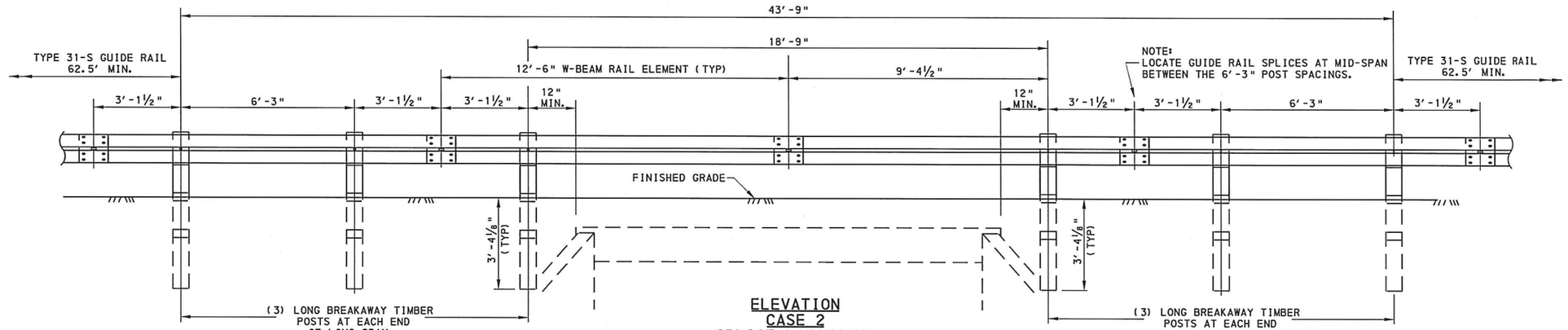
TYPE 31 STRONG POST GUIDE RAIL

LONG SPAN SYSTEMS ACROSS CULVERTS AND SMALL STRUCTURES 12′-6" SPAN

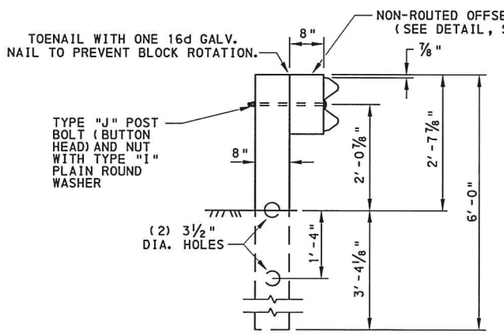
RECOMMENDED FEB. 8, 2019	RECOMMENDED FEB. 8, 2019	SHT 8 OF 14
CHIEF, HWY. DELIVERY DIVISION	DIRECTOR, BUREAU OF PROJECT DELIVERY	RC-51M



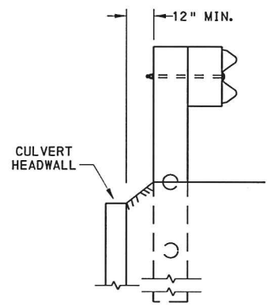
ELEVATION
CASE 1
SPLICE LOCATIONS



ELEVATION
CASE 2
SPLICE LOCATIONS



LONG BREAKAWAY TIMBER POST
(6"x 8"x 6′ LONG)
(6) REQUIRED.
SEE ELEVATION DETAIL FOR LOCATIONS



LATERAL OFFSET BETWEEN THE
BACK OF POST AND A CULVERT HEADWALL

NOTES

1. DO NOT SET POSTS IN CONCRETE, OF ANY DEPTH.
2. BURNING THROUGH POSTS OR RAIL ELEMENTS FOR HOLES IS NOT PERMITTED. USE A MECHANICAL PUNCH TO PRODUCE SPLICE HOLES IN RAIL ELEMENTS IF NEEDED FOR A TRANSITION SECTION. COAT ALL EXPOSED/CUT EDGES WITH 2 COATS OF APPROVED GALVANIZING PAINT.

COMMONWEALTH OF PENNSYLVANIA
DEPARTMENT OF TRANSPORTATION
BUREAU OF PROJECT DELIVERY

TYPE 31 STRONG POST GUIDE RAIL

LONG SPAN SYSTEMS ACROSS CULVERTS AND SMALL STRUCTURES 18′-9" SPAN

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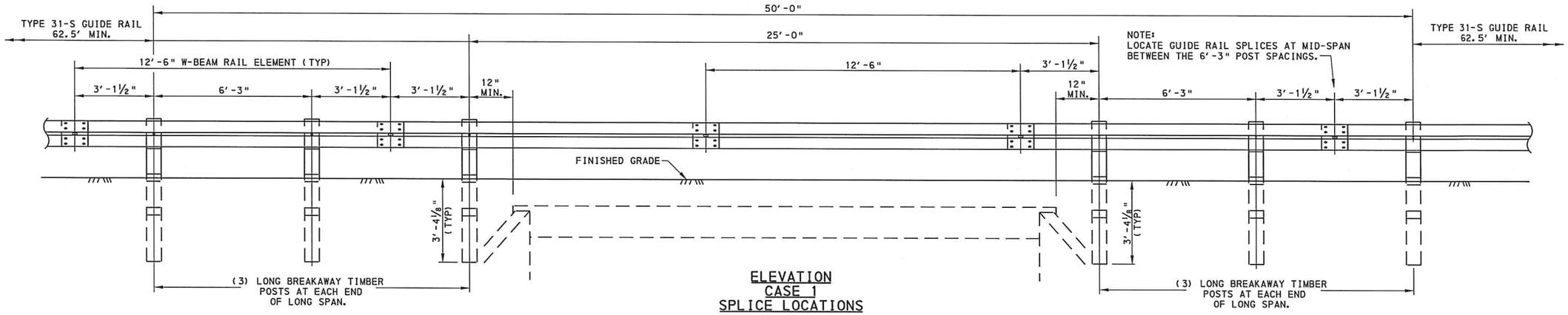
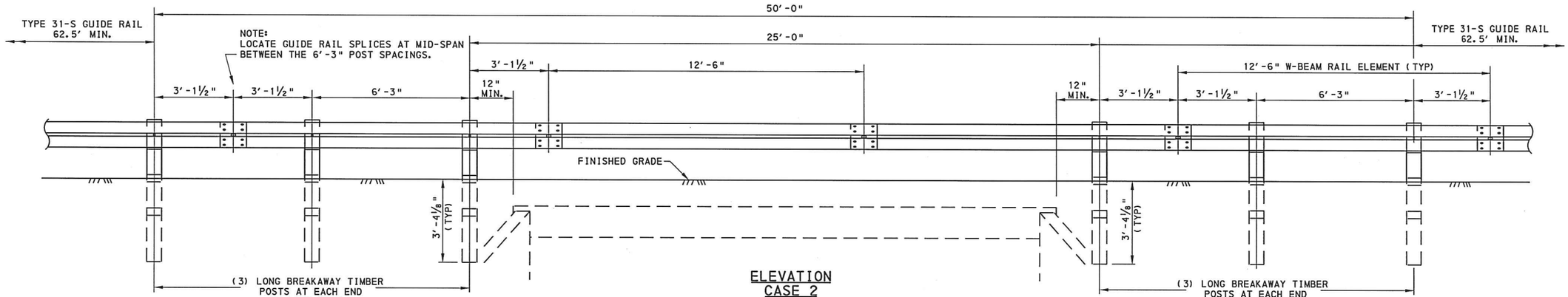
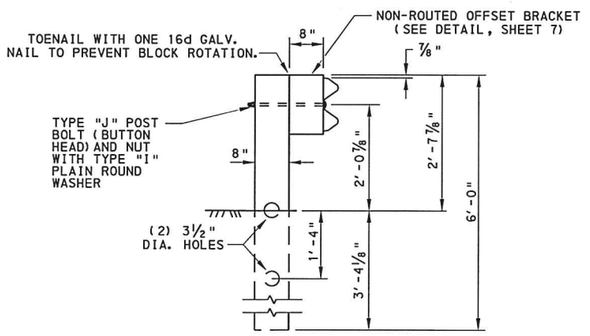
CHIEF, HWY. DELIVERY DIVISION	DIRECTOR, BUREAU OF PROJECT DELIVERY	RC-51M



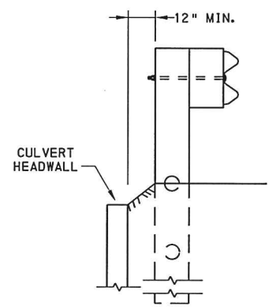
ELEVATION
CASE 1
SPLICE LOCATIONS



ELEVATION
CASE 2
SPLICE LOCATIONS



LONG BREAKAWAY TIMBER POST
(6" X 8" X 6' LONG)
(6) LONG BREAKAWAY POSTS REQUIRED.
SEE ELEVATION DETAIL FOR LOCATIONS



LATERAL OFFSET BETWEEN THE
BACK OF POST AND A CULVERT HEADWALL

NOTES

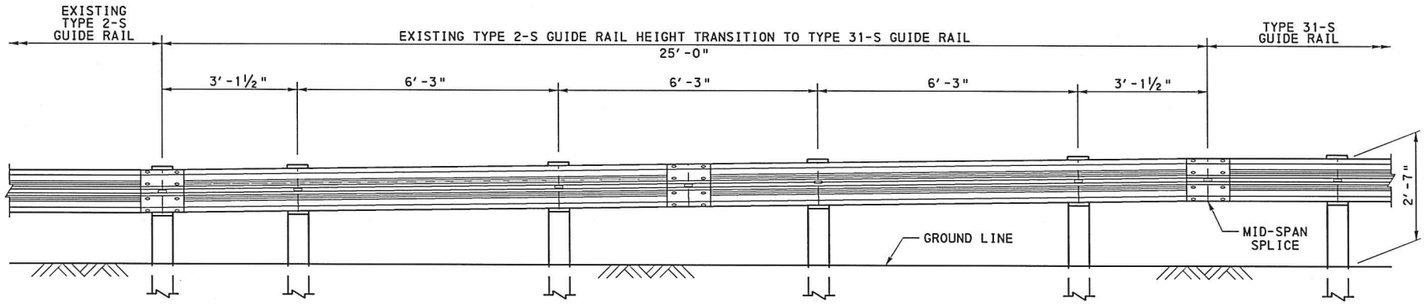
1. DO NOT SET POSTS IN CONCRETE, OF ANY DEPTH.
2. BURNING THROUGH POSTS OR RAIL ELEMENTS FOR HOLES IS NOT PERMITTED. USE A MECHANICAL PUNCH TO PRODUCE SPLICE HOLES IN RAIL ELEMENTS IF NEEDED FOR A TRANSITION SECTION. COAT ALL EXPOSED/CUT EDGES WITH 2 COATS OF APPROVED GALVANIZING PAINT.
3. FOR THE 25'-0" SPAN, PROVIDE A MINIMUM UNOBSTRUCTED DISTANCE OF 6'-6" BEHIND THE REAR FACE OF THE GUIDE RAIL POST TO THE FRONT FACE OF THE OBSTRUCTION.

COMMONWEALTH OF PENNSYLVANIA
DEPARTMENT OF TRANSPORTATION
BUREAU OF PROJECT DELIVERY

TYPE 31 STRONG POST GUIDE RAIL

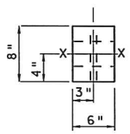
LONG SPAN SYSTEMS ACROSS CULVERTS AND SMALL STRUCTURES 25'-0" SPAN

RECOMMENDED FEB. 8, 2019	RECOMMENDED FEB. 8, 2019	SHT 10 OF 14
CHIEF, HWY. DELIVERY DIVISION	DIRECTOR, BUREAU OF PROJECT DELIVERY	RC-51M

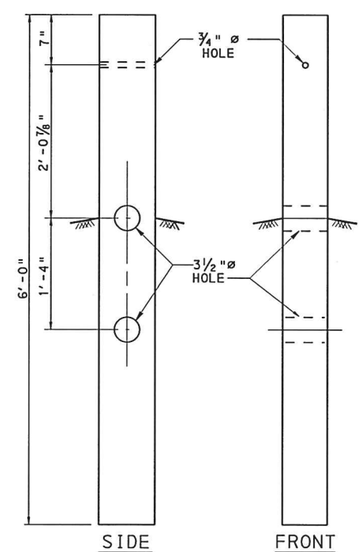


ELEVATION

EXISTING TYPE 2-S GUIDE RAIL HEIGHT TRANSITION TO TYPE 31-S GUIDE RAIL



PLAN



SIDE FRONT

LONG BREAKAWAY TIMBER POST

NOTES

1. BURNING THROUGH POSTS OR RAIL ELEMENTS FOR HOLES IS NOT PERMITTED. USE A MECHANICAL PUNCH TO PRODUCE SPLICE HOLES IN RAIL ELEMENTS IF NEEDED FOR A TRANSITION SECTION. COAT ALL EXPOSED/CUT EDGES WITH 2 COATS OF APPROVED GALVANIZING PAINT.
2. THE HEIGHT TRANSITION DETAIL CAN BE USED FOR VARYING HEIGHTS OF EXISTING TYPE 2-S GUIDE RAIL.

COMMONWEALTH OF PENNSYLVANIA
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TYPE 31 STRONG POST GUIDE RAIL

HEIGHT TRANSITION AND LONG BREAKAWAY TIMBER POST

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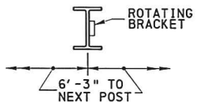
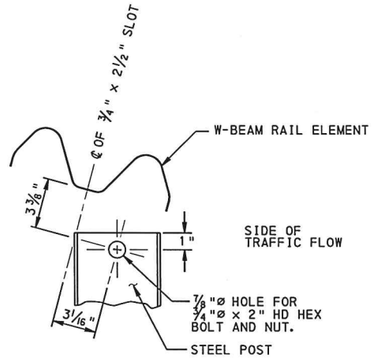


W6x9 OR W6x8.5 POST

POSITIONING OF ROTATING BRACKET

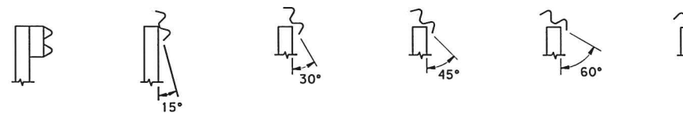


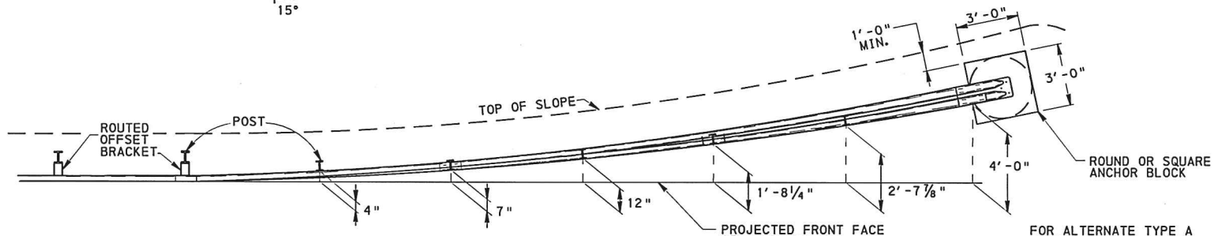
TYPICAL FOR
15° THRU 75° POSITIONS

ROTATING BRACKET

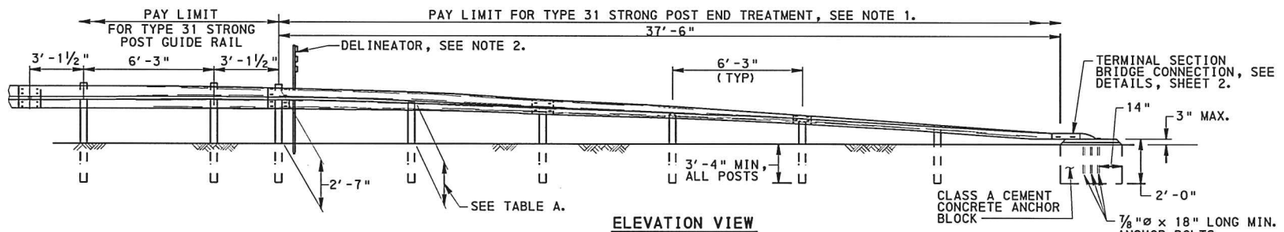
TABLE A

HEIGHT OF POST	19¾"	16½"	13"	9¼"	4¾"
ROTATION ANGLES	15°	30°	45°	60°	75°





PLAN VIEW
SEE NOTE 4.



ELEVATION VIEW

TYPE 31 STRONG POST END TREATMENT

SEE NOTE 5.

NOTES

1. PAYMENT FOR TYPE 31 STRONG POST END TREATMENT INCLUDES 37'-6" OF SLOPING RAIL, TERMINAL SECTION, HARDWARE, EXCAVATION AND CONCRETE.
2. INSTALL DELINEATOR ASSEMBLIES UNDER SEPARATE PAY ITEM OR CONTRACT. FOR ADDITIONAL DETAILS, SEE TRAFFIC STANDARD TC-8604.
3. ONLY THE NECESSARY DIMENSIONS, FOR UNIFORMITY AND INTERCHANGEABILITY OF ROTATING BRACKETS, ARE INDICATED. PROVIDE ROTATING BRACKETS SUPPLIED BY A MANUFACTURER AS LISTED IN BULLETIN 15.
4. MEASURE OFFSETS FROM THE PROJECTED FRONT FACE OF THE GUIDE RAIL TO THE FRONT FACE OF THE POST.
5. TYPE 31 STRONG POST END TREATMENT OR "TURNDOWN" CAN BE USED AS FOLLOWS:
   a. NHS. CAN BE USED ONLY ON THE TRAILING END OF GUIDE RAIL ON DIVIDED HIGHWAYS WHEN OPPOSING TRAFFIC WILL NOT BE ABLE TO IMPACT THE TRAILING END OF THE GUIDE RAIL SYSTEM.
   b. NON-NHS. CAN BE USED FOR DIVIDED AND NON-DIVIDED HIGHWAYS AS DESCRIBED BELOW.
      (1) DIVIDED HIGHWAYS. CAN BE USED ON THE TRAILING END OF GUIDE RAIL ON DIVIDED HIGHWAYS WHEN OPPOSING TRAFFIC WILL NOT BE ABLE TO IMPACT THE TRAILING END OF THE GUIDE RAIL SYSTEM.
      (2) NON-DIVIDED HIGHWAYS. CAN BE USED WHEN ALL OF THE FOLLOWING APPLY:
         (a) THE POSTED SPEED LIMIT IS ≤ 45 MPH.
         (b) THE CURRENT TRAFFIC VOLUME IS ≤ 2000 VEHICLES PER DAY.
         (c) THE TURNDOWN IS NOT IN A HIGH CRASH LOCATION.

COMMONWEALTH OF PENNSYLVANIA
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TYPE 31 STRONG POST GUIDE RAIL

TYPE 31 STRONG POST END TREATMENTS "TURNDOWNS"

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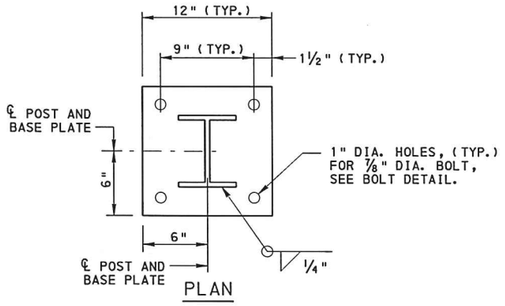
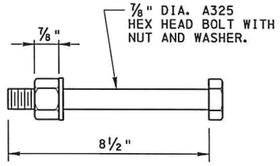
CHIEF, HWY. DELIVERY DIVISION	DIRECTOR, BUREAU OF PROJECT DELIVERY	RC-51M

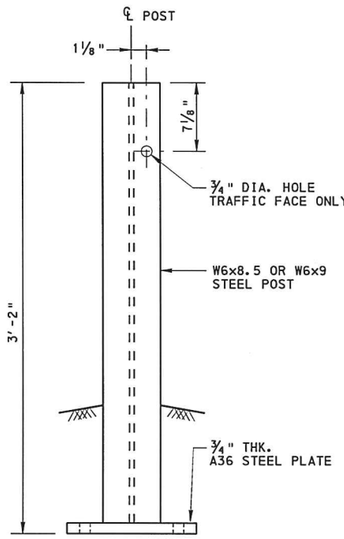


PLAN



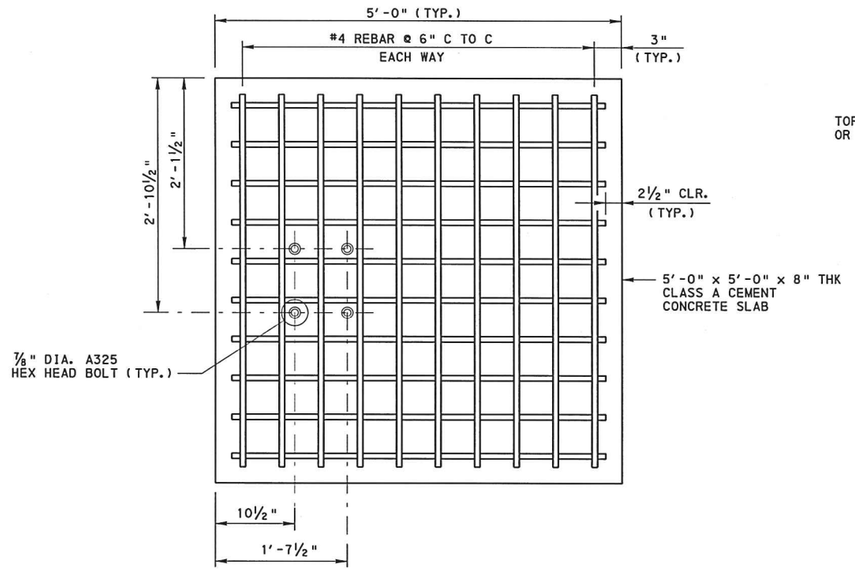
BOLT DETAIL

4 REQUIRED

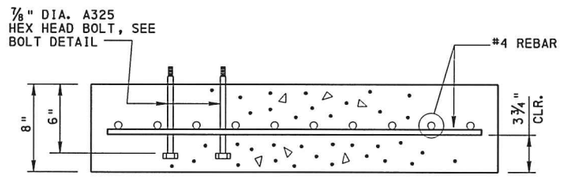


ELEVATION

STEEL POST DETAIL



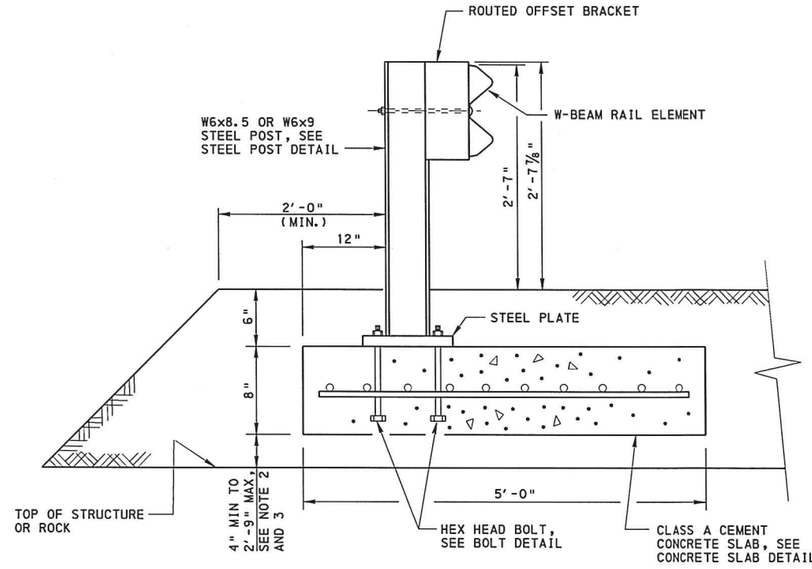
PLAN



ELEVATION

CONCRETE SLAB DETAIL

STEEL POST NOT SHOWN FOR CLARITY



STEEL POST OVER UNDERGROUND STRUCTURE

SEE NOTE 4

NOTES

1. FOR POSTS IN ROCK, SEE SHEET 14.
2. THE DIMENSION OF 4" MIN IS OVER CONCRETE CULVERTS.
3. A DIMENSION OF 2'-0" MIN APPLIES OVER METAL CULVERTS.
4. FOR INSTALLATION OF GUIDE RAIL OVER UNDERGROUND STRUCTURES, THE CONCRETE, REINFORCEMENT BARS AND HARDWARE ARE INCIDENTAL TO THE GUIDE RAIL PAY ITEM.

COMMONWEALTH OF PENNSYLVANIA
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BUREAU OF PROJECT DELIVERY

TYPE 31 STRONG POST GUIDE RAIL

STEEL POSTS OVER UNDERGROUND STRUCTURES

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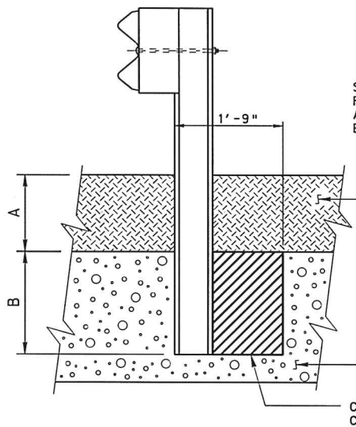
CHIEF, HWY. DELIVERY DIVISION	DIRECTOR, BUREAU OF PROJECT DELIVERY	RC-51M

PLANS

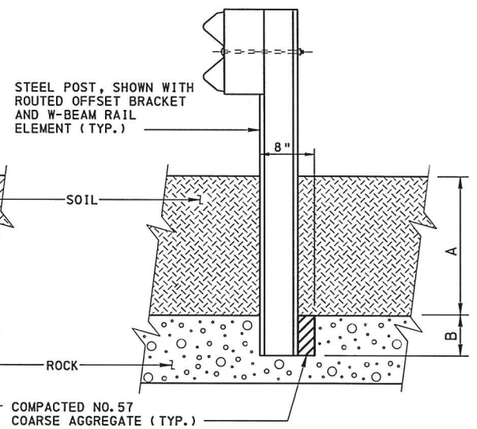
EITHER HOLE CONFIGURATION ACCEPTABLE

PLAN



DETAIL 1

FOR OVERLYING SOIL DEPTHS (A) RANGING FROM 0 TO 1'-6", THE DEPTH OF REQUIRED DRILLING (B) IS EQUAL TO 2'-0".



DETAIL 2

FOR OVERLYING SOIL DEPTHS (A) RANGING FROM 1'-6" TO THE EMBEDMENT DEPTH OF THE POST, THE DEPTH OF REQUIRED DRILLING (B) IS EQUAL TO EITHER 1'-0" OR THE DESIRED EMBEDMENT DEPTH MINUS THE DEPTH OF SOIL, WHICH EVER IS LESS.

POSTS IN ROCK

COMMONWEALTH OF PENNSYLVANIA
DEPARTMENT OF TRANSPORTATION
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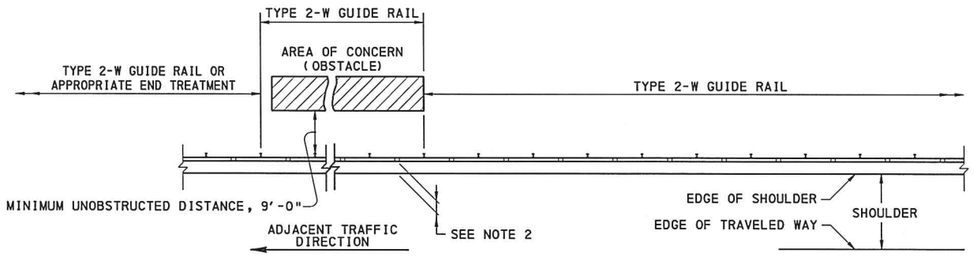
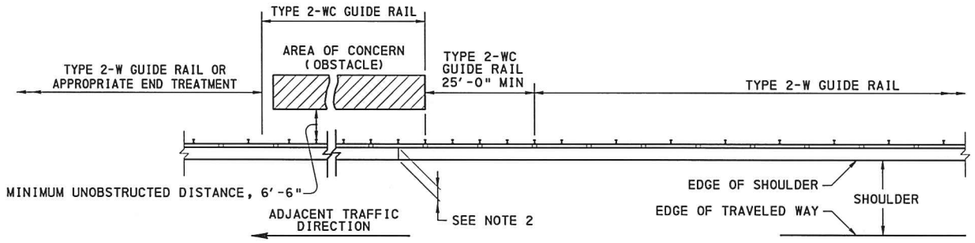
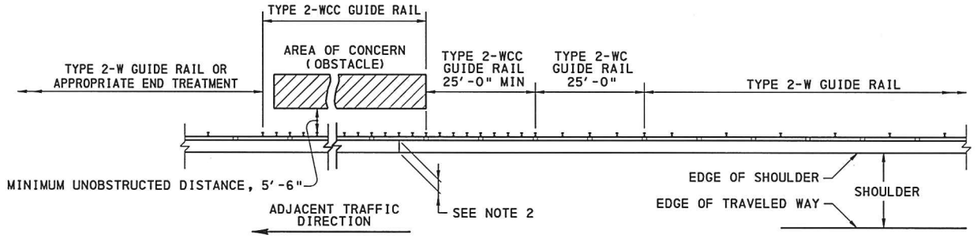
TYPE 31 STRONG POST GUIDE RAIL

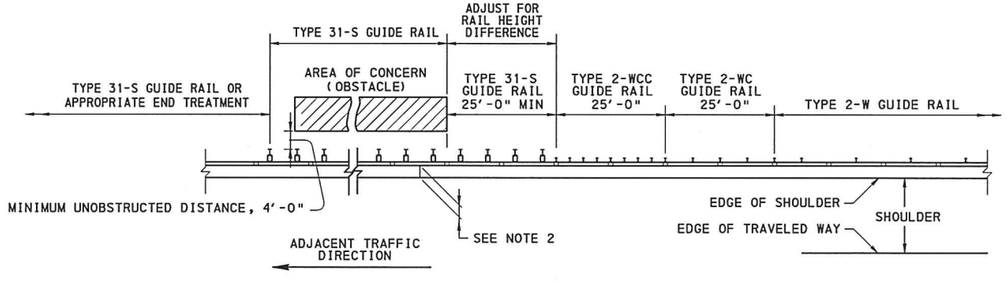
STEEL POSTS IN ROCK

RECOMMENDED FEB. 8, 2019 CHIEF, HWY. DELIVERY DIVISION	RECOMMENDED FEB. 8, 2019 DIRECTOR, BUREAU OF PROJECT DELIVERY	SHT 14 OF 14 RC-51M









TYPICAL TYPE 2 WEAK POST GUIDE RAIL TREATMENTS FOR VARIOUS UNOBSTRUCTED DISTANCES

NOTES

1. THIS STANDARD HAS BEEN PREPARED AS A GUIDE FOR THE PLACEMENT OF GUIDE RAIL AND MEDIAN BARRIER. IT IS IMPRACTICAL TO PROVIDE A STANDARD FOR ALL POSSIBLE CONDITIONS. MODIFICATION OF TREATMENTS CAN BE MADE TO FIT EXISTING CONDITIONS; HOWEVER, FOLLOW THE RECOMMENDED GUIDELINES IN PUBLICATION 13M, DM-2, CHAPTER 12.
2. THE DISTANCE FROM THE EDGE OF SHOULDER TO THE FRONT FACE OF THE W-BEAM RAIL ELEMENT MAY VARY. BASE THE ACTUAL PLACEMENT OF THE GUIDE RAIL SYSTEM SELECTED ON FIELD CONDITIONS. LOCATE THE SYSTEM SELECTED AS FAR FROM THE EDGE OF SHOULDER AS POSSIBLE AND STILL MAINTAIN MINIMUM UNOBSTRUCTED DISTANCES FROM TABLE 1. NOTE THAT ALTHOUGH EMBANKMENTS MAY REQUIRE PROTECTION, THE EMBANKMENT ITSELF IS NOT CONSIDERED AN OBSTRUCTION WHEN DETERMINING THE "UNOBSTRUCTED DISTANCE".
3. THESE FIGURES ARE FOR DIVIDED HIGHWAYS AND ONE-WAY ROADWAYS. FOR TWO-WAY ROADWAYS, PROVIDE A BARRIER LAYOUT FOR OPPOSING TRAFFIC THAT IS SIMILAR TO THE APPROACH BARRIER LAYOUT SHOWN FOR ADJACENT TRAFFIC IF THE BARRIER IS IN THE CLEAR ZONE OR IS LIKELY TO BE HIT.

TABLE 1

TYPE OF GUIDE RAIL	MINIMUM † UNOBSTRUCTED DISTANCE
31-SCC (NESTED)	1'-0"
31-SCC	1'-6"
31-SC	3'-0"
31-S	4'-0"
2-WCC	5'-6"
2-WC	6'-6"
2-W	9'-0"

† FROM BACK OF GUIDE RAIL POST TO AREA OF CONCERN (FACE OF OBSTRUCTION).

COMMONWEALTH OF PENNSYLVANIA
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BARRIER PLACEMENT AT OBSTRUCTIONS

TYPICAL TYPE 2 WEAK POST GUIDE RAIL TREATMENTS

RECOMMENDED FEB. 8, 2019
CHIEF, HWY. DELIVERY DIVISION

RECOMMENDED FEB. 8, 2019
DIRECTOR, BUREAU OF PROJECT DELIVERY

SHT 1 OF 12

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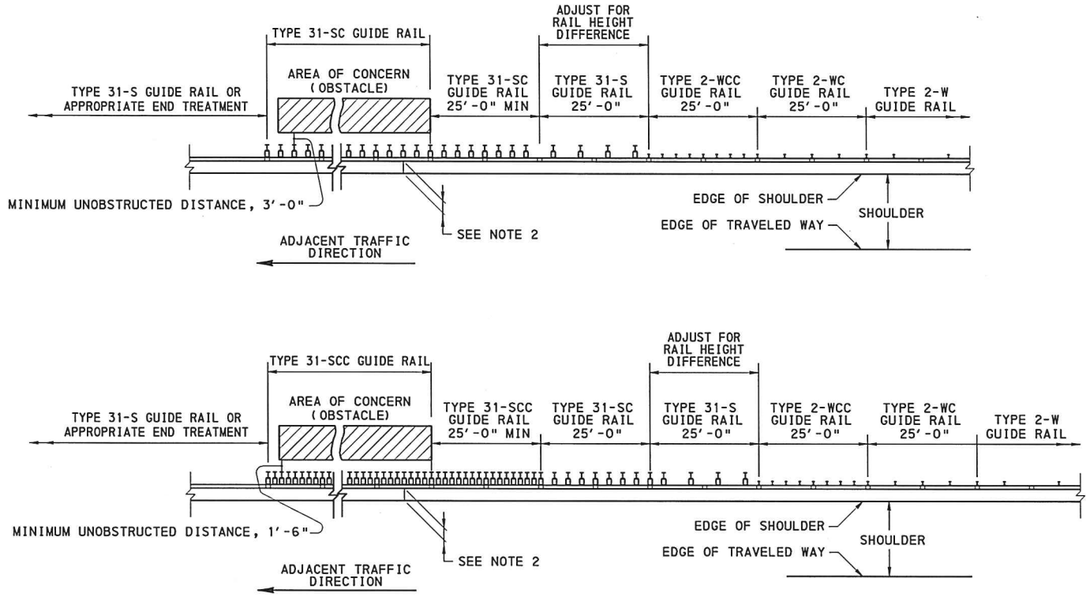

TYPICAL TYPE 2 WEAK POST GUIDE RAIL TREATMENTS FOR VARIOUS UNOBSTRUCTED DISTANCES

NOTES

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2. THE DISTANCE FROM THE EDGE OF SHOULDER TO THE FRONT FACE OF THE W-BEAM RAIL ELEMENT MAY VARY. BASE THE ACTUAL PLACEMENT OF THE GUIDE RAIL SYSTEM SELECTED ON FIELD CONDITIONS. LOCATE THE SYSTEM SELECTED AS FAR FROM THE EDGE OF SHOULDER AS POSSIBLE AND STILL MAINTAIN MINIMUM UNOBSTRUCTED DISTANCES FROM TABLE 1. NOTE THAT ALTHOUGH EMBANKMENTS MAY REQUIRE PROTECTION, THE EMBANKMENT ITSELF IS NOT CONSIDERED AN OBSTRUCTION WHEN DETERMINING THE "UNOBSTRUCTED DISTANCE".
3. THESE FIGURES ARE FOR DIVIDED HIGHWAYS AND ONE-WAY ROADWAYS. FOR TWO-WAY ROADWAYS, PROVIDE A BARRIER LAYOUT FOR OPPOSING TRAFFIC THAT IS SIMILAR TO THE APPROACH BARRIER LAYOUT SHOWN FOR ADJACENT TRAFFIC IF THE BARRIER IS IN THE CLEAR ZONE OR IS LIKELY TO BE HIT.

TABLE 1

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† FROM BACK OF GUIDE RAIL POST TO AREA OF CONCERN (FACE OF OBSTRUCTION).

COMMONWEALTH OF PENNSYLVANIA
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BARRIER PLACEMENT AT OBSTRUCTIONS

TYPICAL TYPE 2 WEAK POST GUIDE RAIL TREATMENTS

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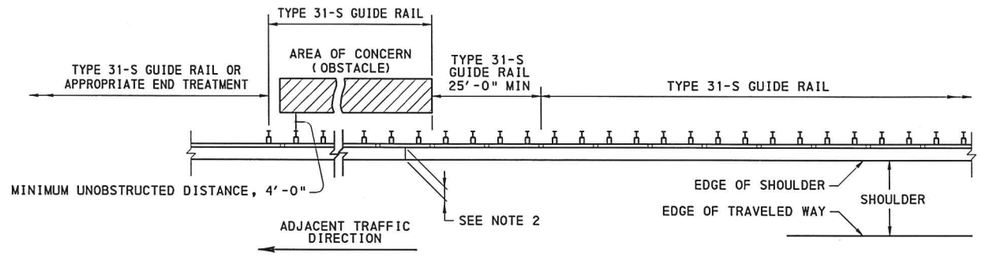
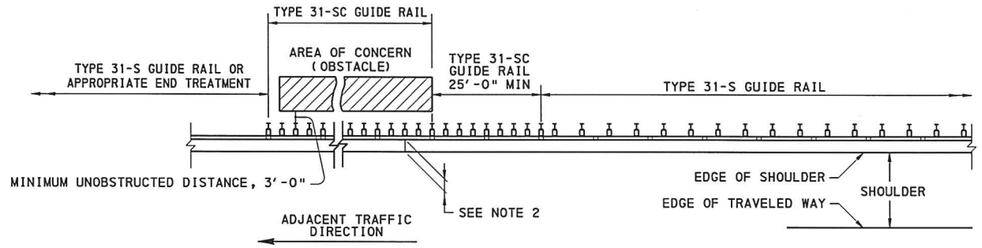
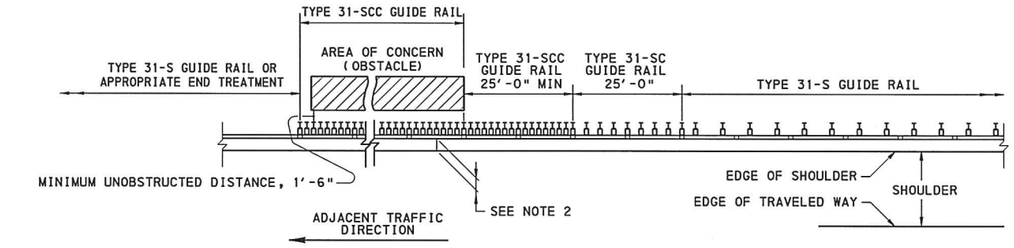
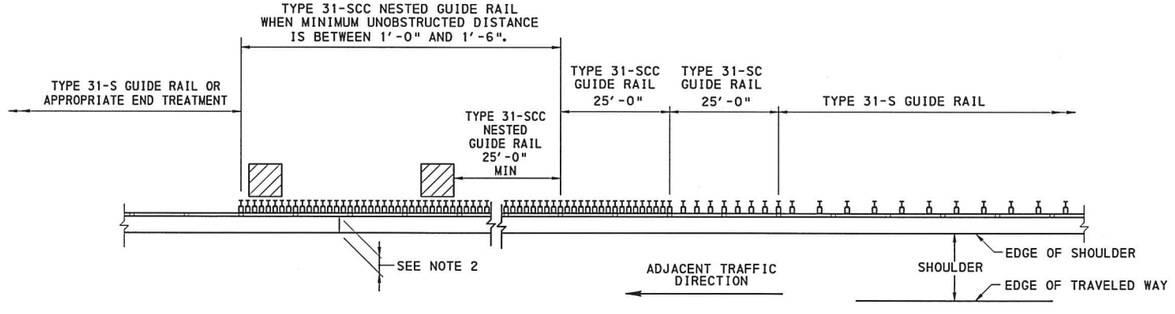
CHIEF, HWY. DELIVERY DIVISION	DIRECTOR, BUREAU OF PROJECT DELIVERY	RC-54M









TYPICAL TYPE 31 STRONG POST GUIDE RAIL TREATMENTS FOR VARIOUS UNOBSTRUCTED DISTANCES

NOTES

1. THIS STANDARD HAS BEEN PREPARED AS A GUIDE FOR THE PLACEMENT OF GUIDE RAIL AND MEDIAN BARRIER. IT IS IMPRACTICAL TO PROVIDE A STANDARD FOR ALL POSSIBLE CONDITIONS. MODIFICATION OF TREATMENTS CAN BE MADE TO FIT EXISTING CONDITIONS; HOWEVER, FOLLOW THE RECOMMENDED GUIDELINES IN PUBLICATION 13M, DM-2, CHAPTER 12.
2. THE DISTANCE FROM THE EDGE OF SHOULDER TO THE FRONT FACE OF THE W-BEAM RAIL ELEMENT MAY VARY. BASE THE ACTUAL PLACEMENT OF THE GUIDE RAIL SYSTEM SELECTED ON FIELD CONDITIONS. LOCATE THE SYSTEM SELECTED AS FAR FROM THE EDGE OF SHOULDER AS POSSIBLE AND STILL MAINTAIN MINIMUM UNOBSTRUCTED DISTANCES FROM TABLE 1. NOTE THAT ALTHOUGH EMBANKMENTS MAY REQUIRE PROTECTION, THE EMBANKMENT ITSELF IS NOT CONSIDERED AN OBSTRUCTION WHEN DETERMINING THE "UNOBSTRUCTED DISTANCE".
3. THESE FIGURES ARE FOR DIVIDED HIGHWAYS AND ONE-WAY ROADWAYS. FOR TWO-WAY ROADWAYS, PROVIDE A BARRIER LAYOUT FOR OPPOSING TRAFFIC THAT IS SIMILAR TO THE APPROACH BARRIER LAYOUT SHOWN FOR ADJACENT TRAFFIC IF THE BARRIER IS IN THE CLEAR ZONE OR IS LIKELY TO BE HIT.

TABLE 1

TYPE OF GUIDE RAIL	MINIMUM † UNOBSTRUCTED DISTANCE
31-SCC (NESTED)	1'-0"
31-SCC	1'-6"
31-SC	3'-0"
31-S	4'-0"
2-WCC	5'-6"
2-WC	6'-6"
2-W	9'-0"

† FROM BACK OF GUIDE RAIL POST TO AREA OF CONCERN (FACE OF OBSTRUCTION).

COMMONWEALTH OF PENNSYLVANIA
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BARRIER PLACEMENT AT OBSTRUCTIONS

TYPICAL TYPE 31 STRONG POST GUIDE RAIL TREATMENTS

RECOMMENDED FEB. 8, 2019
CHIEF, HWY. DELIVERY DIVISION

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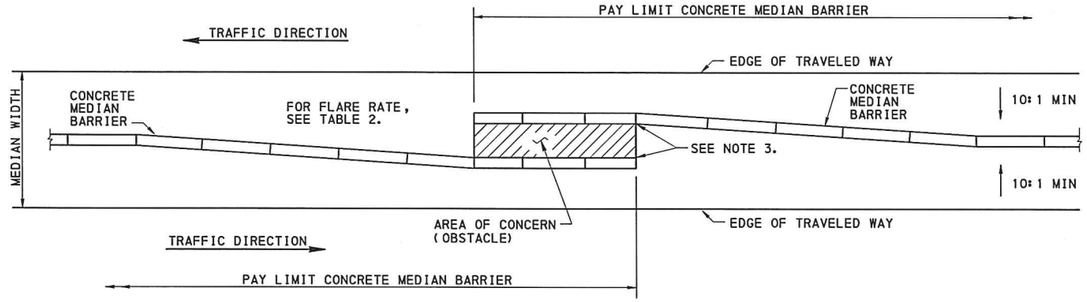
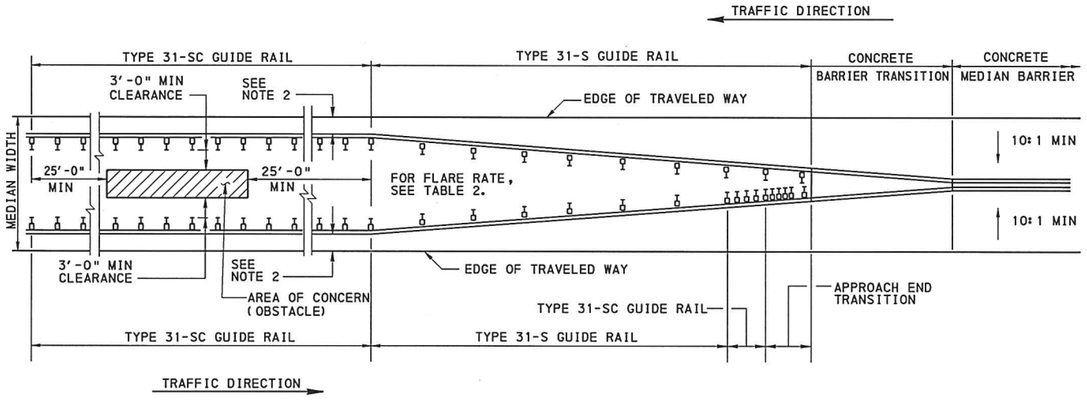
DIRECTOR, BUREAU OF PROJECT DELIVERY

RC-54M



TREATMENT AT OBSTRUCTION FOR MEDIAN WIDTHS 20′ OR LESS WHERE CONTINUOUS BARRIER IS REQUIRED



TREATMENT AT OBSTRUCTION FOR MEDIAN WIDTHS OF 20′ TO 30′ WHERE CONTINUOUS BARRIER IS REQUIRED

TABLE 1

TYPE OF GUIDE RAIL	MINIMUM † UNOBSTRUCTED DISTANCE
31-SCC (NESTED)	1′-0"
31-SCC	1′-6"
31-SC	3′-0"
31-S	4′-0"
2-WCC	5′-6"
2-WC	6′-6"
2-W	9′-0"

† FROM BACK OF GUIDE RAIL POST TO AREA OF CONCERN (FACE OF OBSTRUCTION).

TABLE 2
FLARE RATES FOR BARRIER DESIGN

DESIGN SPEED	MAXIMUM FLARE RATES	
mph	CONCRETE BARRIER	GUIDE RAIL
70	20 : 1	15 : 1
65	19 : 1	15 : 1
60	18 : 1	14 : 1
55	16 : 1	12 : 1
50	14 : 1	11 : 1
45	12 : 1	10 : 1
40	11 : 1	9 : 1
35	10 : 1	8 : 1
30	8 : 1	7 : 1

NOTES

1. THIS STANDARD HAS BEEN PREPARED AS A GUIDE FOR THE PLACEMENT OF GUIDE RAIL AND MEDIAN BARRIER. IT IS IMPRACTICAL TO PROVIDE A STANDARD FOR ALL POSSIBLE CONDITIONS. MODIFICATIONS OF TREATMENTS CAN BE MADE TO FIT EXISTING CONDITIONS; HOWEVER, FOLLOW RECOMMENDED GUIDELINES IN DESIGN MANUAL, PART 2, CHAPTER 12.
2. THE DISTANCE FROM THE EDGE OF SHOULDER TO THE FRONT FACE OF THE W-BEAM RAIL ELEMENT MAY VARY. BASE THE ACTUAL PLACEMENT OF THE GUIDE RAIL SYSTEM SELECTED ON FIELD CONDITIONS. LOCATE THE SYSTEM SELECTED AS FAR FROM THE EDGE OF SHOULDER AS POSSIBLE AND STILL MAINTAIN MINIMUM UNOBSTRUCTED DISTANCES FROM TABLE 1. NOTE THAT ALTHOUGH EMBANKMENTS MAY REQUIRE PROTECTION, THE EMBANKMENT ITSELF IS NOT CONSIDERED AN OBSTRUCTION WHEN DETERMINING THE "UNOBSTRUCTED DISTANCE".
3. PROVIDE SINGLE FACE CONCRETE BARRIER THROUGH THE AREA OF THE OBSTRUCTION. NO MINIMUM BARRIER-TO-OBSTRUCTION DISTANCE IS REQUIRED. FOR DETAILS, SEE RC-58M.

COMMONWEALTH OF PENNSYLVANIA
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BARRIER PLACEMENT AT OBSTRUCTIONS

MEDIAN TREATMENTS

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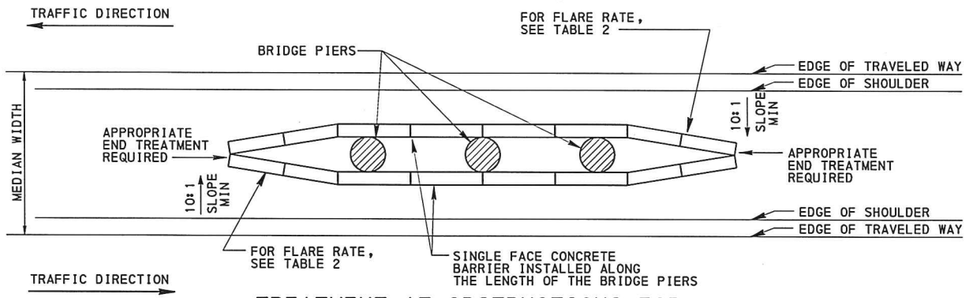
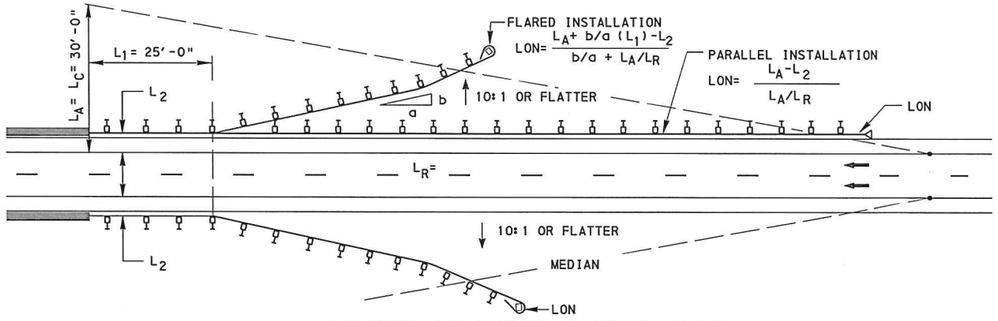
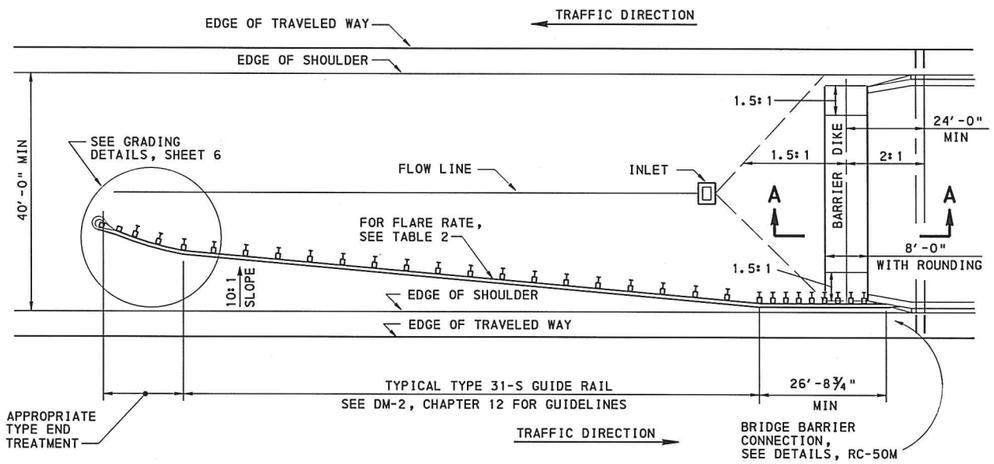


TREATMENT AT OBSTRUCTIONS FOR MEDIAN WIDTHS GREATER THAN 20'-0" WHERE CONTINUOUS BARRIER IS NOT REQUIRED

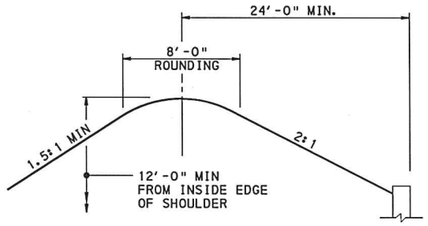


LENGTH OF BARRIER NEED (LON)

SEE PUBLICATION DM-2, CHAPTER 12 FOR GUIDELINES

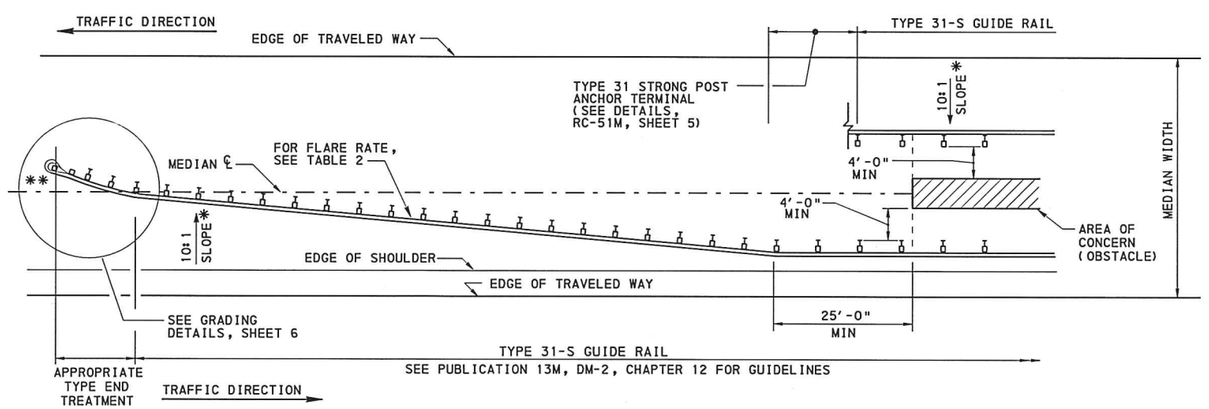


MEDIAN TREATMENT AT DUAL STRUCTURES



SECTION A-A

MEDIAN TREATMENT AT DUAL STRUCTURE



TREATMENT AT OBSTRUCTIONS FOR MEDIAN WIDTHS GREATER THAN 30'-0" WHERE CONTINUOUS BARRIER IS NOT REQUIRED

* A 10:1 SLOPE MINIMUM IS REQUIRED IN FRONT OF THE BARRIER, IF ANY PORTION OF THE BARRIER IS LOCATED WITHIN 12'-0" FROM THE EDGE OF SHOULDER (HINGE POINT). BARRIER MUST NOT BE PLACED ON SLOPES STEEPER THAN 6:1.

** DO NOT INSTALL END TREATMENT WITHIN 3'-0" FROM MEDIAN ℄.

NOTE:

FOR FURTHER END TREATMENT DETAILS, SEE DM-2, CHAPTER 12 FOR GUIDELINES.

TABLE 2

FLARE RATES FOR BARRIER DESIGN

DESIGN SPEED	MAXIMUM FLARE RATES	
mph	CONCRETE BARRIER	GUIDE RAIL
70	20 : 1	15 : 1
65	19 : 1	15 : 1
60	18 : 1	14 : 1
55	16 : 1	12 : 1
50	14 : 1	11 : 1
45	12 : 1	10 : 1
40	11 : 1	9 : 1
35	10 : 1	8 : 1
30	8 : 1	7 : 1

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BARRIER PLACEMENT AT OBSTRUCTIONS

MEDIAN TREATMENTS

RECOMMENDED FEB. 8, 2019
CHIEF, ENGR. DELIVERY DIVISION

RECOMMENDED FEB. 8, 2019
DIRECTOR, BUREAU OF PROJECT DELIVERY

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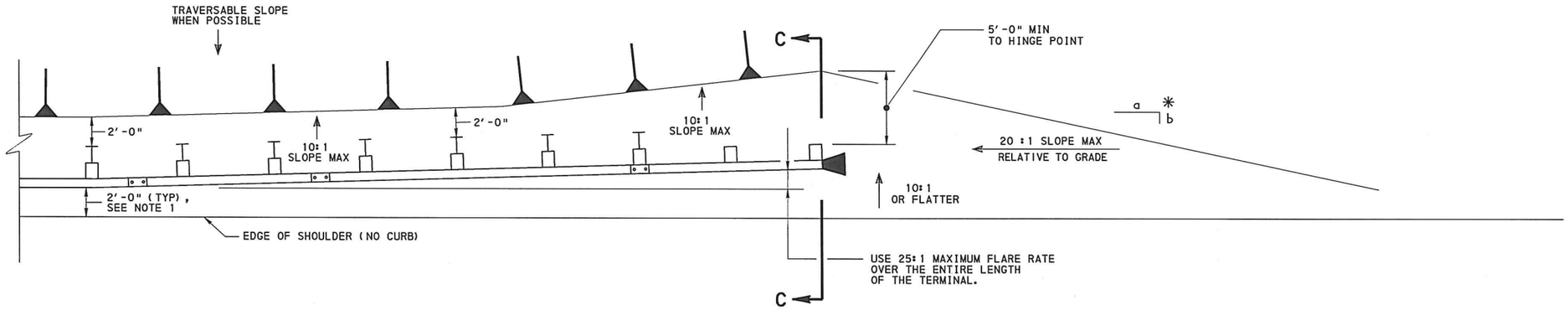
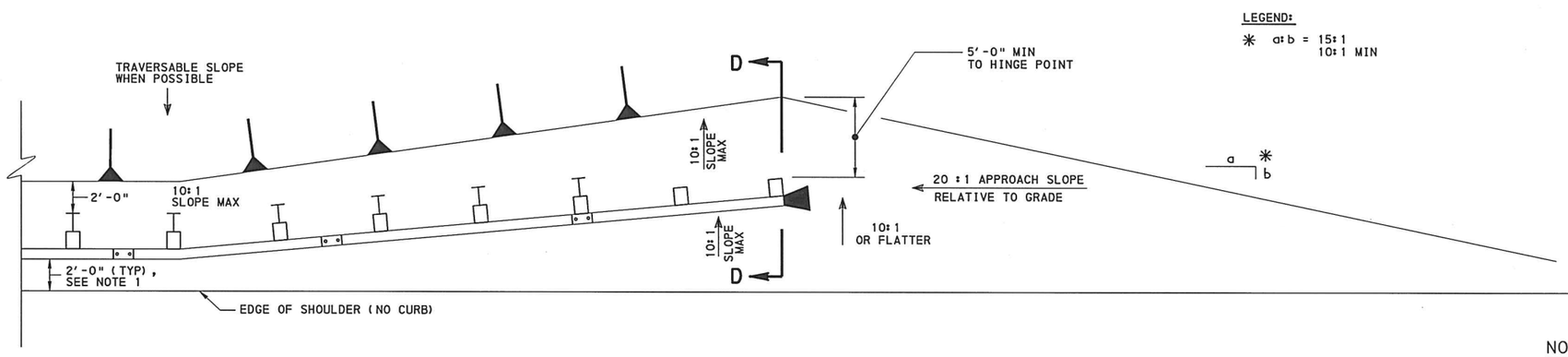


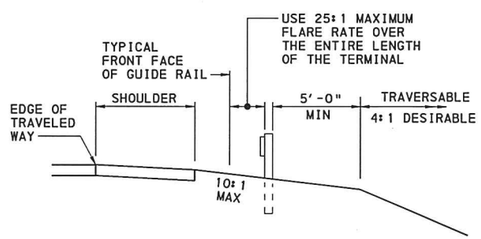
GRADING DETAIL FOR TANGENT TERMINALS



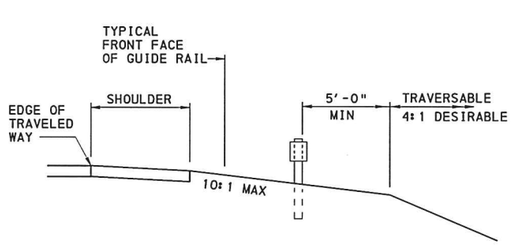
GRADING DETAIL FOR FLARED TERMINALS

NOTE

1. THE DISTANCE FROM THE EDGE OF SHOULDER TO THE FRONT FACE OF THE W-BEAM RAIL ELEMENT MAY VARY. BASE THE ACTUAL PLACEMENT OF THE GUIDE RAIL SYSTEM SELECTED ON FIELD CONDITIONS. LOCATE THE SYSTEM SELECTED AS FAR FROM THE EDGE OF SHOULDER AS POSSIBLE AND STILL MAINTAIN MINIMUM UNOBSTRUCTED DISTANCES FROM TABLE 1. NOTE THAT ALTHOUGH EMBANKMENTS MAY REQUIRE PROTECTION, THE EMBANKMENT ITSELF IS NOT CONSIDERED AN OBSTRUCTION WHEN DETERMINING THE "UNOBSTRUCTED DISTANCE".



SECTION C-C



SECTION D-D

TABLE 1

TYPE OF GUIDE RAIL	MINIMUM † UNOBSTRUCTED DISTANCE
31-SCC (NESTED)	1'-0"
31-SCC	1'-6"
31-SC	3'-0"
31-S	4'-0"
2-WCC	5'-6"
2-WC	6'-6"
2-W	9'-0"

† FROM BACK OF GUIDE RAIL POST TO AREA OF CONCERN (FACE OF OBSTRUCTION).

COMMONWEALTH OF PENNSYLVANIA
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BARRIER PLACEMENT AT OBSTRUCTIONS

GRADING DETAILS

RECOMMENDED FEB. 8, 2019
CHIEF, ENGR. DELIVERY DIVISION

RECOMMENDED FEB. 8, 2019
DIRECTOR, BUREAU OF PROJECT DELIVERY

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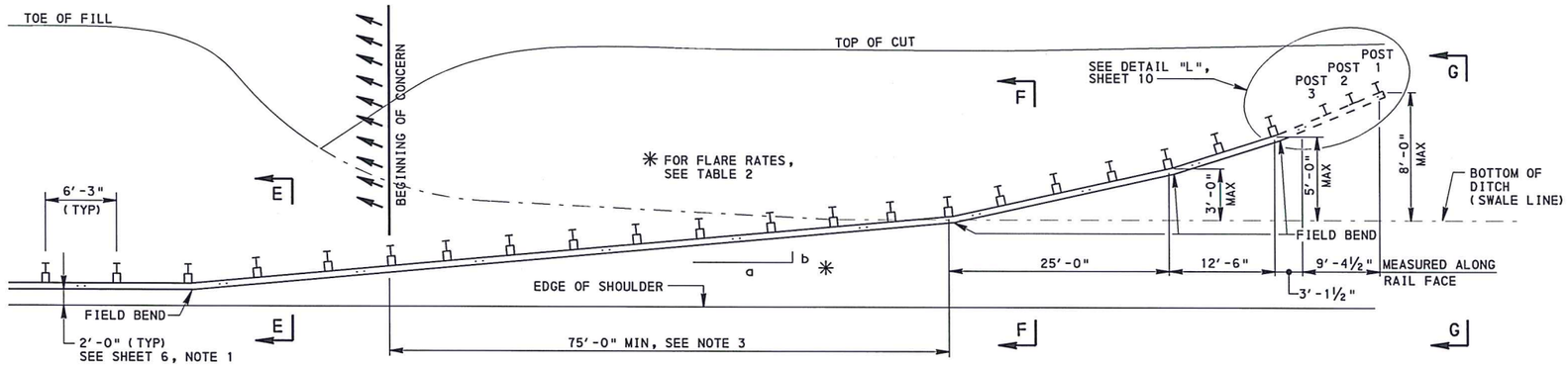
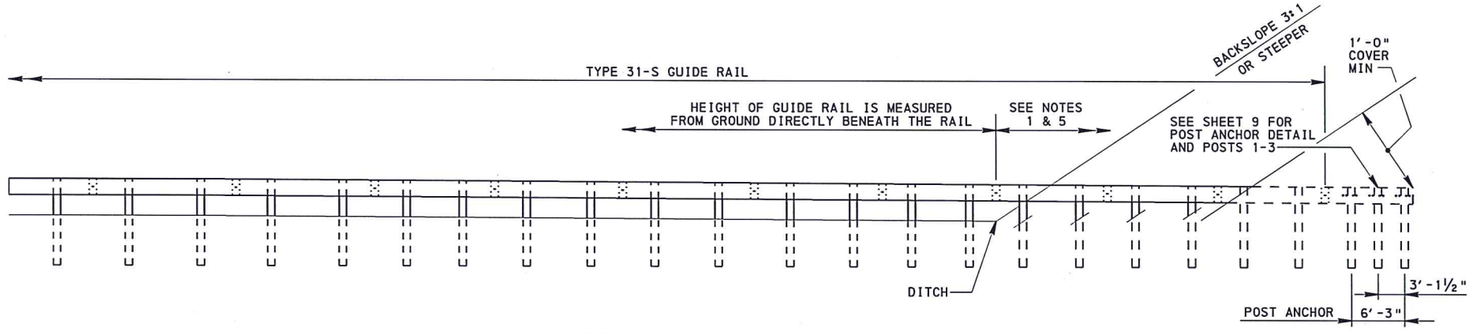


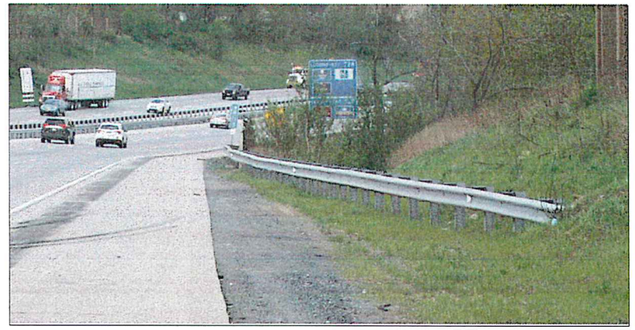
PLAN VIEW



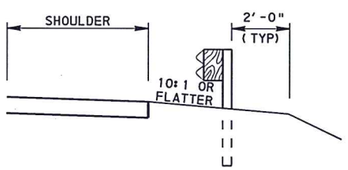
ELEVATION VIEW (PROFILE ALONG RAIL)

NOTES

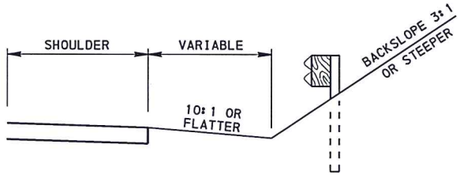
1. HEIGHT OF GUIDE RAIL MAY BE TAPERED DOWN AFTER CROSSING DITCH BOTTOM TO ACHIEVE 1'-0" OF COVER MINIMUM OVER POST 1.
2. WHEN THE GUIDE RAIL LENGTH OF NEED FALLS NEAR A CUT TO FILL SLOPE, THE PREFERRED TREATMENT IS TO ANCHOR THE GUIDE RAIL TO THE CUT SLOPE.
3. PROVIDE 75'-0" MINIMUM FROM WHERE THE GUIDE RAIL CROSSES THE BOTTOM OF DITCH (SWALE LINE) TO THE BEGINNING OF THE CONCERN.
4. BURIED-IN-BACKSLOPE TERMINALS MUST BE USED WITH TYPE 31 STRONG POST GUIDE RAIL.
5. THE POSTS IN ROCK DETAIL ON RC-51M, SHEET 14 IS NOT APPLICABLE FOR POSTS BETWEEN POST 1 AND THE BOTTOM OF DITCH.



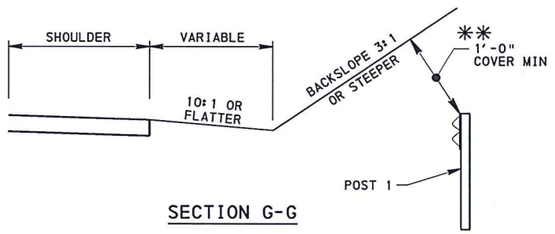
TYPICAL BURIED-IN-BACKSLOPE TERMINAL SINGLE RAIL



SECTION E-E



SECTION F-F



SECTION G-G

TABLE 2

FLARE RATES FOR BARRIER DESIGN

DESIGN SPEED	MAXIMUM FLARE RATES	
mph	CONCRETE BARRIER	GUIDE RAIL
70	20 : 1	15 : 1
65	19 : 1	15 : 1
60	18 : 1	14 : 1
55	16 : 1	12 : 1
50	14 : 1	11 : 1
45	12 : 1	10 : 1
40	11 : 1	9 : 1
35	10 : 1	8 : 1
30	8 : 1	7 : 1

** PLACEMENT INTO ROCK DOES NOT REQUIRE THE 1'-0" BURIAL.

COMMONWEALTH OF PENNSYLVANIA
DEPARTMENT OF TRANSPORTATION
BUREAU OF PROJECT DELIVERY

BARRIER PLACEMENT AT OBSTRUCTIONS

BURIED-IN-BACKSLOPE TERMINAL SINGLE RAIL

RECOMMENDED FEB. 8, 2019
CHIEF, HWY. DELIVERY DIVISION

RECOMMENDED FEB. 8, 2019
DIRECTOR, BUREAU OF PROJECT DELIVERY

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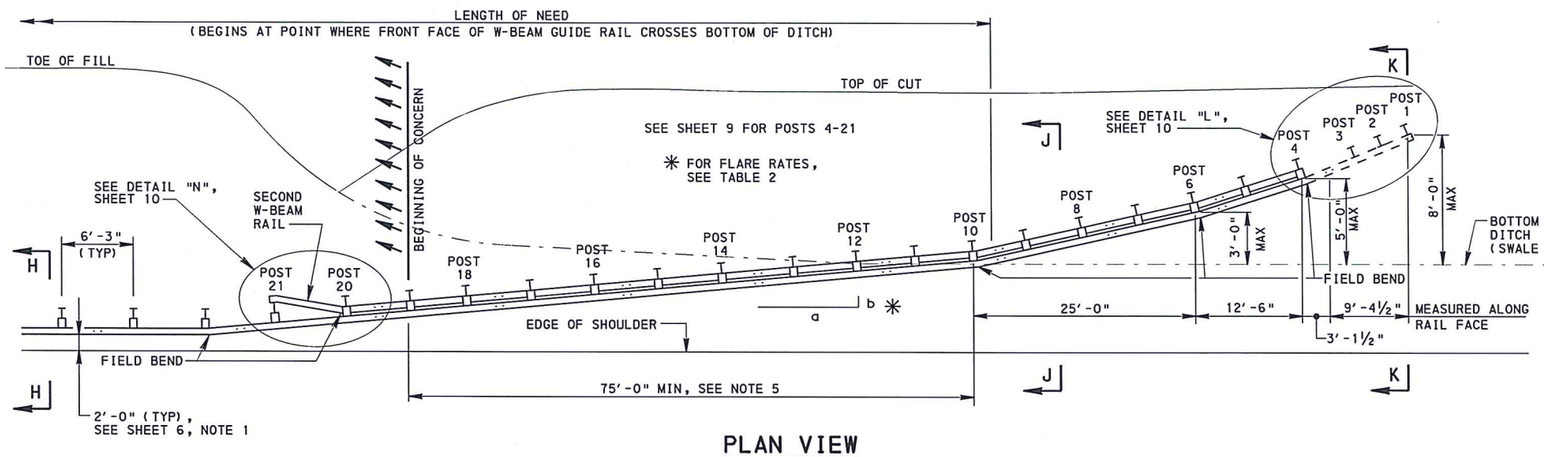
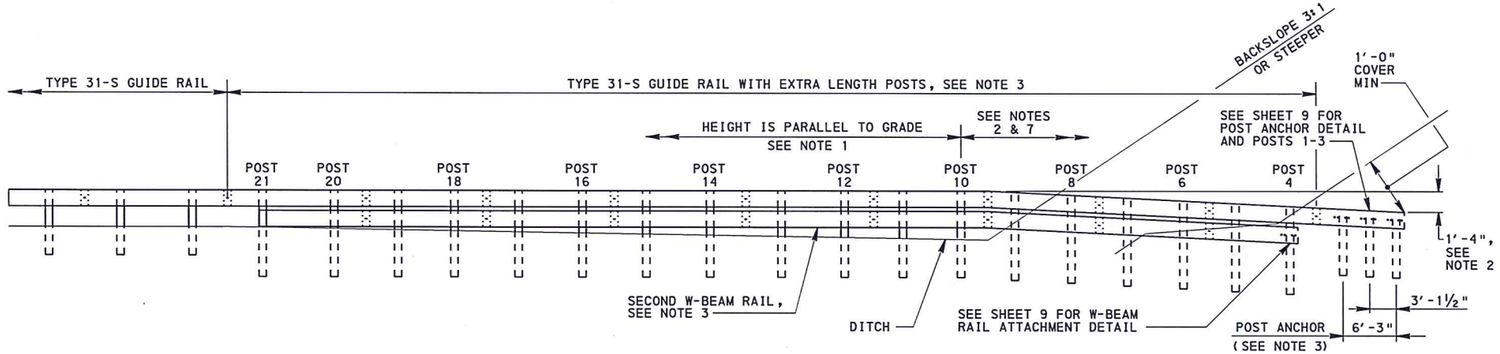
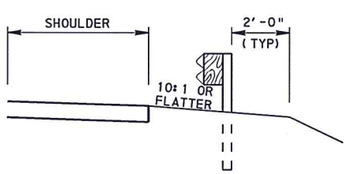


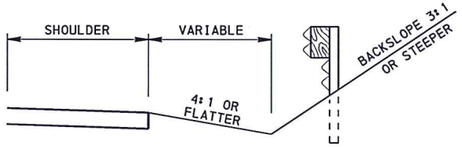
PLAN VIEW



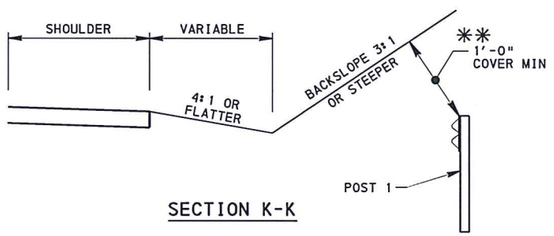
ELEVATION VIEW (PROFILE ALONG RAIL)



SECTION H-H



SECTION J-J

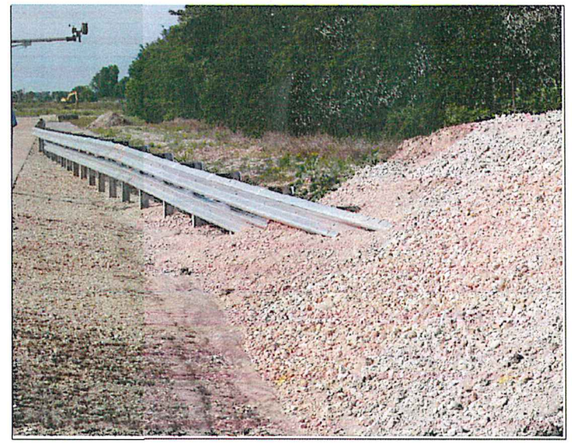


SECTION K-K

** PLACEMENT INTO ROCK DOES NOT REQUIRE THE 1'-0" BURIAL.

NOTES

1. THE HEIGHT OF THE TOP OF THE W-BEAM RAIL, BEGINNING AT POST 10, IS HELD AT A CONSTANT 2'-7" RELATIVE TO THE EDGE OF SHOULDER.
2. HEIGHT OF GUIDE RAIL MAY BE TAPERED DOWN AFTER CROSSING DITCH BOTTOM TO ACHIEVE 1'-0" OF COVER MINIMUM OVER POST 1.
3. USE 8'-0" LONG POSTS FOR ALL POST LOCATIONS WITH A DOUBLE RAIL. POSTS 1-3 FOR THE BURIED-IN-BACKSLOPE TERMINAL ARE 6'-0" LONG. THE SECOND W-BEAM RAIL ELEMENT IS A SEPARATE PAY ITEM.
4. WHEN THE GUIDE RAIL LENGTH OF NEED IS NEAR A CUT TO FILL SLOPE, THE PREFERRED TREATMENT IS TO USE THE BURIED-IN-BACKSLOPE SYSTEM.
5. PROVIDE 75'-0" MINIMUM FROM WHERE THE GUIDE RAIL CROSSES THE BOTTOM OF DITCH (SWALE LINE) TO THE BEGINNING OF THE CONCERN.
6. BURIED-IN-BACKSLOPE TERMINALS MUST BE USED WITH TYPE 31 STRONG POST GUIDE RAIL.
7. THE POSTS IN ROCK DETAIL ON RC-51M, SHEET 14 IS NOT APPLICABLE FOR POSTS BETWEEN POST 1 AND THE BOTTOM OF DITCH.



TYPICAL BURIED-IN-BACKSLOPE TERMINAL DOUBLE RAIL

TABLE 2
FLARE RATES FOR BARRIER DESIGN

DESIGN SPEED	MAXIMUM FLARE RATES	
mph	CONCRETE BARRIER	GUIDE RAIL
70	20 : 1	15 : 1
65	19 : 1	15 : 1
60	18 : 1	14 : 1
55	16 : 1	12 : 1
50	14 : 1	11 : 1
45	12 : 1	10 : 1
40	11 : 1	9 : 1
35	10 : 1	8 : 1
30	8 : 1	7 : 1

COMMONWEALTH OF PENNSYLVANIA
DEPARTMENT OF TRANSPORTATION
BUREAU OF PROJECT DELIVERY

BARRIER PLACEMENT AT OBSTRUCTIONS

BURIED-IN-BACKSLOPE TERMINAL DOUBLE RAIL

RECOMMENDED FEB. 8, 2019
CHIEF, HWY. DELIVERY DIVISION

RECOMMENDED FEB. 8, 2019
DIRECTOR, BUREAU OF PROJECT DELIVERY

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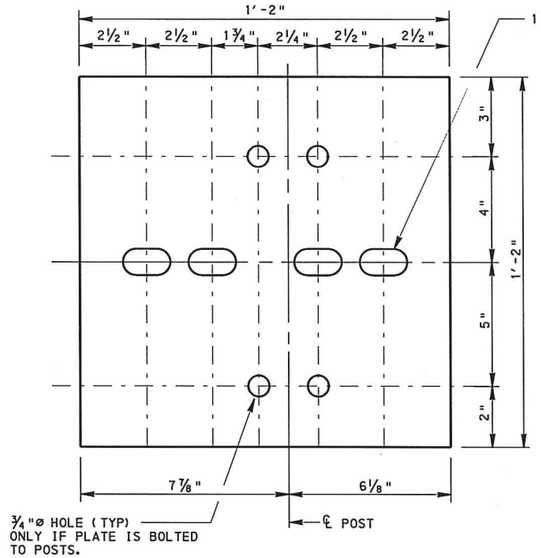
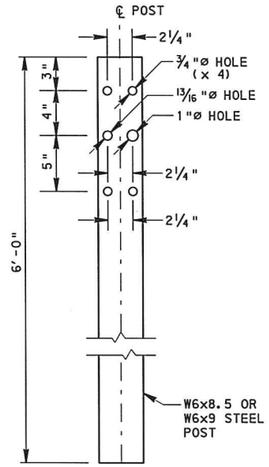


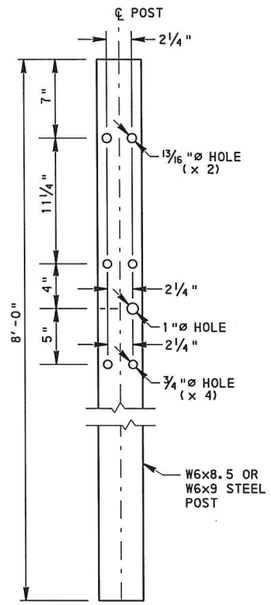
STEEL PLATE - ½"

GALVANIZED
WELDED OR BOLTED TO POST



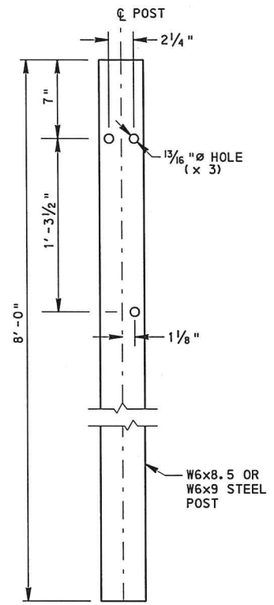
POSTS 1-3

(SEE NOTE 2)



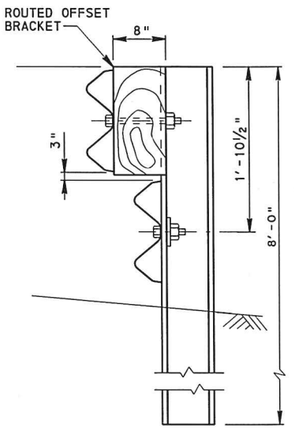
POST 4

(SEE NOTE 3)



POSTS 5-21

(SEE NOTE 3)

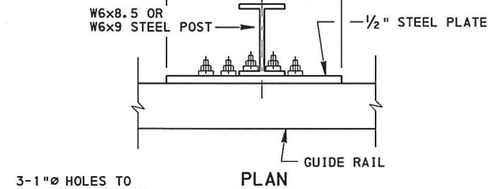


TYPICAL ELEVATION

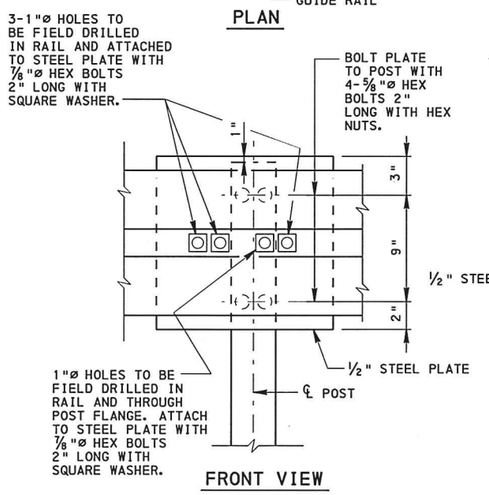
W6x8.5 OR W6x9 STEEL POSTS POSTS 5-20

NOTES

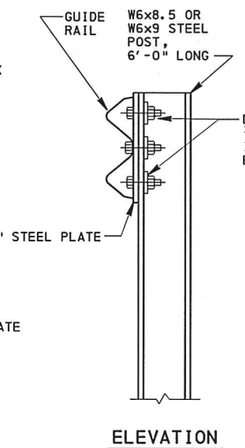
1. FOR ROUTED OFFSET BRACKET DETAIL, SEE RC-51M, SHEET 2.
2. FOR LOCATIONS OF POSTS 1-3, SEE SHEETS 7 AND 8.
3. FOR LOCATIONS OF POST 4 AND POSTS 5-21, SEE SHEET 8.



PLAN



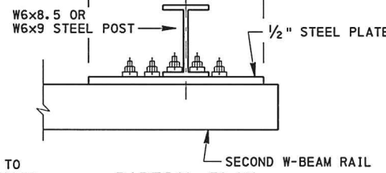
FRONT VIEW



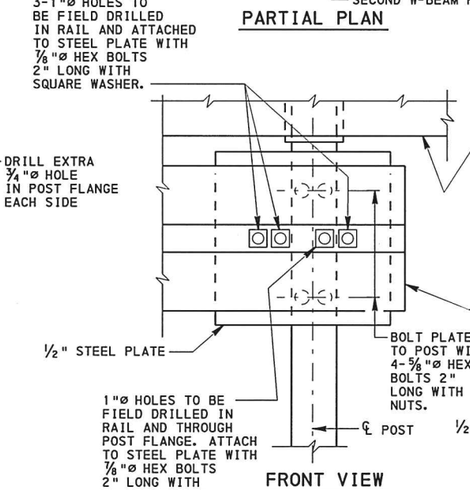
ELEVATION

POST ANCHOR DETAIL (POSTS 1-3)

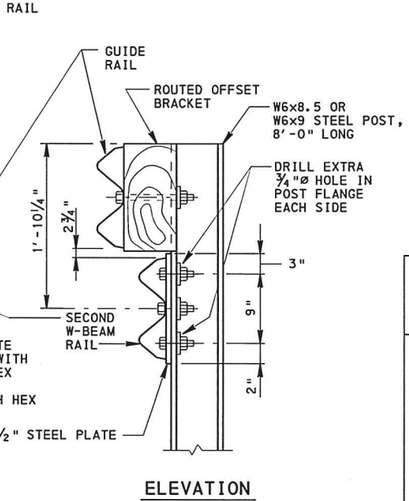
DIMENSIONS ARE TYPICAL



PARTIAL PLAN

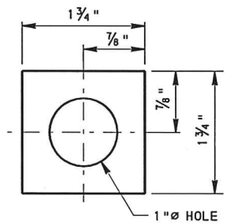


FRONT VIEW



ELEVATION

W-BEAM RAIL ATTACHMENT (POST 4)



SQUARE WASHER

3/16" THICK - GALVANIZED

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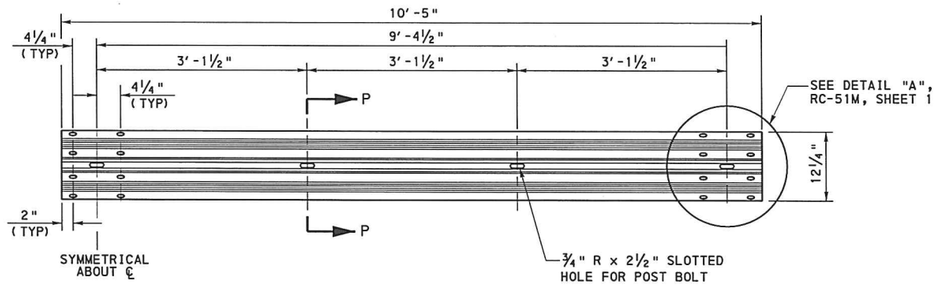
BARRIER PLACEMENT AT OBSTRUCTIONS

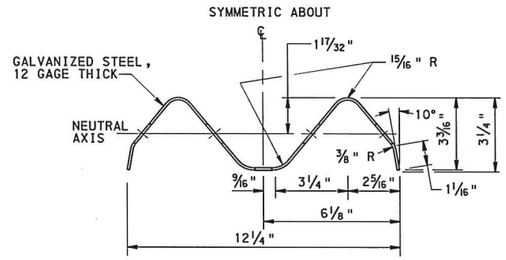
BURIED-IN-BACKSLOPE TERMINAL END ANCHORAGE DETAILS

RECOMMENDED FEB. 8, 2019
CHIEF, HWY. DELIVERY DIVISION

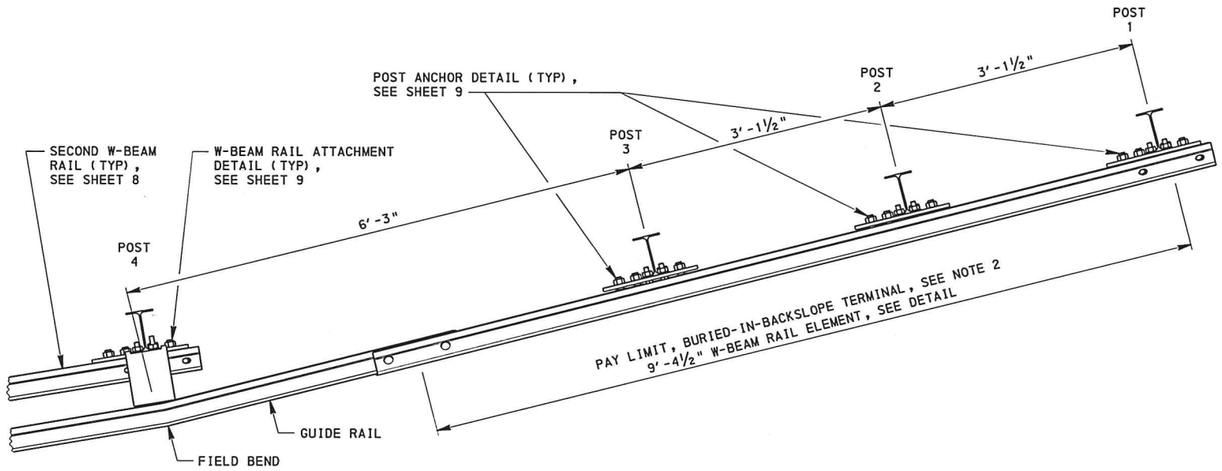
RECOMMENDED FEB. 8, 2019
DIRECTOR, BUREAU OF PROJECT DELIVERY



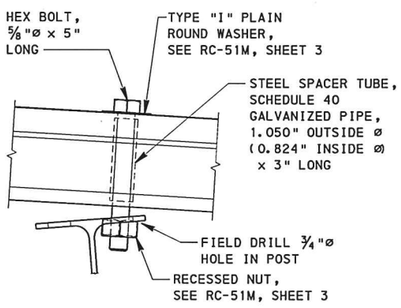
9′-4½" W-BEAM RAIL ELEMENT



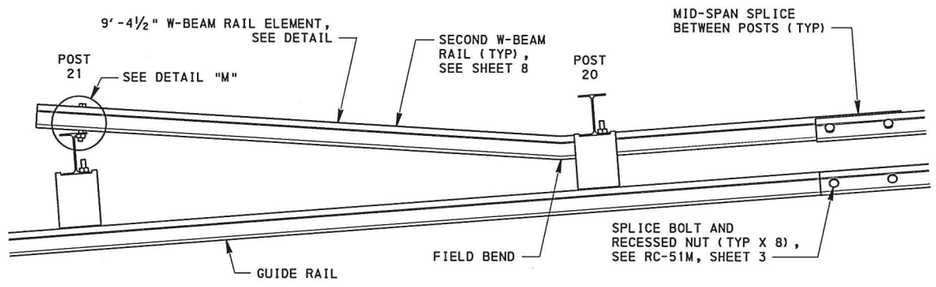
RAIL ELEMENT SECTION P-P



DETAIL "L"



DETAIL "M"



DETAIL "N"

NOTES

1. FOR ROUTED OFFSET BRACKET DETAIL, SEE RC-51M, SHEET 2.
2. BURIED-IN-BACKSLOPE TERMINAL PAY LIMIT INCLUDES 9′-4½" OF W-BEAM RAIL ELEMENT, ½" STEEL PLATE, POSTS 1, 2, AND 3, AND ASSOCIATED HARDWARE.

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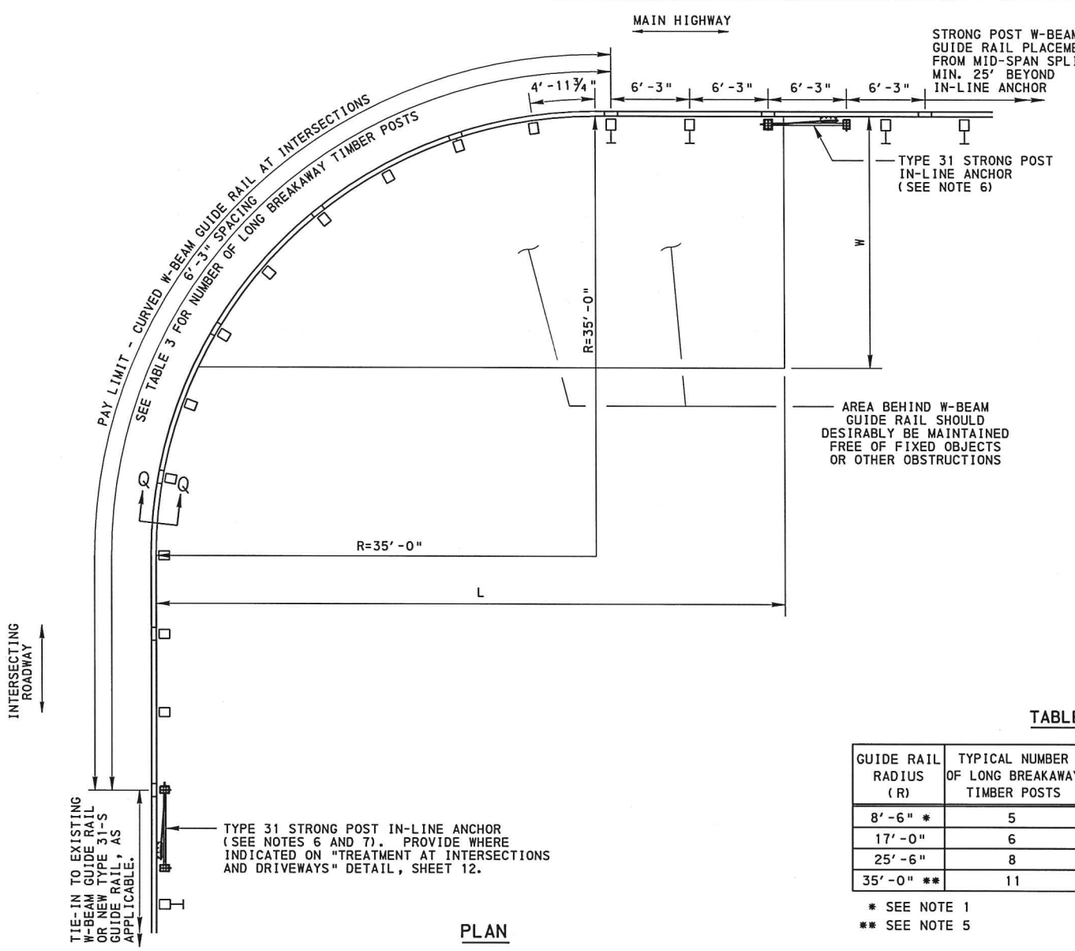
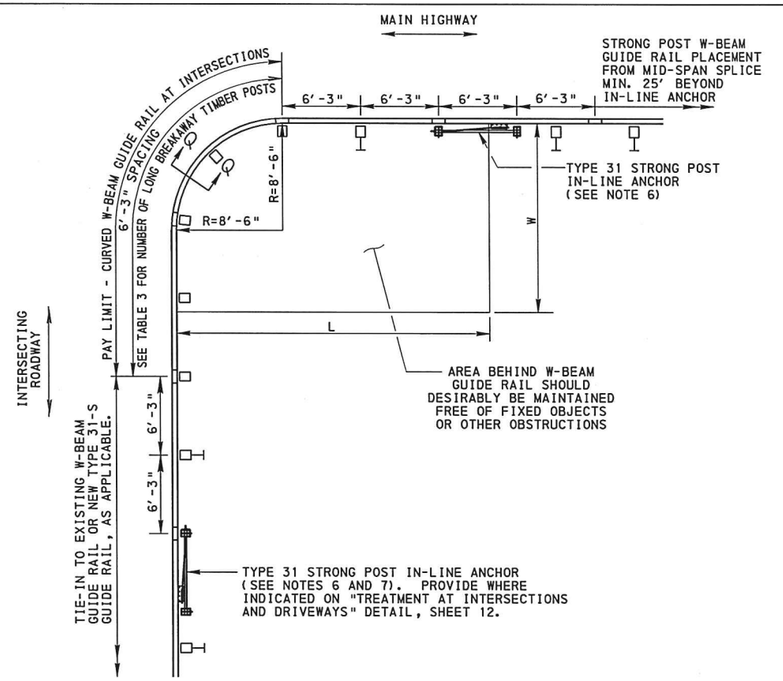
BURIED-IN-BACKSLOPE TERMINAL END ANCHORAGE DETAILS

RECOMMENDED FEB. 8, 2019	RECOMMENDED FEB. 8, 2019	SHT 10 OF 12
CHIEF, HWY. DELIVERY DIVISION	DIRECTOR, BUREAU OF PROJECT DELIVERY	RC-54M



PLAN

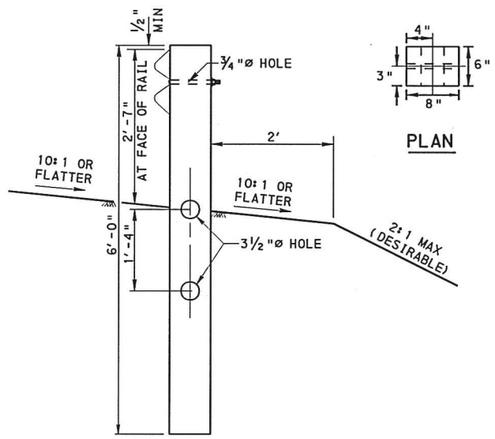


PLAN

TABLE 3

GUIDE RAIL RADIUS (R)	TYPICAL NUMBER OF LONG BREAKAWAY TIMBER POSTS	MIN. DESIRED AREA FREE OF FIXED OBJECTS L x W
8'-6" *	5	25' x 15'
17'-0"	6	30' x 15'
25'-6"	8	40' x 20'
35'-0" **	11	50' x 20'

* SEE NOTE 1
** SEE NOTE 5



PLAN

SECTION Q-Q

LONG BREAKAWAY TIMBER POST

CURVED W-BEAM GUIDE RAIL AT INTERSECTIONS

NOTES

1. ON THE 8'-6" RADIUS SYSTEM IN THE CURVED W-BEAM GUIDE RAIL AT INTERSECTIONS DETAIL, THE RAIL IS NOT TO BE BOLTED TO THE CENTER POST.
2. RADIUS PANELS MUST BE SHOP BENT ONLY.
3. DO NOT USE ANY WASHERS ON THE RAIL SIDE OF THE LONG BREAKAWAY POSTS.
4. FOR GUIDE RAIL TERMINATED ON THE MAIN HIGHWAY, USE A PROPER END TREATMENT IN PLACE OF AN IN-LINE ANCHOR.
5. LONG BREAKAWAY TIMBER POSTS ARE NOT NEEDED AT INTERSECTION WITH GUIDE RAIL RADIUS > 35'.
6. SEE RC-51M, SHEETS 4 THRU 7 OF DETAILS AND HARDWARE FOR TYPE 31 STRONG POST IN-LINE ANCHOR.
7. ALONG THE INTERSECTING ROADWAY, AN APPRORIATE END TREATMENT OR TERMINAL SECTION, SINGLE, AS INDICATED ON SHEET 12, MAY BE USED IN PLACE OF THE TYPE 31 STRONG POST IN-LINE ANCHOR.

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GUIDE RAIL WITH SHORT RADIUS

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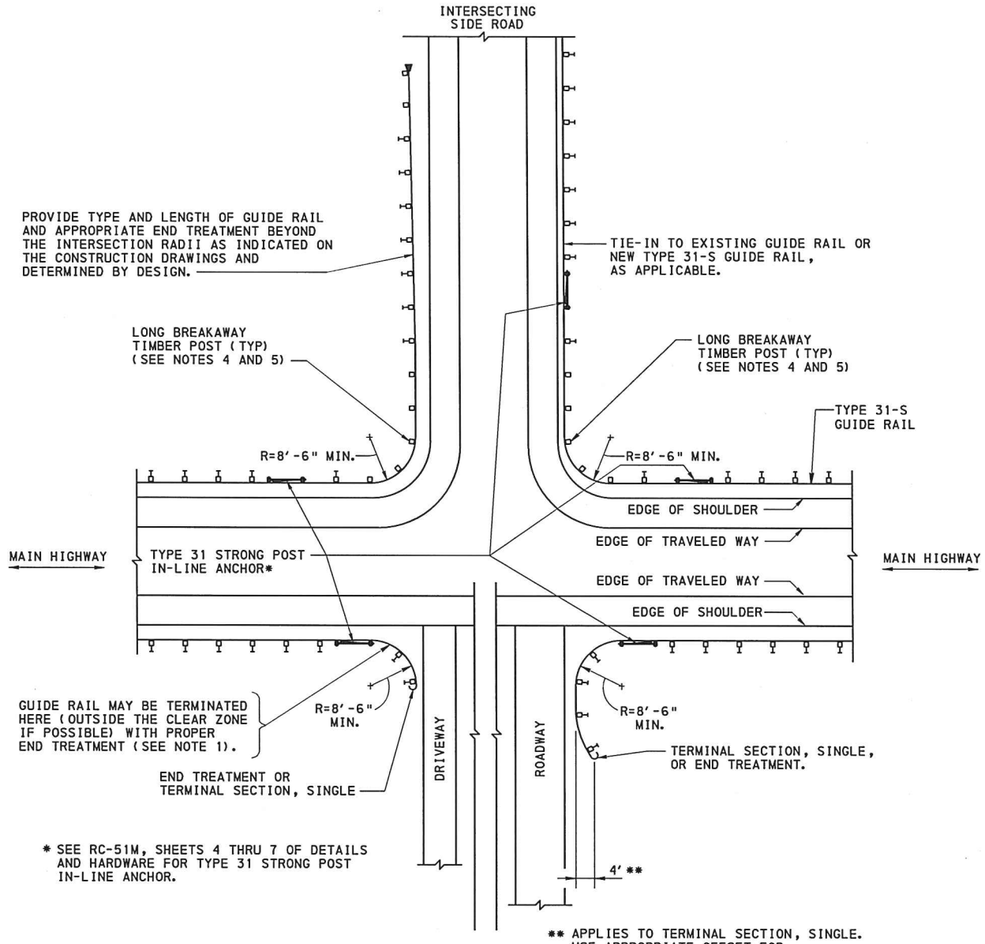

TREATMENT AT INTERSECTIONS AND DRIVEWAYS

NOTES

1. FOR GUIDE RAIL TERMINATED ON THE MAIN HIGHWAY, USE A PROPER END TREATMENT IN PLACE OF AN IN-LINE ANCHOR.
2. A TERMINAL SECTION, SINGLE MAY BE USED AT DRIVEWAYS AND ACCESS POINTS AND FOR LOCAL AND MINOR COLLECTOR ROADWAYS COMING TO A STOP CONDITION, EXCLUDING SIGNALS, WITH AN AVERAGE DAILY TRAFFIC (ADT) ≤ 2000 VEHICLES PER DAY AND CANNOT BE USED BEYOND THE IMMEDIATE INTERSECTION.
3. A TYPE 31 STRONG POST END TREATMENT OR "TURNDOWN" MAY BE USED ON NON-NHS HIGHWAYS COMING TO A STOP CONDITION WHEN ALL OF THE FOLLOWING APPLY:
   (a) THE POSTED SPEED LIMIT IS ≤ 45 MPH.
   (b) THE ADT IS ≤ 2000 VEHICLES PER DAY.
   (c) THE TURNDOWN IS NOT IN A HIGH CRASH LOCATION.
4. LONG BREAKAWAY TIMBER POSTS ARE NOT NEEDED AT INTERSECTIONS WITH GUIDE RAIL RADIUS > 35'.
5. FOR CURVED W-BEAM GUIDE RAIL AT INTERSECTIONS WITH LONG BREAKAWAY TIMBER POSTS, REFER TO SHEET 11 FOR ADDITIONAL DETAILS.

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BARRIER PLACEMENT AT OBSTRUCTIONS

GUIDE RAIL WITH SHORT RADIUS

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