



All –

SDDOT has to comply with a FHWA/AASHTO Joint Implementation plan to convert our Roadside Safety Devices from the NCHRP 350 crash tested devices to the new MASH (Manual for Assessing Safety Hardware) crash testing standards on an incremental basis. We have certain dates in the implementation plan of when we have to start using new devices that meet MASH crash testing guidelines. Our first change involves implementing new W beam guardrail and end terminals. The new W beam guardrail is MGS (Midwest Guardrail System).

I attached the set of standard plates involving steel beam guardrail that is currently under DOT and FHWA review. There may be some minor changes here and there, but the plates should be good enough for a heads up to the Contractors regarding what is going to be used in late winter/early spring lettings.

The major changes will be: Using MGS instead of W Beam Guardrail where applicable, larger embankments for the end terminals, new transitions from the concrete end blocks to MGS, new bid items(not created yet), and new set of approved products for end terminals that work with the increased height of the MGS(the approved list has not been created yet).

I should be available to answer any questions this month. Feel free to make any review comments regarding the standard plates.

Thanks,

**Bernie Clocksin**

Standards Engineer - Project Development Office

South Dakota Department of Transportation

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## GUIDANCE FOR COMPLETELY REVISED 630 SERIES OF STANDARD PLATES

Standard Plates to include for different basic design scenarios:

DESIGN SCENARIO	STANDARD PLATES NECESSARY
Attaching guardrail to NEW concrete end block with double (nested) thrie beam and the guardrail transitions to 3 cable guardrail. 2-way traffic	629.01, 629.05, 629.10, 629.15, 630.01, 630.10, 630.47, 630.48, 630.52, 630.85, 630.99
Attaching guardrail to NEW concrete end block with double (nested) thrie beam and the guardrail will transition to MGS. WILL NOT transition to standard W beam. 2-way traffic	630.01, 630.20, 630.47, 630.49, 630.50, 630.87 or 630.88, 630.99
Attaching guardrail to existing concrete end block (see 630.53) with double (nested) thrie beam and the guardrail transitions to 3 cable guardrail. 2-way traffic	629.01, 629.05, 629.10, 629.15, 630.01, 630.10, 630.47, 630.48, 630.53, 630.85, 630.99
Attaching guardrail to existing concrete end block (see 630.51) with double (nested) thrie beam and the guardrail will transition to MGS. WILL NOT transition to standard W beam. 2-way traffic	630.01, 630.20, 630.47, 630.49, 630.51, 630.87 or 630.88, 630.99
Attaching guardrail to bridge rail class B design 1T or 2T (thrie beam rail on bridge) with transition from double (nested) thrie beam to 3 cable guardrail. 2-way traffic	629.01, 629.05, 629.10, 629.15, 630.01, 630.10, 630.48, 630.55, 630.85, 630.99
Attaching guardrail to bridge rail class B design 1T or 2T (thrie beam rail on bridge) with transition from double (nested) thrie beam to MGS. WILL NOT transition to standard W beam. 2-way traffic	630.01, 630.20, 630.49, 630.54, 630.87 or 630.88, 630.99
The double (nested) W Beam transitions from Bridge ends/rails are on plates 630.60 to 630.63. If there is going to be a longer length of steel beam rail off of the bridge (such as a steep slope that runs a long ways) we recommend transitioning from W beam guardrail to MGS (see 630.64) Note that the transition is 62'-6" long. We recommend MGS over transitioning to cable because MGS meets MASH TL-3 while the cable and W Beam to cable transition does not meet MASH. However, this would be decided on a case by case basis.	630.60 to 630.63, 630.99, and other necessary standard plates
If replacing or need new steel beam guardrail based on deflection requirements, we will install MGS instead of standard W Beam Guardrail.	630.20, 630.99, and other MGS plates as needed

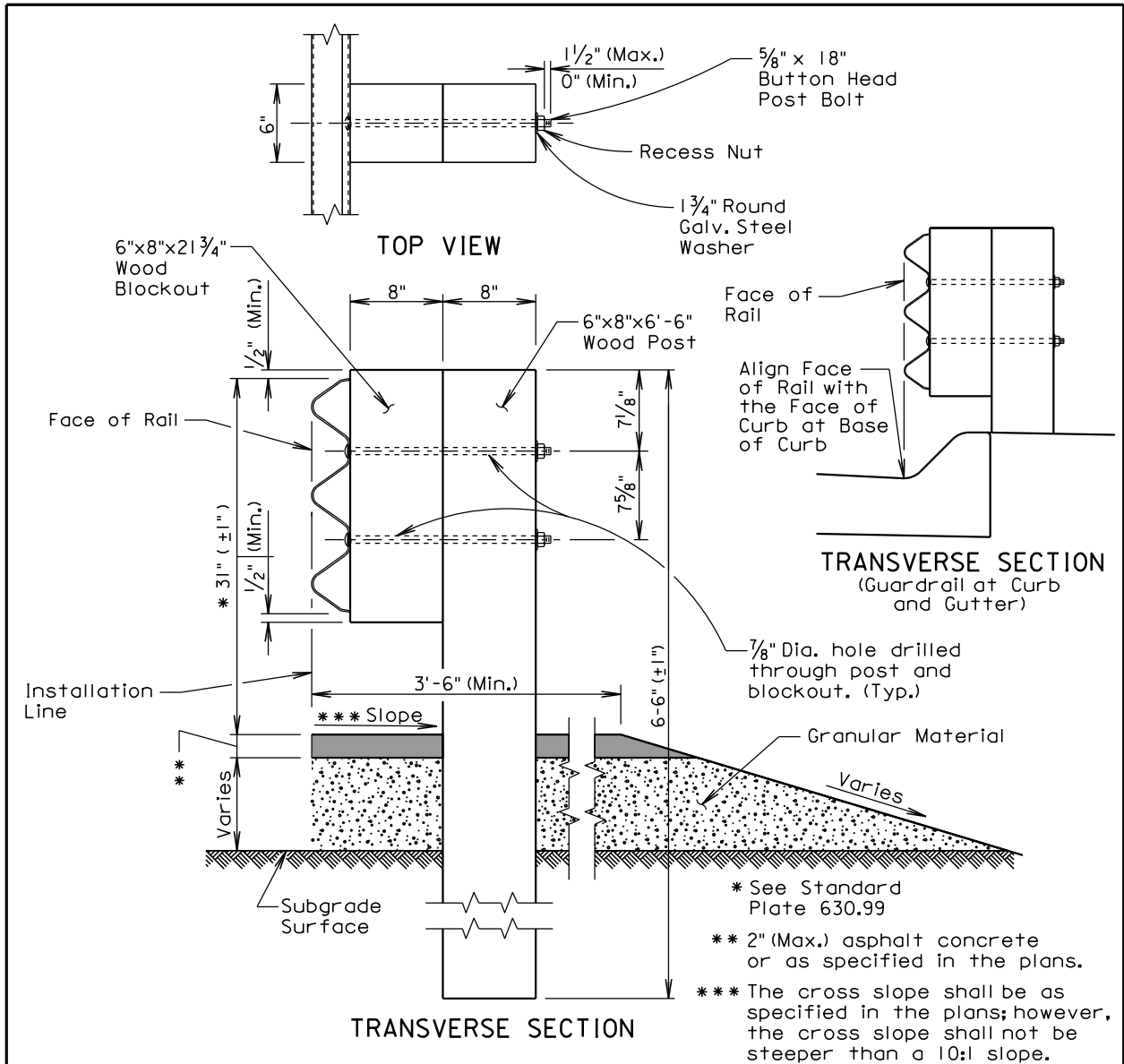
MGS is commonly known as Midwest Guardrail System.

We will have two lists of approved products for steel beam guardrail end terminals. The name of the group might change, but assume they will be W Beam Guardrail End Terminals and MGS End Terminals.

FYI: There is currently NO transitions available that meet MASH test requirements for transitions from W Beam or MGS to High Tension Cable or 3 Cable Guardrail.

FYI: There is currently NO High Tension Cable or 3 Cable Guardrail systems or end terminals/anchors available that meet MASH Crash Testing Requirements.

Bid Items: New bid items have not been added to the system yet for the new guardrail transitions or types of MGS. Our plan is to use bid items to encompass (pay for) the whole transition for all of the new transitions to MGS. Older transitions will be paid for by their separate items as is currently being done; however, the plans could reference the transition type ## in the plans instead of spelling out all the bid item descriptions on the layouts. MGS will be paid for based on the type of MGS used. The plan is to add the bid items after all of the 630 Series of plates have been reviewed and corrected for use.



**GENERAL NOTES:**

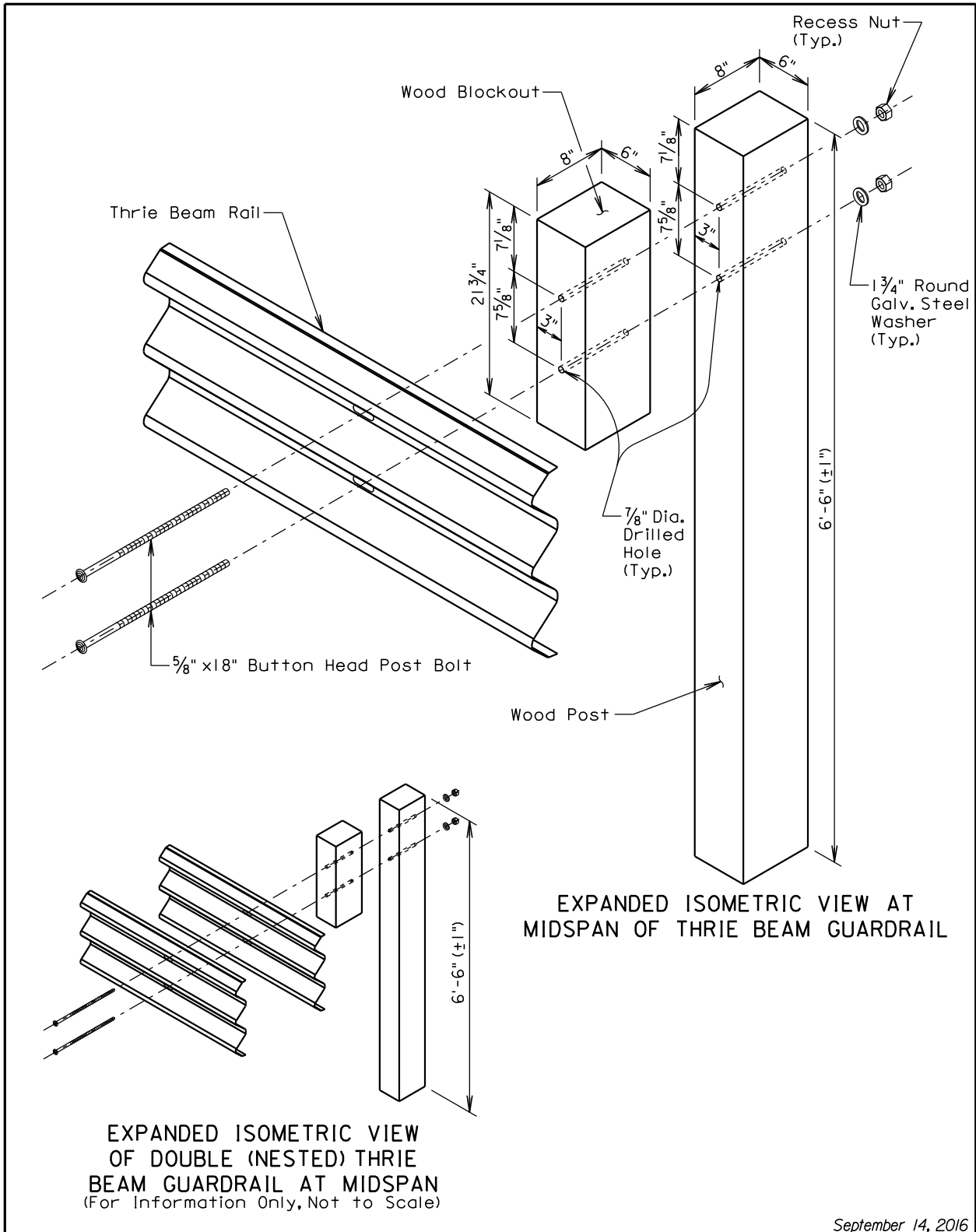
Asphalt concrete shall be the same type used elsewhere on the project or shall be as specified in the plans. If asphalt concrete is not specified in the plans, the asphalt concrete shall conform to the Specifications for "Asphalt Concrete Composite." For informational purposes, the Rate of Materials for the 3.5' wide section of asphalt concrete as shown above shall be 4.80 Tons per Station.

Granular material shall be the same type used elsewhere on the project or shall be as specified in the plans. If granular material type is not specified in the plans, the material shall conform to the Specifications for "Base Course". The granular material shall be placed the same thickness as the mainline surfacing or as specified in the plans.

The top of post and top of block shall have a true square cut. The top of block shall be a maximum of ± 1/2 inch from the top of the post.

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<p><b>FOR REVIEW ONLY</b></p> <p>12/02/2016</p>	<p><b>S D D O T</b></p>	<p><b>THRE BEAM GUARDRAIL</b></p>	<p>PLATE NUMBER</p> <p><b>630.01</b></p>
			<p>Sheet 1 of 5</p>



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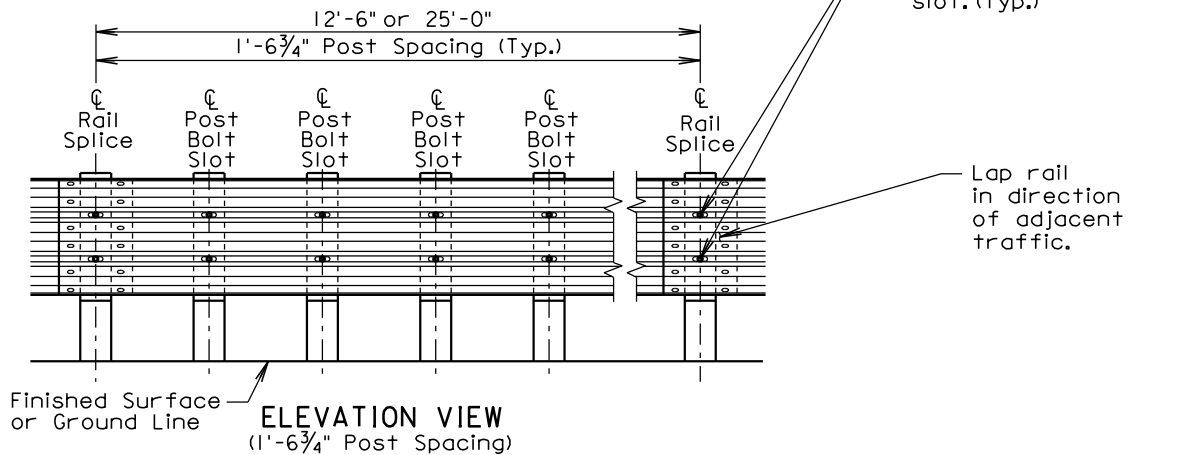
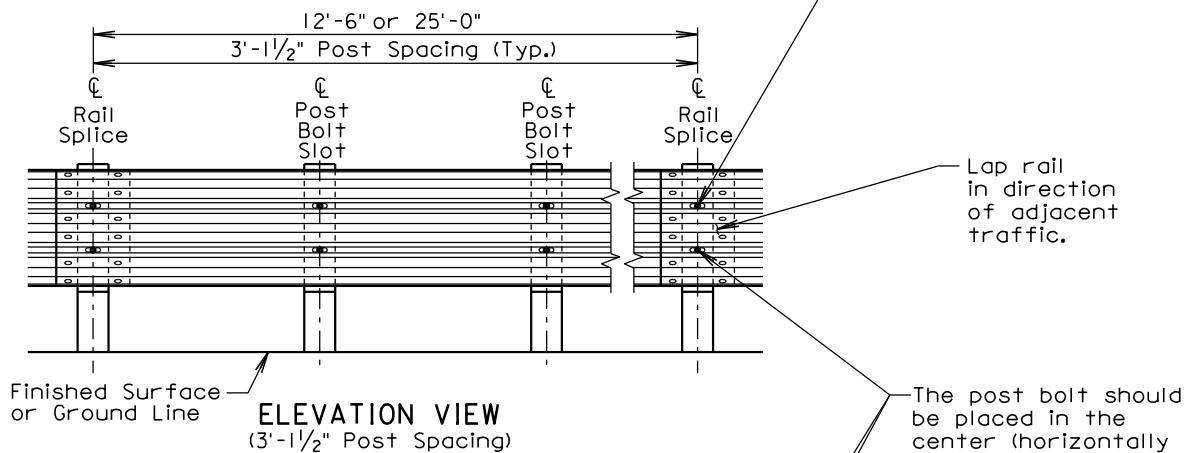
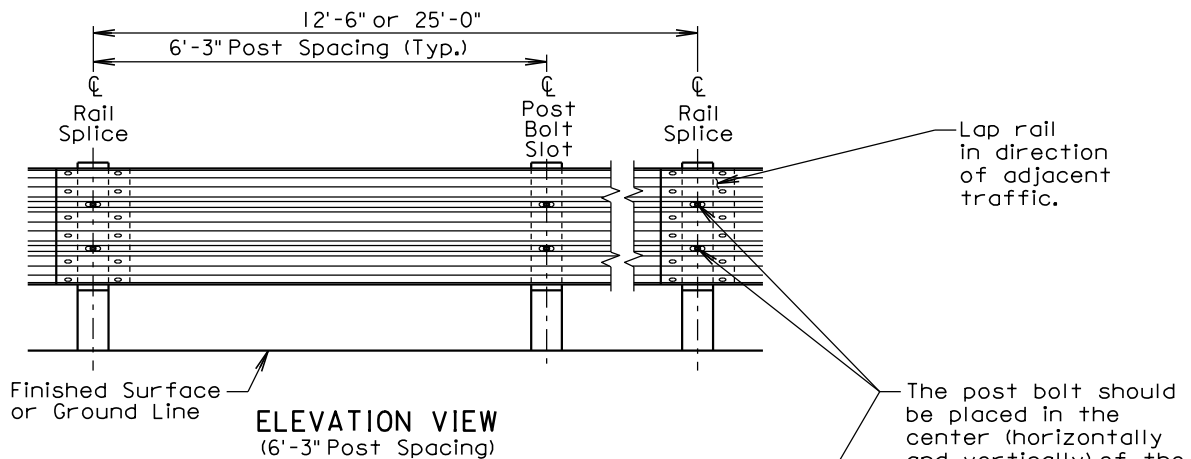
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**THRIE BEAM GUARDRAIL**

PLATE NUMBER  
**630.01**

Sheet 2 of 5



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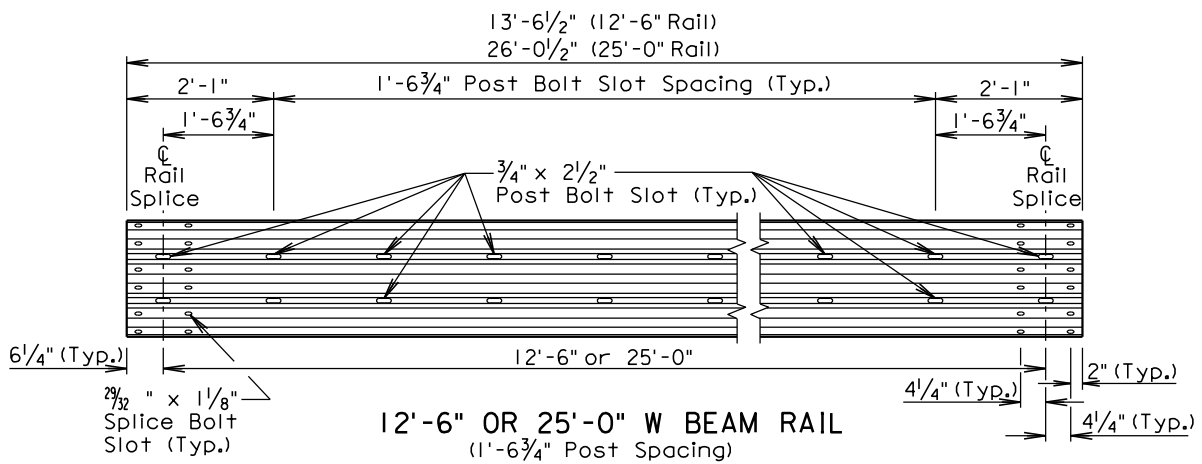
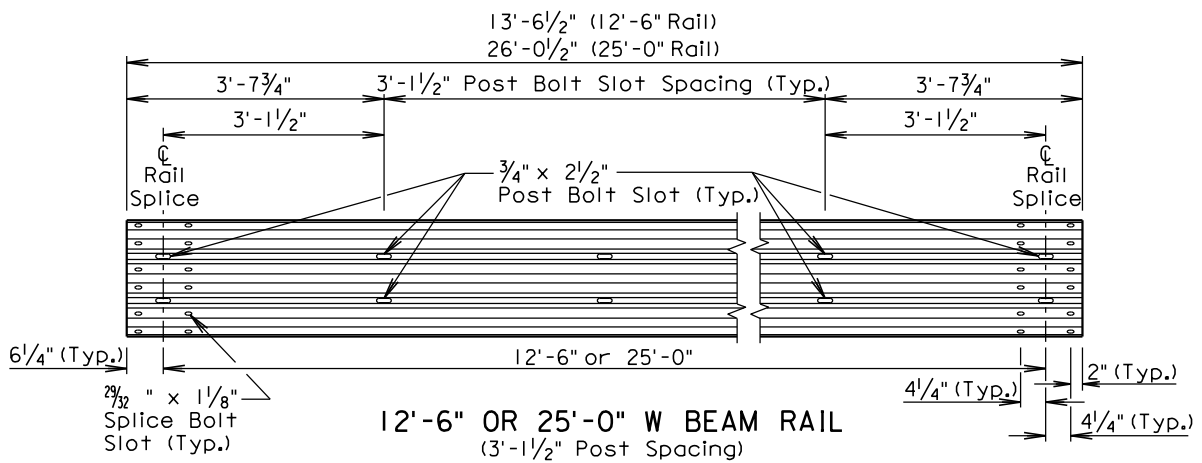
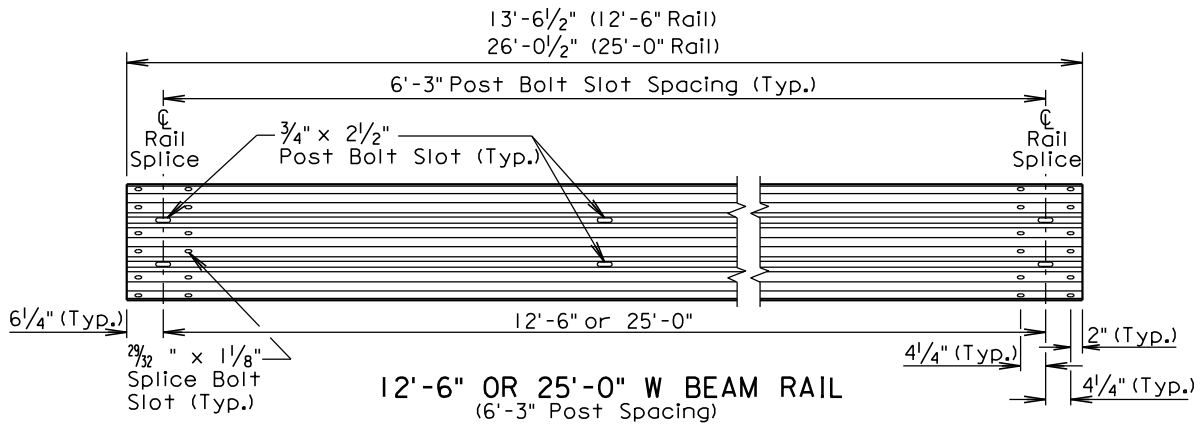
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**THREE BEAM GUARDRAIL**

PLATE NUMBER  
**630.01**

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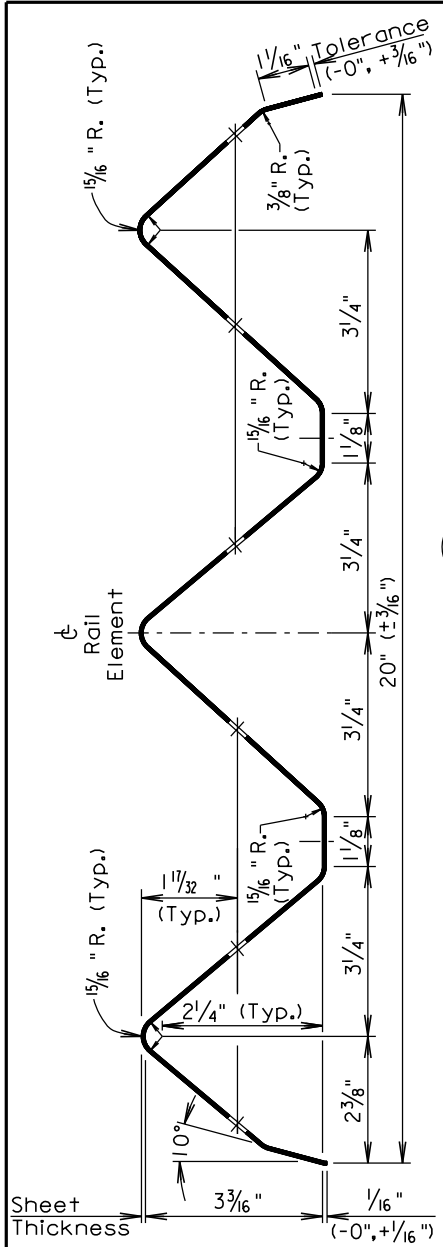
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**THRE BEAM GUARDRAIL**

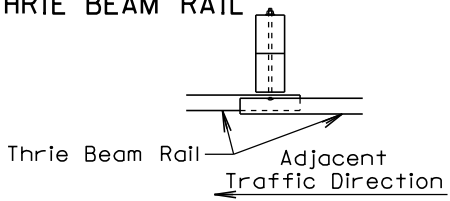
PLATE NUMBER  
630.01

Sheet 4 of 5



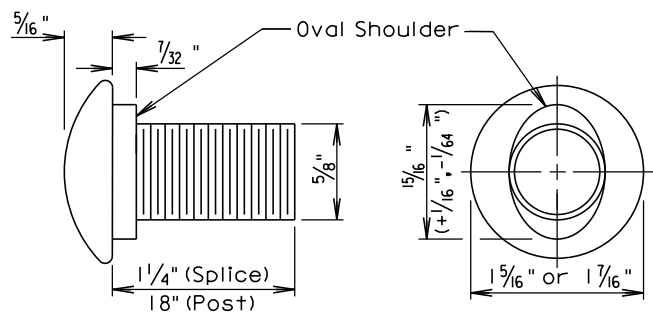
**SECTION THROUGH THRIE BEAM RAIL**

Sheet Thickness

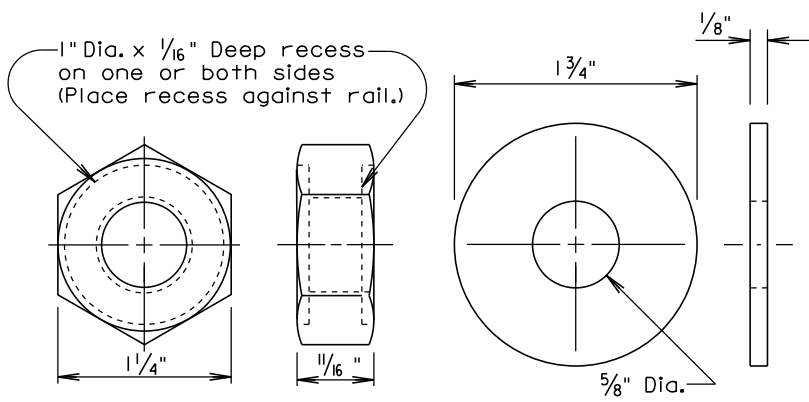


**PLAN VIEW (Lap Splice)**

(Lap rail in direction of adjacent traffic.)

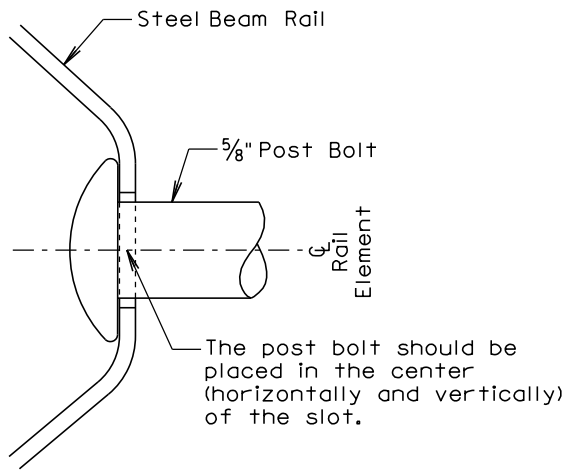


**SPLICE BOLT AND POST BOLT**  
(5/8" Button Head Bolt)



**RECESS NUT AND WASHER**

(Recess nut shall be used with splice bolt and post bolt.)  
(The washer shall be placed between the recess nut and the post.)



**SECTION VIEW (At Post Bolt)**

The post bolt should be placed in the center (horizontally and vertically) of the slot.

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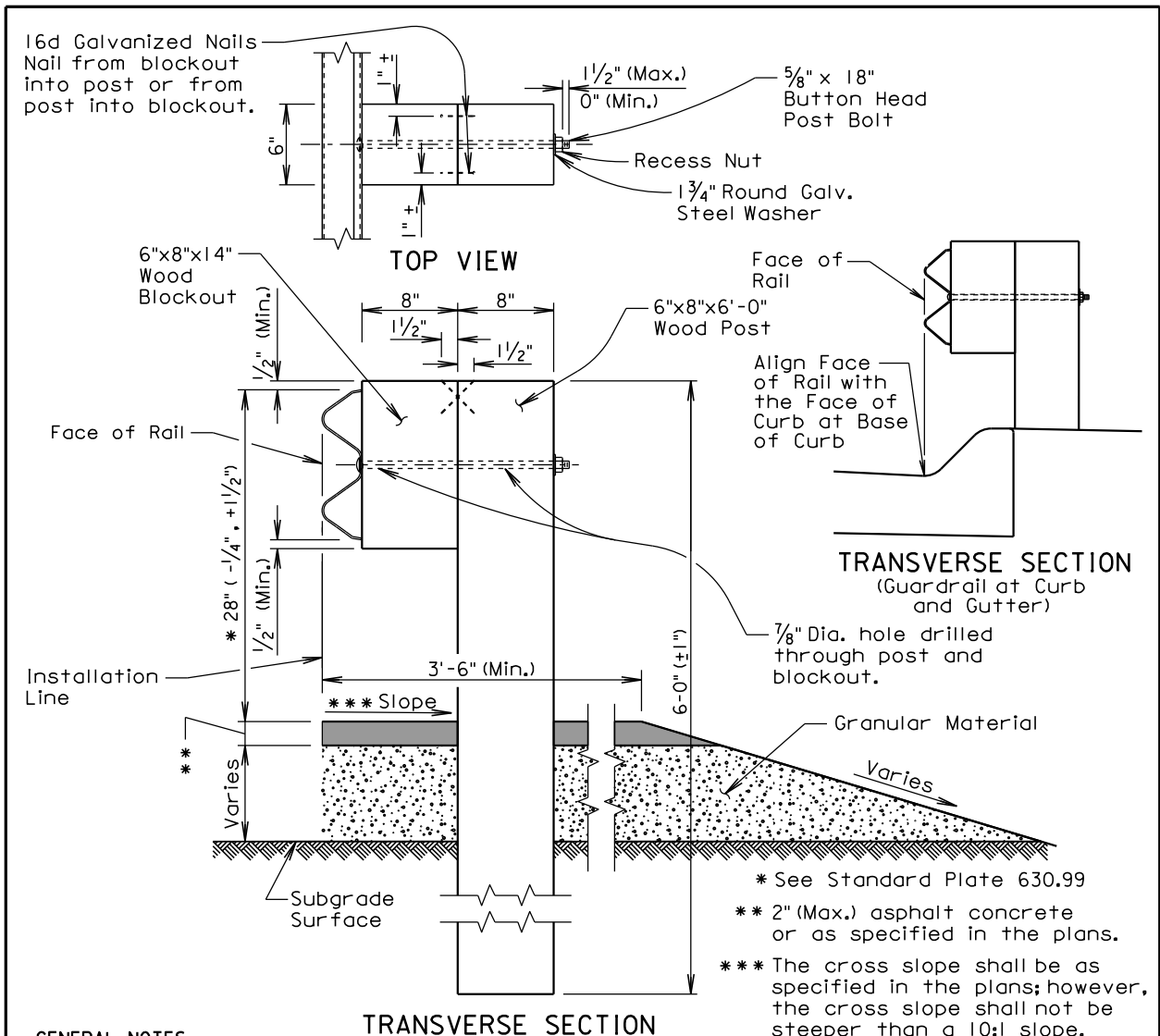
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**THRIE BEAM GUARDRAIL**

**PLATE NUMBER**  
**630.01**

Sheet 5 of 5



16d Galvanized Nails  
Nail from blockout  
into post or from  
post into blockout.

1 1/2" (Max.)  
0" (Min.)

5/8" x 18"  
Button Head  
Post Bolt

Recess Nut

1 3/4" Round Galv.  
Steel Washer

6"x8"x14"  
Wood  
Blockout

8" 8"

6"x8"x6'-0"  
Wood Post

Face of  
Rail

Align Face  
of Rail with  
the Face of  
Curb at Base  
of Curb

**TRANSVERSE SECTION**  
(Guardrail at Curb  
and Gutter)

7/8" Dia. hole drilled  
through post and  
blockout.

Face of Rail

Installation  
Line

\* 28" (-1/4", +1 1/2")

3'-6" (Min.)

6'-0" (+/-1")

Granular Material

Varies

Varies

Subgrade  
Surface

\* See Standard Plate 630.99

\*\* 2" (Max.) asphalt concrete  
or as specified in the plans.

\*\*\* The cross slope shall be as  
specified in the plans; however,  
the cross slope shall not be  
steeper than a 10:1 slope.

**GENERAL NOTES:**

Asphalt concrete shall be the same type used elsewhere on the project or shall be as specified in the plans. If asphalt concrete is not specified in the plans, the asphalt concrete shall conform to the Specifications for "Asphalt Concrete Composite."  
For informational purposes, the Rate of Materials for the 3.5' wide section of asphalt concrete as shown on the drawing above shall be 4.80 Tons per Station.

Granular material shall be the same type used elsewhere on the project or shall be as specified in the plans. If granular material type is not specified in the plans, the material shall conform to the Specifications for "Base Course". The granular material shall be placed the same thickness as the mainline surfacing or as specified in the plans.

All W beam rail shall be Type I and Class A (12 Ga.) unless specified otherwise in the plans.

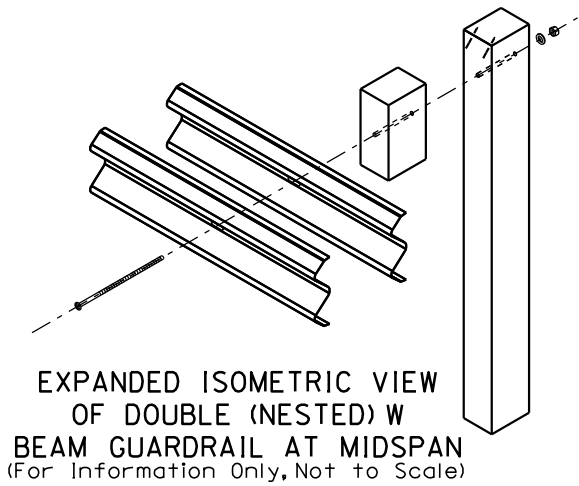
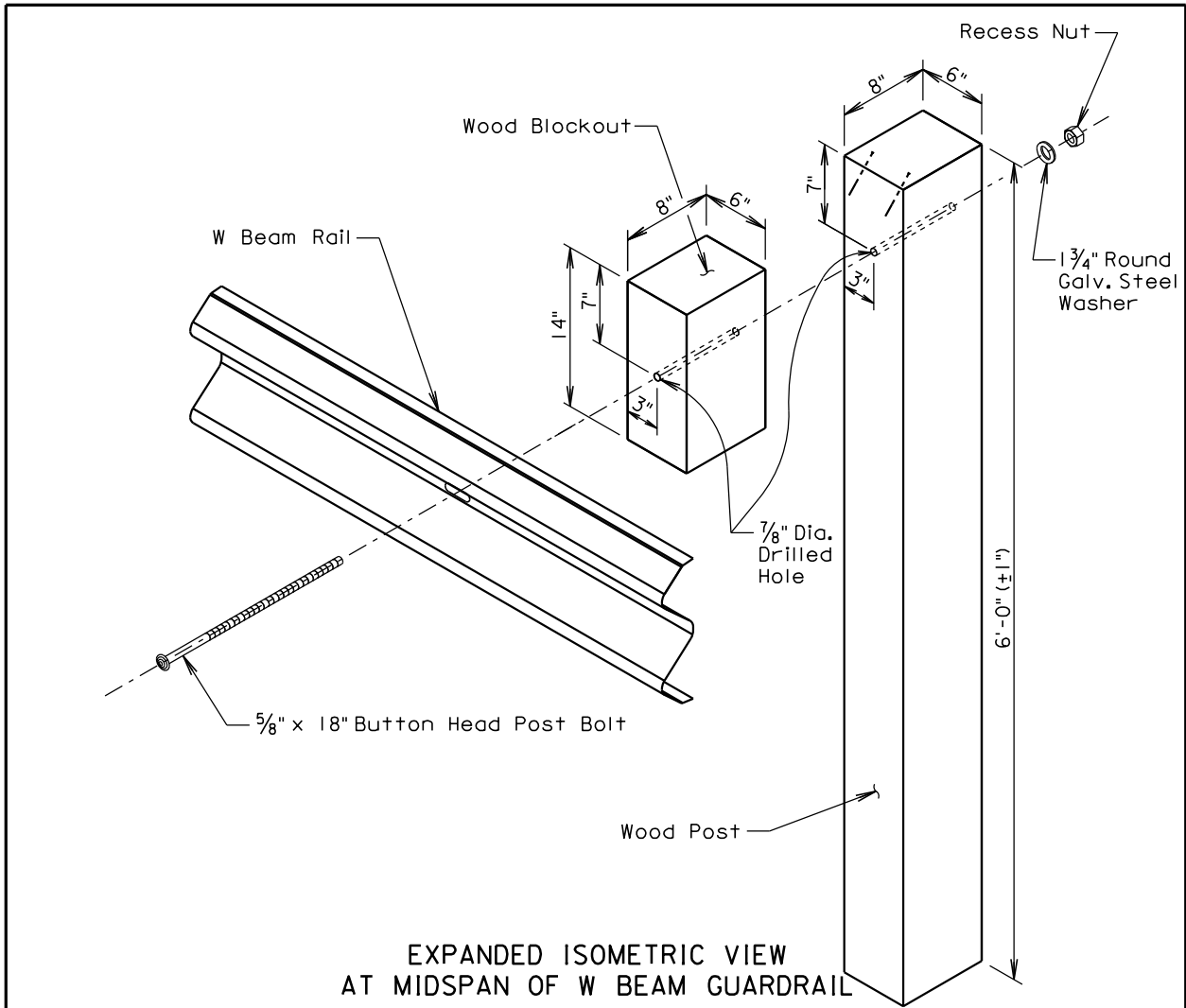
W beam rail section lengths may be 12'-6" and/or 25'-0". The combination of section lengths used shall be compatible with the total length of rail per site as shown in the plans.

The top of post and top of block shall have a true square cut. The top of block shall be a maximum of ±1/2 inch from the top of the post.

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<p><b>FOR REVIEW ONLY</b> 12/02/2016</p>	<p><b>S D D O T</b></p>	<p><b>W BEAM GUARDRAIL</b></p>	<p>PLATE NUMBER <b>630.10</b></p>
			<p>Sheet 1 of 5</p>





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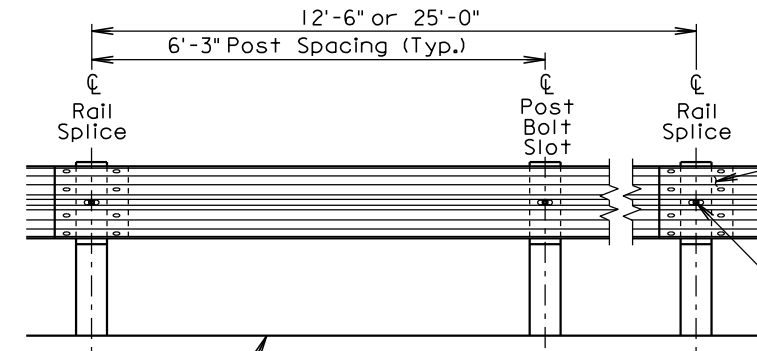
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**W BEAM GUARDRAIL**

PLATE NUMBER  
**630.10**

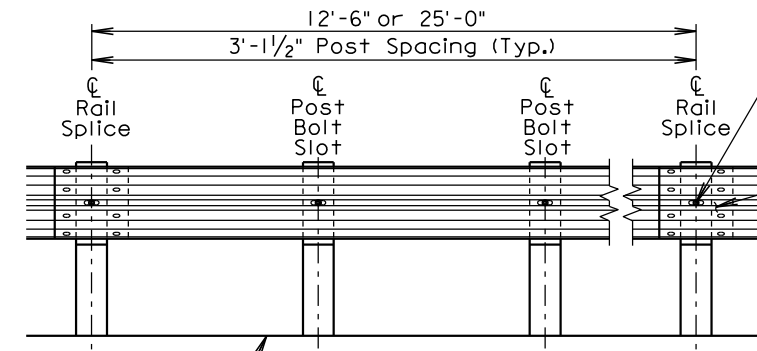
Sheet 2 of 5



Finished Surface or Ground Line  
**ELEVATION VIEW**  
 (6'-3" Post Spacing)

Lap rail in direction of adjacent traffic.

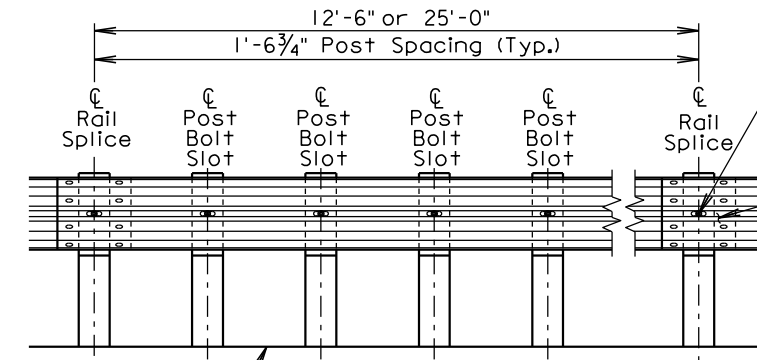
The post bolt should be placed in the center (horizontally and vertically) of the slot. (Typ.)



Finished Surface or Ground Line  
**ELEVATION VIEW**  
 (3'-1 1/2" Post Spacing)

Lap rail in direction of adjacent traffic.

The post bolt should be placed in the center (horizontally and vertically) of the slot. (Typ.)



Finished Surface or Ground Line  
**ELEVATION VIEW**  
 (1'-6 3/4" Post Spacing)

Lap rail in direction of adjacent traffic.

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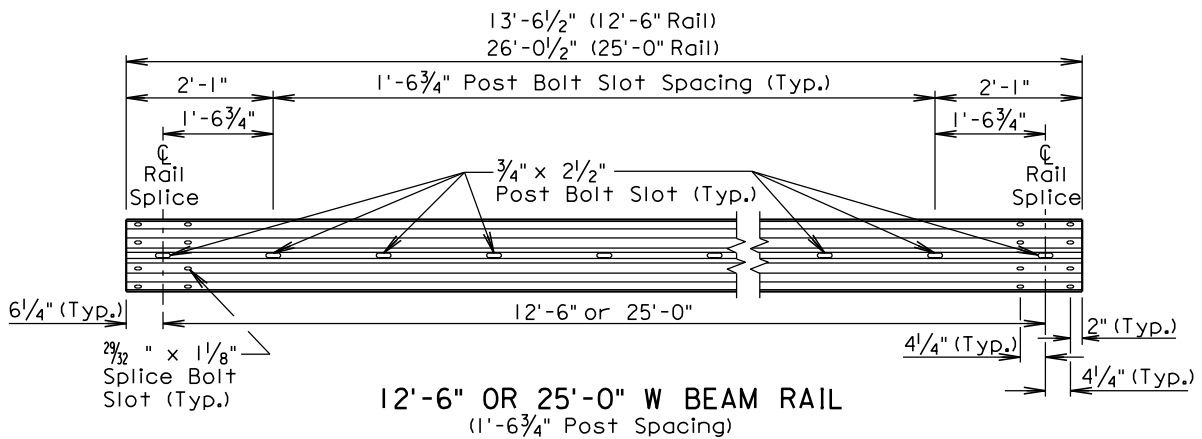
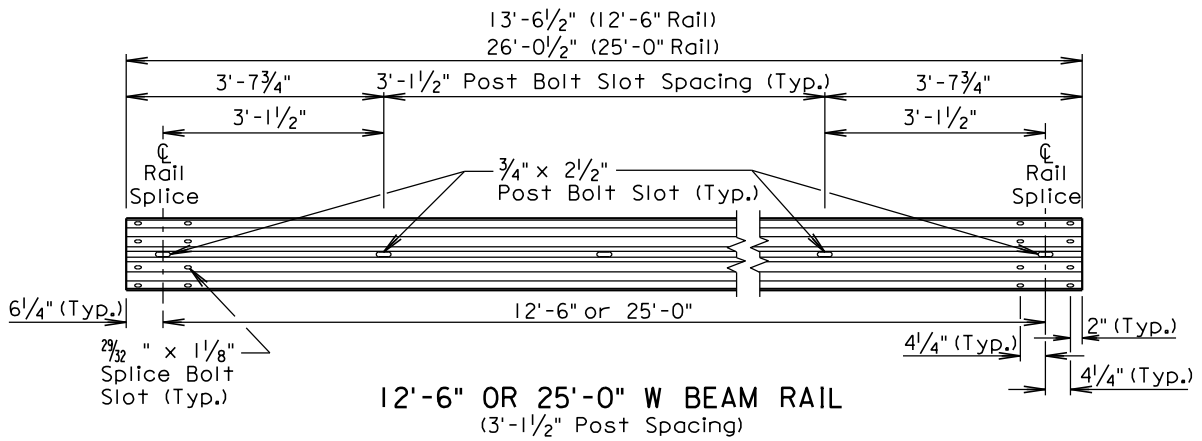
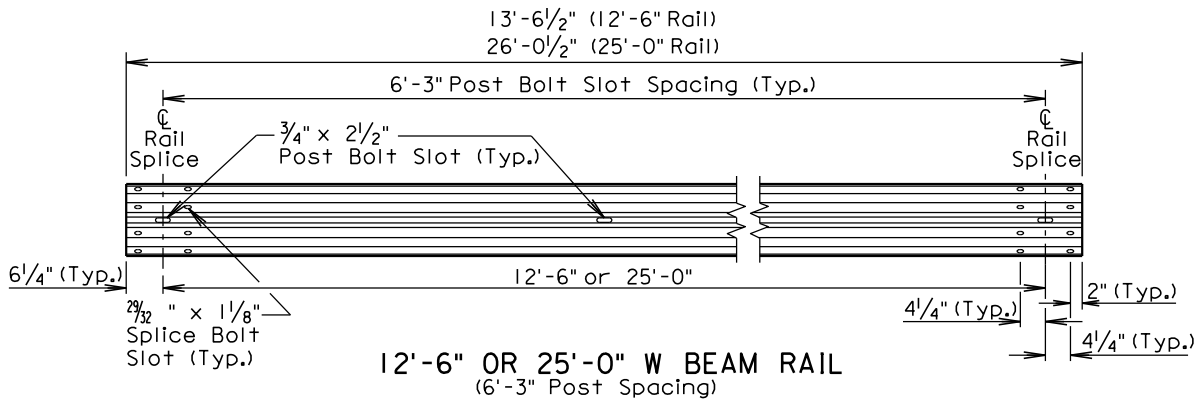
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**W BEAM GUARDRAIL**

**PLATE NUMBER**  
**630.10**

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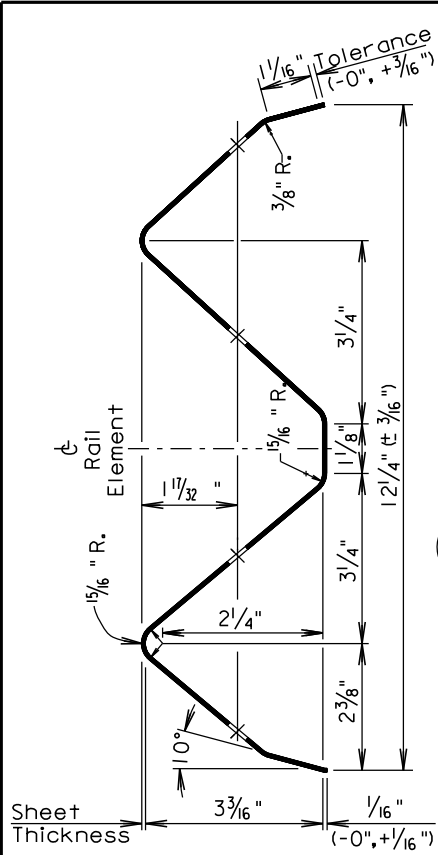
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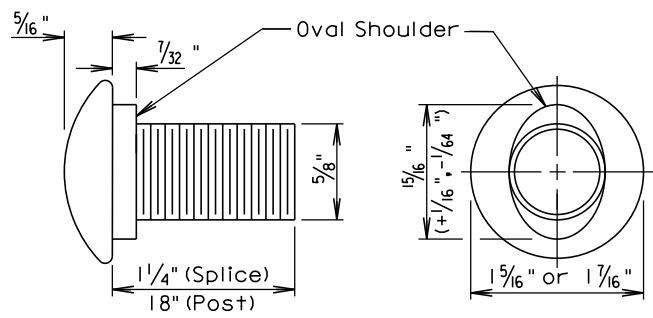
**W BEAM GUARDRAIL**

**PLATE NUMBER**  
**630.10**

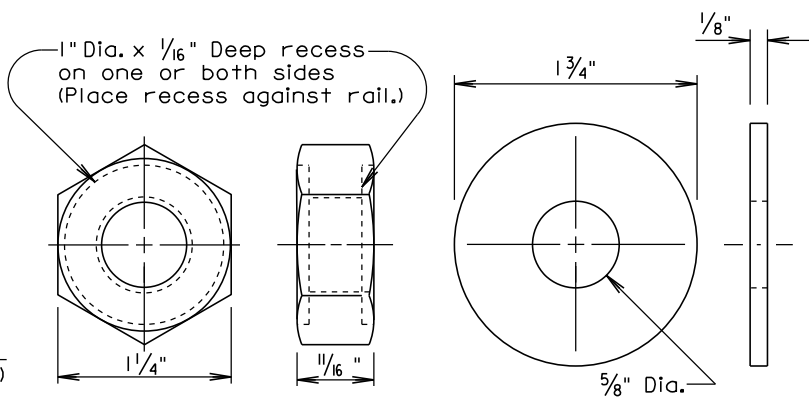
Sheet 4 of 5



**SECTION THROUGH W BEAM RAIL**

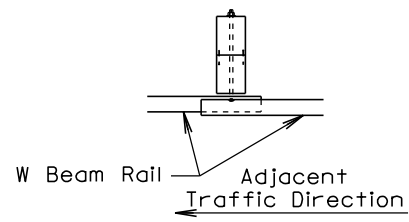


**SPLICE BOLT AND POST BOLT**  
(5/8" Button Head Bolt)

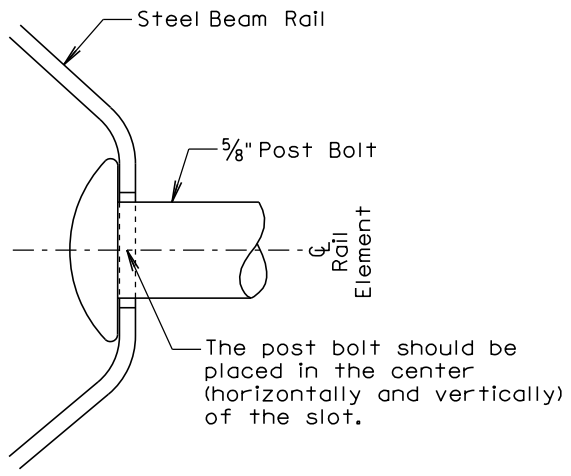


**RECESS NUT AND WASHER**

(Recess nut shall be used with splice bolt and post bolt.)  
(The washer shall be placed between the recess nut and the post.)



**PLAN VIEW**  
(Lap Splice)  
(Lap rail in direction of adjacent traffic.)



**SECTION VIEW**  
(At Post Bolt)

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**W BEAM GUARDRAIL**

**PLATE NUMBER**  
**630.10**

Sheet 5 of 5

TYPE AND DETAILS OF MGS						
Type of MGS	W Beam Rail Single or Double (Nested)	Blockout Size	Blockout Material	Post Size	Post Material	Post Spacing
1	Single	6"x12"x14"	Wood	6"x8"x6'-0"	Wood	6'-3"
1C	Single	6"x12"x14"	Wood	6"x8"x7'-6"	Wood	6'-3"
2	Single	6"x12"x14"	Wood	6"x8"x6'-0"	Wood	3'-1 $\frac{1}{2}$ "
3	Single	6"x12"x14"	Wood	6"x8"x6'-0"	Wood	1'-6 $\frac{3}{4}$ "
4	Double	6"x12"x14"	Wood	6"x8"x6'-0"	Wood	6'-3"

STANDARD PLATE REFERENCE	
Type of MGS	See Standard Plate(s)
1	630.20, 630.22
1C	630.20, 630.25
2	630.20
3	630.20
4	630.20

**GENERAL NOTES:**

Asphalt concrete shall be the same type used elsewhere on the project or shall be as specified in the plans. If asphalt concrete is not specified in the plans, the asphalt concrete shall conform to the Specifications for "Asphalt Concrete Composite." For informational purposes, the Rate of Materials for the 3.5' wide section of asphalt concrete as shown on the drawing on sheet 2 shall be 4.80 Tons per Station.

Granular material shall be the same type used elsewhere on the project or shall be as specified in the plans. If granular material type is not specified in the plans, the material shall conform to the Specifications for "Base Course". The granular material shall be placed the same thickness as the mainline surfacing or as specified in the plans.

All W beam rail shall be Type 1 and Class A (12 Ga.) unless specified otherwise in the plans.

W beam rail section lengths may be 12'-6" and/or 25'-0". The combination of section lengths used shall be compatible with the total length of rail per site as shown in the plans.

All costs for constructing the MGS including labor, equipment, and materials including all posts, blockouts, steel beam rail, and hardware shall be incidental to the contract unit price per foot for the respective MGS bid item.

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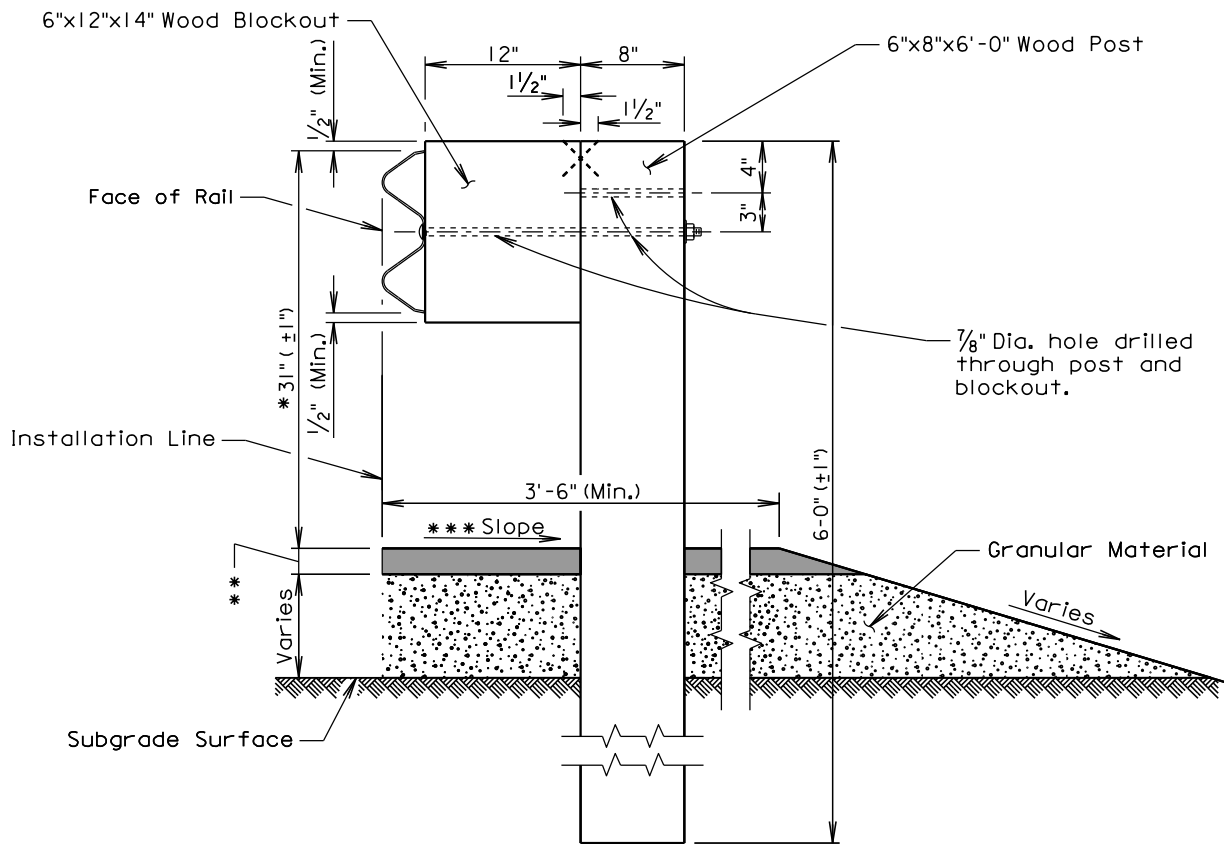
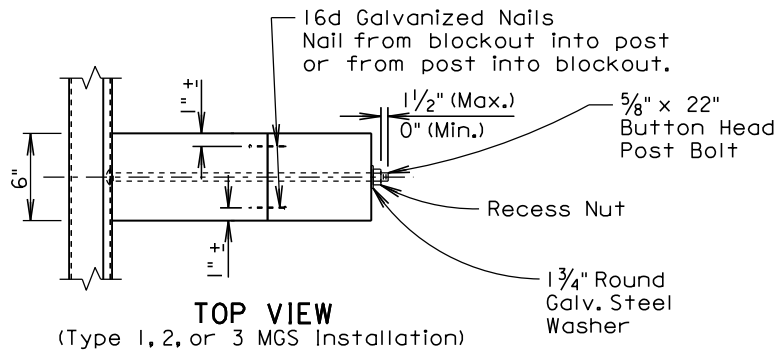
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**MIDWEST GUARDRAIL SYSTEM (MGS)**

**PLATE NUMBER**  
**630.20**

Sheet 1 of 6



\* See Standard Plate 630.99

\*\* 2" (Max.) asphalt concrete  
or as specified in the plans.

\*\*\* The cross slope shall be as  
specified in the plans; however,  
the cross slope shall not be  
steeper than a 10:1 slope.

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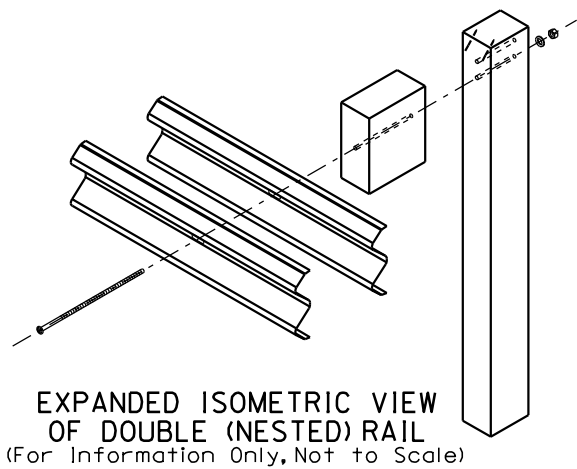
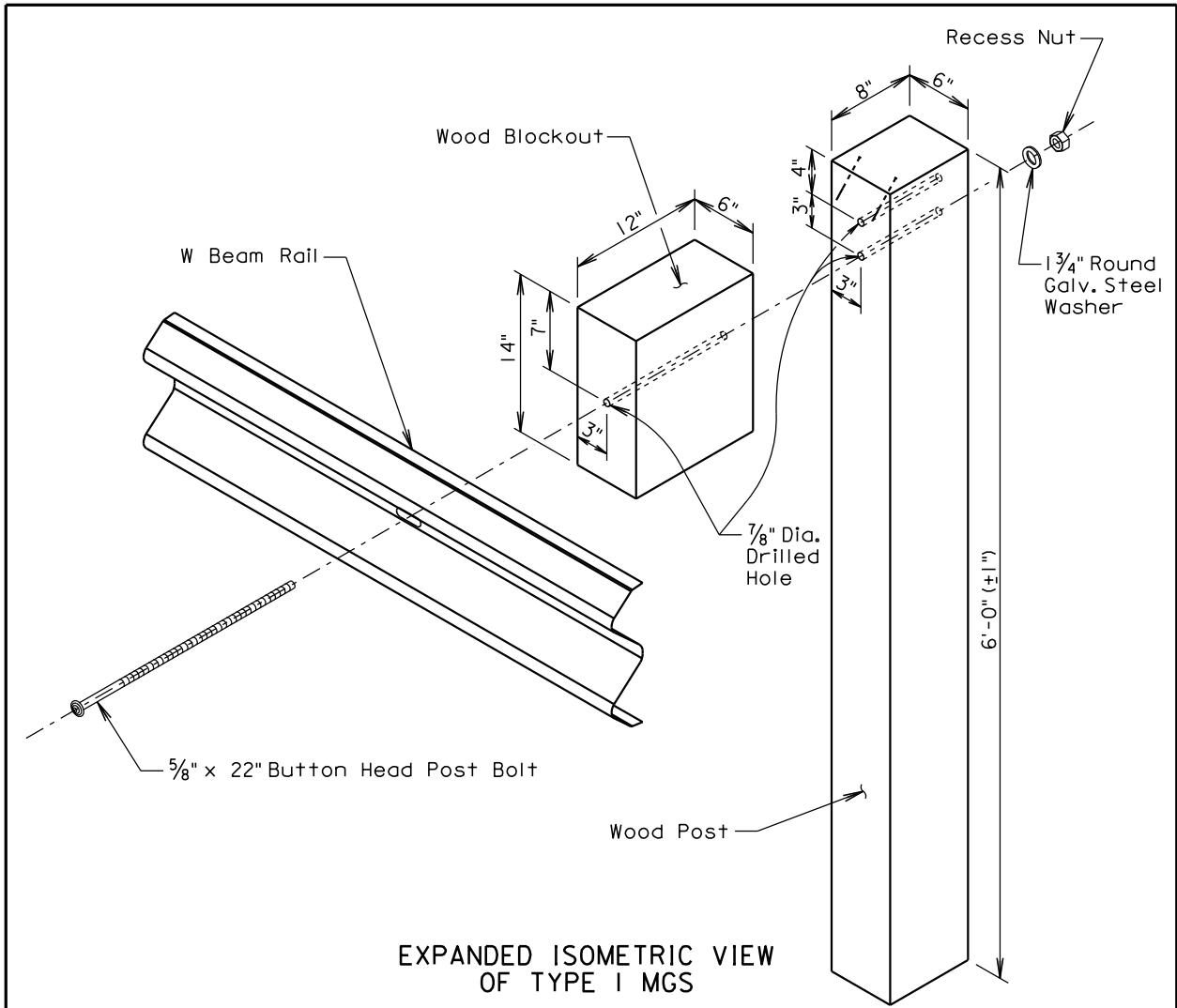
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**MIDWEST GUARDRAIL SYSTEM (MGS)**

PLATE NUMBER  
**630.20**

Sheet 2 of 6



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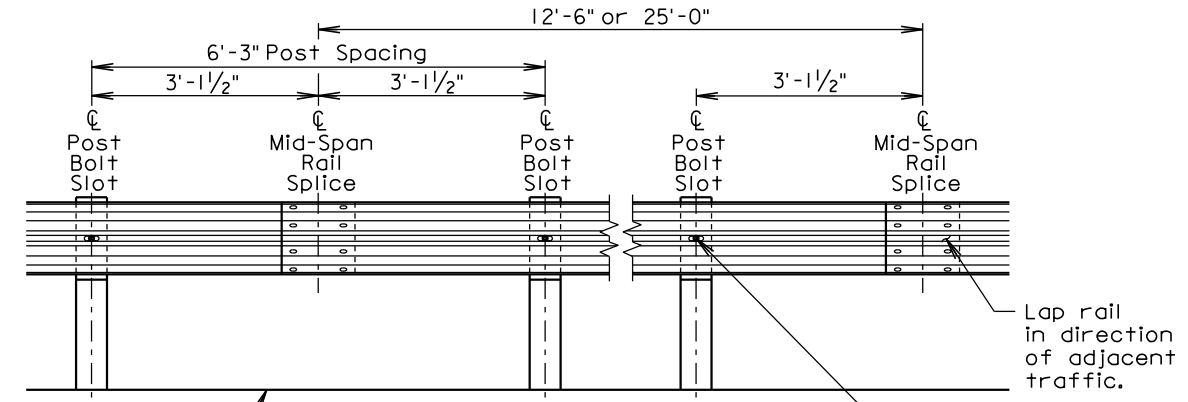
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**MIDWEST GUARDRAIL SYSTEM (MGS)**

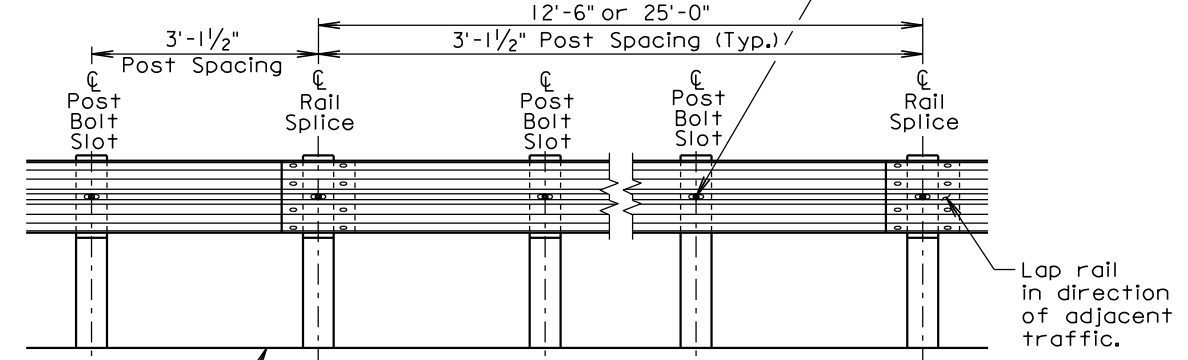
PLATE NUMBER  
**630.20**

Sheet 3 of 6



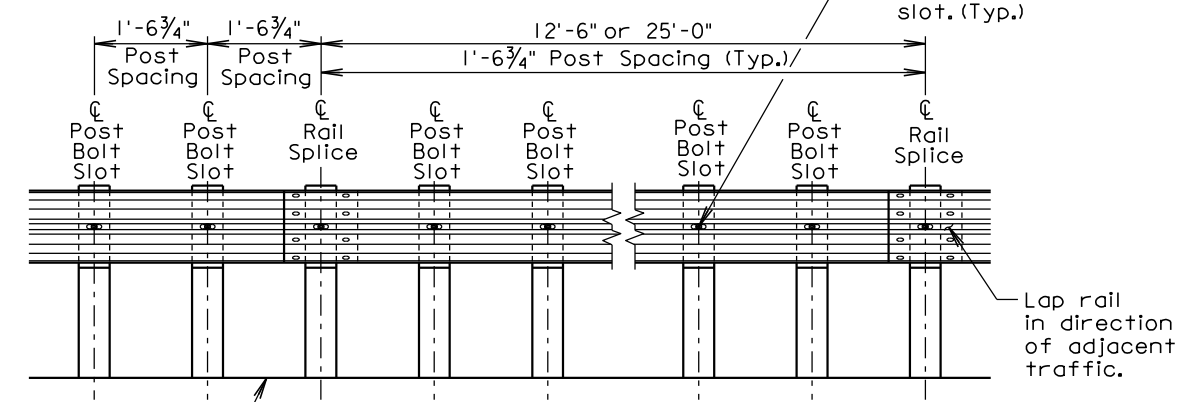
**ELEVATION VIEW**  
(6'-3" Post Spacing)

The post bolt should be placed in the center (horizontally and vertically) of the slot. (Typ.)



**ELEVATION VIEW**  
(3'-1 1/2" Post Spacing)

The post bolt should be placed in the center (horizontally and vertically) of the slot. (Typ.)



**ELEVATION VIEW**  
(1'-6 3/4" Post Spacing)

Lap rail in direction of adjacent traffic.

September 14, 2016

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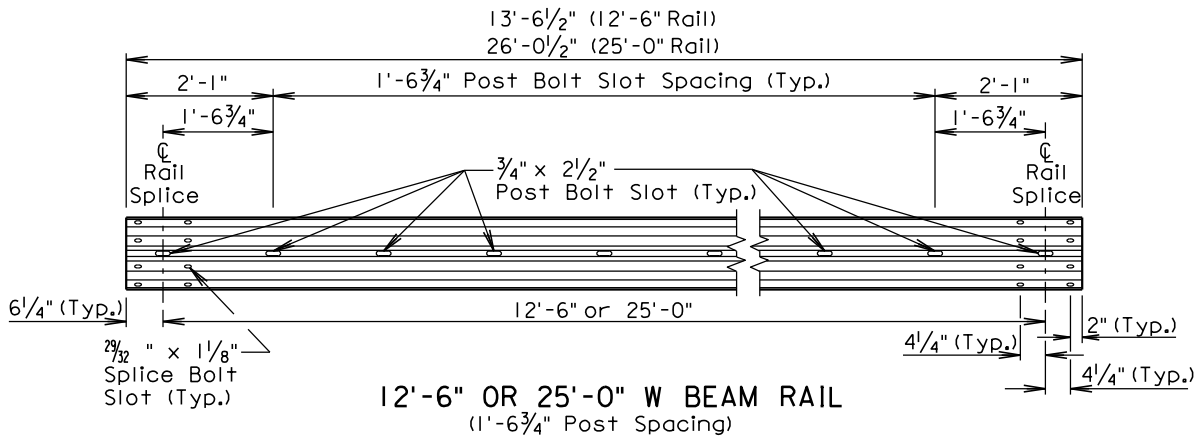
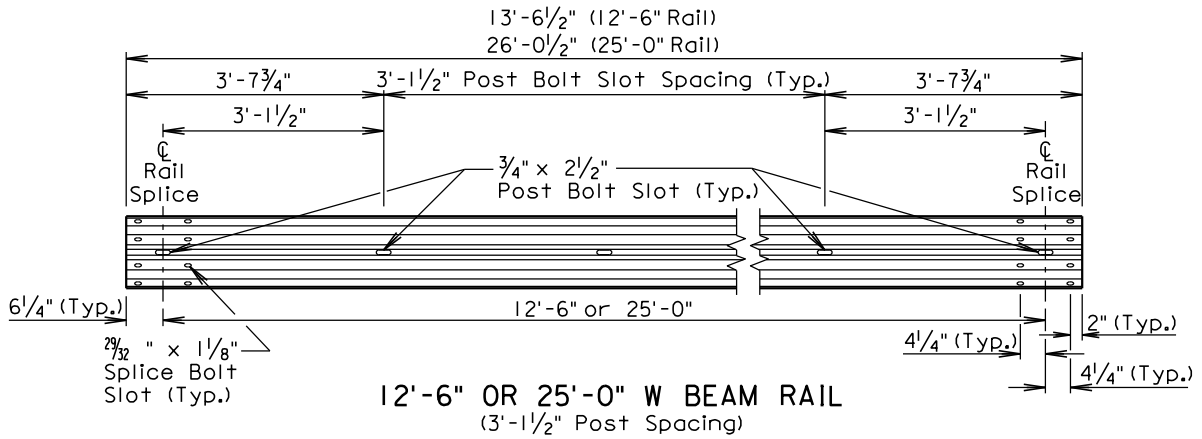
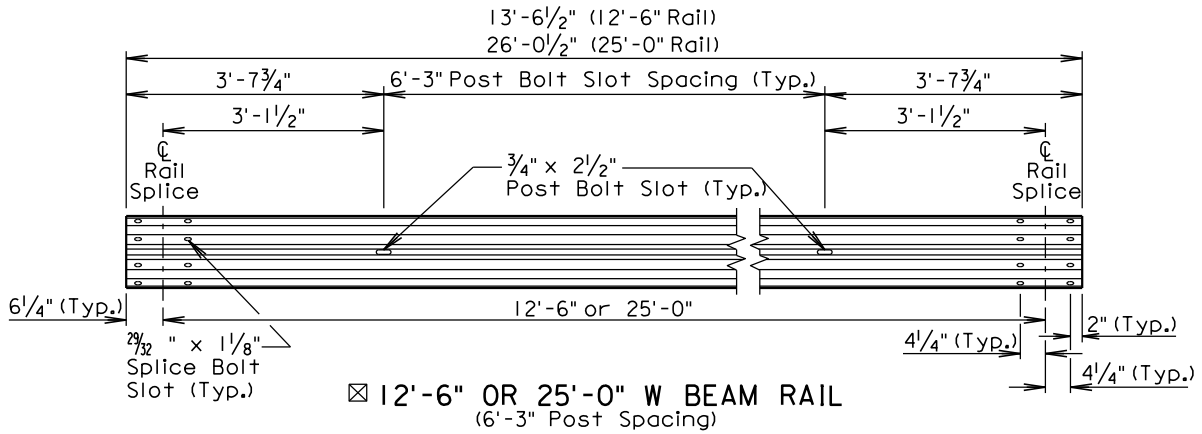
**MIDWEST GUARDRAIL SYSTEM (MGS)**

PLATE NUMBER  
**630.20**

Sheet 4 of 6



☒ Post bolt slots shall not be located at the lap splice.



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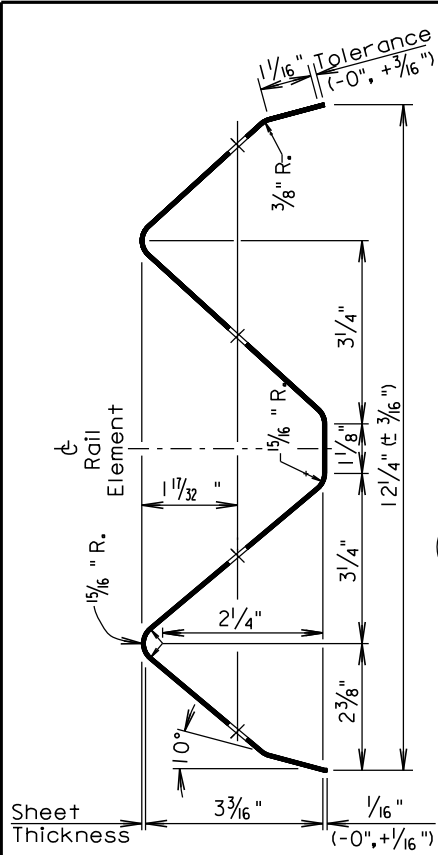
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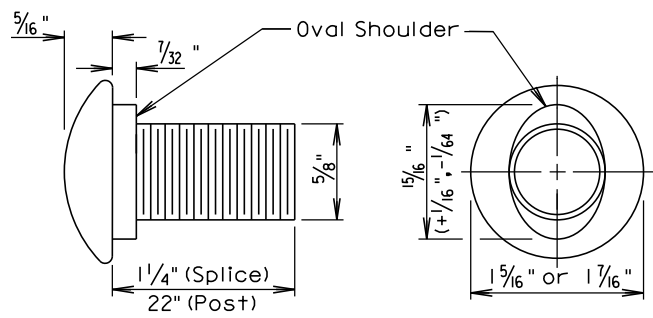
**MIDWEST GUARDRAIL SYSTEM (MGS)**

PLATE NUMBER  
630.20

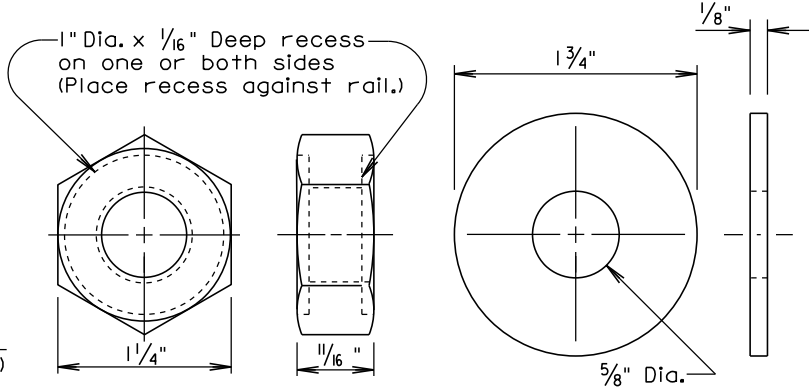
Sheet 5 of 6



**SECTION THROUGH W BEAM RAIL**

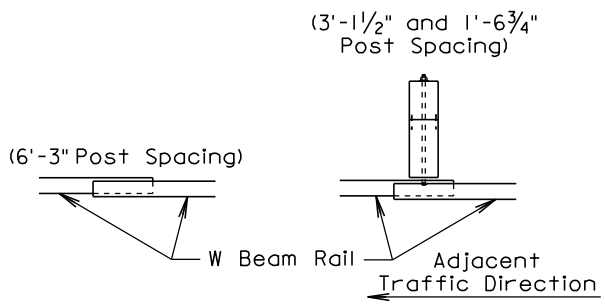


**SPLICE BOLT AND POST BOLT**  
(5/8" Button Head Bolt)



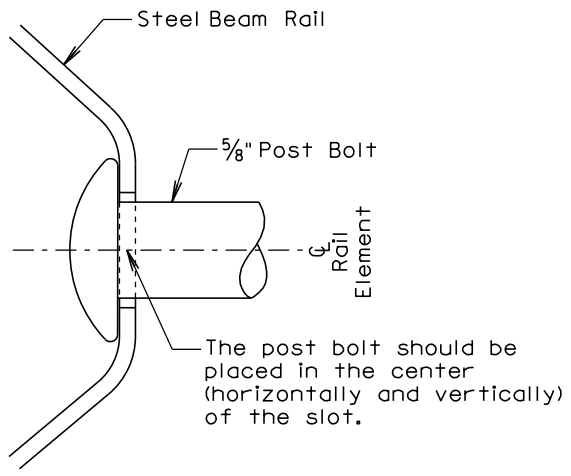
**RECESS NUT AND WASHER**

(Recess nut shall be used with splice bolt and post bolt.)  
(The washer shall be placed between the recess nut and the post.)



**PLAN VIEW**

(Lap rail in direction of adjacent traffic.)



**SECTION VIEW**

(At Post Bolt)

September 14, 2016

**FOR REVIEW ONLY**  
12/02/2016

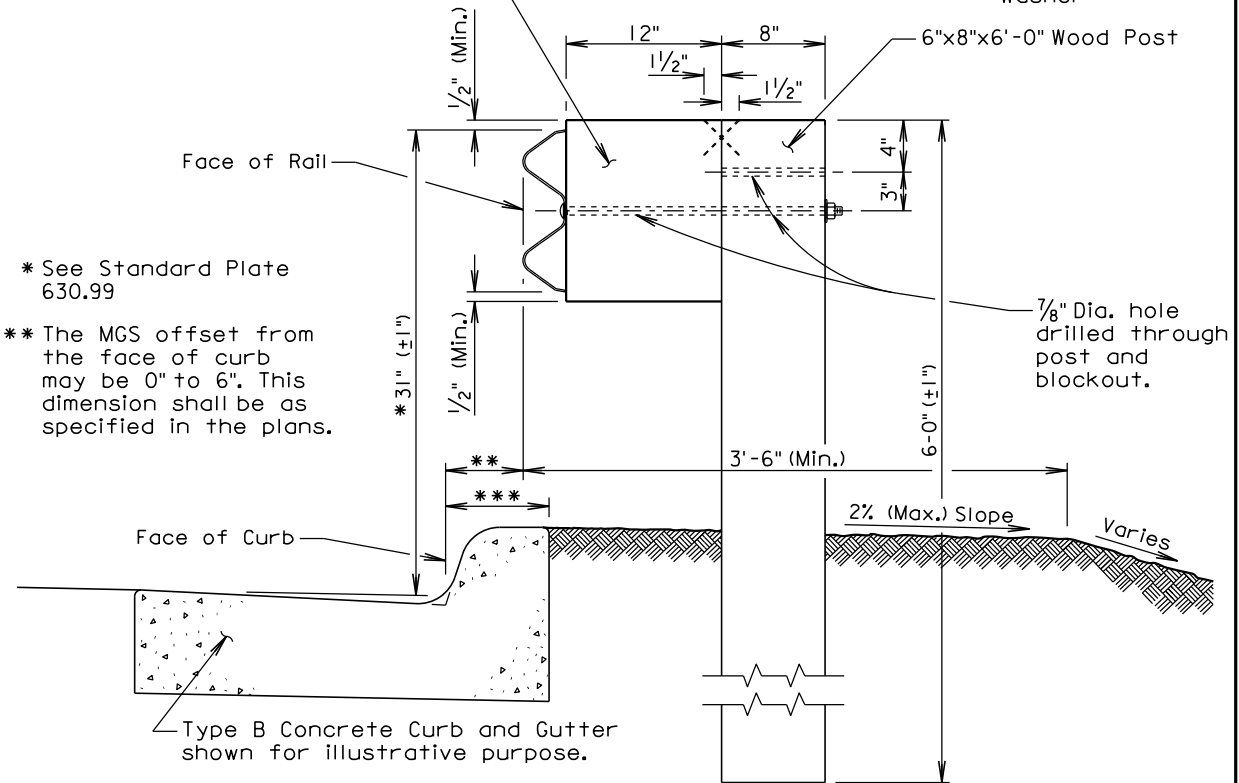
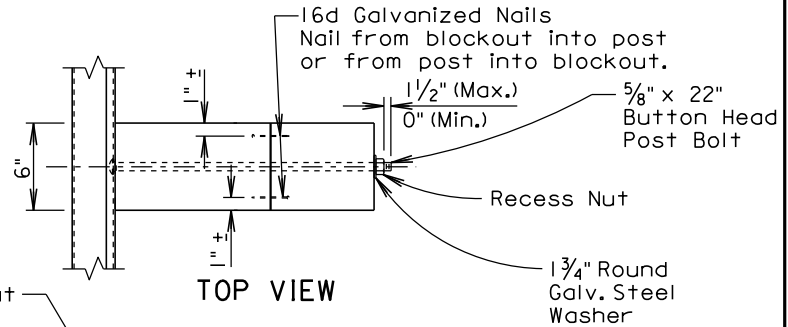
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**MIDWEST GUARDRAIL SYSTEM (MGS)**

**PLATE NUMBER**  
**630.20**

Sheet 6 of 6

Concrete Curb and Gutter Type	Dimension *** (In.)
B and BL	8
D	12
F and FL	10
R	11



\* See Standard Plate 630.99

\*\* The MGS offset from the face of curb may be 0" to 6". This dimension shall be as specified in the plans.

Type B Concrete Curb and Gutter shown for illustrative purpose.

TRANSVERSE SECTION

GENERAL NOTES:

The guardrail on this standard plate is Type I MGS. See standard plate 630.20 for specifications regarding Type I MGS.

When PCC pavement or asphalt concrete pavement (thicker than 2") is adjacent to the MGS, the minimum distance allowed between the back of the guardrail post to the edge of the pavement is 7 inches.

September 14, 2016

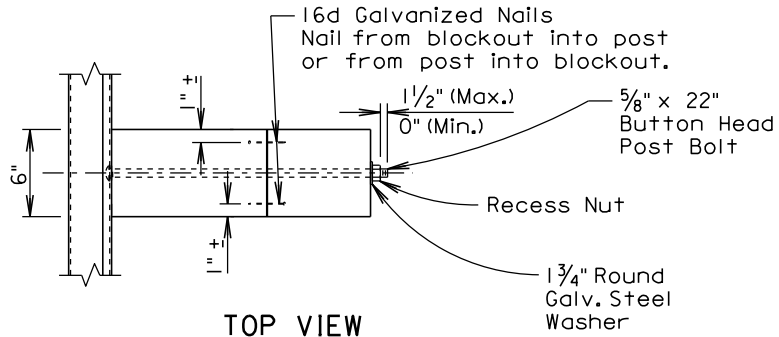
**FOR REVIEW ONLY**  
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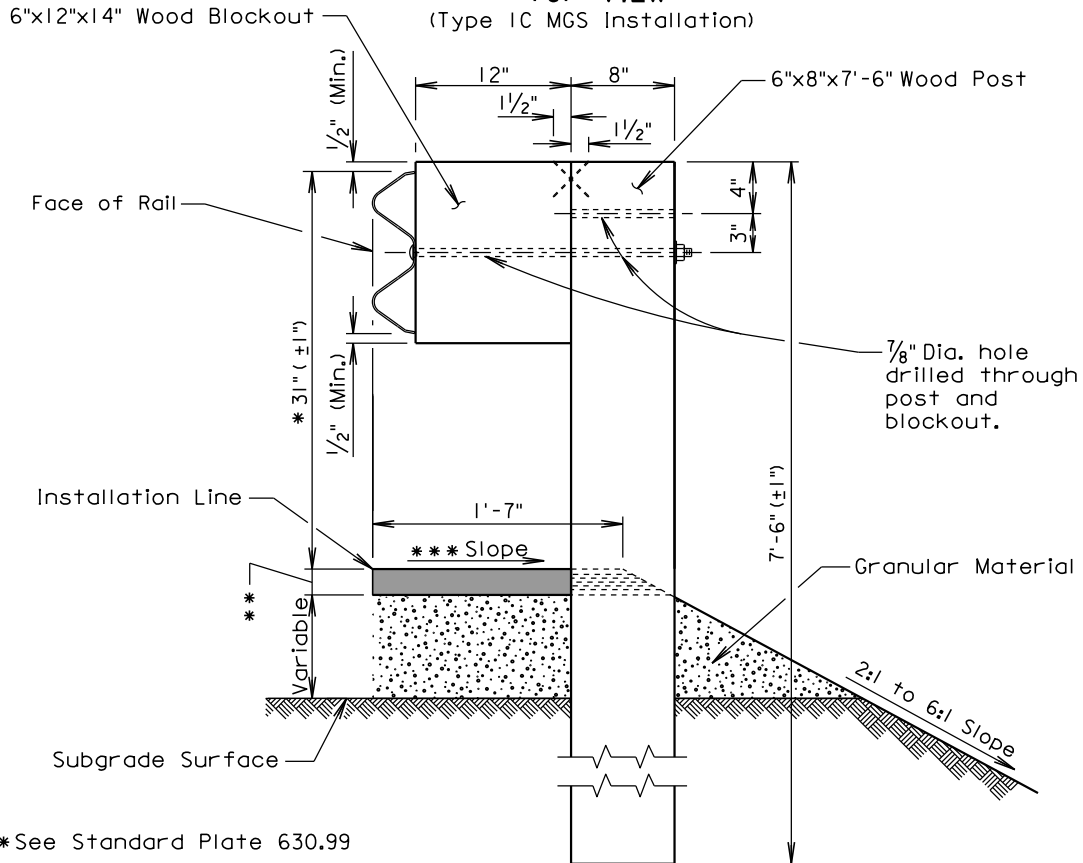
**MIDWEST GUARDRAIL SYSTEM (MGS)  
AT CURB AND GUTTER**

PLATE NUMBER  
**630.22**

Sheet 1 of 1



**TOP VIEW**  
(Type IC MGS Installation)



**TRANSVERSE SECTION**  
(Type IC MGS Installation)

\*See Standard Plate 630.99

\*\* 2" (Max.) asphalt concrete or as specified in the plans.

\*\*\*The cross slope shall be as specified in the plans; however, the cross slope shall not be steeper than a 10:1 slope.

**GENERAL NOTES:**

The guardrail on this standard plate is Type IC MGS. See standard plate 630.20 for specifications regarding Type IC MGS.

September 14, 2016

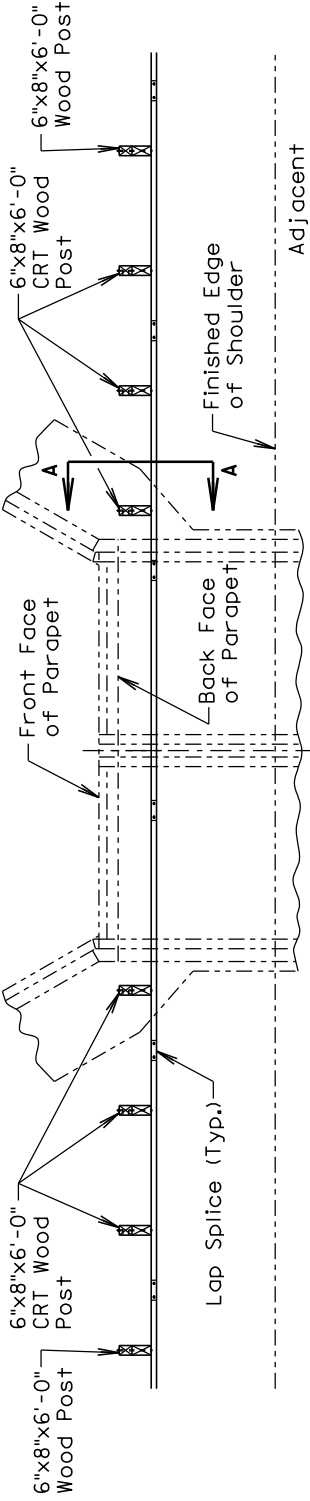
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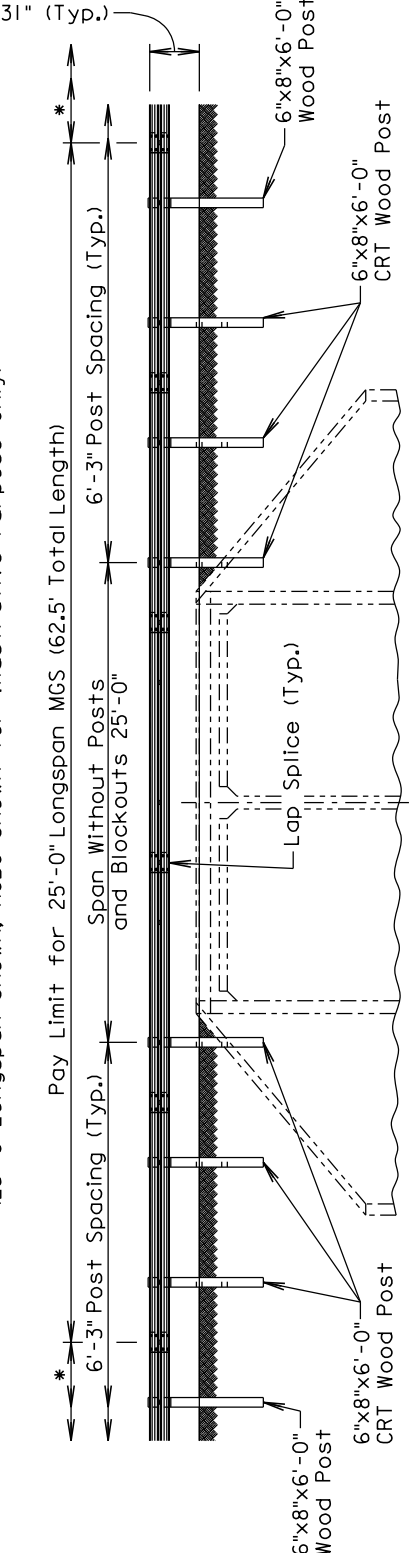
**TYPE 1C MIDWEST GUARDRAIL SYSTEM (MGS)  
INSTALLATION AT BREAK POINT OF SLOPE**

PLATE NUMBER  
**630.25**

Sheet 1 of 1

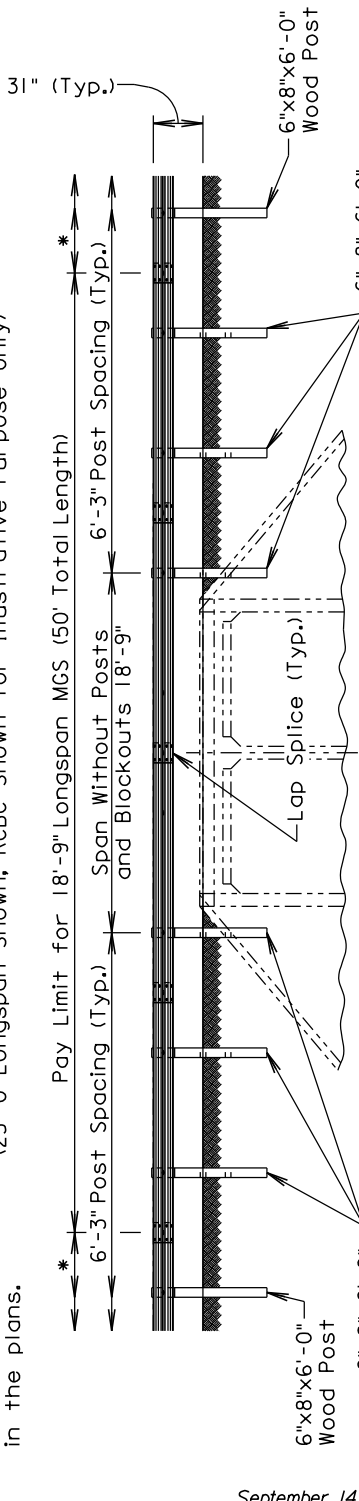


**PLAN VIEW**  
(25'-0" Longspan Shown, RCBC Shown for Illustrative Purpose Only)



**ELEVATION VIEW**  
(25'-0" Longspan Shown, RCBC Shown for Illustrative Purpose Only)

\* MGS as specified in the plans.



**ELEVATION VIEW**  
(18'-9" Longspan Shown, RCBC Shown for Illustrative Purpose Only)

September 14, 2016

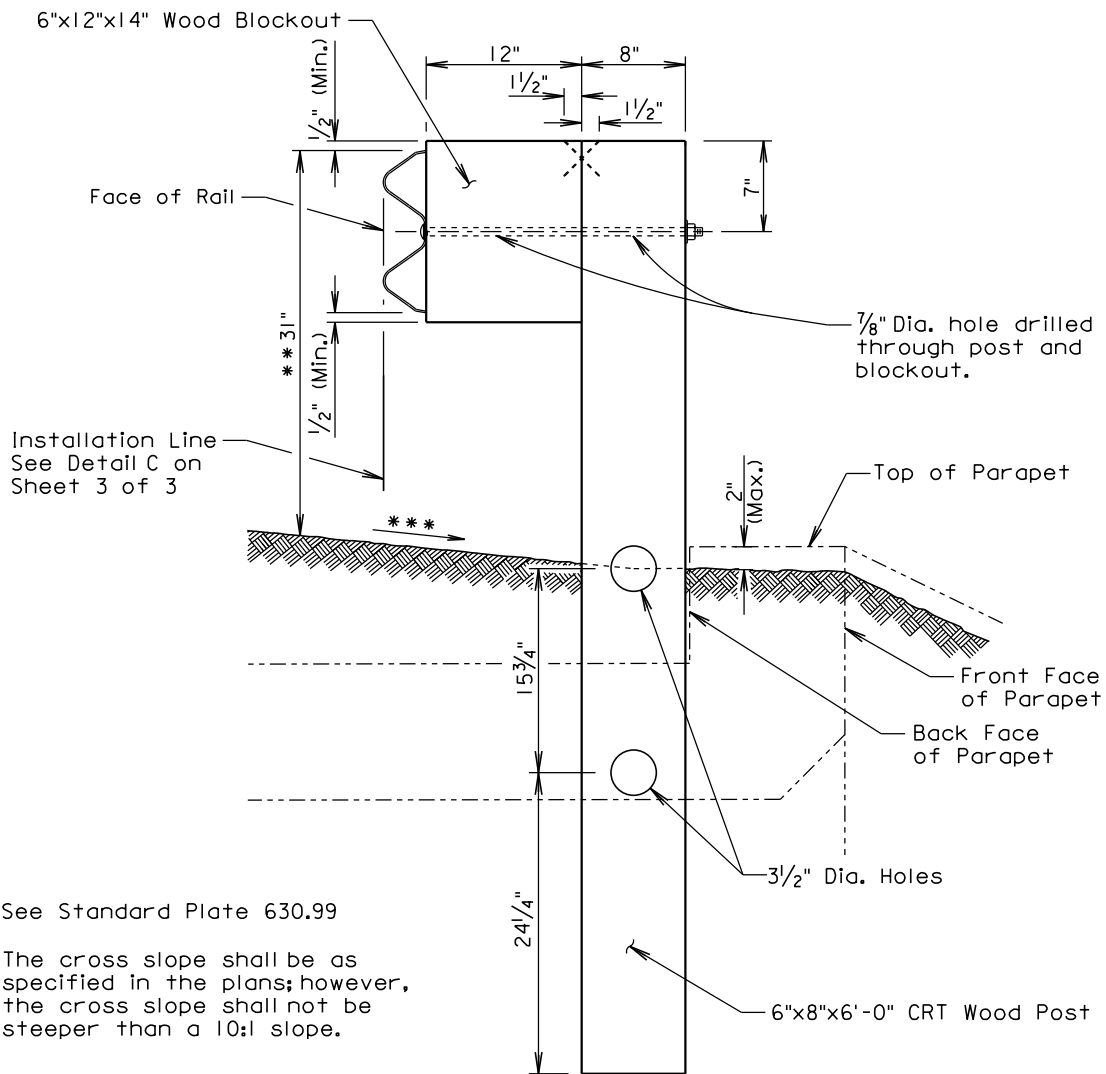
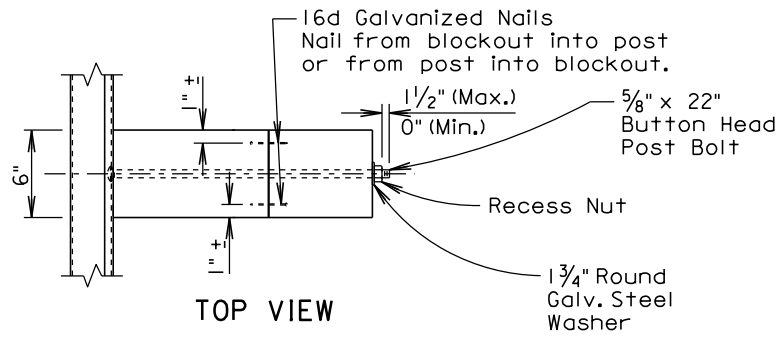
**FOR REVIEW ONLY**  
12/02/2016

**SDDOT**

**LONGSPAN  
MIDWEST GUARDRAIL SYSTEM (MGS)**

**PLATE NUMBER  
630.27**

Sheet 1 of 3



\*\* See Standard Plate 630.99

\*\*\* The cross slope shall be as specified in the plans; however, the cross slope shall not be steeper than a 10:1 slope.

VIEW A-A

(Longspan alignment is shown with the back of post aligned with the back face of parapet.)

September 14, 2016

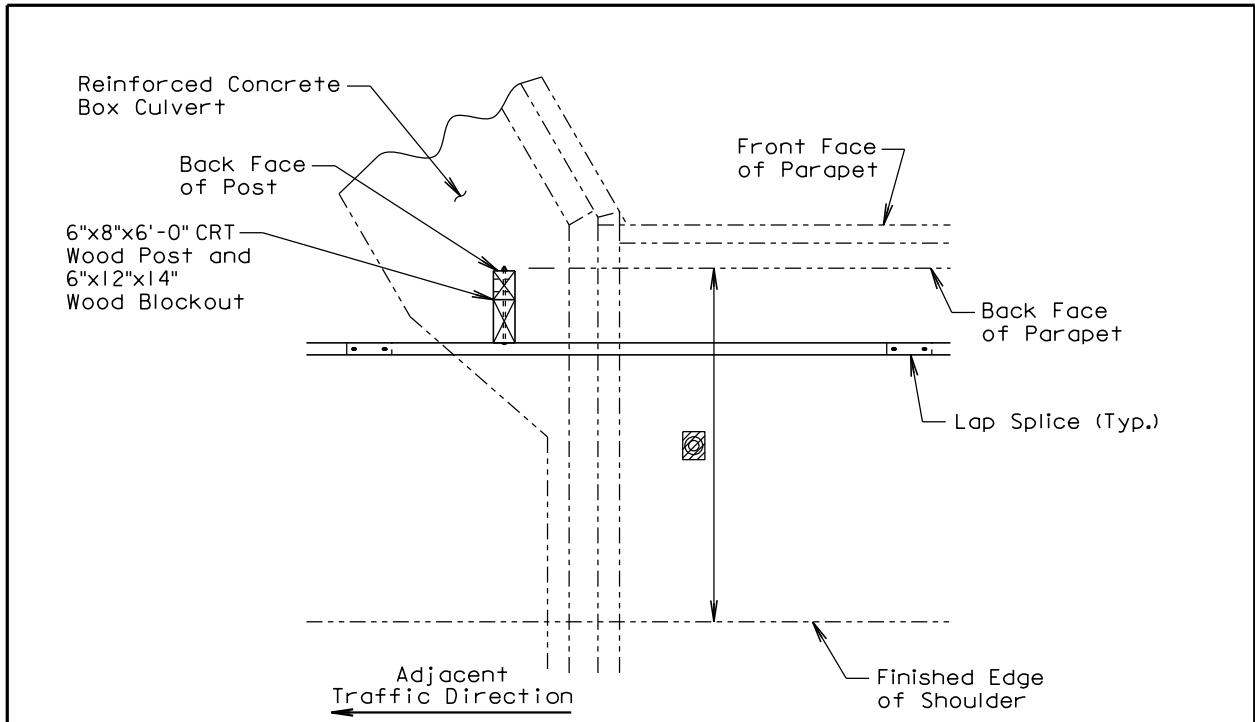
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**LONGSPAN  
MIDWEST GUARDRAIL SYSTEM (MGS)**

PLATE NUMBER  
**630.27**

Sheet 2 of 3



**DETAIL C**

(Longspan alignment is shown with the back of post aligned with the back face of parapet)

- The MGS Longspan alignment shall be as specified in the plans; however, the allowable limits of lateral alignment shall be such that the back of post shall not encroach beyond the back face of the parapet and the front face of the guardrail shall not encroach onto the finished shoulder.

**GENERAL NOTES:**

See Standard Plate 630.20 for hardware details and specifications.

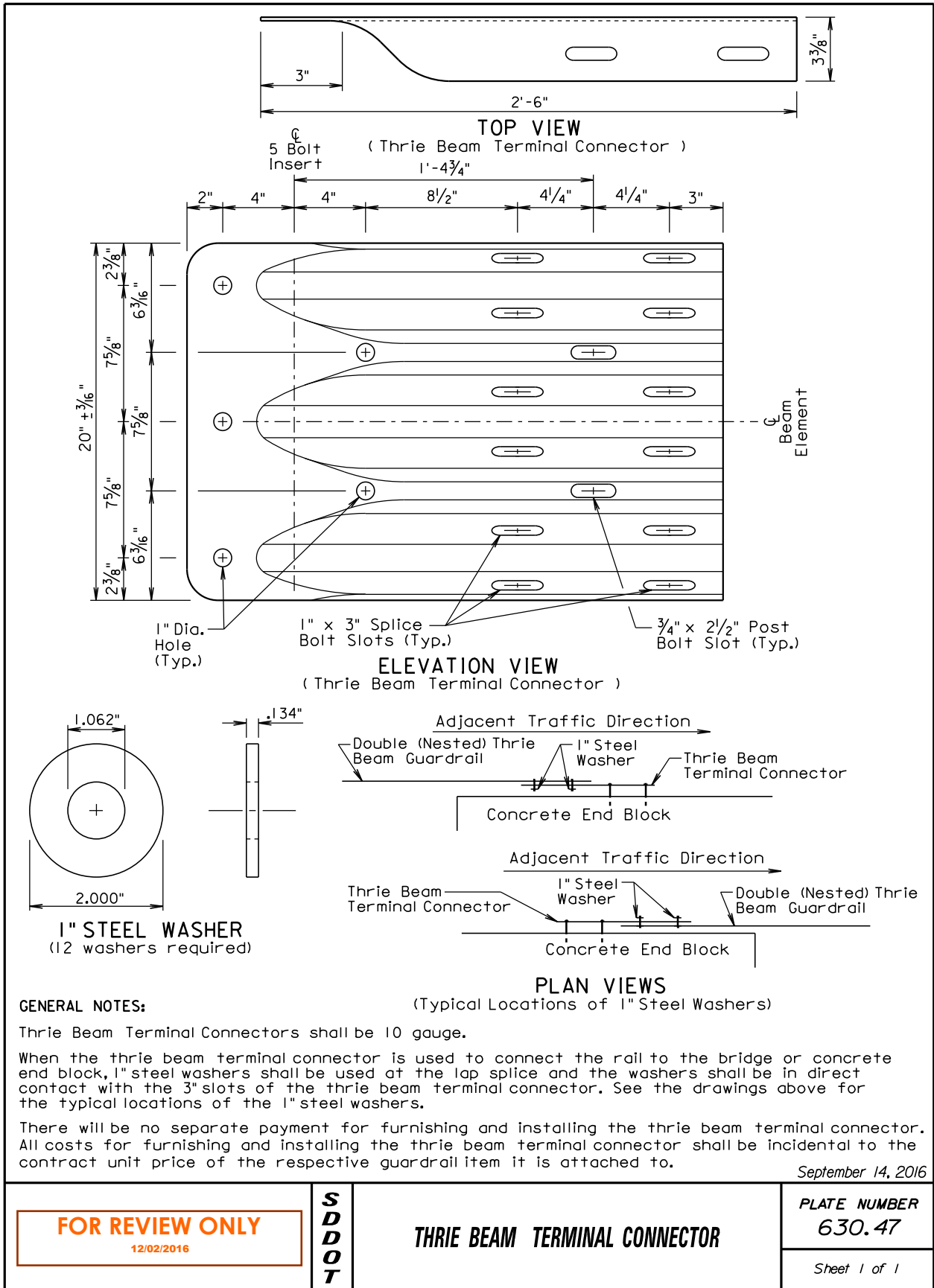
All W beam rail shall be Type I and Class A (12 Ga.) unless specified otherwise in the plans.

W beam rail section lengths may be 12'-6" and/or 25'-0". The combination of section lengths used shall be compatible with the total length of rail per site as shown in the plans.

All costs for constructing the Longspan MGS including labor, equipment, and materials including all posts, blockouts, steel beam rail, and hardware shall be incidental to the contract unit price per each for the corresponding Longspan MGS bid item.

September 14, 2016

<p><b>FOR REVIEW ONLY</b> 12/02/2016</p>	<p><b>S D D O T</b></p>	<p><b>LONGSPAN MIDWEST GUARDRAIL SYSTEM (MGS)</b></p>	<p>PLATE NUMBER <b>630.27</b></p>
			<p>Sheet 3 of 3</p>



**FOR REVIEW ONLY**  
12/02/2016

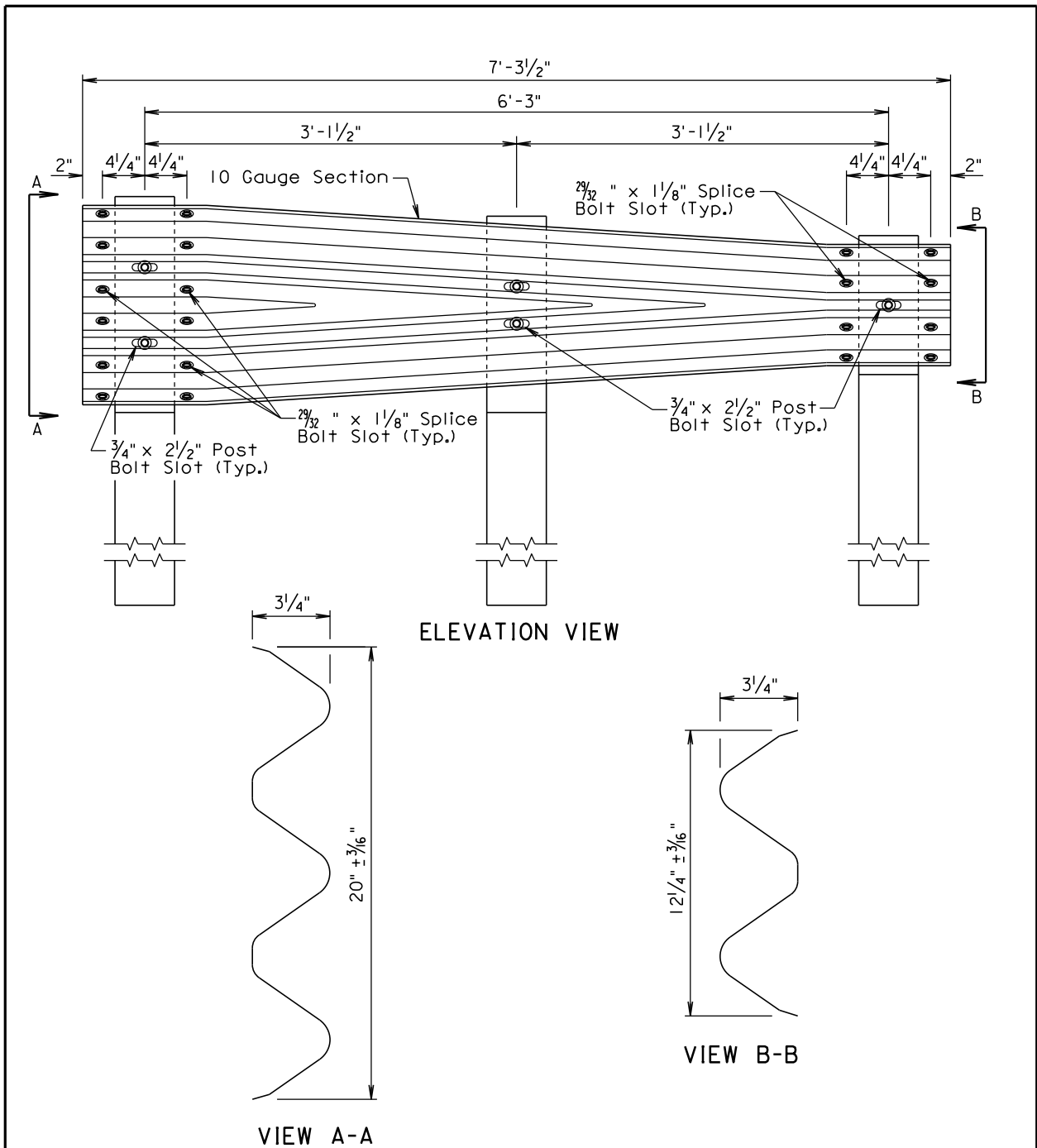
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**THRIE BEAM TERMINAL CONNECTOR**

**PLATE NUMBER**  
**630.47**

Sheet 1 of 1





**GENERAL NOTES:**

All costs for furnishing and installing the W beam to thrie beam guardrail transition including labor, equipment, and materials including two posts, two blocks, W beam to thrie beam transition section, and hardware shall be incidental to the contract unit price per each for "W Beam to Thrie Beam Guardrail Transition".

September 14, 2016

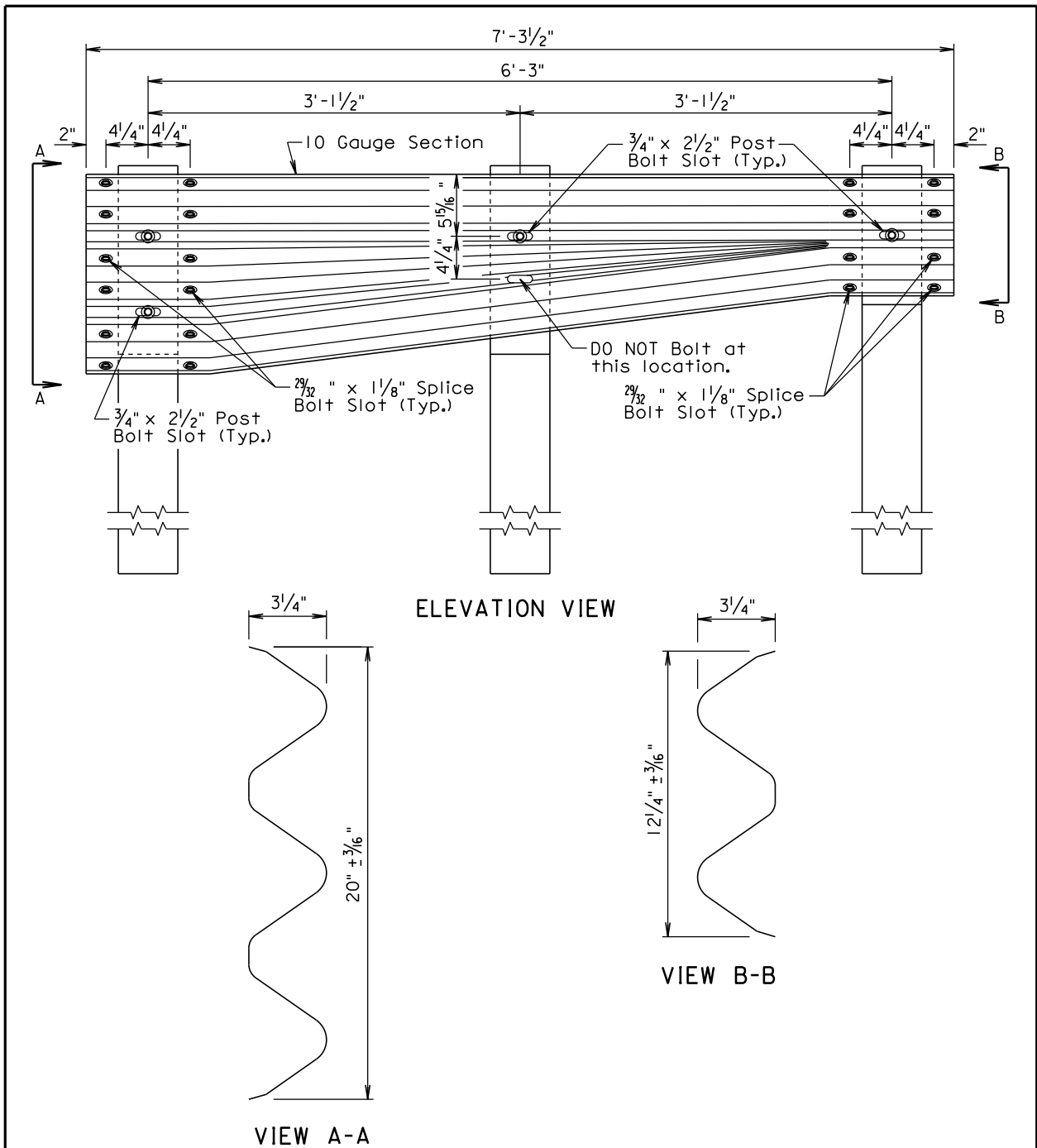
**FOR REVIEW ONLY**  
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**W BEAM TO THRIE BEAM  
GUARDRAIL TRANSITION SECTION**

**PLATE NUMBER**  
**630.48**

Sheet 1 of 1



**GENERAL NOTES:**

All costs for furnishing and installing the asymmetrical W beam to thrie beam guardrail transition including labor, equipment, and materials including two posts, two blocks, asymmetrical W beam to thrie beam transition section, and hardware shall be incidental to the contract unit price per each for the corresponding guardrail transition bid item.

September 14, 2016

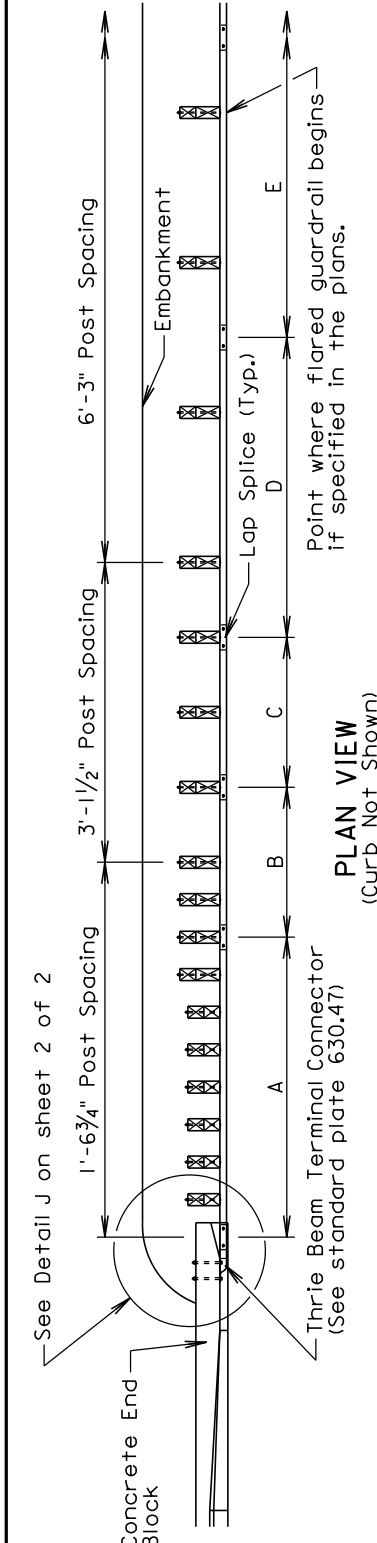
**FOR REVIEW ONLY**  
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**ASYMMETRICAL W BEAM TO THRIE BEAM  
GUARDRAIL TRANSITION SECTION**

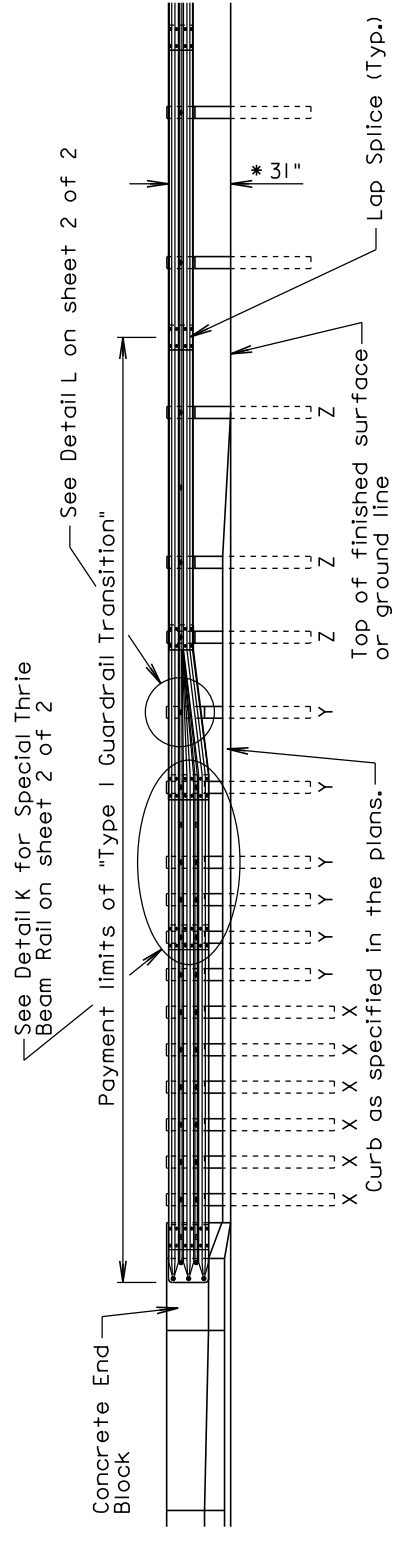
PLATE NUMBER  
**630.49**

Sheet 1 of 1



**PLAN VIEW**  
(Curb Not Shown)

- A: 12'-6" Straight Double (Nested) Class A Thrie Beam Guardrail with Wood Posts (See standard plate 630.01)
- B: 6'-3" Straight Single Class A Thrie Beam Guardrail with Wood Posts (See sheet 2 of 2 of this standard plate)
- C: 6'-3" Asymmetrical W Beam to Thrie Beam Guardrail Transition Section with Wood Posts (See standard plate 630.49)
- D: 12'-6" Straight Type 4 MGS (See standard plate 630.20)
- E: Straight Type 1 MGS or as specified in the plans (See standard plate 630.20)



**ELEVATION VIEW**

\* See standard plate 630.99

- X: 6" x 8" x 7'-0" Wood Post and 6" x 8" x 19" Wood Blockout
- Y: 6" x 8" x 6'-0" Wood Post and 6" x 12" x 19" Wood Blockout
- Z: 6" x 8" x 6'-0" Wood Post and 6" x 12" x 14" Wood Blockout

September 14, 2016

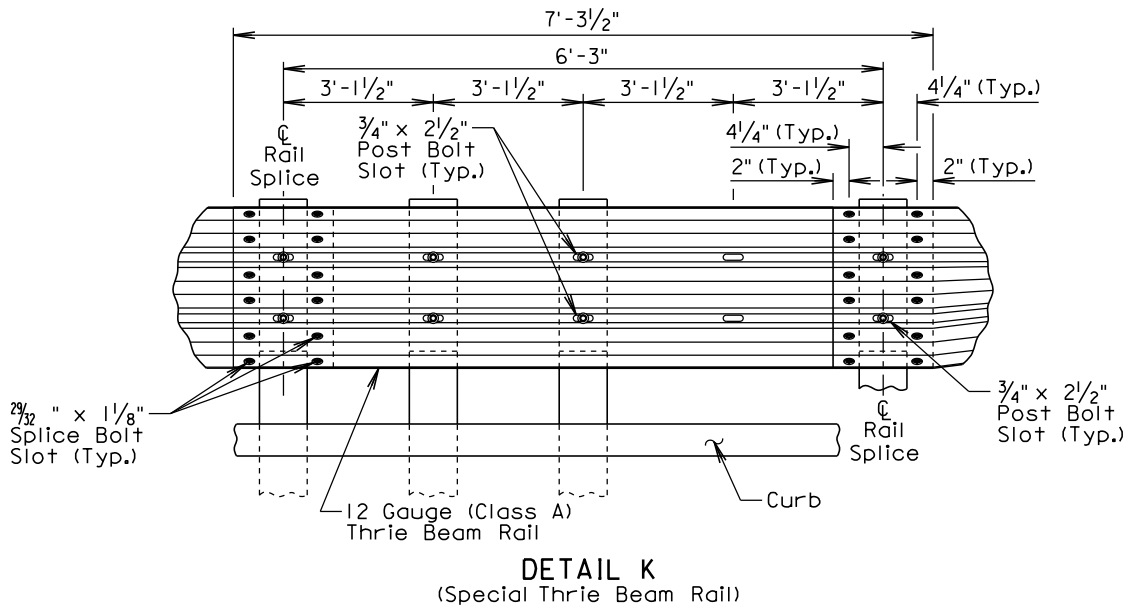
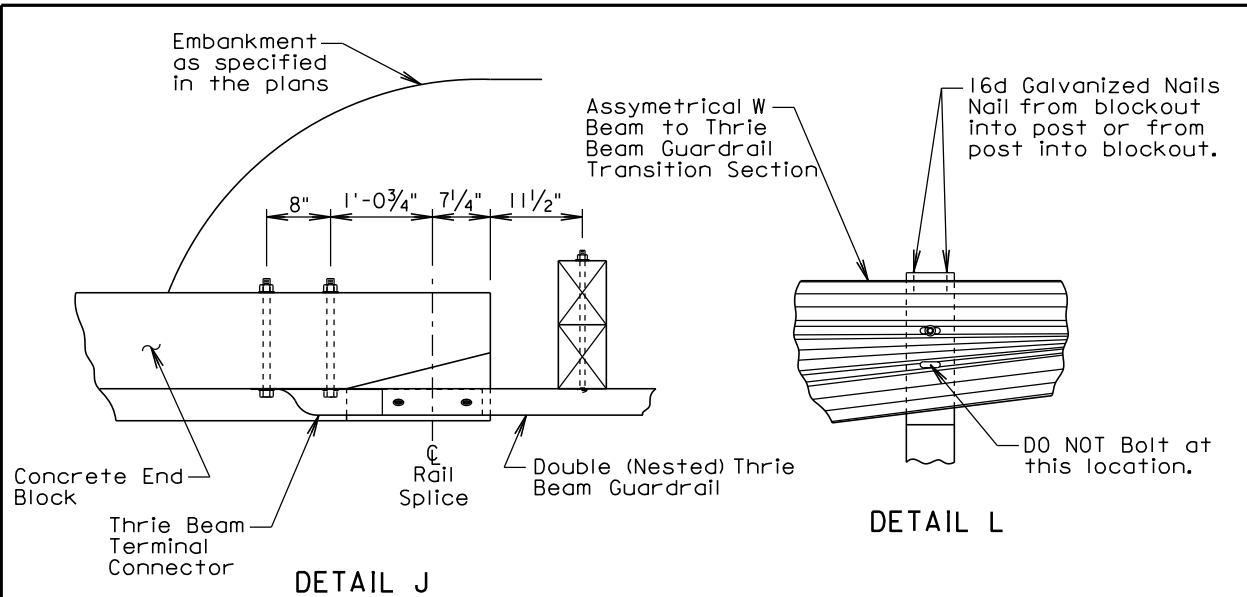
**FOR REVIEW ONLY**  
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**WOODS**

**TYPE 1 GUARDRAIL TRANSITION  
(CONCRETE END BLOCK TO  
MIDWEST GUARDRAIL SYSTEM (MGS))**

PLATE NUMBER  
**630.50**

Sheet 1 of 2



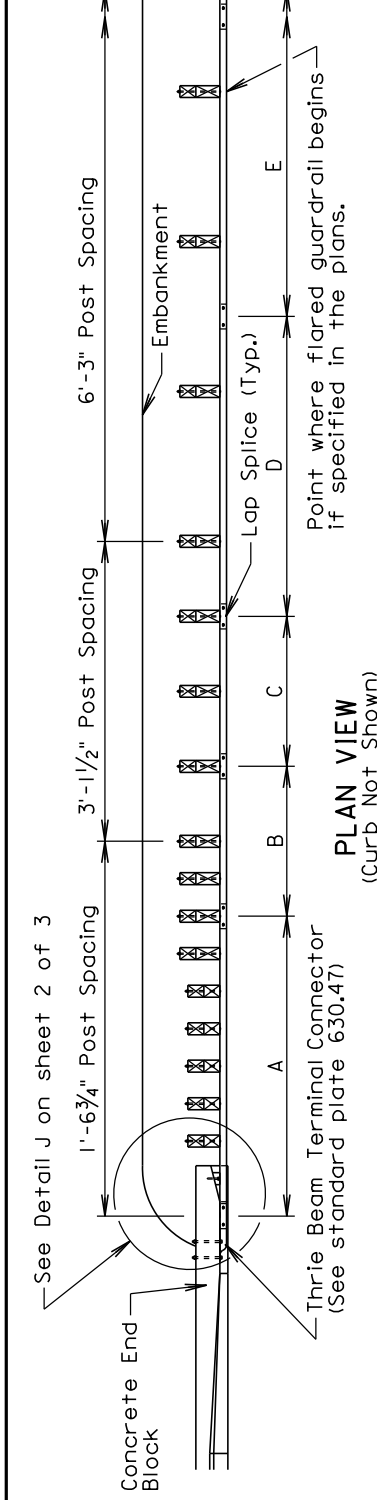
**GENERAL NOTES:**

Throughout the type I guardrail transition, slots in the rails shall be provided as specified in the plans and by the manufacturer. A drilled hole through the rail is not allowed as a replacement for a slot. If the Contractor must create a slot, a cutting torch or plasma cutter is not allowed.

All costs for furnishing and installing the type I guardrail transition including labor, equipment, and materials which includes all rail sections, posts and blockouts, hardware, and incidentals shall be included in the contract unit price per each for "Type I Guardrail Transition".

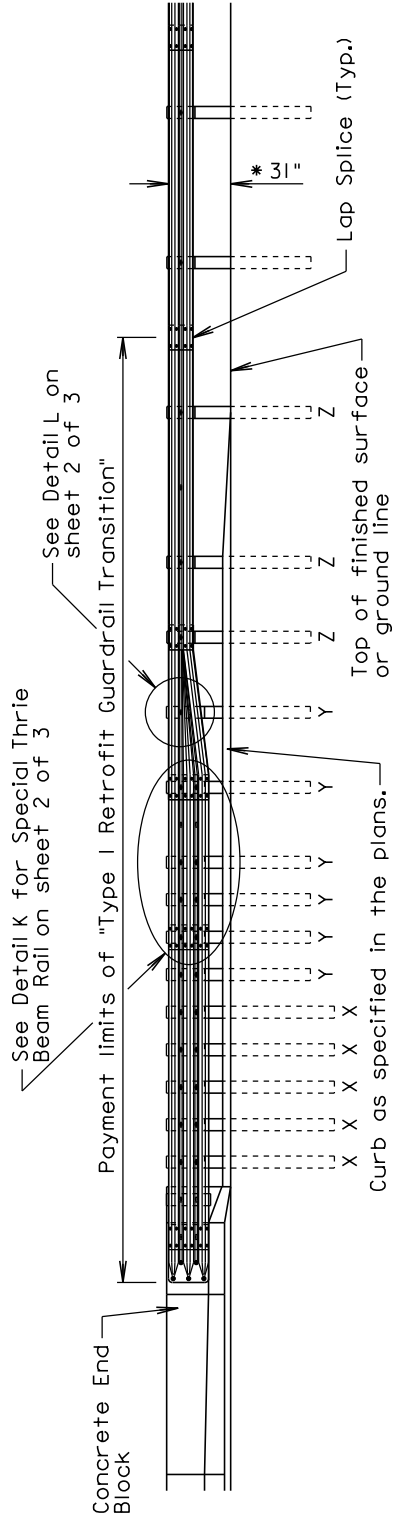
September 14, 2016

<p><b>FOR REVIEW ONLY</b></p> <p>12/02/2016</p>	<p><b>S D D O T</b></p>	<p><b>TYPE 1 GUARDRAIL TRANSITION (CONCRETE END BLOCK TO MIDWEST GUARDRAIL SYSTEM (MGS))</b></p>	<p>PLATE NUMBER <b>630.50</b></p>
			<p>Sheet 2 of 2</p>



**PLAN VIEW**  
(Curb Not Shown)

- A: 12'-6" Straight Double (Nested) Class A Thrie Beam Guardrail with Wood Posts (See standard plate 630.01)
- B: 6'-3" Straight Single Class A Thrie Beam Guardrail with Wood Posts (See sheet 2 of 2 of this standard plate)
- C: 6'-3" Asymmetrical W Beam to Thrie Beam Guardrail Transition Section with Wood Posts (See standard plate 630.49)
- D: 12'-6" Straight Type 4 MGS (See standard plate 630.20)
- E: Straight Type 1 MGS or as specified in the plans (See standard plate 630.20)



**ELEVATION VIEW**

\* See standard plate 630.99

- X: 6" x 8" x 7'-0" Wood Post and 6" x 8" x 19" Wood Blockout
- Y: 6" x 8" x 6'-0" Wood Post and 6" x 12" x 19" Wood Blockout
- Z: 6" x 8" x 6'-0" Wood Post and 6" x 12" x 14" Wood Blockout

September 14, 2016

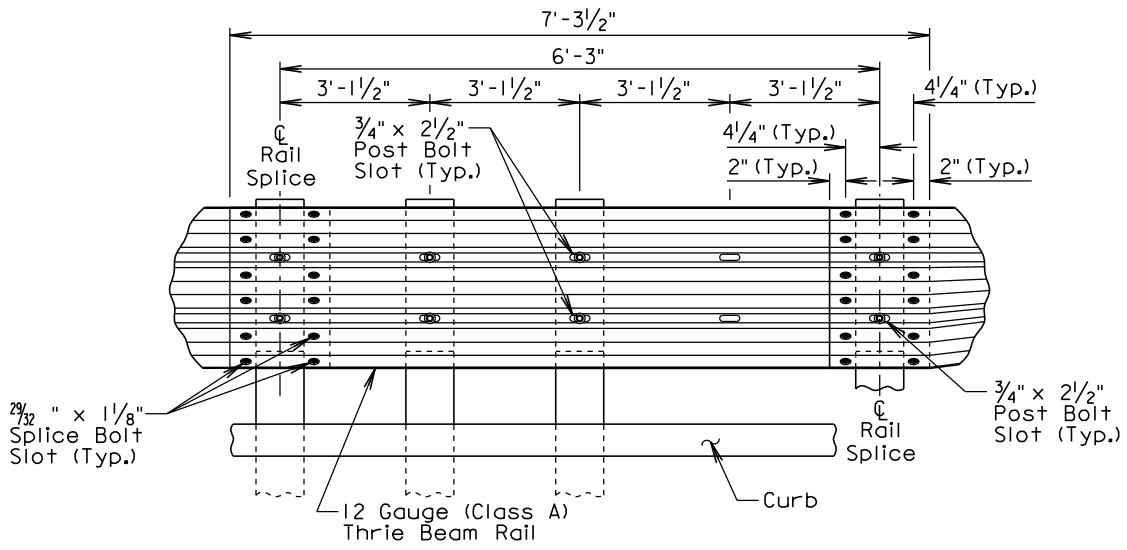
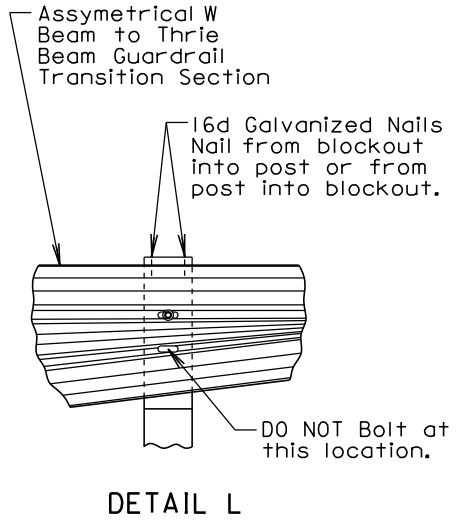
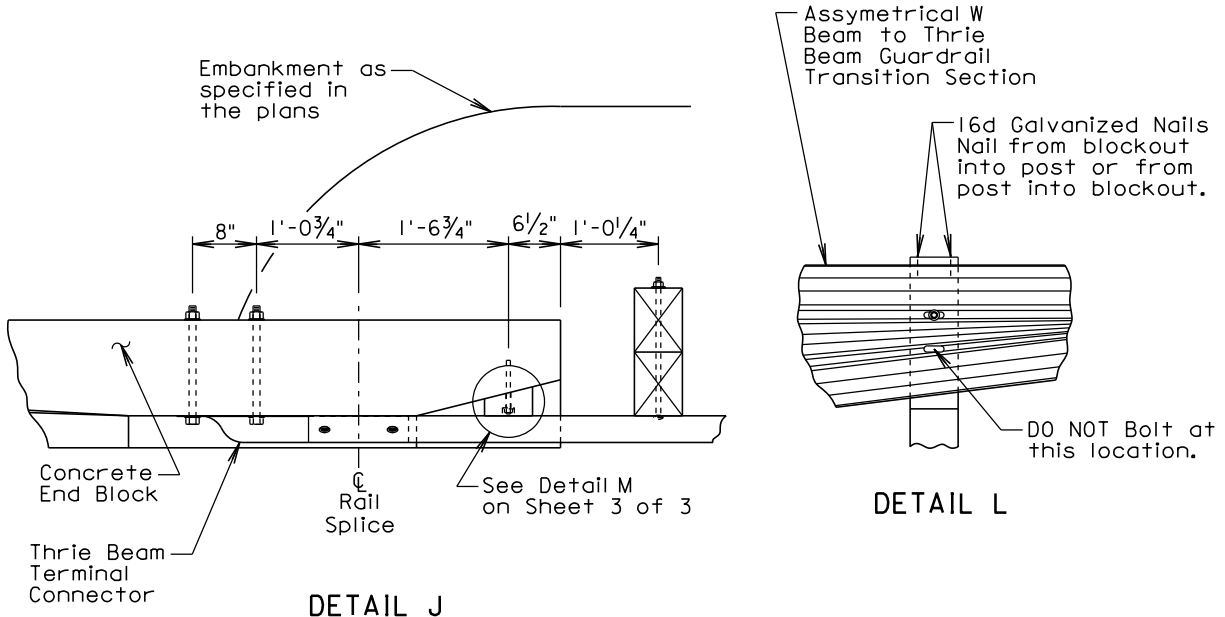
**FOR REVIEW ONLY**  
12/02/2016

**WOOD**

**TYPE 1 RETROFIT GUARDRAIL TRANSITION  
(CONCRETE END BLOCK TO  
MIDWEST GUARDRAIL SYSTEM (MGS))**

PLATE NUMBER  
**630.51**

Sheet 1 of 3



**DETAIL K**  
(Special Thrie Beam Rail)

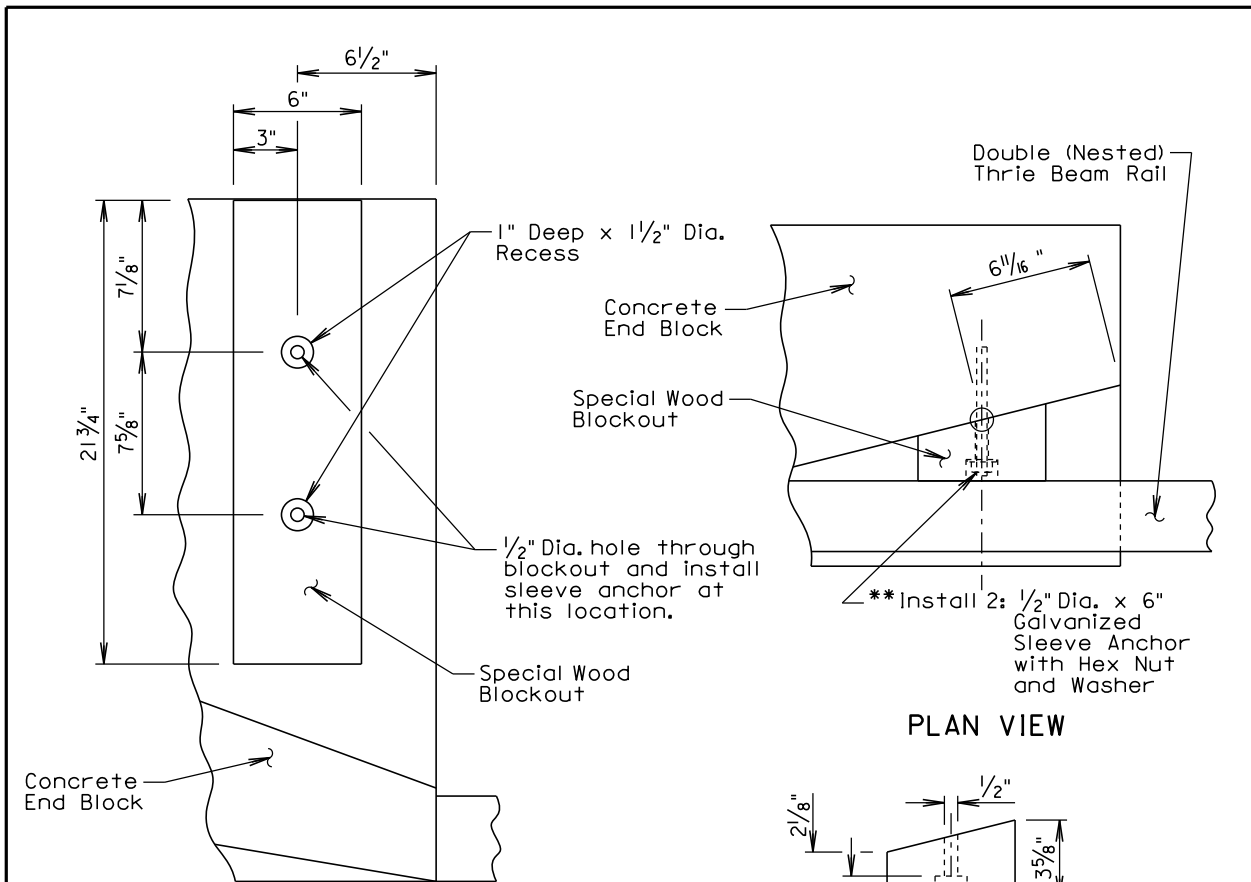
September 14, 2016

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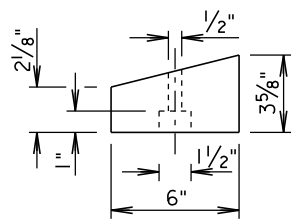
**TYPE 1 RETROFIT GUARDRAIL TRANSITION  
(CONCRETE END BLOCK TO  
MIDWEST GUARDRAIL SYSTEM (MGS))**

PLATE NUMBER  
**630.51**  
Sheet 2 of 3



**ELEVATION VIEW**  
(Double Thrie Beam Rail and Hardware Not Shown)

**PLAN VIEW**



**PLAN VIEW**  
(Special Wood Blockout)

**DETAIL M**  
(See the 3 drawings above)

**GENERAL NOTES:**

The special wood blockout may need to be installed at a different location than what is shown in Detail M as the in place concrete end block may not have been constructed to the exact dimensions. The blockout may be moved in the longitudinal (sideways) direction as necessary such that the blockout rests against the back of the double (nested) thrie beam rail and the rail is straight. The location shall be approved by the Engineer before installation of the blockout.

\*\*The 1/2" Dia. x 6" galvanized sleeve anchors shall be installed in accordance with the Manufacturer's recommendations.

Throughout the type I retrofit guardrail transition, slots in the rails shall be provided as specified in the plans and by the manufacturer. A drilled hole through the rail is not allowed as a replacement for a slot. If the Contractor must create a slot, a cutting torch or plazma cutter is not allowed.

All costs for furnishing and installing the type I retrofit guardrail transition including labor, equipment, and materials which includes all rail sections, posts and blockouts, special blockout, hardware, and incidentals shall be included in the contract unit price per each for "Type I Retrofit Guardrail Transition".

September 14, 2016

**FOR REVIEW ONLY**  
12/02/2016

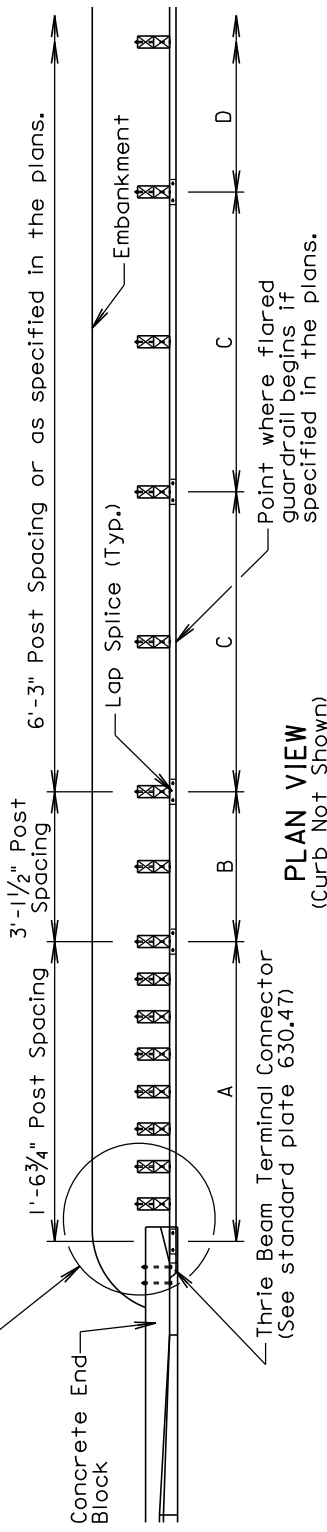
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**TYPE 1 RETROFIT GUARDRAIL TRANSITION  
(CONCRETE END BLOCK TO  
MIDWEST GUARDRAIL SYSTEM (MGS))**

**PLATE NUMBER**  
**630.51**

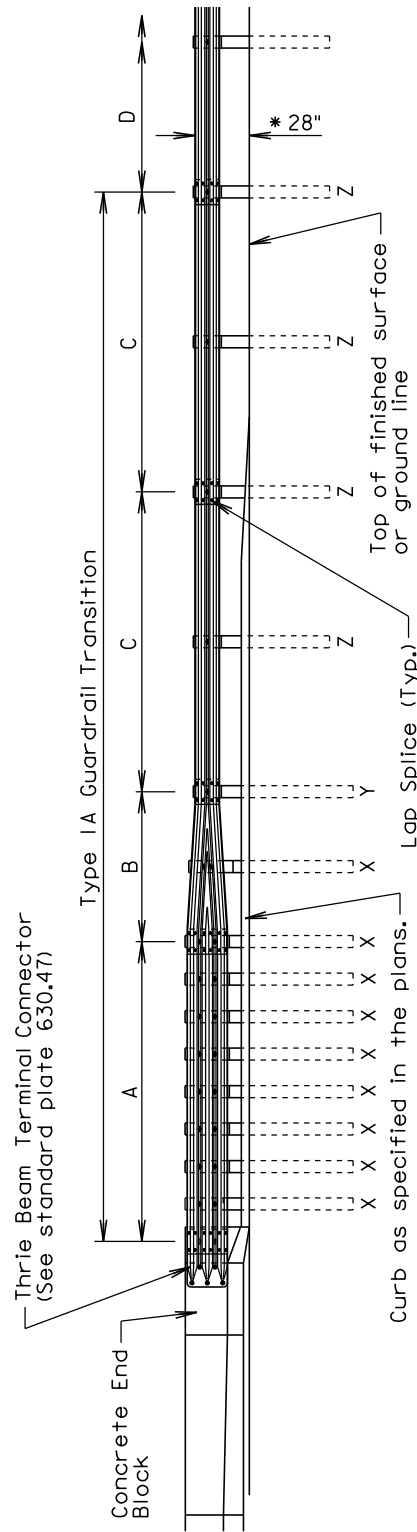
Sheet 3 of 3

See Detail J on sheet 2 of 2



**PLAN VIEW**  
(Curb Not Shown)

- A: 12'-6" Straight Double (Nested) Class A Thrie Beam Guardrail with Wood Posts (See standard plate 630.01)
- B: 6'-3" W Beam to Thrie Beam Guardrail Transition Section with Wood Posts (See standard plate 630.48)
- C: 12'-6" Straight Class A W Beam Guardrail with Wood Posts (See standard plate 630.10) or as specified in the plans.
- D: Guardrail as specified in the plans.



**ELEVATION VIEW**

\* See standard plate 630.99

- X: 6" x 8" x 7'-0" Wood Post and 6" x 8" x 21 3/4" Wood Blockout
- Y: 6" x 8" x 7'-0" Wood Post and 6" x 8" x 14" Wood Blockout
- Z: 6" x 8" x 6'-0" Wood Post and 6" x 8" x 14" Wood Blockout

September 14, 2016

**FOR REVIEW ONLY**  
12/02/2016

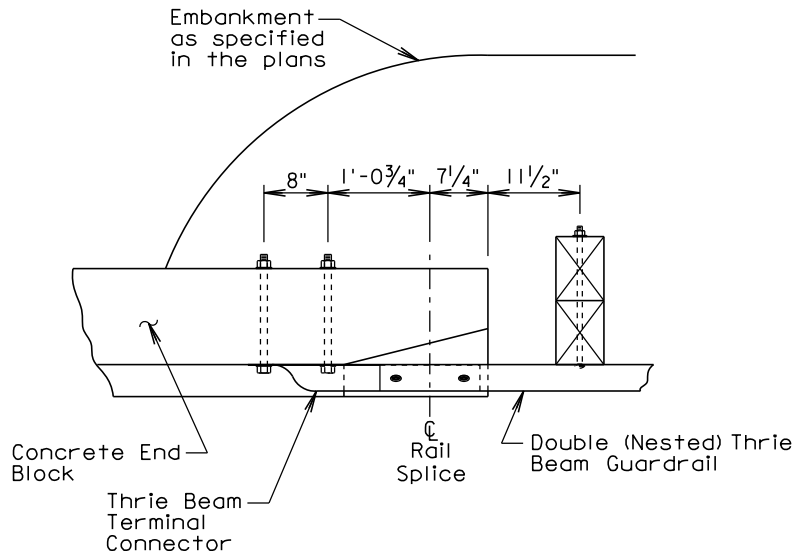
**DOT**

**TYPE 1A GUARDRAIL TRANSITION  
(CONCRETE END BLOCK TO  
W BEAM GUARDRAIL)**

PLATE NUMBER  
**630.52**

Sheet 1 of 2





DETAIL J

**GENERAL NOTES:**

Throughout the type IA guardrail transition, slots in the rails shall be provided as specified in the plans and by the manufacturer. A drilled hole through the rail is not allowed as a replacement for a slot. If the Contractor must create a slot, a cutting torch or plazma cutter is not allowed.

All costs for furnishing and installing the straight double class A thrie beam guardrail including labor, equipment, and materials including the thrie beam rails, posts, blockouts, thrie beam terminal connector, and hardware shall be incidental to the contract unit price per foot for "Straight Double Class A Thrie Beam Guardrail with Wood Posts".

All costs for furnishing and installing the type IA guardrail transition including labor, equipment, and materials shall be included in the contract unit price for the respective guardrail bid items.

September 14, 2016

**FOR REVIEW ONLY**

12/02/2016

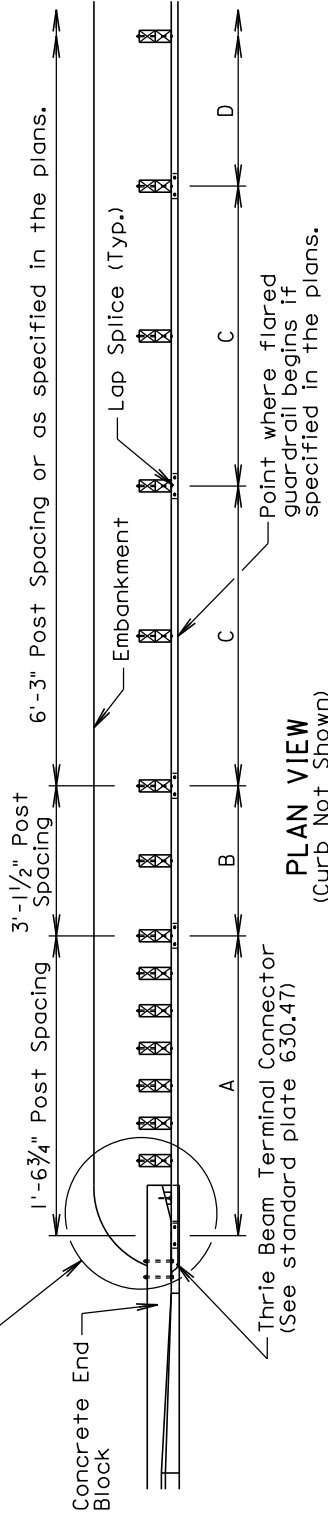
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**TYPE 1A GUARDRAIL TRANSITION  
(CONCRETE END BLOCK TO  
W BEAM GUARDRAIL)**

PLATE NUMBER  
**630.52**

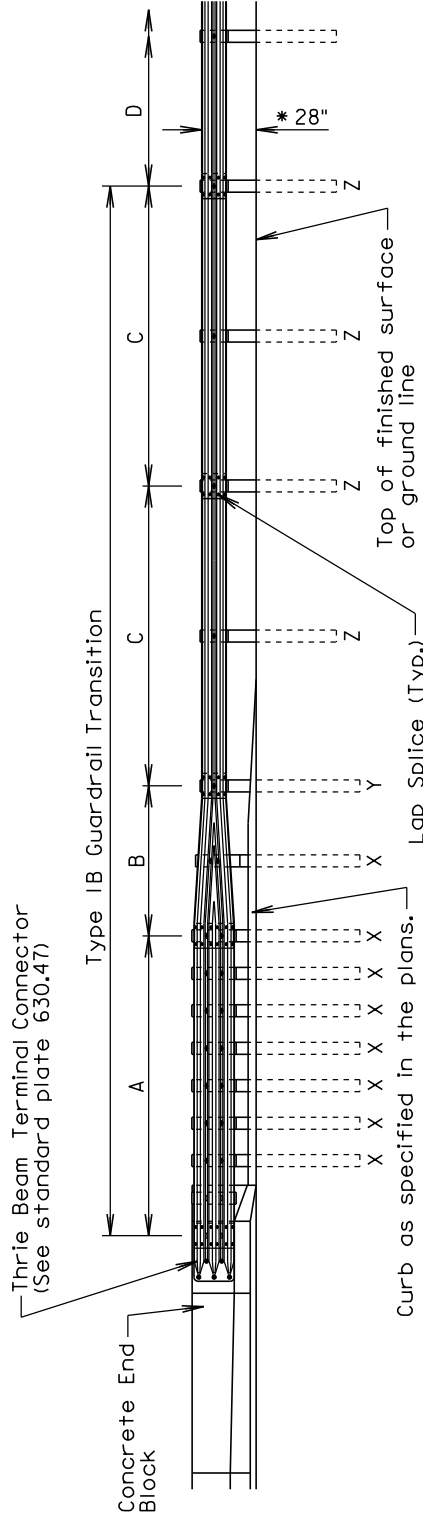
Sheet 2 of 2

See Detail J on sheet 3 of 3



**PLAN VIEW**  
(Curb Not Shown)

- A: 12'-6" Straight Double (Nested) Class A Thrie Beam Guardrail with Wood Posts (See standard plate 630.01)
- B: 6'-3" W Beam to Thrie Beam Guardrail Transition Section with Wood Posts (See standard plate 630.48)
- C: 12'-6" Straight Class A W Beam Guardrail with Wood Posts (See standard plate 630.10) or as specified in the plans.
- D: Guardrail as specified in the plans.



**ELEVATION VIEW**

- X: 6" x 8" x 7'-0" Wood Post and 6" x 8" x 21 3/4" Wood Blockout
- Y: 6" x 8" x 7'-0" Wood Post and 6" x 8" x 14" Wood Blockout
- Z: 6" x 8" x 6'-0" Wood Post and 6" x 8" x 14" Wood Blockout

\* See standard plate 630.99

September 14, 2016

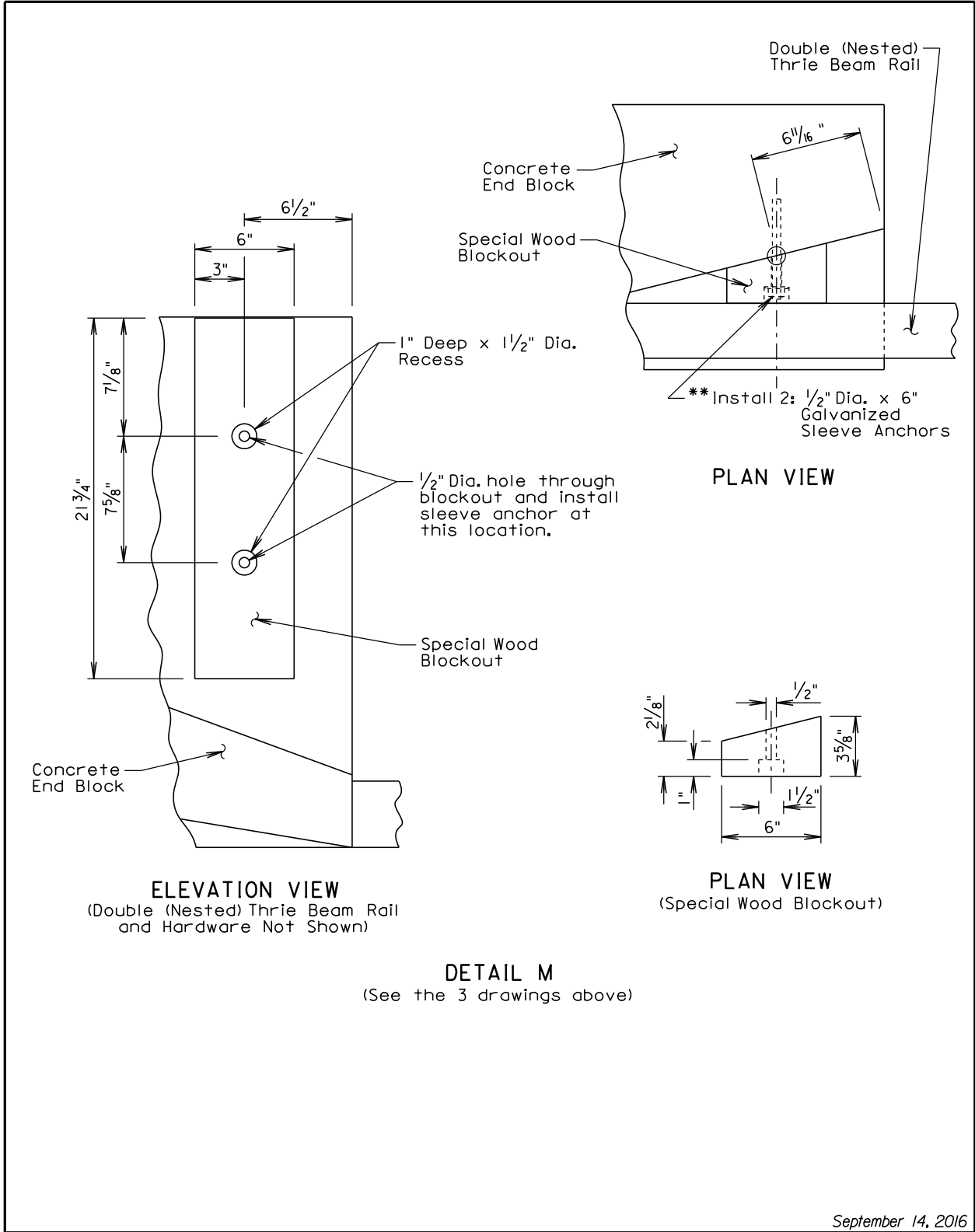
**FOR REVIEW ONLY**  
12/02/2016

**WOOD**

**TYPE 1B GUARDRAIL TRANSITION  
(CONCRETE END BLOCK TO  
W BEAM GUARDRAIL)**

PLATE NUMBER  
**630.53**

Sheet 1 of 3



**DETAIL M**  
(See the 3 drawings above)

September 14, 2016

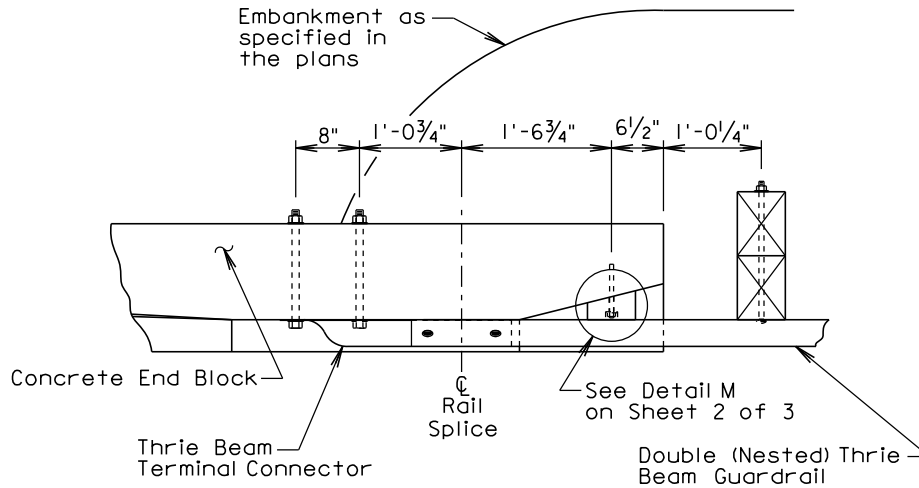
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**TYPE 1B GUARDRAIL TRANSITION  
(CONCRETE END BLOCK TO  
W BEAM GUARDRAIL)**

PLATE NUMBER  
**630.53**

Sheet 2 of 3



DETAIL J

**GENERAL NOTES:**

The special wood blockout may need to be installed at a different location than what is shown in Detail M as the in place concrete end block may not have been constructed to the exact dimensions. The blockout may be moved in the longitudinal (sideways) direction as necessary such that the blockout rests against the back of the double (nested) thrie beam rail and the rail is straight. The location shall be approved by the Engineer before installation of the blockout.

\*\*The 1/2" Dia. x 6" galvanized sleeve anchors shall be installed in accordance with the Manufacturer's recommendations.

Throughout the type I retrofit guardrail transition, slots in the rails shall be provided as specified in the plans and by the manufacturer. A drilled hole through the rail is not allowed as a replacement for a slot. If the Contractor must create a slot, a cutting torch or plazma cutter is not allowed.

All costs for furnishing and installing the straight double class A thrie beam guardrail including labor, equipment, and materials including the thrie beam rails, posts, blockouts, special blockout, thrie beam terminal connector, and hardware shall be incidental to the contract unit price per foot for "Straight Double Class A Thrie Beam Guardrail with Wood Posts".

All costs for furnishing and installing the type IB guardrail transition including labor, equipment, and materials shall be included in the contract unit price for the respective guardrail bid items.

September 14, 2016

**FOR REVIEW ONLY**

12/02/2016

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**TYPE 1B GUARDRAIL TRANSITION  
(CONCRETE END BLOCK TO  
W BEAM GUARDRAIL)**

PLATE NUMBER  
**630.53**

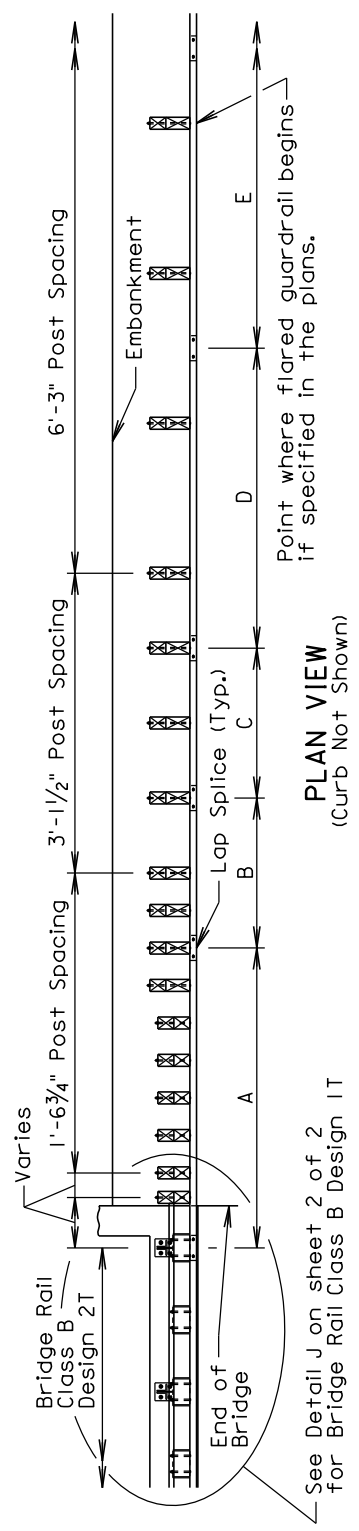
Sheet 3 of 3

**FOR REVIEW ONLY**  
12/02/2016

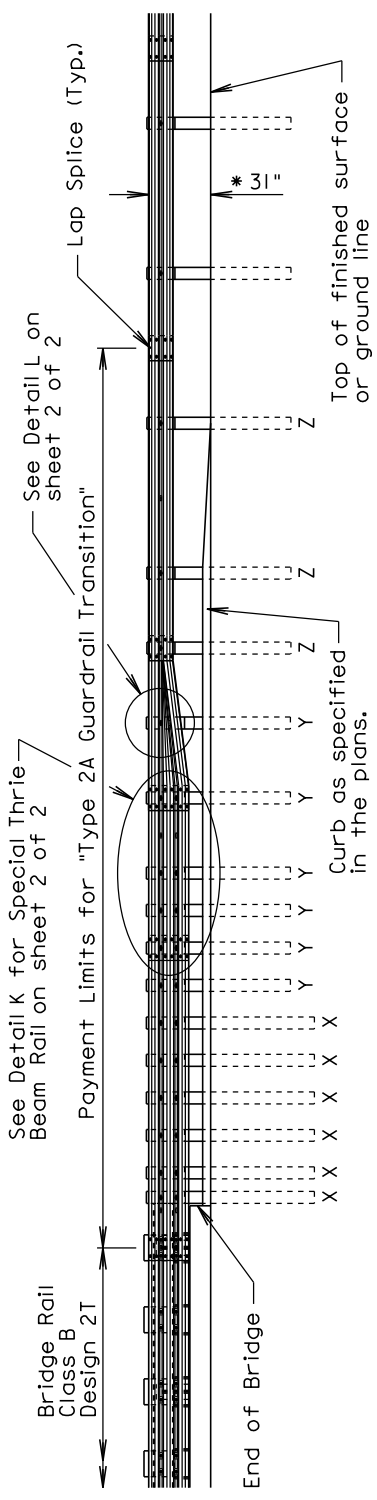
**SDS**

**TYPE 2A GUARDRAIL TRANSITION  
(BRIDGE RAIL CLASS B DESIGN 1T OR 2T  
TO MIDWEST GUARDRAIL SYSTEM (MGS))**

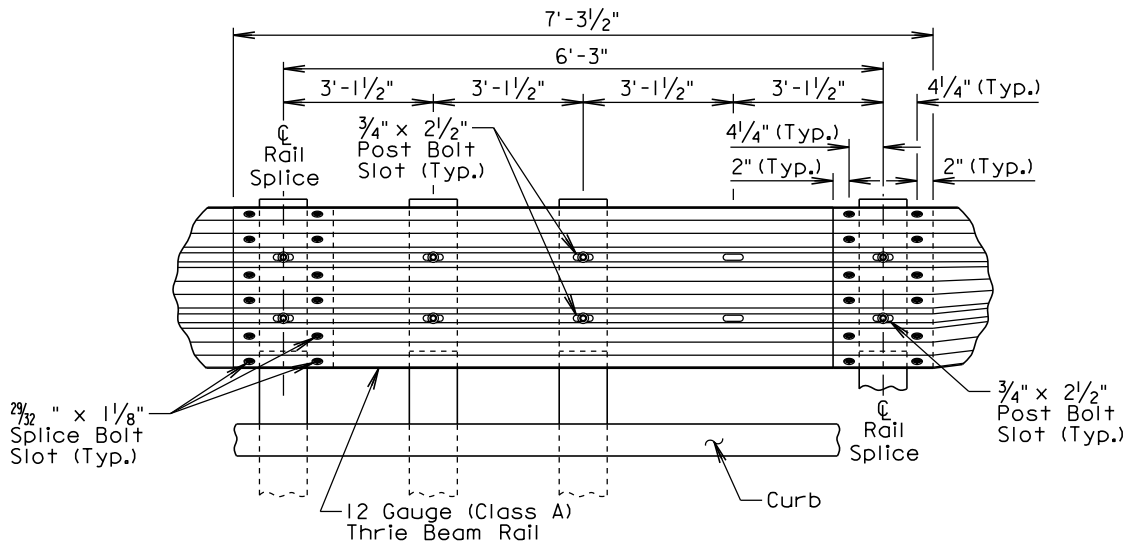
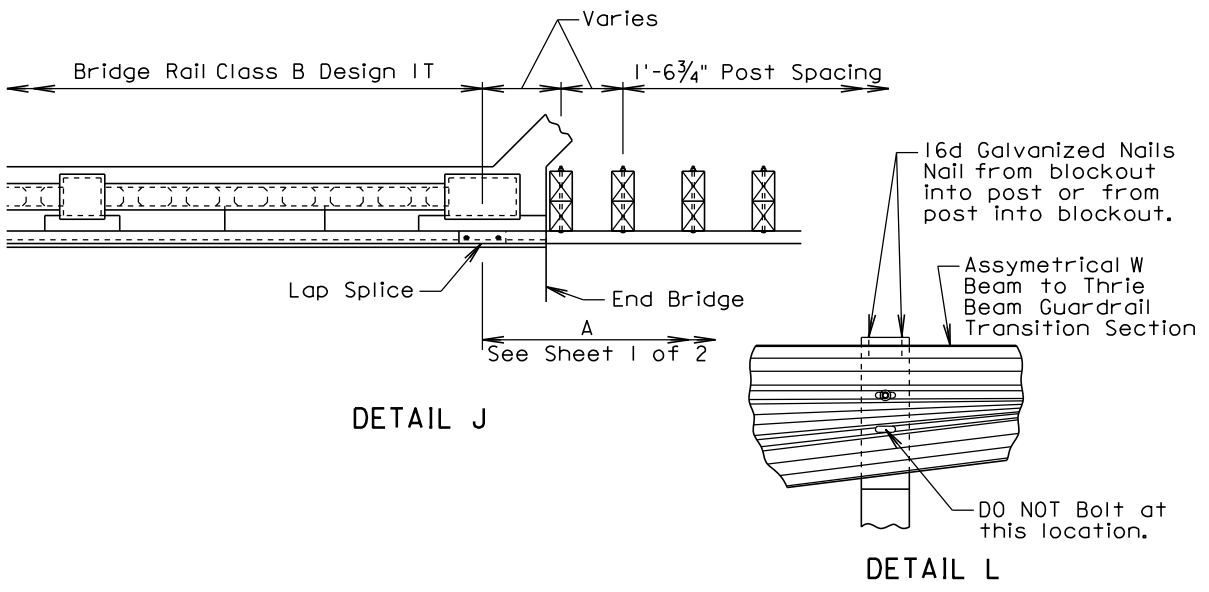
September 14, 2016  
**PLATE NUMBER**  
**630.54**  
Sheet 1 of 2



- A: 12'-6" Straight Double (Nested) Class A Thrie Beam Guardrail with Wood Posts (See standard plate 630.01)
- B: 6'-3" Straight Single Class A Thrie Beam Guardrail with Wood Posts (See sheet 2 of 2 of this standard plate)
- C: 6'-3" Asymmetrical W Beam to Thrie Beam Guardrail Transition Section with Wood Posts (See standard plate 630.49)
- D: 12'-6" Straight Type 4 MGS (See standard plate 630.20)
- E: Straight Type 1 MGS or as specified in the plans (See standard plate 630.20)



- X: 6" x 8" x 7'-0" Wood Post and 6" x 8" x 19" Wood Blockout
  - Y: 6" x 8" x 6'-0" Wood Post and 6" x 12" x 19" Wood Blockout
  - Z: 6" x 8" x 6'-0" Wood Post and 6" x 12" x 14" Wood Blockout
- \* See standard plate 630.99



**GENERAL NOTES:**

Throughout the type 2A guardrail transition, slots in the rails shall be provided as specified in the plans and by the manufacturer. A drilled hole through the rail is not allowed as a replacement for a slot. If the Contractor must create a slot, a cutting torch or plazma cutter is not allowed.

All costs for furnishing and installing the type 2A guardrail transition including labor, equipment, and materials which includes all rail sections, posts and blockouts, hardware, and incidentals shall be included in the contract unit price per each for "Type 2A Guardrail Transition".

September 14, 2016

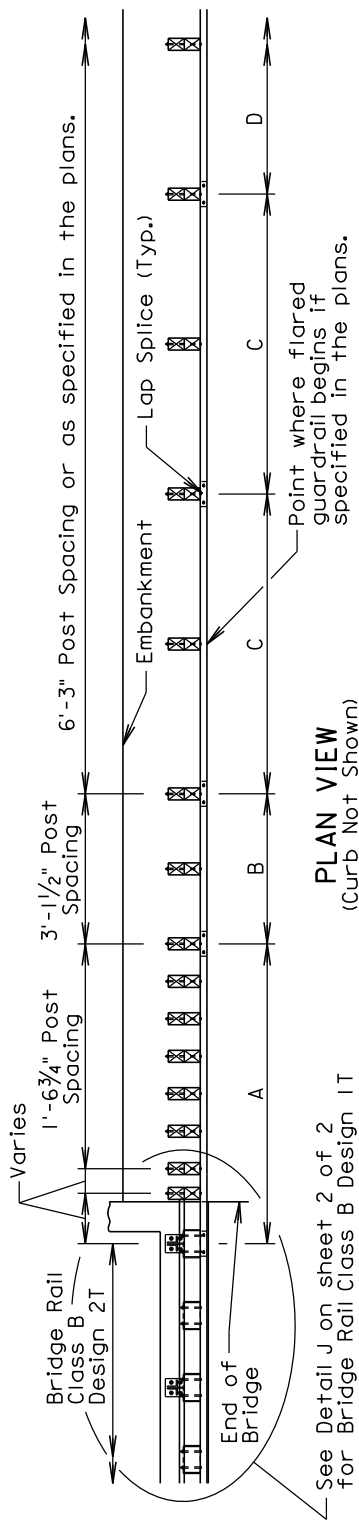
<p><b>FOR REVIEW ONLY</b> 12/02/2016</p>	<p><b>S D D O T</b></p>	<p><b>TYPE 2A GUARDRAIL TRANSITION (BRIDGE RAIL CLASS B DESIGN 1T OR 2T TO MIDWEST GUARDRAIL SYSTEM (MGS))</b></p>	<p>PLATE NUMBER <b>630.54</b></p>
			<p>Sheet 2 of 2</p>

**FOR REVIEW ONLY**  
12/02/2016

**WOOD**

**TYPE 2B GUARDRAIL TRANSITION  
(BRIDGE RAIL CLASS B DESIGN 1T OR 2T  
TO W BEAM GUARDRAIL)**

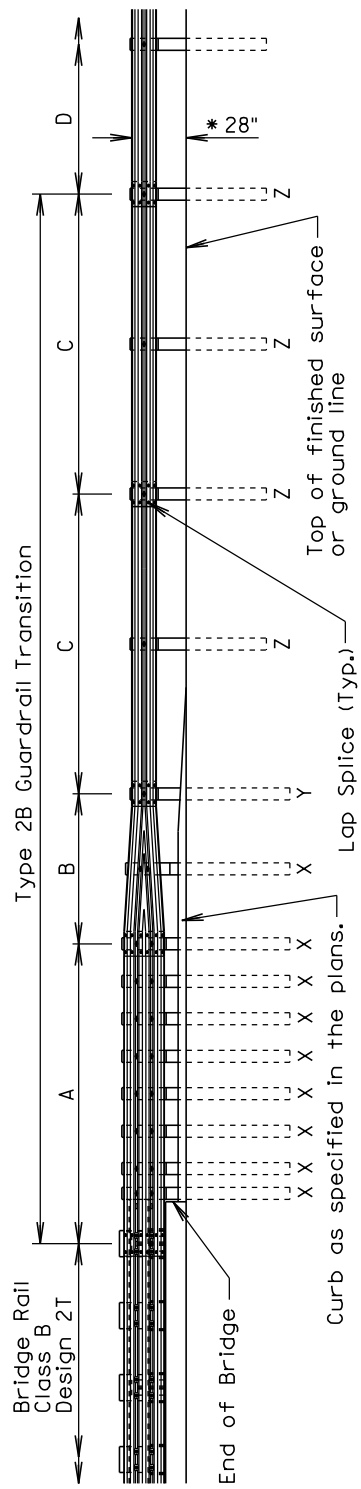
September 14, 2016  
**PLATE NUMBER**  
**630.55**  
Sheet 1 of 2



**PLAN VIEW**  
(Curb Not Shown)

See Detail J on sheet 2 of 2 for Bridge Rail Class B Design 1T

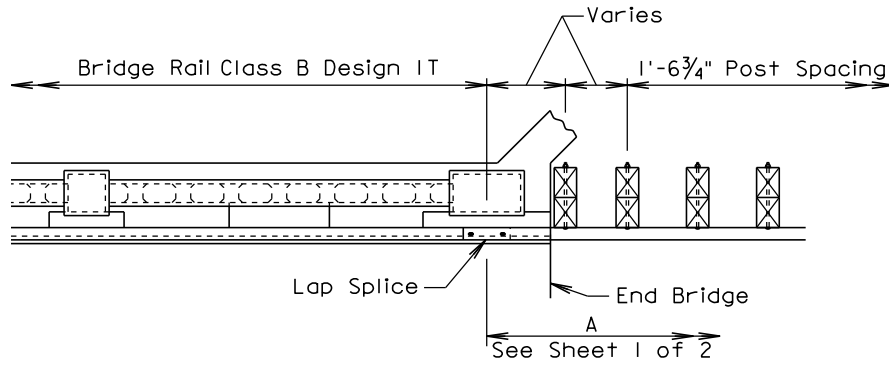
- A: 12'-6" Straight Double (Nested) Class A Thrie Beam Guardrail with Wood Posts (See standard plate 630.01)
- B: 6'-3" W Beam to Thrie Beam Guardrail Transition Section with Wood Posts (See standard plate 630.48)
- C: 12'-6" Straight Class A W Beam Guardrail with Wood Posts (See standard plate 630.10) or as specified in the plans.
- D: Guardrail as specified in the plans.



**ELEVATION VIEW**

- X: 6" x 8" x 7'-0" Wood Post and 6" x 8" x 2 3/4" Wood Blockout
- Y: 6" x 8" x 7'-0" Wood Post and 6" x 8" x 14" Wood Blockout
- Z: 6" x 8" x 6'-0" Wood Post and 6" x 8" x 14" Wood Blockout

\* See standard plate 630.99



DETAIL J

**GENERAL NOTES:**

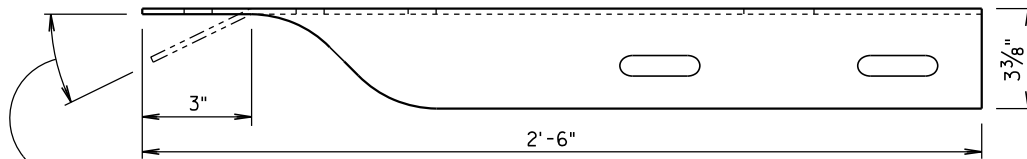
Throughout the type 2B guardrail transition, slots in the rails shall be provided as specified in the plans and by the manufacturer. A drilled hole through the rail is not allowed as a replacement for a slot. If the Contractor must create a slot, a cutting torch or plasma cutter is not allowed.

All costs for furnishing and installing the type 2B guardrail transition including labor, equipment, and materials shall be included in the contract unit price for the respective guardrail bid items.

September 14, 2016

<p><b>FOR REVIEW ONLY</b> 12/02/2016</p>	<p><b>S D D O T</b></p>	<p><b>TYPE 2B GUARDRAIL TRANSITION (BRIDGE RAIL CLASS B DESIGN 1T OR 2T TO W BEAM GUARDRAIL)</b></p>	<p>PLATE NUMBER <b>630.55</b></p>
			<p>Sheet 2 of 2</p>

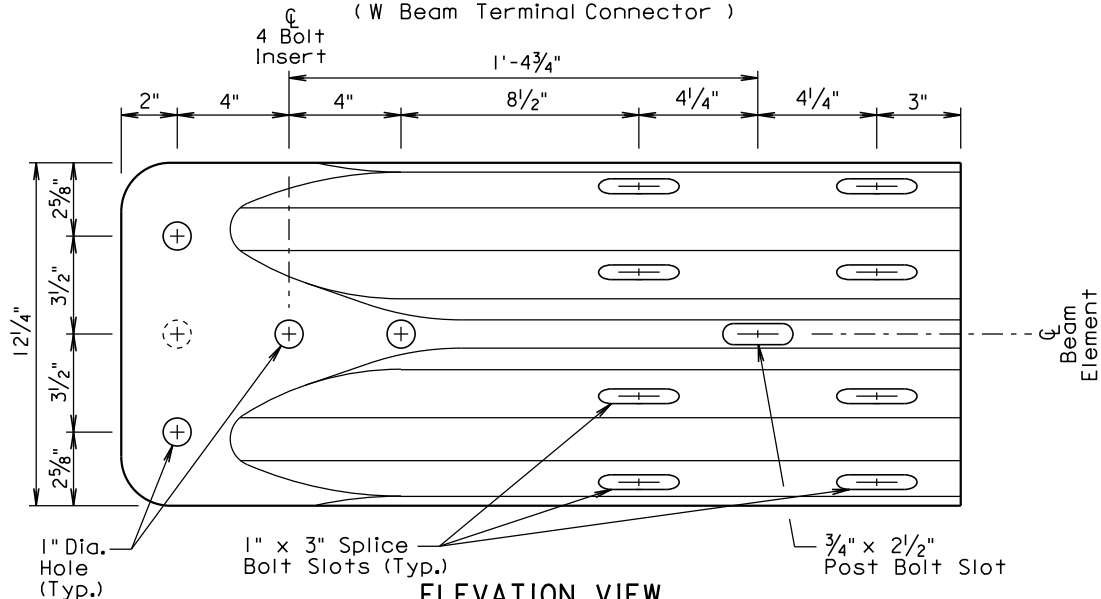




An extra hole and an approximate 26° bend shall be required only for the Special Anchor Assembly and Breakaway Cable Terminal. The Modified W Beam Terminal Connector placement detail is shown on Standard Plates 630.84 and 630.85.

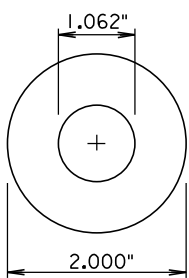
**TOP VIEW**

( W Beam Terminal Connector )

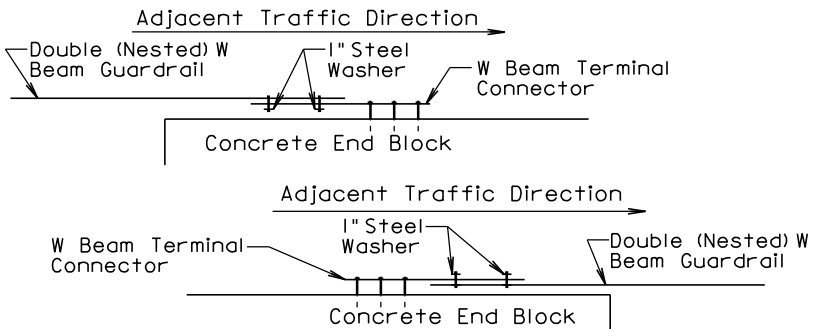
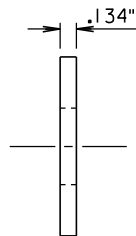


**ELEVATION VIEW**

( W Beam Terminal Connector )



**1" STEEL WASHER**  
(8 washers required)



**PLAN VIEWS**

(Typical Locations of 1" Steel Washers)

**GENERAL NOTES:**

W Beam Terminal Connectors shall be 10 gauge.

When the W beam terminal connector is used to connect the rail to the bridge or concrete end block, 1" steel washers shall be used at the lap splice and the washers shall be in direct contact with the 3" slots of the W beam terminal connector. See the drawings above for the typical locations of the 1" steel washers.

There will be no separate payment for furnishing and installing the W beam terminal connector. All costs for furnishing and installing the W beam terminal connector shall be incidental to the contract unit price of the respective guardrail item it is attached to.

September 14, 2016

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12/02/2016

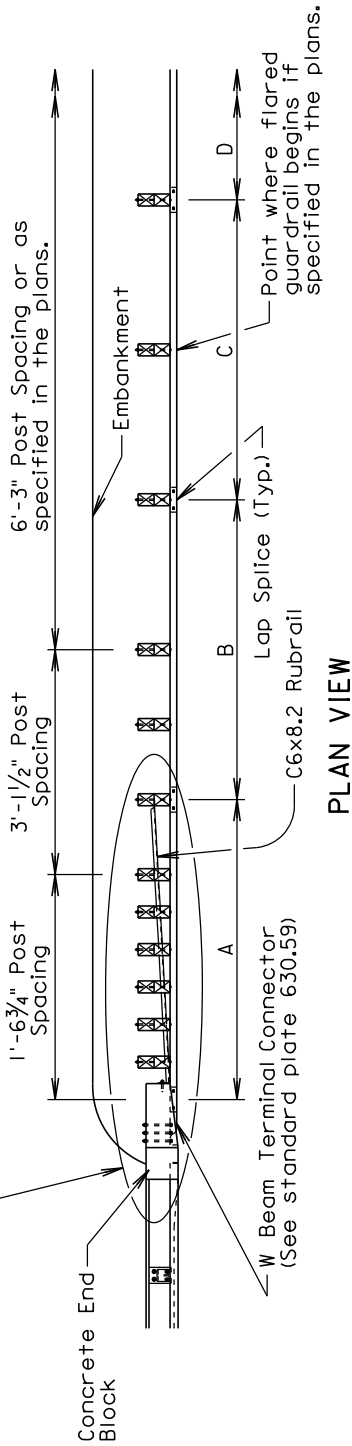
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**W BEAM TERMINAL CONNECTOR**

**PLATE NUMBER**  
**630.59**

Sheet 1 of 1

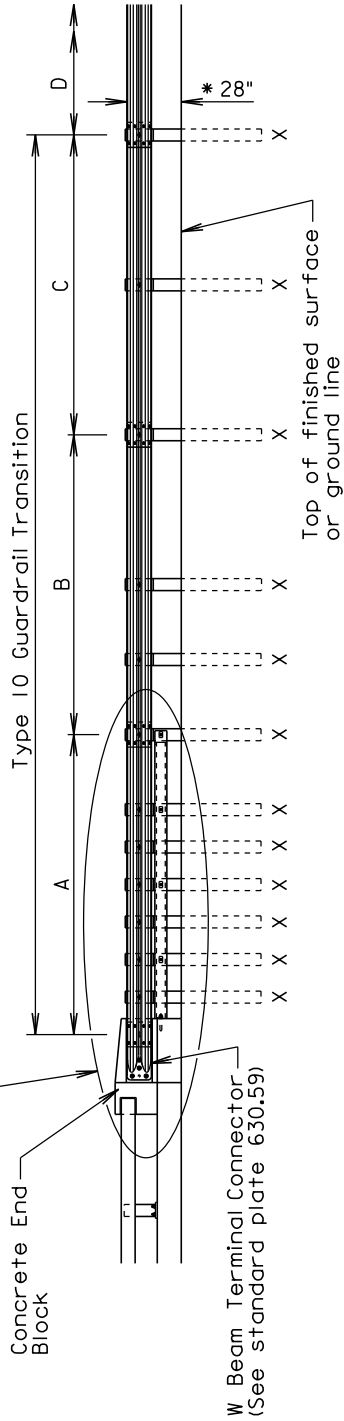
See Detail E on sheet 2 of 3



PLAN VIEW

- A: 12'-6" Straight Double (Nested) Class B W Beam Guardrail with Wood Posts (See standard plate 630.10)
- B: 12'-6" Straight Class B W Beam Guardrail with Wood Posts (See standard plate 630.10)
- C: 12'-6" Straight Class A W Beam Guardrail with Wood Posts (See standard plate 630.10) or as specified in the plans.
- D: Guardrail as specified in the plans.

See Detail F on sheet 2 of 3



ELEVATION VIEW

\* See standard plate 630.99

X: 6" x 8" x 6'-0" Wood Post and 6" x 8" x 14" Wood Blockout

September 14, 2016

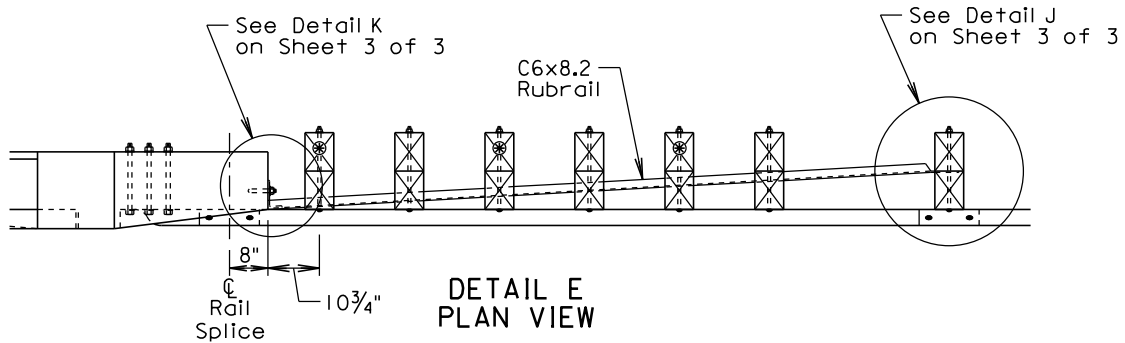
**FOR REVIEW ONLY**  
12/02/2016

**STANDARD**

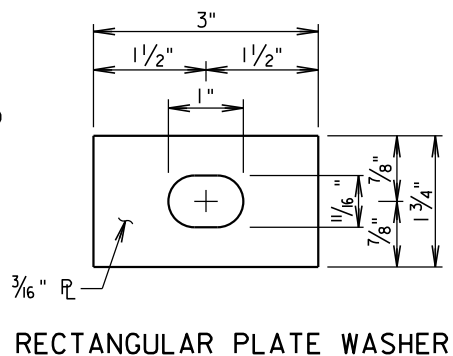
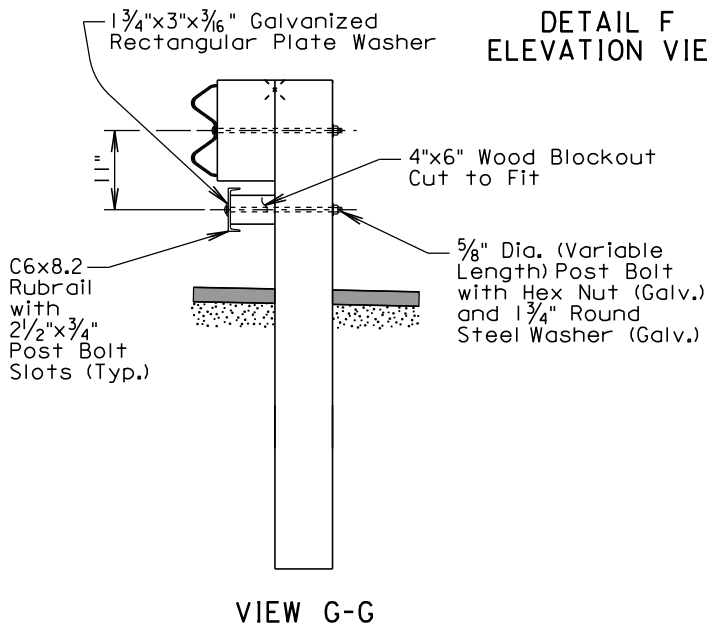
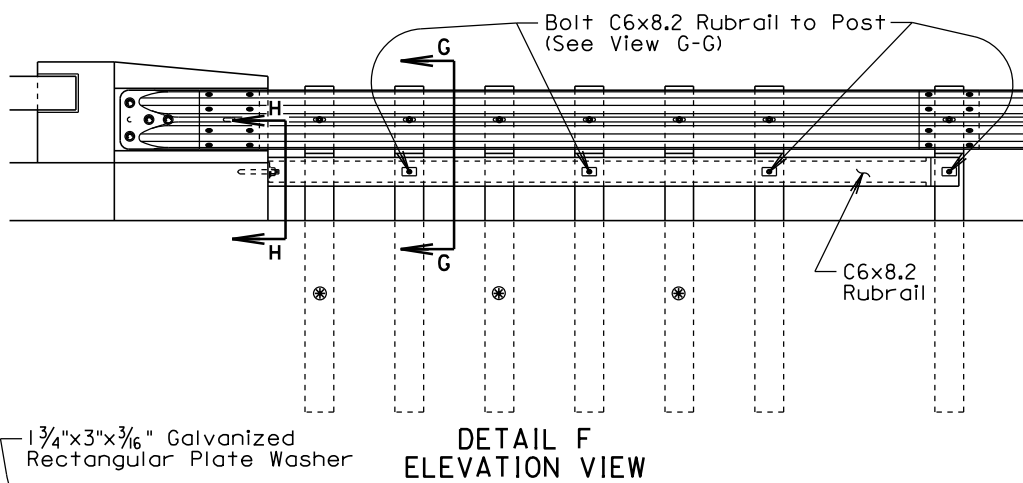
**TYPE 10 GUARDRAIL TRANSITION  
(CONCRETE END BLOCK TO  
W BEAM GUARDRAIL)**

PLATE NUMBER  
**630.60**

Sheet 1 of 3



⊗ Rubrail does not have to be attached to these posts.



September 14, 2016

**FOR REVIEW ONLY**  
12/02/2016

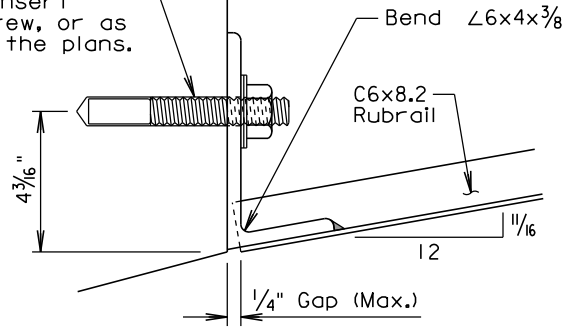
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**TYPE 10 GUARDRAIL TRANSITION  
(CONCRETE END BLOCK TO  
W BEAM GUARDRAIL)**

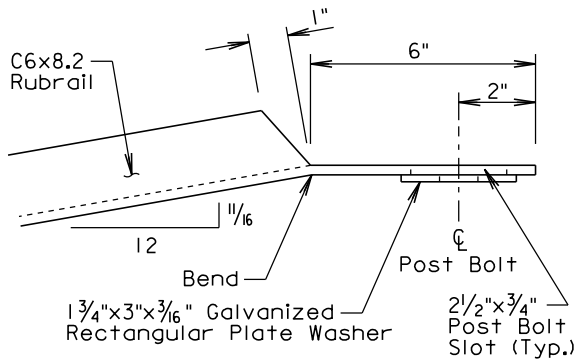
PLATE NUMBER  
**630.60**

Sheet 2 of 3

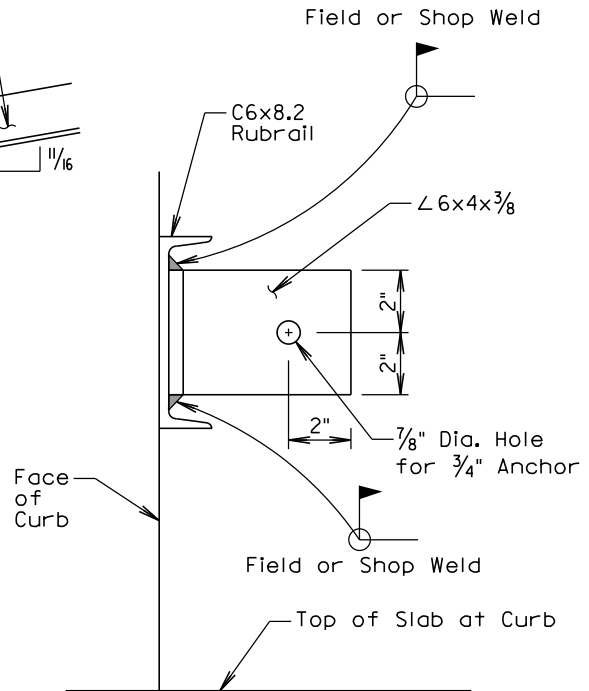
3/4" Wedge Type Anchor with Nut and 2 Washers, Cast in 3/4" Insert with Cap Screw, or as specified in the plans.



**DETAIL K**  
(Double Class B Rail Not Shown)



**DETAIL J**  
(Post, Blockout, Post Bolt, and Rail Not Shown)



**VIEW H-H**  
(Anchor and Rail Not Shown)

**GENERAL NOTES:**

Throughout the type 10 guardrail transition, slots in the rails shall be provided as specified in the plans and by the manufacturer. A drilled hole through the rail is not allowed as a replacement for a slot. If the Contractor must create a slot, a cutting torch or plazma cutter is not allowed.

The rubrail steel shall be in conformance with ASTM A36 and shall be galvanized after fabrication in conformance with ASTM A123. If pre-galvanized steel members are used, all cuts and welds shall be coated with an approved galvanizing paint.

The wedge type anchor bolt, nut, and washers shall be hot dipped galvanized or made of a corrosion resistant material. The wedge type anchor shall be capable of sustaining an ultimate load in tension or shear of 17,000 pounds when the anchor is set in 4,500 psi compressive strength concrete. The anchor shall be installed according to the manufacturer's recommendations. The Contractor shall obtain certification from the manufacturer that the anchor meets the tensile and shear requirements and shall submit the certification to the Engineer. The cost for furnishing and installing the wedge type anchor, nut, and washers shall be incidental to the contract unit price per foot for "Rubrail".

All costs for furnishing and installing the straight double class B W beam guardrail including labor, equipment, and materials including the W beam rails, posts, blockouts, W beam terminal connector, and hardware shall be incidental to the contract unit price per foot for "Straight Double Class B W Beam Guardrail with Wood Posts".

All costs for furnishing and installing the type 10 guardrail transition including labor, equipment, and materials shall be included in the contract unit price for the respective guardrail bid items.

September 14, 2016

**FOR REVIEW ONLY**  
12/02/2016

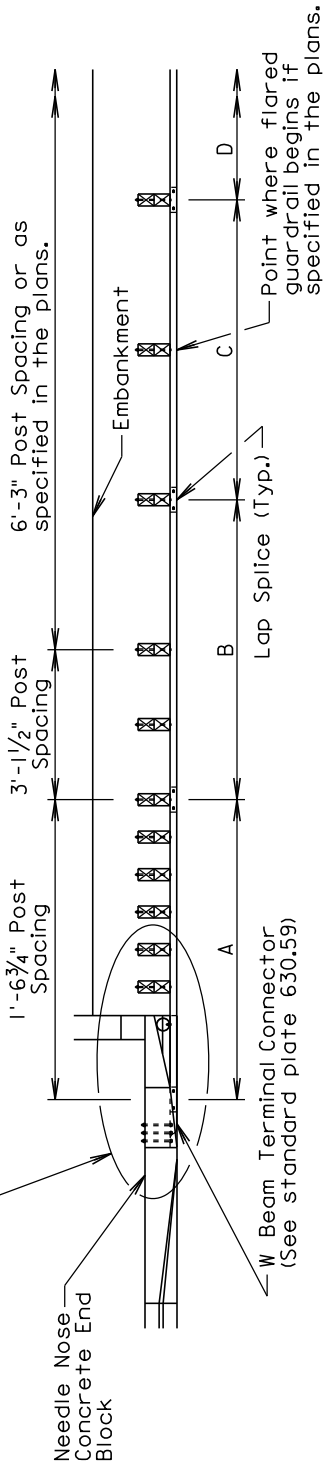
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**TYPE 10 GUARDRAIL TRANSITION  
(CONCRETE END BLOCK TO  
W BEAM GUARDRAIL)**

**PLATE NUMBER**  
**630.60**

Sheet 3 of 3

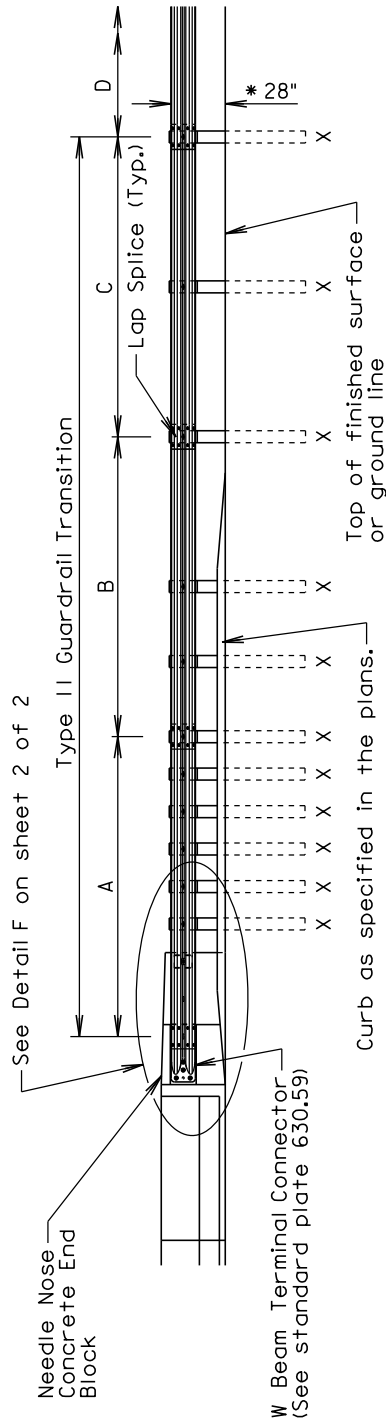
See Detail E on sheet 2 of 2



**PLAN VIEW**  
(Curb Not Shown)

- A: 12'-6" Straight Double (Nested) Class B W Beam Guardrail with Wood Posts (See standard plate 630.10)
- B: 12'-6" Straight Class B W Beam Guardrail with Wood Posts (See standard plate 630.10)
- C: 12'-6" Straight Class A W Beam Guardrail with Wood Posts (See standard plate 630.10) or as specified in the plans.
- D: Guardrail as specified in the plans.

See Detail F on sheet 2 of 2



**ELEVATION VIEW**

\* See standard plate 630.99

X: 6" x 8" x 6'-0" Wood Post and 6" x 8" x 14" Wood Blockout

September 14, 2016

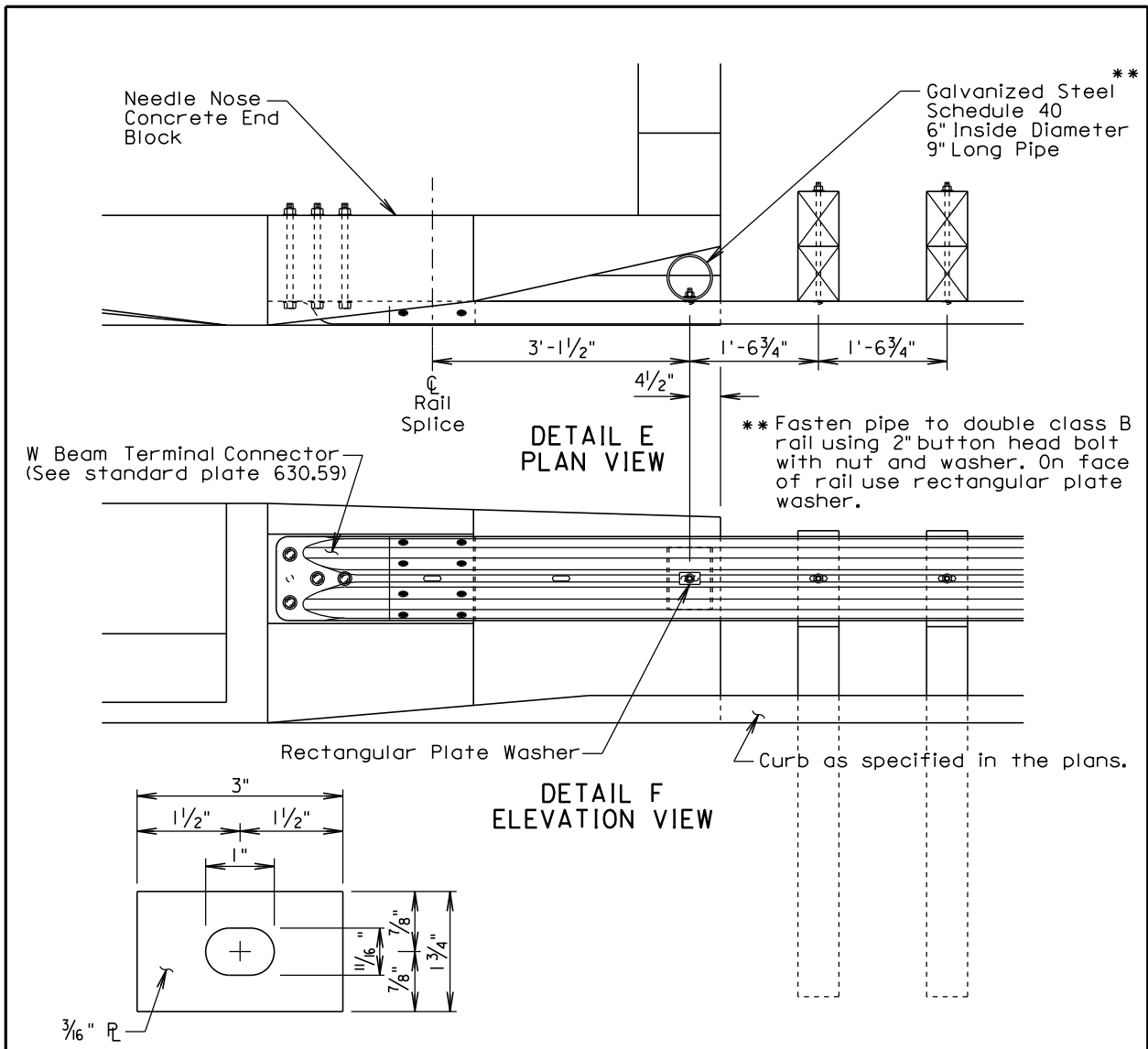
**FOR REVIEW ONLY**  
12/02/2016

**ADD**

**TYPE 11 GUARDRAIL TRANSITION  
(NEEDLE NOSE CONCRETE END BLOCK  
TO W BEAM GUARDRAIL)**

PLATE NUMBER  
**630.61**

Sheet 1 of 2



**RECTANGULAR PLATE WASHER**

**GENERAL NOTES:**

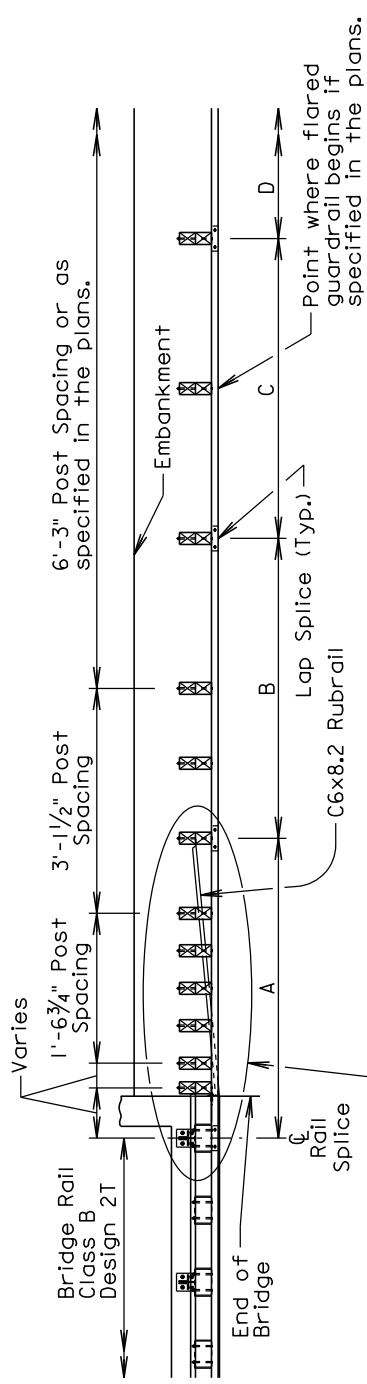
Throughout the type II guardrail transition, slots in the rails shall be provided as specified in the plans and by the manufacturer. A drilled hole through the rail is not allowed as a replacement for a slot. If the Contractor must create a slot, a cutting torch or plasma cutter is not allowed.

All costs for furnishing and installing the straight double class B W beam guardrail including labor, equipment, and materials including the W beam rails, posts, blockouts, W beam terminal connector, steel pipe, and hardware shall be incidental to the contract unit price per foot for "Straight Double Class B W Beam Guardrail with Wood Posts".

All costs for furnishing and installing the type II guardrail transition including labor, equipment, and materials shall be included in the contract unit price for the respective guardrail bid items.

September 14, 2016

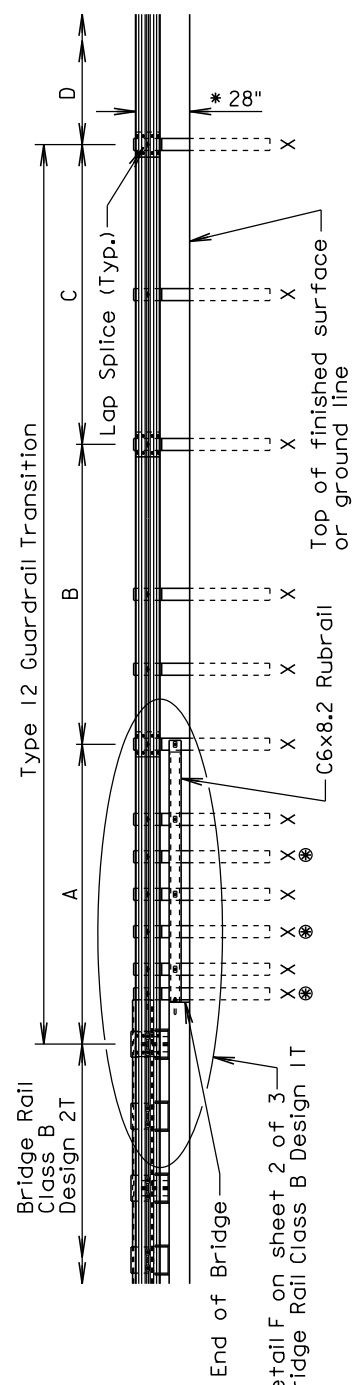
<p><b>FOR REVIEW ONLY</b> 12/02/2016</p>	<p><b>S D D O T</b></p>	<p><b>TYPE 11 GUARDRAIL TRANSITION (NEEDLE NOSE CONCRETE END BLOCK TO W BEAM GUARDRAIL)</b></p>	<p>PLATE NUMBER <b>630.61</b></p>
			<p>Sheet 2 of 2</p>



**PLAN VIEW**

See Detail E on sheet 2 of 3 for Bridge Rail Class B Design 1T

- A: 12'-6" Straight Double (Nested) Class B W Beam Guardrail with Wood Posts (See standard plate 630.10)
- B: 12'-6" Straight Class B W Beam Guardrail with Wood Posts (See standard plate 630.10)
- C: 12'-6" Straight Class A W Beam Guardrail with Wood Posts (See standard plate 630.10) or as specified in the plans.
- D: Guardrail as specified in the plans.



**ELEVATION VIEW**

See Detail F on sheet 2 of 3 for Bridge Rail Class B Design 1T

- X: 6" x 8" x 6'-0" Wood Post and 6" x 8" x 14" Wood Blockout
- ⊗: Rubrail does not have to be attached to these posts.

\* See standard plate 630.99

September 14, 2016

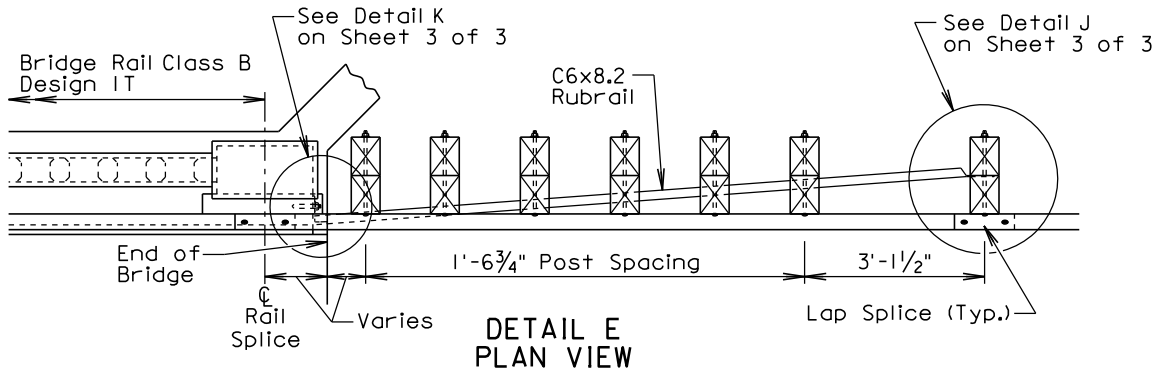
**FOR REVIEW ONLY**  
12/02/2016

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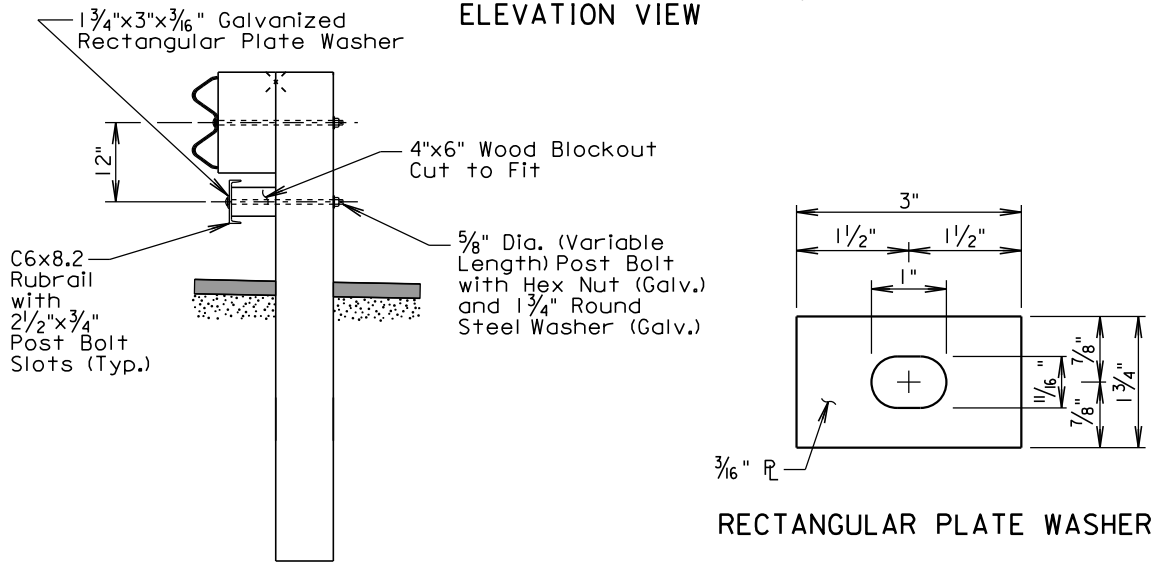
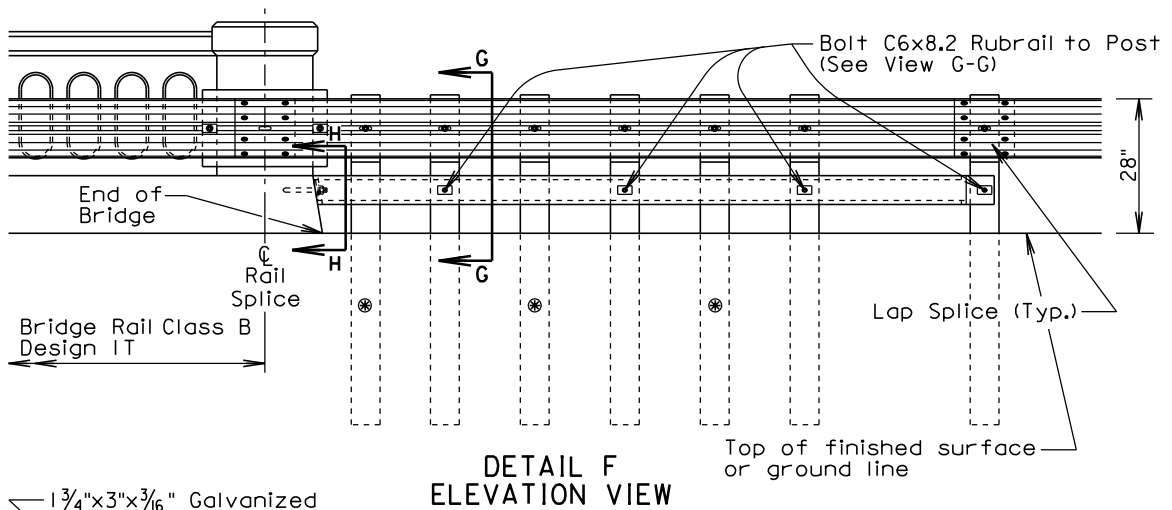
**TYPE 12 GUARDRAIL TRANSITION  
(W BEAM BRIDGE RAIL CLASS B DESIGN  
1T OR 2T TO W BEAM GUARDRAIL)**

**PLATE NUMBER**  
**630.63**

Sheet 1 of 3



⊗ Rubrail does not have to be attached to these posts.



(For Bridge Rail Class B Design 1T or 2T)

September 14, 2016

**FOR REVIEW ONLY**

12/02/2016

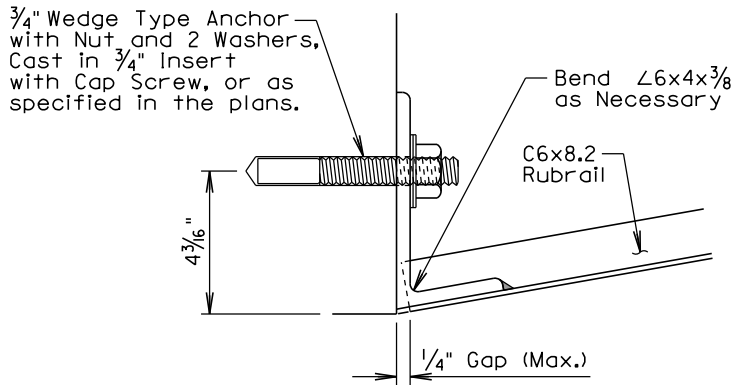
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**TYPE 12 GUARDRAIL TRANSITION  
(W BEAM BRIDGE RAIL CLASS B DESIGN  
1T OR 2T TO W BEAM GUARDRAIL)**

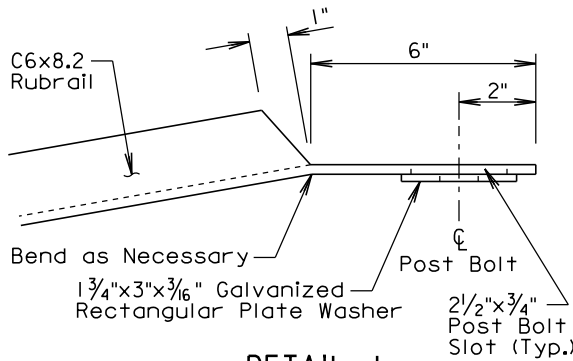
**PLATE NUMBER  
630.63**

Sheet 2 of 3

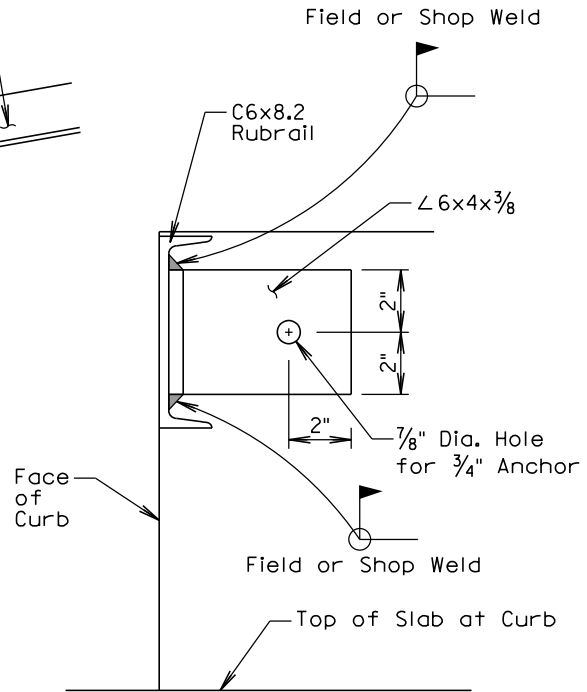




**DETAIL K**  
(Double Class B Rail Not Shown)  
(For Bridge Rail Class B Design 1T or 2T)



**DETAIL J**  
(Post, Blockout, Post Bolt, and Rail Not Shown)  
(For Bridge Rail Class B Design 1T or 2T)



**VIEW H-H**  
(Anchor and Rail Not Shown)  
(For Bridge Rail Class B Design 1T or 2T)

**GENERAL NOTES:**

Throughout the type 12 guardrail transition, slots in the rails shall be provided as specified in the plans and by the manufacturer. A drilled hole through the rail is not allowed as a replacement for a slot. If the Contractor must create a slot, a cutting torch or plazma cutter is not allowed.

The rubrail steel shall be in conformance with ASTM A36 and shall be galvanized after fabrication in conformance with ASTM A123. If pre-galvanized steel members are used, all cuts and welds shall be coated with an approved galvanizing paint.

The wedge type anchor bolt, nut, and washers shall be hot dipped galvanized or made of a corrosion resistant material. The wedge type anchor shall be capable of sustaining an ultimate load in tension or shear of 17,000 pounds when the anchor is set in 4,500 psi compressive strength concrete. The anchor shall be installed according to the manufacturer's recommendations. The Contractor shall obtain certification from the manufacturer that the anchor meets the tensile and shear requirements and shall submit the certification to the Engineer. The cost for furnishing and installing the wedge type anchor, nut, and washers shall be incidental to the contract unit price per foot for "Rubrail".

All costs for furnishing and installing the straight double class B W beam guardrail including labor, equipment, and materials including the W beam rails, posts, blockouts, W beam terminal connector, and hardware shall be incidental to the contract unit price per foot for "Straight Double Class B W Beam Guardrail with Wood Posts".

All costs for furnishing and installing the type 12 guardrail transition including labor, equipment, and materials shall be included in the contract unit price for the respective guardrail bid items.

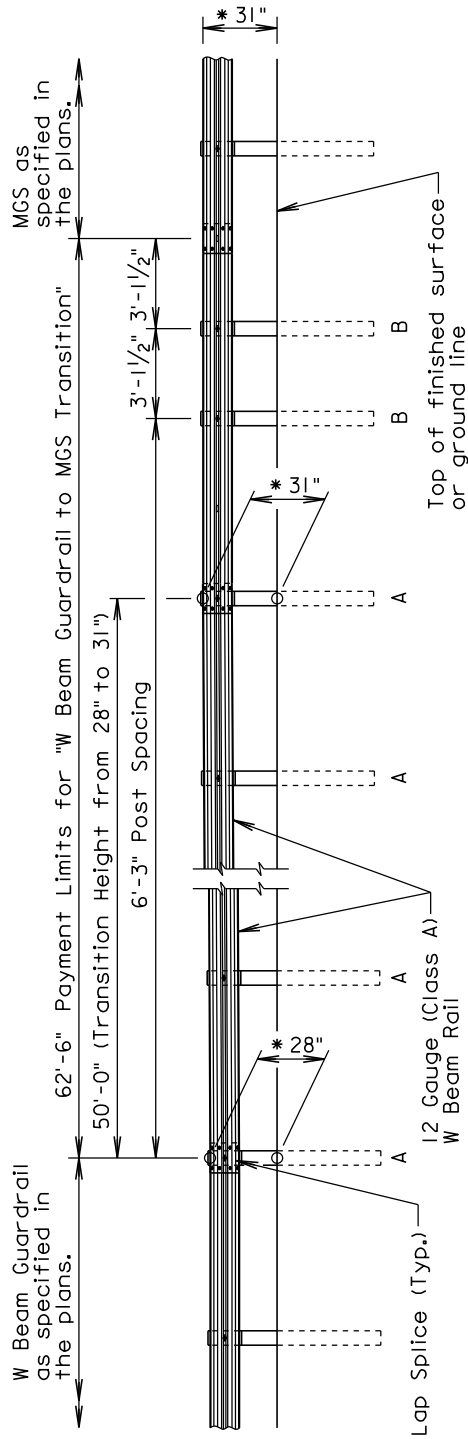
September 14, 2016

**FOR REVIEW ONLY**  
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**TYPE 12 GUARDRAIL TRANSITION  
(W BEAM BRIDGE RAIL CLASS B DESIGN  
1T OR 2T TO W BEAM GUARDRAIL)**

**PLATE NUMBER  
630.63**  
Sheet 3 of 3



**ELEVATION VIEW**

- A: 6" x 8" x 6'-0" Wood Post and 6" x 8" x 14" Wood Blockout (See standard plate 630.10)
- B: 6" x 8" x 6'-0" Wood Post and 6" x 12" x 14" Wood Blockout (See standard plate 630.20)

\* See standard plate 630.99

**GENERAL NOTES:**

All costs for furnishing and installing the W beam guardrail to MGS transition including labor, equipment, and materials, which includes all rail sections, posts and blockouts, hardware, and incidentals shall be included in the contract unit price per each for "W Beam Guardrail to MGS Transition".

September 14, 2016

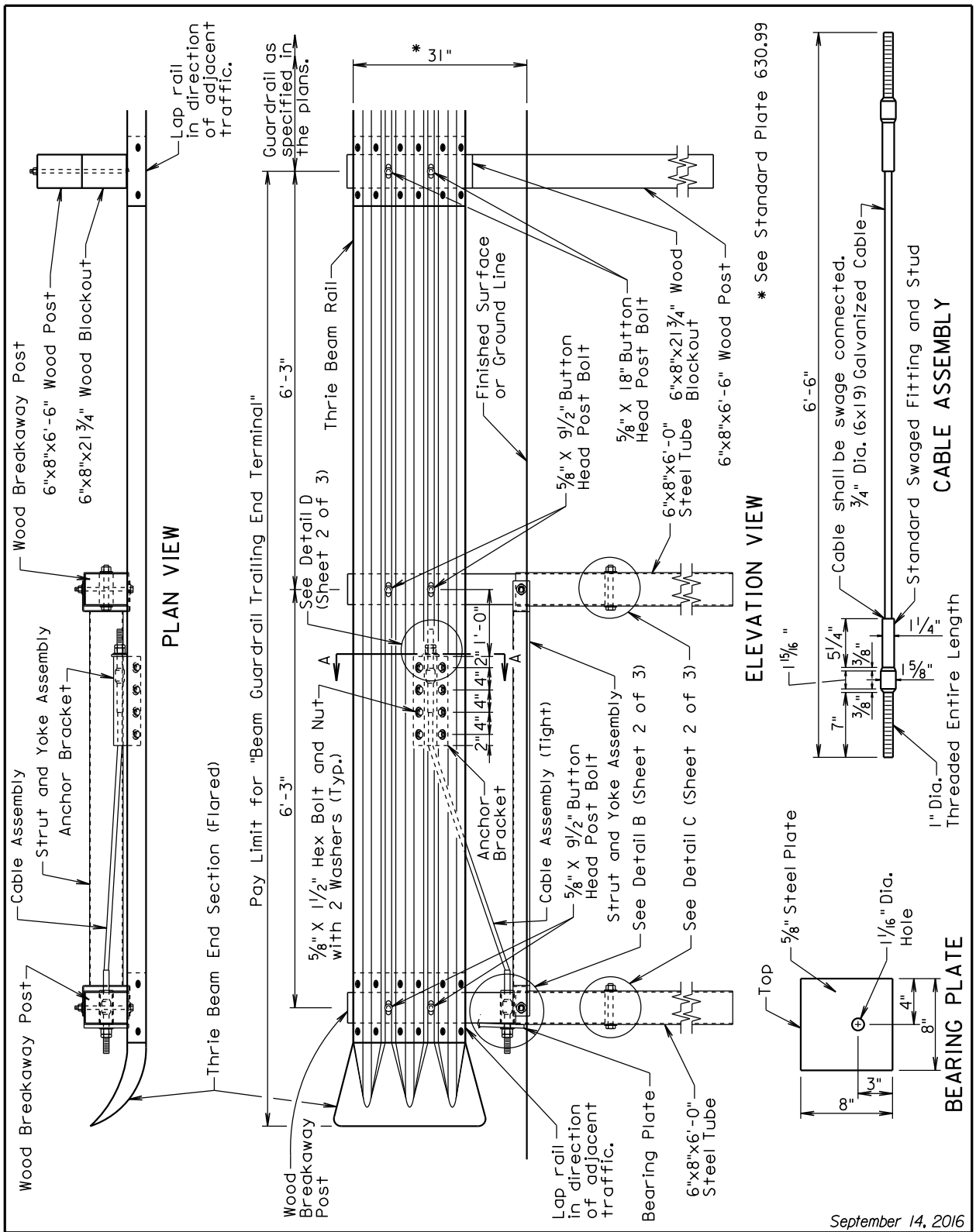
**FOR REVIEW ONLY**  
12/02/2016

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**W BEAM GUARDRAIL TO  
MGS (MIDWEST GUARDRAIL SYSTEM)  
TRANSITION**

**PLATE NUMBER  
630.64**

Sheet 1 of 1



**FOR REVIEW ONLY**  
 12/02/2016

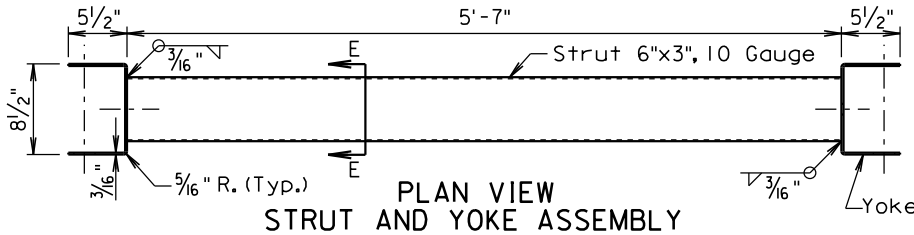
**TODD**

**THRIE BEAM GUARDRAIL TRAILING END TERMINAL**

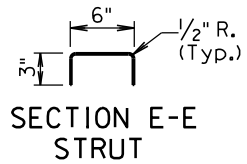
September 14, 2016

PLATE NUMBER  
**630.80**

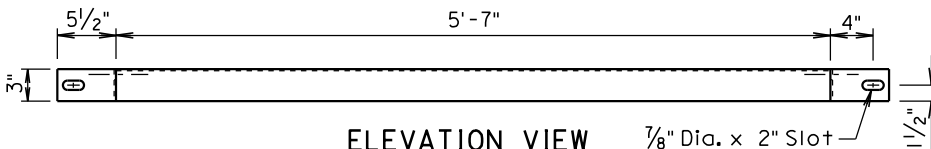
Sheet 1 of 3



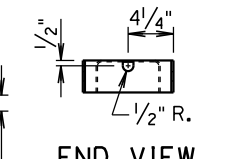
PLAN VIEW  
STRUT AND YOKE ASSEMBLY



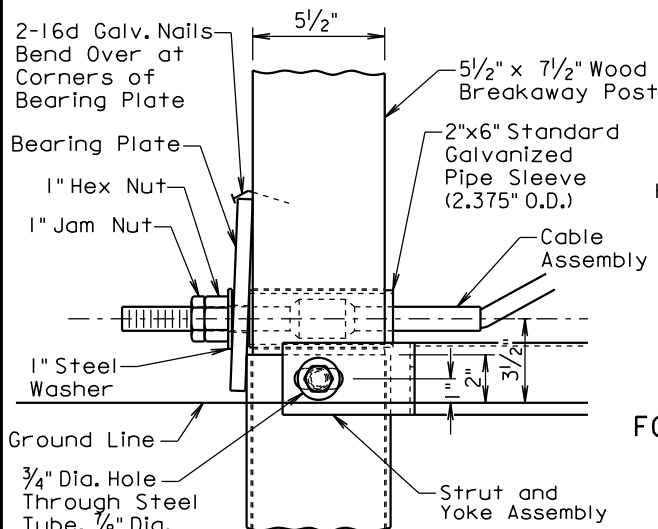
SECTION E-E  
STRUT



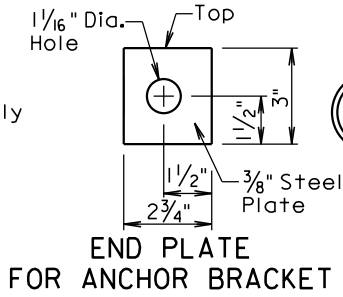
ELEVATION VIEW  
STRUT AND YOKE ASSEMBLY



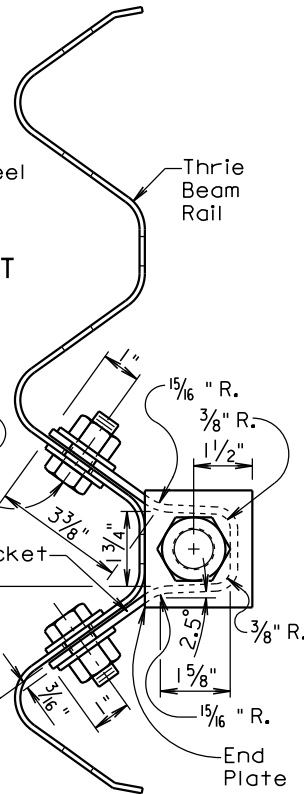
END VIEW  
STRUT AND  
YOKE ASSEMBLY



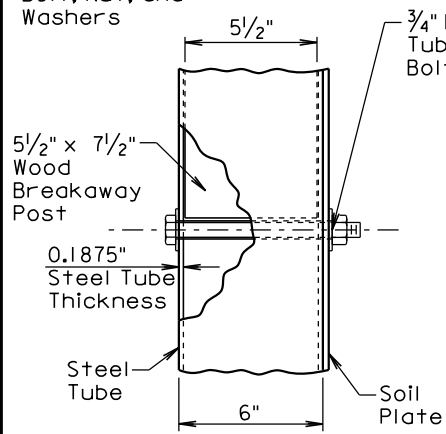
DETAIL B



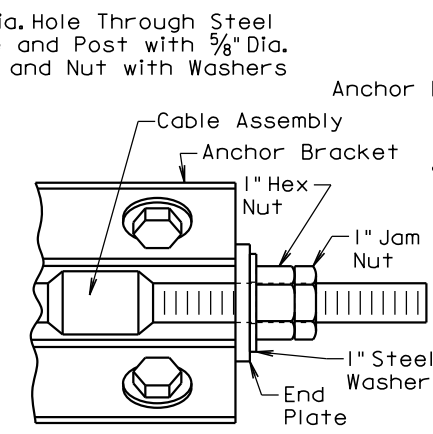
END PLATE  
FOR ANCHOR BRACKET



SECTION A-A



DETAIL C



DETAIL D  
(Thrie Beam Rail Not Shown)

September 14, 2016

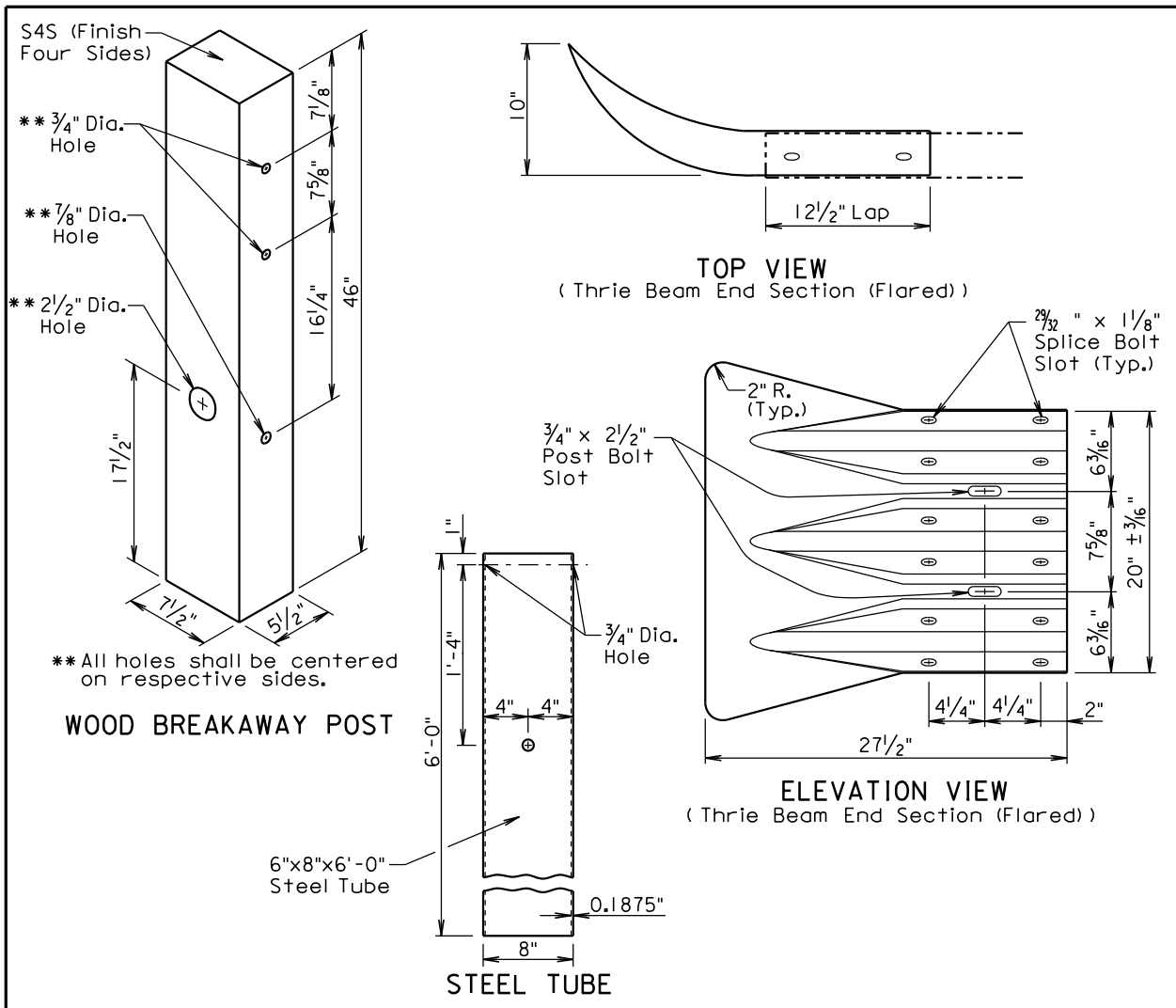
**FOR REVIEW ONLY**  
12/02/2016

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**THRIE BEAM GUARDRAIL  
TRAILING END TERMINAL**

PLATE NUMBER  
**630.80**

Sheet 2 of 3



**GENERAL NOTES:**

The thrie beam guardrail trailing end terminal shall only be used in a one-way traffic situation.

Thrie beam end sections (flared) shall be 12 gauge.

The cable shall be 3/4", Type II, with Class A coating in conformance with AASHTO M30.

The steel tube shall meet the requirements of ASTM Specification A500, Grade B, and shall be galvanized after fabrication in accordance with the requirements of AASHTO Specification M111.

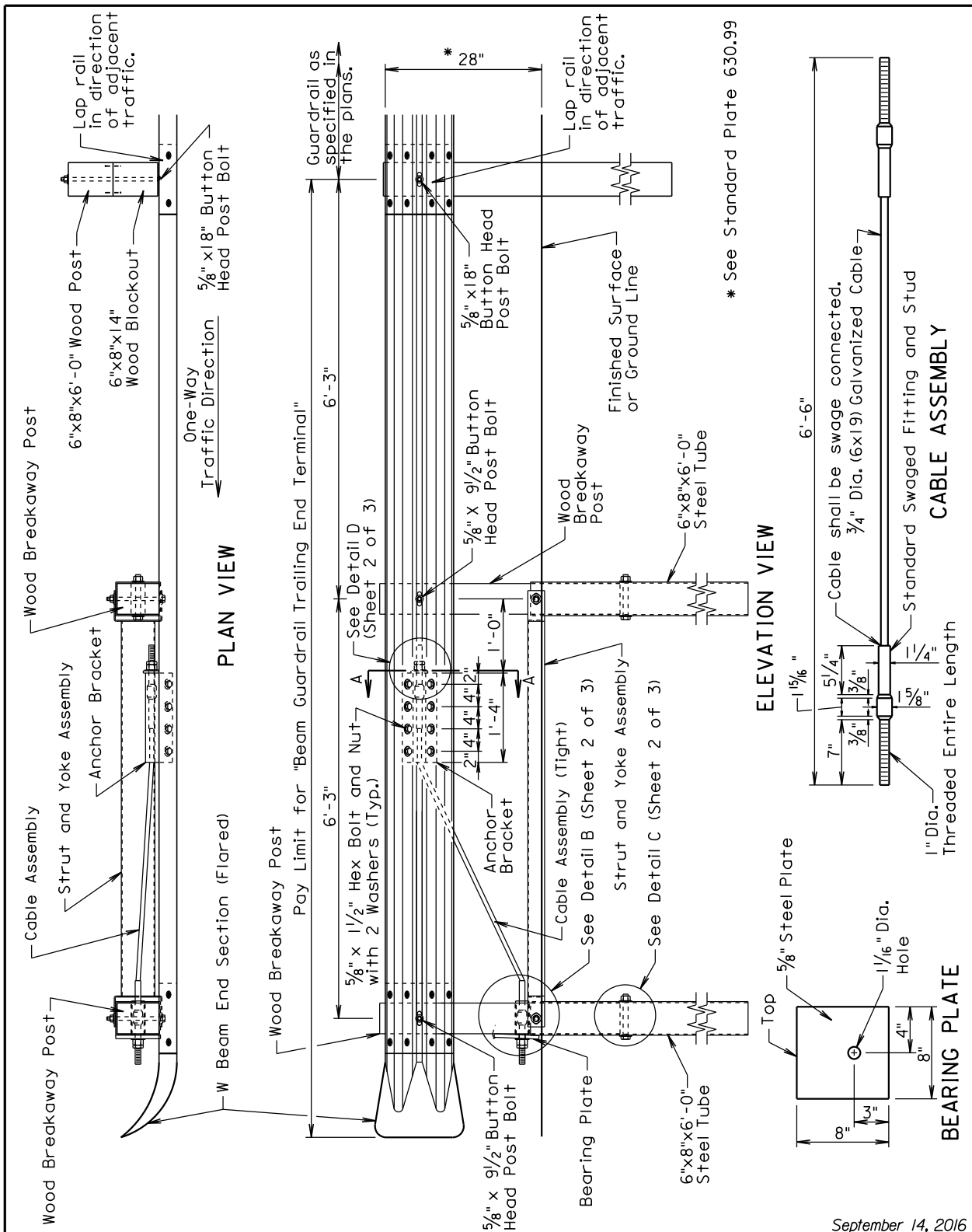
All hardware shall be galvanized in accordance with ASTM A153.

The anchor bracket, soil plate, and bearing plate shall be fabricated from steel that meets ASTM A36 Specifications. They shall be galvanized after fabrication in accordance with ASTM A123.

All costs for furnishing and constructing the thrie beam guardrail trailing end terminal including labor, equipment, materials which includes thrie beam rail section, post and blockout, wood breakaway posts, steel tubes, cable assembly, bearing plate, anchor bracket, strut and yoke assembly, thrie beam end section (flared), hardware, and incidentals shall be included in the contract unit price per each for "Beam Guardrail Trailing End Terminal".

September 14, 2016

<p><b>FOR REVIEW ONLY</b></p> <p>12/02/2016</p>	<p><b>S D D O T</b></p>	<p><b>THRIE BEAM GUARDRAIL TRAILING END TERMINAL</b></p>	<p>PLATE NUMBER</p> <p><b>630.80</b></p>
			<p>Sheet 3 of 3</p>



**FOR REVIEW ONLY**  
 12/02/2016

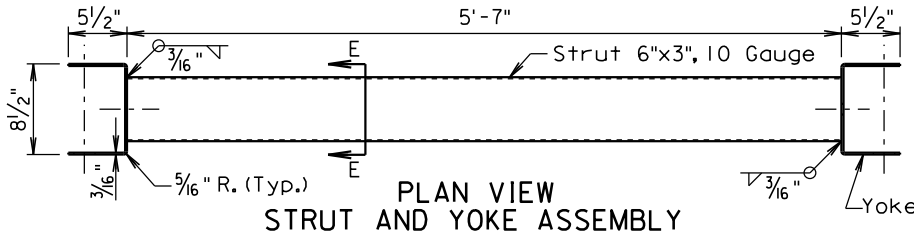
**TODDS**

**W BEAM GUARDRAIL TRAILING END TERMINAL**

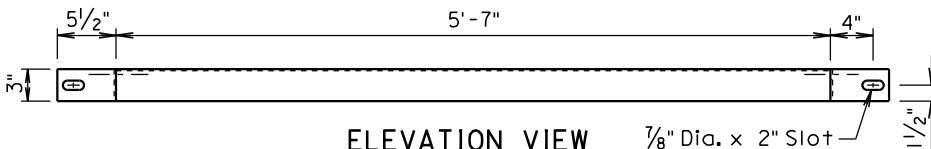
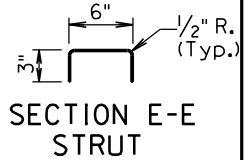
September 14, 2016

PLATE NUMBER  
**630.81**

Sheet 1 of 3

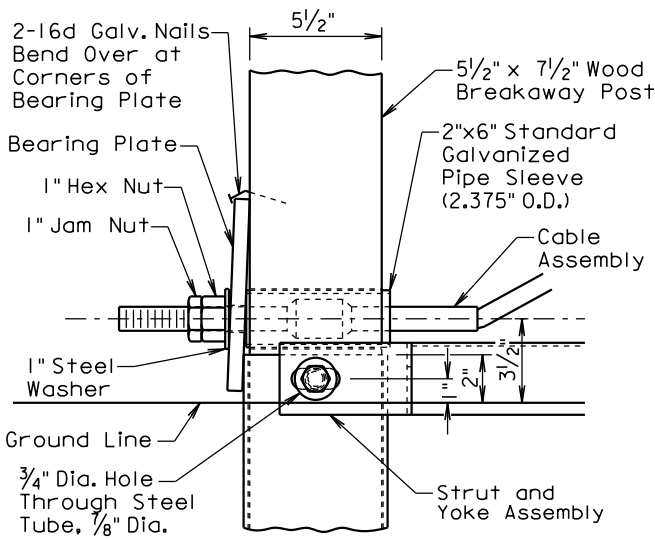


PLAN VIEW  
STRUT AND YOKE ASSEMBLY

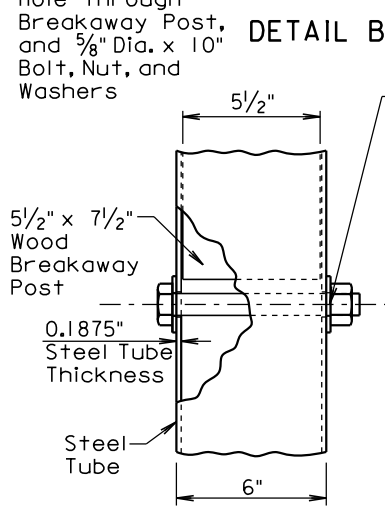
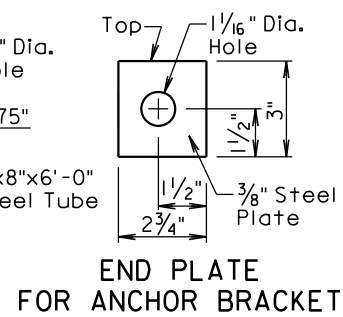


ELEVATION VIEW  
STRUT AND YOKE ASSEMBLY

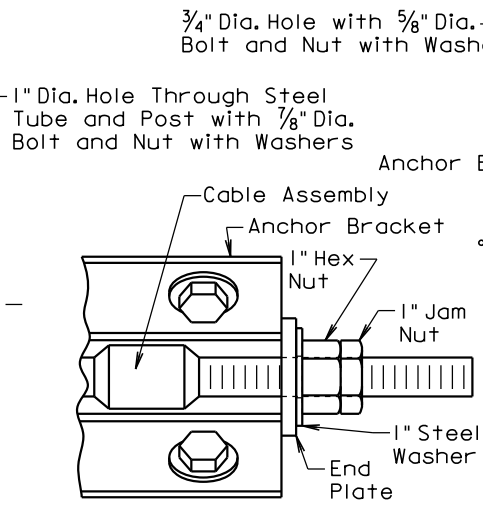
END VIEW  
STRUT AND  
YOKE ASSEMBLY



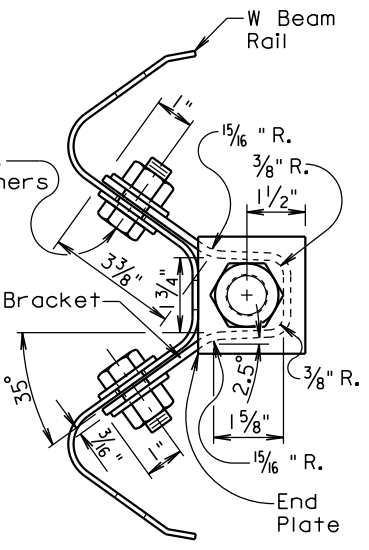
DETAIL B



DETAIL C



DETAIL D  
(W Beam Rail Not Shown)



SECTION A-A

STEEL TUBE

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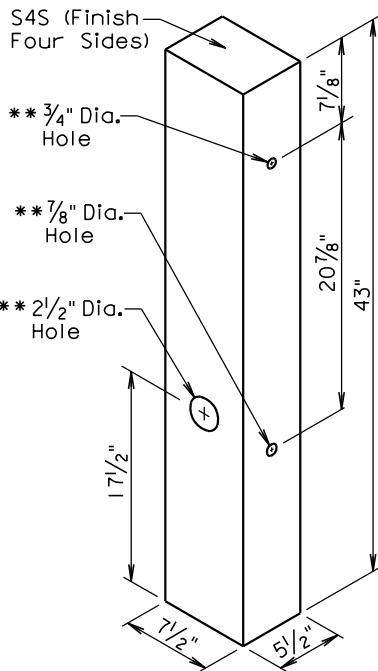
**FOR REVIEW ONLY**  
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**W BEAM GUARDRAIL  
TRAILING END TERMINAL**

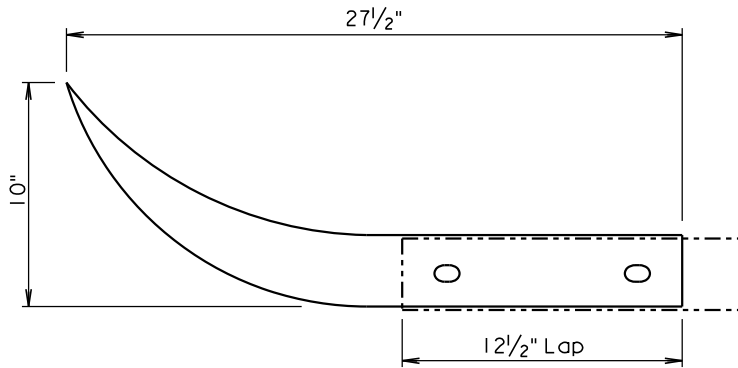
PLATE NUMBER  
**630.81**

Sheet 2 of 3

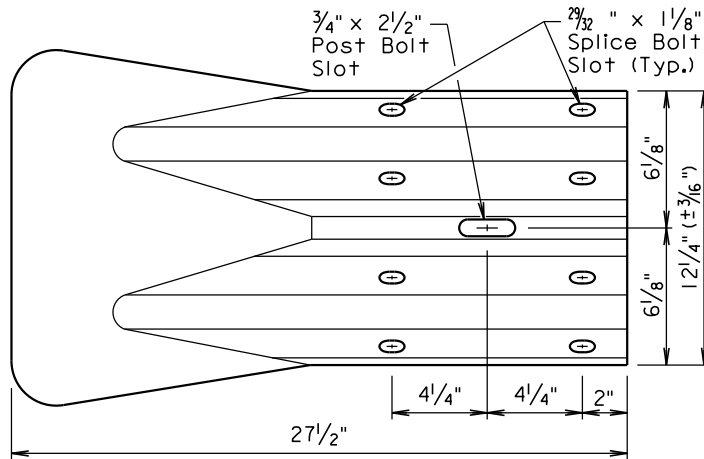


\*\* All holes shall be centered on respective sides.

**WOOD BREAKAWAY POST**



**PLAN VIEW**  
( W Beam End Section (Flared) )



**ELEVATION VIEW**  
( W Beam End Section (Flared) )

**GENERAL NOTES:**

The W beam guardrail trailing end terminal shall only be used in a one-way traffic situation.

W beam end section (flared) shall be 12 gauge.

The cable shall be 3/4", Type II, with Class A coating in conformance with AASHTO M30.

The steel tube shall meet the requirements of ASTM Specification A500, Grade B, and shall be galvanized after fabrication in accordance with the requirements of AASHTO Specification M11.

All hardware shall be galvanized in accordance with ASTM A153.

The anchor bracket, strut and yoke assembly, and bearing plate shall be fabricated from steel that meets ASTM A36 Specifications. They shall be galvanized after fabrication in accordance with ASTM A123.

All costs for furnishing and constructing the W beam guardrail trailing end terminal including labor, equipment, materials which includes W beam rail section, two wood breakaway posts, steel tubes, strut and yoke assembly, cable assembly, bearing plate, anchor bracket, W beam end section (flared), one wood post and blockout, hardware, and incidentals shall be included in the contract unit price per each for "Beam Guardrail Trailing End Terminal".

September 14, 2016

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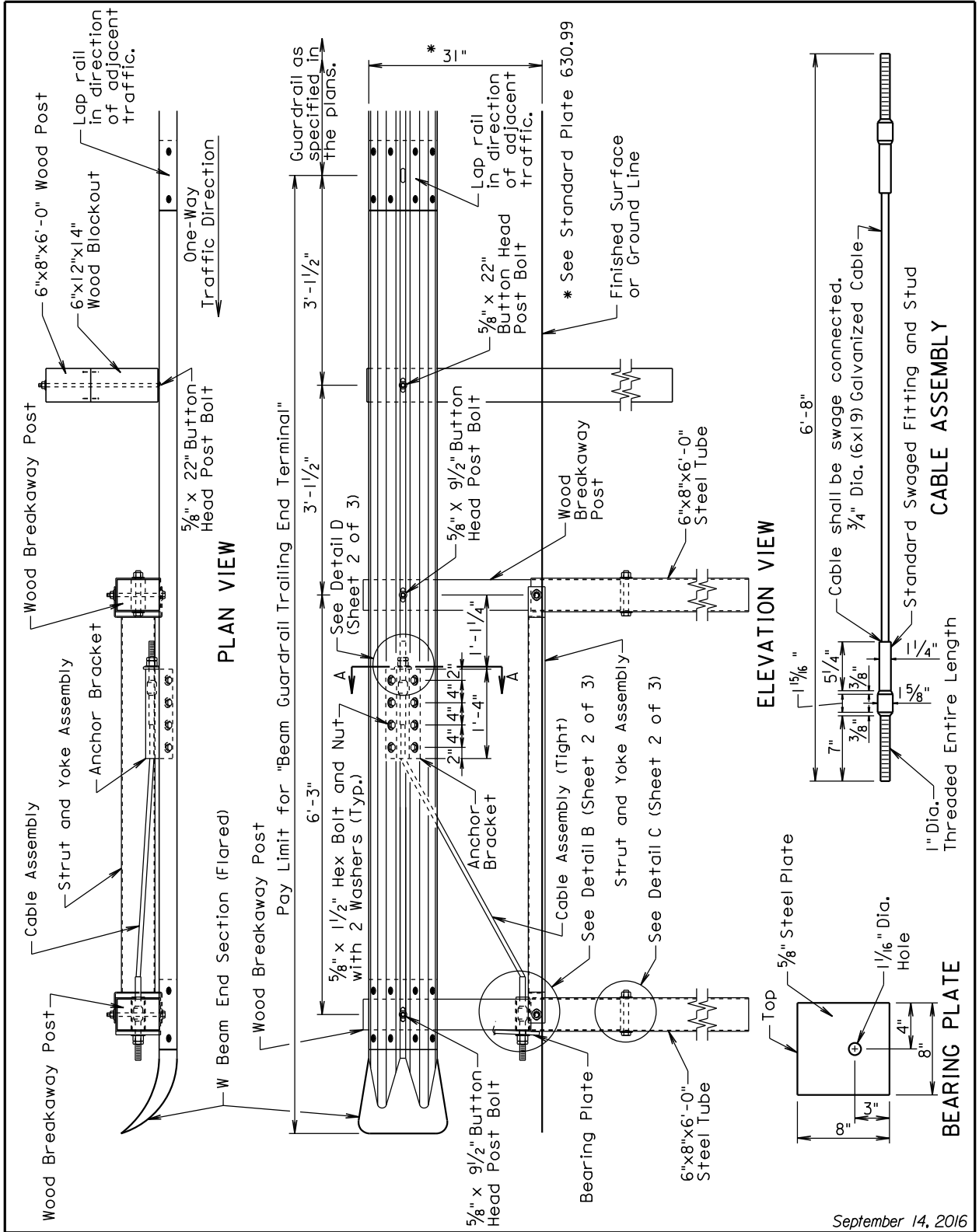
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**W BEAM GUARDRAIL  
TRAILING END TERMINAL**

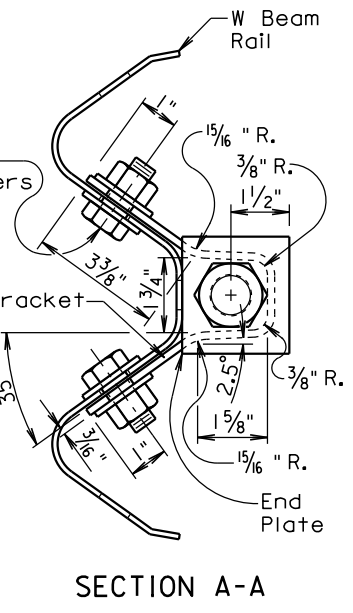
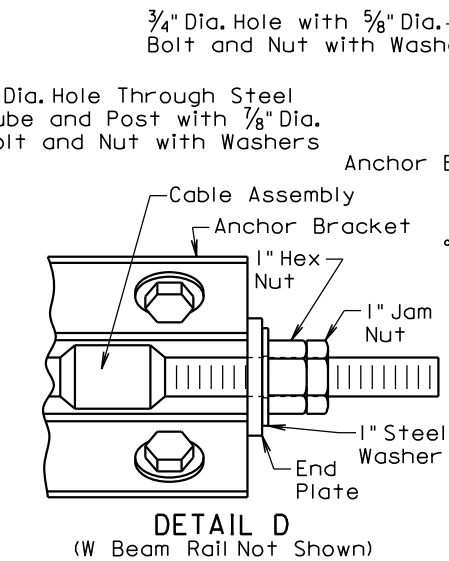
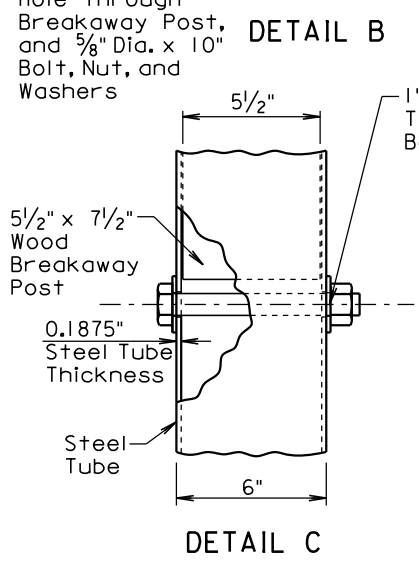
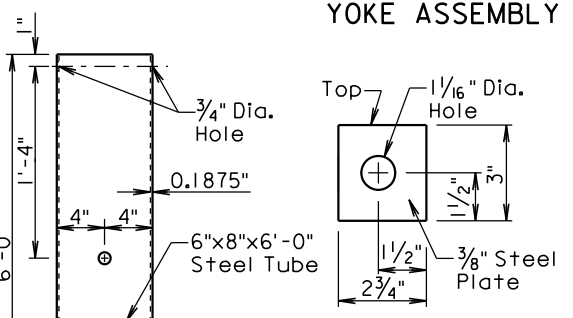
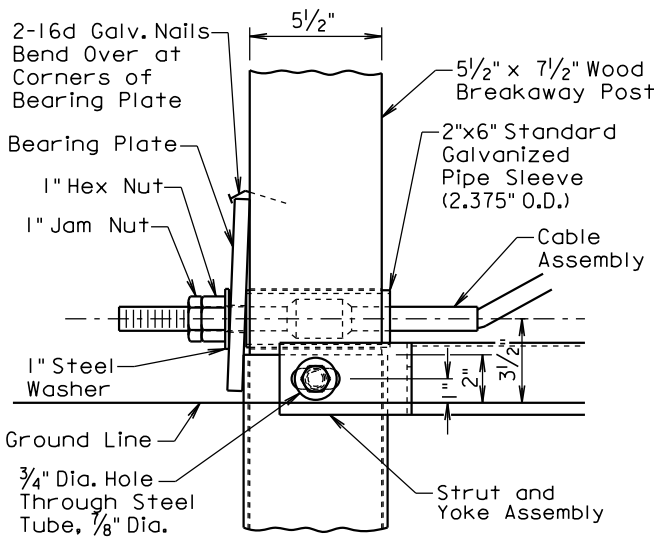
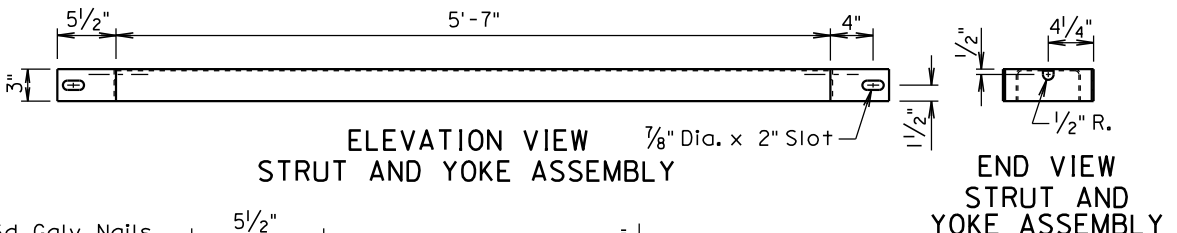
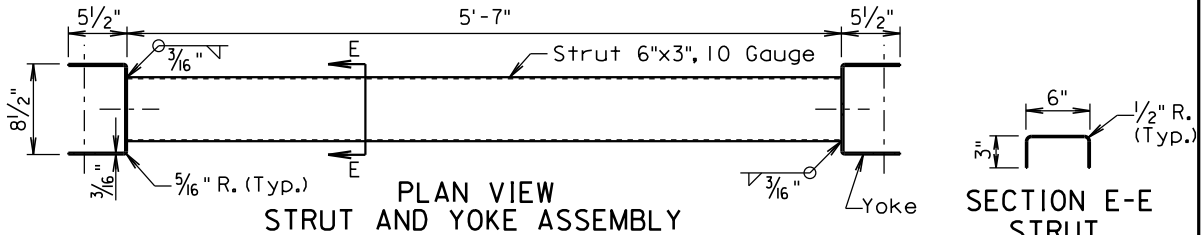
**PLATE NUMBER  
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Sheet 3 of 3





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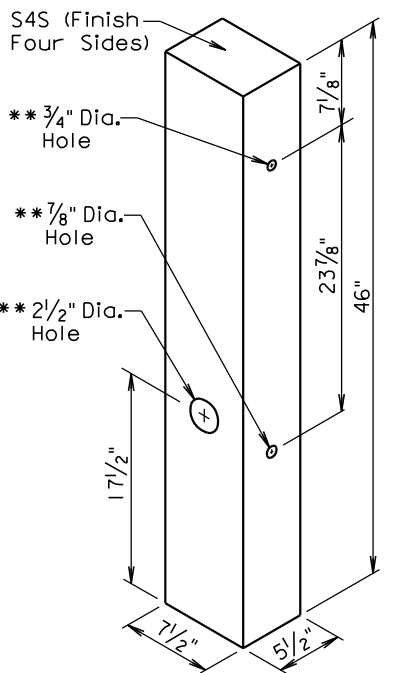
**FOR REVIEW ONLY**  
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**MIDWEST GUARDRAIL SYSTEM (MGS)  
TRAILING END TERMINAL**

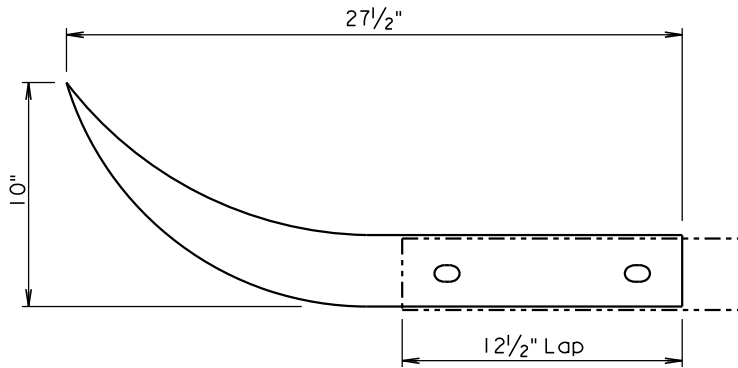
**PLATE NUMBER  
630.82**

Sheet 2 of 3

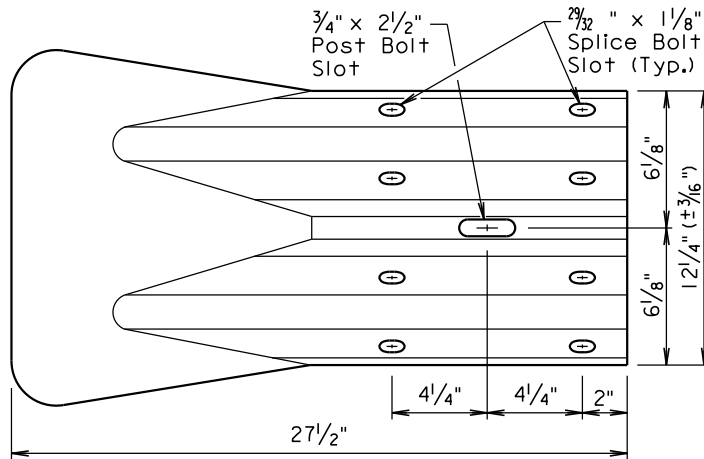


\*\* All holes shall be centered on respective sides.

**WOOD BREAKAWAY POST**



**PLAN VIEW**  
( W Beam End Section (Flared) )



**ELEVATION VIEW**  
( W Beam End Section (Flared) )

**GENERAL NOTES:**

The MGS trailing end terminal shall only be used in a one-way traffic situation.

W beam end section (flared) shall be 12 gauge.

The cable shall be 3/4", Type II, with Class A coating in conformance with AASHTO M30.

The steel tube shall meet the requirements of ASTM Specification A500, Grade B, and shall be galvanized after fabrication in accordance with the requirements of AASHTO Specification M111.

All hardware shall be galvanized in accordance with ASTM A153.

The anchor bracket, strut and yoke assembly, and bearing plate shall be fabricated from steel that meets ASTM A36 Specifications. They shall be galvanized after fabrication in accordance with ASTM A123.

All costs for furnishing and constructing the MGS trailing end terminal including labor, equipment, materials which includes W beam rail section, two wood breakaway posts, steel tubes, strut and yoke assembly, cable tubes, bearing plate, anchor bracket, W beam end section (flared), one MGS wood post and blockout, hardware, and incidentals shall be included in the contract unit price per each for "Beam Guardrail Trailing End Terminal".

September 14, 2016

<p><b>FOR REVIEW ONLY</b> 12/02/2016</p>	<p><b>S D D O T</b></p>	<p><b>MIDWEST GUARDRAIL SYSTEM (MGS) TRAILING END TERMINAL</b></p>	<p>PLATE NUMBER <b>630.82</b></p>
			<p>Sheet 3 of 3</p>

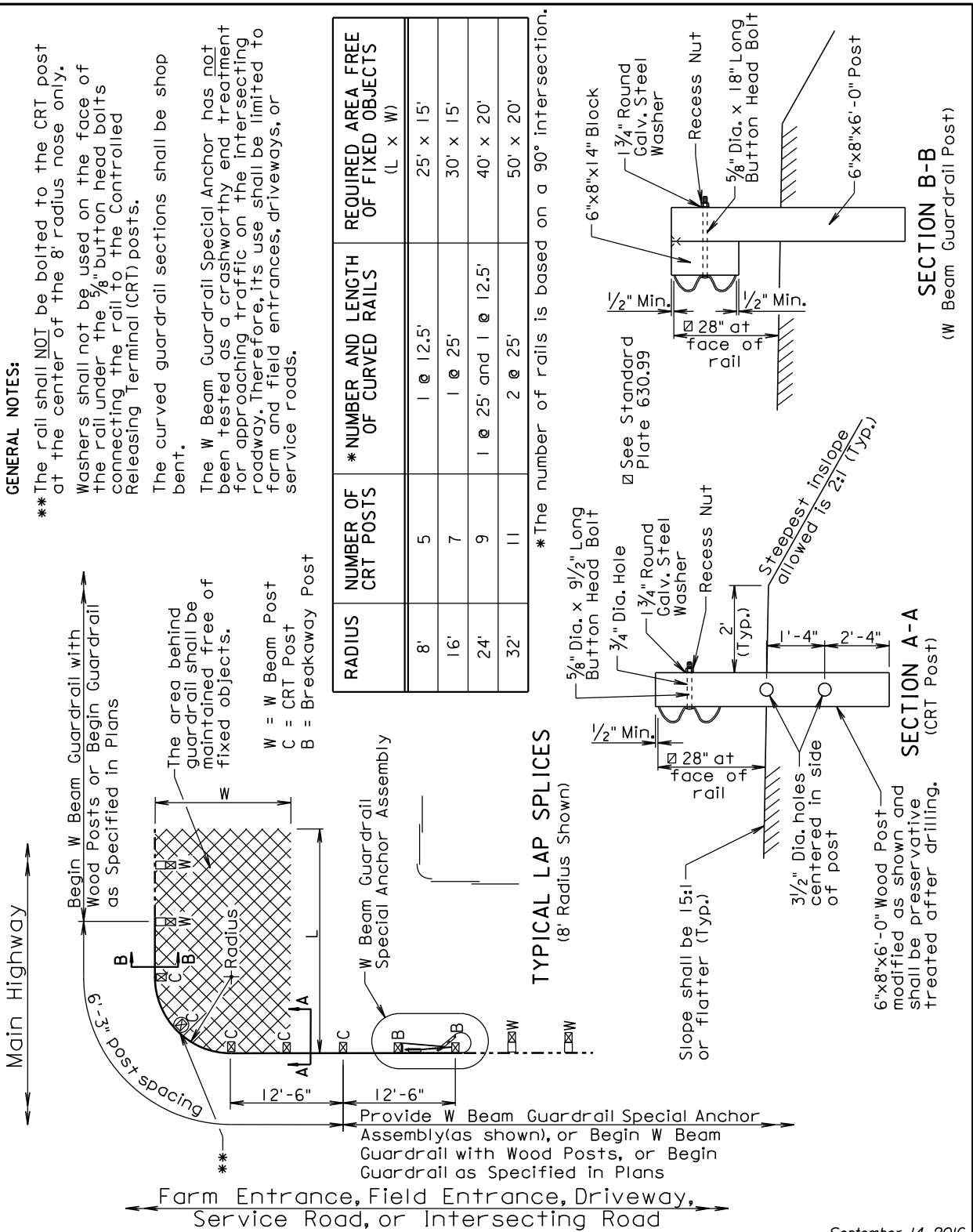
Main Highway

Begin W Beam Guardrail with Wood Posts or Begin Guardrail as Specified in Plans

The area behind guardrail shall be maintained free of fixed objects.

W = W Beam Post  
C = CRT Post  
B = Breakaway Post

W Beam Guardrail Special Anchor Assembly



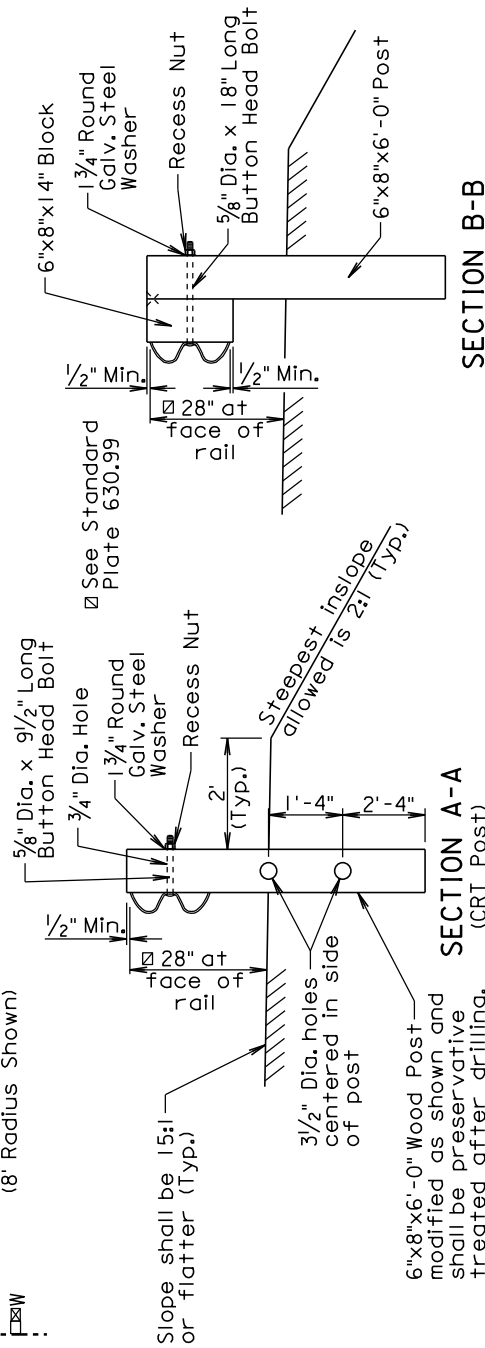
**GENERAL NOTES:**

- \*\* The rail shall NOT be bolted to the CRT post at the center of the 8' radius nose only.
- Washers shall not be used on the face of the rail under the 5/8" button head bolts connecting the rail to the Controlled Releasing Terminal (CRT) posts.
- The curved guardrail sections shall be shop bent.
- The W Beam Guardrail Special Anchor has not been tested as a crashworthy end treatment for approaching traffic on the intersecting roadway. Therefore, its use shall be limited to farm and field entrances, driveways, or service roads.

RADIUS	NUMBER OF CRT POSTS	* NUMBER AND LENGTH OF CURVED RAILS	REQUIRED AREA FREE OF FIXED OBJECTS (L x W)
8'	5	1 @ 12.5'	25' x 15'
16'	7	1 @ 25'	30' x 15'
24'	9	1 @ 25' and 1 @ 12.5'	40' x 20'
32'	11	2 @ 25'	50' x 20'

\* The number of rails is based on a 90° intersection.

**TYPICAL LAP SPLICES**  
(8' Radius Shown)



**SECTION B-B**

(W Beam Guardrail Post)

**SECTION A-A**

(CRT Post)

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12/02/2016

**TODDS**

**SHORT RADIUS W BEAM GUARDRAIL AND SPECIAL ANCHOR ASSEMBLY**

PLATE NUMBER  
**630.84**

Sheet 1 of 4

**FOR REVIEW ONLY**  
12/02/2016

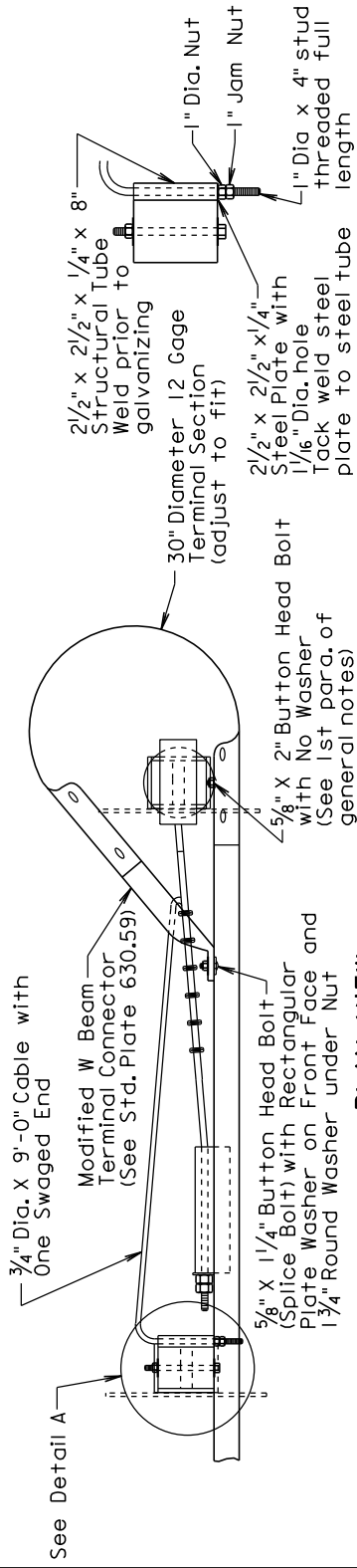
**TODDS**

**SHORT RADIUS W BEAM GUARDRAIL AND SPECIAL ANCHOR ASSEMBLY**

September 14, 2016

PLATE NUMBER  
**630.84**

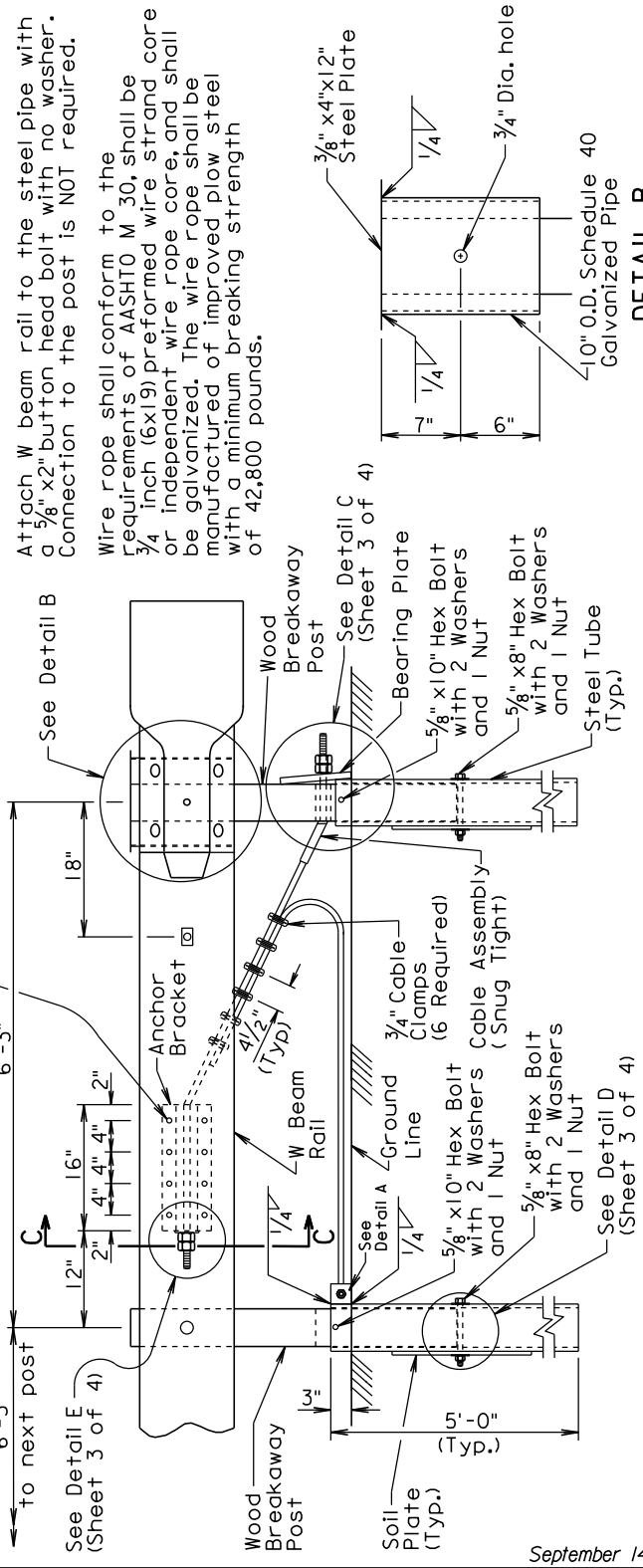
Sheet 2 of 4



**PLAN VIEW SPECIAL ANCHOR ASSEMBLY**

**DETAIL A**

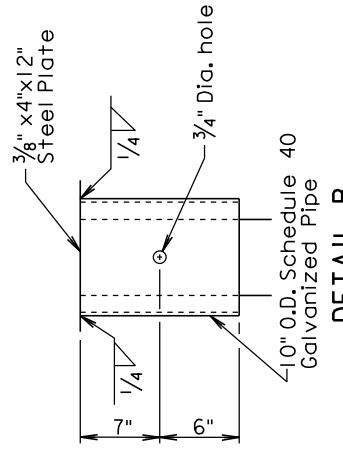
2 1/2" x 2 1/2" x 1/4" x 8" Structural Tube Weld prior to galvanizing  
30" Diameter 12 Gage Terminal Section (adjust to fit)  
1" Dia. Nut  
1" Dia x 4" stud threaded full length plate to steel tube  
2 1/2" x 2 1/2" x 1/4" Steel Plate with 1/16" Dia. hole Tack weld steel plate to steel tube



**ELEVATION VIEW SPECIAL ANCHOR ASSEMBLY**

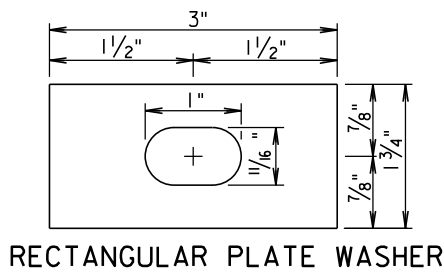
**GENERAL NOTES:**

Attach W beam rail to the steel pipe with a 5/8" x 2" button head bolt with no washer. Connection to the post is NOT required.  
Wire rope shall conform to the requirements of AASHTO M 30, shall be 3/4 inch (6x19) preformed wire strand core or independent wire rope core, and shall be galvanized. The wire rope shall be manufactured of improved plow steel with a minimum breaking strength of 42,800 pounds.



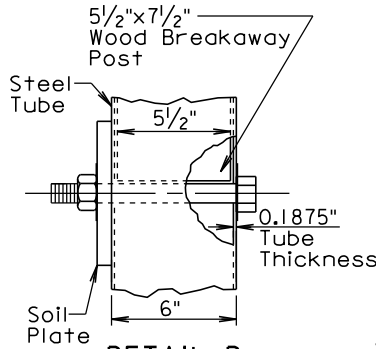
**DETAIL B**

(Guardrail and Terminal Section not shown)  
3/8" x 4" x 12" Steel Plate  
1/4"  
3/4" Dia. hole  
10" O.D. Schedule 40 Galvanized Pipe

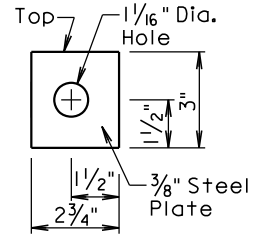


**RECTANGULAR PLATE WASHER**

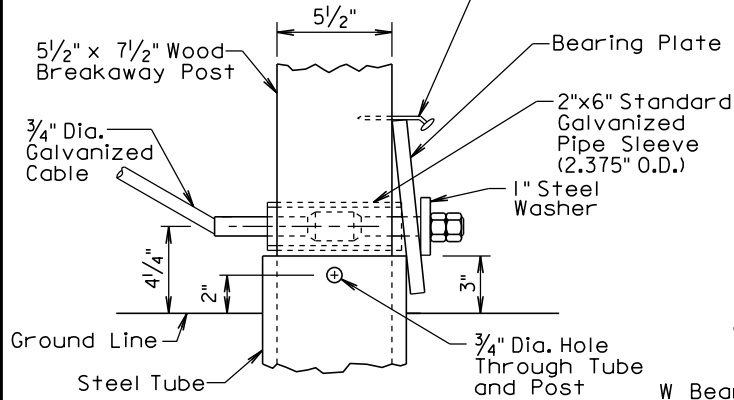
10d Galvanized Nails (2 Req'd.) spaced 4" center to center



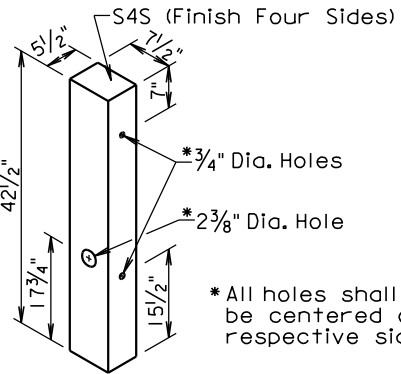
**DETAIL D**



**END PLATE FOR ANCHOR BRACKET**

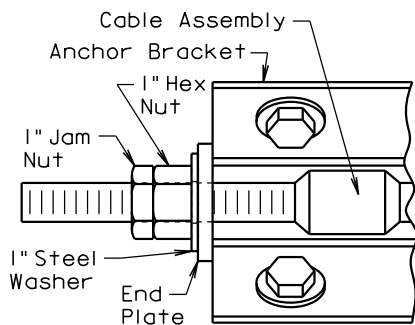


**DETAIL C**



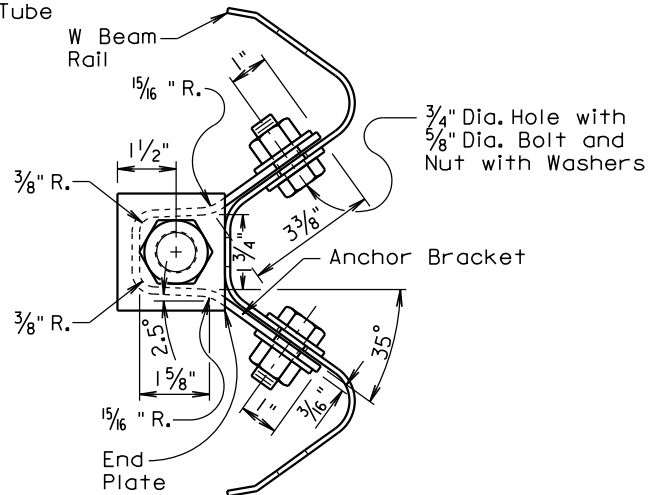
**WOOD BREAKAWAY POST**

\* All holes shall be centered on respective sides.

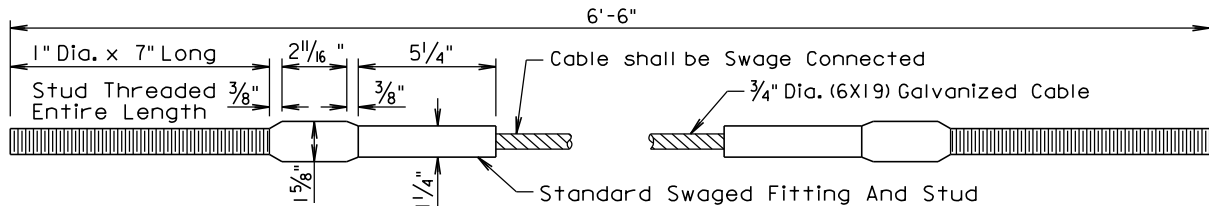


**DETAIL E**

(W Beam Rail Not Shown)



**SECTION C-C**



**CABLE ASSEMBLY**

September 14, 2016

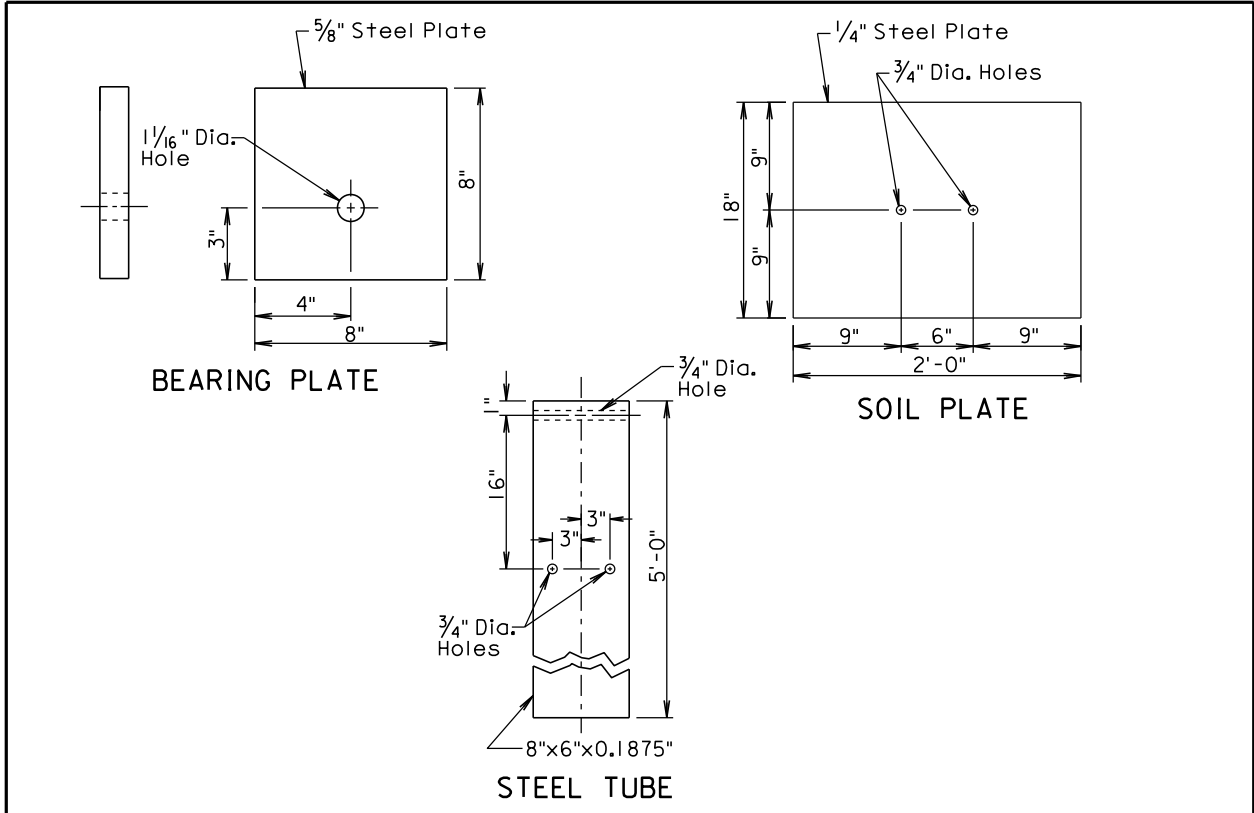
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12/02/2016

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**SHORT RADIUS W BEAM GUARDRAIL  
AND SPECIAL ANCHOR ASSEMBLY**

**PLATE NUMBER  
630.84**

Sheet 3 of 4



**GENERAL NOTES:**

The wood breakaway post shall be in conformance with Section 630.2 A. of the Specifications.

The bolts shall be in conformance with ASTM A307 and the nuts shall be in conformance with ASTM A563, Grade A or better. The bolts and nuts shall be galvanized in accordance with ASTM A153.

All angles, channels, and plates shall conform to the requirements of ASTM A36 and the structural tubing shall conform to ASTM A500. Welding shall meet the current requirements of the Structural Welding Code AWS D1.1. All structural steel shall be galvanized in accordance with ASTM A123. Punching, drilling, cutting, or welding will NOT be permitted after galvanizing.

All costs for constructing the straight W beam guardrail with CRT posts including labor, equipment, and materials including all posts, blocks, steel beam rail, and hardware shall be incidental to the contract unit price per foot for "Straight Class A W Beam Guardrail with CRT Posts".

All costs for constructing the curved W beam guardrail with CRT posts including labor, equipment, and materials including all CRT posts, steel beam rail, and hardware shall be incidental to the contract unit price per foot for "Curved Class A W Beam Guardrail with CRT Posts".

All costs for constructing the W beam guardrail special anchor assembly including labor, equipment, hardware, and all components of the W beam guardrail special anchor assembly except the W beam rail shall be incidental to the contract unit price per each for "W Beam Guardrail Special Anchor Assembly". The 12'-6" length of W beam rail located within the W beam guardrail special anchor assembly shall be paid for per foot with the bid item "Straight Class A W Beam Guardrail with Wood Posts".

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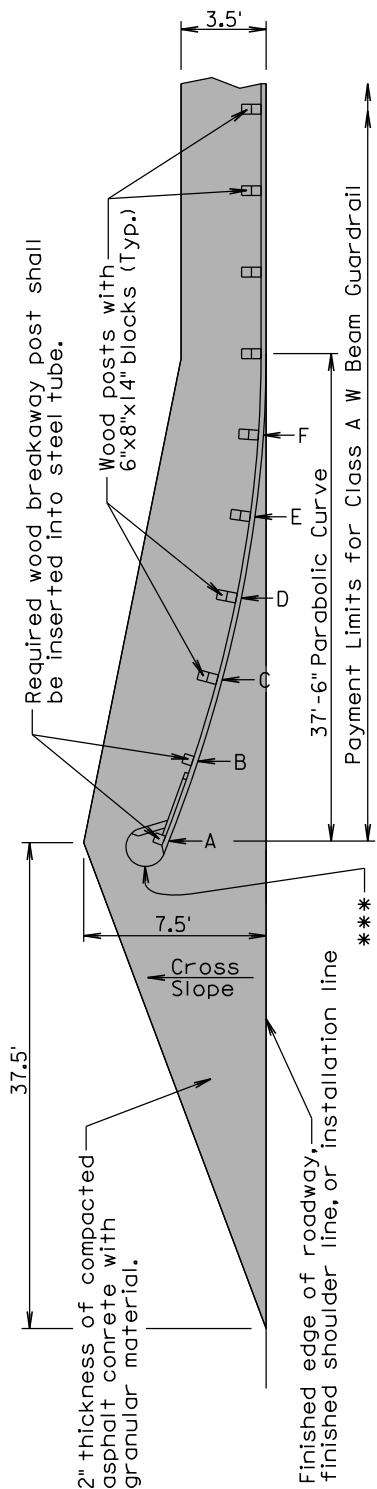
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**SHORT RADIUS W BEAM GUARDRAIL  
AND SPECIAL ANCHOR ASSEMBLY**

PLATE NUMBER  
**630.84**

Sheet 4 of 4

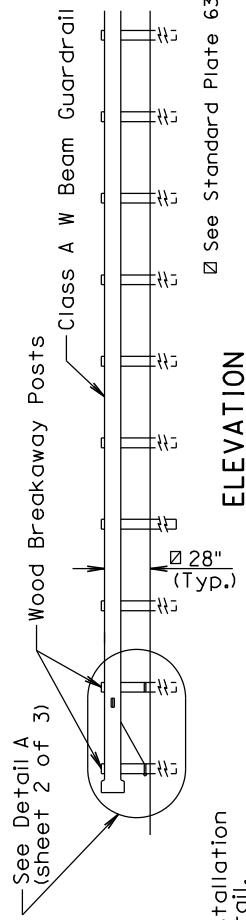
2:1 or flatter inslope, or inslope as specified in the plans.



OFFSETS FOR BREAKAWAY CABLE TERMINAL	
POST	OFFSET
A	4.00'
B	2.79'
C	1.79'
D	1.01'
E	0.45'
F	0.11'

Offsets shall be measured from the installation line to the face of the W beam guardrail.

**PLAN**



**ELEVATION**

**GENERAL NOTES:**

The finished embankment surfacing cross slope shall match the roadway cross slope; however, if a steeper cross slope is necessary the steepest allowable cross slope is 10:1.

Asphalt concrete shall be the same type used elsewhere on the project or shall be as specified in the plans. If asphalt concrete is not specified in the plans, the asphalt concrete shall conform to the Specifications for "Asphalt Concrete Composite."

Granular material shall be the same type used elsewhere on the project or shall be as specified in the plans. If granular material type is not specified in the plans, the material shall conform to the Specifications for "Base Course". The granular material shall be placed the same thickness as the mainline surfacing or as specified in the plans.

\*\*\* An adhesive object marker shall be placed on the end section buffer after placement of the end section buffer. The adhesive object marker dimensions may be 16" x 16" or other variation due to the shape of the end section buffer. A minimum of 236 square inches of object marker reflective sheeting area is required. The reflective sheeting shall be fluorescent yellow super or very high intensity. All costs for furnishing and installing the adhesive object marker shall be incidental to various contract items. Costs for constructing the W Beam Guardrail Breakaway Cable Terminal including labor, equipment, and materials including the anchor bracket, cable assembly, steel tubes, soil plates, bearing plate, pipe sleeve, W beam end section(buffer), modified W beam terminal connector, and all necessary hardware shall be incidental to the contract unit price per each for "W Beam Guardrail Breakaway Cable Terminal".

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12/02/2016

**TODDS**

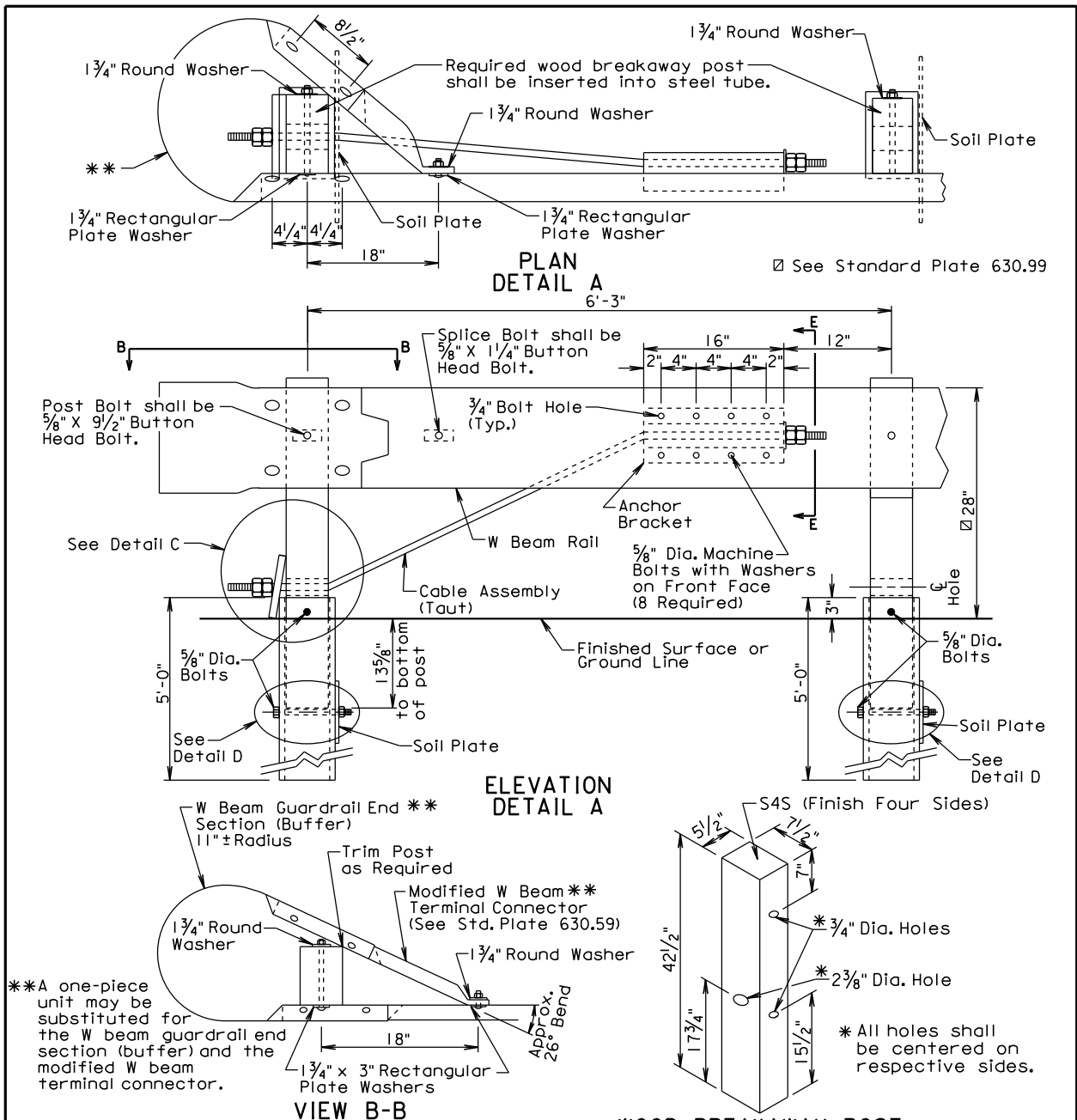
**W BEAM GUARDRAIL  
BREAKAWAY CABLE TERMINAL**

September 14, 2016

**PLATE NUMBER  
630.85**

Sheet 1 of 3





**GENERAL NOTES:**

All hardware shall be galvanized in accordance with ASTM A153.

The steel tubes shall meet the requirements of ASTM Specification A500, Grade B, and shall be galvanized after fabrication in accordance with the requirements of AASHTO Specification M111.

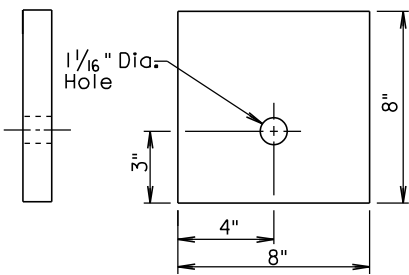
The anchor bracket, soil plate, and bearing plate shall be fabricated from steel that meets ASTM A36 Specifications. They shall be galvanized after fabrication in accordance with ASTM A123.

The W Beam End Section (Buffer) shall be 12 gage galvanized steel.

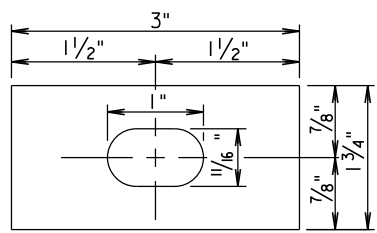
The cable shall be 3/4", Type II, with Class A coating in conformance with AASHTO M30.

September 14, 2016

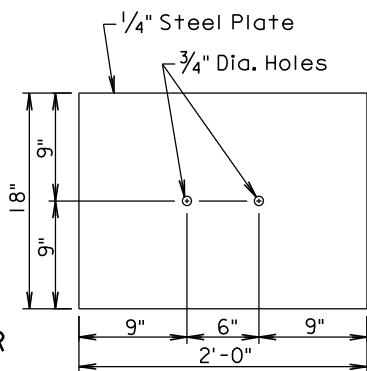
<p><b>FOR REVIEW ONLY</b></p> <p>12/02/2016</p>	<p><b>SDDOT</b></p>	<p><b>W BEAM GUARDRAIL BREAKAWAY CABLE TERMINAL</b></p>	<p>PLATE NUMBER <b>630.85</b></p>
			<p>Sheet 2 of 3</p>



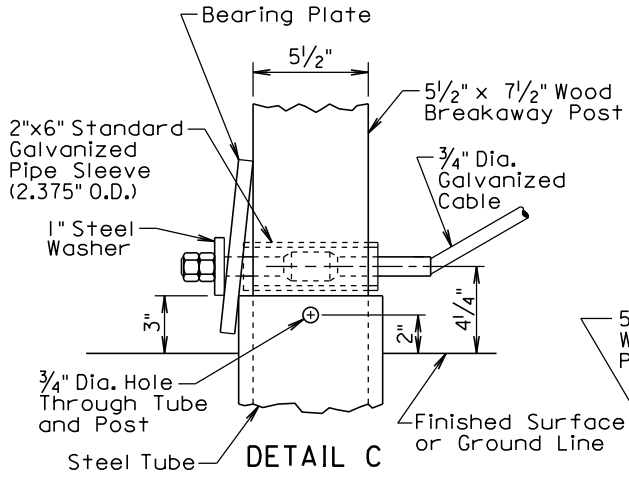
BEARING PLATE



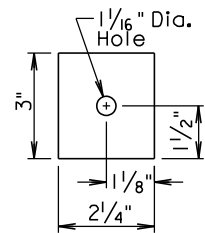
RECTANGULAR PLATE WASHER



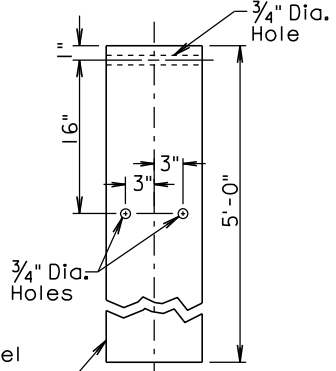
SOIL PLATE



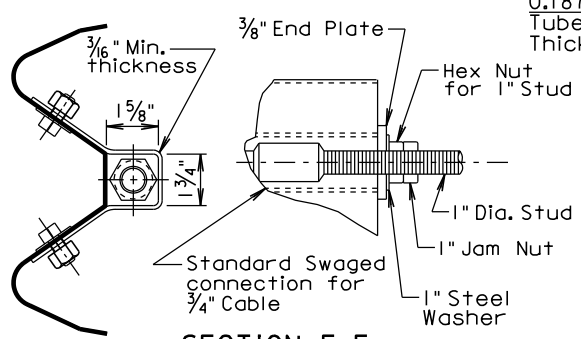
DETAIL C



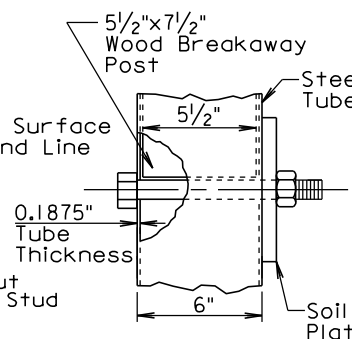
END PLATE



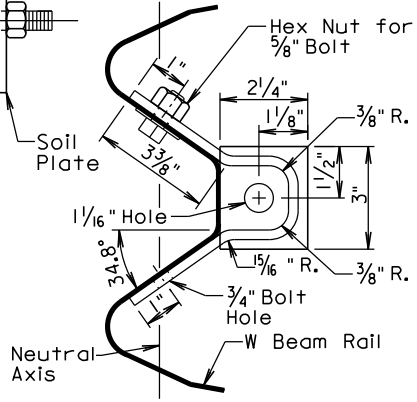
STEEL TUBE



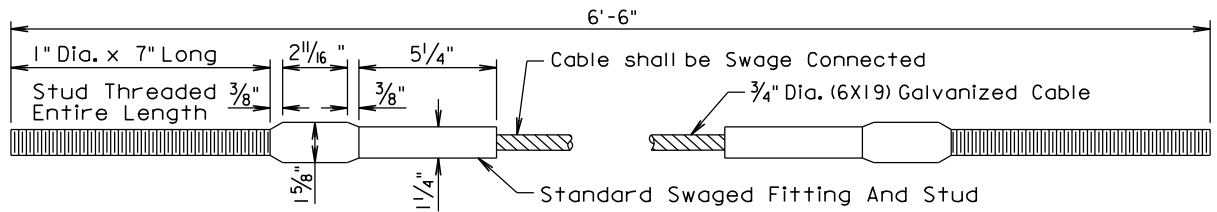
SECTION E-E (END PLATE REMOVED)



DETAIL D



ANCHOR BRACKET



CABLE ASSEMBLY

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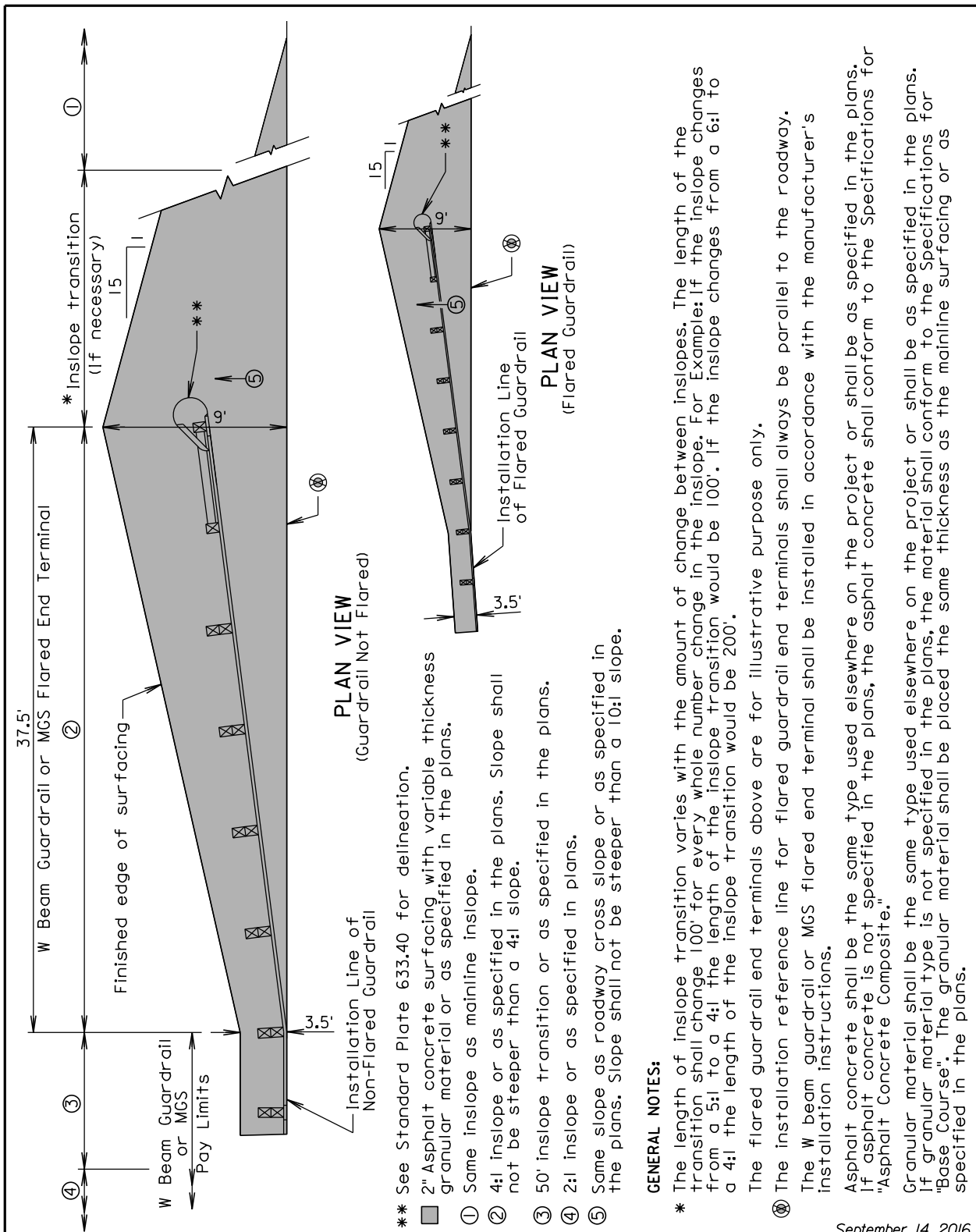
**FOR REVIEW ONLY**  
12/02/2016

**SDDOT**

**W BEAM GUARDRAIL  
BREAKAWAY CABLE TERMINAL**

PLATE NUMBER  
**630.85**

Sheet 3 of 3



**FOR REVIEW ONLY**  
12/02/2016

**STANDARD**

**EMBANKMENT AND SURFACING FOR  
W BEAM GUARDRAIL AND MGS  
FLARED END TERMINAL**

September 14, 2016

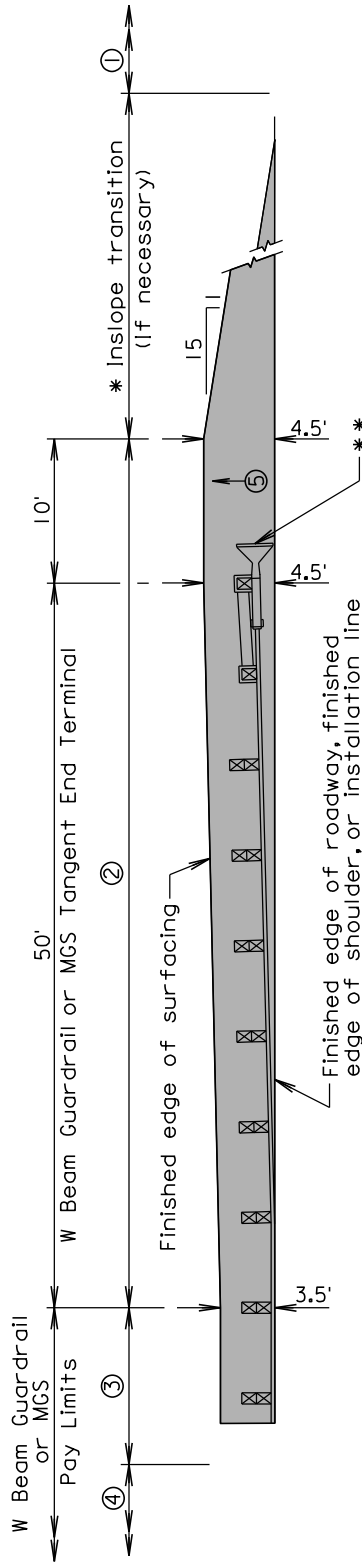
**PLATE NUMBER**  
**630.87**

Sheet 1 of 1

- \*\* See Standard Plate 633.40 for delineation.
- 2" Asphalt concrete surfacing with variable thickness granular material or as specified in the plans.
- ① Same inslope as mainline inslope.
- ② 4:1 inslope or as specified in the plans. Slope shall not be steeper than a 4:1 slope.
- ③ 50' inslope transition or as specified in the plans.
- ④ 2:1 inslope or as specified in plans.
- ⑤ Same slope as roadway cross slope or as specified in the plans. Slope shall not be steeper than a 10:1 slope.

**GENERAL NOTES:**

- \* The length of inslope transition varies with the amount of change between inslopes. The length of the transition shall change 100' for every whole number change in the inslope. For Example: If the inslope changes from a 5:1 to a 4:1 the length of the inslope transition would be 100'. If the inslope changes from a 6:1 to a 4:1 the length of the inslope transition would be 200'.
- Ⓢ The flared guardrail end terminals above are for illustrative purpose only.
- Ⓢ The installation reference line for flared guardrail end terminals shall always be parallel to the roadway. The W beam guardrail or MGS flared end terminal shall be installed in accordance with the manufacturer's installation instructions.
- Asphalt concrete shall be the same type used elsewhere on the project or shall be as specified in the plans. If asphalt concrete is not specified in the plans, the asphalt concrete shall conform to the Specifications for "Asphalt Concrete Composite."
- Granular material shall be the same type used elsewhere on the project or shall be as specified in the plans. If granular material type is not specified in the plans, the material shall conform to the Specifications for "Base Course". The granular material shall be placed the same thickness as the mainline surfacing or as specified in the plans.



**PLAN VIEW**

- \*\* See Standard Plate 633.40 for delineation.
- Asphalt concrete surfacing with variable thickness granular material or as specified in the plans.
- ① Same inslope as mainline inslope.
- ② 4:1 inslope or as specified in the plans. Slope shall not be steeper than a 4:1 slope.
- ③ 50' inslope transition or as specified in the plans.
- ④ 2:1 inslope or as specified in plans.
- ⑤ Same slope as roadway cross slope or as specified in the plans. Slope shall not be steeper than a 10:1 slope.

**GENERAL NOTES:**

- \* The length of inslope transition varies with the amount of change between inslopes. The length of the transition shall change 100' for every whole number change in the inslope. For Example: If the inslope changes from a 5:1 to a 4:1 the length of the inslope transition would be 100'. If the inslope changes from a 6:1 to a 4:1 the length of the inslope transition would be 200'.
- The tangent guardrail end terminal above is for illustrative purpose only.
- The W beam guardrail or MGS tangent end terminal shall be installed in accordance with the manufacturer's installation instructions.
- Asphalt concrete shall be the same type used elsewhere on the project or shall be as specified in the plans. If asphalt concrete is not specified in the plans, the asphalt concrete shall conform to the Specifications for "Asphalt Concrete Composite."
- Granular material shall be the same type used elsewhere on the project or shall be as specified in the plans. If granular material type is not specified in the plans, the material shall conform to the Specifications for "Base Course". The granular material shall be placed the same thickness as the mainline surfacing or as specified in the plans.

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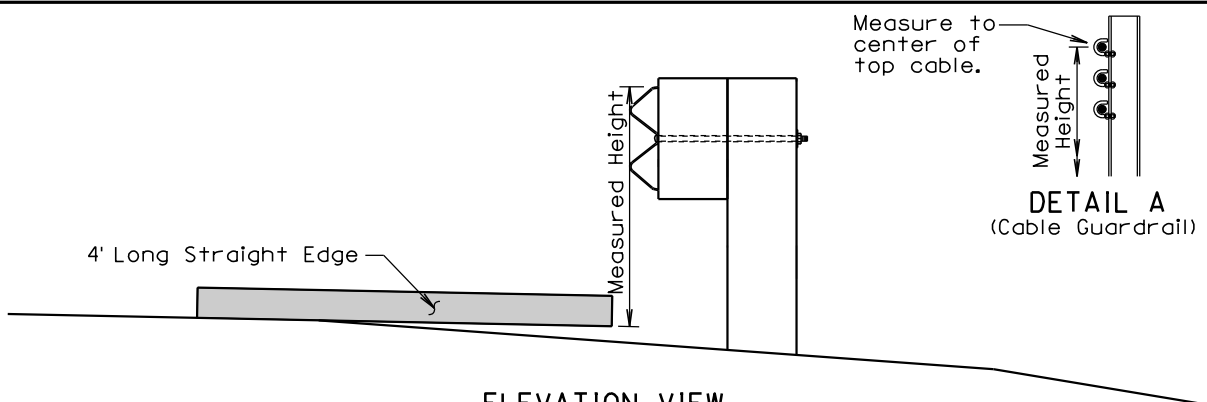
**FOR REVIEW ONLY**  
12/02/2016

**SDS**

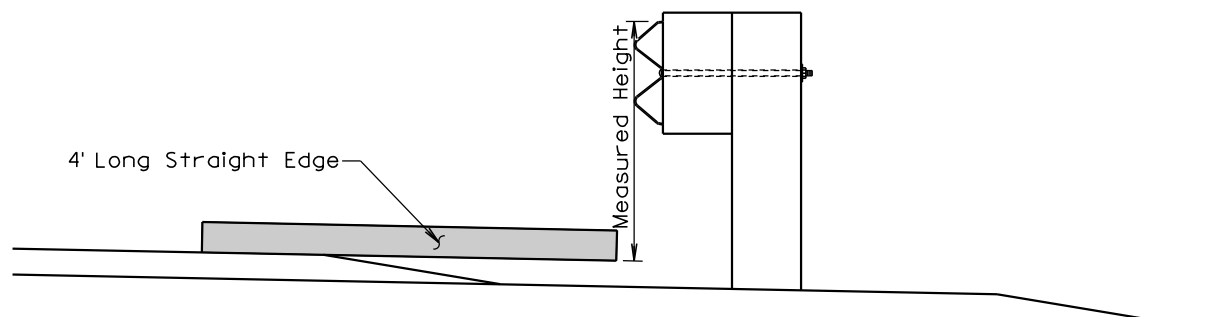
**EMBANKMENT AND SURFACING FOR  
W BEAM GUARDRAIL AND MGS  
TANGENT END TERMINAL**

**PLATE NUMBER**  
**630.88**

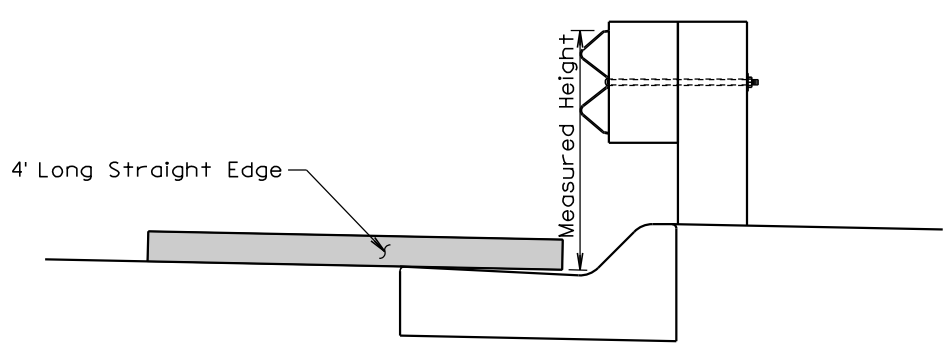
Sheet 1 of 1



**ELEVATION VIEW**  
(Guardrail Adjacent to Differential Slopes)



**ELEVATION VIEW**  
(Guardrail Adjacent to Differential Surfacing Elevations)



**ELEVATION VIEW**  
(Guardrail at Curb and Gutter)

**GENERAL NOTES:**

The W Beam guardrail shown is for illustrative purpose. The guardrail height for all types of guardrail systems shall be measured in accordance with this standard plate.

When measuring height of cable guardrail or cable barrier the height shall be measured to the center of the top cable. See Detail A.

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<p><b>FOR REVIEW ONLY</b> 12/02/2016</p>	<p><b>S D D O T</b></p>	<p><b>MEASURING GUARDRAIL HEIGHT</b></p>	<p>PLATE NUMBER <b>630.99</b></p>
			<p>Sheet 1 of 1</p>