

STATE OF SOUTH DAKOTA  
DEPARTMENT OF TRANSPORTATION

STATE OF SOUTH DAKOTA	PROJECT	SHEET	TOTAL SHEETS
	PH 0040(311)	1	43

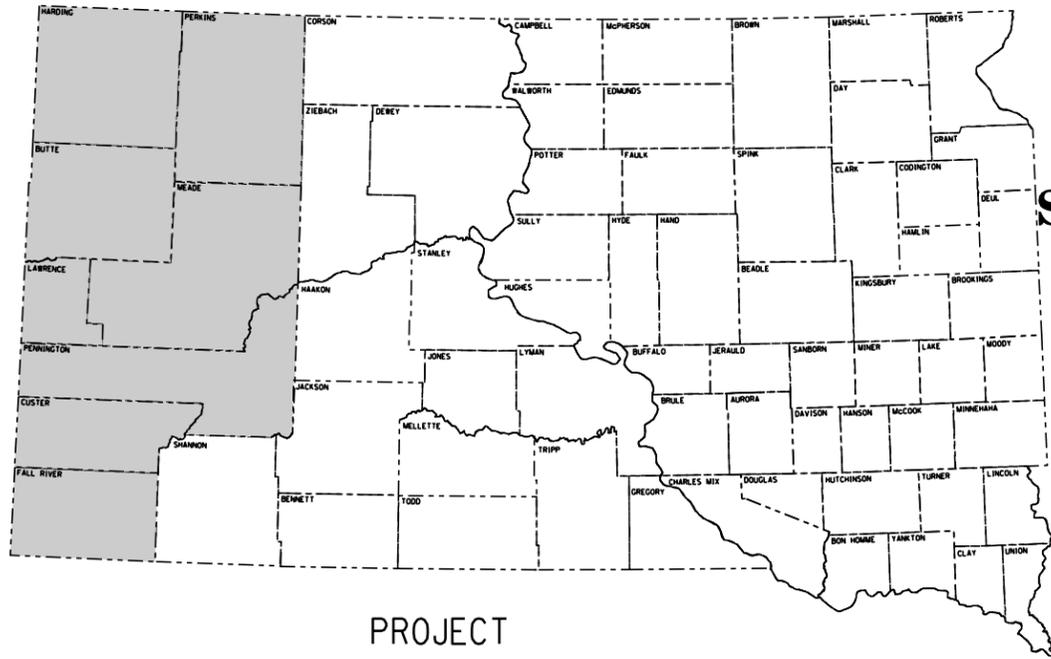
Plotting Date: 09/29/2015 Revised: 09-29-2015 kh

PLANS FOR PROPOSED  
**PROJECT PH 0040(311)**  
**SD HIGHWAYS 20, 34, 36, 40, 44, 73, 79, & 244**  
**US HIGHWAYS 14A, 18, 85, & 212**  
**INTERSTATE 90**  
**HARDING, PERKINS, BUTTE,**  
**LAWRENCE, MEADE,**  
**PENNINGTON, CUSTER,**  
**& FALL RIVER COUNTIES**  
GUARDRAIL REPAIR  
PCN 03vf

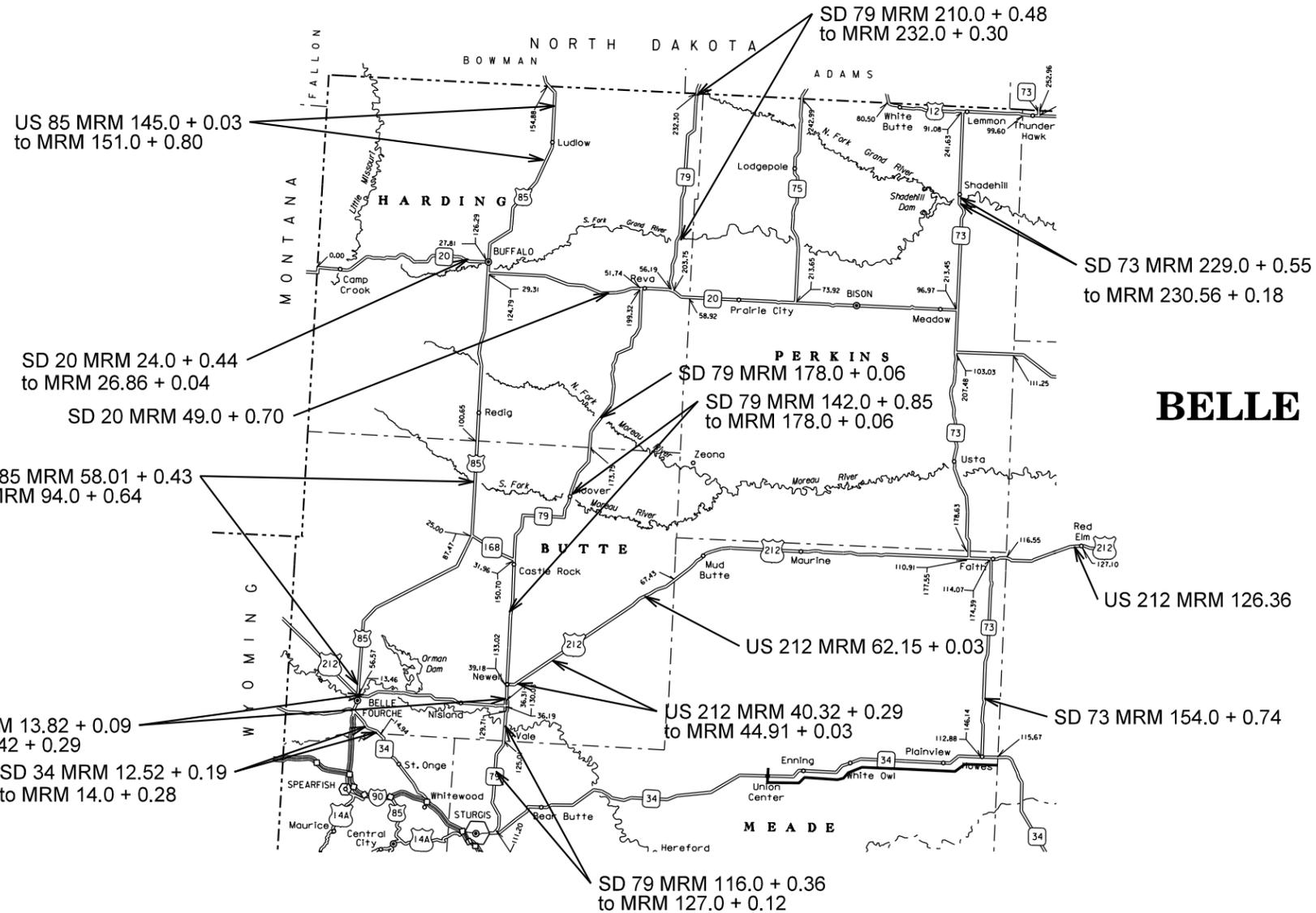
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- 1 - 2 General Layout W/Index
- 3 - 14 Estimate With General Notes & Tables
- 15 - 19 Guardrail Layout
- 20 Guardrail Post Installation on Edge of Embankment Detail
- 21 Traffic Control Detail 3 Lane Road
- 22 - 43 Standard Plates

Plot Scale - 1:200



PROJECT



**BELLE FOURCHE AREA**



STORM WATER PERMIT  
None Required

4

Plotted From - trcs11610

File - ...103xvf (2015)title.dgn



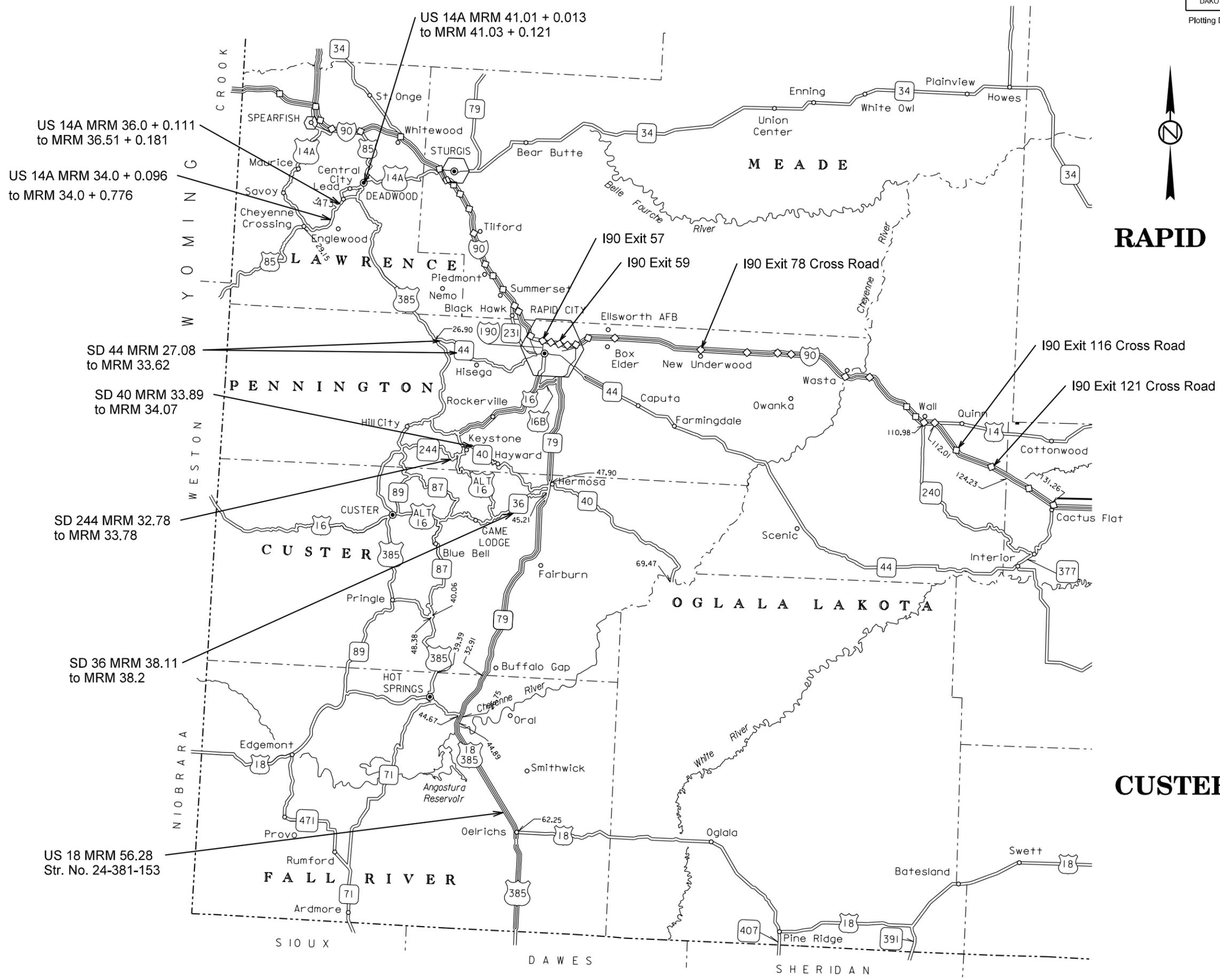
# RAPID CITY AREA

# CUSTER AREA

Plot Scale - 1:200

Plotted From - irrc11610

File - ...103xvt (2015)title.dgn



# ESTIMATE OF QUANTITIES AND ENVIRONMENTAL COMMITMENTS

STATE OF SOUTH DAKOTA	PROJECT	SHEET	TOTAL SHEETS
	PH 0040(311)	3	43

Revised: 10-15-2015 klh

## ESTIMATE OF QUANTITIES

BID ITEM NUMBER	ITEM	QUANTITY	UNIT
009E0010	Mobilization	Lump Sum	LS
* 110E0730	Remove Beam Guardrail	2,874.5	Ft
110E0730	Remove Beam Guardrail	474.5	Ft
110E0740	Remove 3 Cable Guardrail Anchor Assembly	12	Each
110E0760	Remove Beam Guardrail Trailing End Terminal	1	Each
110E0770	Remove W Beam Guardrail Breakaway Cable Terminal	3	Each
110E0790	Remove W Beam Guardrail Deformed End	8	Each
110E0800	Remove W Beam Guardrail End Terminal	4	Each
110E4330	Salvage W Beam Guardrail	275.0	Ft
110E6000	Remove 3 Cable Guardrail for Reset	1,895	Ft
110E6200	Remove Double Thrie Beam Guardrail for Reset	25.0	Ft
110E6220	Remove Double W Beam Guardrail for Reset	100.0	Ft
110E6230	Remove W Beam Guardrail for Reset	11,562.5	Ft
110E6240	Remove W Beam to Thrie Beam Guardrail Transition for Reset	2	Each
110E6269	Remove W Beam Guardrail End Terminal for Reset	4	Each
* 110E6270	Remove W Beam Guardrail Flared End Terminal for Reset	1	Each
110E6270	Remove W Beam Guardrail Flared End Terminal for Reset	30	Each
110E6280	Remove W Beam Guardrail Tangent End Terminal for Reset	6	Each
110E6300	Remove Rubrail for Reset	144.0	Ft
120E0600	Contractor Furnished Borrow Excavation	103	CuYd
230E0100	Remove and Replace Topsoil	Lump Sum	LS
260E1010	Base Course	325.0	Ton
320E1200	Asphalt Concrete Composite	117.8	Ton
629E0100	3 Cable Guardrail	1,013	Ft
629E0200	Reset 3 Cable Guardrail	1,895	Ft
629E0300	3 Cable Guardrail Slip Base Anchor Assembly	13	Each
* 629E0400	3 Cable Guardrail Anchor Assembly	1	Each
* 629E1100	3 Cable Guardrail End Post	2	Each
* 629E1102	3 Cable Guardrail Intermediate Post	14	Each
* 630E0010	Straight Class A Thrie Beam Guardrail with Wood Posts	850.0	Ft
* 630E0110	Straight Double Class A Thrie Beam Guardrail with Wood Posts	12.5	Ft
630E0110	Straight Double Class A Thrie Beam Guardrail with Wood Posts	100.0	Ft
630E0200	Straight Class A Thrie Beam Rail	50.0	Ft
* 630E1010	Straight Class A W Beam Guardrail with Wood Posts	1,750.0	Ft
630E1010	Straight Class A W Beam Guardrail with Wood Posts	875.0	Ft
630E1150	Straight Double Class B W Beam Guardrail with Wood Posts	50.0	Ft
630E1210	Straight Class B W Beam Rail	25.0	Ft
* 630E2000	W Beam to Thrie Beam Guardrail Transition	2	Each
630E2000	W Beam to Thrie Beam Guardrail Transition	8	Each
630E2015	W Beam Guardrail Flared End Terminal	15	Each
630E2030	W Beam Guardrail Breakaway Cable Terminal	1	Each
* 630E2110	Beam Guardrail Post and Block	115	Each

BID ITEM NUMBER	ITEM	QUANTITY	UNIT
630E2110	Beam Guardrail Post and Block	3,348	Each
* 630E2215	W Beam Guardrail End Section Buffer	7	Each
630E5130	Reset Double Thrie Beam Rail	25.0	Ft
630E5160	Reset W Beam Rail	11,562.5	Ft
630E5170	Reset Double W Beam Rail	100.0	Ft
630E5190	Reset W Beam to Thrie Beam Guardrail Transition	2	Each
* 630E5207	Reset W Beam Guardrail Flared End Terminal	1	Each
630E5207	Reset W Beam Guardrail Flared End Terminal	30	Each
630E5208	Reset W Beam Guardrail Tangent End Terminal	6	Each
630E5209	Reset W Beam Guardrail End Terminal	4	Each
630E5220	Reset Rubrail	144.0	Ft
* 630E5540	Reset Beam Guardrail Post	2	Each
634E0010	Flagging	200.0	Hour
634E0110	Traffic Control Signs	478	SqFt
634E0120	Traffic Control, Miscellaneous	Lump Sum	LS
634E0265	Type 3 Barricade, 6' Double Sided	2	Each
634E0420	Type C Advance Warning Arrow Board	3	Each
734E0010	Erosion Control	Lump Sum	LS

\* - Denotes Non-Participating

## SPECIFICATIONS

Standard Specifications for Roads and Bridges, 2015 Edition and Required Provisions, Supplemental Specifications, and Special Provisions as included in the Proposal.

# ESTIMATE OF QUANTITIES AND ENVIRONMENTAL COMMITMENTS

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## ENVIRONMENTAL COMMITMENTS

An Environmental Commitment is a measure that SDDOT commits to implement in order to avoid, minimize, and/or mitigate a real or potential environmental impact. Environmental commitments to various agencies and the public have been made to secure approval of this project. An agency mentioned below with permitting authority can influence a project if perceived environmental impacts have not been adequately addressed. Unless otherwise designated, the Contractor's primary contact regarding matters associated with these commitments will be the Project Engineer. These environmental commitments are not subject to change without prior written approval from the SDDOT Environmental Office. The environmental commitments associated with this project are as follows:

### COMMITMENT B2: WHOOPING CRANE

The Whooping Crane is a spring and fall migratory bird in South Dakota that is about 5 feet tall and typically stops on wetlands, rivers, and agricultural lands along their migration route. An adult Whooping Crane is white with a red crown and a long, dark, pointed bill. Immature Whooping Cranes are cinnamon brown. While in flight, their long necks are kept straight and their long dark legs trail behind. Adult Whooping Cranes' black wing tips are visible during flight.

#### Action Taken/Required:

Harassment or other measures to cause the Whooping Crane to leave the site is a violation of the Endangered Species Act. If a Whooping Crane is sighted roosting in the vicinity of the project, borrow pit, or staging site associated with the project, cease construction activities in the affected area until the Whooping Crane departs and contact the Project Engineer. The Project Engineer will contact the Environmental Office so that the sighting can be reported to USFWS.

### COMMITMENT B4: BALD EAGLE

Bald eagles are known to occur in this area.

#### Action Taken/Required:

If a nest is observed within one mile of the project site, notify the Project Engineer immediately so that he/she can consult with the Environmental Office for an appropriate course of action.

### COMMITMENT E: STORM WATER

Construction activities constitute less than 1 acre of disturbance.

#### Action Taken/Required:

At a minimum and regardless of project size, appropriate erosion and sediment control measures must be installed to control the discharge of pollutants from the construction site.

## COMMITMENT H: WASTE DISPOSAL SITE

The Contractor shall furnish a site(s) for the disposal of construction and/or demolition debris generated by this project.

#### Action Taken/Required:

Construction and/or demolition debris may not be disposed of within the State ROW.

The waste disposal site(s) shall be managed and reclaimed in accordance with the following from the General Permit for Highway, Road, and Railway Construction/Demolition Debris Disposal Under the South Dakota Waste Management Program issued by the Department of Environment and Natural Resources.

The waste disposal site(s) shall not be located in a wetland, within 200 feet of surface water, or in an area that adversely affects wildlife, recreation, aesthetic value of an area, or any threatened or endangered species, as approved by the Project Engineer.

If the waste disposal site(s) is located such that it is within view of any ROW, the following additional requirements shall apply:

1. Construction and/or demolition debris consisting of concrete, asphalt concrete, or other similar materials shall be buried in a trench completely separate from wood debris. The final cover over the construction and/or demolition debris shall consist of a minimum of 1 foot of soil capable of supporting vegetation. Waste disposal sites provided outside of the State ROW shall be seeded in accordance with Natural Resources Conservation Service recommendations. The seeding recommendations may be obtained through the appropriate County NRCS Office. The Contractor shall control the access to waste disposal sites not within the State ROW through the use of fences, gates, and placement of a sign or signs at the entrance to the site stating "No Dumping Allowed".

2. Concrete and asphalt concrete debris may be stockpiled within view of the ROW for a period of time not to exceed the duration of the project. Prior to project completion, the waste shall be removed from view of the ROW or buried and the waste disposal site reclaimed as noted above.

The above requirements will not apply to waste disposal sites that are covered by an individual solid waste permit as specified in SDCL 34A-6-58, SDCL 34A-6-1.13, and ARSD 74:27:10:06.

Failure to comply with the requirements stated above may result in civil penalties in accordance with South Dakota Solid Waste Law, SDCL 34A-6-1.31.

All costs associated with furnishing waste disposal site(s), disposing of waste, maintaining control of access (fence, gates, and signs), and reclamation of the waste disposal site(s) shall be incidental to the various contract items.

## COMMITMENT I: HISTORICAL PRESERVATION OFFICE CLEARANCES

The SDDOT has obtained concurrence with the State Historical Preservation Office (SHPO or THPO) for all work included within the project limits and all designated option borrow sites provided within the plans.

#### Action Taken/Required:

All earth disturbing activities not designated within the plans require review of cultural resources impacts. This work includes, but is not limited to: staging areas, borrow sites, waste disposal sites, and all material processing sites.

The Contractor shall arrange and pay for a cultural resource survey and/or records search. The Contractor has the option to contact the state Archaeological Research Center (ARC) at 605-394-1936 or another qualified archaeologist, to obtain either a records search or a cultural resources survey. A record search might be sufficient for review; however, a cultural resources survey may need to be conducted by a qualified archaeologist.

The Contractor shall provide ARC with the following: a topographical map or aerial view on which the site is clearly outlined, site dimensions, project number, and PCN. If applicable, provide evidence that the site has been previously disturbed by farming, mining, or construction activities with a landowner statement that artifacts have not been found on the site.

The Contractor shall submit the records search or cultural resources survey report and if the location of the site is within the current geographical or historic boundaries of any South Dakota reservation to SDDOT Environmental Engineer, 700 East Broadway Avenue, Pierre, SD 57501-2586 (605-773-3180). SDDOT will submit the information to the appropriate SHPO/THPO. Allow **30 Days** from the date this information is submitted to the Environmental Engineer for SHPO/THPO review.

If evidence for cultural resources is uncovered during project construction activities, then such activities shall cease and the Project Engineer shall be immediately notified. The Project Engineer will contact the SDDOT Environmental Engineer in order to determine an appropriate course of action.

SHPO/THPO review does not relieve the Contractor of the responsibility for obtaining any additional permits and clearances for staging areas, borrow sites, waste disposal sites, or material processing sites that affect wetlands, threatened and endangered species, or waterways. The Contractor shall provide the required permits and clearances to the Project Engineer at the preconstruction meeting.

## COMMITMENT R: FIRE PREVENTION IN THE BLACK HILLS AREA

This project is located within the confines of the Black Hills Forest Fire Protection Boundary.

#### Action Taken/Required:

The Contractor shall adhere to the "Special Provision for Fire Plan".

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Revised: 10-15-2015 klh

### **PROJECT COORDINATION**

The Contractor shall coordinate guardrail repair work with any project that is adjacent to the repair location.

The Contractor shall coordinate guardrail work on 14A MRM 41.1 L with the City of Deadwood fence installation project.

### **UTILITIES**

The Contractor shall contact the involved utility companies through South Dakota One Call (1-800-781-7474) prior to starting work. It shall be the responsibility of the Contractor to coordinate work with the utility owners to avoid damage to existing facilities.

Utilities are not planned to be affected on this project. If utilities are identified near the improvement area through the SD One Call Process as required by South Dakota Codified Law 49-7A and Administrative Rule Article 20:25, the Contractor shall contact the Project Engineer to determine modifications that will be necessary to avoid utility impacts.

### **SAWING IN EXISTING SURFACING**

Where new asphalt concrete is placed adjacent to existing asphalt concrete, the existing pavement shall be sawed full depth to a true line with a vertical face. No separate payment shall be made for sawing.

### **REMOVE ASPHALT CONCRETE PAVEMENT**

Where the existing guardrail posts that are to be removed are located within asphalt the Contractor shall remove the damaged asphalt as directed by the Engineer.

### **CONTRACTOR FURNISHED BORROW EXCAVATION**

The Contractor shall provide a suitable site for Contractor furnished borrow excavation material. The Contractor is responsible for obtaining all required permits and clearances for the borrow site. The borrow material shall be approved by the Engineer. The plans quantity for "Contractor Furnished Borrow Excavation" as shown in the Estimate of Quantities will be the basis of payment for this item.

Restoration of the Contractor furnished borrow excavation site shall be the responsibility of the Contractor.

Contractor furnished borrow in the Table of Guardrail Quantities will be used to build the additional embankment required for Standard Plate 630.45 and 630.46. Plans quantity will be the paid amount unless changes are ordered by the Engineer.

### **BASE COURSE**

Base Course shall be furnished by the Contractor.

At the locations listed in the Table of Guardrail Quantities the Base Course thickness shall be 6" to 8" to match existing surfacing thickness. Compaction shall be to the satisfaction of the Engineer.

All other requirements of the Standard Specifications for Base Course shall apply.

### **ASPHALT CONCRETE COMPOSITE**

Mineral aggregate for the Asphalt Concrete Composite shall conform to the requirements of the Standard Specifications for Class E, Type 1

All other requirements in the Standard Specifications for Asphalt Concrete Composite shall apply.

The asphalt binder used in the mixture shall be PG 64-22, PG 64-28 or PG 58-28 Asphalt Binder.

### **GUARDRAIL – Hwy 44**

The guardrail posts shall be 7' long as noted in the Table of Guardrail Quantities. The guardrail post shall be placed at the break point of the inslope to maintain the shoulder width of 5'.

### **RESET W BEAM GUARDRAIL END TERMINAL**

This bid item is provided for resetting "Curved W Beam Guardrail Terminal" at the locations provided in the table of guardrail. This work shall be performed in accordance with standard plate 630.70. An additional quantity of "Beam Guardrail Post and Block" has been provided for installing new posts in the "Curved W Beam Guardrail Terminal. All costs associated with this work shall be incidental to the contract unit price per each for "Reset W Beam Guardrail End Terminal" and for "Beam Guardrail Post and Block".

### **SALVAGE W BEAM GUARDRAIL**

Steel beam rail, end terminals, and hardware items shall become the property of the State and shall be removed, hauled, and neatly stacked at the Rapid City South Maintenance Yard located along SD 79 south of Rapid City as approved by the Engineer.

Existing guardrail post and blocks shall become the property of the Contractor and shall be removed from the project limits. Payment for removing, hauling, and stacking the guardrail items shall be incidental to the contract unit price per foot for "Salvage Beam Guardrail".

### **REMOVE 3 CABLE GUARDRAIL ANCHOR ASSEMBLY**

The Contractor shall provide the backfill material necessary as a result of the guardrail footing removal. All costs associated with removing and disposing of the concrete anchor, backfilling and compaction shall be incidental to the contract unit price per each "Remove 3 Cable Guardrail Anchor Assembly".

### **REMOVE GUARDRAIL POST FROM CONCRETE SIDEWALK**

The Contractor shall note that a portion of the guardrail located along Hwy 14A MRM 41.1 L will be removed and installed through the concrete sidewalk. Sawing necessary to safely remove posts without damaging the concrete sidewalk shall be incidental to the contract unit price per foot for "Remove beam guardrail". Where posts are to be placed through the concrete sidewalk the Contractor shall provide oversized holes, also known as the "leave-out", through the sidewalk. The dimension of the leave-out is 15" x15". The leave out shall have a minimum of 7" from the back of the post. The leave-outs may be filled with low-strength grout or asphalt concrete that has a compressive strength of 120 psi or less.

### **GUARDRAIL**

Type 4 rail shall be AASHTO M180-00 Type 4 Weathering Steel. The end terminal rails and impact head shall be powder coated the same color as the adjacent weathering steel rails as approved by the Engineer.

At locations where guardrail layouts are not provided the new guardrail will be placed at the existing location.

"3 Cable Guardrail Intermediate Post" includes all costs to furnish and install either I Beam or Flanged type of posts. The post for this item shall be furnished and installed consistent with the type of posts presently in place at the proposed repair site.

The removal of excess granular material build up that is required to make room for the surfacing shall be incidental to the various bid items on the project.

All reset portions of W Beam and Thrie Beam Guardrail sections shall include the removal of existing wood guardrail posts and resetting with new posts and block to the proper alignment with the steel beam guardrail.

The Contractor shall furnish new galvanized steel hardware for resetting beam rail in accordance with the details provided in these plans. All costs to furnish and install new bolts, nuts, washers, nails, and miscellaneous shall be incidental to the various bid items on the project.

All removed guardrail items that are not reused shall become the property of the Contractor.

### **GUARDRAIL DELINEATORS**

All guardrail delineation shall be reset on the new post. Costs for resetting the delineators shall be incidental to the various guardrail bid items on the project.

**TABLE OF GUARDRAIL – BELLE FOURCHE AREA - Participating**

Location	MRM	L/R	Remove Beam Guardrail Ft	Remove 3 Cable Guardrail for Reset Ft	Remove Double W Beam Guardrail for Reset Ft	Remove W Beam Guardrail for Reset Ft	Remove W Beam Guardrail Flared End Terminal for Reset Each	Remove Rubrail for Reset Ft	Straight Class A W Beam Guardrail w/ Wood Post Ft	Straight Class B W Beam Rail Ft	Beam Guardrail Post & Block Each	Reset 3 Cable Guardrail Ft	Reset W Beam Rail Ft	Reset Double W Beam Rail Ft	Reset W Beam Guardrail Flared End Terminal Each	Reset Rubrail Ft	Base Course Ton	Asphalt Concrete Composite Ton	Comments
<b>Butte County</b>																			
<b>SD Hwy 34</b>																			
10-114-411	12.81	Right Side		234								234							Reset 3 Cable Guardrail to correct height
10-130-416	14.29	Left Side		255								255							Reset 3 Cable Guardrail to correct height
<b>US Hwy 212</b>																			
10-103-367	14.10	Left Off		172								172							Reset 3 Cable Guardrail to correct height
<b>SD Hwy 79</b>																			
10-310-416	125.42	Right On	12.5	12.5	25	1	12	12.5			17		25	12.5	1	12	28	9.8	Replace 12.5 ft of W Beam, Remove for Reset and Reset Flared End Terminal includes Removing & Resetting 2 HBA Post
		Right Off		12.5	50	1	12				21		50	12.5	1	12	28	10.4	Remove for Reset and Reset Flared End Terminal includes Removing & Resetting 2 HBA Post
		Left On		12.5	50	1	12				21		50	12.5	1	12	28	10.4	Remove for Reset and Reset Flared End Terminal includes Removing & Resetting 2 HBA Post
		Left Off	37.5	12.5	12.5	1	12	37.5			15		12.5	12.5	1	12	28	10.4	Replace 12.5 ft and 25 ft of W Beam, Remove for Reset and Reset Flared End Terminal includes Removing & Resetting 2 HBA Post
<b>Meade County</b>																			
<b>SD Hwy 79</b>																			
47-060-329	121.73	Right On	75	12.5	62.5	1	12	50	25	13			62.5	12.5	1	12		12.2	Beam, Remove for Reset and Reset Flared End Terminal includes Removing & Resetting 2 HBA Post
		Right Off		12.5	50	1	12				13		50	12.5	1	12	28	10.4	Resetting 2 HBA Post
		Left On	12.5	12.5	37.5	1	12	12.5			13		37.5	12.5	1	12	28	9.8	Replace 12.5 ft section of W Beam, Remove for Reset and Reset Flared End Terminal includes Removing & Resetting 2 HBA Post
		Left Off		12.5	112.5	1	12				13		112.5	12.5	1	12	31	13.4	Resetting 2 HBA Post
		<b>TOTALS:</b>	<b>137.5</b>	<b>661.0</b>	<b>100.0</b>	<b>400.0</b>	<b>8.0</b>	<b>96.0</b>	<b>112.5</b>	<b>25.0</b>	<b>126.0</b>	<b>661.0</b>	<b>400.0</b>	<b>100.0</b>	<b>8.0</b>	<b>96.0</b>	<b>199.0</b>	<b>86.8</b>	

**TABLE OF GUARDRAIL – BELLE FOURCHE AREA – Participating (Cont.)**

Location	MRM	L/R	Remove Beam Guardrail Ft	Remove Beam Guardrail End Terminal Each	Remove W Beam Guardrail for Reset Ft	Straight Double Class A Thrie Beam Guardrail with Wood Posts Ft	Straight Class A W Beam Guardrail w/ Wood Post Ft	W Beam to Thrie Beam Guardrail Transition Each	W Beam Guardrail Flared End Terminal Each	Beam Guardrail Post & Block Each	Reset W Beam Rail Ft	Comments
<b>Harding County</b>												
<b>SD Hwy 79</b>												
32-517-215	210.59	Right On	31.25			12.5	12.5	1				
		Right Off	18.75		62.5	12.5		1		10	62.5	reset 18 ft of Thrie Beam and 62 ft of W Beam to the correct height
		Left On	18.75		25	12.5		1		4	25	reset 18 ft of Thrie Beam and 25 ft of W Beam to the correct height
		Left Off	43.75		62.5	12.5	25	1		10	62.5	one 25 ft section of W Beam contains 2 sets of short slots (SRT 350)
32-531-001	232.25	Right On	93.75			12.5	75	1		2		one 25 ft section of W Beam is attached to ET 2000 head, one of the wood posts is a CRT
		Right Off	18.25			12.5		1		1		replace wood post #1 and reset ET 2000 head
		Left On	56.25			12.5	37.5	1		1		W Beam lengths are 25 ft & 12.5 ft, replace wood post #1
		Left Off	31.25			12.5	12.5	1				
<b>SD Hwy 20</b>												
32-242-255	26.86	Right Off			112.5					18	112.5	reset W Beam to correct height
		Left On			112.5					18	112.5	reset W Beam to correct height - includes SRT 350 end
		Left Off			62.5					10	62.5	reset 62 ft of W Beam to correct height
<b>US Hwy 85</b>												
32-327-097	145.07	Right Off	12.5	1			12.5		1			
		Left On	12.5	1			12.5		1			
32-330-029	151.99	Right Off			50					8	50	reset 50 ft of W Beam to correct height
		Left Off			125					21	125	replace wood post #1 (ET 2000), reset 125 of W Beam to correct height
		<b>TOTALS:</b>	<b>337.0</b>	<b>2</b>	<b>612.5</b>	<b>100.0</b>	<b>187.5</b>	<b>8</b>	<b>2</b>	<b>103</b>	<b>612.5</b>	

**TABLE OF GUARDRAIL – BELLE FOURCHE AREA - Nonparticipating**

Location Str. No.	MRM	L/R	Remove Beam Guardrail Ft	3 Cable Guardrail Intermediate Post Each	Straight Class A W Beam Guardrail w/ Wood Post Ft	W Beam to Thrie Beam Guardrail Transition Each	Beam Guardrail Post & Block Each	W Beam Guardrail End Section Buffer Each	Comments
<b>Butte County</b>									
<b>US Hwy 212</b>									
10-156-360	19.59	Left Off					1		replace wood post #1 (ET 2000)
10-309-368	36.42	Left On					2		replace two standard wood posts
10-324-337	40.63	Right On					1		Replace wood post #2 (FLEAT)
10-357-312	44.91	Left On					1		replace wood post #2 (FLEAT)
10-496-208	62.15	Right Off					1		replace wood post #1 (FLEAT)
<b>SD Hwy 79</b>									
10-310-399	127.15	Left On Left Off					1 2		replace 1 standard wood post replace 2 standard wood posts
10-310-242	142.90	Right Off Left On Left Off	25 25		25 25		1 1 1		replace 1 standard wood post replace two 12.5 ft sections of W Beam replace 25 ft section of W Beam
10-310-215	145.58	Right On					1		replace wood post #1 (SRT 350)
10-310-196	147.53	Right Left		9 2					replace nine S3x5.7 steel I beam posts for 3 cable G.R. replace two S3x5.7 steel I beam posts for 3 cable G.R.
10-386-067	166.55	Right On	25		25		1 2		25 ft section of W Beam contains 2 sets of short slots (SRT 350), wood post is a CRT replace 2 wood posts
<b>US Hwy 85</b>									
10-100-347	58.47	Right Off Left On Left Off	25		25		1 1 3		replace two 12.5 ft sections of W Beam, replace 1 standard wood post replace 1 standard wood post replace 3 standard wood posts
10-105-261	67.37	Right Off Left Off						1 1	replace SRT 350 end (boxing glove) replace SRT 350 end (boxing glove)
10-146-229	72.59	Right On Right Off	25		25		2		replace one 25 ft section of W Beam one of the wood posts to be replaced is a CRT
10-249-135	87.18	Right On Right Off Left On Left Off	31.25		25	1	2 1 3 1		replace wood post #1 (FLEAT) and one regular post replace wood post #1 (FLEAT) replace wood post #2 (FLEAT), one CRT post and one regular wood post replace 25 ft section of W Beam, replace thrie beam transition
10-249-129	87.80	Right On Right Off Left On Left Off					6 1 2 1		replace wood post #1 & #2 (FLEAT), three CRT posts and one regular post replace wood post #1 (FLEAT) replace wood post #1 (FLEAT) and one standard post replace wood post #1 (FLEAT)
10-250-086	92.04	Right On Right Off Left Off	37.5		37.5		7 8 1		replace wood post #1 & #2 (FLEAT), and five CRT posts replace one 25 ft & one 12.5 section of W Beam, wood post #1 & #2 (FLEAT) and six CRT posts replace wood post #1 (FLEAT)
10-250-060	94.69	Right On Left Off					17 2		replace wood post #1 & #2 (FLEAT), five CRT posts and 10 standard posts replace wood post #1 & #2 (FLEAT)
		<b>TOTALS:</b>	<b>193.75</b>	<b>11</b>	<b>187.5</b>	<b>1</b>	<b>75</b>	<b>2</b>	

**TABLE OF GUARDRAIL – BELLE FOURCHE AREA – Nonparticipating (Cont.)**

Location	MRM	L/R	Remove Beam Guardrail Ft	3 Cable Guardrail End Post Each	3 Cable Guardrail Intermediate Post Each	Straight Class A W Beam Guardrail w/ Wood Post Ft	Beam Guardrail Post & Block Each	W Beam Guardrail End Section Buffer Each	Reset Beam Guardrail Post Each	Comments
<b>Meade County</b>										
<b>SD Hwy 79</b>										
47-060-383	116.37	Right Off					4			replace 4 standard wood posts
<b>SD Hwy 73</b>										
47-755-203	154.91	Left Off					1			
<b>Harding County</b>										
<b>SD Hwy 79</b>										
32-423-471	178.08	Left Off					1			replace wood post #1 (ET 2000)
32-250-166	215.52	Left Off							1	Reset HBA post #1
32-520-136	218.51	Right On	50			50				replace two 25 ft sections of W Beam
		Left On							1	Reset HBA post #1
		Left Off	50			50	1			replace two 25 ft sections of W Beam
<b>SD Hwy 20</b>										
32-215-255	24.24	Left On					2			replace 2 standard wood posts
32-451-284	49.68	Right On					1			replace wood post #1 (ET 2000)
		Right Off	25			25	2			25 ft section of W Beam is attached to ET 2000 head, one of the two wood posts to be replaced is post #1 (ET 2000)
		Left On					2			replace 2 standard wood posts
		Left Off					1			replace wood post #2 (ET 2000)
<b>US Hwy 85</b>										
32-327-097	145.07	Left Off					1			replace wood post #2 (FLEAT)
32-330-029	151.99	Right On					1			replace one wood CRT post
<b>Ziebach County</b>										
<b>US Hwy 212</b>										
69-105-289	126.36	Right On	25			25		1		replace SRT 350 end (boxing glove)
		Right Off	50			50				one 12.5 ft section of W Beam contains 2 sets of short slots (SRT 350), remaining W Beams lengths are 12.5 ft and 25 ft
		Left On	25			25				
		Left Off	25			25		1		replace SRT 350 end (boxing glove)
<b>Perkins County</b>										
<b>SD Hwy 73</b>										
53-380-131	229.60	Right Off						1		replace BCT end (boxing glove)
		Left On	50			50	2			replace 50 ft of W Beam, tubes for wood post #1 & #2 are missing
		Left Off					2	1		replace BCT end (boxing glove)
53-380-119	230.77	Right On		2			2			replace two S3x5.7 steel I beam posts for 3 cable G.R.
		Right Off					4	1		replace BCT end (boxing glove)
		Left On			3		5			replace 5 standard wood posts
		Left Off					2			replace 2 standard wood posts
		<b>TOTALS:</b>	<b>300.0</b>	<b>2</b>	<b>3</b>	<b>300.0</b>	<b>34</b>	<b>5</b>	<b>2</b>	

**TABLE OF GUARDRAIL – RAPID CITY AREA - Participating**

Location		L/R	Remove Beam Guardrail Ft	Remove W Beam Guardrail for Reset Ft	Remove W Beam Guardrail End Terminal for Reset Each	Remove W Beam Guardrail Flared End Terminal for Reset Each	Remove W Beam Guardrail Tangent End Terminal for Reset Each	Straight Class A W Beam Guardrail w/ Wood Post Ft	Beam Guardrail Post & Block Each	Reset W Beam Rail Ft	Reset W Beam Guardrail Flared End Terminal Each	Reset W Beam Guardrail Tangent End Terminal Each	* Reset W Beam Guardrail End Terminal Each	Asphalt Concrete Composite Ton	Comments
<b>Pennington County</b>															
<b>SD 44</b>															
27.08	27.17	R		500		2			175	500	2			5	All 7' post, 3.125' spacing
27.12	27.21	L		387.5		2			139	387.5	2			5	Asphalt Concrete Composite for leveling End Terminal area
27.62	27.7	L		462.5	1	1			155	462.5	1		1	2.5	* Curved W Beam Guardrail Terminal
27.68	27.74	R		287.5	1	1			99	287.5	1		1	2.5	* Curved W Beam Guardrail Terminal
27.91	28.22	R		1525		2			503	1525	2			5	
28.41	28.61	R		950		2			319	950	2			5	
28.54	28.65	L		525		2			183	525	2			5	
29.06	29.27	L		1175	1	1			383	1175	1		1	2.5	* Curved W Beam Guardrail Terminal
29.22	29.29	R		262.5		2			99	262.5	2			5	
33.08	33.17	R		387.5		2			139	387.5	2			5	
33.47	33.54	R		275		2			103	275	2			5	
33.48	33.59	L		625	1	1			207	625	1		1	2.5	* Curved W Beam Guardrail Terminal
33.55	33.62	R		275		2			103	275	2			5	
<b>Lawrence County</b>															
<b>US 14A</b>															
36.0 + 0.111	36.0 + 0.185	R	25	287.5			2	25	57	287.5		2			All rail AASHTO Type 4 Rail, Remove W Beam Guardrail Tangent End Terminal for Reset includes 50' of W Beam Rail
36.0 + 0.187	36.51 + 0.01	R	225	225			2	225	47	225		2			All rail AASHTO Type 4 Rail, MRM 36.51 Kirk Road, Remove W Beam Guardrail Tangent End Terminal for Reset includes 50'
36.51 + 0.03	36.51 + 0.18	R	50	675			2	50	119	675		2			All rail AASHTO Type 4 Rail, Remove W Beam Guardrail Tangent End Terminal for Reset includes 50' of W Beam Rail
<b>TOTALS:</b>			<b>300</b>	<b>8825.0</b>	<b>4</b>	<b>22</b>	<b>6</b>	<b>300.0</b>	<b>2830.0</b>	<b>8825.0</b>	<b>22</b>	<b>6</b>	<b>4</b>	<b>55.0</b>	

**TABLE OF GUARDRAIL – RAPID CITY AREA – Participating (Cont.)**

Revised: 10-15-2015 klh

Location	MRM to	MRM	Remove 3 Cable Guardrail Anchor Assembly Each	Remove Beam Guardrail Trailing End Terminal Each	Remove W Beam Guardrail Breakaway Cable Terminal Each	Remove W Beam Deformed End Each	Salvage W Beam Guardrail Ft	Remove 3 Cable Guardrail for Reset Ft	Remove W Beam Guardrail for Reset Ft	Remove Rubrail for Reset Ft	3 Cable Guardrail Ft	Reset 3 Cable Guardrail Ft	3 Cable Guardrail Slip Base Anchor Assembly Each	Straight Class A W Beam Guardrail w/ Wood Post Ft	Straight Double Class B W Beam Guardrail w/ Wood Post Ft	W Beam Guardrail Flared End Terminal Each	Beam Guardrail Post & Block Each	Reset W Beam Rail Ft	Reset Rubrail Ft
<b>Pennington County</b>																			
<b>I-90 Exit 57</b>																			
Eastbound		Median	2					350			134	350	2						
Westbound		Median	2					360			124	360	2						
<b>Exit 59</b>																			
Eastbound		Median	2					292			208	292	2						
Westbound		Median	2					232			268	232	2						
<b>Exit 78 Cross Road</b>																			
Northbound		On End			1		50		25	12					12.5	1	8	50	12
		Off End			1		50		125	12					12.5	1	20	125	12
Southbound		On End		1			125		150	12					12.5	1	20	125	12
		Off End			1		50		25	12					12.5	1	4	25	12
<b>Exit 116 Cross Road</b>																			
Eastbound									2		350			37.5		2	55	350	
Westbound									2		350			50		2	55	350	
<b>Exit 121 Cross Road</b>																			
Northbound									2		300			25		2	47	300	
Southbound									2		300			50		2	47	300	
<b>TOTALS:</b>			<b>8</b>	<b>1</b>	<b>3</b>	<b>8</b>	<b>275</b>	<b>1234</b>	<b>1625</b>	<b>48</b>	<b>734</b>	<b>1234</b>	<b>8</b>	<b>162.5</b>	<b>50</b>	<b>12</b>	<b>256</b>	<b>1625</b>	<b>48</b>

**TABLE OF GUARDRAIL – RAPID CITY AREA - Nonparticipating**

Location	MRM to	MRM	L/R	Remove Beam Guardrail Ft	Remove W Beam Guardrail Flared End Terminal for Reset Each	Straight Double Class A Thrie Beam Guardrail with Wood Posts Ft	Straight Class A Thrie Beam Guardrail w/ Wood Post Ft	Straight Class A Thrie Beam Guardrail Ft	Straight Class A W Beam Guardrail w/ Wood Post Ft	W Beam to Thrie Beam Guardrail Transition Each	Beam Guardrail Post and Block Each	Reset W Beam Guardrail Flared End Terminal Each	Comments
<b>Lawrence County</b>													
<b>US 14A</b>													
34.0 + 0.096	34.0 + 0.776		L	837.5					837.5				All rail AASHTO Type 4 Rail
41.0 + 0.01	41.0 + 0.2		L	643.25	1	12.5	625			1	6	1	See note on removing guardrail post from sidewalk
41.01 + 0.013	41.03 + 0.121		R	375			225	50	100				Straight Class A Thrie Beam Guardrail attached to concrete barrier on Railroad Street
<b>TOTALS:</b>				<b>1855.75</b>	<b>1</b>	<b>12.5</b>	<b>850</b>	<b>50</b>	<b>937.5</b>	<b>1</b>	<b>6</b>	<b>1</b>	

**TABLE OF GUARDRAIL – CUSTER AREA - Participating**

Location	MRM	L/R	Remove 3 Cable Guardrail Anchor Assembly	Remove W Beam End Terminal	Remove Dbl Thrie Beam Guardrail for Reset	Remove W Beam Guardrail for Reset	Remove W Beam to Thrie Beam Guardrail Transition for Reset	3 Cable Guardrail	3 Cable Guardrail Slip Base Anchor Assembly	3 Cable Guardrail Anchor Assembly	Straight Class A W Beam Guardrail w/ Wood Post	W Beam Guardrail Flared End Terminal	W Beam Guardrail Breakaway Cable Terminal	Beam Guardrail Post & Block	Reset Double Thrie Beam Rail	Reset W Beam Rail	Reset W Beam to Thrie Beam Guardrail Transition	Contractor Furnished Borrow Excavation	Base Course	Asphalt Concrete Composite	Comments
Str. No.	MRM		Each	Each	Ft	Ft	Each	Ft	Each	Each	Ft	Each	Each	Each	Ft	Ft	Each	CuYd	Ton	Ton	
<b>Pennington County</b>																					
<b>SD Hwy 40</b>																					
33.89	34.07	Left	2						2												
<b>Custer County</b>																					
<b>SD Hwy 36</b>																					
38.11	38.2	Left	2						2												
<b>Fall River County</b>																					
<b>US Hwy 18</b>																					
24-381-153	56.28	Left		1	12.5	50	1	279	1	1	12.5		1	17	12.5	50	1	48	65	10	Remove W Beam End Terminal includes 50' of beam rail
		Right		1	12.5	50	1				100	1		16	12.5	50	1	55	61	21	Remove W Beam End Terminal includes 50' of beam rail
		<b>TOTALS:</b>	<b>4</b>	<b>2</b>	<b>25</b>	<b>100</b>	<b>2</b>	<b>279</b>	<b>5</b>	<b>1</b>	<b>112.5</b>	<b>1</b>	<b>1</b>	<b>33</b>	<b>25</b>	<b>100</b>	<b>2</b>	<b>103</b>	<b>126</b>	<b>31</b>	

**TABLE OF GUARDRAIL – CUSTER AREA - Nonparticipating**

Location	MRM to	MRM	L/R	Remove Beam Guardrail	Straight Class A W Beam Guardrail w/ Wood Post	Comments
				Ft	Ft	
<b>Pennington County</b>						
<b>SD Hwy 244</b>						
32.78	33.1	Right		25	25	Replace damaged rail w/ AASHTO Type IV Guardrail
33.15	33.78	Left		300	300	Replace damaged rail w/ AASHTO Type IV Guardrail
		<b>TOTALS:</b>		<b>325</b>	<b>325</b>	

**REMOVE AND REPLACE TOPSOIL**

Topsoil shall also be salvaged and stockpiled prior to constructing guardrail embankment area(s). Limits of this work, depth of salvage, and stockpile location will be directed by the Engineer. Following completion of construction, topsoil shall be spread evenly over the disturbed areas.

The estimated amount of topsoil to be removed and replaced is 16 CuYd.

All costs associated with removing and replacing the topsoil along areas to be resurfaced shall be incidental to the contract lump sum price for "Remove and Replace Topsoil".

**EROSION CONTROL**

The contract lump sum price for Erosion Control includes material, equipment, and labor to seed, mycorrhizal inoculum, fertilize and fiber mulching the disturbed areas within the right of way resulting from the work required by this contract.

**PERMANENT SEEDING**

Areas disturbed as a result of the work necessary to repair guardrail shall be reshaped and/or restored to the satisfaction of the Engineer. The disturbed areas shall be tilled to a minimum depth of three inches and seeded with the following seed mix rate:

Type F Permanent Seed Mixture shall consist of the following:

Grass Species	Variety	Pure Live Seed (PLS) (Pounds/Acre)
Western Wheatgrass	Flintlock, Rodan, Rosana	7
Green Needlegrass	Lodorm	4
Sideoats Grama	Butte, Killdeer, Pierre, Trailway	3
Blue Grama	Bad River, Willis	2
Oats or Spring Wheat: April through May; Winter Wheat: August through November		10
Total:		26

Hand seeding devices approved by the Engineer will be allowed. Following seeding operations, the areas shall be hand raked (incorporated) within the top ¼" to ½" of topsoil when possible to the satisfaction of the Engineer.

Limits of Erosion Control work will be as determined by the Engineer on construction.

**MYCORRHIZAL INOCULUM**

Mycorrhizal inoculum shall consist of mycorrhizal fungi spores and mycorrhizal fungi-infected root fragments in a solid carrier. The carrier may include organic materials, calcinated clay, or other materials consistent with application and good plant growth. The supplier shall provide certification of the fungal species claimed and the live propagule count. The inoculum shall include the following fungal species:

<i>Glomus intraradices</i>	25%
<i>Glomus aggregatu</i>	25%
<i>Glomus mosseae</i>	25%
<i>Glomus etunicatum</i>	25%

All seed shall be inoculated by the seed supplier with a minimum of 100,000 live propagules of mycorrhizal fungi per acre. All costs of inoculating the seed shall be incidental to the contract lump sum price "Erosion Control".

The mycorrhizal inoculum shall be as shown below or an approved equal:

<u>Product</u>	<u>Manufacturer</u>
MycoApply	Mycorrhizal Applications, Inc. Grants Pass, OR Phone: 1-866-476-7800 <a href="http://www.mycorrhizae.com/">http://www.mycorrhizae.com/</a>

**FERTILIZING**

The Contractor shall apply an all-natural slow release fertilizer prior to seeding or placing sod. The all-natural fertilizer shall have a minimum guaranteed analysis of 4-6-4 and be USDA Certified BioBased. It should provide a minimum of 4% (N) nitrogen with a minimum water insoluble nitrogen (WIN) fraction of 3.2%, a minimum of 6% (P2O5) available phosphate, a minimum of 4% (K2O) soluble potash, and a maximum carbon to nitrogen ratio (C:N ratio) of 5:1. The all-natural fertilizer shall be free of weed-seed and pathogens accomplished through thermophilic composting, and not mechanical or chemical sterilization, to assure presence of beneficial soil microbiology. The fertilizer shall have a near neutral pH, a low salt index, a low biological oxygen demand, contain organic humic and fulvic acids, and have high aerobic organism counts. The fertilizer shall also be stable, free of bad odors, and be unattractive as a food source for animals. It should also be in a granular form that is easily spread.

The all-natural slow release fertilizer shall be applied according to the manufacturer's application recommendations.

The application rate is 1,500 pounds per acre.

The all-natural slow release fertilizer shall be as shown below or an approved equal:

<u>Product</u>	<u>Manufacturer</u>
Sustane	Sustane Corporate Headquarters Cannon Falls, Minnesota Phone: 1-800-352-9245 <a href="http://www.sustane.com/">http://www.sustane.com/</a>

**FIBER MULCHING**

Fiber mulch shall be applied in a separate operation following permanent seeding.

An additional 2% by weight of tackifier shall be added to the fiber mulch product selected from the approved product list. If the product selected has guar gum tackifier included, then the additional 2% of tackifier shall be guar gum. If the product selected has synthetic tackifier included, then the additional 2% of tackifier shall be synthetic.

The Contractor shall allow the fiber mulch to cure a minimum of 18 hours prior to watering or any storm event to ensure proper cohesion between the soil and fiber particles.

All costs for the additional tackifier added to the fiber mulch including labor, equipment, and materials shall be incidental to the contract lump sum price for "Erosion Control".

The fiber mulch provided shall be from the approved product list or an approved equal. The approved product list for fiber mulch may be viewed at the following internet site:

<http://sddot.com/business/certification/products/Default.aspx>

**TRAFFIC CONTROL – GENERAL NOTES**

- Traffic shall be returned to the normal driving lanes during non-working hours.
- All work activities shall be completed from the hours of 9:00 am to 3:00 pm on Interstate 90 at Exit 57 and Exit 59. Traffic control shall be removed and all lanes shall be open and unimpeded at the end of each day.
- Requests to deviate from the sequence of operations shall be submitted in writing to the Engineer for review. Approval of an alternate sequence of operations will only be allowed when the proposed changes meet with the Department's intent for traffic control and sequencing of the work. An alternate sequence shall be submitted for review a minimum of one week prior to potential implementation.
- Unless otherwise stated in these plans, no work will be allowed during hours of darkness.
- Any damage of the vegetation, surfacing, embankment, delineators, and existing signs resulting from such indiscriminate use shall be repaired and/or restored by the Contractor, at no expense to the State, and to the satisfaction of the Engineer.
- Existing guide, route, informational logo, regulatory, warning signs and delineation shall be temporarily reset and maintained during construction as directed by the Engineer. Removing, relocating, salvaging and resetting of the above items shall be the responsibility of the Contractor.
- Construction signing mounted on portable supports shall not be used for a duration of more than 3 days, unless approved by the Engineer. Construction signing that remains in the same location for more than 3 days shall be mounted on fixed location, ground mounted, breakaway supports.
- Any delineators and signs damaged or lost shall be replaced by the Contractor at no cost to the State.
- All materials and equipment shall be stored a minimum distance of 30' from the traveled way during nonworking hours.
- All haul trucks shall be equipped with a second flashing amber light that is visible from the backside of the haul truck. The costs for the flashing amber lights shall be incidental to the various related contract bid items.
- All construction operations shall be conducted in the general direction of traffic movement.
- If there is a discrepancy between the traffic control plans, standard plates, and the MUTCD – whichever is more stringent shall be used, as determined by the Engineer.

**ITEMIZED LIST FOR TRAFFIC CONTROL SIGNS**

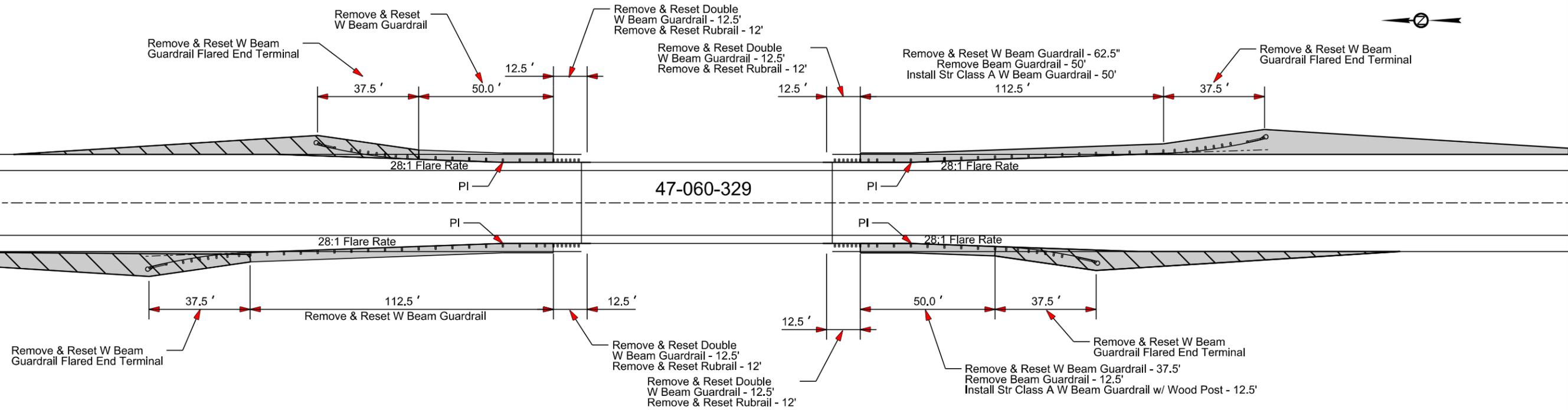
SIGN CODE	SIGN DESCRIPTION	CONVENTIONAL ROAD				EXPRESSWAY / INTERSTATE			
		NUMBER	SIGN SIZE	SQFT PER SIGN	SQFT	NUMBER	SIGN SIZE	SQFT PER SIGN	SQFT
W4-2	LEFT or RIGHT LANE ENDS (symbol)	1	48" x 48"	16	16	4	48" x 48"	16	64
W9-3	CENTER LANE CLOSED AHEAD	1	48" x 48"	16	16		48" x 48"	16	
W20-1	ROAD WORK AHEAD	6	48" x 48"	16	96	4	48" x 48"	16	64
W20-4	ONE LANE ROAD AHEAD	2	48" x 48"	16	32		48" x 48"	16	
W20-5	LEFT or RIGHT LANE CLOSED AHEAD	1	48" x 48"	16	16	4	48" x 48"	16	64
W20-7	FLAGGER (symbol)	2	48" x 48"	16	32		48" x 48"	16	
W21-5	SHOULDER WORK	2	48" x 48"	16	32		48" x 48"	16	
G20-2	END ROAD WORK	6	36" x 18"	5	30	2	48" x 24"	8	16
		<b>CONVENTIONAL ROAD TRAFFIC CONTROL SIGNS SQFT 270</b>				<b>EXPRESSWAY / INTERSTATE TRAFFIC CONTROL SIGNS SQFT 208</b>			

# GUARDRAIL LAYOUT

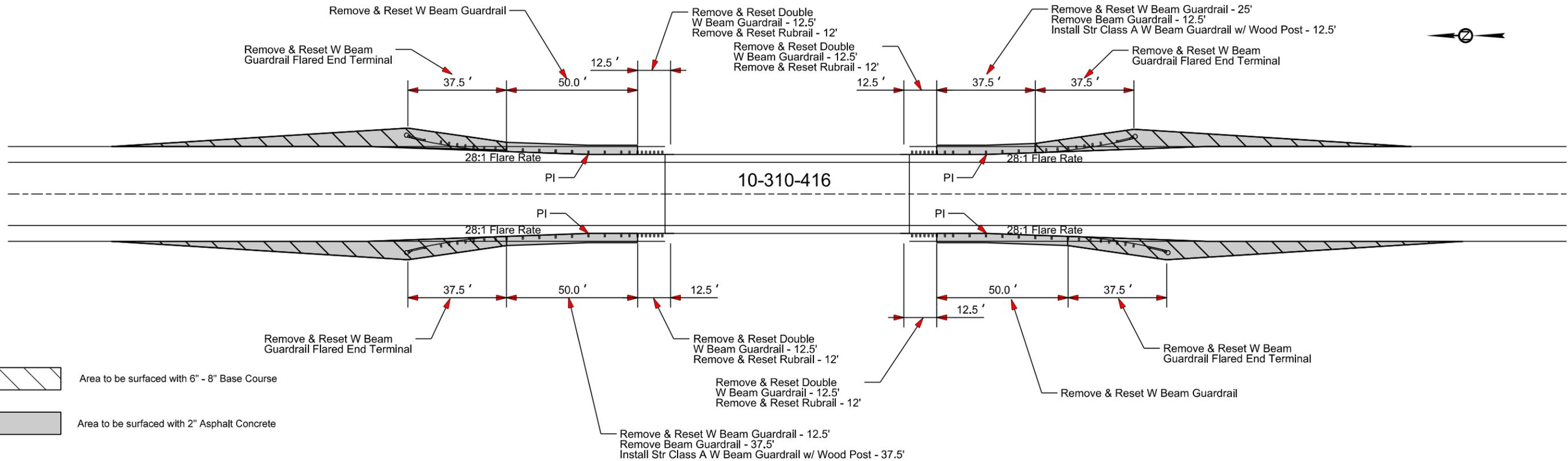
STATE OF SOUTH DAKOTA	PROJECT	SHEET	TOTAL SHEETS
	PH 0040(311)	15	43

Plotting Date: 09/16/2015

## Meade County SD Hwy 79



## Butte County SD Hwy 79



-  Area to be surfaced with 6" - 8" Base Course
-  Area to be surfaced with 2" Asphalt Concrete

Plot Scale - 1:40

Plotted From - trc:11610

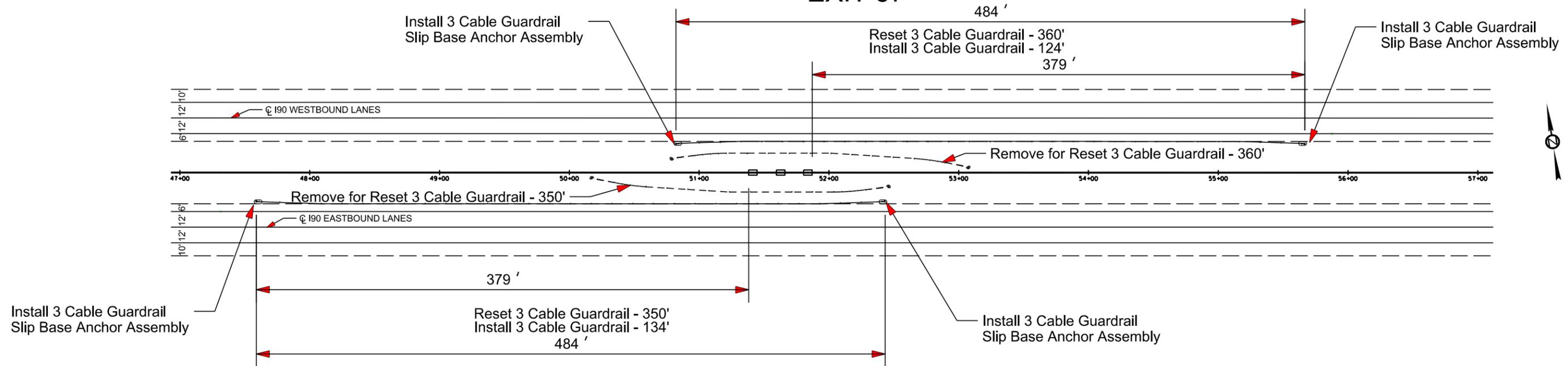
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# GUARDRAIL LAYOUT

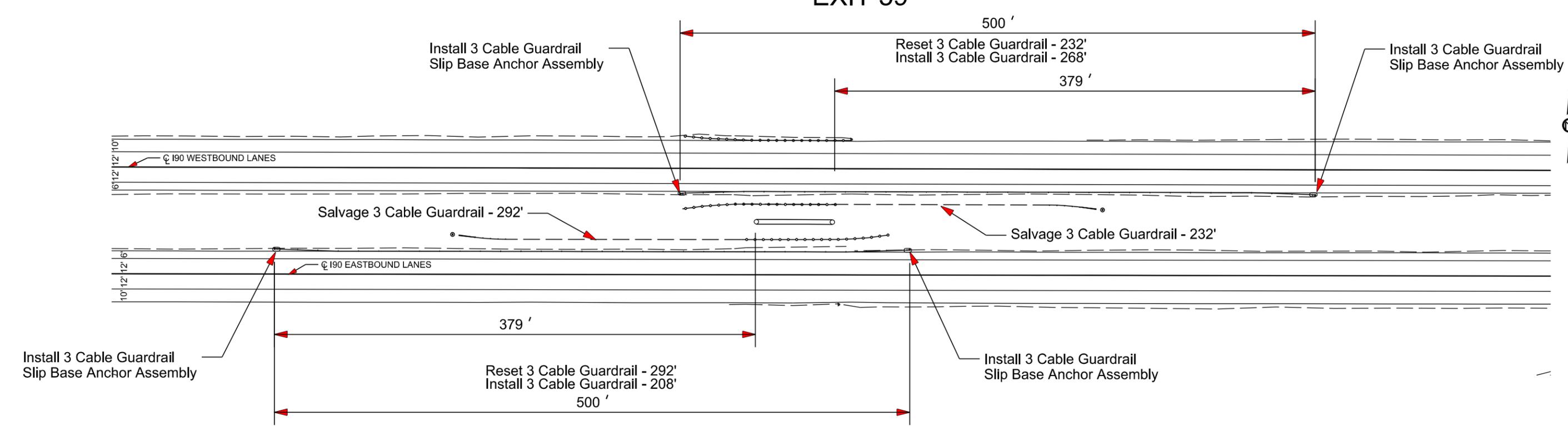
STATE OF SOUTH DAKOTA	PROJECT	SHEET	TOTAL SHEETS
	PH 0040(311)	16	43

Plotting Date: 09/16/2015

## EXIT 57



## EXIT 59



Plot Scale - 1:80

Plotted From - trc11610

File - ...IRC Guardrail\_I90\_57.dgn

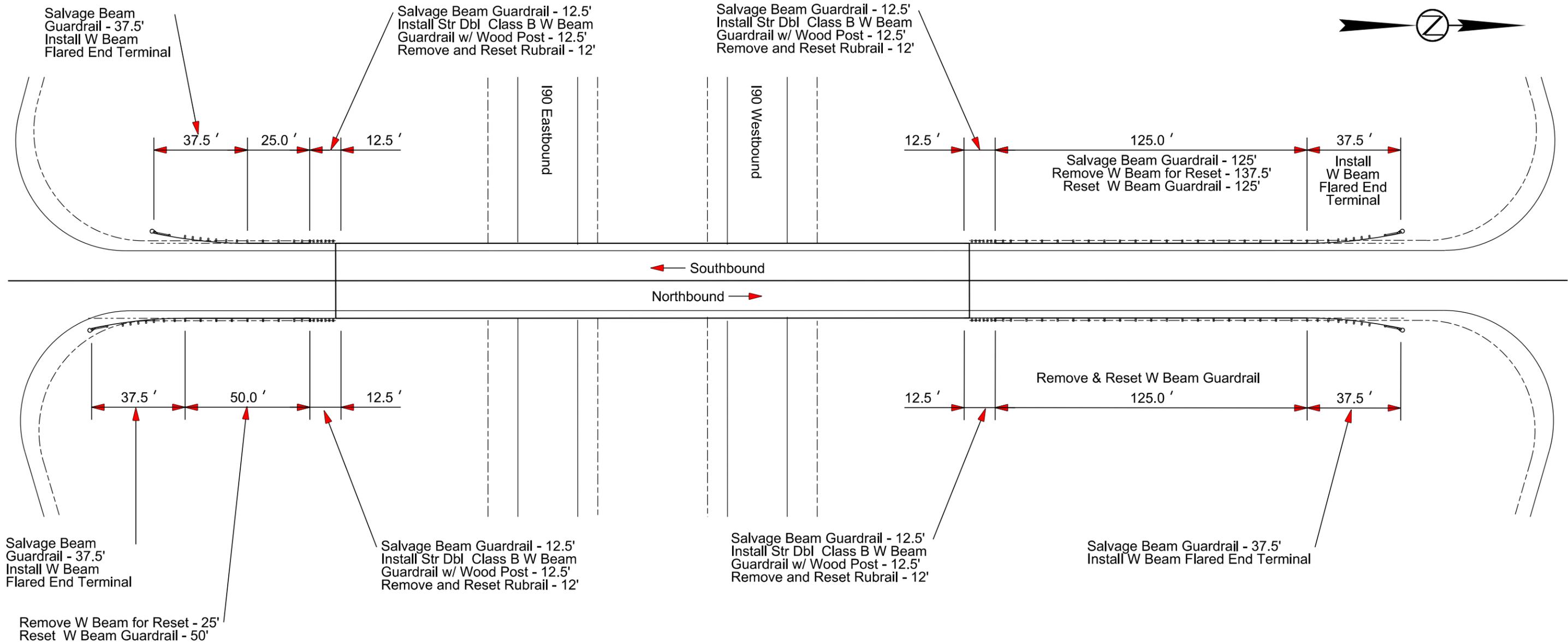
# GUARDRAIL LAYOUT

STATE OF SOUTH DAKOTA	PROJECT	SHEET	TOTAL SHEETS
	PH 0040(311)	17	43

Plotting Date: 09/16/2015

## Exit 78

Plot Scale - 1:40



trc11610

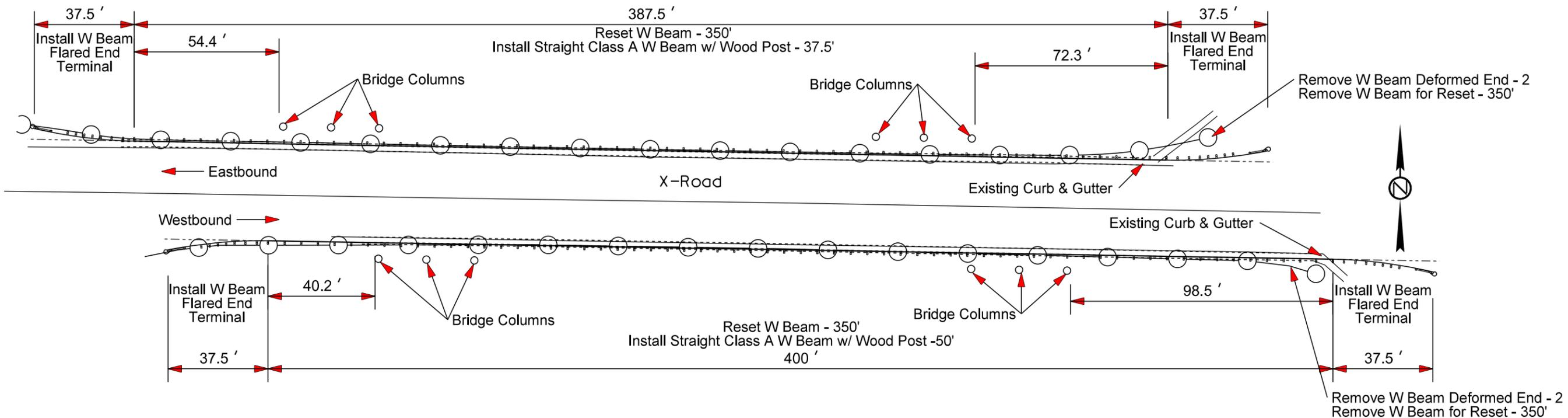
Plotted From -

File - ...IRC GuardrailExit 78.dgn

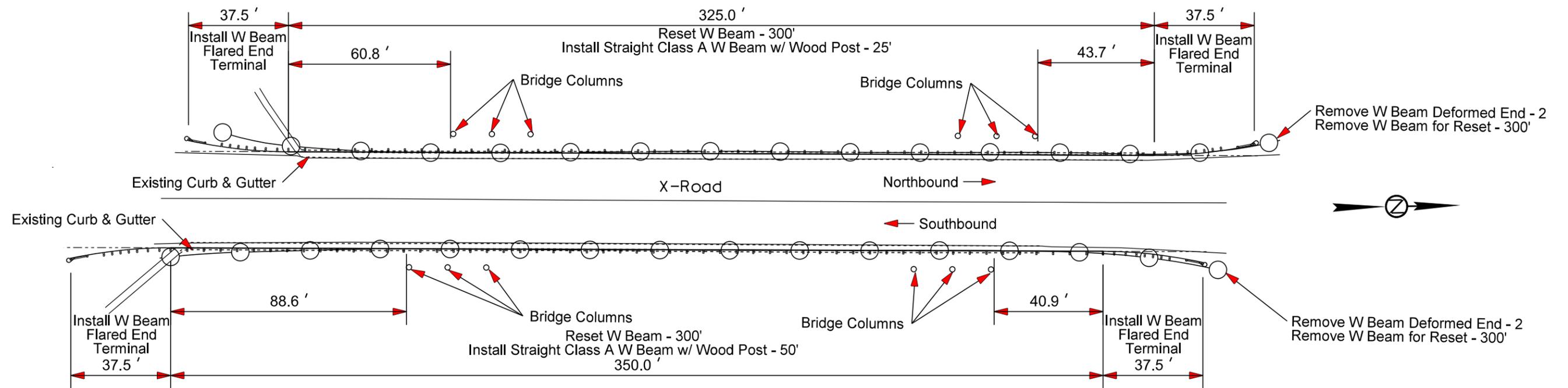
# GUARDRAIL LAYOUT

STATE OF SOUTH DAKOTA	PROJECT PH 0040(311)	SHEET 18	TOTAL SHEETS 43
Plotting Date: 09/16/2015			

## Exit 116



## Exit 121



Plot Scale - 1:40

Plotted From - trc11610

File - ...IRC Guardrail\exit 116\_121.dgn

# GUARDRAIL LAYOUT

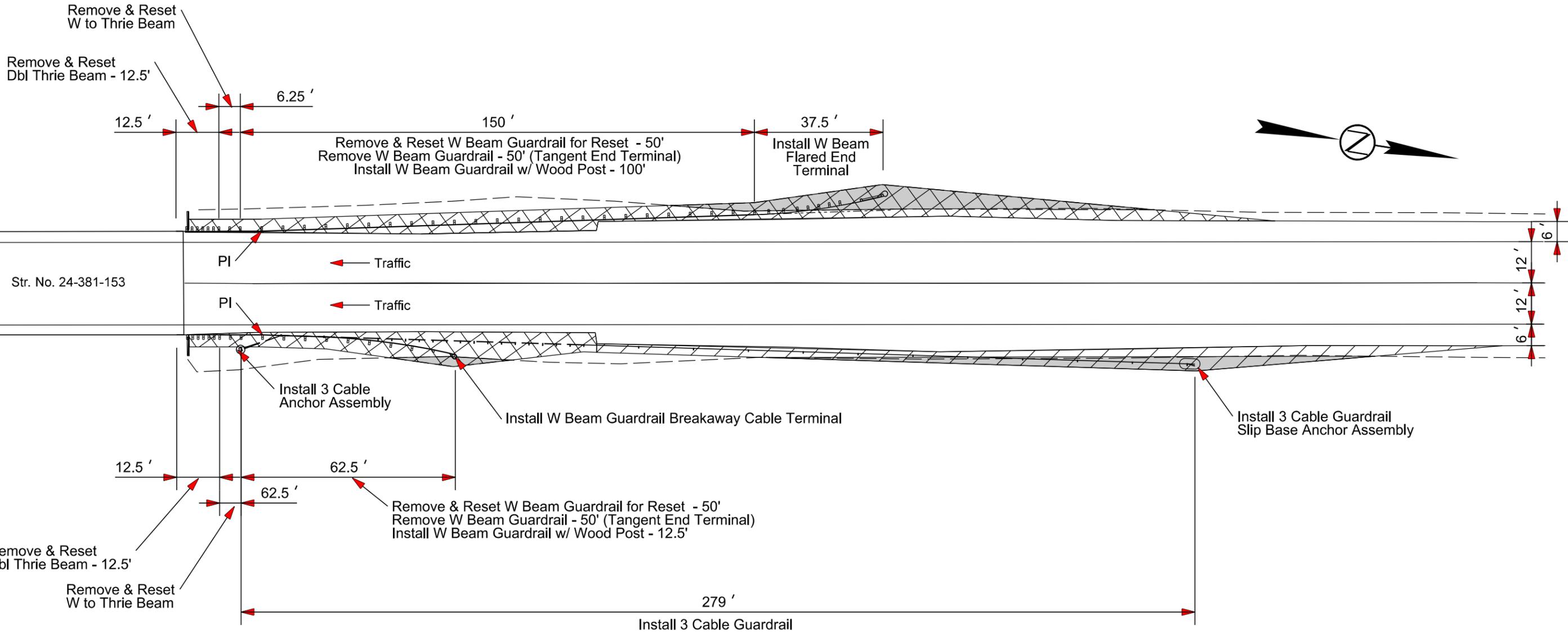
STATE OF SOUTH DAKOTA	PROJECT PH 0040(311)	SHEET 19	TOTAL SHEETS 43
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Plotting Date: 09/16/2015

Fall River County  
US Hwy 18

Plot Scale - 1:30

Plotted From - trcs11610



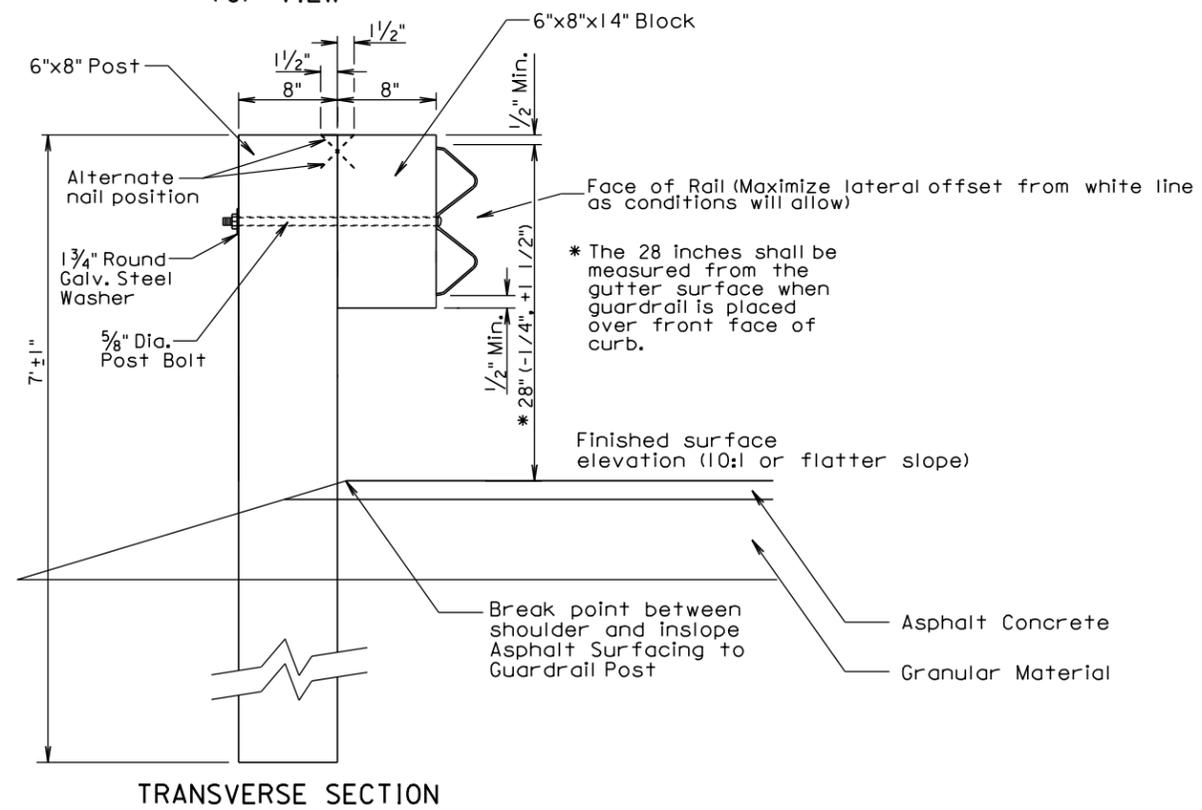
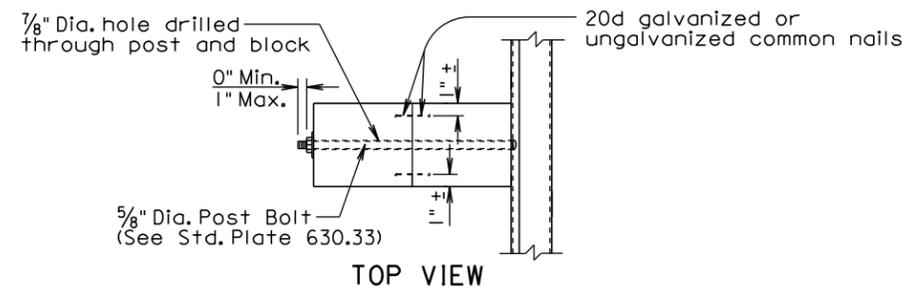
- Area of additional embankment
- Area to be surfaced with 6" Base Course
- Area to be surfaced with 2" Asphalt Concrete and in area of additional embankment - 6" Base Course

File - ...agr18.dgn

STATE OF SOUTH DAKOTA	PROJECT PH 0040(311)	SHEET 20	TOTAL SHEETS 43
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Plotting Date: 09/16/2015

# W BEAM GUARDRAIL POST INSTALLATION



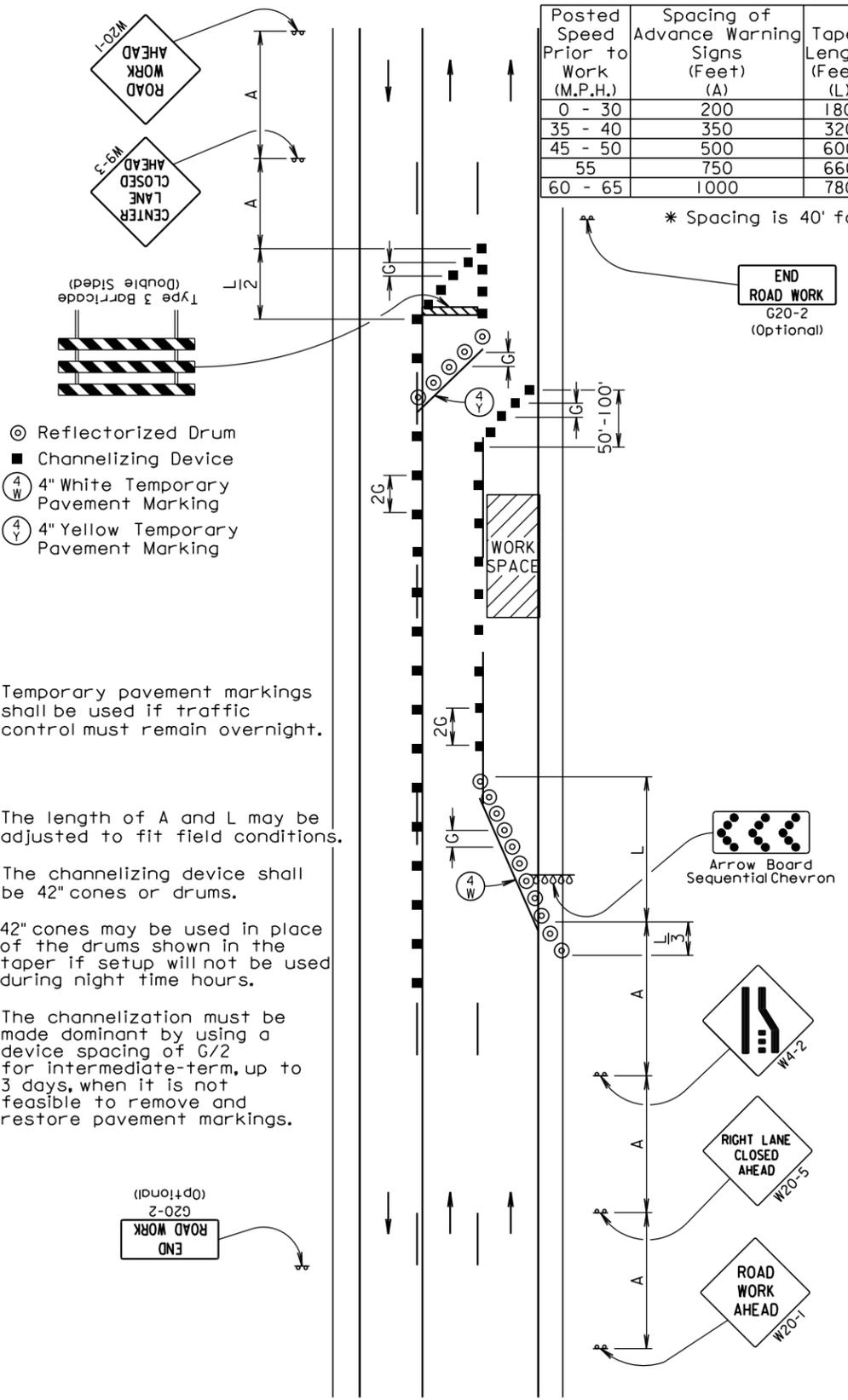
**GENERAL NOTES:**

The top of posts and top of block shall have a true square cut. The top of post and top of block shall be flush.

### GUIDES FOR TRAFFIC CONTROL DEVICES 3-LANE, OUTSIDE LANE CLOSED

Posted Speed Prior to Work (M.P.H.)	Spacing of Advance Warning Signs (Feet) (A)	Taper Length (Feet) (L)	Spacing of Channelizing Devices (Feet) (G)
0 - 30	200	180	25
35 - 40	350	320	25
45 - 50	500	600	50 *
55	750	660	50 *
60 - 65	1000	780	50 *

\* Spacing is 40' for 42" cones.



- ⊙ Reflectorized Drum
- Channelizing Device
- ⓪ 4" White Temporary Pavement Marking
- ⓪ 4" Yellow Temporary Pavement Marking

Temporary pavement markings shall be used if traffic control must remain overnight.

The length of A and L may be adjusted to fit field conditions.

The channelizing device shall be 42" cones or drums.

42" cones may be used in place of the drums shown in the taper if setup will not be used during night time hours.

The channelization must be made dominant by using a device spacing of G/2 for intermediate-term, up to 3 days, when it is not feasible to remove and restore pavement markings.

END ROAD WORK  
G20-2  
(Optional)

Plot Scale - 1:200

Plotted From - trcs11610

File - ...103xvt (2015)TCSlane.dgn

**GENERAL NOTES:**

Either flanged channel steel posts or S3x5.7 steel I beam posts shall be used, but post type shall be consistent throughout the project. The S3x5.7 Steel I Beam post shall be used for the end posts.

All costs associated with furnishing and constructing the 3 cable guardrail anchor assembly including the concrete anchor, cable anchor bracket, compensating device, steel turnbuckle cable assembly, and necessary hardware shall be incidental to the contract unit price per each for "3 Cable Guardrail Anchor Assembly".

All costs associated with furnishing and constructing the 3 cable guardrail including posts, cable, cable splices, and hardware shall be incidental to the contract unit price per foot for "3 Cable Guardrail".

The following table and criteria shall apply to the arrangement of the Spring Cable End Assemblies (Compensation Devices) and Turnbuckle Cable End Assemblies:

LENGTH OF CABLE RUN	CRITERIA FOR ARRANGEMENT OF THE SPRING CABLE END ASSEMBLIES (COMPENSATION DEVICES) AND TURNBUCKLE CABLE END ASSEMBLIES
Less than 500'	Use turnbuckle on the approaching traffic end and compensating device on the other end of each individual cable, except in the W Beam to 3 Cable Transition where all compensating devices shall be provided at the bridge ends.
Greater than 500' to 1000'	Use compensating device on each end of each individual cable.
Greater than 1000'	Start new run by interlacing at last parallel post as shown on sheet 2 of 6.

All Compensating Devices shall be attached to the cable anchor bracket when one end of the run is attached to a bridge.

Compensating Devices must have a spring rate of 450 ± 50 pounds per inch and shall have a total available travel of 6 inches minimum.

The cable shall be retensioned after the initial 2 week pretension period in accordance with the following table:

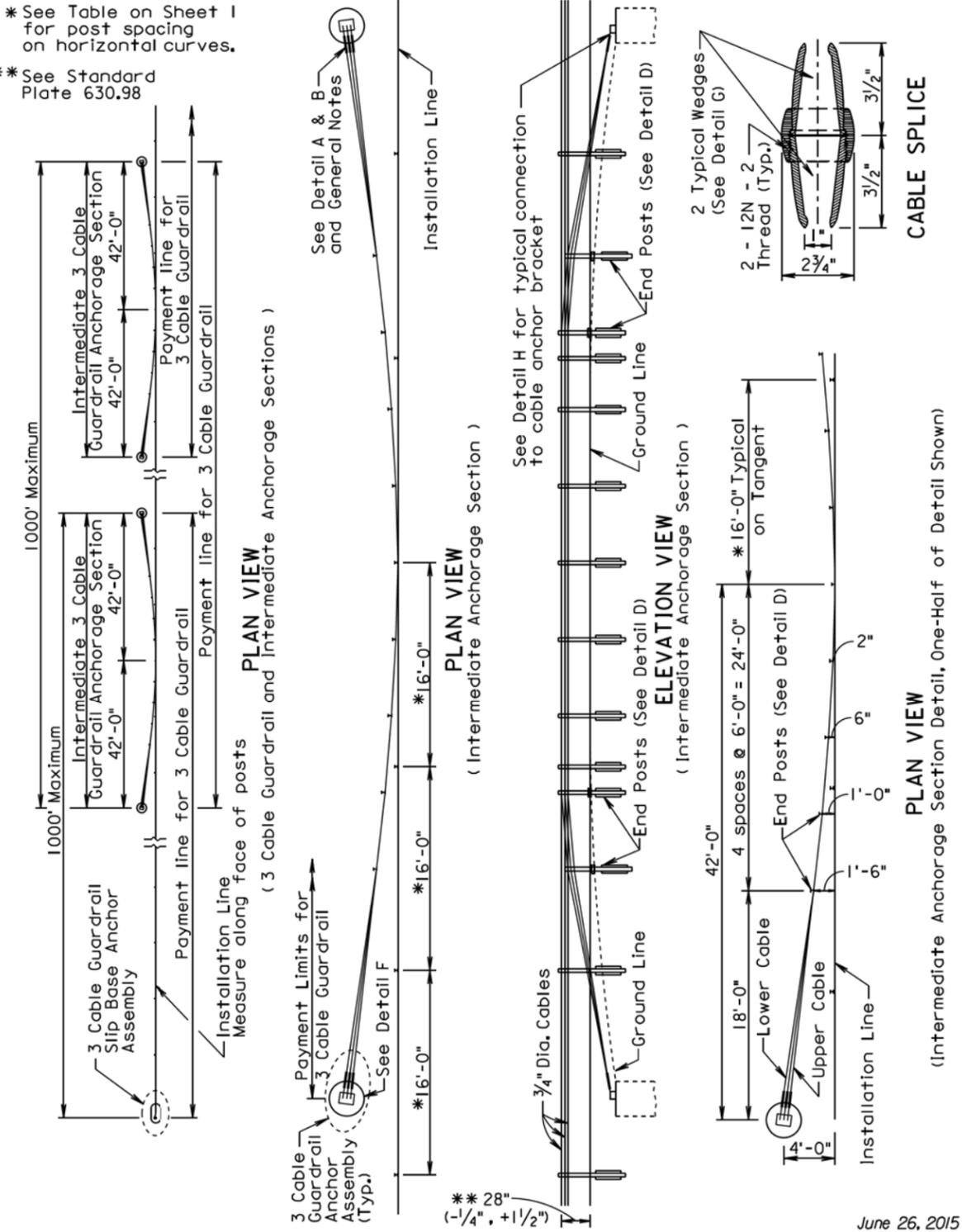
CABLE TENSIONING SPECIFICATIONS														
Temperature Range (Degree F)	-20 to -11	-10 to -1	0 to 9	10 to 19	20 to 29	30 to 39	40 to 49	50 to 59	60 to 69	70 to 79	80 to 89	90 to 99	100 to 109	110 to 120
Spring Compression (Inch)	4 1/4	4	3 3/4	3 1/2	3 1/4	3	2 3/4	2 1/2	2 1/4	2	1 3/4	1 1/2	1 1/4	1

POST SPACING FOR HORIZONTAL CURVES	
Roadway $\frac{1}{4}$ Curvature	Maximum Post Spacing (Ft)
1° and Less	16'
Greater than 1° to 8°	12'
Greater than 8° to 13°	8'
Greater than 13°	NOT ALLOWED

June 26, 2015

<b>S D D O T</b>	<b>3 CABLE GUARDRAIL (LOW TENSION)</b>	PLATE NUMBER <b>629.01</b>
	Published Date: 3rd Qtr. 2015	Sheet 1 of 6

\* See Table on Sheet 1 for post spacing on horizontal curves.  
 \*\* See Standard Plate 630.98

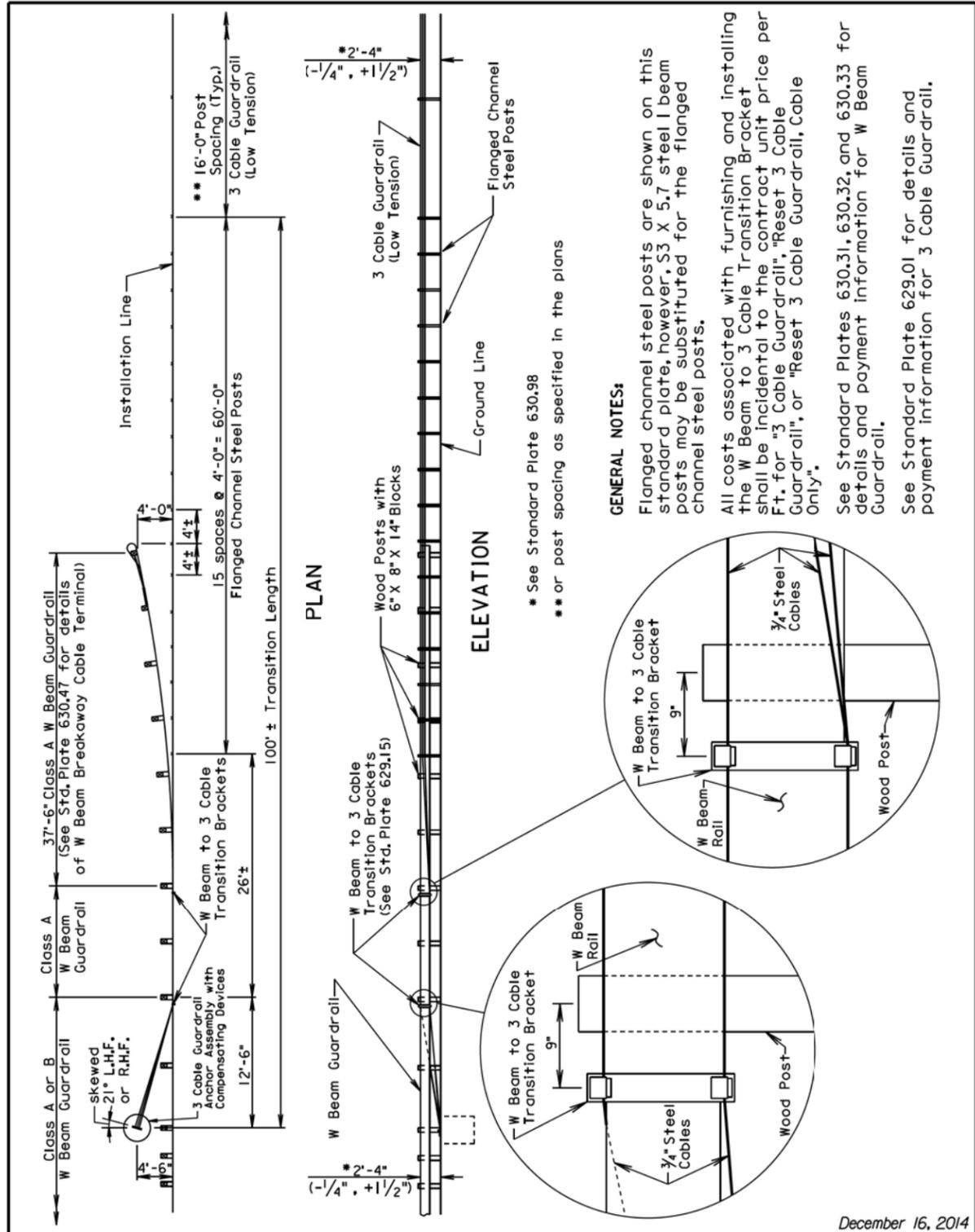


June 26, 2015

<b>S D D O T</b>	<b>3 CABLE GUARDRAIL (LOW TENSION)</b>	PLATE NUMBER <b>629.01</b>
	Published Date: 3rd Qtr. 2015	Sheet 2 of 6







December 16, 2014

<b>S D D O T</b>	<b>W BEAM TO 3 CABLE TRANSITION</b>	PLATE NUMBER <b>629.05</b>
	Published Date: 3rd Qtr. 2015	Sheet 1 of 1

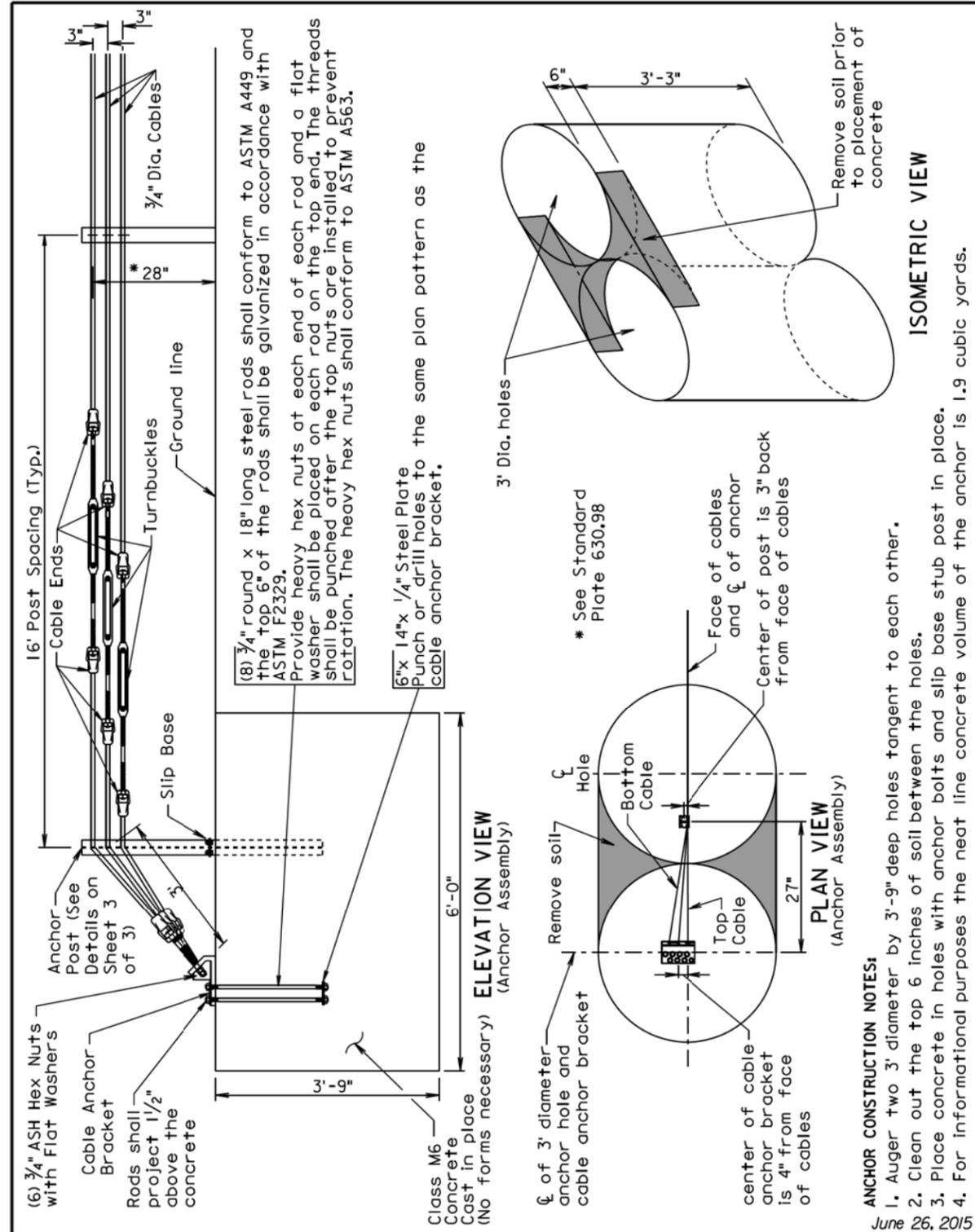
**GENERAL NOTES:**

Flanged channel steel posts are shown on this standard plate, however, S3 X 5.7 steel I beam posts may be substituted for the flanged channel steel posts.

All costs associated with furnishing and installing the W Beam to 3 Cable Transition Bracket shall be incidental to the contract unit price per Ft. for "3 Cable Guardrail", "Reset 3 Cable Guardrail", or "Reset 3 Cable Guardrail, Cable Only".

See Standard Plates 630.31, 630.32, and 630.33 for details and payment information for W Beam Guardrail.

See Standard Plate 629.01 for details and payment information for 3 Cable Guardrail.



June 26, 2015

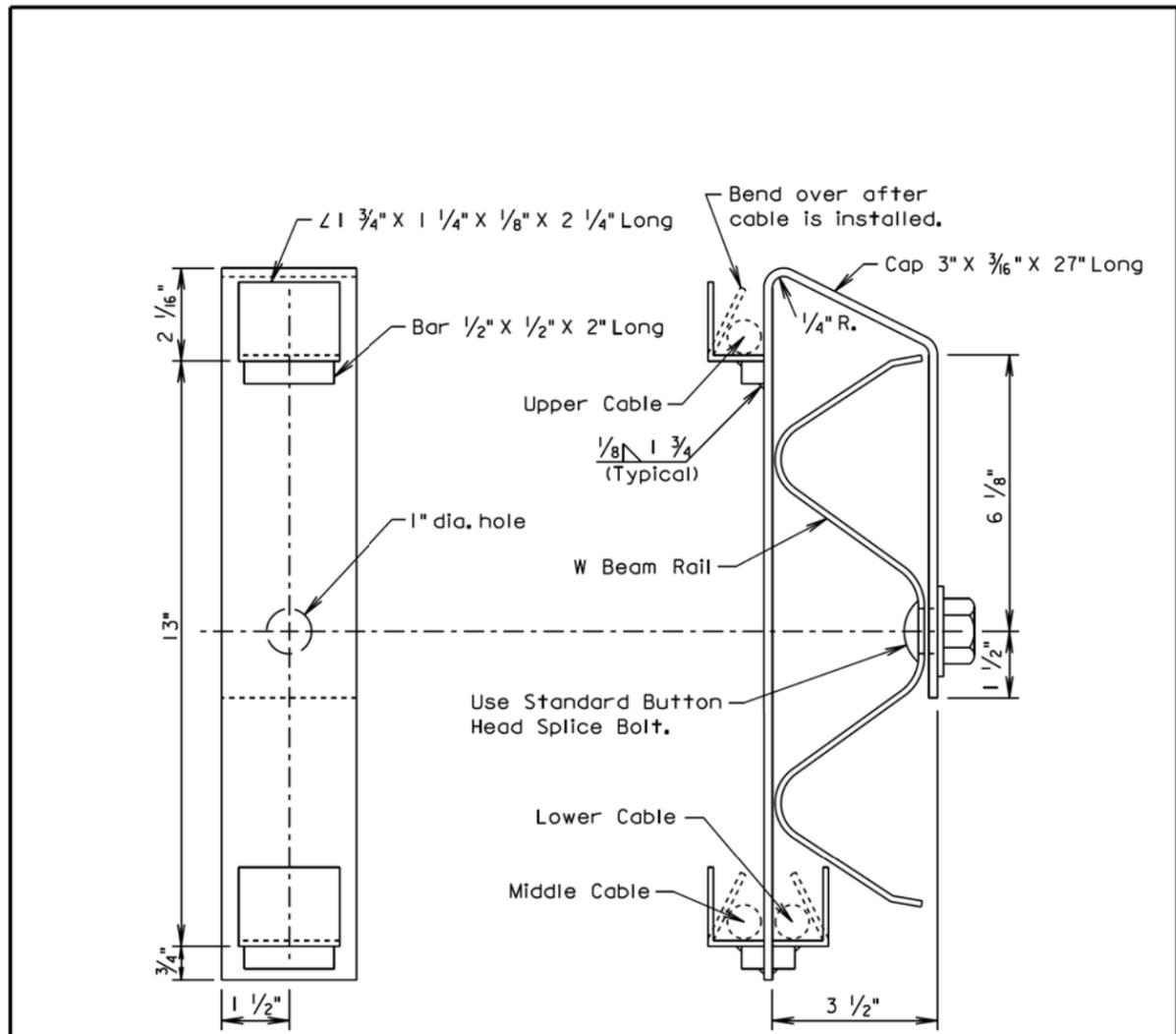
<b>S D D O T</b>	<b>3 CABLE GUARDRAIL SLIP BASE ANCHOR ASSEMBLY</b>	PLATE NUMBER <b>629.10</b>
	Published Date: 3rd Qtr. 2015	Sheet 1 of 3

**ANCHOR CONSTRUCTION NOTES:**

1. Auger two 3' diameter by 3'-9" deep holes tangent to each other.
2. Clean out the top 6 inches of soil between the holes.
3. Place concrete in holes with anchor bolts and slip base stub post in place.
4. For informational purposes the neat line concrete volume of the anchor is 1.9 cubic yards.



Plot Scale - 1:200



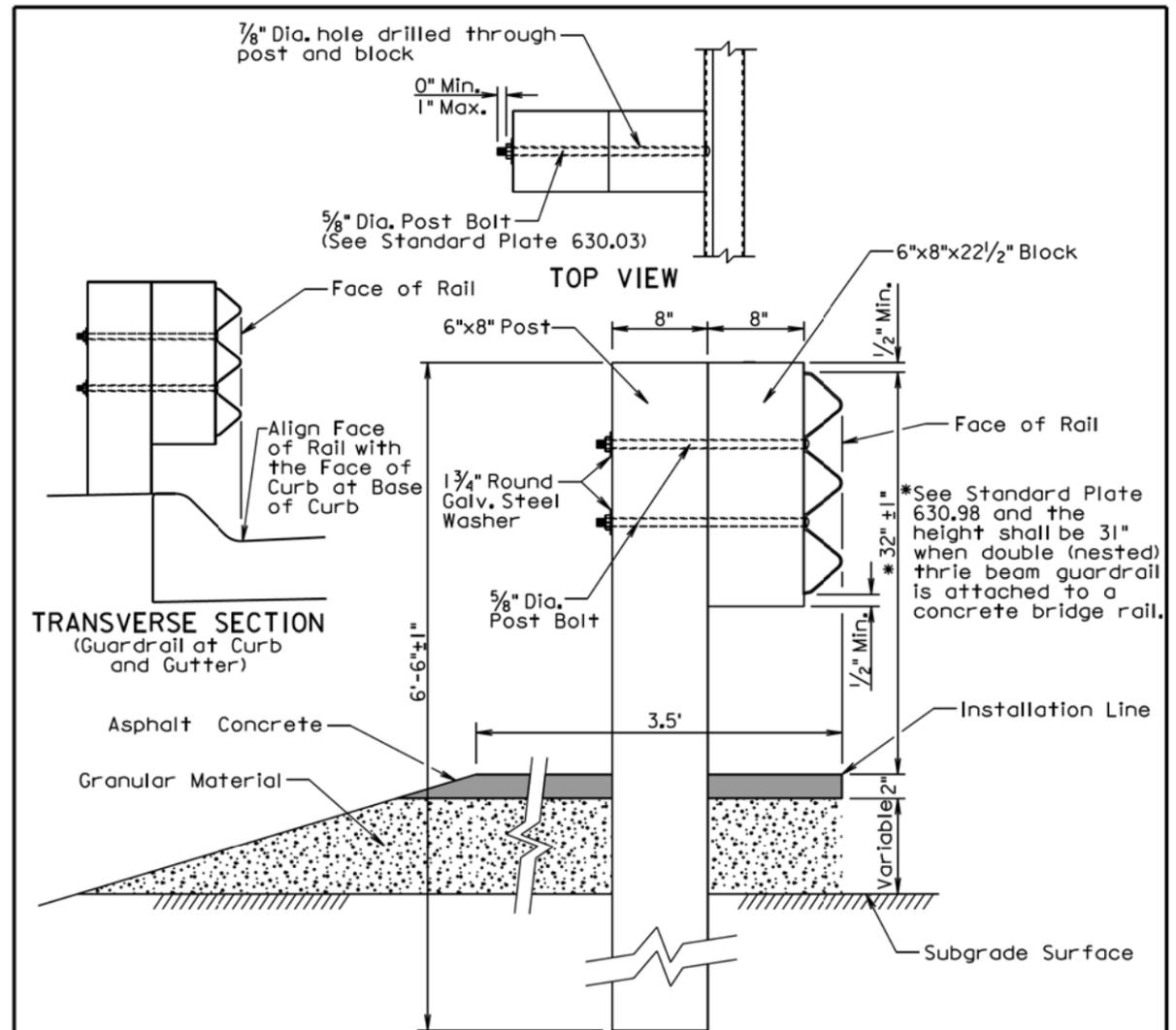
**ELEVATION (TRANSITION BRACKET)**  
**END VIEW (W BEAM RAIL AND TRANSITION BRACKET)**

**GENERAL NOTES:**  
Steel used in the fabrication of the bracket shall conform to ASTM A36 and the bracket shall be galvanized after fabrication in accordance with ASTM A123.

March 31, 2000

<b>S D D O T</b>	<b>W BEAM TO 3 CABLE TRANSITION BRACKET</b>	PLATE NUMBER 629.15
		Sheet 1 of 1

Published Date: 3rd Qtr. 2015



**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 cross slope for the surfacing and subgrade surface shall be as specified in the plans (See Typical Sections and/or Cross Sections).  
The top of post and top of block shall have a true square cut. The top of block shall be ±1 inch from the top of the post.

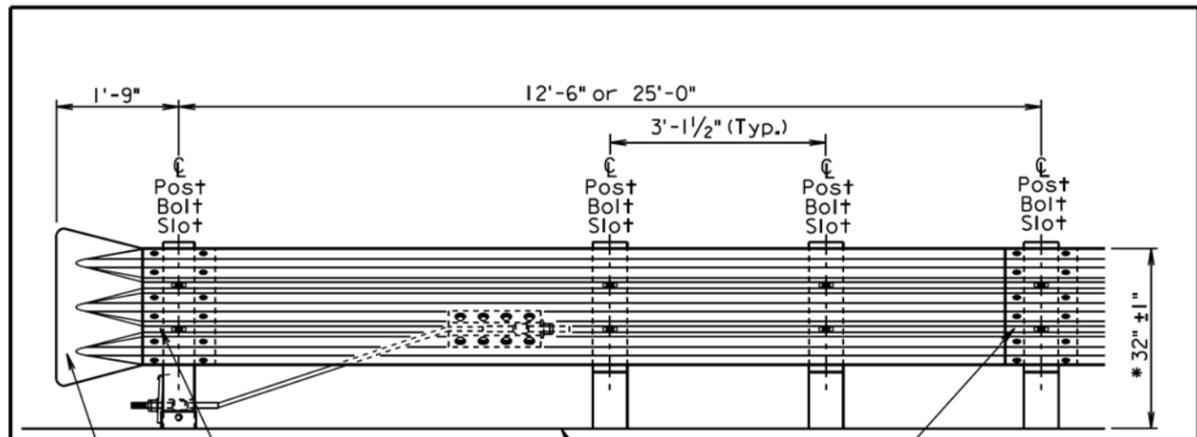
June 26, 2015

<b>S D D O T</b>	<b>THRIE BEAM GUARDRAIL POST INSTALLATION</b>	PLATE NUMBER 630.01
		Sheet 1 of 1

Published Date: 3rd Qtr. 2015

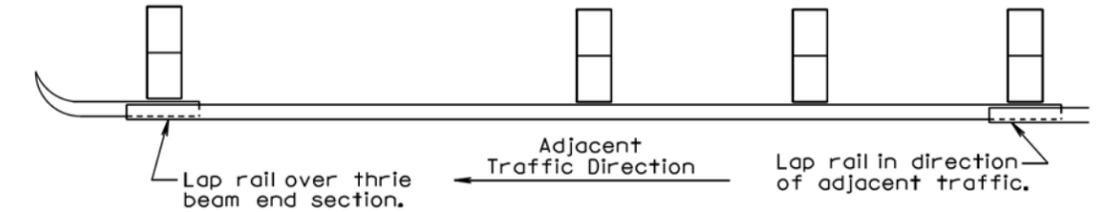
- Plotted From - trc11610

File - ...IRC GuardrailStdPlatePg6.dgn



**ELEVATION**

\* See Standard Plate 630.98 and the height shall be 31" when double (nested) thrie beam guardrail is attached to a concrete bridge rail.



**PLAN**

THRIE BEAM GUARDRAIL DEFLECTION CRITERIA	
POST SPACING	MAXIMUM DEFLECTION
6'-3"	2'-6"
3'-1/2"	1'-9"

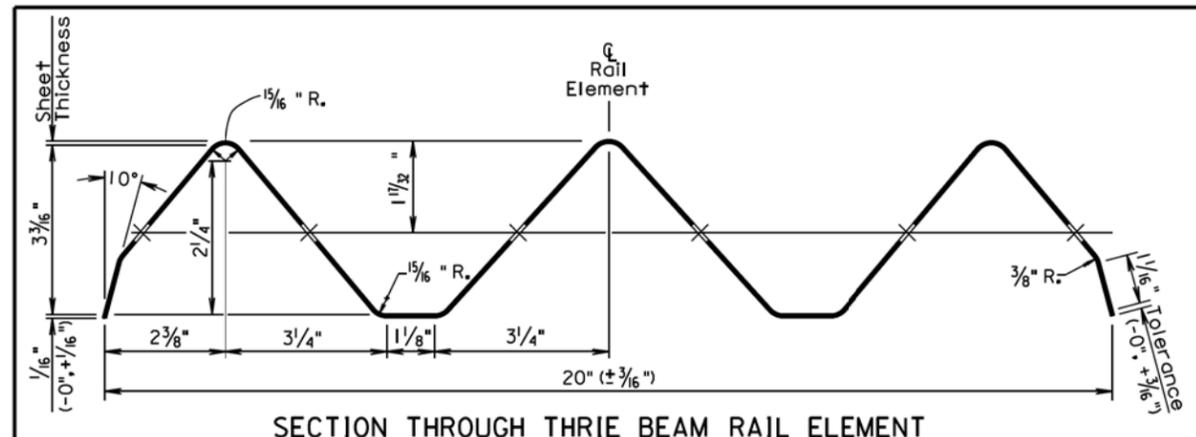
For Informational Purposes Only

**GENERAL NOTES:**

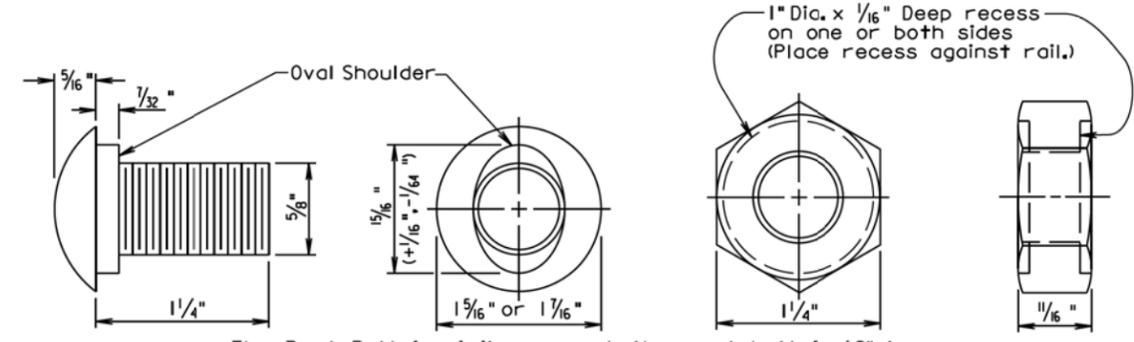
- All thrie beam rail shall be Type 1.
- There will be no separate payment for furnishing and installing Thrie Beam End Sections (Flared) and Thrie Beam Terminal Connectors. All costs for the Thrie Beam End Sections (Flared) and Thrie Beam Terminal Connectors shall be incidental to the contract unit price per foot for the respective "Thrie Beam Guardrail" bid item.
- Thrie 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.
- Thrie Beam End Sections (Flared) shall only be used in a one-way traffic situation. See Standard Plate 630.80 for Thrie Beam End Section (Flared) in the Beam Guardrail Trailing End Terminal.
- All costs for constructing thrie beam guardrail 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 the respective "Thrie Beam Guardrail" bid item.

June 26, 2015

<b>S D D O T</b>	<b>THRIE BEAM GUARDRAIL INSTALLATION</b>	PLATE NUMBER <b>630.02</b>
	Published Date: 3rd Qtr. 2015	Sheet 1 of 1

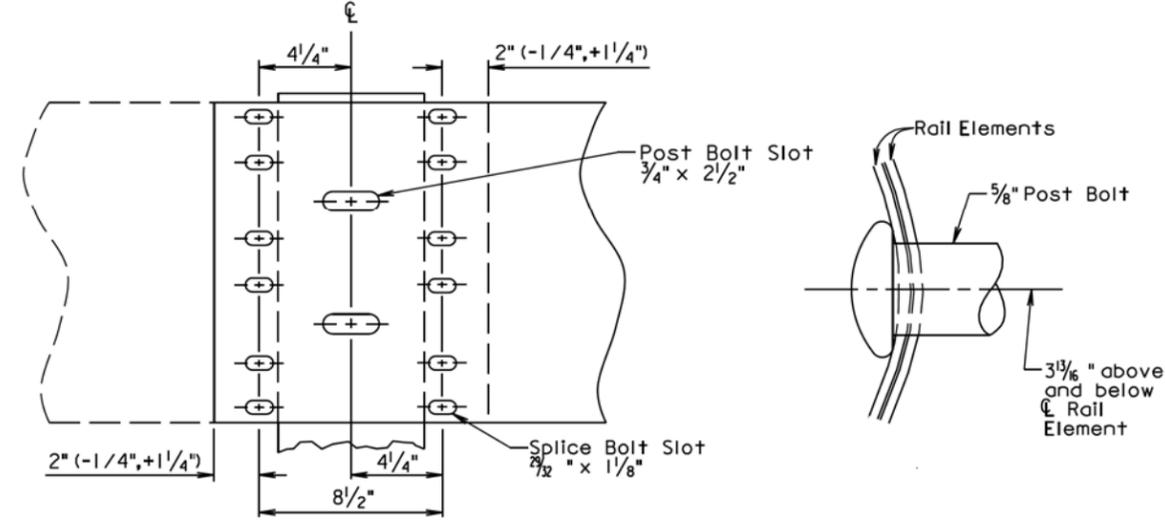


**SECTION THROUGH THRIE BEAM RAIL ELEMENT**



The Post Bolt is similar except the post bolt is 18" long.

**SPLICE BOLT (5/8" BUTTON HEAD BOLT AND RECESS NUT)**



Lap in direction of traffic.

**RAIL SPLICE**

March 31, 2000

<b>S D D O T</b>	<b>THRIE BEAM RAIL, RAIL SPLICE, AND HARDWARE</b>	PLATE NUMBER <b>630.03</b>
	Published Date: 3rd Qtr. 2015	Sheet 1 of 1

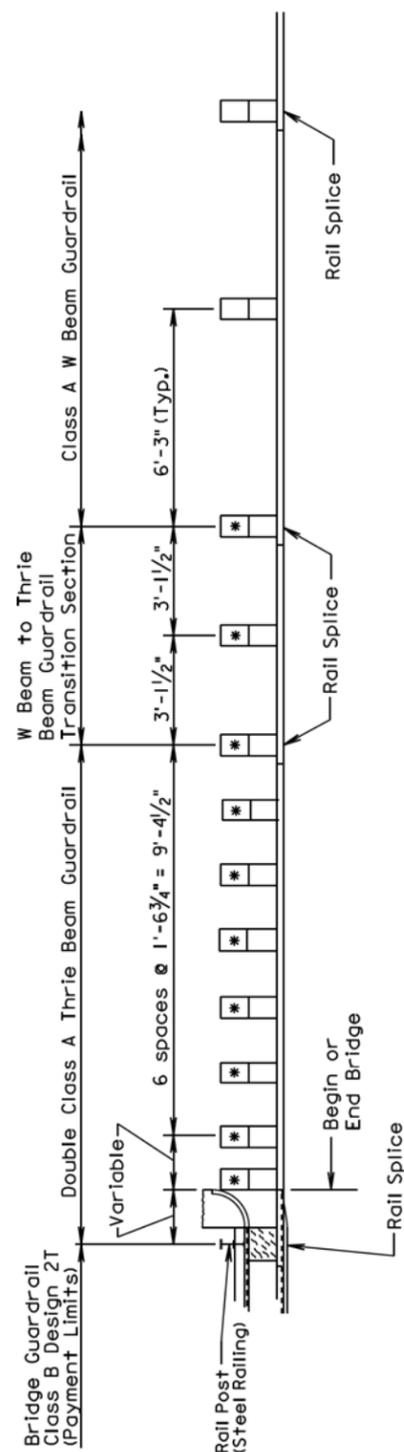
Plot Scale - 1:200

- Plotted From - ttrc11610

File - ...IRC GuardrailStdPlatePg7.dgn

Plot Scale - 1:200

Plotted From - trcc11610



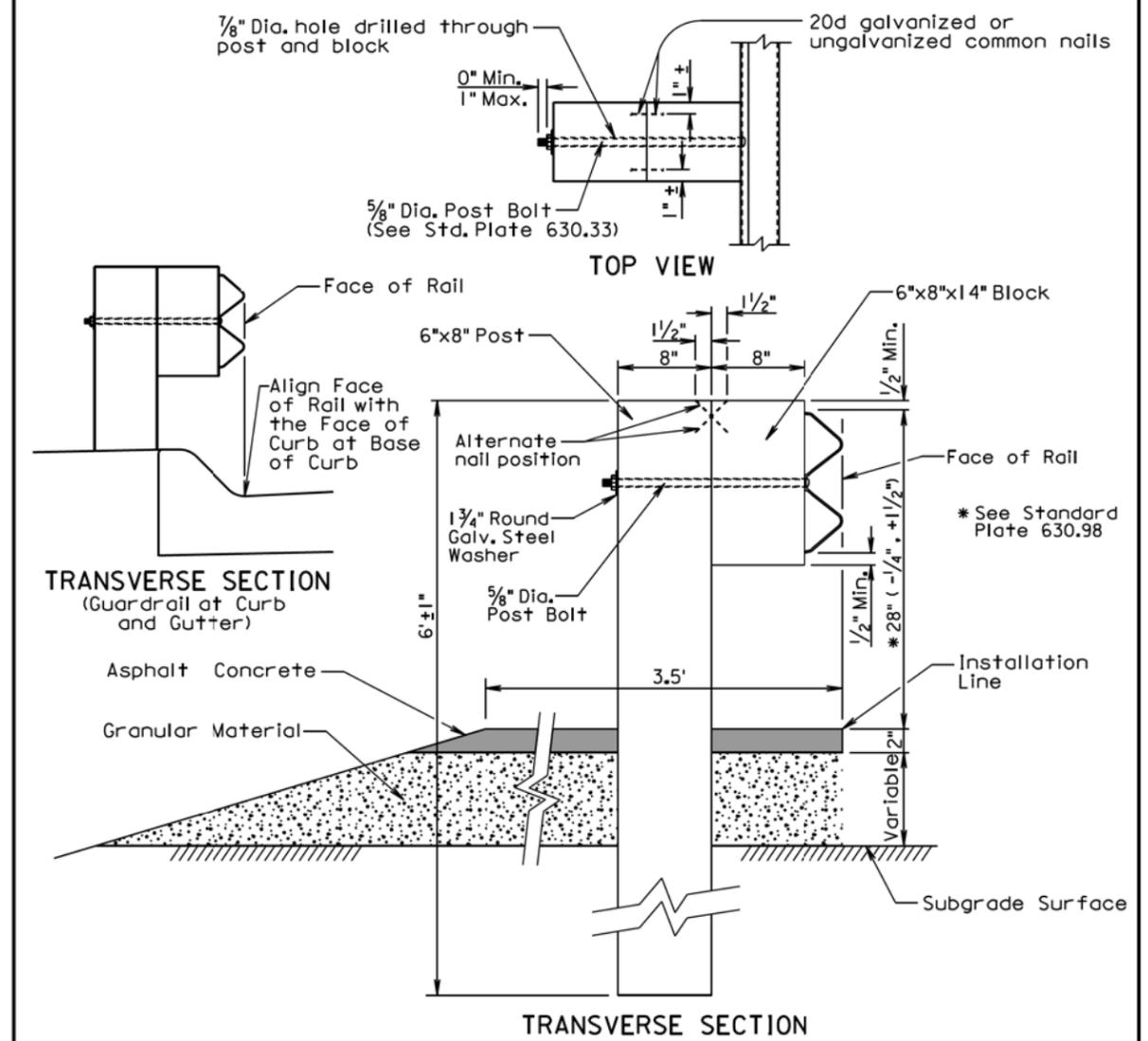
\* 6" x 8" x 7" posts shall be used at these locations.

**POST SPACING ARRANGEMENT FOR THRIE BEAM GUARDRAIL AT BRIDGE END**

December 23, 2002

<b>S D D O T</b>	<b>POST SPACING ARRANGEMENT FOR THRIE BEAM GUARDRAIL AT BRIDGE END (BRIDGE GUARDRAIL DESIGN 2T)</b>	PLATE NUMBER <b>630.21</b>
		Sheet 1 of 1

Published Date: 3rd Qtr. 2015



**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 cross slope for the surfacing and subgrade surface shall be as specified in the plans (See Typical Sections and/or Cross Sections).

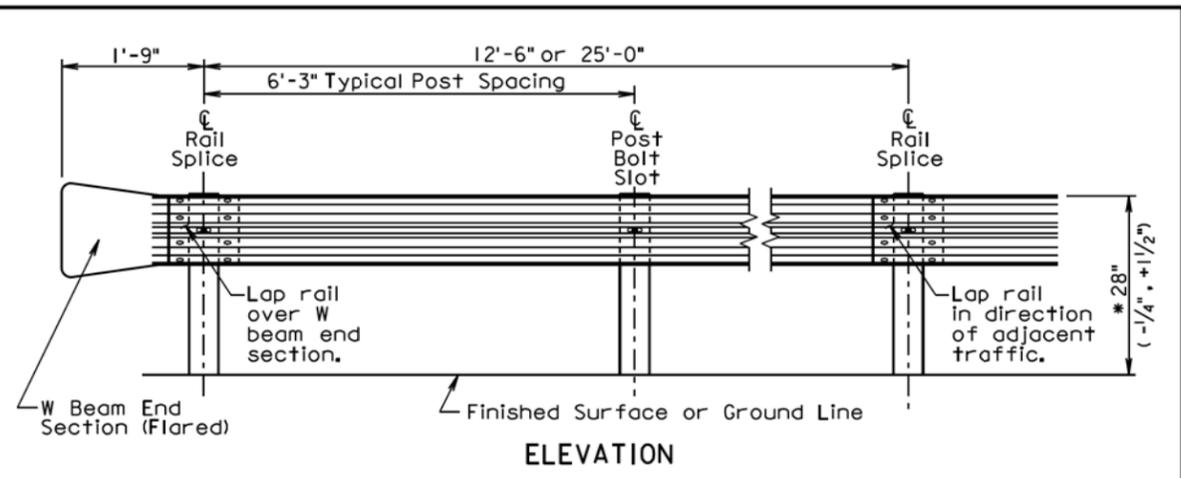
The top of post and top of block shall have a true square cut. The top of block shall be ±1 inch from the top of the post.

June 26, 2015

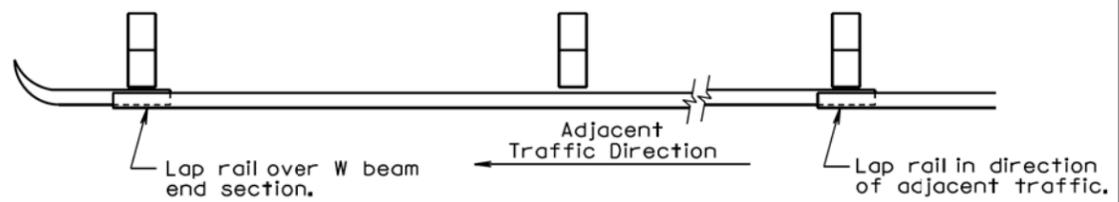
<b>S D D O T</b>	<b>W BEAM GUARDRAIL POST INSTALLATION</b>	PLATE NUMBER <b>630.31</b>
		Sheet 1 of 1

Published Date: 3rd Qtr. 2015

File - ...IRC GuardrailStdPlatePg8.dgn



ELEVATION



PLAN

W BEAM GUARDRAIL DEFLECTION CRITERIA	
POST SPACING	MAXIMUM DEFLECTION
6'-3"	5'-0"
3'-1 1/2"	3'-9"

For Informational Purposes Only

**GENERAL NOTES:**

All W beam rail shall be Type I.

There will be no separate payment for furnishing and installing W Beam End Sections (Flared) and W Beam Terminal Connectors. All costs for the W Beam End Sections (Flared) and W Beam Terminal Connectors shall be incidental to the contract unit price per foot for the respective "W Beam Guardrail" bid item.

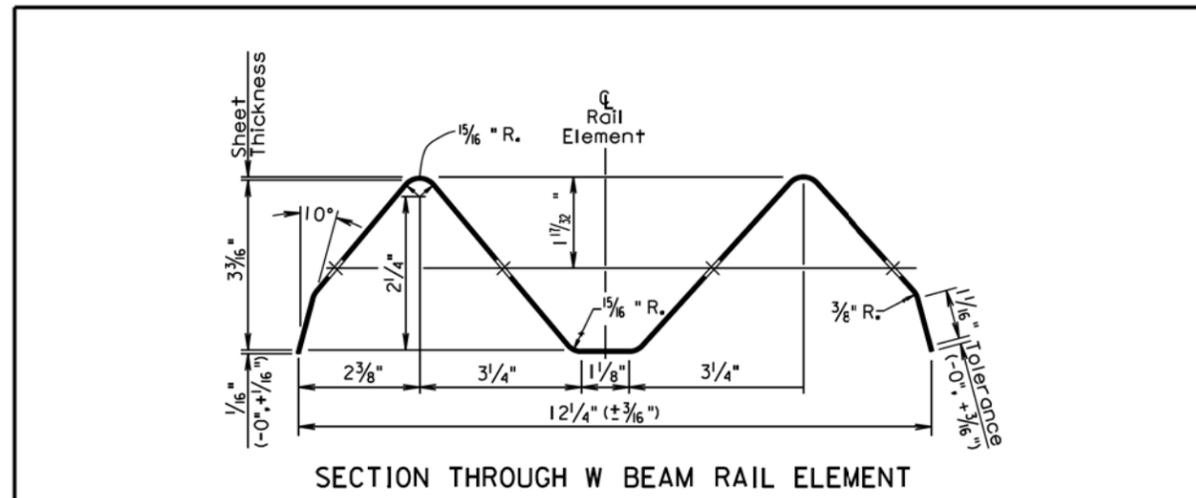
W beam rail section lengths may be 12'-6" and/or 25'-0". The combination of section lengths used shall be compatible with the total length of rail per site as shown in the plans.

W Beam End Sections (Flared) shall only be used in a one way traffic situation. See Standard Plate 630.80 for W Beam End Section (Flared) in the Beam Guardrail Trailing End Terminal.

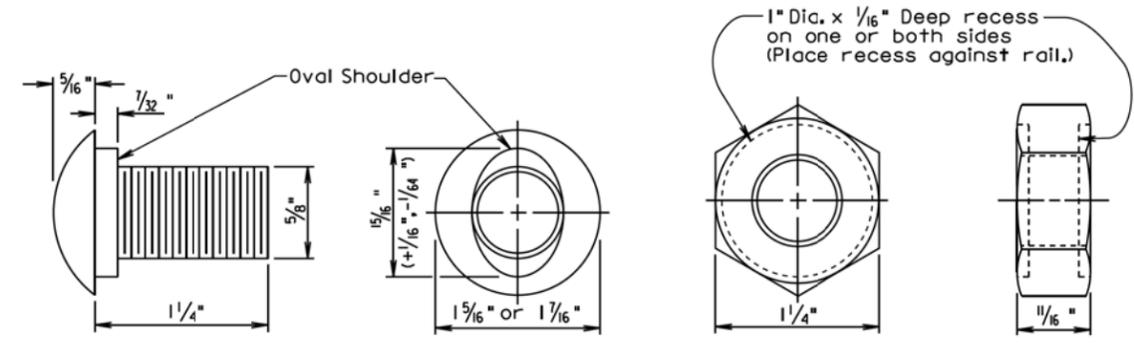
All costs for constructing W beam guardrail including labor, equipment, and materials including all posts, blocks, steel beam rail, and hardware shall be incidental to the contract unit price per foot for the respective "W Beam Guardrail" bid item.

June 26, 2015

<b>S D D O T</b>	<b>W BEAM GUARDRAIL INSTALLATION</b>	PLATE NUMBER <b>630.32</b>
	Published Date: 3rd Qtr. 2015	Sheet 1 of 1

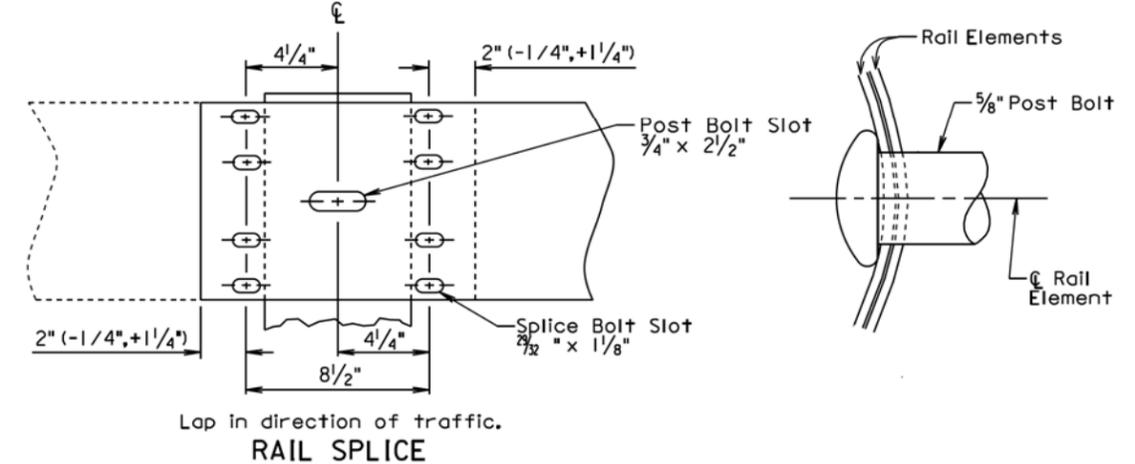


SECTION THROUGH W BEAM RAIL ELEMENT



The Post Bolt is similar except the post bolt is 18" long.

SPLICE BOLT  
(5/8" BUTTON HEAD BOLT AND RECESS NUT)



RAIL SPLICE

December 23, 2004

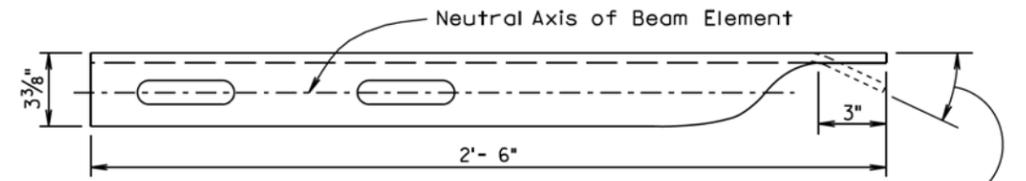
<b>S D D O T</b>	<b>W BEAM RAIL, RAIL SPLICE, AND HARDWARE</b>	PLATE NUMBER <b>630.33</b>
	Published Date: 3rd Qtr. 2015	Sheet 1 of 1

Plot Scale - 1:200

- Plotted From - tnc11610

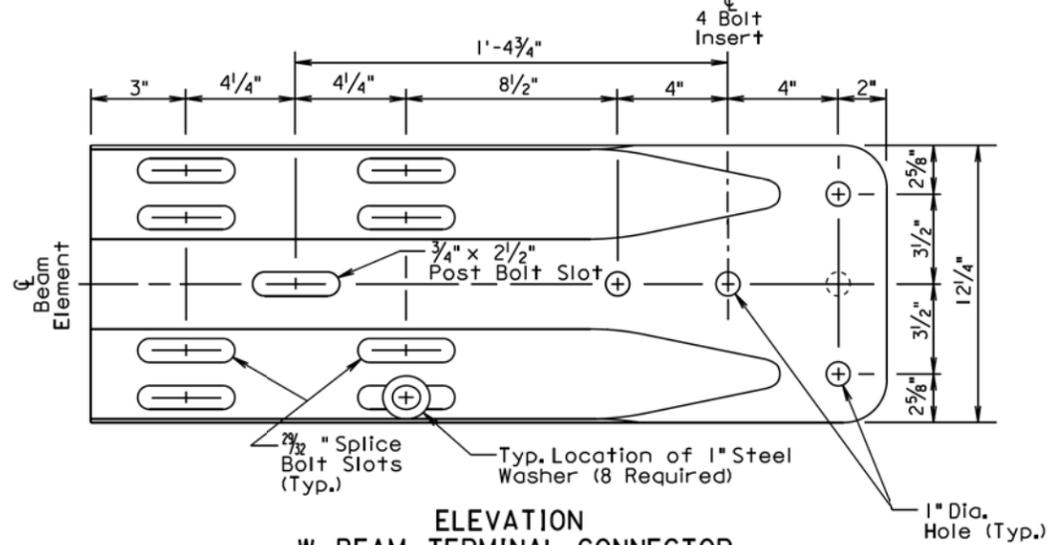
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Plot Scale - 1:200

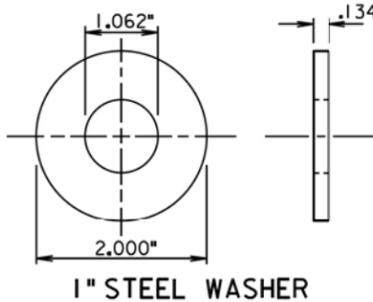


An extra hole and an approximate 26° bend shall be required only for the Breakaway Cable Terminal. The Modified W Beam Terminal Connector placement detail is shown on Standard Plate 630.47.

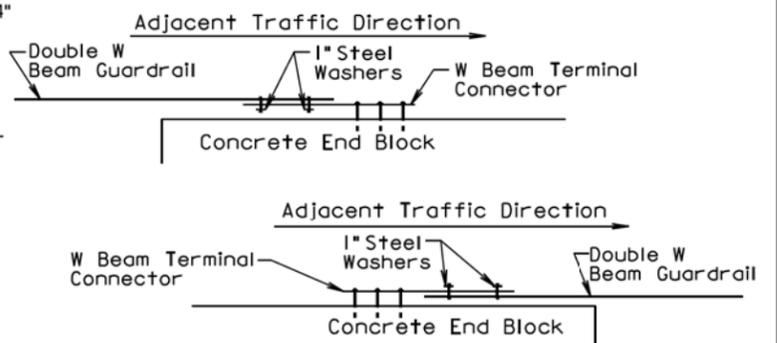
**TOP VIEW**



**ELEVATION  
W BEAM TERMINAL CONNECTOR**



**1" STEEL WASHER**

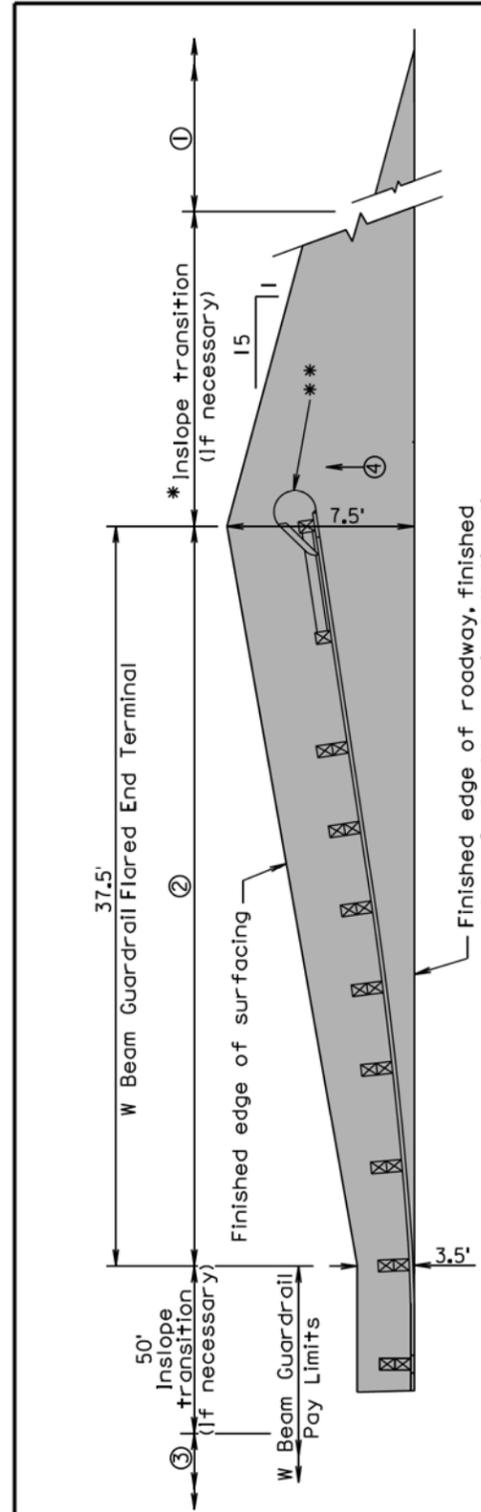


**GENERAL NOTES:**

W Beam Terminal Connectors shall be 10 gauge.  
 When the W beam terminal connector is used to connect the rail to the bridge, 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 the W Beam Terminal Connector shall be incidental to the contract unit price per foot for the respective "W Beam Guardrail" bid item.

September 14, 2001

<b>S D D O T</b>	<b>W BEAM TERMINAL CONNECTOR AND 1" STEEL WASHER</b>	PLATE NUMBER <b>630.35</b>
	Published Date: 3rd Qtr. 2015	Sheet 1 of 1



\* 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'.

- PLAN**
- ① 2" Asphalt concrete surfacing with variable thickness granular material
  - ② Same inslope as mainline inslope
  - ③ 4:1 inslope
  - ④ 2:1 inslope or flatter, or inslope as specified in plans
  - ⑤ Same slope as roadway cross slope

**GENERAL NOTES:**

The W beam guardrail flared end terminal shall be installed according to the manufacturer's installation instructions.  
 \*\* An adhesive object marker shall be placed on the end section buffer or extruder after placement of the end section buffer or extruder. The adhesive object marker dimensions may be 16" x 16" or other variation due to the shape of the end section buffer or extruder. A minimum of 256 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.  
 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.

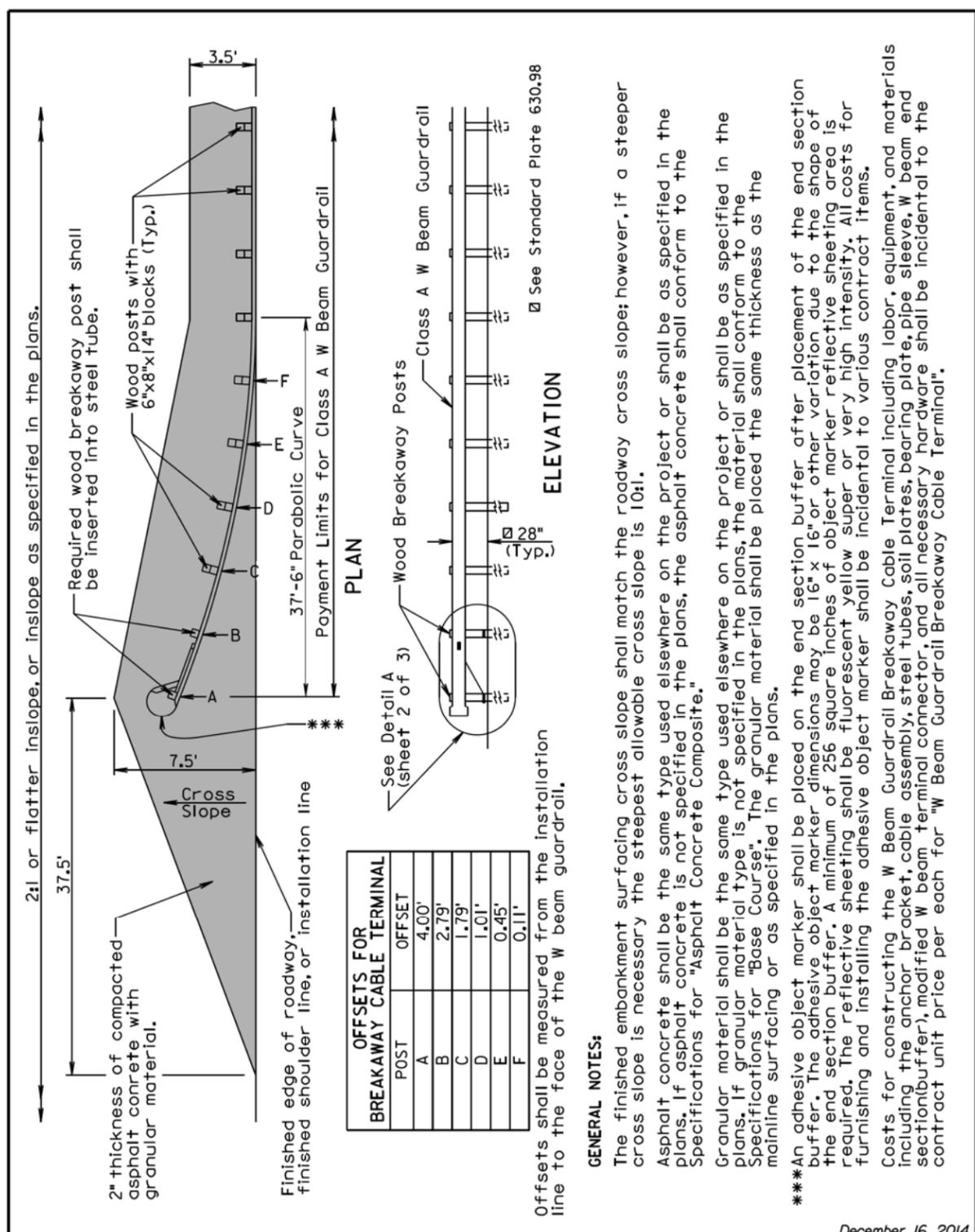
December 16, 2014

<b>S D D O T</b>	<b>EMBANKMENT AND SURFACING FOR W BEAM GUARDRAIL FLARED END TERMINAL</b>	PLATE NUMBER <b>630.45</b>
	Published Date: 3rd Qtr. 2015	Sheet 1 of 1

- Plotted From - ttrc11610

File - ...IRC GuardrailStdPlatePg10.dgn

Plot Scale - 1:200



See Standard Plate 630.98

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

**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.

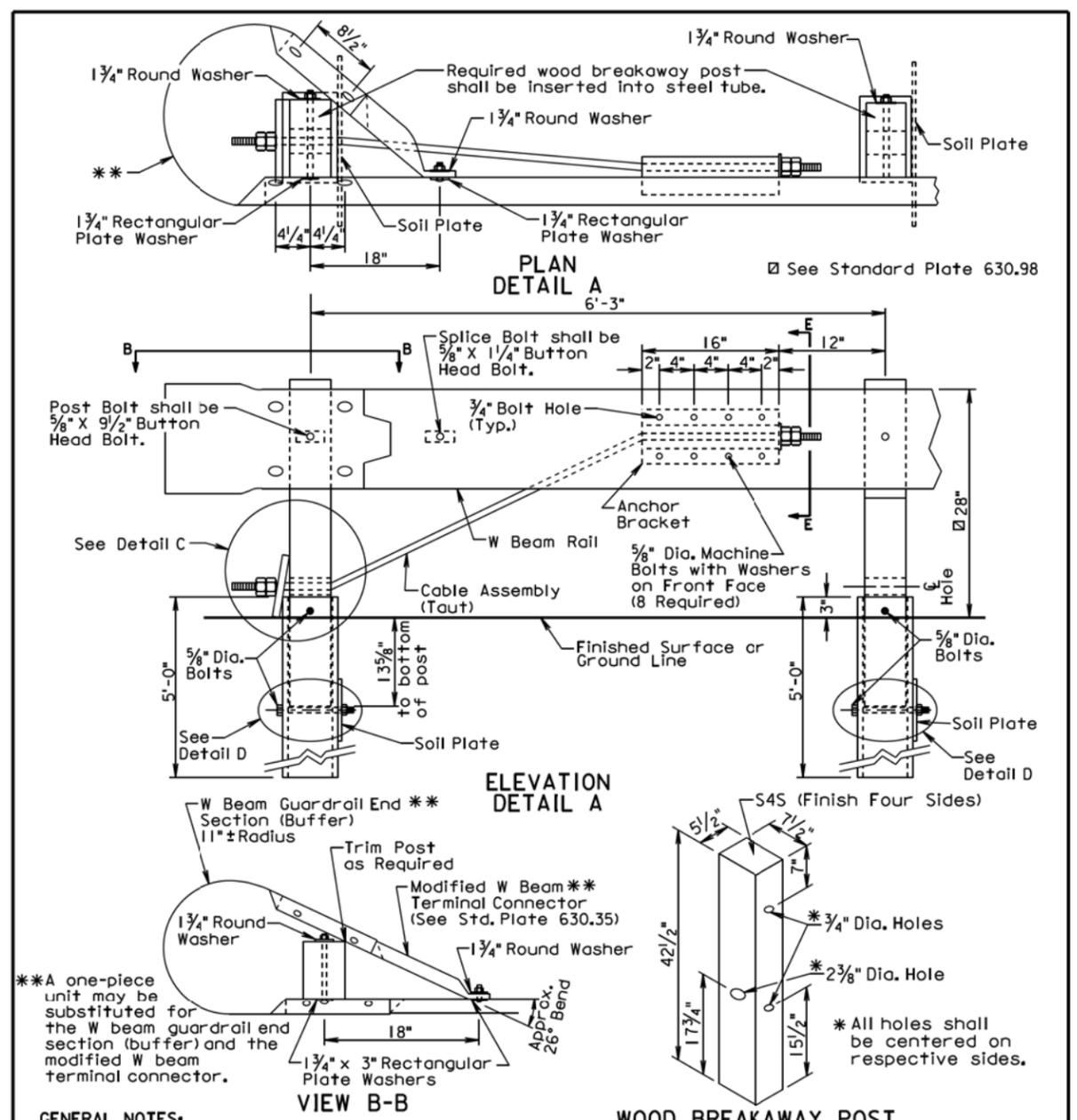
\*\*An adhesive object marker shall be placed on the end section buffer after placement of the end section buffer. The adhesive object marker dimensions may be 16" x 16" or other variation due to the shape of the end section buffer. A minimum of 256 square inches of object marker reflective sheeting 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, 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".

December 16, 2014

<b>S D D O T</b>	<b>W BEAM GUARDRAIL BREAKAWAY CABLE TERMINAL</b>	PLATE NUMBER <b>630.47</b>
		Sheet 1 of 3

Published Date: 3rd Qtr. 2015



\*\*A one-piece unit may be substituted for the W beam guardrail end section (buffer) and the modified W beam terminal connector.

**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.

December 16, 2014

<b>S D D O T</b>	<b>W BEAM GUARDRAIL BREAKAWAY CABLE TERMINAL</b>	PLATE NUMBER <b>630.47</b>
		Sheet 2 of 3

Published Date: 3rd Qtr. 2015

File - ...IRC GuardrailStdPlatePg11.dgn



**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.

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

Provide W Beam Guardrail Special Anchor Assembly (as shown), or Begin W Beam Guardrail with Wood Posts, or Begin Guardrail as Specified in Plans

Farm Entrance, Field Entrance, Driveway, Service Road, or Intersecting Road

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)**

5/8" Dia. x 9/2" Long Button Head Bolt  
3/4" Dia. Hole  
1 3/4" Round Galv. Steel Washer  
Recess Nut  
Slope shall be 15:1 or flatter (Typ.)  
3/2" Dia. holes centered in side of post  
6"x8"x6'-0" Wood Post modified as shown and shall be preservative treated after drilling.

**SECTION A-A (CRT POST)**

6"x8"x14" Block  
1 3/4" Round Galv. Steel Washer  
Recess Nut  
5/8" Dia. x 18" Long Button Head Bolt  
6"x8"x6'-0" Post  
1/2" Min.  
2" Min.  
See Standard Plate 630.98  
Steepest In-slope allowed is 2:1 (Typ.)

**SECTION B-B (W BEAM GUARDRAIL POST)**

June 26, 2015

**SDDOT**

**CURVED W BEAM GUARDRAIL TERMINAL**

PLATE NUMBER 630.70

Sheet 1 of 4

Published Date: 3rd Qtr. 2015

**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.

3/4" Dia. X 9'-0" Cable with One Swaged End

Modified W Beam Terminal Connector (See Std. Plate 630.35)

5/8" X 1 1/4" Button Head Bolt (Splice Bolt) with Rectangular Plate Washer on Front Face and 1 3/4" Round Washer under Nut

5/8" X 2" Button Head Bolt with No Washer (See 1st para. of general notes)

30" Diameter 12 Gage Terminal Section (adjust to fit)

2 1/2" x 2 1/2" x 1/4" x 8" Structural Tube Weld prior to galvanizing

1" Dia. Nut

1" Dia x 4" stud threaded full length to steel tube plate

**DETAIL A**

**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.

5/8" x 1 1/2" Hex Bolt and Nut with Washers on Front Face (8 Required)

See Detail B

Wood Breakaway Post (See Detail C (Sheet 3 of 4))

Bearing Plate

5/8" x 10" Hex Bolt with 2 Washers and 1 Nut

5/8" x 8" Hex Bolt with 2 Washers and 1 Nut

Steel Tube (Typ.)

18"

6'-3"

12"

16"

4"

4"

2"

2"

1/4"

1/4"

1/4"

5'-0" (Typ.)

3/4" Cable Clamps (6 Required)

Anchor Bracket

W Beam Rail

Ground Line

5/8" x 10" Hex Bolt with 2 Washers and 1 Nut

5/8" x 8" Hex Bolt with 2 Washers and 1 Nut

See Detail D (Sheet 3 of 4)

Soil Plate (Typ.)

Wood Breakaway Post

6'-3" to next post

**DETAIL B**  
(Guardrail and Terminal Section not shown)

3/8" x 4"x12" Steel Plate

1/4"

3/4" Dia. hole

10" O.D. Schedule 40 Galvanized Pipe

**DETAIL C**  
(Guardrail and Terminal Section not shown)

**DETAIL D**  
(Guardrail and Terminal Section not shown)

**PLAN (W BEAM GUARDRAIL SPECIAL ANCHOR ASSEMBLY)**

**ELEVATION (W BEAM GUARDRAIL SPECIAL ANCHOR ASSEMBLY)**

June 26, 2015

**SDDOT**

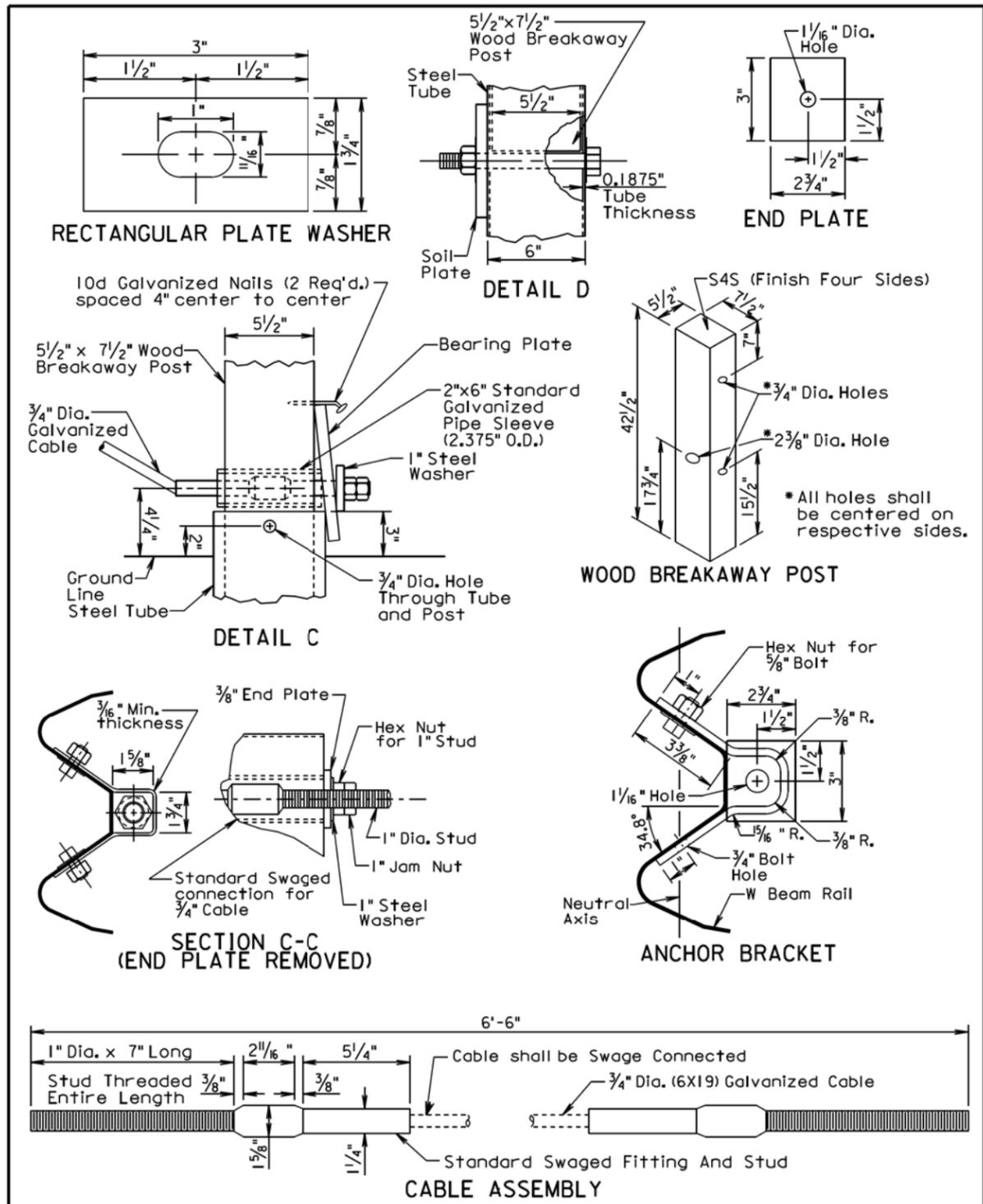
**CURVED W BEAM GUARDRAIL TERMINAL**

PLATE NUMBER 630.70

Sheet 2 of 4

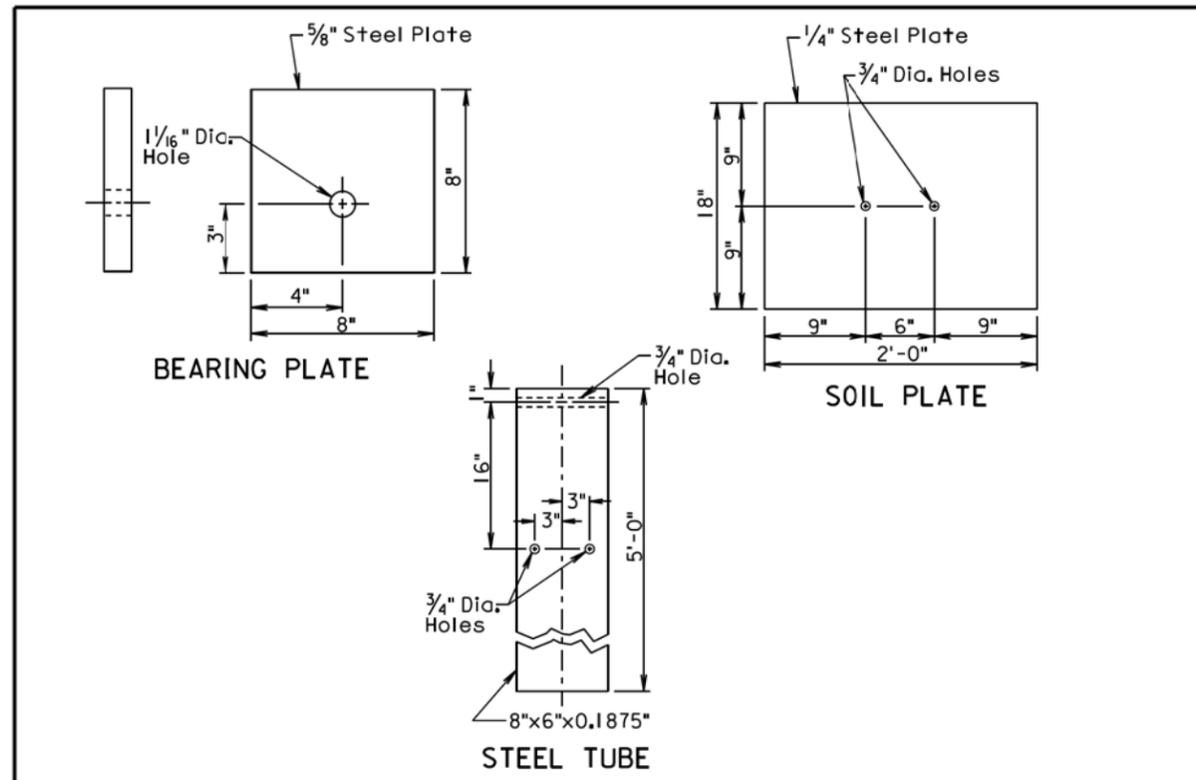
Published Date: 3rd Qtr. 2015

Plot Scale - 1:200



June 26, 2015

<b>S D D O T</b>	<b>CURVED W BEAM GUARDRAIL TERMINAL</b>	PLATE NUMBER <b>630.70</b>
	Published Date: 3rd Qtr. 2015	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 portion of the curved W beam guardrail terminal 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 portion of the curved W beam guardrail terminal 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".

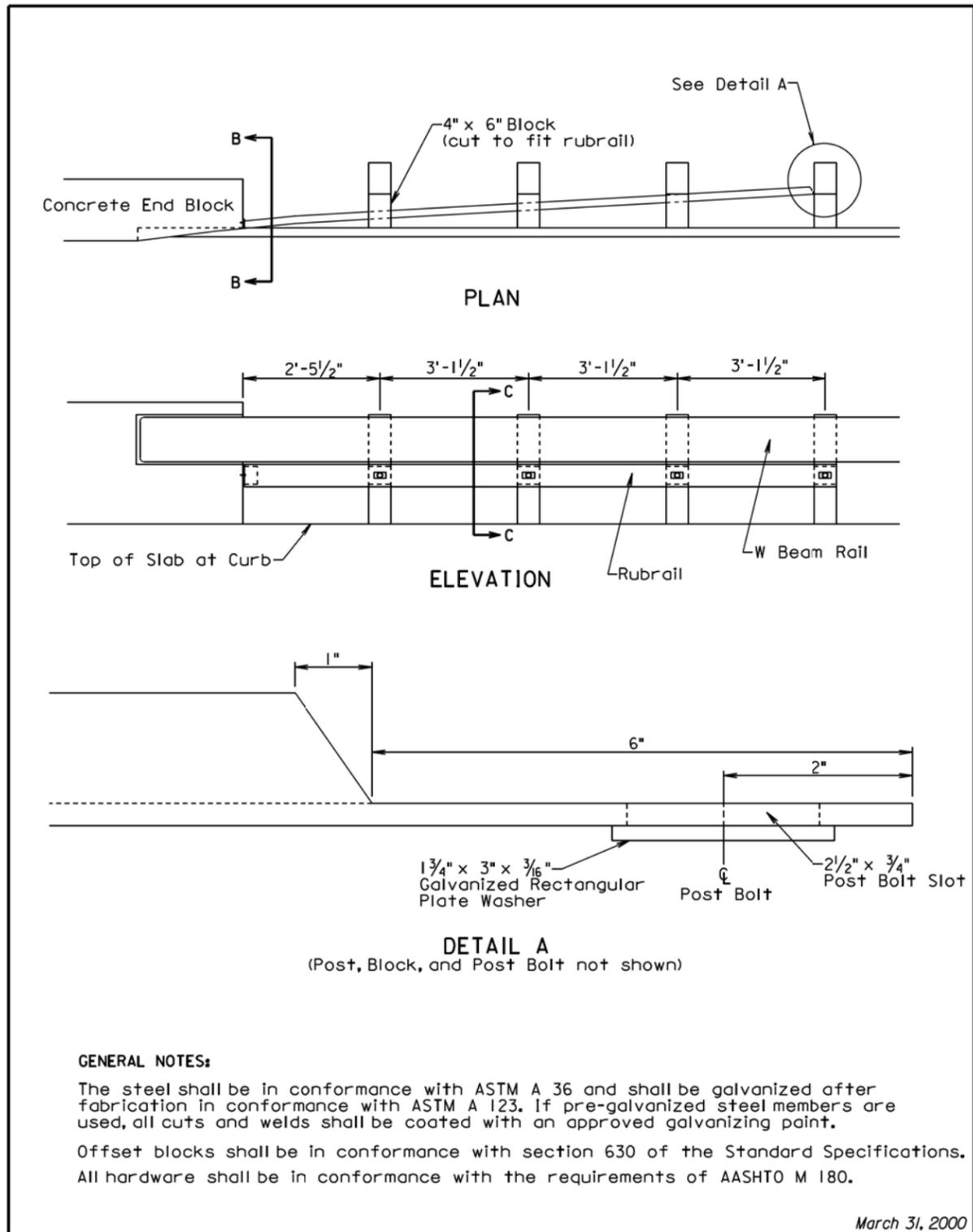
June 26, 2015

<b>S D D O T</b>	<b>CURVED W BEAM GUARDRAIL TERMINAL</b>	PLATE NUMBER <b>630.70</b>
	Published Date: 3rd Qtr. 2015	Sheet 4 of 4

- Plotted From - ttrc11610

File - ...IRC GuardrailStdPlatePg14.dgn

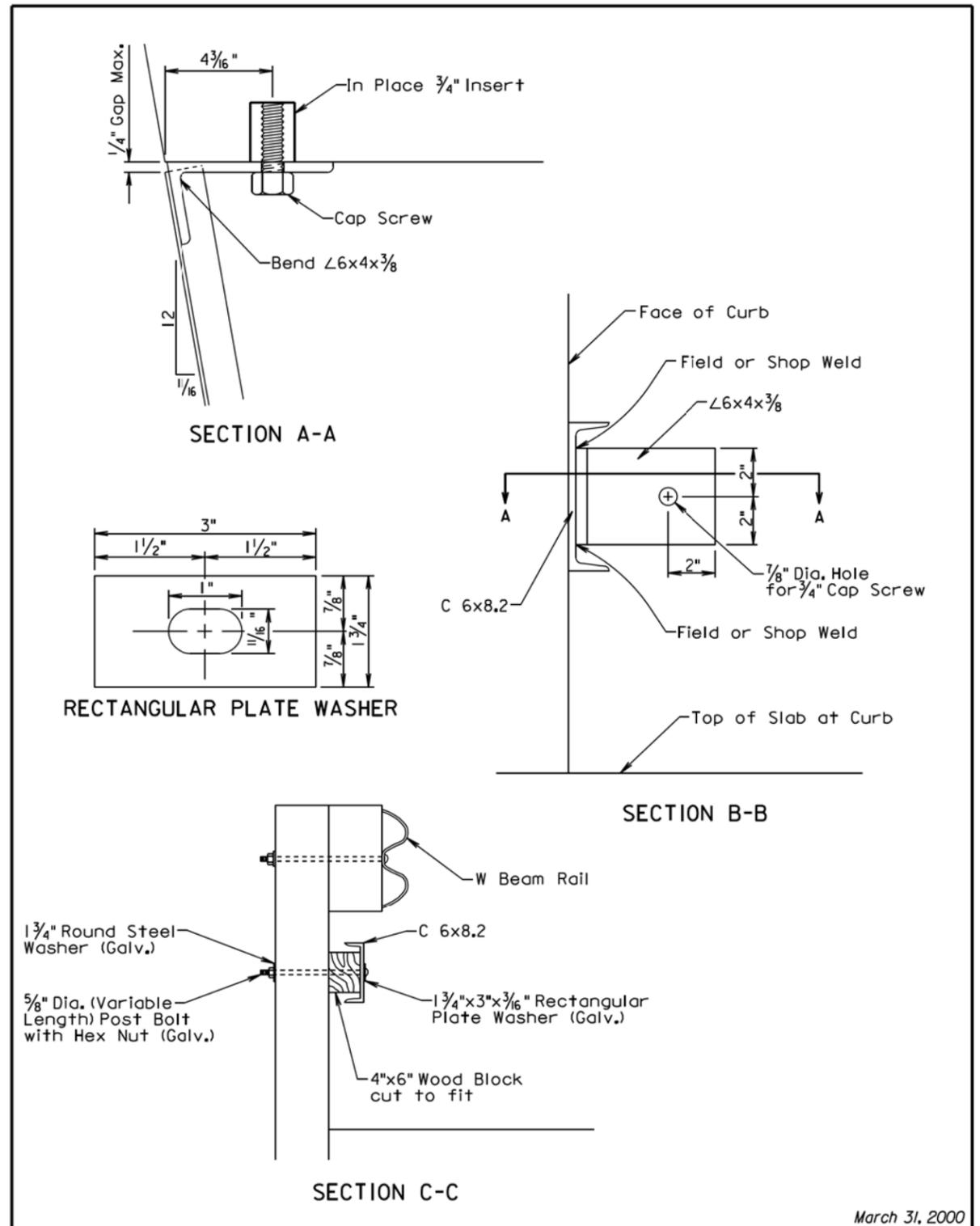
1:200  
- Plotted From -  
...IRC GuardrailStdPlatePg15.dgn



March 31, 2000

<b>S D D O T</b>	<b>RUBRAIL AT BRIDGE END (CAST IN INSERT)</b>	PLATE NUMBER 630.75
		Sheet 1 of 2

Published Date: 3rd Qtr. 2015

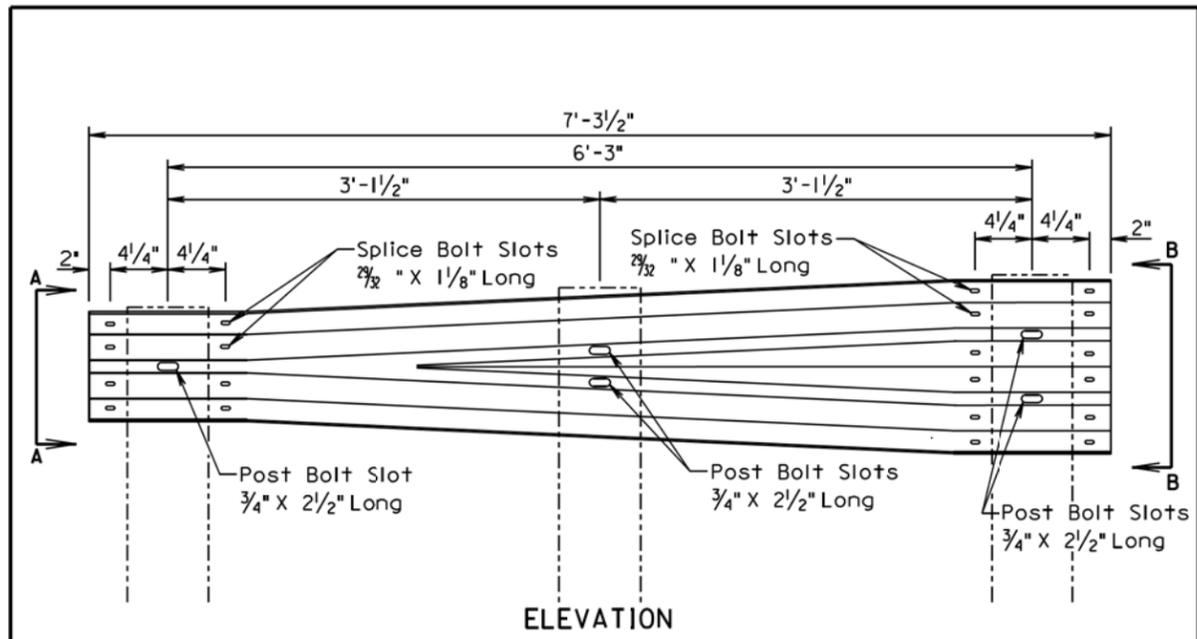


March 31, 2000

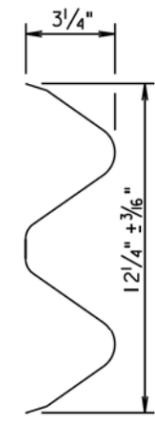
<b>S D D O T</b>	<b>RUBRAIL AT BRIDGE END (CAST IN INSERT)</b>	PLATE NUMBER 630.75
		Sheet 2 of 2

Published Date: 3rd Qtr. 2015

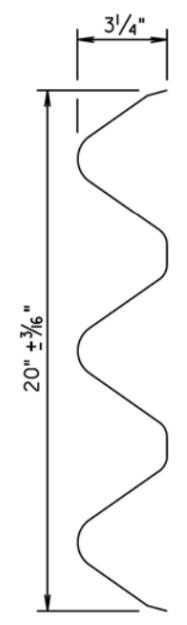
Plotting Date: 09/16/2015



ELEVATION



VIEW A-A



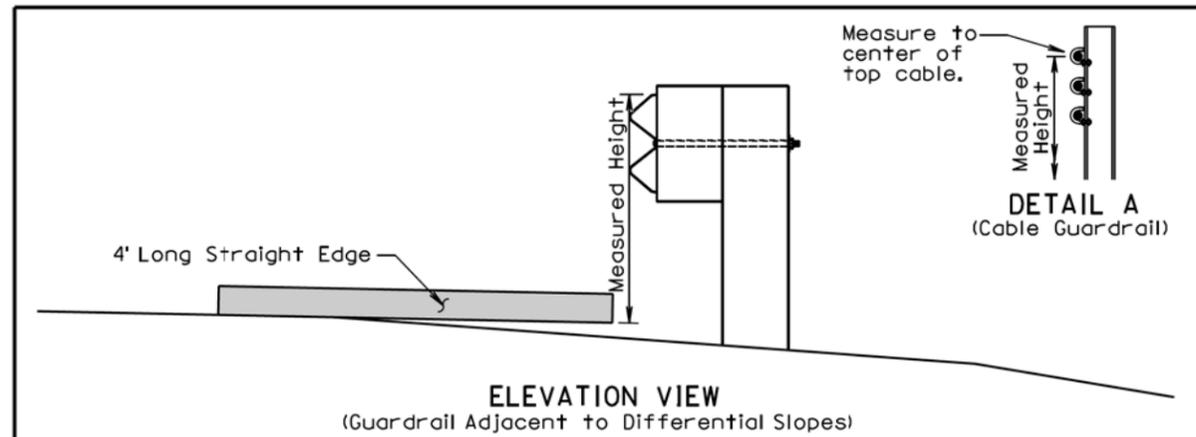
VIEW B-B

**GENERAL NOTE:**

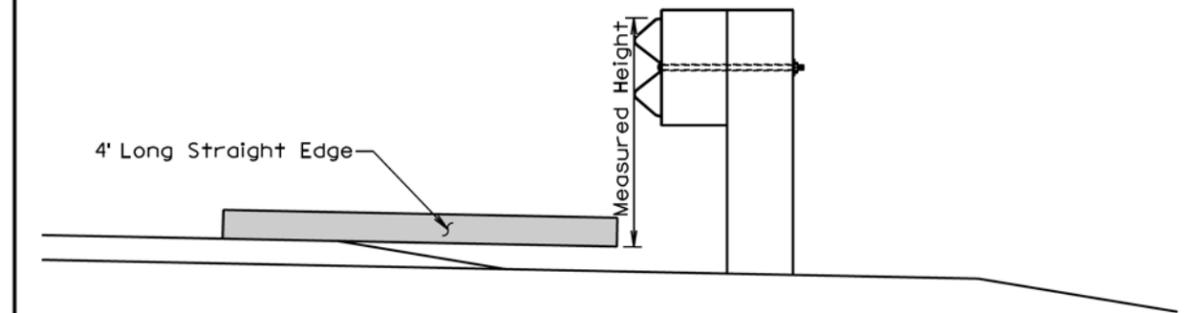
All costs for constructing the W Beam to Thrie Beam Guardrail Transition including labor, equipment, and materials including two posts, two blocks, W beam to thrie beam transition section, and hardware shall be incidental to the contract unit price per each for "W Beam to Thrie Beam Guardrail Transition".

March 31, 2000

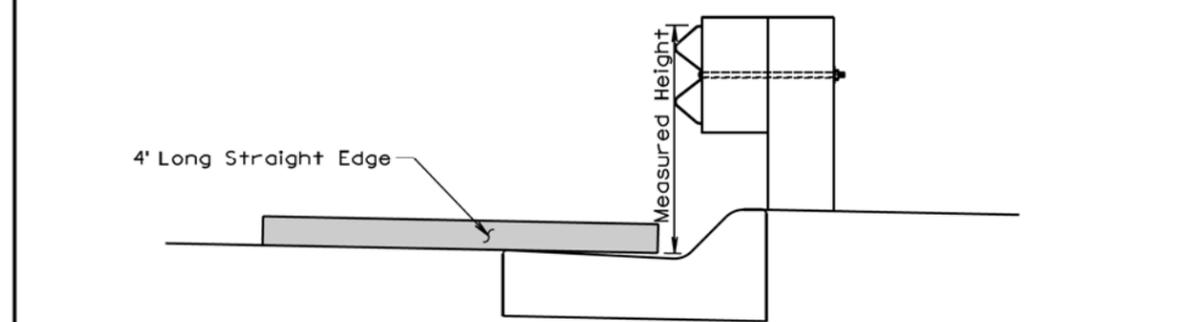
<b>S D D O T</b>	<b>W BEAM TO THRIE BEAM GUARDRAIL TRANSITION SECTION</b>	PLATE NUMBER <b>630.82</b>
	Published Date: 3rd Qtr. 2015	Sheet 1 of 1



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.

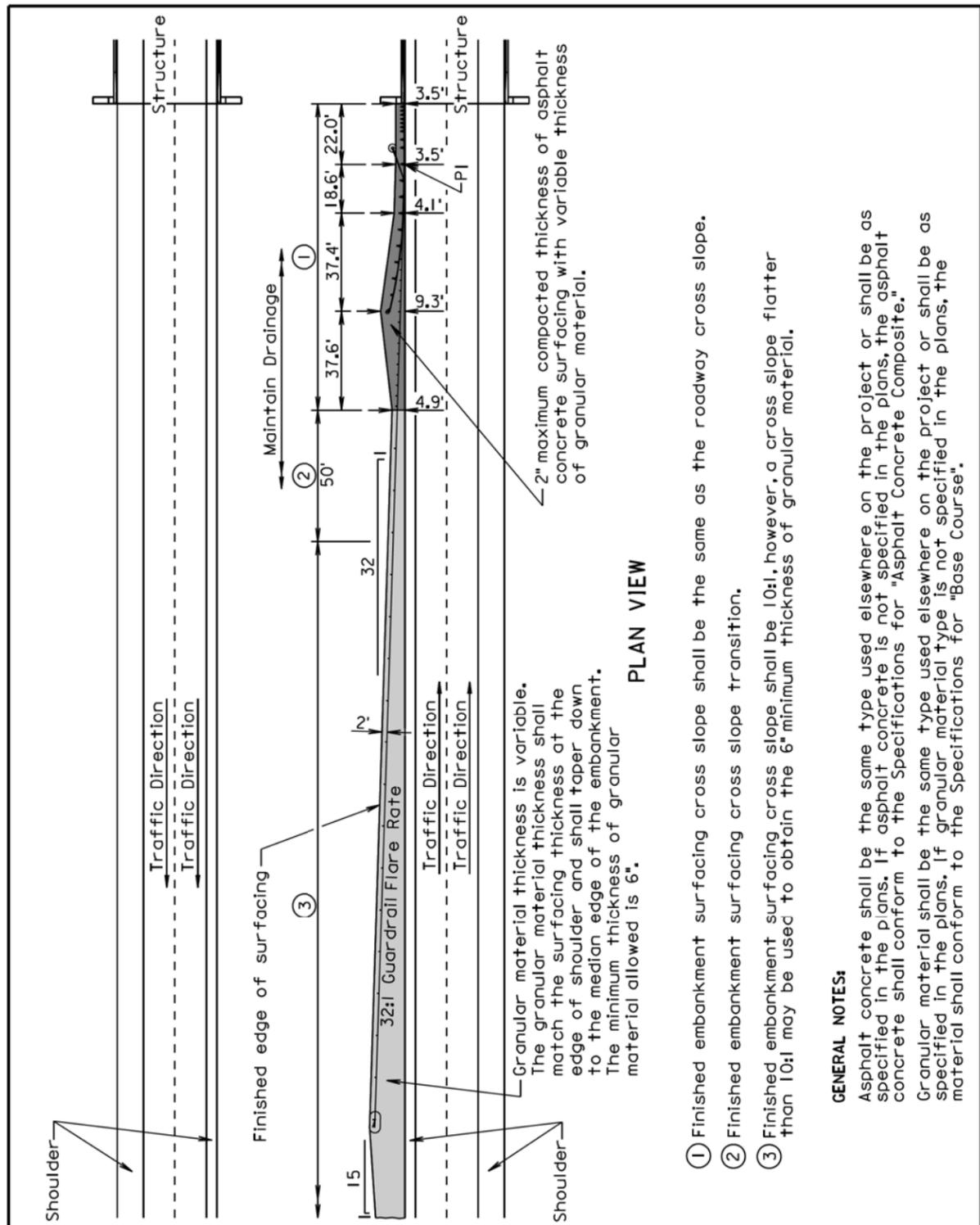
June 26, 2010

<b>S D D O T</b>	<b>MEASURING GUARDRAIL HEIGHT</b>	PLATE NUMBER <b>630.98</b>
	Published Date: 3rd Qtr. 2015	Sheet 1 of 1

Plot Scale - 1:200

- Plotted From - trc11610

File - ...IRC GuardrailStdPlatePg16.dgn



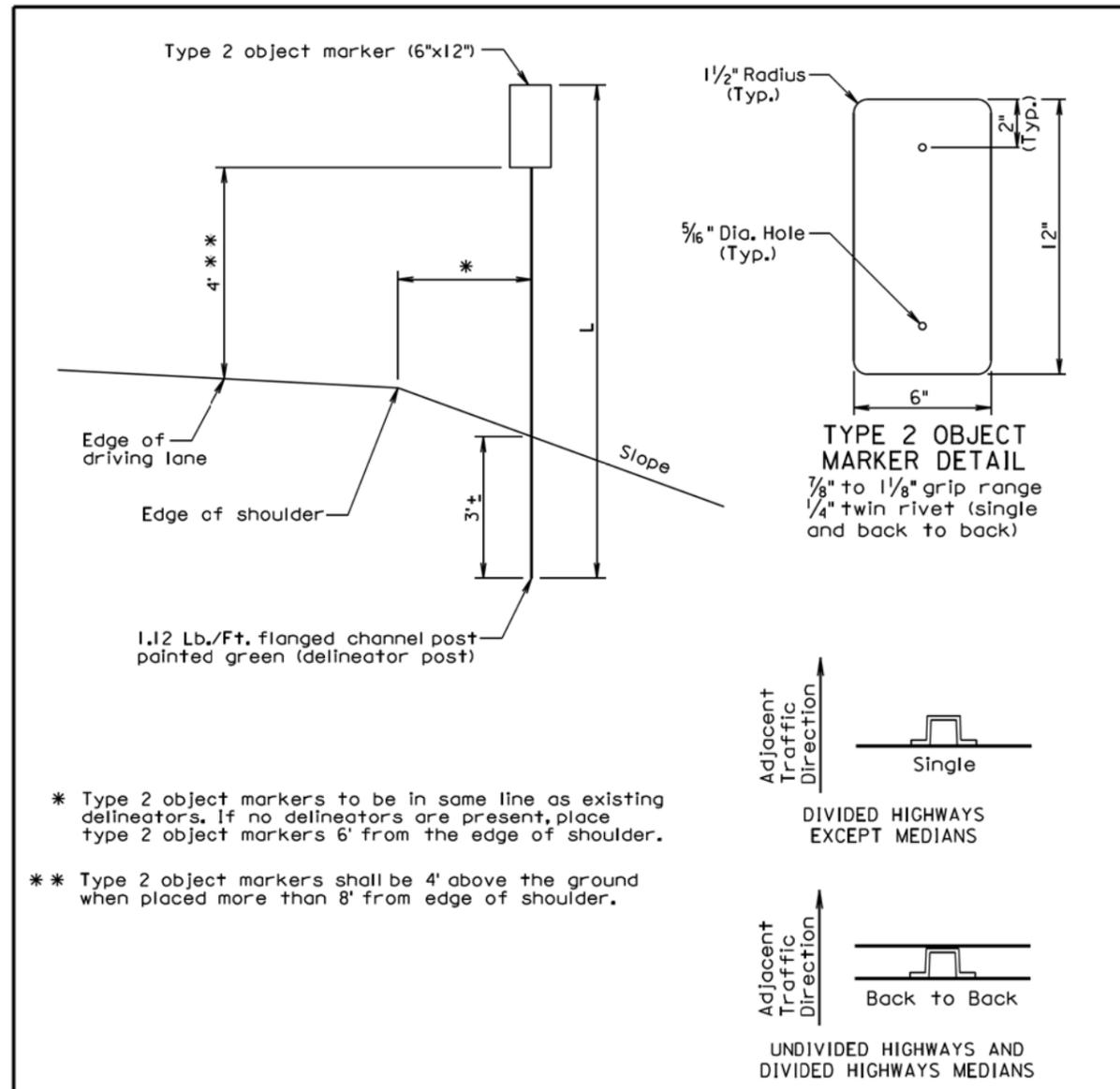
- ① Finished embankment surfacing cross slope shall be the same as the roadway cross slope.
- ② Finished embankment surfacing cross slope transition.
- ③ Finished embankment surfacing cross slope shall be 10:1, however, a cross slope flatter than 10:1 may be used to obtain the 6" minimum thickness of granular material.

**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."  
 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".

February 10, 2014

<b>S D D O T</b>	<b>EMBAKMENT AND SURFACING FOR TYPICAL MEDIAN PROTECTION</b>	PLATE NUMBER <b>630.99</b>
		Sheet 1 of 1

Published Date: 3rd Qtr. 2015



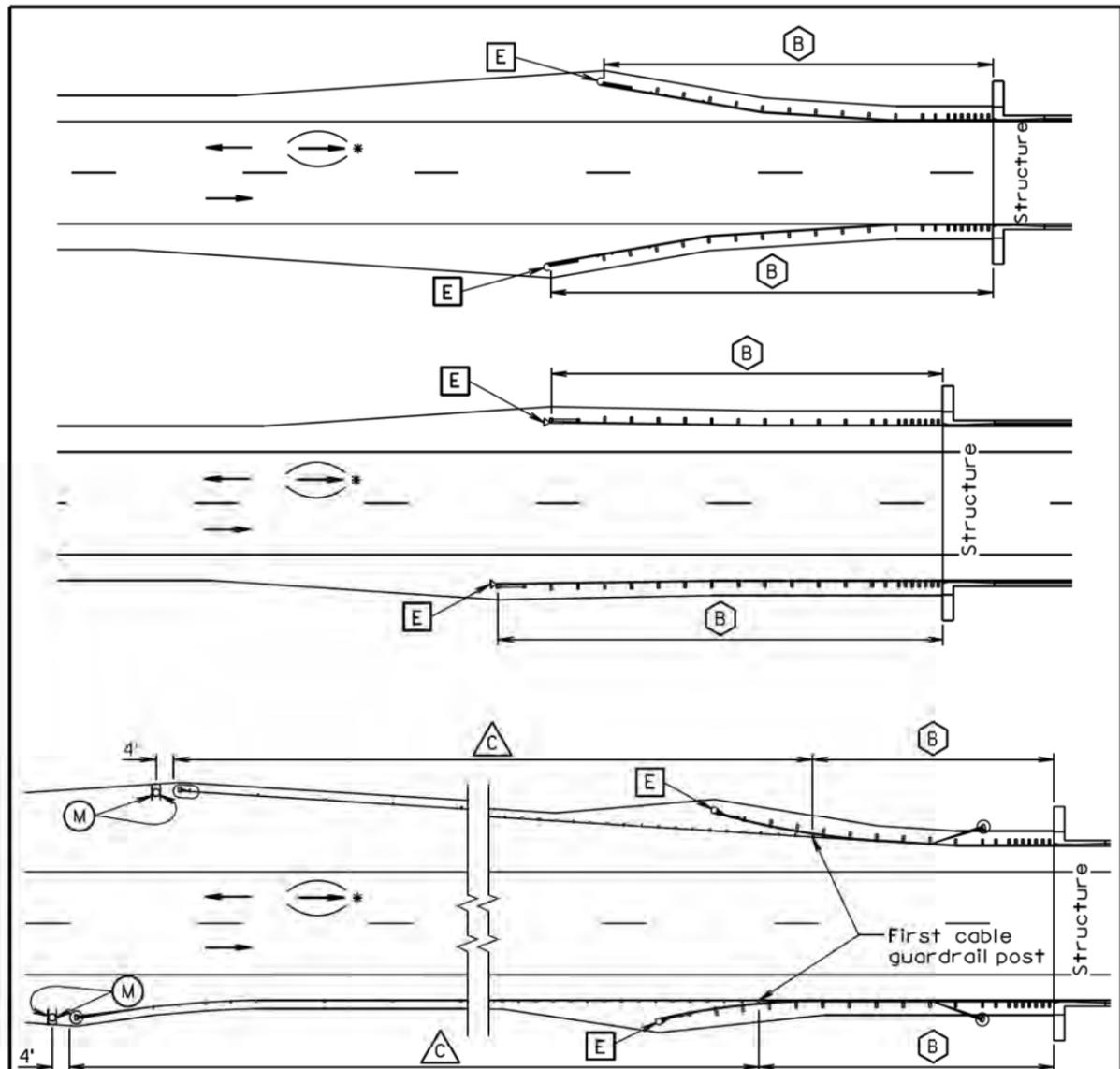
- \* Type 2 object markers to be in same line as existing delineators. If no delineators are present, place type 2 object markers 6' from the edge of shoulder.
- \* \* Type 2 object markers shall be 4' above the ground when placed more than 8' from edge of shoulder.

Slope	Distance To Marker (Ft.) *	Post Length L (Ft.)						
		2	3	4	5	6	7	8
4:1	9	9	9	9	10	10	10	
	3:1	9	9	9	10	10	10	11

June 26, 2006

<b>S D D O T</b>	<b>TYPE 2 OBJECT MARKER (DIRECT DRIVE)</b>	PLATE NUMBER <b>632.01</b>
		Sheet 1 of 1

Published Date: 3rd Qtr. 2015



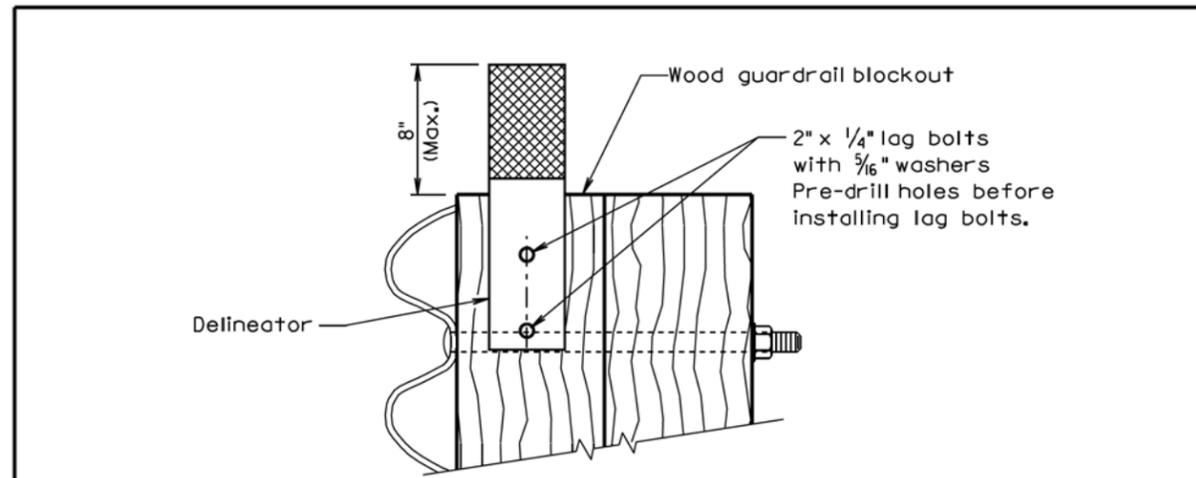
TYPICAL GUARDRAIL LAYOUTS

- B** Steel Beam Guardrail Delineation
- E** Guardrail Terminal End Object Marker
- C** 3 Cable Guardrail Delineation
- M** Type 2 Object Marker

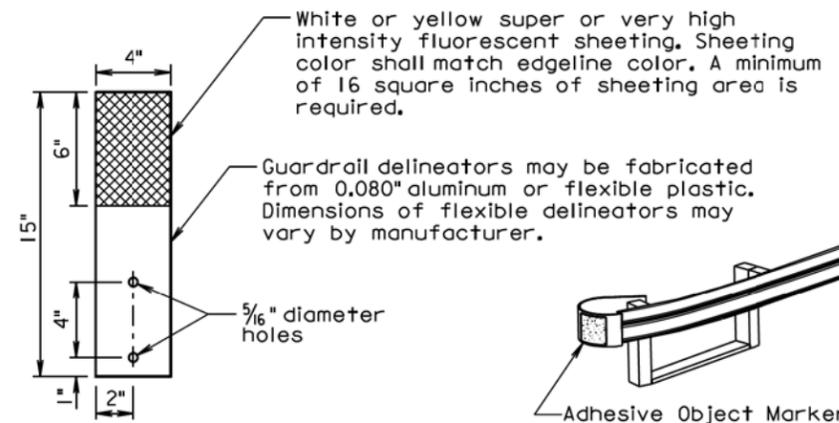
\*For two-way traffic, install delineation at the opposite end of structure the same as shown. Back-to-back delineation is required for two-way traffic, single-sided delineation for one-way traffic.

June 26, 2011

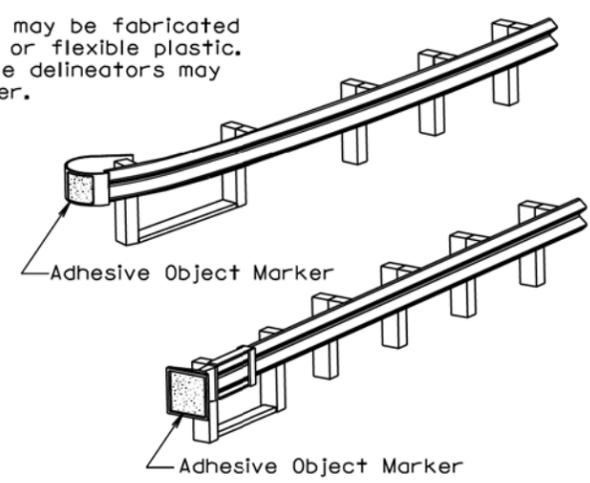
<b>S D D O T</b>	<b>DELINEATION OF GUARDRAIL AT BRIDGES</b>	PLATE NUMBER <b>632.40</b>
	Published Date: 3rd Qtr. 2015	Sheet 1 of 4



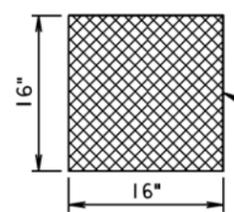
**B** STEEL BEAM GUARDRAIL DELINEATION



**DELINEATOR**  
(For Steel Beam Guardrail)



**E** GUARDRAIL TERMINAL END OBJECT MARKER



**ADHESIVE OBJECT MARKER**

Adhesive object marker dimensions may vary due to shape of terminal end. A minimum of 256 square inches of object marker sheeting area is required. The sheeting shall be fluorescent yellow super or very high intensity.

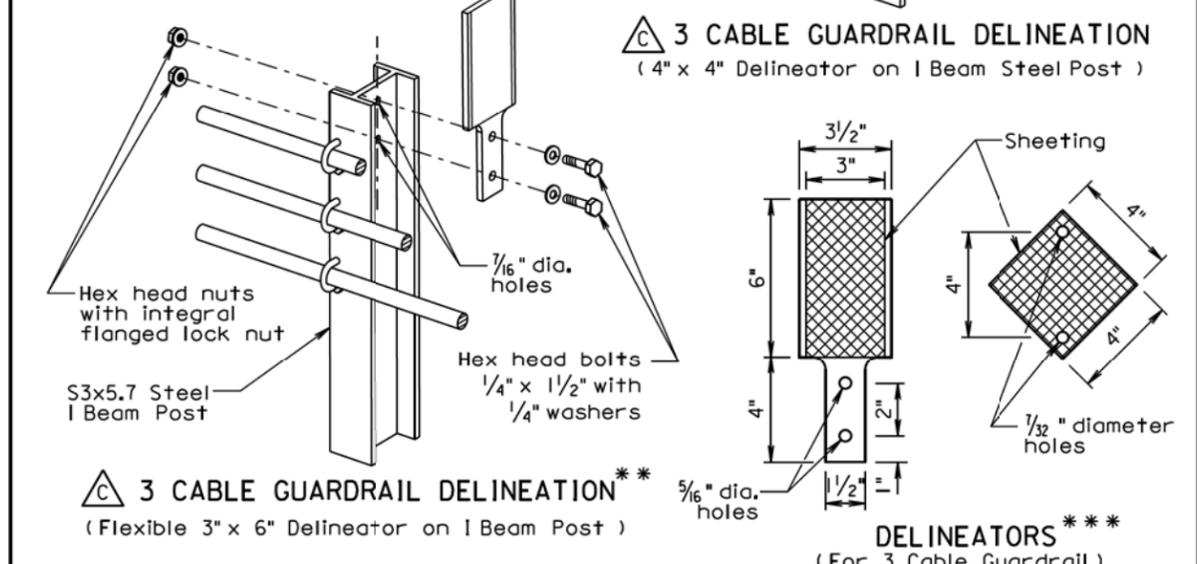
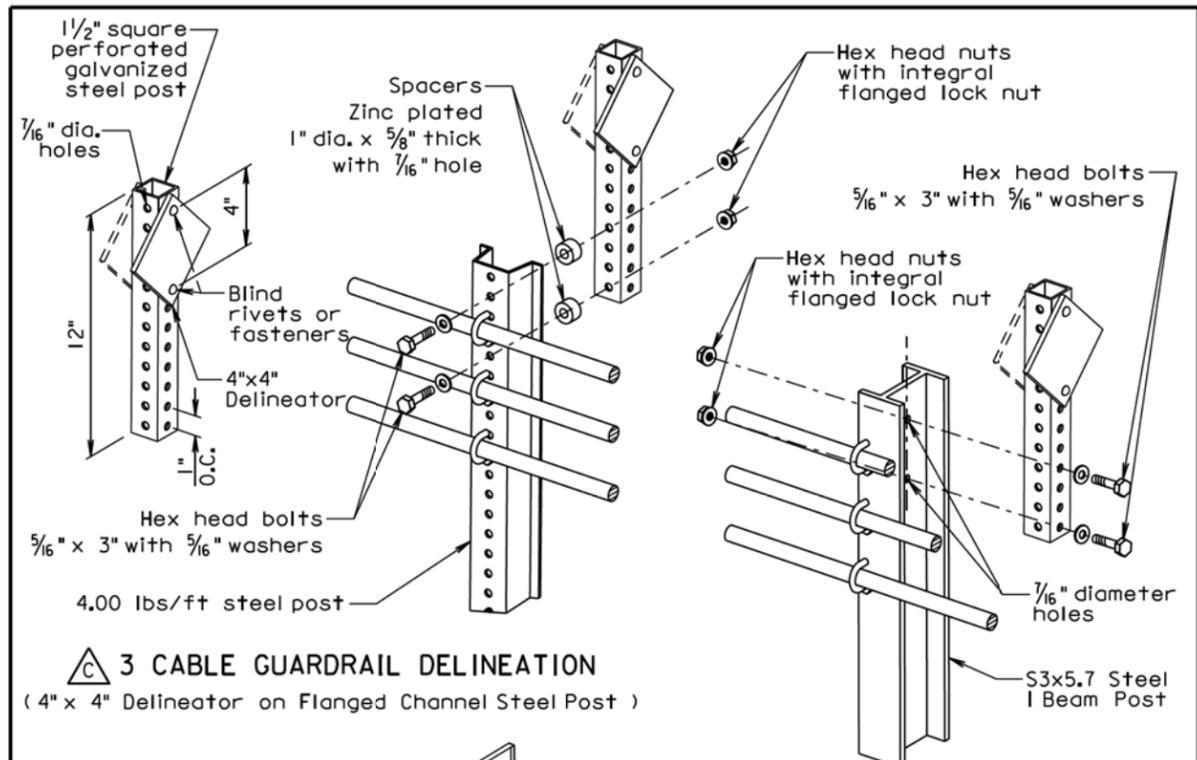
June 26, 2011

<b>S D D O T</b>	<b>DELINEATION OF GUARDRAIL AT BRIDGES</b>	PLATE NUMBER <b>632.40</b>
	Published Date: 3rd Qtr. 2015	Sheet 2 of 4

Plot Scale - 1:200

- Plotted From - trc11610

File - ...IRC GuardrailStdPlatePg18.dgn



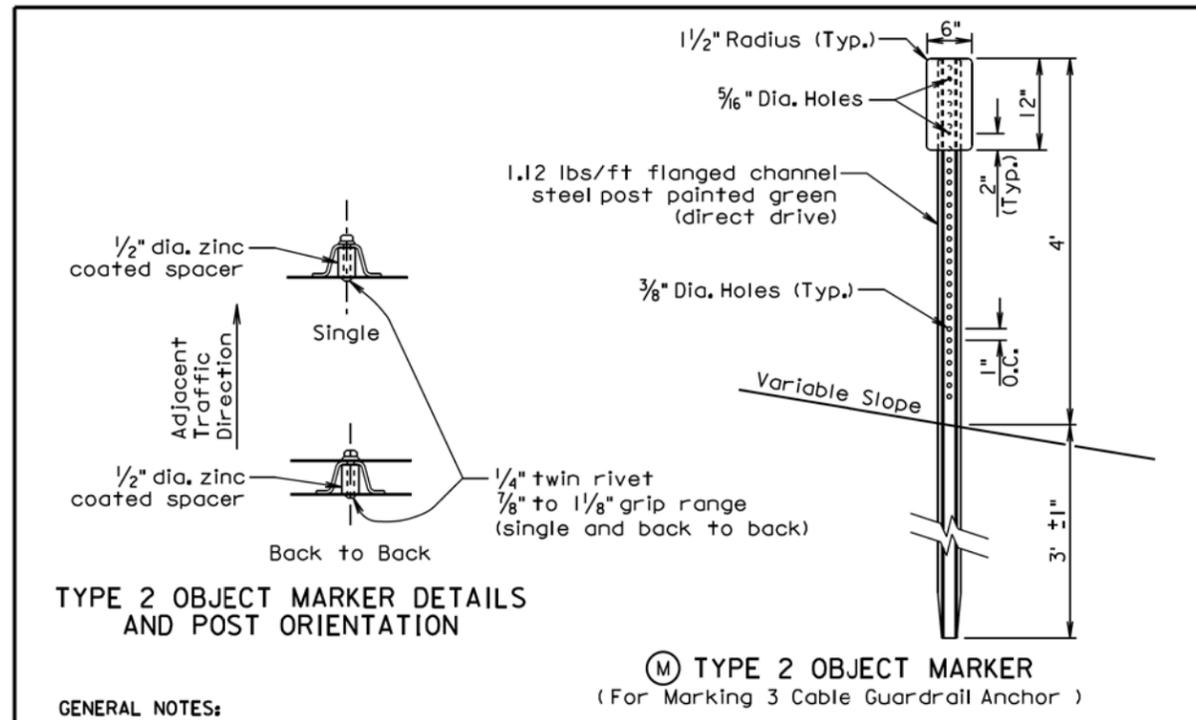
\*\* Flexible delineators may be attached to post with manufacturer approved adhesive instead of bolts.

\*\*\* Dimensions of flexible delineators may vary by manufacturer. A minimum of 16 square inches of sheeting area is required. The sheeting shall be white or yellow super or very high intensity fluorescent sheeting. The sheeting color shall match the edgeline color.

June 26, 2011

<b>S D D O T</b>	<b>DELINEATION OF GUARDRAIL AT BRIDGES</b>	PLATE NUMBER <b>632.40</b>
		Sheet 3 of 4

Published Date: 3rd Qtr. 2015



**GENERAL NOTES:**

The delineators shall be covered with a minimum of 16 square inches of reflective sheeting. The reflective sheeting shall be of either very high intensity or super high intensity material. For bridges along two-way roadways the sheeting shall be on both sides of the delineator and shall be white in color. For one-way roadways the sheeting will only be required on the side facing traffic and the color will be the same as the nearest pavement marking, yellow on the left side of the roadway and white on the right side.

The first delineator shall be attached to the post nearest the bridge with additional delineators spaced in advance of the bridge at approximately 50 foot intervals. At bridges with short lengths of guardrail, less than 200 feet, a minimum of 4 delineators shall be placed in addition to the yellow object marker. The spacing between the delineators shall be approximately one third of the length of the guardrail. This will provide for a shorter spacing. At bridges with longer lengths of guardrail, greater than 200 feet, including bridges that have cable guardrail transitioning into the steel beam guardrail, the delineators will be placed at a spacing of approximately 50 feet. Delineation shall extend throughout the length of the guardrail system.

All costs for furnishing and installing single or back to back guardrail delineation shall be included in the contract unit price per each for "Guardrail Delineator".

An adhesive object marker shall be placed on the end of the W beam guardrail end terminal. The adhesive object marker dimensions may vary due to the shape of the terminal end. A minimum of 256 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.

A type 2 object marker shall be placed adjacent to the 3 cable guardrail anchor at the location noted on sheet 1 of this standard plate. The type 2 object marker (6" x 12") shall have a fluorescent yellow very high or super high intensity reflective sheeting. All costs for furnishing and installing the type 2 object marker including the steel post, 6" x 12" reflective panel, and hardware shall be included in the contract unit price per each for "Type 2 Object Marker" for single-sided and "Type 2 Object Marker Back to Back" for back to back type 2 object markers.

June 26, 2011

<b>S D D O T</b>	<b>DELINEATION OF GUARDRAIL AT BRIDGES</b>	PLATE NUMBER <b>632.40</b>
		Sheet 4 of 4

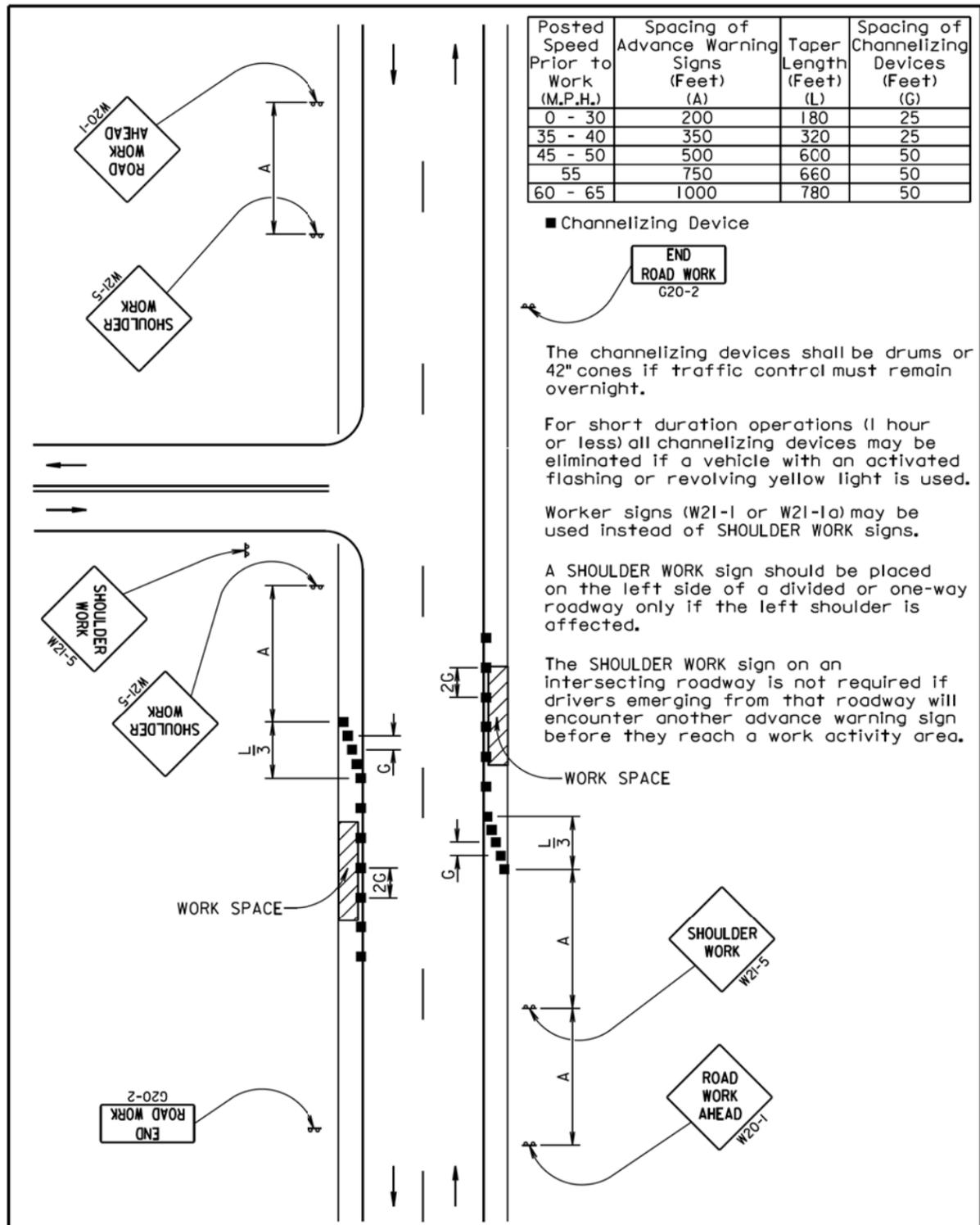
Published Date: 3rd Qtr. 2015

Plot Scale - 1:200

- Plotted From - tnc11610

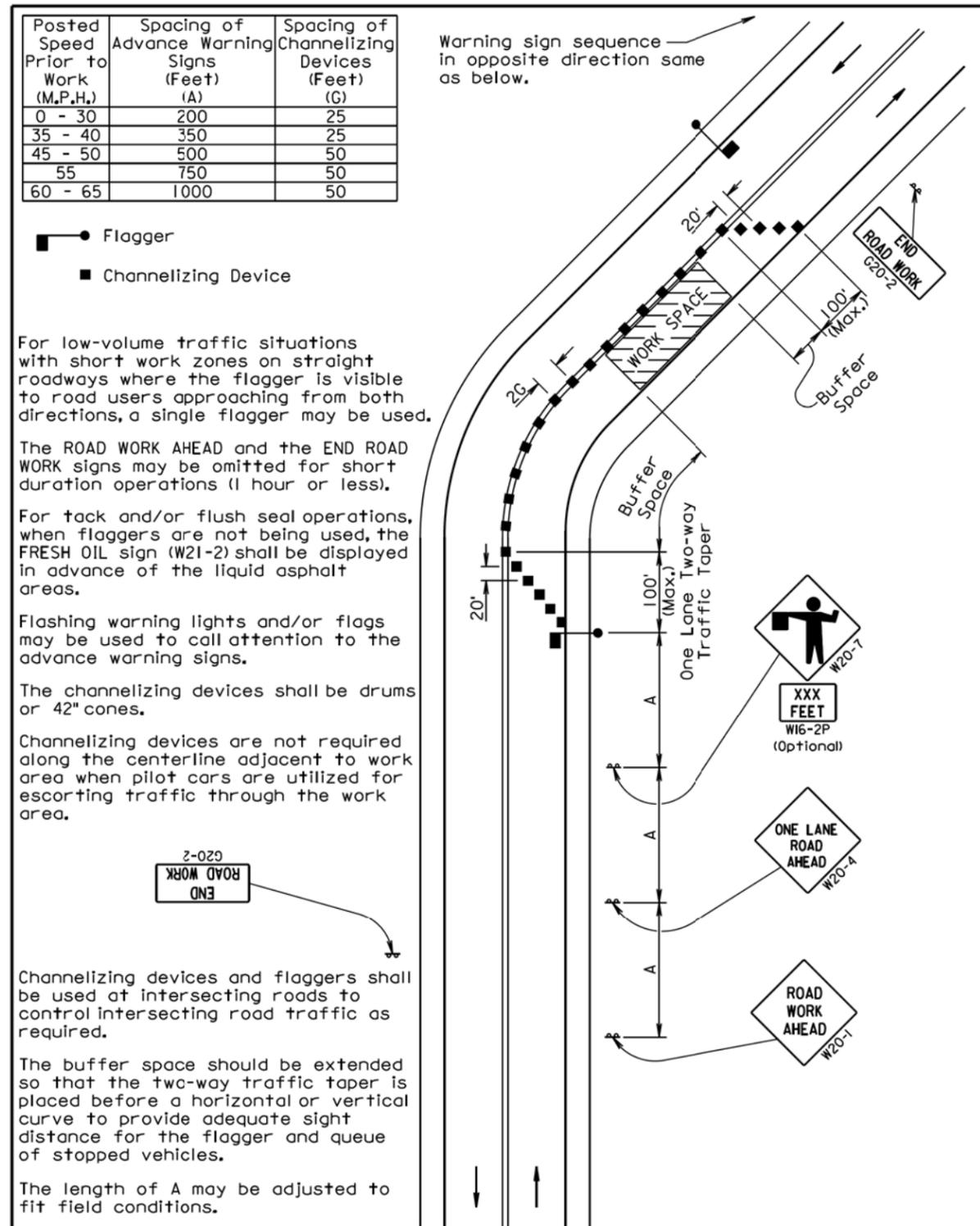
File - ...IRC GuardrailStdPlatePg19.dgn

Plot Scale - 1:200



September 22, 2014

<b>S D D O T</b>	<b>GUIDES FOR TRAFFIC CONTROL DEVICES WORK ON SHOULDERS</b>	PLATE NUMBER <b>634.03</b>
	Published Date: 3rd Qtr. 2015	Sheet 1 of 1



September 22, 2014

<b>S D D O T</b>	<b>GUIDES FOR TRAFFIC CONTROL DEVICES LANE CLOSURE WITH FLAGGER PROVIDED</b>	PLATE NUMBER <b>634.23</b>
	Published Date: 3rd Qtr. 2015	Sheet 1 of 1

- Plotted From - tirc11610

File - ...IRC GuardrailStdPlate1CPg1.dgn

Posted Speed Prior to Work (M.P.H.)	Spacing of Advance Warning Signs (Feet) (A)	Taper Length (Feet) (L)	Spacing of Channelizing Devices (Feet) (G)
0 - 30	200	180	25
35 - 40	350	320	25
45 - 50	500	600	50 *
55	750	660	50 *
60 - 65	1000	780	50 *

\* Spacing is 40' for 42" cones.

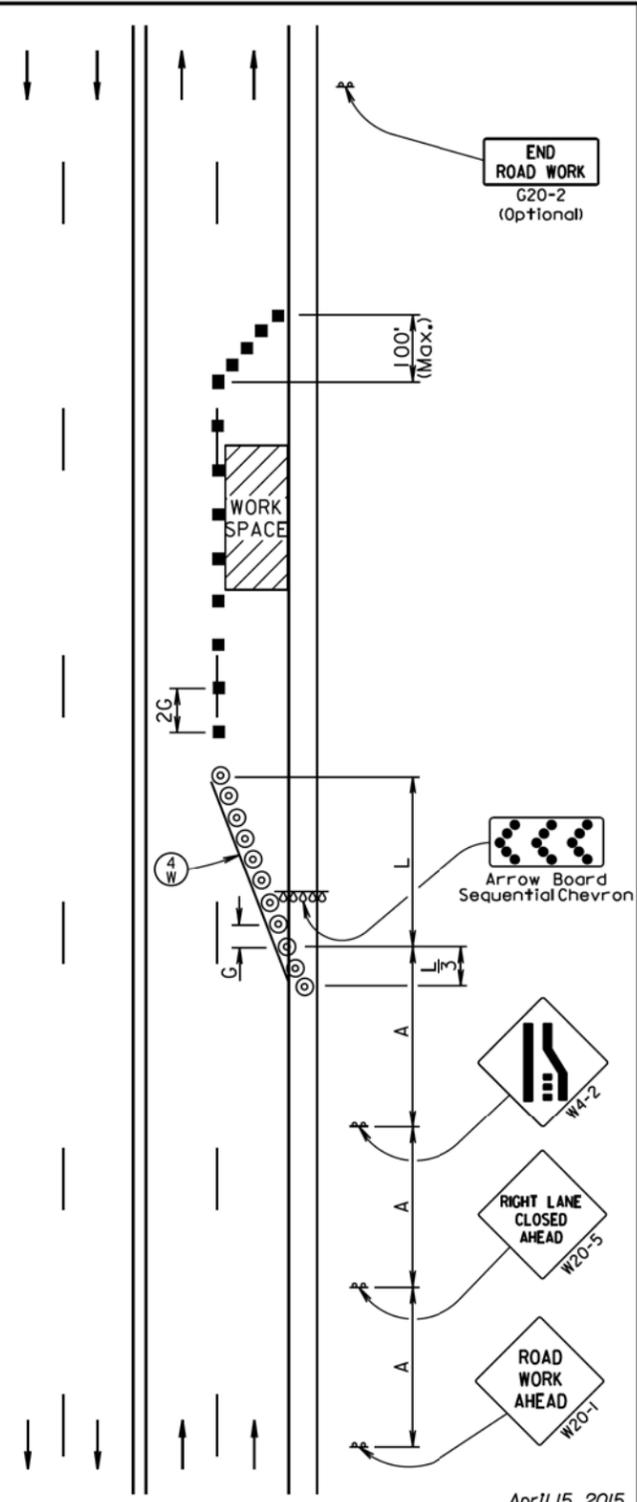
- ⊙ Reflectorized Drum
- Channelizing Device
- ④ W 4" White Temporary Pavement Marking

The channelizing devices shall be 42" cones or drums.

42" cones may be used in place of the drums shown in the taper if setup will not be used during night time hours.

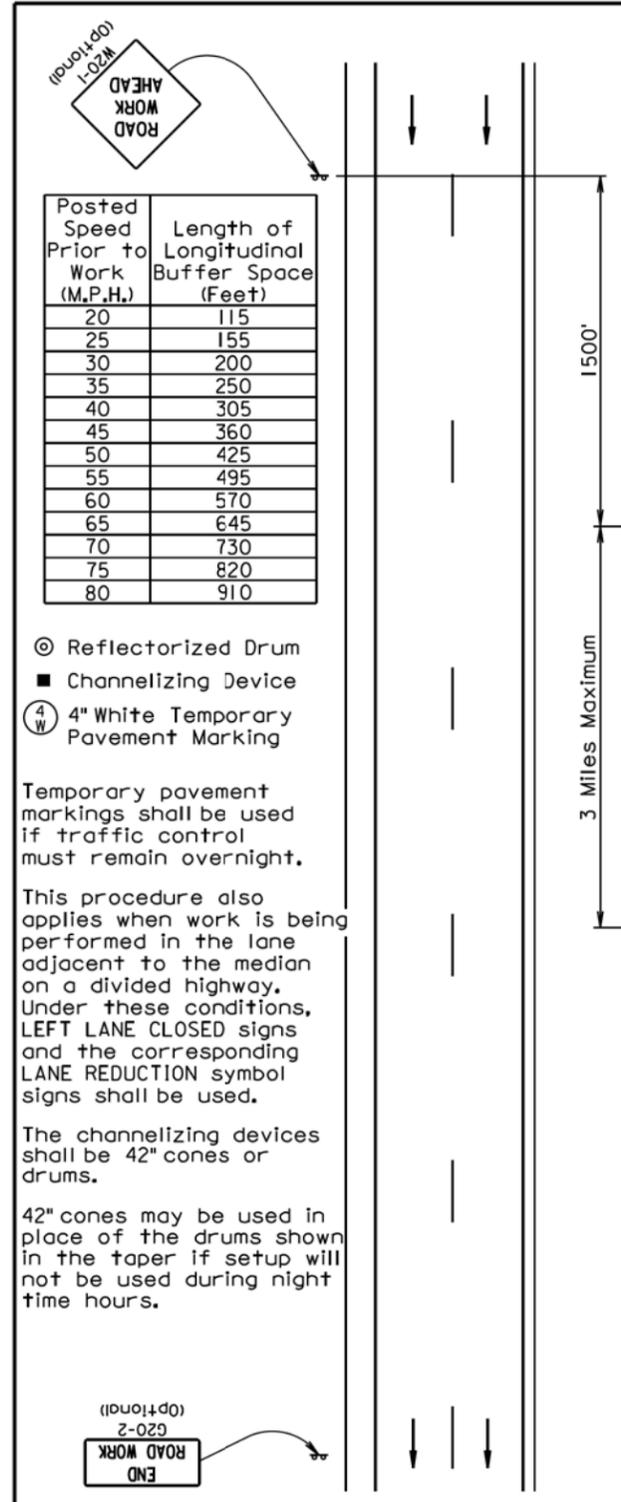
Temporary pavement markings shall be used if traffic control must remain overnight.

The length of A and L may be adjusted to fit field conditions.



April 15, 2015

<b>S D D O T</b>	<b>GUIDES FOR TRAFFIC CONTROL DEVICES 4-LANE UNDIVIDED, RIGHT LANE CLOSED</b>	PLATE NUMBER <b>634.47</b>
	Published Date: 3rd Qtr. 2015	Sheet 1 of 1



April 15, 2015

<b>S D D O T</b>	<b>GUIDES FOR TRAFFIC CONTROL DEVICES LANE CLOSURE WITHOUT BARRIER</b>	PLATE NUMBER <b>634.64</b>
	Published Date: 3rd Qtr. 2015	Sheet 1 of 1

Posted Speed Prior to Work (M.P.H.)	Spacing of Advance Warning Signs (Feet) (A) (B) (C)	Taper Length (Feet) (L)
0 - 30	200	180
35 - 40	350	320
45 - 50	500	600
55	750	660
60 - 65	1000	780
	(A) (B) (C)	
70 - 80	1000 1500 2640	960

Posted Speed Prior to Work (M.P.H.)	Spacing of Channelizing Devices (Feet) (G)
0 - 30	25
35 - 40	25
45 - 50	50 *
55	50 *
60 - 65	50 *
75 - 80	50 *

\* Spacing is 40' for 42" cones.

Posted Speed Prior to Work (M.P.H.)	Length of Longitudinal Buffer Space (Feet)
20	115
25	155
30	200
35	250
40	305
45	360
50	425
55	495
60	570
65	645
70	730
75	820
80	910

- ⊙ Reflectorized Drum
- Channelizing Device
- ④ W 4" White Temporary Pavement Marking

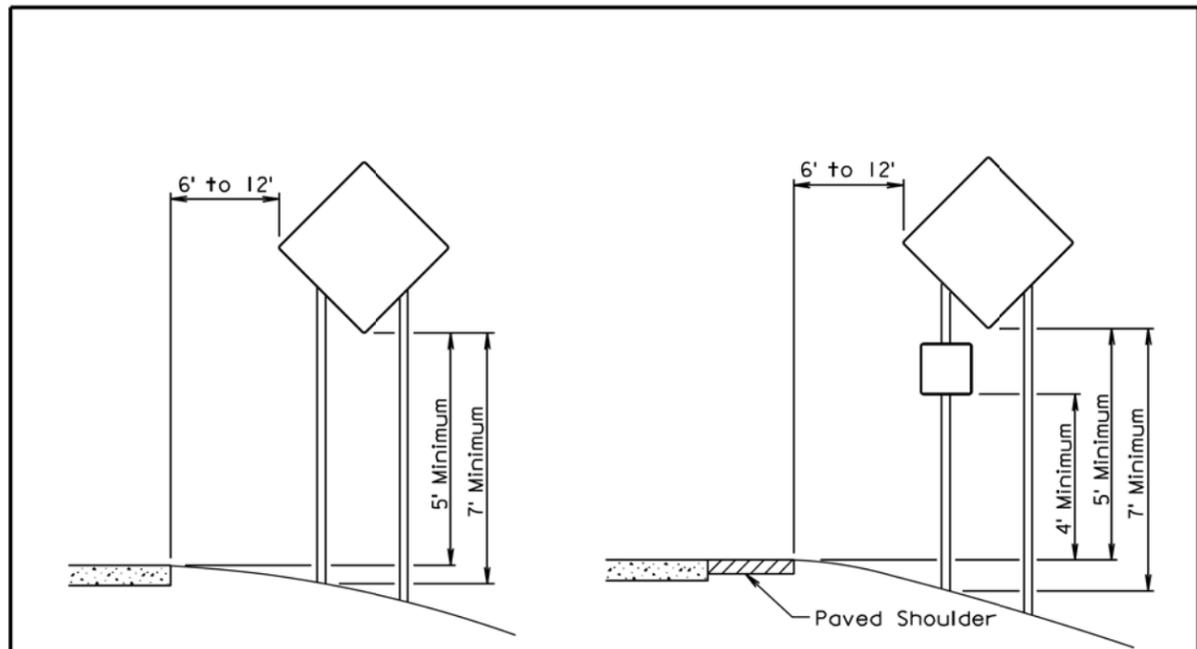
Temporary pavement markings shall be used if traffic control must remain overnight.

This procedure also applies when work is being performed in the lane adjacent to the median on a divided highway. Under these conditions, LEFT LANE CLOSED signs and the corresponding LANE REDUCTION symbol signs shall be used.

The channelizing devices shall be 42" cones or drums.

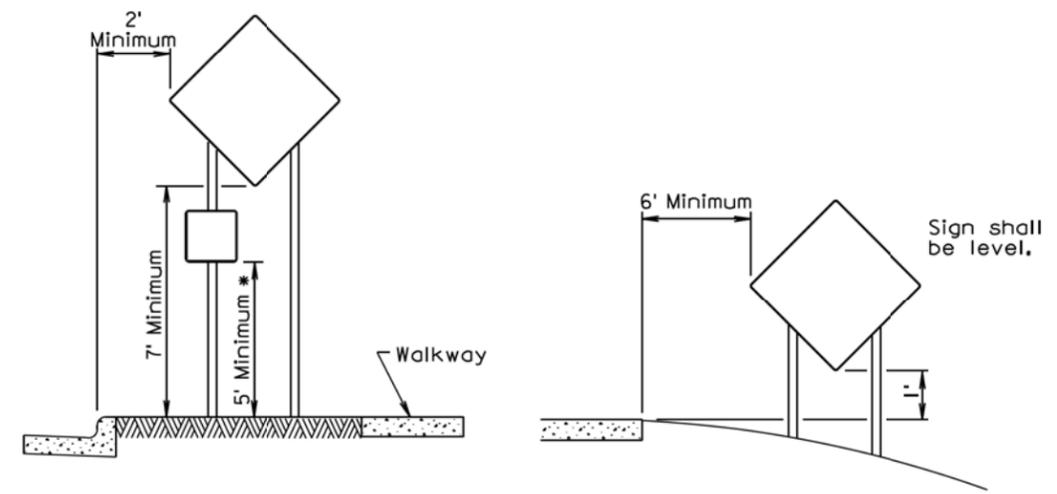
42" cones may be used in place of the drums shown in the taper if setup will not be used during night time hours.

Plot Scale - 1:200



RURAL DISTRICT

RURAL DISTRICT WITH SUPPLEMENTAL PLATE



URBAN DISTRICT

RURAL DISTRICT 3 DAY MAXIMUM

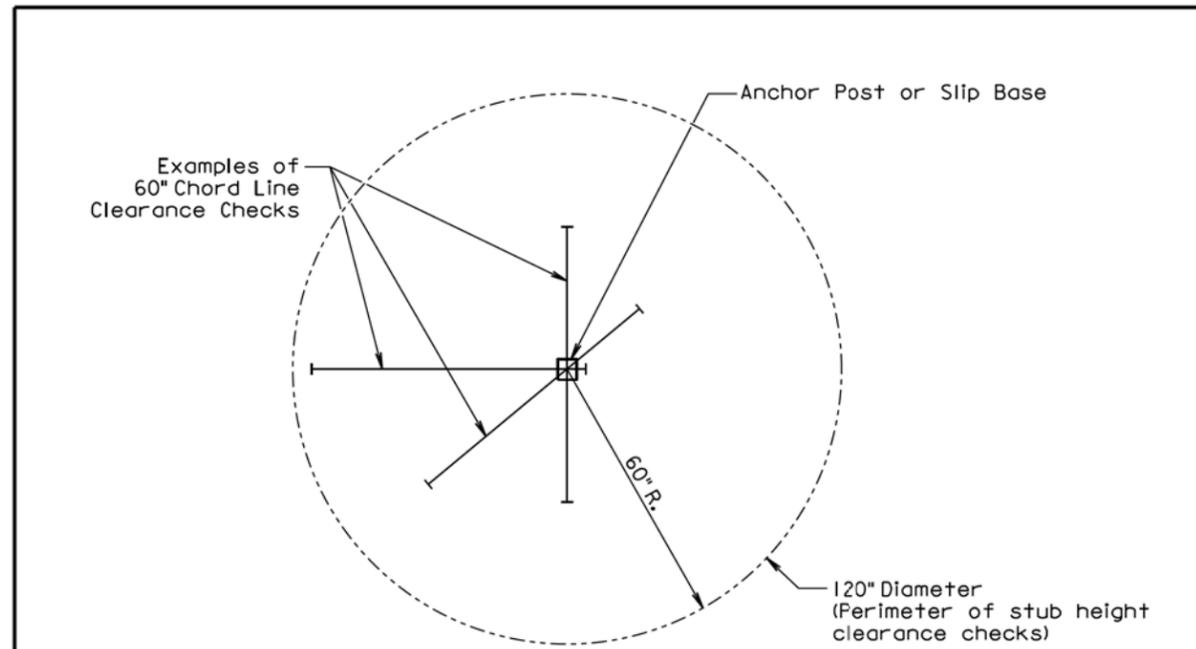
\* If the bottom of supplemental plate is mounted lower than 7 feet above a pedestrian walkway, the supplemental plate should not project more than 4" into the pedestrian facility.

(Not applicable to regulatory signs)

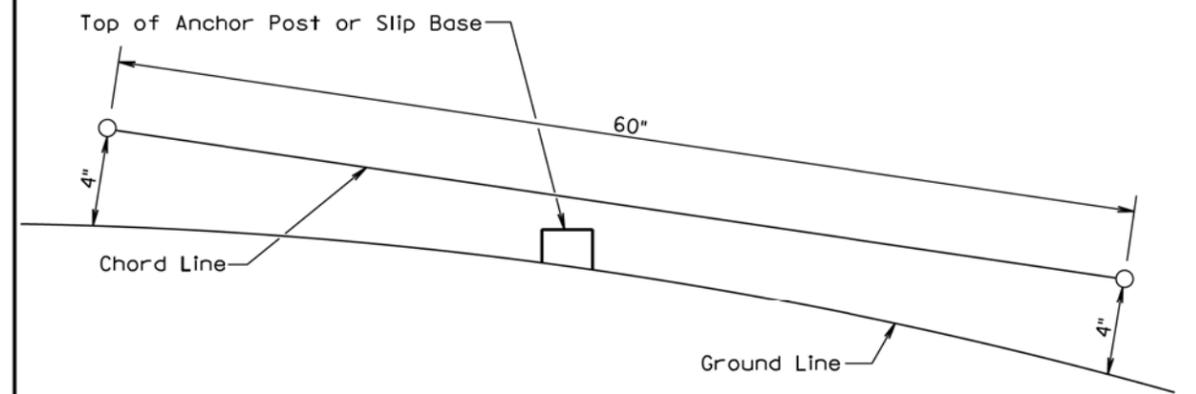
September 22, 2014

<b>S D D O T</b>	<b>CRASHWORTHY SIGN SUPPORTS (Typical Construction Signing)</b>	PLATE NUMBER <b>634.85</b>
		Sheet 1 of 1

Published Date: 3rd Qtr. 2015



PLAN VIEW  
(Examples of stub height clearance checks)



ELEVATION VIEW

**GENERAL NOTES:**

The top of anchor posts and slip bases SHALL NOT extend above a 60" chord line within a 120" diameter circle around the post with ends 4" above the ground.  
 At locations where there is curb and gutter adjacent to the breakaway sign support, the stub height shall be a maximum of 4" above the ground line at the localized area adjacent to the breakaway support stub.  
 The 4" stub height clearance is not necessary for U-channel lap splices where the support is designed to yield (bend) at the base.

July 1, 2005

<b>S D D O T</b>	<b>BREAKAWAY SUPPORT STUB CLEARANCE</b>	PLATE NUMBER <b>634.99</b>
		Sheet 1 of 1

Published Date: 3rd Qtr. 2015

- Plotted From - tncs11610

File - ...IRC GuardrailStdPlate1CPg2.dgn