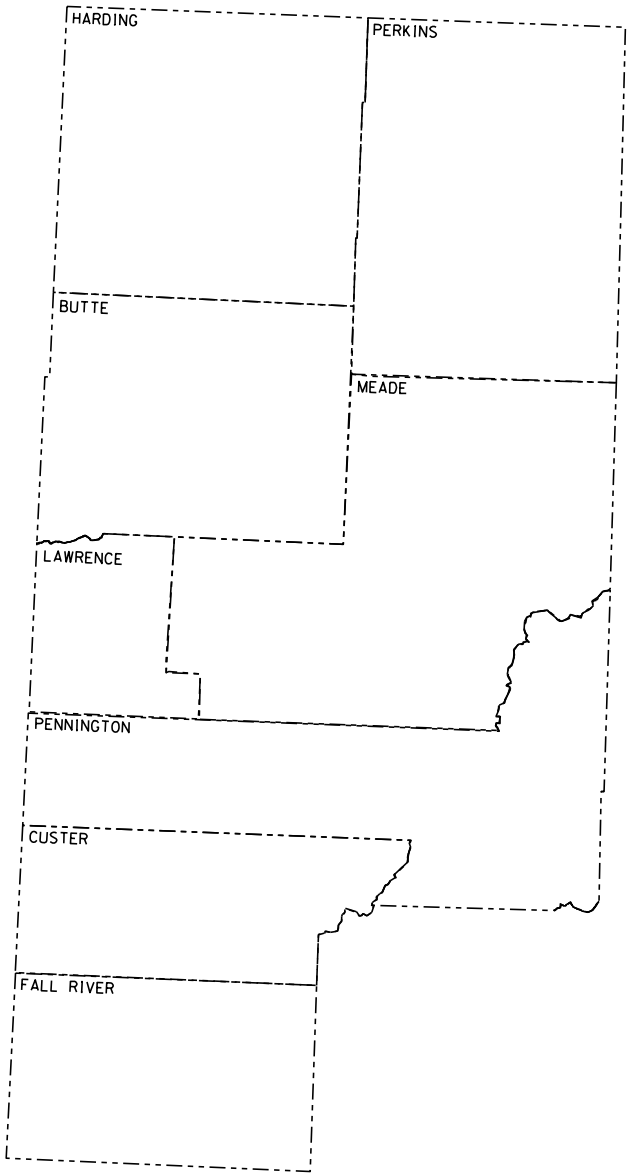



PROJECT

STATE OF SOUTH DAKOTA
DEPARTMENT OF TRANSPORTATION
PLANS FOR PROPOSED
PROJECTS
000I-469, 000N-469, & 000P-469
RAPID CITY REGION
GUARDRAIL MAINTENANCE
GUARDRAIL REPAIR AT VARIOUS LOCATIONS
ON A DEMAND BASIS
PCNS i7wu, i7wv & i7ww



	PROJECT	SECTION	SHEET
	000I-469, etc.	non	1/28

Plotting Date: 4/22/2025

INDEX OF SHEETS

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- 2 - 5 Estimate of Quantities and Plan Notes
- 6 Slip Base Detail
- 7 - 28 Standard Plates



STORM WATER PERMIT
No Permit Required

ESTIMATE OF QUANTITIES, 000I-469, PCN i7wu, (Interstate)

BID ITEM NUMBER	ITEM	QUANTITY	UNIT
009E0198	Mobilization 2	11	Each
110E0730	Remove Beam Guardrail	350.0	Ft
110E0770	Remove W Beam Guardrail Breakaway Cable Terminal	1	Each
629E0110	NCHRP 350 Test Level 3 High Tension Cable Guardrail	50	Ft
629E0290	NCHRP 350 Test Level 3 High Tension Cable Guardrail Anchor Assembly	1	Each
629E0453	Retension High Tension 3 Cable Guardrail	300	Ft
629E0454	Retension High Tension 4 Cable Guardrail	500	Ft
629E1000	Repair 3 Cable Guardrail	1,900	Ft
629E1010	Repair 3 Cable Guardrail Slip Base Anchor Assembly	1	Each
629E1100	3 Cable Guardrail End Post	5	Each
629E1102	3 Cable Guardrail Intermediate Post	60	Each
629E1104	3 Cable Guardrail Post, Winter	30	Each
629E1106	Drive Down 3 Cable Guardrail Post	2	Each
629E1112	Cable Splice	1	Each
629E1114	3 Cable Guardrail J Hook Bolt	200	Each
629E1116	Steel Turnbuckle Cable End Assembly	1	Each
629E1118	Spring Cable End Assembly with Turnbuckle	6	Each
629E1120	W Beam to 3 Cable Transition Bracket	4	Each
629E1122	3 Cable Guardrail End Post Cap	5	Each
629E1143	High Tension 3 Cable Guardrail Post	2	Each
629E1144	High Tension 4 Cable Guardrail Post	2	Each
629E1158	High Tension 3 Cable Guardrail Post and Sleeve	2	Each
629E1159	High Tension 4 Cable Guardrail Post and Sleeve	3	Each
629E1163	High Tension 3 Cable Guardrail Sleeve	3	Each
629E1164	High Tension 4 Cable Guardrail Sleeve	3	Each
629E1170	High Tension Cable Guardrail Terminal Post	1	Each
629E1174	Hardware for High Tension Cable Attachment to Terminal Post	3	Each
629E1175	Hardware for High Tension Cable Attachment to Post	3	Each
629E1180	High Tension Cable Guardrail Post Strap	3	Each
629E1181	High Tension Cable Guardrail Cable Spacer	3	Each
630E0200	Straight Class A Thrie Beam Rail	50.0	Ft
630E1200	Straight Class A W Beam Rail	250.0	Ft
630E2000	W Beam to Thrie Beam Guardrail Transition	2	Each
630E2015	W Beam Guardrail Flared End Terminal	1	Each
630E2020	W Beam Guardrail Tangent End Terminal	2	Each
630E2110	Beam Guardrail Post and Block	30	Each
630E2120	Beam Guardrail Post and Block, Winter	10	Each
634E0010	Flagging	20.0	Hour
634E0125	Traffic Control for Guardrail Repair	10	Site
634E0420	Type C Advance Warning Arrow Panel	10	Each

ESTIMATE OF QUANTITIES, 000N-469, PCN i7wv, (Non-Priority)

BID ITEM NUMBER	ITEM	QUANTITY	UNIT
009E0197	Mobilization 1	3	Each
009E0198	Mobilization 2	6	Each
009E0199	Mobilization 3	3	Each
110E0730	Remove Beam Guardrail	425.0	Ft
110E0770	Remove W Beam Guardrail Breakaway Cable Terminal	1	Each
629E0110	NCHRP 350 Test Level 3 High Tension Cable Guardrail	50	Ft
629E0290	NCHRP 350 Test Level 3 High Tension Cable Guardrail Anchor Assembly	1	Each
629E0453	Retension High Tension 3 Cable Guardrail	300	Ft
629E0454	Retension High Tension 4 Cable Guardrail	300	Ft
629E1000	Repair 3 Cable Guardrail	300	Ft
629E1010	Repair 3 Cable Guardrail Slip Base Anchor Assembly	1	Each
629E1100	3 Cable Guardrail End Post	5	Each
629E1102	3 Cable Guardrail Intermediate Post	60	Each
629E1104	3 Cable Guardrail Post, Winter	30	Each
629E1106	Drive Down 3 Cable Guardrail Post	2	Each
629E1112	Cable Splice	1	Each
629E1114	3 Cable Guardrail J Hook Bolt	200	Each
629E1116	Steel Turnbuckle Cable End Assembly	1	Each
629E1118	Spring Cable End Assembly with Turnbuckle	6	Each
629E1120	W Beam to 3 Cable Transition Bracket	4	Each
629E1122	3 Cable Guardrail End Post Cap	5	Each
629E1143	High Tension 3 Cable Guardrail Post	2	Each
629E1144	High Tension 4 Cable Guardrail Post	2	Each
629E1158	High Tension 3 Cable Guardrail Post and Sleeve	2	Each
629E1159	High Tension 4 Cable Guardrail Post and Sleeve	3	Each
629E1163	High Tension 3 Cable Guardrail Sleeve	3	Each
629E1164	High Tension 4 Cable Guardrail Sleeve	3	Each
629E1170	High Tension Cable Guardrail Terminal Post	1	Each
629E1174	Hardware for High Tension Cable Attachment to Terminal Post	3	Each
629E1175	Hardware for High Tension Cable Attachment to Post	3	Each
629E1180	High Tension Cable Guardrail Post Strap	3	Each
629E1181	High Tension Cable Guardrail Cable Spacer	3	Each
630E0200	Straight Class A Thrie Beam Rail	50.0	Ft
630E1200	Straight Class A W Beam Rail	250.0	Ft
630E2000	W Beam to Thrie Beam Guardrail Transition	2	Each
630E2015	W Beam Guardrail Flared End Terminal	1	Each
630E2020	W Beam Guardrail Tangent End Terminal	2	Each
630E2110	Beam Guardrail Post and Block	30	Each
630E2120	Beam Guardrail Post and Block, Winter	10	Each
634E0010	Flagging	20.0	Hour
634E0125	Traffic Control for Guardrail Repair	10	Site
634E0420	Type C Advance Warning Arrow Panel	10	Each

ESTIMATE OF QUANTITIES, 000P-469, PCN i7ww, (Priority)

BID ITEM NUMBER	ITEM	QUANTITY	UNIT
009E0197	Mobilization 1	5	Each
009E0198	Mobilization 2	2	Each
009E0199	Mobilization 3	6	Each
110E0730	Remove Beam Guardrail	600.0	Ft
110E0770	Remove W Beam Guardrail Breakaway Cable Terminal	1	Each
629E0110	NCHRP 350 Test Level 3 High Tension Cable Guardrail	50	Ft
629E0290	NCHRP 350 Test Level 3 High Tension Cable Guardrail Anchor Assembly	1	Each
629E0453	Retension High Tension 3 Cable Guardrail	300	Ft
629E0454	Retension High Tension 4 Cable Guardrail	500	Ft
629E1000	Repair 3 Cable Guardrail	700	Ft
629E1010	Repair 3 Cable Guardrail Slip Base Anchor Assembly	1	Each
629E1100	3 Cable Guardrail End Post	2	Each
629E1102	3 Cable Guardrail Intermediate Post	30	Each
629E1104	3 Cable Guardrail Post, Winter	15	Each
629E1106	Drive Down 3 Cable Guardrail Post	2	Each
629E1112	Cable Splice	1	Each
629E1114	3 Cable Guardrail J Hook Bolt	100	Each
629E1116	Steel Turnbuckle Cable End Assembly	1	Each
629E1118	Spring Cable End Assembly with Turnbuckle	2	Each
629E1120	W Beam to 3 Cable Transition Bracket	1	Each
629E1122	3 Cable Guardrail End Post Cap	2	Each
629E1143	High Tension 3 Cable Guardrail Post	2	Each
629E1144	High Tension 4 Cable Guardrail Post	2	Each
629E1158	High Tension 3 Cable Guardrail Post and Sleeve	2	Each
629E1159	High Tension 4 Cable Guardrail Post and Sleeve	2	Each
629E1163	High Tension 3 Cable Guardrail Sleeve	2	Each
629E1164	High Tension 4 Cable Guardrail Sleeve	2	Each
629E1170	High Tension Cable Guardrail Terminal Post	1	Each
629E1174	Hardware for High Tension Cable Attachment to Terminal Post	2	Each
629E1175	Hardware for High Tension Cable Attachment to Post	2	Each
629E1180	High Tension Cable Guardrail Post Strap	1	Each
629E1181	High Tension Cable Guardrail Cable Spacer	1	Each
630E0200	Straight Class A Thrie Beam Rail	25.0	Ft
630E1200	Straight Class A W Beam Rail	200.0	Ft
630E2000	W Beam to Thrie Beam Guardrail Transition	1	Each
630E2015	W Beam Guardrail Flared End Terminal	2	Each
630E2020	W Beam Guardrail Tangent End Terminal	4	Each
630E2110	Beam Guardrail Post and Block	20	Each
630E2120	Beam Guardrail Post and Block, Winter	10	Each
634E0010	Flagging	75.0	Hour
634E0125	Traffic Control for Guardrail Repair	12	Site
634E0420	Type C Advance Warning Arrow Panel	4	Each

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SPECIFICATIONS

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

CONTRACT TIME PROVISIONS

At such time as repairs are required, the Contractor will be notified. The Contractor will have 7 calendar days to complete the repairs.

WORK DESCRIPTION

Repair of guardrail at various locations in the Rapid City Region on a demand basis.

UTILITIES

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

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 will contact the Project Engineer to determine modifications that will be necessary to avoid utility impacts.

MOBILIZATION

If more than one location within an area is to be repaired, the Contractor will be compensated for only one mobilization per area.

Mobilization 1 is the cost of mobilization per each time the Contractor is called in by the Belle Fourche Area Engineer, or his designated representative, to perform guardrail repair within the Belle Fourche Area.

Mobilization 2 is the cost of mobilization per each time the Contractor is called in by the Rapid City Area Engineer, or his designated representative, to perform guardrail repair within the Rapid City Area.

Mobilization 3 is the cost of mobilization per each time the Contractor is called in by the Custer Area Engineer, or his designated representative, to perform guardrail repair within the Custer Area

Mobilization will be paid once each time the Contractor is called to repair guardrail, regardless of the number of sites requiring repair within the project limits.

Guardrail repairs will be limited to all Interstate and State highways within the boundaries of the Rapid City Region. Maintenance maps for priority and non-priority routes are available at the Rapid City Region office.

TRAFFIC CONTROL

The bid item “Traffic Control for Guardrail Repair” shall include all necessary traffic control devices as required by these plans and shall be measured and paid and the contract unit price per “site”. The Contractor shall be compensated each time they are required to mobilize to a “site” for guardrail repair. If the Contractor relocates the traffic control devices to a different location during the same mobilization, additional compensation will not be made and it shall be considered the same “site”.

Unless otherwise stated in these plans, no work will be allowed during hours of darkness.

Indiscriminate driving and parking of vehicles within the right-of-way will not be permitted. 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.

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.

Traffic shall be returned to the normal driving lanes during non-working hours.

The Contractor shall provide installation details at the preconstruction meeting for all breakaway sign support assemblies.

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.

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RESTORATION OF DISTURBED AREAS

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, Kildeer, Pierre, Trailway	3
Blue Grama	Bad River, Willis	2
Oats or Spring Wheat: April through May; Winter Wheat: August through November		10
Total:		26

All costs for reshaping, leveling, tilling, and seeding disturbed areas shall be incidental to the various bid items on the project.

GUARDRAIL

Retension High Tension3 Cable Guardrail shall include all costs to adjust the tension in a length of 3 Cable Guardrail. Measurement for payment will be per foot for all runs of 3 Cable Guardrail and shall include all 3 cables and both anchor ends that make up a run of 3 Cable Guardrail. Retension 3 Cable Guardrail may include cutting and shortening of cables at the anchors to allow for the proper tensioning. Payment will be center of anchor to center of anchor.

Retension High Tension 4 Cable Guardrail shall include all costs to adjust the tension in a length of High Tension 4 Cable Guardrail to manufacturers specifications. Measurement for payment shall be from center of anchor to center of anchor and shall include all 4 cables that make up a run of High Tension 4 Cable Guardrail. Retension High Tension 4 Cable Guardrail shall include cutting and shortening of cables at the anchors to allow for the proper tensioning.

Repair 3 Cable Guardrail Slip Base Anchor Assembly will include full compensation for repair of the damaged Slip Base Anchor Assembly. This work will be performed if it is determined that the Slip Base Anchor Assembly can be repaired without total footing removal. See detail provided in these plans.

3 Cable Guardrail End Post shall include all costs for removal of damaged end post and installation of 3 cable guardrail end post. 3 Cable Guardrail End Post shall also include a new end post cap. All costs incurred for removal and replacement of the existing cable on the new post shall be incidental to this contract item.

3 Cable Guardrail Intermediate Post shall include all costs for removal of damaged post and installation of 3 cable guardrail intermediate line post. All costs incurred for removal and replacement of the existing cable on the new post, including J Hook Bolts shall be incidental to this contract item.

3 Cable Guardrail Slip Base Anchor Post shall include all costs for removal of damaged post and installation of 3 cable guardrail slip base anchor post. All costs incurred for removal and replacement of the existing cable on the new post, shall be incidental to this contract item.

3 Cable Guardrail Post, Winter shall include all costs for removal of the damaged post and installation of cable guardrail post when there is in excess of one foot of frozen ground at the work site. When this condition exists, the contract unit price per each for “3 Cable Guardrail Post, Winter” will be the pay unit rather than the contract unit price per each for "3 Cable Guardrail Intermediate Post" and/or "3 Cable Guardrail End Post". The Contractor shall furnish any J Hook Bolts needed as shown on Standard Plate 629.01 (5 of 6). All costs incurred for removal and replacement of the existing cable on the new post, including J Hook Bolts shall be incidental to this contract item.

Drive Down 3 Cable Guardrail Post shall include all costs for adjusting the height of a Cable Rail Post. All costs to disassemble the cable rail to do this work shall be incidental to this contract item.

Reset 3 Cable Guardrail Post shall include all costs incurred for the realignment and/or removal and resetting of a cable guardrail post to properly align cable guardrail section. The Contractor shall furnish any J Hook Bolts needed as shown on Standard Plate 629.01 (5 of 6). Work under this item may require straightening of in place bent cable guardrail posts to bring them

into alignment with cable guardrail section. Payment for “Reset 3 Cable Guardrail Post” will be the same whether in frozen or unfrozen ground. All costs incurred for removal and replacement of the existing cable on the new post shall be incidental to this item.

Cable Anchor Bracket shall include furnishing and installing the Cable Anchor Bracket as shown on Standard Plate 629.01 (3 of 6).

Cable Splice shall include all costs incurred for cutting existing cable and for furnishing and installing the necessary cable splice. This contract item shall be used for low tension and high tension cable guardrail.

3 Cable Guardrail J Hook Bolt shall include furnishing & installing J hook bolts when no other work is required to the 3 cable guardrail other than missing or broken J hook bolts.

Steel Turnbuckle Cable End Assembly shall include all costs for furnishing and installing the Steel Turnbuckle Cable End Assembly as shown on Standard Plate 629.01 (4 of 6).

Turnbuckle Assembly shall include all costs for furnishing and installing the Turnbuckle Assembly on high tension cable guardrail.

Spring Cable End Assembly with Turnbuckle shall include all costs for furnishing and installing the Spring Cable End Assembly with Turnbuckle as shown on Standard Plate 629.01 (4 of 6).

W Beam to 3 Cable Transition Bracket shall include all costs incurred for removing the damaged transition bracket and installing a transition bracket in accordance with the details on Standard Plates 629.05 & 629.15.

3 Cable Guardrail End Post Cap shall include all costs for furnishing and installing an end post cap as shown on Standard Plate 629.01 (6 of 6).

High Tension 4 Cable Guardrail Post: High Tension 4 Cable Guardrail Post shall include all costs for removal of damaged post and installation of a High Tension 4 Cable Guardrail Post. All costs incurred for removal and replacement of the existing cable on the new post, including hardware shall be incidental to this contract item.

High Tension 4 Cable Guardrail Post and Sleeve shall include all costs for removal of damaged post and sleeve, and installation of a High Tension 4 Cable Guardrail Post and Sleeve. All costs incurred for removal and replacement of the existing cable on the new post, including hardware shall be incidental to this contract item.

High Tension 4 Cable Guardrail Sleeve shall include all costs for removal of damaged sleeve and installation of a High Tension 4 Cable Guardrail Sleeve. All costs incurred for removal and replacement of the existing post and of the existing cable on the post, including hardware shall be incidental to this contract item.

High Tension Cable Guardrail Terminal Post shall include all costs for removal of damaged terminal post and installation of a High Tension Cable Guardrail Terminal Post. All costs incurred for removal and replacement of the existing cable on the new post, including reflective sheeting, hardware and tensioning cable shall be incidental to this contract item.

Hardware For High Tension Cable Attachment To Terminal Post shall be used for furnishing and installing the hardware for a high tension cable guardrail terminal post. This item is used for a typical repair if a high tension cable guardrail terminal post is struck and releases the cable(s). Use this item when the terminal post is in good condition and only new hardware and resetting the terminal post is necessary. Payment includes cost for furnishing and installing hardware for the high tension cable attachment to terminal post, resetting terminal post, labor, equipment, and incidentals.

Hardware For High Tension Cable Attachment To Post shall be used for furnishing and installing the hardware for a high tension cable attachment to post. This item is used for a typical repair if the hardware was damaged by a snow plow or other crash. Use this item when the post is in good condition and only new hardware is necessary. The quantity and unit for the bid item is one “Each” for one attachment, i.e. if several attachments are damaged on a high tension 4 cable guardrail post then the quantity would be more than 1. Payment includes cost for furnishing and installing hardware for the high tension cable attachment to post, labor, equipment, and incidentals.

High Tension Cable Guardrail Cable Strap shall include all costs for removal of damaged/missing strap and installation of a High Tension Cable Guardrail Cable Strap. High Tension Cable Guardrail Cable Strap contract item will not be paid for when a new guardrail post is paid for as the new guardrail post shall include the strap. This item is specific to products from Trinity known as the CASS high tension cable barrier.

High Tension Cable Guardrail Cable Spacer shall include all costs for removal of damaged spacer and installation of a High Tension Cable Guardrail Cable Spacer. High Tension Cable Guardrail Cable Spacer contract item will not be paid for when a new guardrail post is paid for as the new guardrail post shall include the spacer. This item is specific to products from Trinity known as the CASS high tension cable barrier.

W Beam Guardrail Flared End Terminal shall include all costs incurred for furnishing and installing an approved flared end terminal in accordance with details on Standard Plate 630.87. At some locations of W Beam Guardrail Flared End Terminal damage, the Area Engineer may decide to replace the existing W Beam Guardrail Flared End Terminal in lieu of replacing the various components of the W Beam Guardrail Flared End Terminal.

The W Beam Guardrail Flared End Terminal shall be on the approved products list: <http://apps.sd.gov/HC60ApprovedProducts/main.aspx>

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The contract unit price per each for “W Beam Guardrail Flared End Terminal” shall include all costs incurred for furnishing and installing one (1) end section as shown on Standard Plate 630.87 including removal of the existing end terminal.

W Beam Guardrail Tangent End Terminal shall include all costs incurred for furnishing and installing an approved tangent end terminal in accordance with details on Standard Plate 630.88. At some locations of W Beam Guardrail Tangent End Terminal damage, the Area Engineer may decide to replace the existing W Beam Guardrail Tangent End Terminal in lieu of replacing the various components of the W Beam Guardrail Tangent End Terminal.

The W Beam Guardrail Tangent End Terminal shall be on the approved products list: <http://apps.sd.gov/HC60ApprovedProducts/main.aspx>

The contract unit price per each for “W Beam Guardrail Tangent End Terminal” shall include all costs incurred for furnishing and installing one (1) end section as shown on Standard Plate 630.88 including removal of the existing end terminal.

Beam Guardrail Block shall include all costs for removing the broken block and installing a block.

Beam Guardrail Post & Block shall include all costs for removing the broken post and installing a post and block. Beam Guardrail Post & Block shall include replacement of post and blocks located within the limits of the Tangent and Flared End Terminals.

Beam Guardrail Post & Block, Winter shall include all costs incurred for replacement of a steel beam guardrail post when there is in excess of one foot of frozen ground at the work site. When this condition exists, the contract unit price per each for “Beam Guardrail Post & Block, Winter” will be the pay unit rather than the contract unit price per each for “Beam Guardrail Post & Block”. Beam Guardrail Post & Block, Winter shall include replacement of post and blocks located within the limits of the Tangent and Flared End Terminals.

End Terminal Wood Breakaway Post shall include all costs incurred for removal of a broken wood end post and installing a replacement wood end post in a steel tube sleeve. This contract item shall include replacement of wood posts on various end terminals including Breakaway Cable Terminals (BCT), Trailing End Terminals, Tangent End Terminals and Flared End Terminals. The Contractor shall be responsible for making sure the wood post matches the appropriate Standard Plate or end terminal manufacturer’s requirements.

End Terminal Hinged Breakaway Post shall include all costs incurred for removal of a hinged breakaway end post and installing a replacement hinged post on a post bottom base. This contract item shall include replacement of hinged breakaway posts on various end terminals including Tangent End Terminals and Flared End Terminals. The Contractor shall be responsible for making sure the hinged breakaway post match the end terminal manufacturer’s requirements.

Breakaway Cable Terminal (B.C.T) End Rail shall include all costs incurred for removing the 12.5 ft. or 25 ft section of damaged B.C.T. W beam adjacent to the Radius Terminal Element and replacing with new guardrail. The Contractor shall field drill holes in the guardrail for installation.

W-Beam Guardrail End Section Buffer shall include all costs incurred for installing a buffer assembly. Removal of the existing end section buffer shall be incidental to this contract item.

Tangent End Terminal Extruder Head shall include all costs incurred for removing the damaged extruder head and installing a new extruder head on the Tangent End Terminal.

Tangent End Terminal Rail shall include all costs incurred for removing 12.5 ft. or 25 ft. section(s) of damaged beam guardrail and replacing new beam guardrail on the Tangent End Terminal.

Rubrail shall include all costs to install rubrail. The Contractor shall provide the necessary wood blocks and bolts to attach the rubrail to the wood posts.

Drive Down Beam Guardrail Post: Drive Down Beam Guardrail Post shall include all costs for adjusting the height of a steel beam guardrail post. All costs to disassemble the steel beam guardrail shall be incidental to this contract item.

Reset Beam Guardrail Post & Block shall include all costs for removing and resetting post to properly align the steel beam section. Payment for “Reset Beam Guardrail Post & Block” shall be the same in frozen or unfrozen ground.

HIGH TENSION CABLE GUARDRAIL

The Contractor will furnish and install a high tension cable guardrail system that meets the Test Level 3 crash testing requirements of the Manual for Assessing Safety Hardware (MASH). The maximum dynamic deflection of the system will be less than 10'-0" and the maximum post spacing will be 10'-6" unless specified otherwise in the plans. High Tension 4 Cable Guardrail will be one of the following products:

- Valtir (Trinity) – CASS S3 M10
- Brifen – 4 Rope O-Post System

The high tension cable guardrail system will be in compliance with Specifications Section 6.9 Buy America.

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The Contractor will install the system according to the manufacturer’s installation recommendations except where stated otherwise in the plans. A copy of the detail drawings and installation instructions for the high tension cable guardrail and anchor assemblies will be given to the Engineer a minimum of 4 weeks prior to installation of the high tension cable guardrail system.

All posts will be galvanized and inserted into driven galvanized steel sleeves with soil plates. The driven sleeves must be designed for a minimum frost

depth of 42” and to resist the additional lateral component of curved cable sections.

Delineation of the high tension cable guardrail will be in conformance with standard plate 632.40.

The cables provided will be pre-stretched in the factory.

The Contractor will check and adjust the tension of the cables a minimum of 3 weeks after installation and not longer than 6 weeks after installation. Cost for this work will be incidental to the contract unit price per foot for "High Tension 3 Cable Guardrail" or “High Tension 4 Cable Guardrail”.

The lengths of high tension cable guardrail stated in the plans are based on a minimum effective length (length of need). The length and location of the high tension cable guardrail at each site will need to be adjusted during construction as necessary depending on the system provided and will be approved by the Design Engineer before installation. When the Valtir (Trinity) CASS S3 M10 system is installed adjacent to one-way traffic roadways, 26’ of the anchor assembly on the approach end is considered non-effective, and 51’ on the non-approach end is considered non-effective; however, when the same system is installed adjacent to two-way traffic roadways, 26’ of the anchor assembly on both the approach and non-approach ends is considered non-effective. For Brifen 4 Rope O-Post System installations, the anchor assembly is non-effective.

The Contractor will provide a signed letter of compliance to the Engineer upon completion of the high tension cable guardrail installation(s) stating that the high tension cable barrier system has been installed in conformance to the manufacturer installation instructions and specifications, meets the Test Level 3 crash test requirements of MASH, and is terminated with an approved anchor assembly.

The high tension cable guardrail will be measured along the centerline of the cable guardrail from the beginning to the end of the minimum effective length.

All costs for furnishing and installing the high tension cable guardrail system including all labor, materials, and equipment will be incidental to the contract unit price per foot for “High Tension 3 Cable Guardrail” or “High Tension 4 Cable Guardrail”.



(ASTM A709 Gr 36)
galvanized according
to ASTM 123

PLAN

(Existing)

3/4" Heavy Hex Nut
(ASTM 563 Gr. DH)

3/4" Washer
(ASTM F436)

1/2" DIA. BOLT. 2" LONG WITH
NUT AND 3 WASHERS. TORQUE
TO 25 FT-LBS

3/4" HEAVY HEX NUT WITH
PLAIN WASHER (TYP)

— ANCHOR POST

POST SLIP PLATE

✓ KEEPER PLATE

— POST SLIP PLATE

2" - S3x5.7 Post
(ASTM 709 Gr. 36)

 $2\frac{3}{8}"$

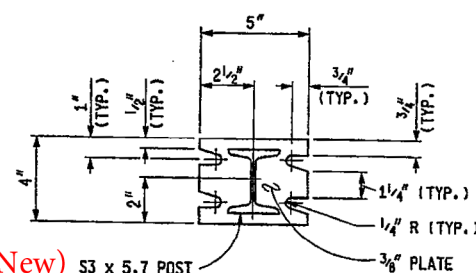
NEW CONSTRUCTION
INSTALL (4) 3/4" DIA. HOOK BOLTS
J BOLTS, OR RESIN BONDED ANCHOR
WITH 8" MIN. EMBEDMENT. THREAD
TOP 1/2" MIN.

RETROFIT SITUATIONS
INSTALL (4) $\frac{3}{4}$ " DIA. RESIN BONDED
ANCHORS WITH 8" MIN. EMBEDMENT.
THREAD TOP 2" MIN.

(ASTM 449)

ELEVATION

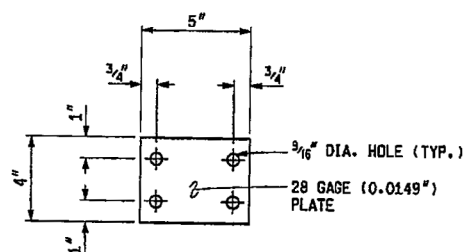
POST SLIP BASE



(New) S3 x 5.7 POST

POST SLIP PLATE DETAIL

(Existing)



KEEPER PLATE DETAIL

(Exisiting)

Bolts, nut, & washers shall be galvanized in accordance with ASTM F2329.

MICHIGAN DEPARTMENT OF TRANSPORTATION
BUREAU OF HIGHWAY DEVELOPMENT STANDARD PLAN FOR

LOW TENSION 3-CABLE BARRIER

4-2E-2003

F.H.W.A. APPROVAL

3 07 0007

PLAN DATE

R-70-C

SHEET

7 OF 10

GENERAL NOTES:

Either flanged channel steel posts or S3x5.7 steel I beam posts will be used, but post type will be consistent throughout the project. The S3x5.7 steel I beam post will 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 will 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 will be incidental to the contract unit price per foot for "3 Cable Guardrail".

The following table and criteria will 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 will 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 will 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 will have a total available travel of 6 inches minimum.

The cable will 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
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

POST SPACING FOR HORIZONTAL CURVES	
Roadway \varnothing 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

September 14, 2018

SD

DOT

3 CABLE GUARDRAIL

(LOW TENSION)

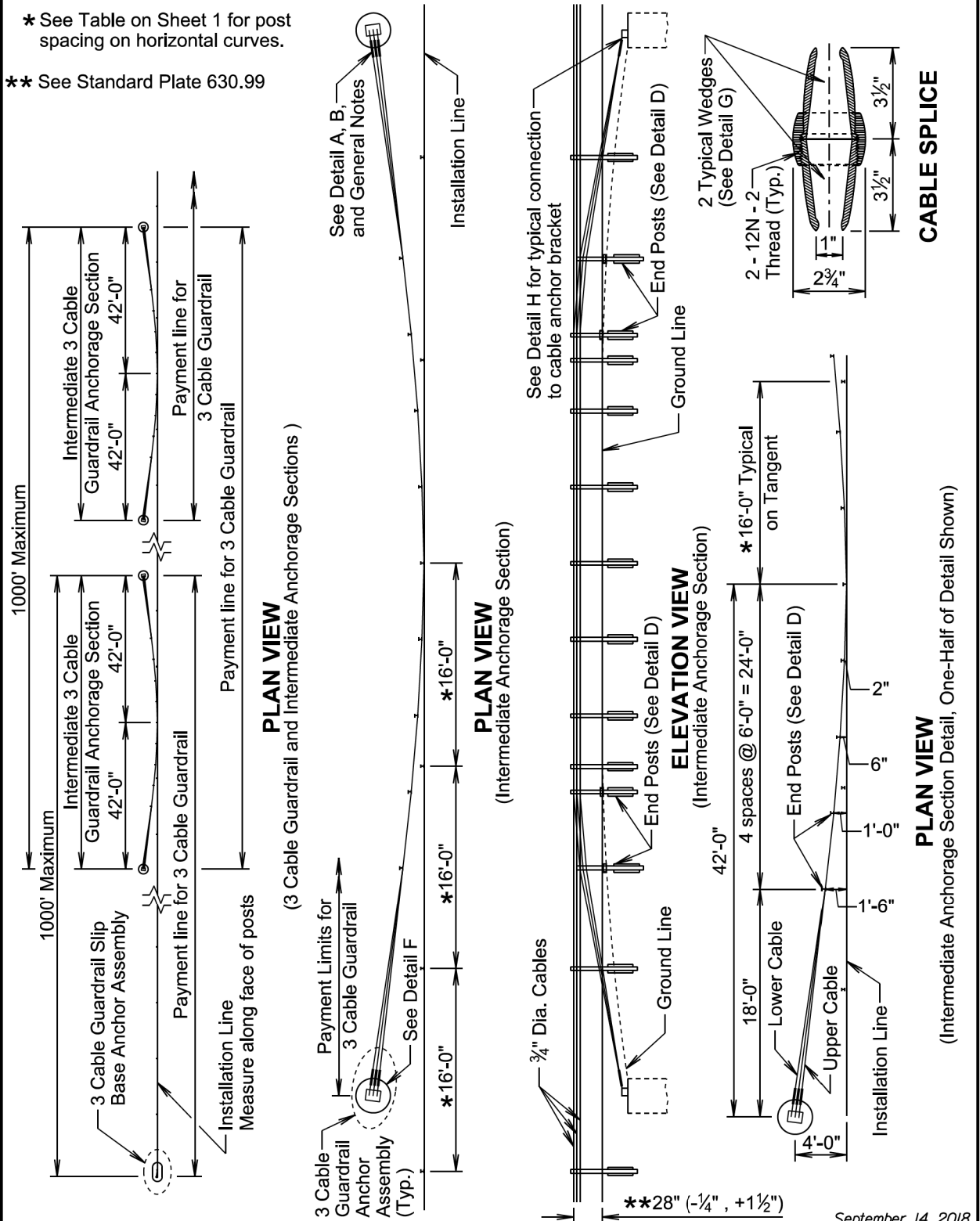
PLATE NUMBER

629.01

Published Date: 2025

Sheet 1 of 6

- * See Table on Sheet 1 for post spacing on horizontal curves.
- ** See Standard Plate 630.99



September 14, 2018

SD

DOT

3 CABLE GUARDRAIL

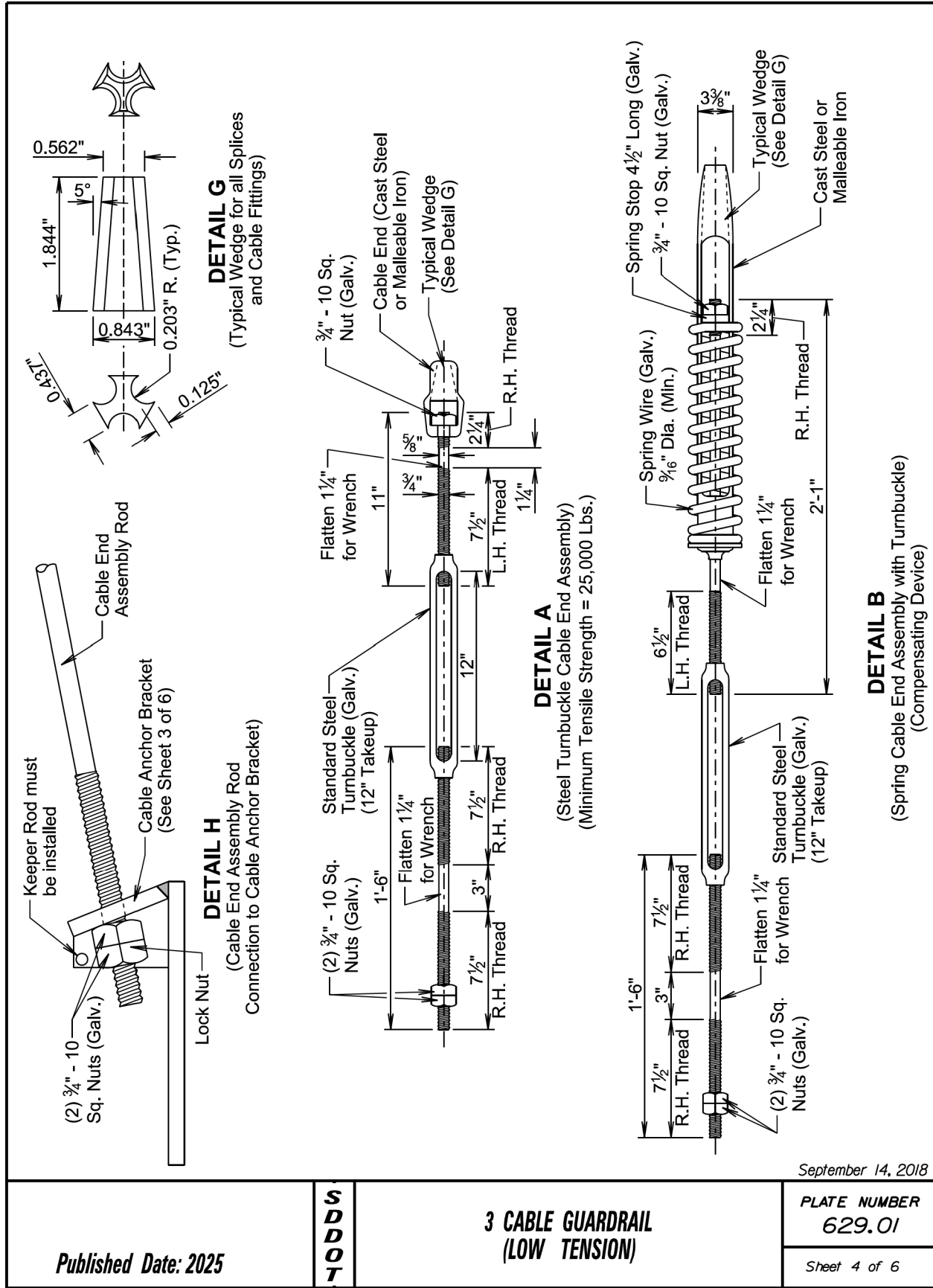
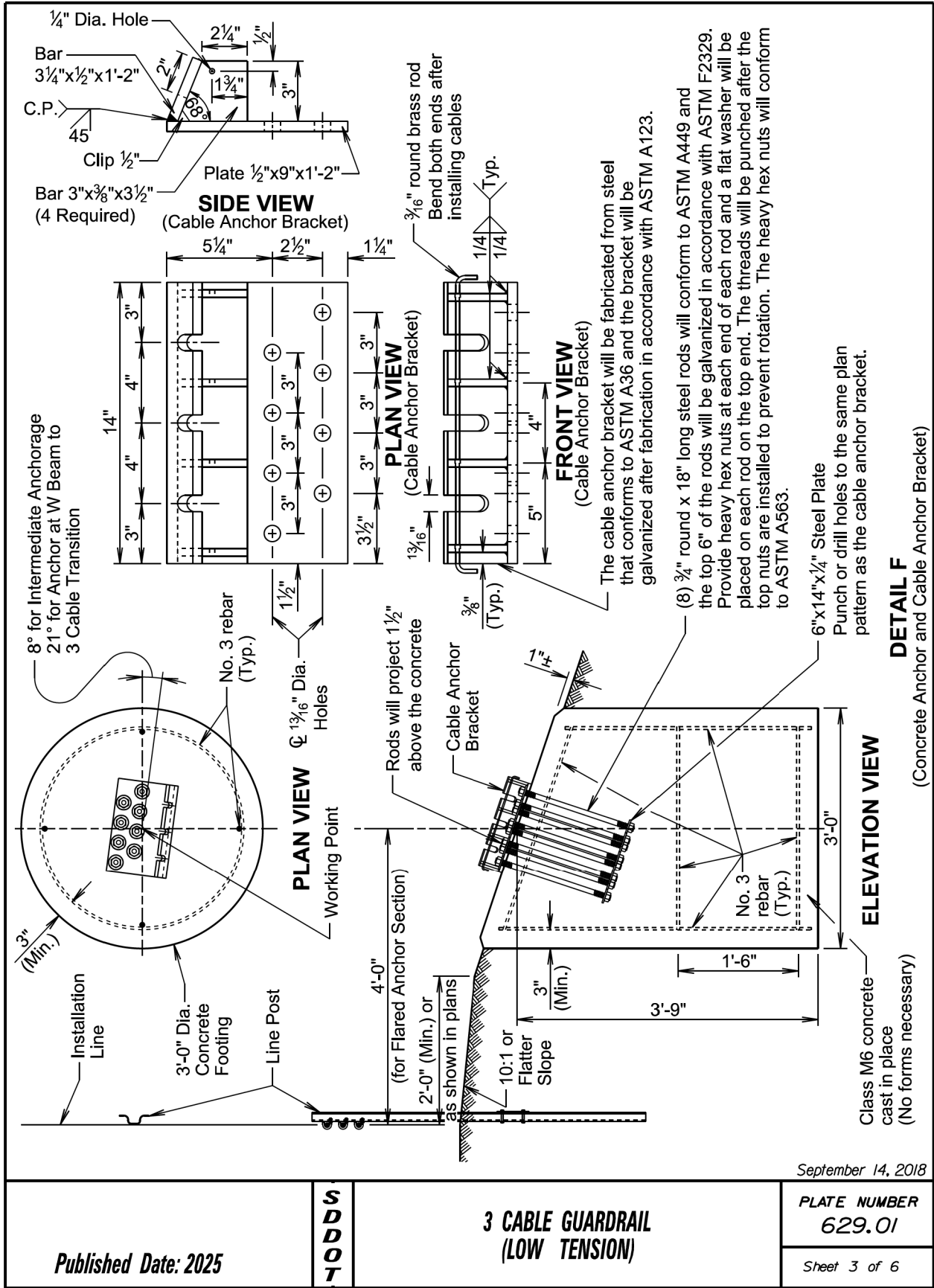
(LOW TENSION)

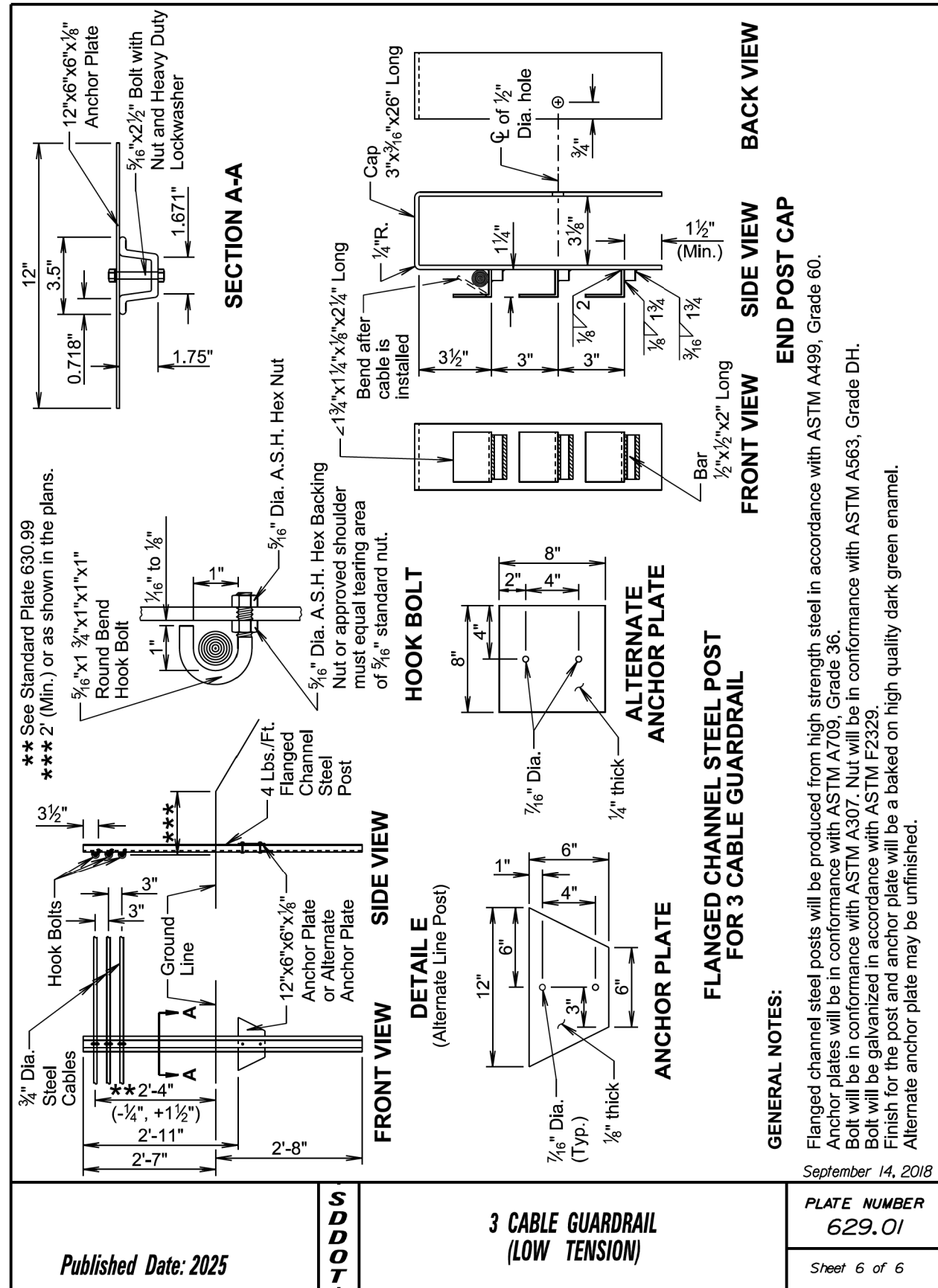
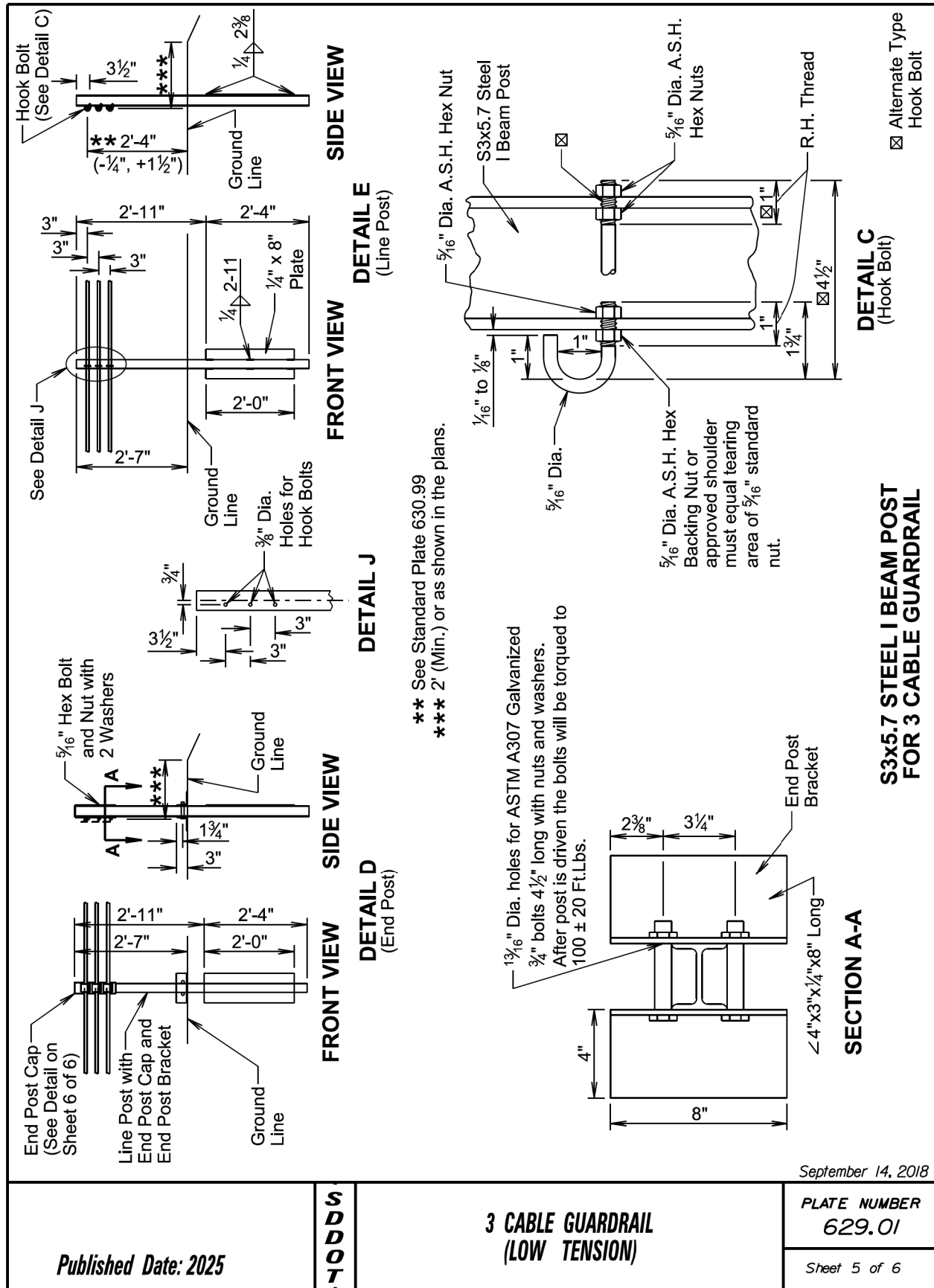
PLATE NUMBER

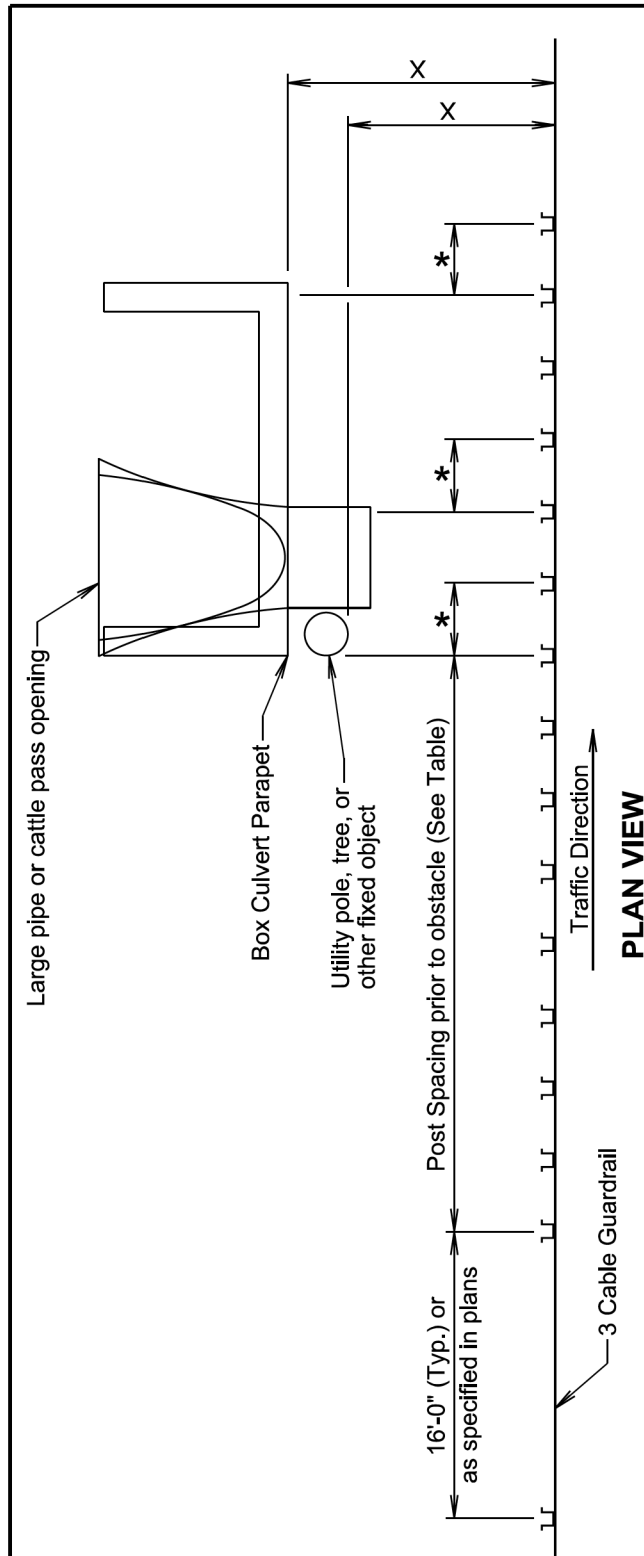
629.01

Published Date: 2025

Sheet 2 of 6







POST SPACING PRIOR TO OBSTACLE		
X	Number of Post Spaces	Post Spacing (Ft.)
Deflection Distance (Ft.)		
10.5 to 11.4	8	4
11.5 to 12.9	6	8
13.0 to 14.9	4	12
15 and Greater	3	16

GENERAL NOTES:

★ Post spacing for deflection control will continue to one post past the obstacle for one-way traffic.

Post spacing for deflection control will be provided on both sides of the obstacle for two-way traffic.

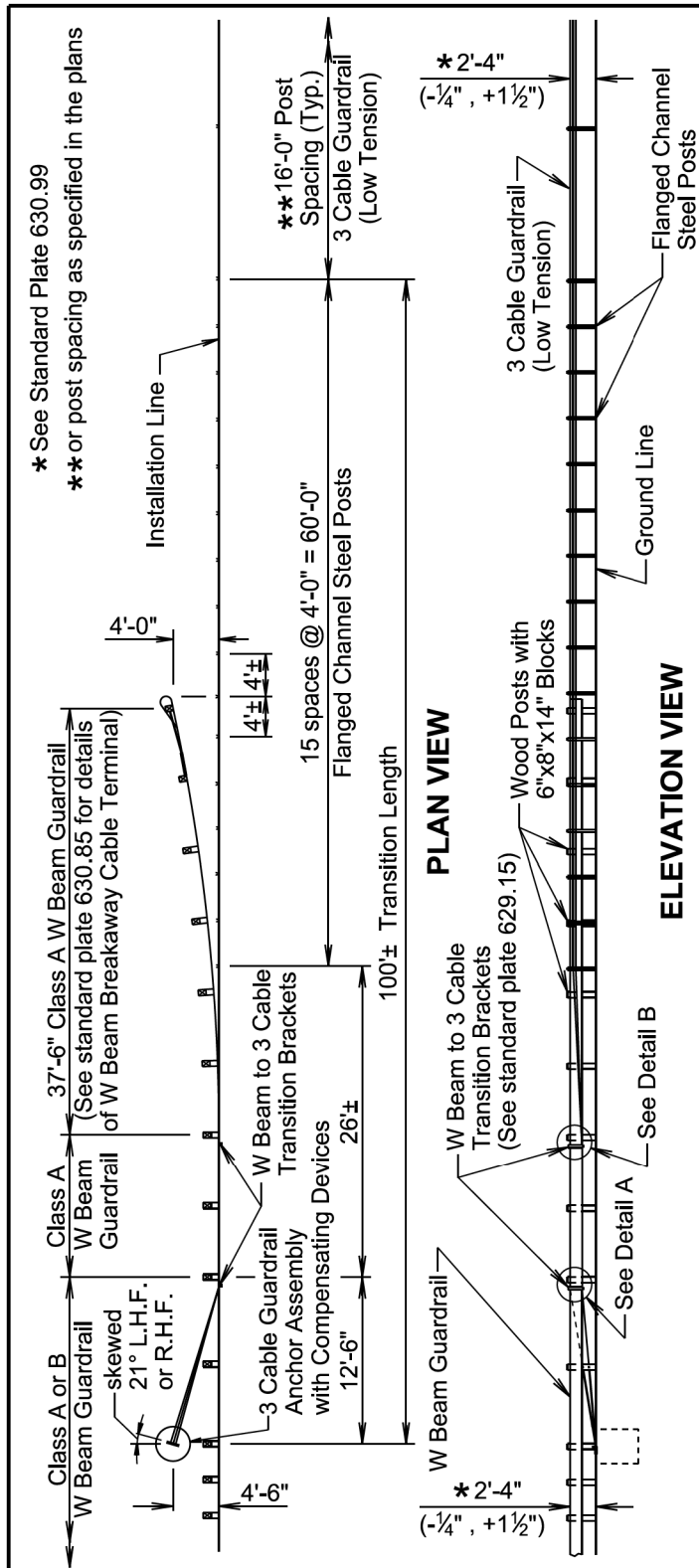
For illustrational purposes, the 3 cable guardrail posts and post spacings shown on this standard plate depict the situation when there is a box culvert 10.5' to 11.49' away from the 3 cable guardrail and the traffic is one-way.

This standard plate will not be used for high tension cable guardrail installations.

September 14, 2018

PLATE NUMBER
629.02

Sheet 1 of 1



ELEVATION VIEW

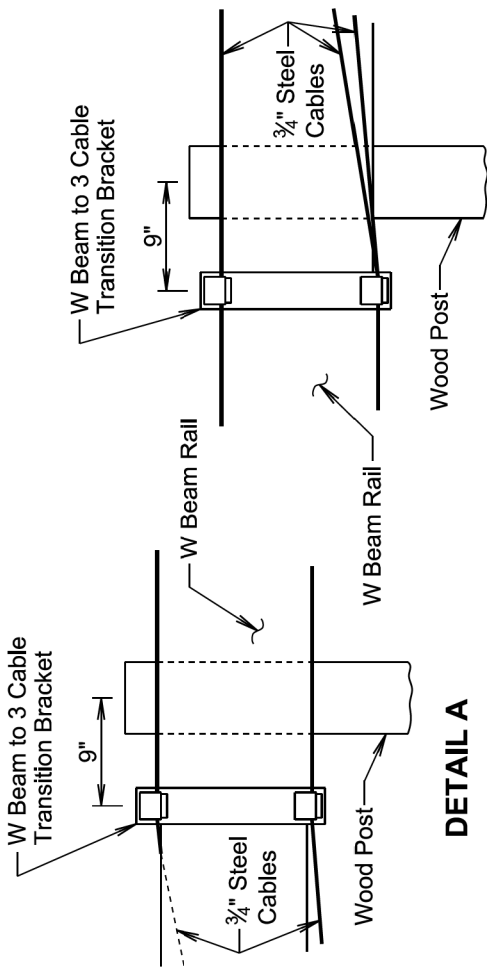
GENERAL NOTES:

Flanged channel steel posts are shown on this standard plate, however, S3x5.7 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 will be incidental to the contract unit price per foot for "3 Cable Guardrail", "Reset 3 Cable Guardrail", or "Reset 3 Cable Guardrail, Cable Only".

See standard plate 630.10 for details of W Beam Guardrail.

See standard plate 629.01 for details and payment information for 3 Cable Guardrail.



DETAIL A

DETAIL B

September 14, 2018

S D D O T	W BEAM TO 3 CABLE TRANSITION	PLATE NUMBER 629.05
		Sheet 1 of 1

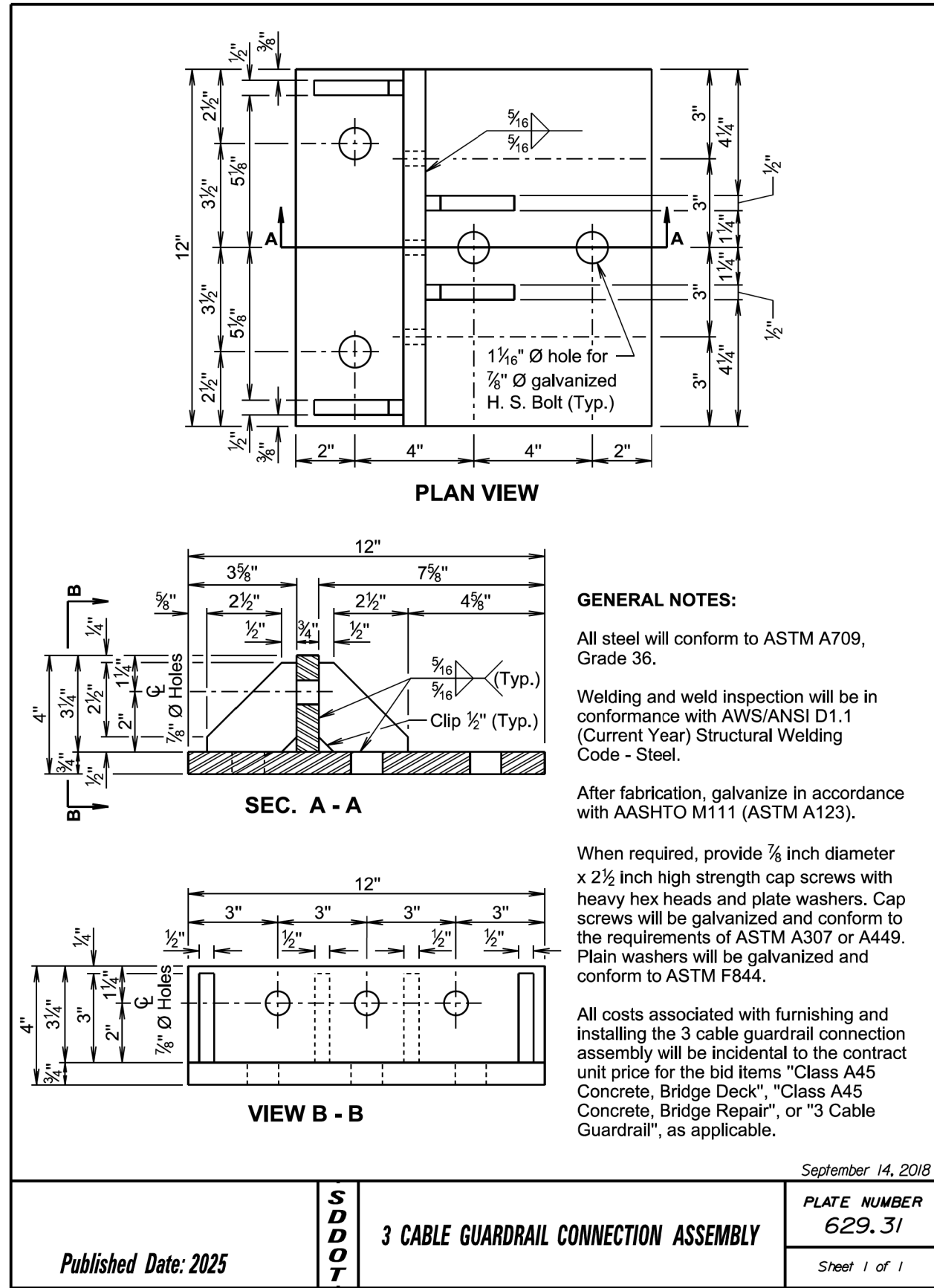
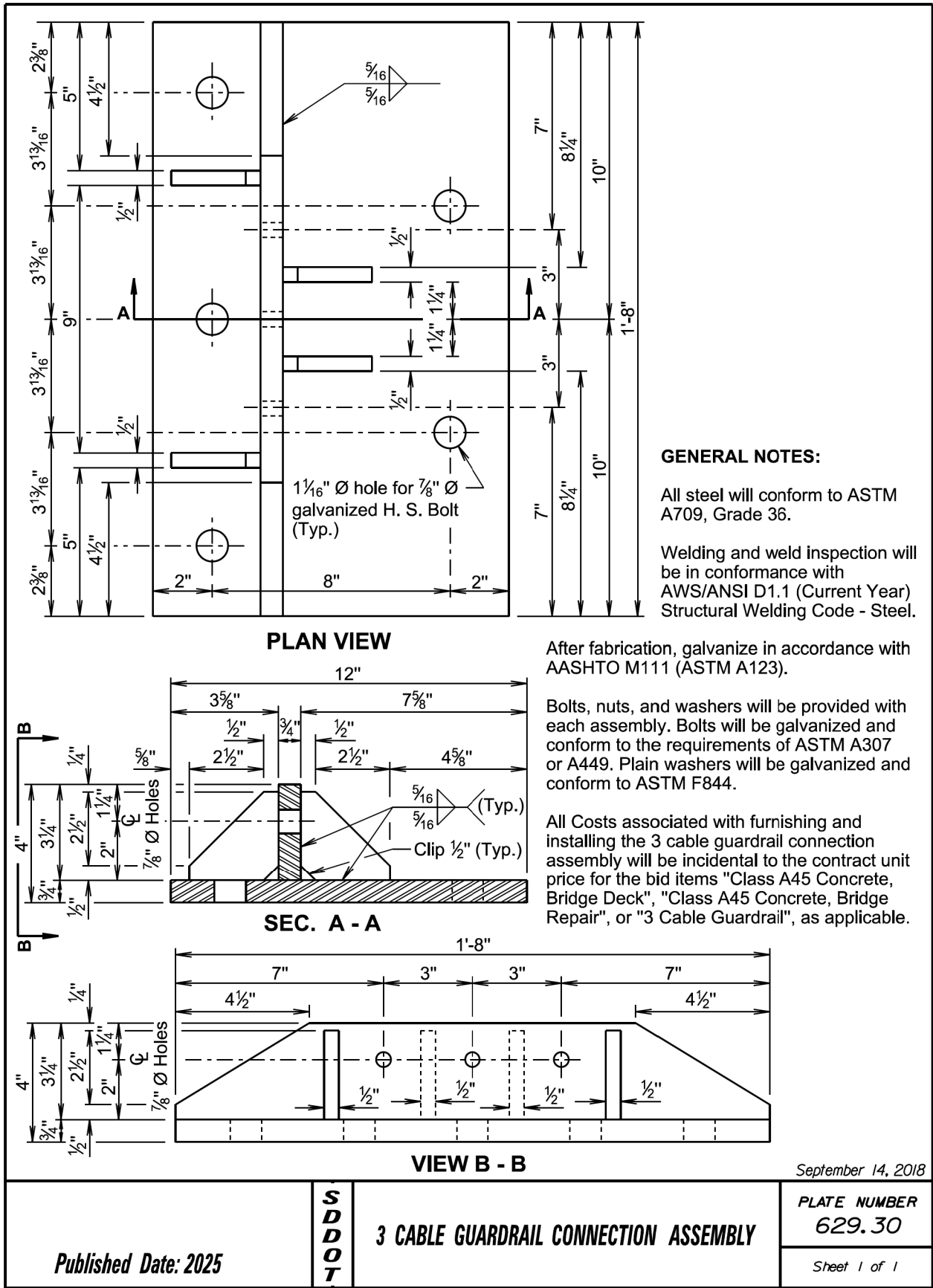
4/17/2025

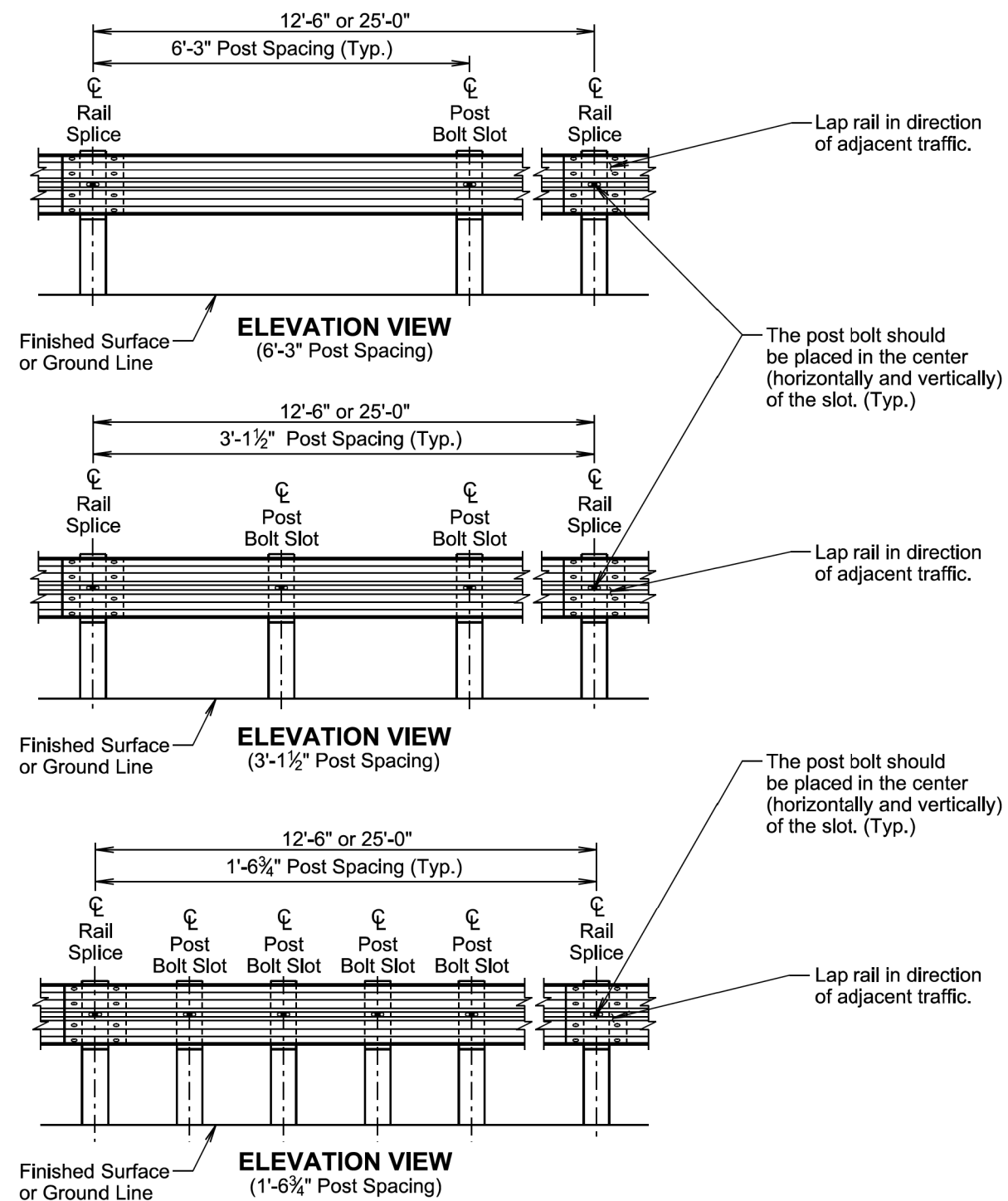


Sheet 1 of 3



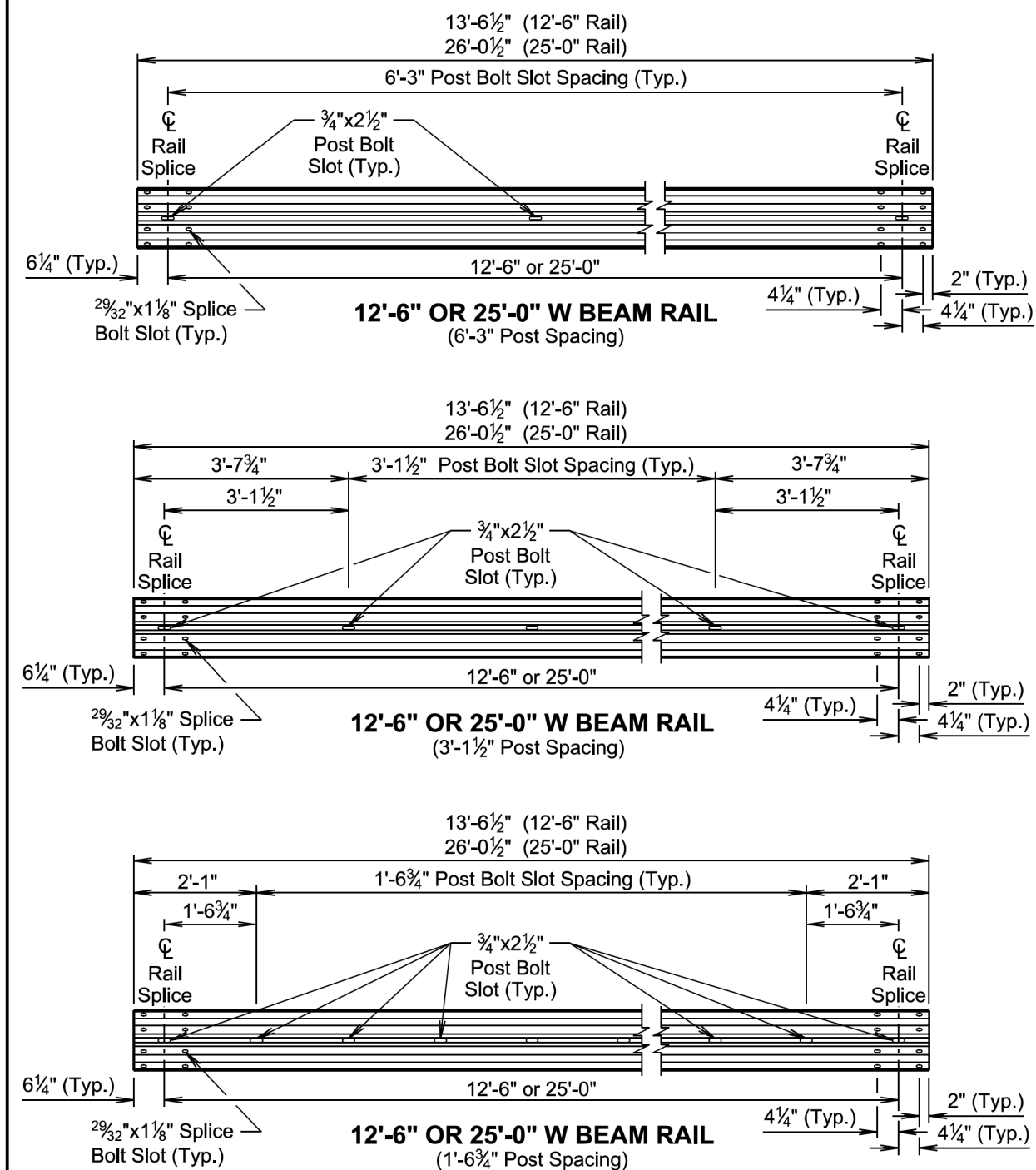
Sheet 2 of 3





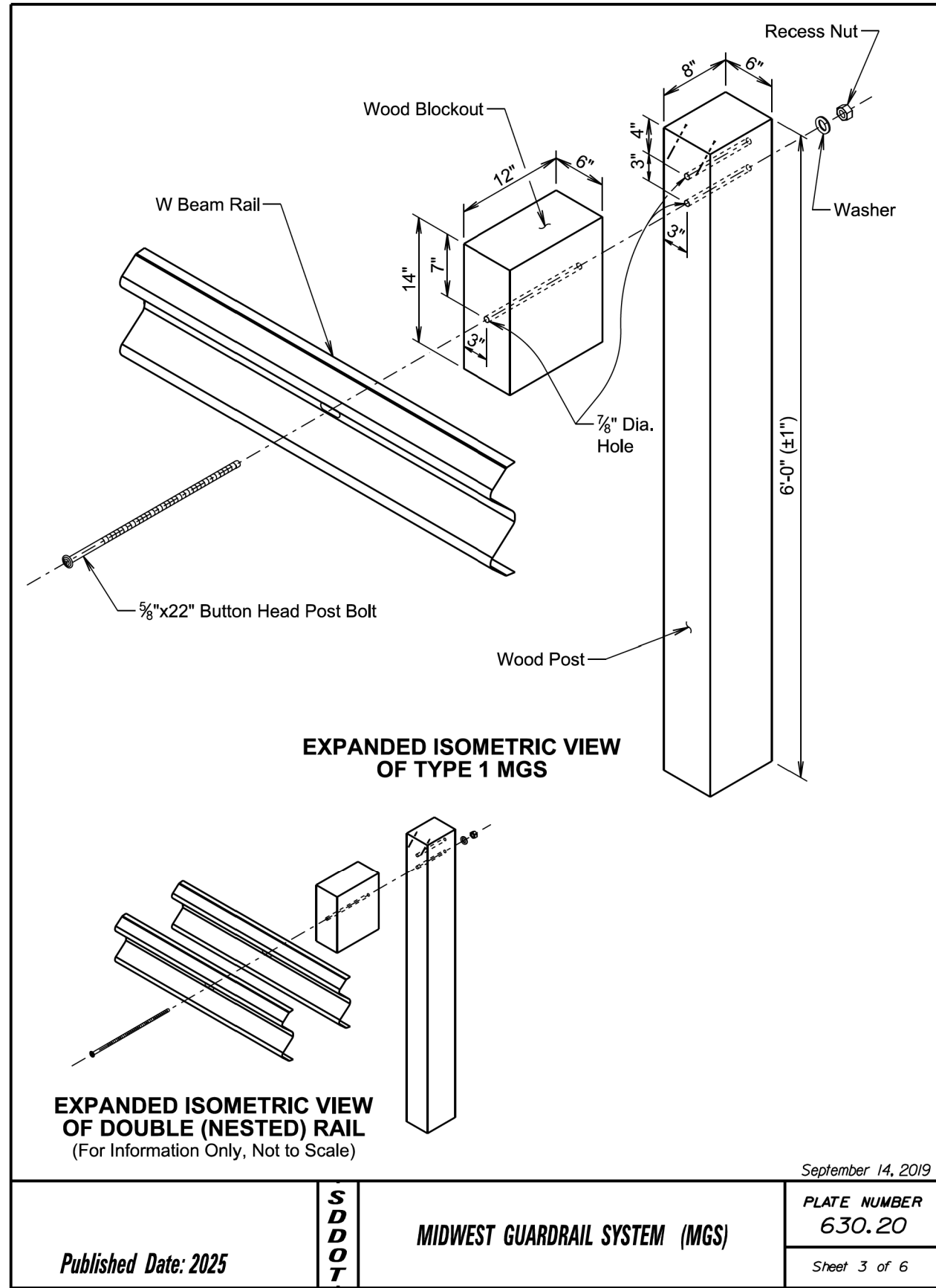
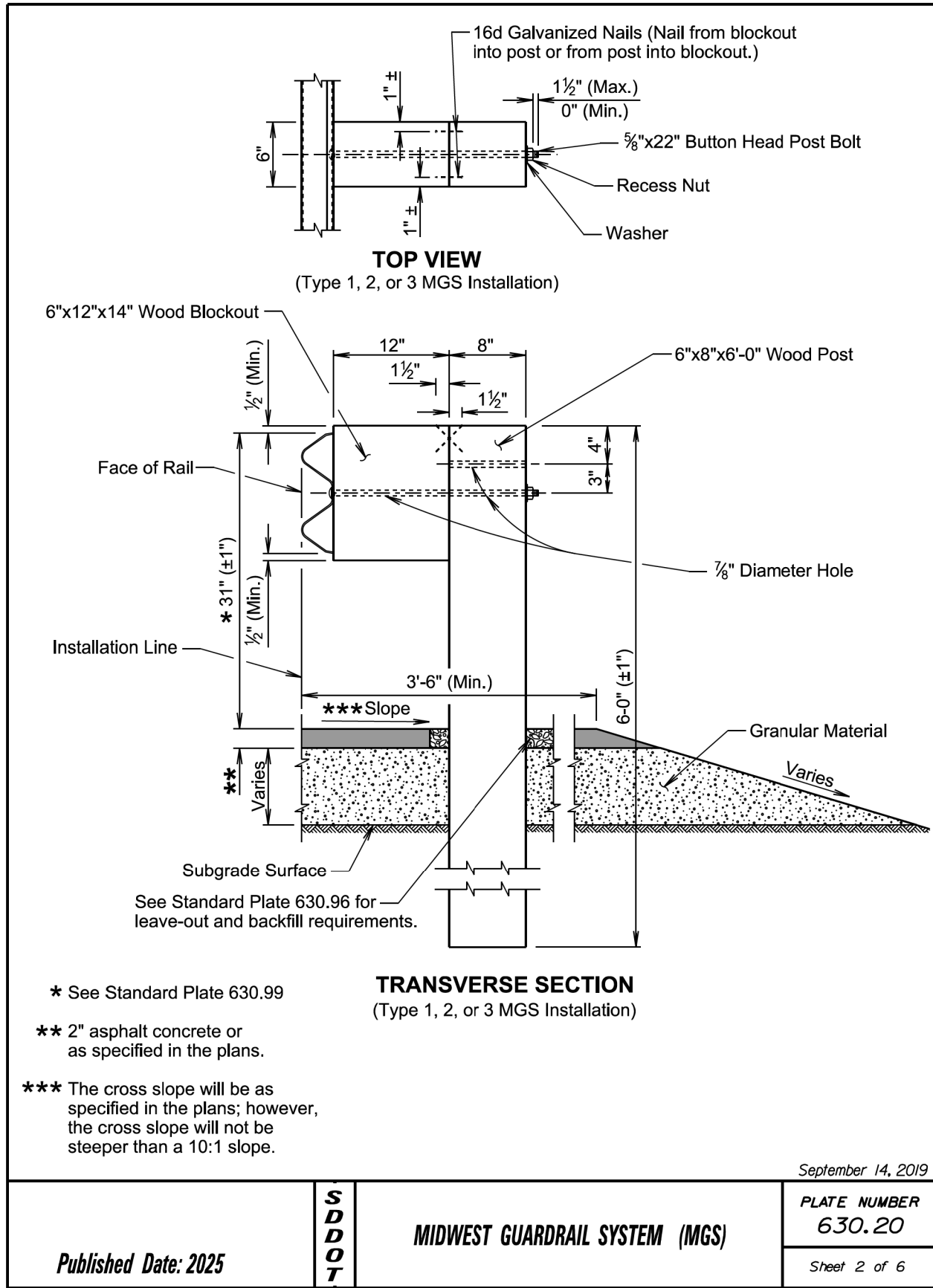
September 14, 2019

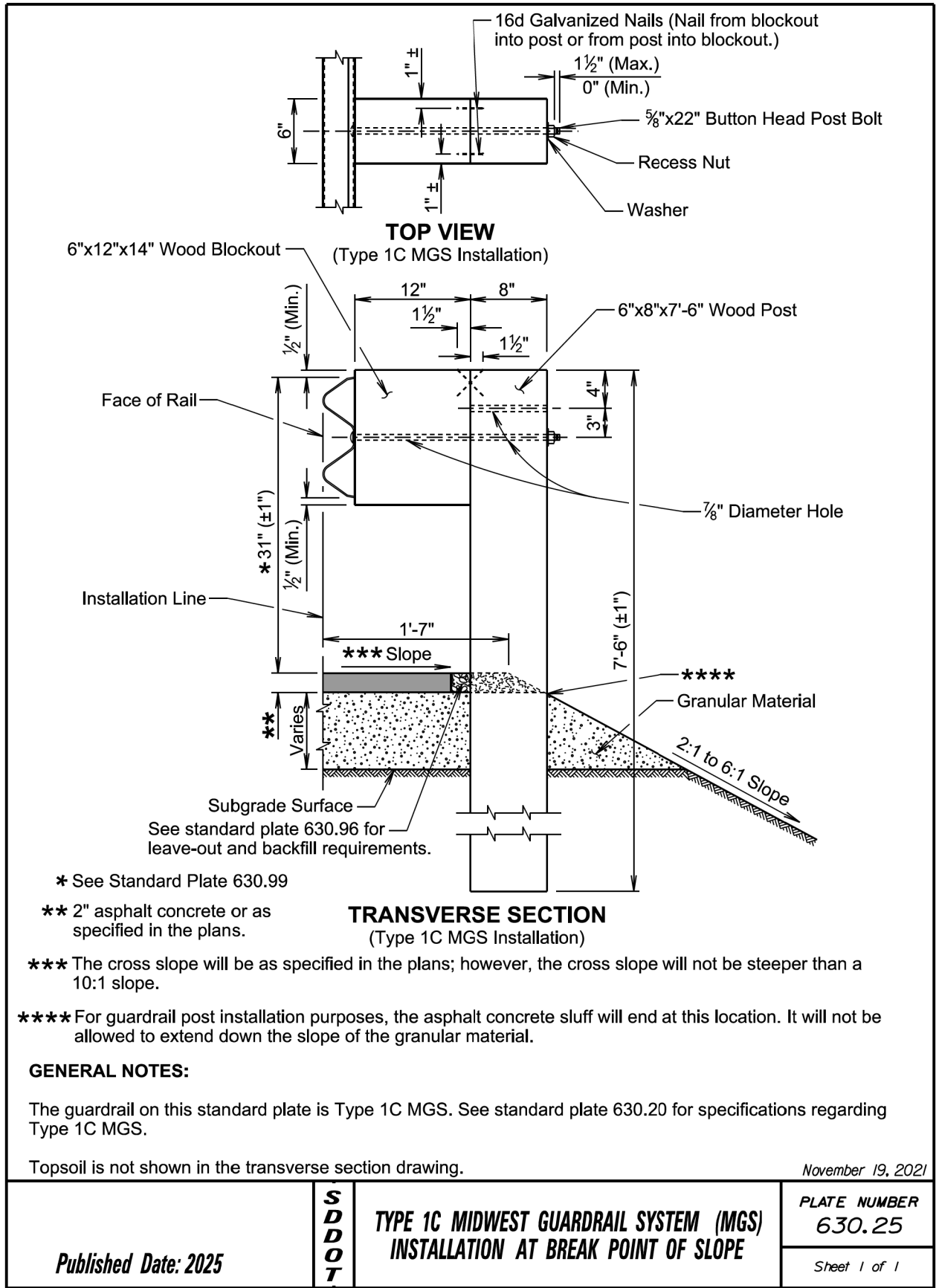
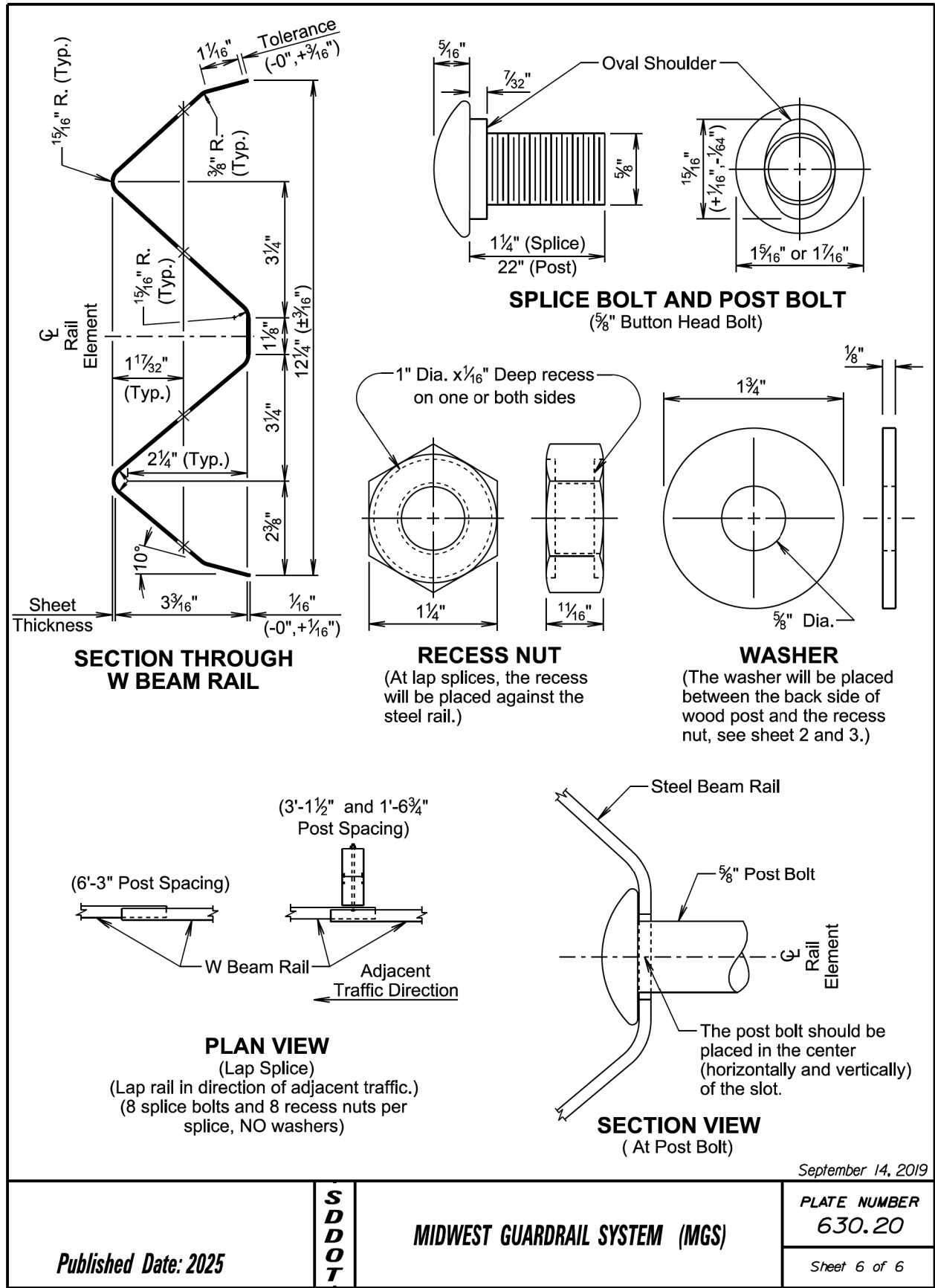
<i>Published Date: 2025</i>	S D D O T	W BEAM GUARDRAIL	PLATE NUMBER 630.10
			Sheet 3 of 5

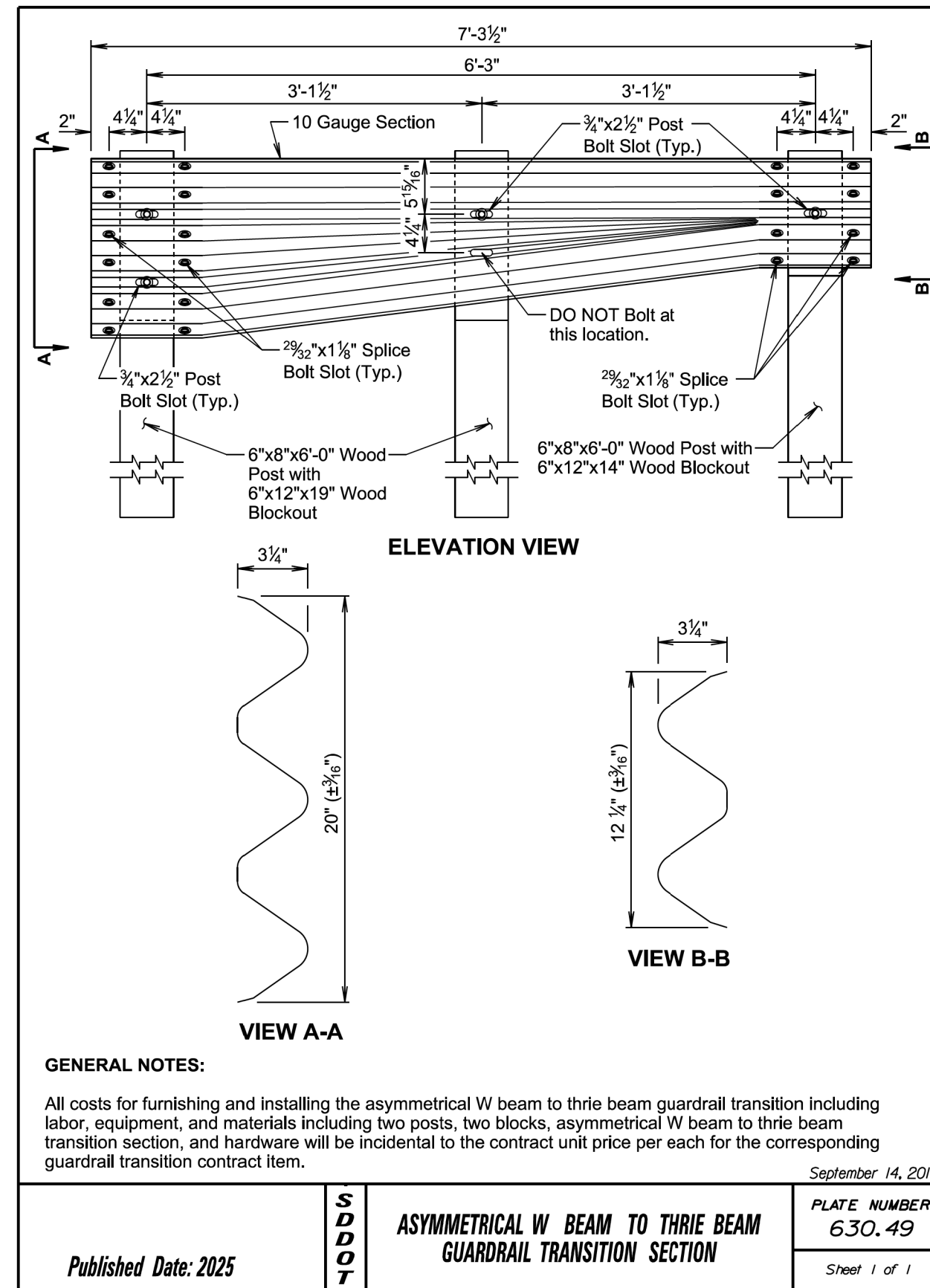
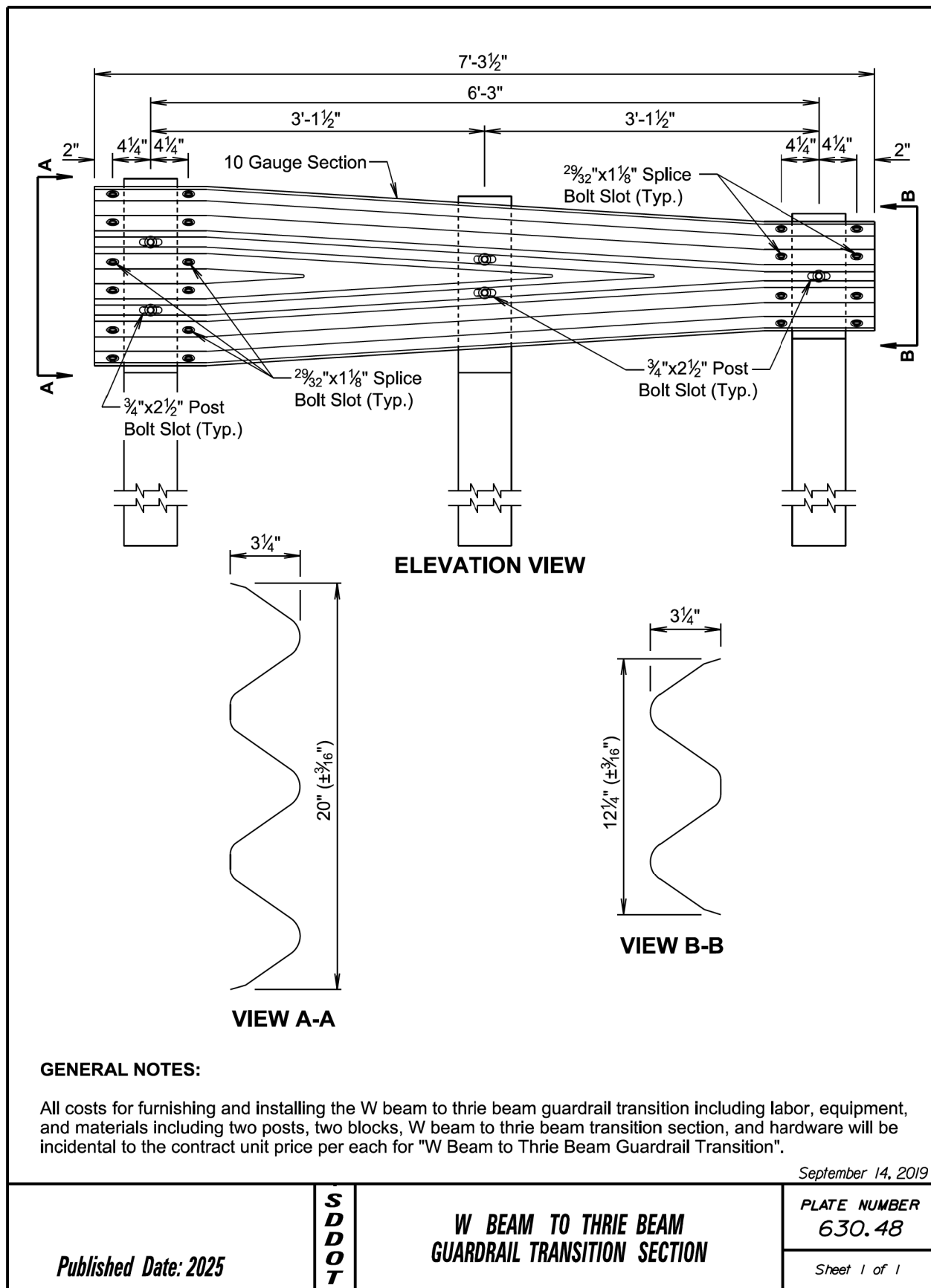


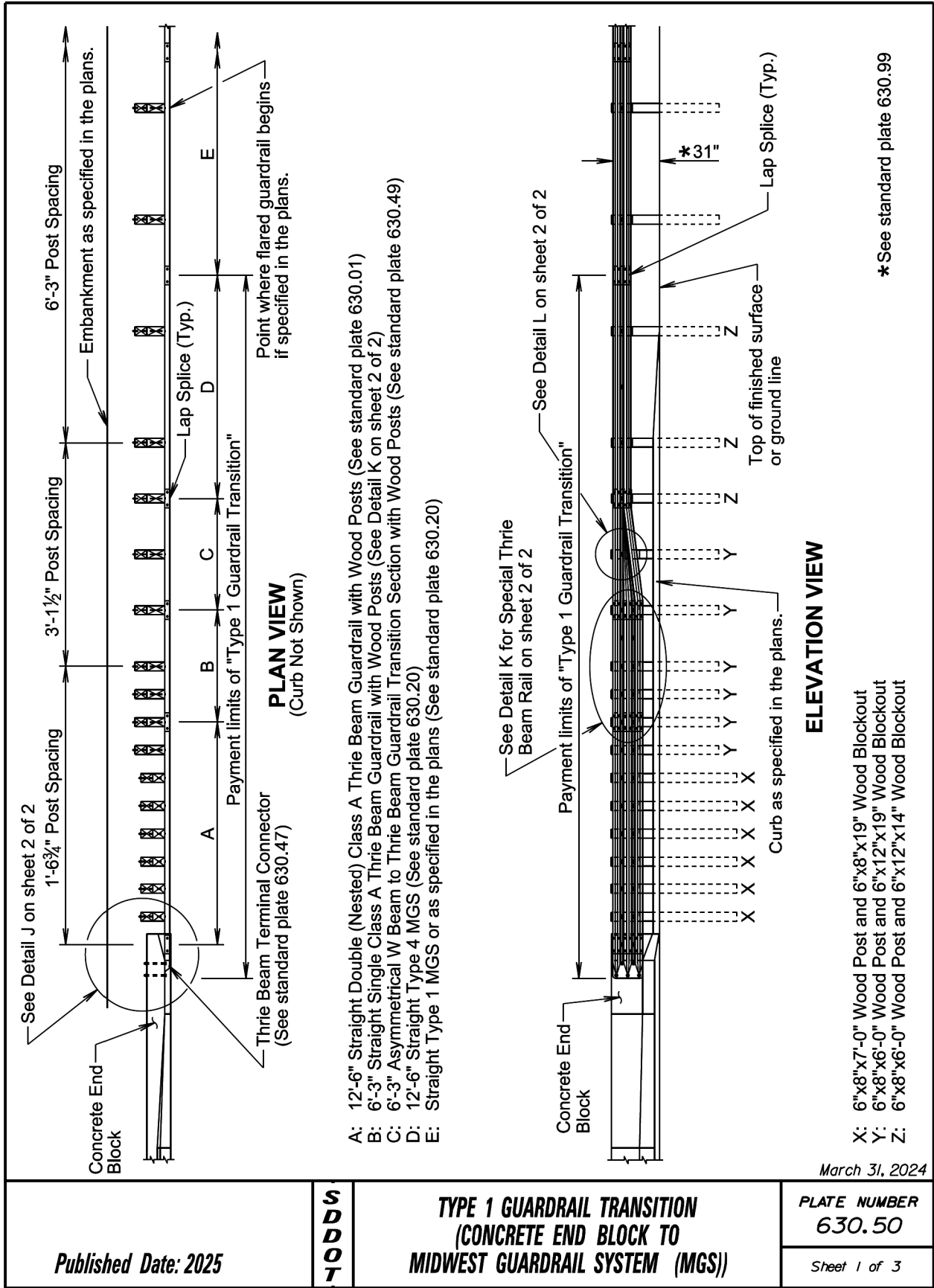
September 14, 2019

<p><i>Published Date: 2025</i></p>	<p>S D D O T</p>	<p>W BEAM GUARDRAIL</p>	<p>PLATE NUMBER 630.10</p>
			<p>Sheet 4 of 5</p>

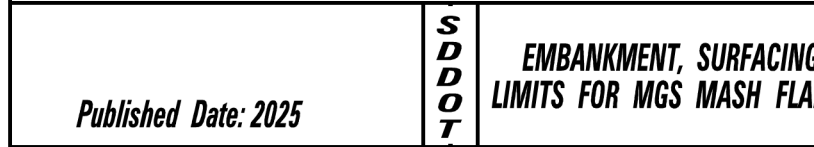






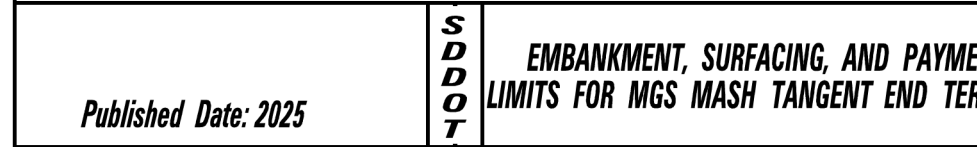


4/17/2025



The flared guardrail end terminals above are for illustrative purpose only.

- June 26, 2019



November 19, 2021

PLATE NUMBER
630.89

Sheet 1 of 2

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

- Flagger
- Channelizing Device

For low-volume traffic situations with short work zones on straight roadways where the flagger is visible to road users approaching from both directions, a single flagger may be used.

The ROAD WORK AHEAD and the END ROAD WORK signs may be omitted for short duration operations (1 hour or less).

For tack and/or flush seal operations, when flaggers are not being used, the FRESH OIL sign (W21-2) will be displayed in advance of the liquid asphalt areas.

Flashing warning lights and/or flags may be used to call attention to the advance warning signs.

The channelizing devices will be drums or 42" cones.

Channelizing devices are not required along the centerline adjacent to work area when pilot cars are utilized for escorting traffic through the work area.

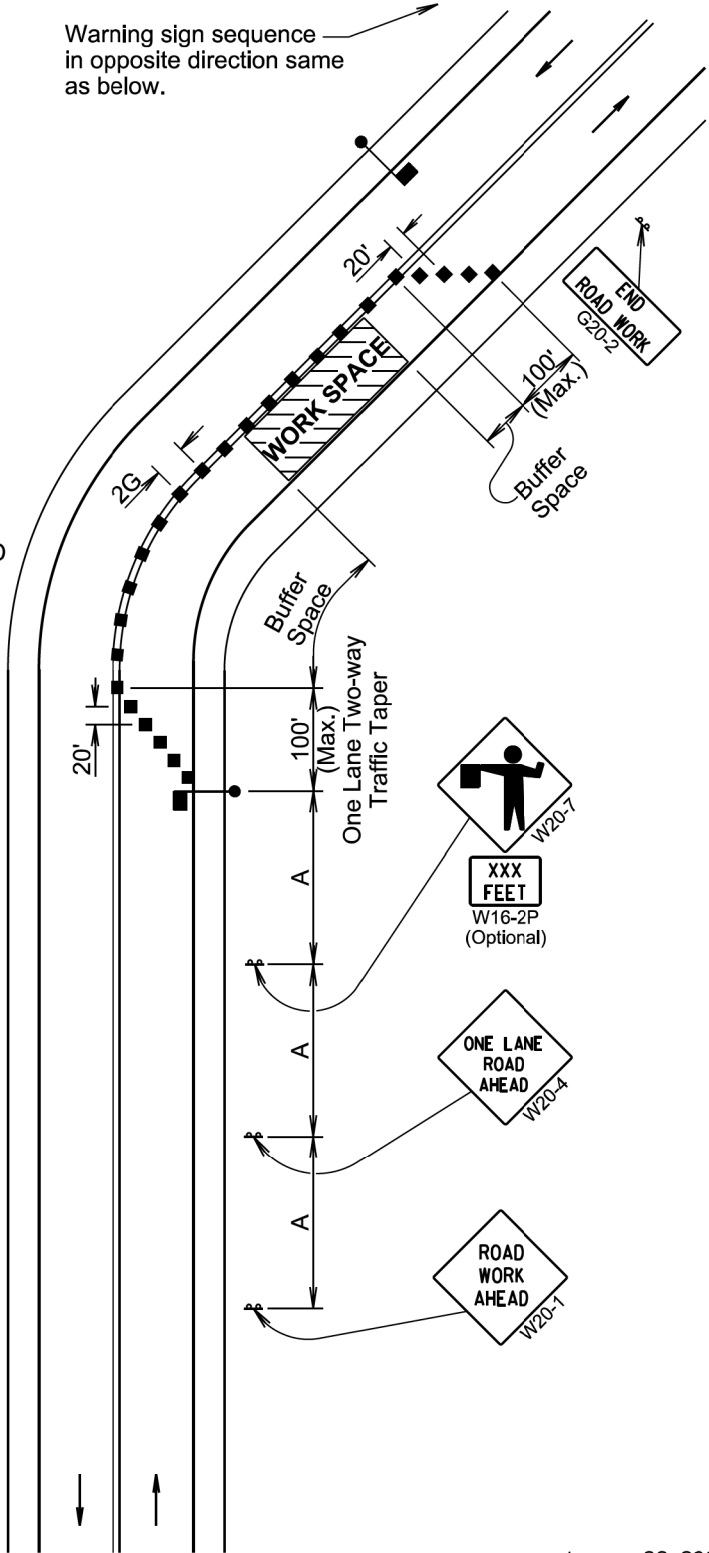
END ROAD WORK
G20-2

Channelizing devices and flaggers will be used at intersecting roads to control intersecting road traffic as required.

The buffer space should be extended so that the two-way traffic taper is placed before a horizontal or vertical curve to provide adequate sight distance for the flagger and queue of stopped vehicles.

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

Warning sign sequence in opposite direction same as below.



January 22, 2021

Published Date: 2025	SD DOT	LANE CLOSURE WITH FLAGGER PROVIDED	PLATE NUMBER
			634.23
			Sheet 1 of 1

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	500	600	25
50	500	600	50 *
55	750	660	50 *
60 - 65	1000	780	50 *

* Spacing is 40' for 42" cones.

- ⊙

 Reflectorized Drum
- Channelizing Device
- Ⓞ

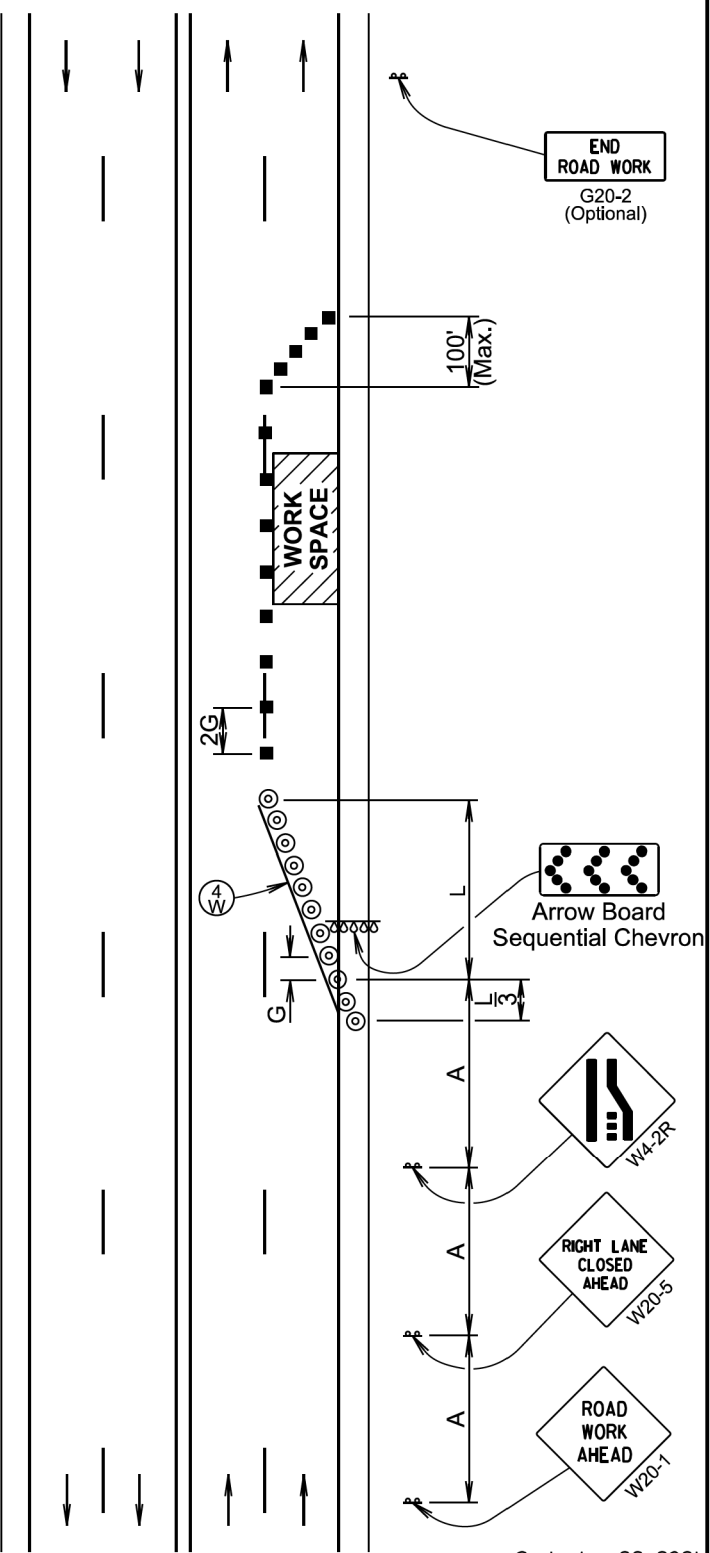
 4" White Temporary Pavement Marking

The channelizing devices will 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 will be used if traffic control must remain overnight.

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



September 22, 2021

Published Date: 2025	SD DOT	4-LANE UNDIVIDED, RIGHT LANE CLOSED	PLATE NUMBER
			634.47
			Sheet 1 of 1

