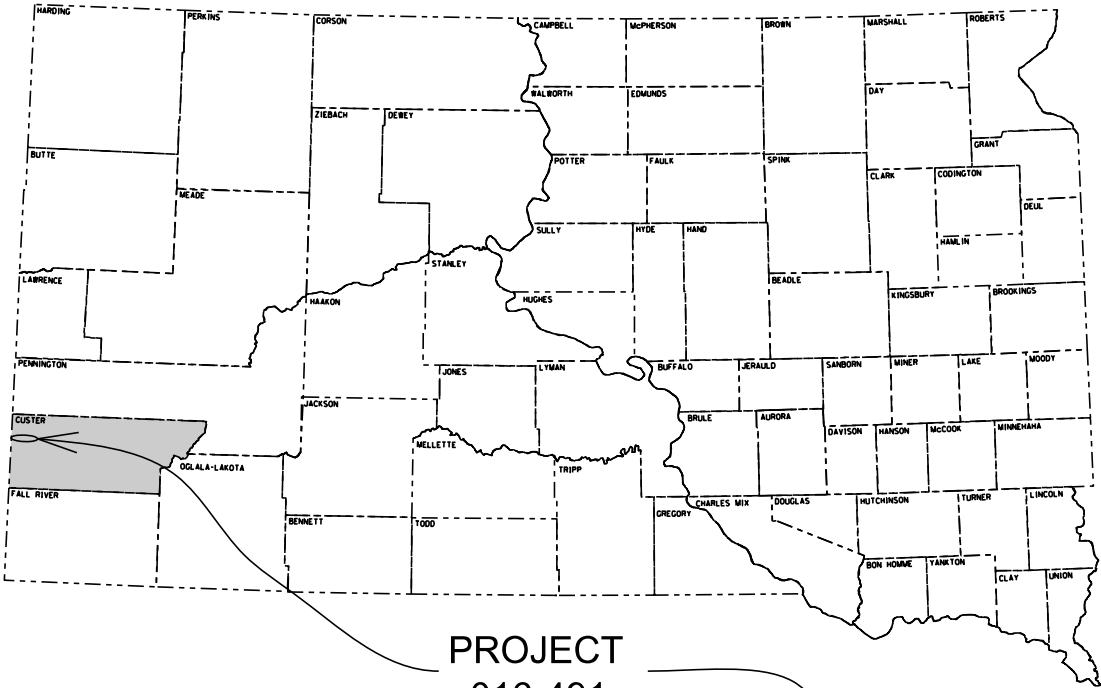


PLOT SCALE - 1"=200'

PLOTTED FROM - TRRC12608



PROJECT
016-491
MRM 0.0 TO MRM 11.1

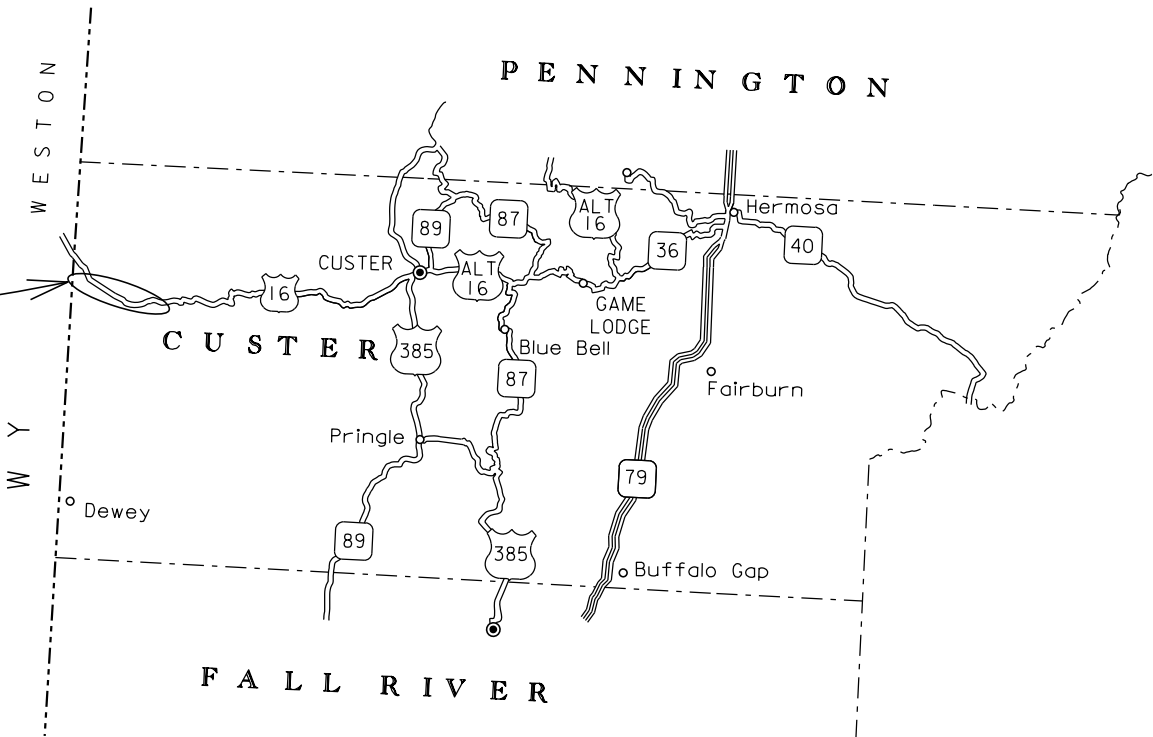
STATE OF SOUTH DAKOTA
DEPARTMENT OF TRANSPORTATION
PLANS FOR PROPOSED
PROJECT 016-491
US HIGHWAY 16
CUSTER COUNTY
PCC PAVEMENT REPAIR
PCN i5L0

STATE OF SOUTH DAKOTA	PROJECT	SHEET	TOTAL SHEETS
	016-491	1	24

Plotting Date: 05/14/2019

INDEX OF SHEETS

Sheet 1	Title Sheet
Sheets 2 - 7	Estimate of Quantities & Plan Notes
Sheet 8	Fixed Location Signs
Sheet 9 - 14	Details
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016 - 491, PCN i5L0
MRM 0.0 to MRM 11.1
DESIGN DESIGNATION

ADT (2018)	1228
ADT (2038)	1492
DHV	373
D	51%
T DHV	8.5%
T ADT	29.3%
V	65 MPH

Storm Water Permit
No Permit Required

PLOT NAME - 1

FILE - ... \2019 DESIGN\0_15L0 TITLE.DGN

ESTIMATE OF QUANTITIES

BID ITEM NUMBER	ITEM	QUANTITY	UNIT
009E0010	Mobilization	Lump Sum	LS
110E1010	Remove Asphalt Concrete Pavement	130.0	SqYd
120E0010	Unclassified Excavation	224	CuYd
260E2010	Gravel Cushion	78.0	Ton
260E5000	Shot Rock	235.0	Ton
320E1200	Asphalt Concrete Composite	20.0	Ton
380E5030	Nonreinforced PCC Pavement Repair	451.8	SqYd
380E6000	Dowel Bar	126	Each
380E6110	Insert Steel Bar in PCC Pavement	860	Each
380E6200	Tie Bar Retrofit, Stitching	390	Each
380E6310	Seal Random Cracks in PCC Pavement	3,470	Ft
390E0200	Repair Type A Spall	142.4	SqFt
633E1400	Pavement Marking Paint, 4" White	700	Ft
633E1405	Pavement Marking Paint, 4" Yellow	700	Ft
634E0010	Flagging	150.0	Hour
634E0020	Pilot Car	75.0	Hour
634E0110	Traffic Control Signs	1,496.9	SqFt
634E0120	Traffic Control, Miscellaneous	Lump Sum	LS
634E0275	Type 3 Barricade	12	Each
634E0420	Type C Advance Warning Arrow Board	2	Each
634E0600	4" Temporary Pavement Marking Tape Type I	936	Ft
831E0300	Reinforcement Fabric (MSE)	1,210	SqYd

SPECIFICATIONS

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

STATE OF SOUTH DAKOTA	PROJECT	SHEET	TOTAL SHEETS
	016-491	2	24

ENVIRONMENTAL COMMITMENTS

The SDDOT is committed to protecting the environment and uses Environmental Commitments as a communication tool for the Engineer and Contractor to ensure that attention is given to avoid, minimize, and/or mitigate an environmental impact. Environmental commitments to various agencies and the public have been made to secure approval of this project. An agency with permitting authority can delay a project if identified 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.

Additional guidance on SDDOT's Environmental Commitments can be accessed through the Environmental Procedures Manual found at: <http://www.sddot.com/resources/Manuals/EnvironProcManual.pdf>

For questions regarding change orders in the field that may have an effect on an Environmental Commitment, the Project Engineer will contact the Environmental Office at 605-773-3098 or 605-773-4336 to determine whether an environmental analysis and/or resource agency coordination is necessary.

COMMITMENT B: FEDERALLY THREATENED, ENDANGERED, AND PROTECTED SPECIES

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 pits, or staging areas associated with the project, cease construction activities in the affected area until the Whooping Crane departs and immediately contact the Project Engineer. The Project Engineer will contact the Environmental Office so that the sighting can be reported to USFWS.

COMMITMENT C: WATER SOURCE

The Contractor will not withdraw water with equipment previously used outside the State of South Dakota or previously used in aquatic invasive species waters within South Dakota without prior approval from the SDDOT Environmental Office. Thoroughly wash all construction equipment to prevent and control the introduction and spread of invasive species into the project vicinity.

Action Taken/Required:

The Contractor will obtain the necessary permits from the regulatory agencies such as the South Dakota Department of Environment and Natural Resources (DENR) and the United States Army Corps of Engineers (USACE) prior to water extraction activities.

Additional information and mapping of Aquatic Invasive Species in South Dakota can be accessed at: <http://sdleastwanted.com/maps/default.aspx>.

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 will 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 Public ROW.

The waste disposal site(s) will be managed and reclaimed in accordance with the following from the General Permit for 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) will 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 Environmental Office and the Project Engineer.

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

1. Construction and/or demolition debris consisting of concrete, asphalt concrete, or other similar materials will be buried in a trench completely separate from wood debris. The final cover over the construction and/or demolition debris will consist of a minimum of 1 foot of soil capable of supporting vegetation. Waste disposal sites provided outside of the Public ROW will be seeded in accordance with Natural Resources Conservation Service recommendations. The seeding recommendations may be obtained through the appropriate County NRCS Office. The Contractor will control the access to waste disposal sites not within the Public ROW with 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.

STATE OF SOUTH DAKOTA	PROJECT	SHEET	TOTAL SHEETS
	016-491	3	24

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) will be incidental to the various contract items.

COMMITMENT I: HISTORICAL PRESERVATION OFFICE CLEARANCES

State Historical Preservation Office (SHPO or THPO) concurrence has not been obtained for this project.

Action Taken/Required:

All earth disturbing activities require a cultural resource review prior to scheduling the pre-construction meeting. This work includes, but is not limited to: Contractor furnished material sources, material processing sites, stockpile sites, storage areas, plant sites, and waste areas.

The Contractor will arrange and pay for a record search and when necessary, a cultural resource survey. 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 if the site was previously surveyed; however, a cultural resources survey may need to be conducted by a qualified archaeologist.

The Contractor will provide ARC with the following: a topographical map or aerial view of 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 will submit the cultural resources survey report to SDDOT Environmental Office, 700 East Broadway Avenue, Pierre, SD 57501-2586. 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.

In the event of an inadvertent discovery of human remains, funerary objects, or if evidence of cultural resources is identified during project construction activities, then such activities will immediately cease and the Project Engineer will be immediately notified. The Project Engineer will contact the SDDOT Environmental Office to determine an appropriate course of action.

The Contractor is responsible for obtaining any additional permits and clearances for Contractor furnished material sources, material processing sites, stockpile sites, storage areas, plant sites, and waste areas that affect wetlands, threatened and endangered species, or waterways. The Contractor will not utilize a site known or suspected of having contaminated soil or water. The Contractor will provide the required permits and clearances to the Project Engineer at the preconstruction meeting.

COMMITMENT S: FIRE PREVENTION IN THE BLACK HILLS AREA

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

Action Taken/Required:

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

SUBGRADE REPAIR

Included in the Estimate of Quantities is Unclassified Excavation, for the necessary removal of unstable material.

Backfill shall be Shot Rock and Gravel Cushion installed in accordance with the detail for Subgrade Repair.

The MSE fabric shall be placed on the bottom and the sides of the excavated subgrade. Additional fabric shall be provided to allow for wrapping the top of the shot rock backfill. MSE fabric shall be overlapped a minimum of 2’ where seams are required. Shot rock shall be placed in lifts not to exceed 8 inches. The shot rock shall be watered and compacted by at least 4 complete vibratory roller passes per lift or to the satisfaction of the Engineer.

When the shot rock backfill has reached a compacted depth of 1.5 feet, the shot rock shall be covered with MSE fabric. Gravel Cushion shall be placed on top of the MSE fabric.

The Contactor shall saw cut the asphalt shoulder; at the lowest point of the area to be repaired, a minimum of 4’ wide to provide positive daylighted drainage through the inslope. 6” of Gravel Cushion shall be placed on top of the trench backfill. 3” of Asphalt Concrete Composite shall be placed on top of the Gravel Cushion.

SHOT ROCK

Shot Rock shall consist of broken or crushed ledge rock produced from blasting or quarrying operations. Shot Rock material utilized in subgrade stabilization shall be less than 8” in diameter with a nominal size of 4”. Gypsum may not be used as Shot Rock.

Compaction shall be to the satisfaction of the Engineer. Acceptance of Shot Rock material shall be visually inspected and may be used without further testing as directed by the Engineer.

ASPHALT CONCRETE COMPOSITE

Asphalt concrete repair may be required on shoulders adjacent to PCCP repair locations and/or on shoulders where subgrade repair is performed as per the Subgrade Repair Detail. These repair areas shall have a repaired thickness of 3”. Locations and quantities of asphalt repair are subject to change. The exact locations of replacement will be determined in the field by the Engineer. The Engineer reserves the right to adjust quantities and/or add locations at no additional cost to the state.

A Flush Seal will not be required on the asphalt concrete patching.

EXISTING PCC PAVEMENT

The existing pavement US Hwy 16 is 8” Nonreinforced PCC Pavement with limestone aggregate. Longitudinal joints are reinforced with No. 5x30” deformed tie bars spaced 30” to 48” center to center. Transverse joints are reinforced with 1 ¼” steel dowel bars spaced 12” center to center.

RESTORATION OF GRAVEL CUSHION

An inspection of the gravel cushion subgrade shall be made after removing concrete from each pavement replacement area. Areas of excess moisture shall be dried to the satisfaction of the Engineer. Loose and excess material shall be removed. Each replacement area shall be leveled and compacted to the satisfaction of the Engineer.

If additional gravel cushion material is required, the Contractor shall furnish, place and compact gravel cushion to the satisfaction of the Engineer.

All costs associated with this work, except where Subgrade Repair is required, shall be incidental to the contract unit price per square yard for “Nonreinforced PCC Pavement Repair”.

NONREINFORCED PCC PAVEMENT REPAIR

Locations and size (length or width) of concrete repair areas are subject to change in the field, at the discretion of the Engineer. There will be no increase in the contract unit price for these changes. Payment will be based on the actual area replaced.

Existing concrete pavement shall be sawed full depth at the beginning and end of the PCCP repair areas. When either the beginning or end of a PCCP repair area falls close to an existing joint or crack, the PCCP repair area shall be extended to eliminate the existing joint or crack. Where possible, new working joints shall be adjacent to existing working joints.

Existing concrete pavement in the replacement areas shall be removed by the lift out method or by means that minimize damage to the base and sides of remaining in place concrete. All removed material shall be removed from within the right-of-way by the end of the workday. Damage to adjacent concrete caused by the Contractor’s operations shall be removed and replaced at the Contractor’s expense.

If the pavement replacement area is entirely on either side of the existing contraction joint, the location of one of the working joints will be at the original location.

Upon removal of the concrete, the Engineer shall inspect for existing tie bars along the longitudinal joint to determine if tie bar installation will be required.

Concrete placed adjacent to asphalt shoulders shall be formed full depth to match the width of existing concrete pavement. Asphalt shoulders adjacent to concrete pavement replacements shall be repaired with Asphalt Concrete Composite. If rumble strips exist, they shall be formed in the asphalt to match existing.

At repair locations where the new working joint is not opposite the existing working joint, the Contractor shall place a ¼ inch preformed asphalt expansion joint material along the longitudinal joint from the existing working joint to the new working joint. The expansion joint material shall meet the requirements of AASHTO M33. Cost for this material shall be incidental to the contract unit price per square yard for “Nonreinforced PCC Pavement Repair”.

All joints (longitudinal and transverse) through and around the repair areas shall be sawed and sealed with Hot Poured Elastic Joint Sealer.

Saw cuts that extend beyond the repair area shall be minimized and filled with Hot Pour Elastic Joint Sealant at the Contractor’s expense.

New pavement thickness shall match existing pavement thickness.

The slump requirement will be limited to 3” maximum after water reducer is added and the concrete shall contain 4.5% to 7.0% entrained air. Coarse aggregate shall be crushed ledge rock, Size No. 1, unless an alternative gradation is approved by the concrete engineer as part of the mix design submittal. The concrete mixture shall contain a minimum of 50% coarse

aggregate by weight. The concrete mix shall contain at least 600 lbs. of type I, II or III cement per cubic yard. The minimum 28 day compressive strength

shall be 4,000 psi. The Contractor is responsible for the mix design used. The Contractor may need to modify the mix design to meet contract time requirements on the project. The Contractor shall submit a mix design and supporting documentation for approval at least 2 weeks prior to use.

The use of a high range water reducer at manufacturer’s recommended dosage will be required.

Concrete shall be cured with white pigmented curing compound applied as soon as practical at a rate of 125 square feet per gallon. Concrete shall be cured for a minimum of 48 hours before opening to traffic. The 48 hours is based upon a concrete surface temperature of 60 degrees Fahrenheit or higher throughout the cure period. If the concrete temperature falls below 60 degrees Fahrenheit, the cure time shall be extended or other measures shall be taken, at no additional cost to the State. In addition to the curing requirements, strength of 4,000 psi must be obtained prior to opening to traffic.

The initial contraction joint sawing shall be performed as soon practical to avoid random cracking.

All costs for performing this work including sawing and removing concrete, furnishing and placing concrete, #5 tie bars cast in place, curing, sawing and sealing joints, labor, tools and equipment shall be incidental to the contract unit price per square yard for “Nonreinforced PCC Pavement Repair”.

STEEL BAR INSERTION

Locations and quantities of concrete repair are subject to change in the field at the discretion of the Engineer. The Contractor will be responsible for ordering the actual quantity of steel bars necessary to complete the work.

A rigid frame or mechanical device will be required to guide the drill to ensure proper horizontal and vertical alignment of the steel bars in the drilled holes.

RUMBLE STRIPS

The Contractor shall install shoulder rumble strips as necessary in locations of PCC Pavement Repair. See Standard Plate 380.15.

REPAIR TYPE A SPALL

Locations and size (length or width) of concrete spall repair areas are subject to change in the field, at the discretion of the Engineer, at no additional cost to the state. The minimum dimension of the repair area shall be 6”. Payment will be based on actual area replaced.

Concrete Patch Material shall be Type III conforming to Section 390.2 B.3.

Spalls which are repaired according to plans and specifications and exhibit partial respalling or cracking, shall be repaired to the satisfaction of the Engineer at no additional cost to the Department of Transportation.

TABLE OF PCCP REPAIR

				Length	Width	8" Nonreinforced PCC Pavement Repair	No. 5 Deformed Tie Bar	No. 9 Deformed Tie Bar	1 ½" Bar	Insert Steel Bar in PCC Pavement	Dowel Bar
HWY	MRM	Displacement	Location	Ft	Ft	SqYd	Each	Each	Each	Each	Each
* 16	0.00	0.190	EBDL	20	14	31.1	8	0	28	36	14
* 16	0.00	0.190	WBDL	20	14	31.1	8	0	28	36	14
16	0.00	0.520	EBDL	7	14	10.9	2	14	14	30	0
16	0.00	0.520	WBDL	7	14	10.9	0	14	14	28	0
16	0.00	0.565	EBDL	20	14	31.1	8	0	28	36	14
16	0.00	0.565	WBDL	10	14	15.6	4	0	28	32	0
16	1.00	0.739	EBDL	6	6	4.0	4	6	6	16	0
16	1.00	0.739	WBDL	6	14	9.3	2	14	14	30	0
16	4.00	0.992	WBDL	6	14	9.3	2	14	14	30	0
16	4.00	0.992	EBDL	6	12	8.0	2	12	12	26	0
16	4.00	0.992	EBSL	6	12	8.0	0	12	12	24	0
16	6.00	0.239	WBDL	6	14	9.3	0	14	14	28	0
16	6.00	0.239	EBDL	36	14	56.0	14	14	14	42	28
16	7.00	0.658	WBDL	10	14	15.6	4	14	14	32	0
16	7.00	0.658	EBDL	10	14	15.6	0	14	14	28	0
16	7.00	0.691	EBDL	6	14	9.3	2	14	14	30	0
* 16	7.00	0.803	EBDL	6	14	9.3	2	14	14	30	0
* 16	7.00	0.803	WBDL	6	14	9.3	0	14	14	28	0
16	8.00	0.002	WBDL	6	14	9.3	0	14	14	28	0
16	8.00	0.002	EBDL	14	14	21.8	5	14	14	33	0
16	8.00	0.642	WBDL	66	14	102.7	26	14	14	54	42
16	9.00	0.838	WBDL	6	14	9.3	2	14	14	30	0
16	9.00	0.838	EBDL	6	14	9.3	0	14	14	28	0
16	10.00	0.213	EBSL	8	4	3.6	3	4	4	11	0
16	10.00	0.216	EBSL	7	4	3.1	2	4	4	10	0
16	10.00	0.219	EBSL	6	5	3.3	2	5	5	12	0
16	10.00	0.318	EBSL	6	12	8.0	2	12	12	26	0
16	10.00	0.614	WBDL	20	14	31.1	8	0	28	36	14
16	10.00	0.614	EBDL	6	14	9.3	2	12	12	26	0
16	10.00	0.614	EBSL	6	14	9.3	0	12	12	24	0
Total:						451.8	114	303	443	860	126

EB = Eastbound; WB = Westbound; DL= Drive Lane; SL= Slow Lane
* Bump location. Use a stringline to identify and isolate the PCCP panel repair area.

TABLE OF SUBGRADE REPAIR

				Unclassified Excavation	Gravel Cushion	Shot Rock	MSE Reinforcement Fabric
HWY	MRM	Displacement	Location	Cu. yds.	Ton	Ton	Sq. Yd.
16	0.00	0.190	EBDL	23.7	8	25	140
16	0.00	0.190	WBDL	23.7	8	25	140
16	0.00	0.565	EBDL	23.7	8	25	140
16	6.00	0.239	EBDL	40.3	14	42	240
16	8.00	0.002	EBDL	17.5	6	18	110
16	8.00	0.642	WBDL	71.4	25	75	300
16	10.00	0.614	WBDL	23.7	8	25	140
Totals:				224.0	78	235	1210

TABLE OF SPALL REPAIR

			Estimated Number of Locations	Type A Spall Repair
MRM	to	MRM	Each	SqFt
0	to	1	25	15.3
1	to	2	30	18.8
2	to	3	25	12.0
3	to	4	8	5.0
4	to	5	17	10.0
5	to	6	20	13.0
6	to	7	16	8.0
7	to	8	19	8.3
8	to	9	15	10.0
9	to	10	18	14.0
10	to	11	45	28.0
Subtotal:				142.4

TABLE OF RETROFITTING TIE BARS & SEAL RANDOM CRACKS IN PCCP

			Estimated Number of Locations	Tie Bar Retrofit, Stitching	Seal Random Cracks in PCC Pavement
MRM	to	MRM	Each	Each	Ft
0	to	1	6	120	240
1	to	2	5	10	100
2	to	3	5	10	100
3	to	4	5	10	100
4	to	5	8	50	150
5	to	6	10	50	160
6	to	7	22	20	300
7	to	8	50	40	800
8	to	9	30	15	160
9	to	10	5	30	160
10	to	11	50	35	1200
Subtotals:				390	3470

RETROFITTING TIE BARS (STITCHING)

Drilling of holes and epoxy resin adhesive shall conform to Section 380. Steel bars shall conform to Section 1010.

Tie Bar Retrofit, Stitching shall be done on longitudinal joints and random cracks as marked out by the Engineer.

The Contractor shall insert No. 5 epoxy coated deformed tie bars into drilled holes in the existing concrete pavement. An epoxy resin adhesive must be used to anchor the steel bar in the drilled hole. A rotary drill or other approved drill shall be used that will not damage the concrete surface. The diameter of the disturbed surface from drilling shall be less than 2 inches. A rigid frame or mechanical device will be required to guide the drill to ensure the proper angle of the steel bars in the drilled holes

The diameter of the drilled holes in the existing concrete pavement for the steel bars shall not be less than 1/8 inch nor more than 3/8 inch greater than the overall diameter of the steel bar. The holes shall be drilled at an angle alternating from opposite sides of the joint to produce a cross-stitching pattern.

Fill the drilled holes sufficiently with epoxy prior to the insertion of the tie bar such that the epoxy will be level with the top of the concrete pavement after insertion of the tie bar. Rotate the steel bar during insertion to eliminate voids and ensure complete bonding of the bar. Insertion of the bars by the dipping method will not be allowed. The top of the drilled hole shall be filled with epoxy or excess epoxy removed such that the epoxy is level with the existing pavement.

No bars shall be inserted within 15 inches of an existing transverse contraction joint. Any bars not functioning or damaged shall be repaired or replaced at the Contractor's expense

Cost for the epoxy resin adhesive, tie bars, drilling of holes, debris or loose material removal, applying the adhesive, inserting the tie bars into the drilled holes and incidentals necessary for the insertion of the tie bars shall be included in the contract unit price per each for "Tie Bar Retrofit, Stitching".

PERMANENT PAVEMENT MARKING – GENERAL NOTES

The Contractor shall survey and mark the location of no passing zones prior to covering pavement marking.

The Contractor shall repaint all the existing pavement marking paint; where damaged or removed due to repair work activities, including centerline, edge line, lane lines, arrows, gore areas, etc. The Contractor will be required to inventory and mark, with appropriately colored tabs, the extent and location of the existing word messages, turn arrows, stop bars, railroad crossings, pedestrian crossings, gore areas, etc. before the markings are obliterated. Locations of pavement marking tape shall be masked. The Contractor shall provide a copy of the pavement marking inventory to the Engineer. All costs associated with this work shall be incidental to the various pavement marking bid items.

Striper and advance and trailing warning vehicles shall be equipped with flashing amber or arrow panel warning lights.

WATERBORNE PAVEMENT MARKING PAINT WITH HIGH GRADE POLYMER

All materials shall be applied as per manufacturer's recommendations.

This material shall consist of a durable high build, low VOC, fast drying, waterborne traffic paint with a 100% acrylic polymer (Dow DT-400 or Dow HD-21A or equivalent). The Contractor shall provide certification that the material is one of the following products or an equivalent as approved by the Operations Traffic Engineer:

Diamond Vogel's Waterborne High Build Polymer Marking Paint
Ennis-Flint's High Build Polymer Marking Paint

No further testing of this material will be required. Reflective media consisting f glass beads as well as bonded core reflective elements shall be adhered to the paint.

The bonded core reflective elements shall contain either clear or yellow tinted microcrystalline ceramic beads bonded to the outer surface. All microcrystalline ceramic beads bonded to reflective elements shall have a minimum index of refraction of 1.8 when tested using the liquid oil immersion method.

RATES OF MATERIALS FOR WATERBORNE PAVEMENT MARKING PAINT WITH HIGH GRADE POLYMER

Solid 4" line = 27.8 Gals/Mile
Glass Beads = 5.3 Lbs/Gal.
Composite Reflective Elements = 2.1 Lbs/Gal.

Pavement Marking Paint shall be Waterborne Pavement Marking Paint with High Grade Polymer. All cost for materials, labor and equipment necessary to furnish and install the pavement markings shall be incidental to the contract unit price per foot for "Pavement Marking Paint, 4" White" or Pavement Marking Paint, Yellow".

TABLE OF PAVEMENT MARKING QUANTITIES

PCN	Highway	4"	4"	For Information only	
		Pavement Marking Paint, White (Ft.)	Pavement Marking Paint, Yellow (Ft.)	Waterborne Pavement Marking Paint, White (Gallons)	Waterborne Pavement Marking Paint, Yellow (Gallons)
i5L0	US 16	700	700	3.7	3.7
				3.7	3.7

TEMPORARY PAVEMENT MARKING

Temporary Flexible Vertical Markers (Tabs) shall be used for all markings as shown in the plans other than the temporary stop bars, or as directed by the Engineer.

Temporary Flexible Vertical Markers (Tabs) shall be used for lane closure tapers or lane shift tapers and shall be installed at 5' spacing. Tabs used for tapers and shifts will not be measured for payment. All costs associated to furnish, install, maintain (including replacement as required by the Engineer at no added cost to the Department), and remove all markers will be incidental to the contract lump sum price for Traffic Control, Miscellaneous.

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TEMPORARY PAVEMENT MARKING TAPE TYPE 1

Temporary pavement marking tape Type 1 shall be used for the 24" white stop bars.

All costs to furnish, install, maintain (including replacement as required by the Engineer at no added cost to the Department), and remove the temporary pavement marking tape type 1 shall be included in the contract price per foot per 4" line or equivalent for 4" Temporary Pavement Marking Tape Type 1.

PCN	Highway	4" Temporary Pavement Marking Tape Type 1 (Ft.)
i5L0	US 16	936

TRAFFIC CONTROL – GENERAL NOTES

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.

No work will be allowed during hours of darkness as defined by the Specifications.

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.

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.

At no time shall mainline traffic be exposed to differential elevations in traveling lanes due either to milling or paving operations. All lanes that are milled or paved shall be left closed until the adjacent lane is completed in a similar manner with no drop offs. All transitions shall be paved for a smooth ride as approved by the Engineer.

The Contractor shall keep the portion of the project being used by public traffic in a condition that will adequately and safely accommodate traffic.

Road Work Ahead (W20-1) signs shall be placed at applicable intersecting roads and as directed by the Engineer.

TRAFFIC CONTROL – GENERAL NOTES (CONTINUED)

A Type 3 Barricade shall be installed as per the details in these plans and at a minimum spacing of 2000’ within the lane closure. Three drums shall be placed across the lane closure in front of any open concrete panel repair area, as directed by the Engineer.

Traffic shall not be delayed for a period longer than 15 minutes.

A maximum of 4 overnight traffic control setups; inclusive of a State furnished portable traffic signal setup, will be allowed at one time. Locations shall be chosen so spacing can be maximized between setups. Any one closure shall not exceed 600’ as shown on Standard Plate 634.25 (or 1500’ within a portable traffic signal setup). Additional flagger setups may be used in addition to the 4 overnight setups for sawing if needed.

STATE FURNISHED PORTABLE TRAFFIC SIGNALS

The State shall furnish 2 Portable Traffic Signals (one set-up). Contractor shall coordinate with the Engineer for location setups. The signals may be used for the duration of the project excluding July 22nd through August 26th. Signal set up, light timing and maintenance shall be determined and managed by the Engineer.

The cost for relocation of the State Furnished Traffic Control Signals shall be incidental to the lump sum unit price for “Traffic Control, Miscellaneous.”

SHEETING FOR TRAFFIC CONTROL SIGNS

All fluorescent orange background material on traffic control signs, all temporary delineators, and all temporary STOP (R1-1), YIELD (R1-2), DO NOT ENTER (R5-1), and WRONG WAY (R5-1a) signs will conform to the requirements of ASTM D4956 Type IX or XI. All other traffic control signs and background colors will conform to the requirements of ASTM D4956 Type IV.

INVENTORY OF TRAFFIC CONTROL DEVICES

SIGN CODE	SIGN DESCRIPTION	CONVENTIONAL ROAD			
		NUMBER	SIGN SIZE	SQFT PER SIGN	SQFT
R1-1	STOP	7	30"	5.2	36.4
R10-6	STOP HERE ON RED	2	24" x 36"	6.0	12.0
W1-4	REVERSE CURVE (L or R)	6	48" x 48"	16.0	96.0
W3-1	STOP AHEAD (symbol)	6	48" x 48"	16.0	96.0
W3-3	SIGNAL AHEAD (symbol)	2	48" x 48"	16.0	32.0
W3-4	BE PREPARED TO STOP	6	48" x 48"	16.0	96.0
W4-2	LEFT or RIGHT LANE ENDS (symbol)	6	48" x 48"	16.0	96.0
W13-1P	ADVISORY SPEED (plaque)	10	30" x 30"	6.3	63.0
W16-2P	FEET (supplemental distance plaque)	4	30" x 24"	5.0	20.0
W20-1	ROAD WORK AHEAD	28	48" x 48"	16.0	448.0
W20-4	ONE LANE ROAD AHEAD	10	48" x 48"	16.0	160.0
W20-5	LEFT or RIGHT LANE CLOSED AHEAD	6	48" x 48"	16.0	96.0
W20-7	FLAGGER (symbol)	6	48" x 48"	16.0	96.0
W21-5	SHOULDER WORK	4	48" x 48"	16.0	64.0
G20-2	END ROAD WORK	19	36" x 18"	4.5	85.5
		CONVENTIONAL ROAD TRAFFIC CONTROL SIGNS SQFT			
		1496.9			

TYPE 3 BARRICADES

ITEM DESCRIPTION	QUANTITY
Type 3 Barricade	12 Each

ARROW BOARDS

ITEM DESCRIPTION	QUANTITY
Type C Advance Warning Arrow Board	2 Each

SEQUENCE OF OPERATIONS

1. Set up traffic control to close one lane.
2. Complete concrete repair.
3. Install Permanent Pavement Marking.
4. Remove traffic control.

OVERWIDTH TRAFFIC

The Contractor shall maintain a minimum width of 16’ for the travel lanes at all times.

PRESS RELEASE ANNOUNCEMENTS

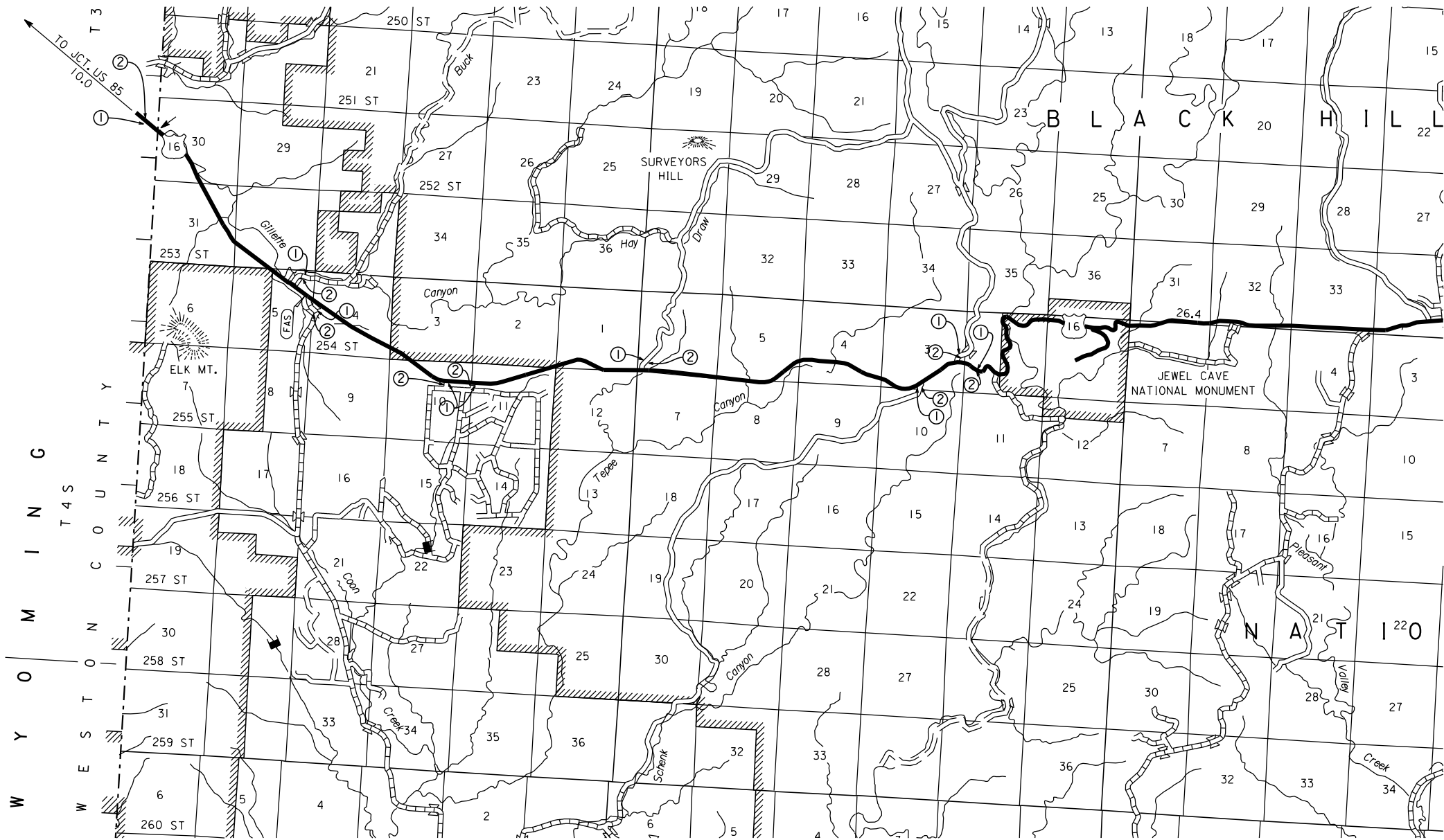
The SDDOT will prepare a Press Release to be released 5 days prior to any phase change or any other major change that affects traffic flow. The SDDOT will be responsible to keep law enforcement, emergency services, and the traveling public notified of changes in project access. The Contractor shall provide the Engineer with pertinent information 7 days prior to any phase change or any other major changes that affect traffic flow.

STATE OF SOUTH DAKOTA	PROJECT	SHEET	TOTAL SHEETS
	016-491	7	24

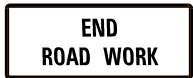
STATE OF SOUTH DAKOTA	PROJECT	SHEET NO.	TOTAL SHEETS
	016-491	8	24

Plotting Date: 05/14/2019

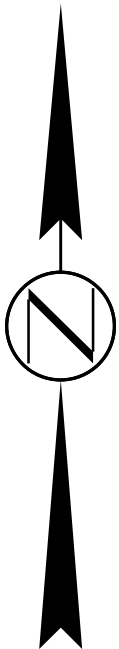
Fixed Location Signs



①



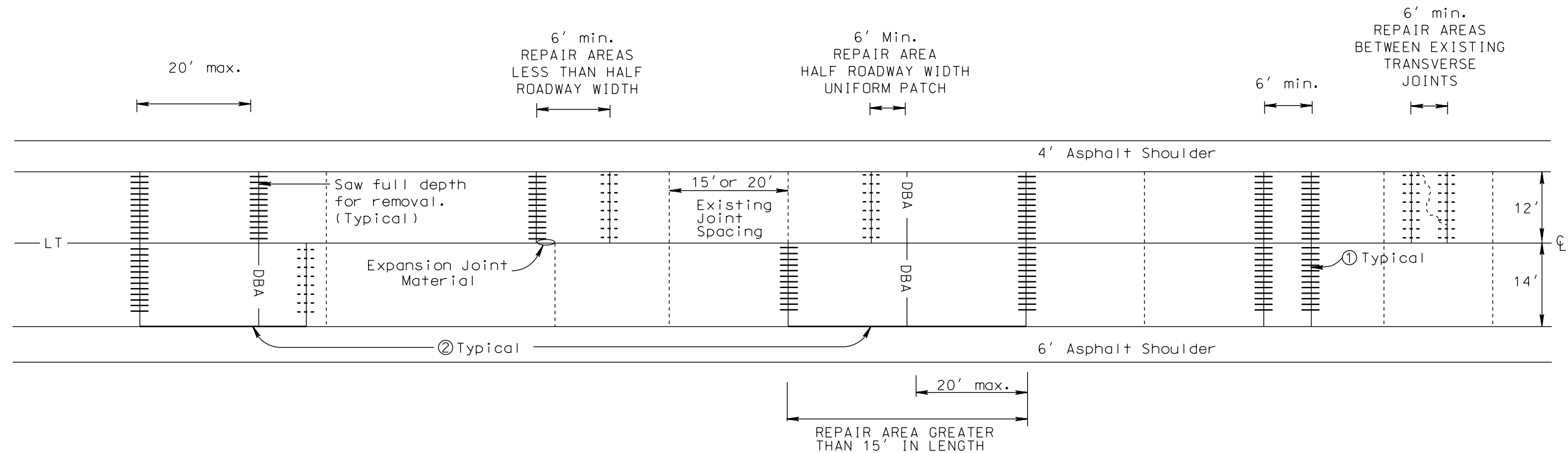
②



STATE OF SOUTH DAKOTA	PROJECT	SHEET NO.	TOTAL SHEETS
	016-491	9	24

NONREINFORCED PCC PAVEMENT REPAIR

TYPICAL REPAIR AREAS



NOTES:

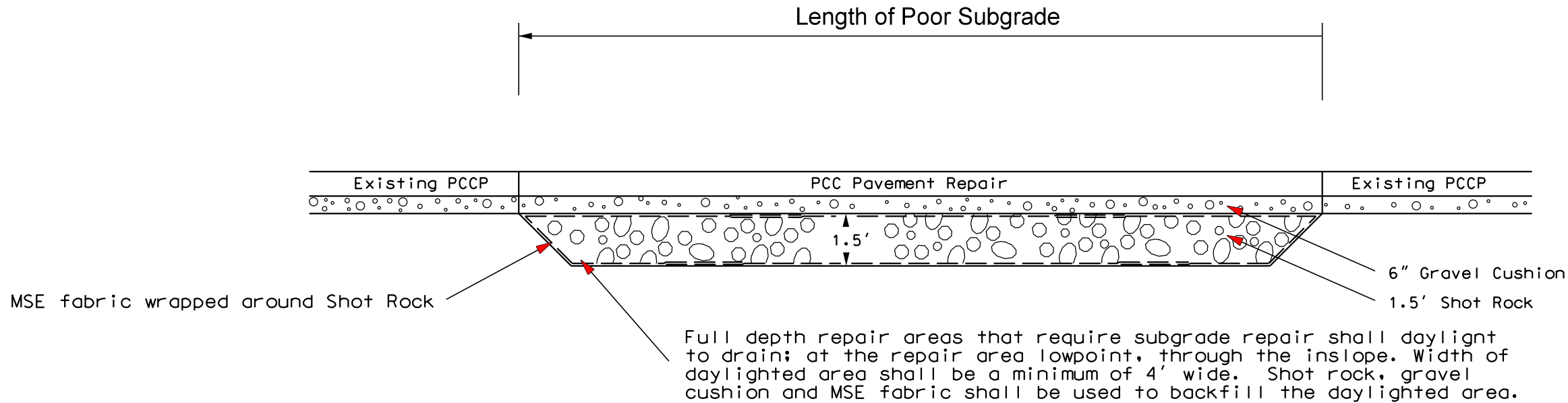
- ① Where possible, transverse joints shall be constructed full roadway width.
- ② All edges of repair areas that are adjacent to asphalt concrete shall be formed to match the depth of the existing concrete pavement and replaced with new asphalt.

Legend:

- Drilled in 1 1/4 " x 18" epoxy coated plain round dowel bar
- Drilled in No. 9 x 18" epoxy coated deformed tie bars
- DBA Dowel Bar Assembly (for repair areas greater than 20' in length)
- L — Longitudinal Construction Joint Without Tie Bars (Keyway Joint)
- LT — Longitudinal Construction Joint With Tie Bars (Do not tie more than 48' width of pavement)

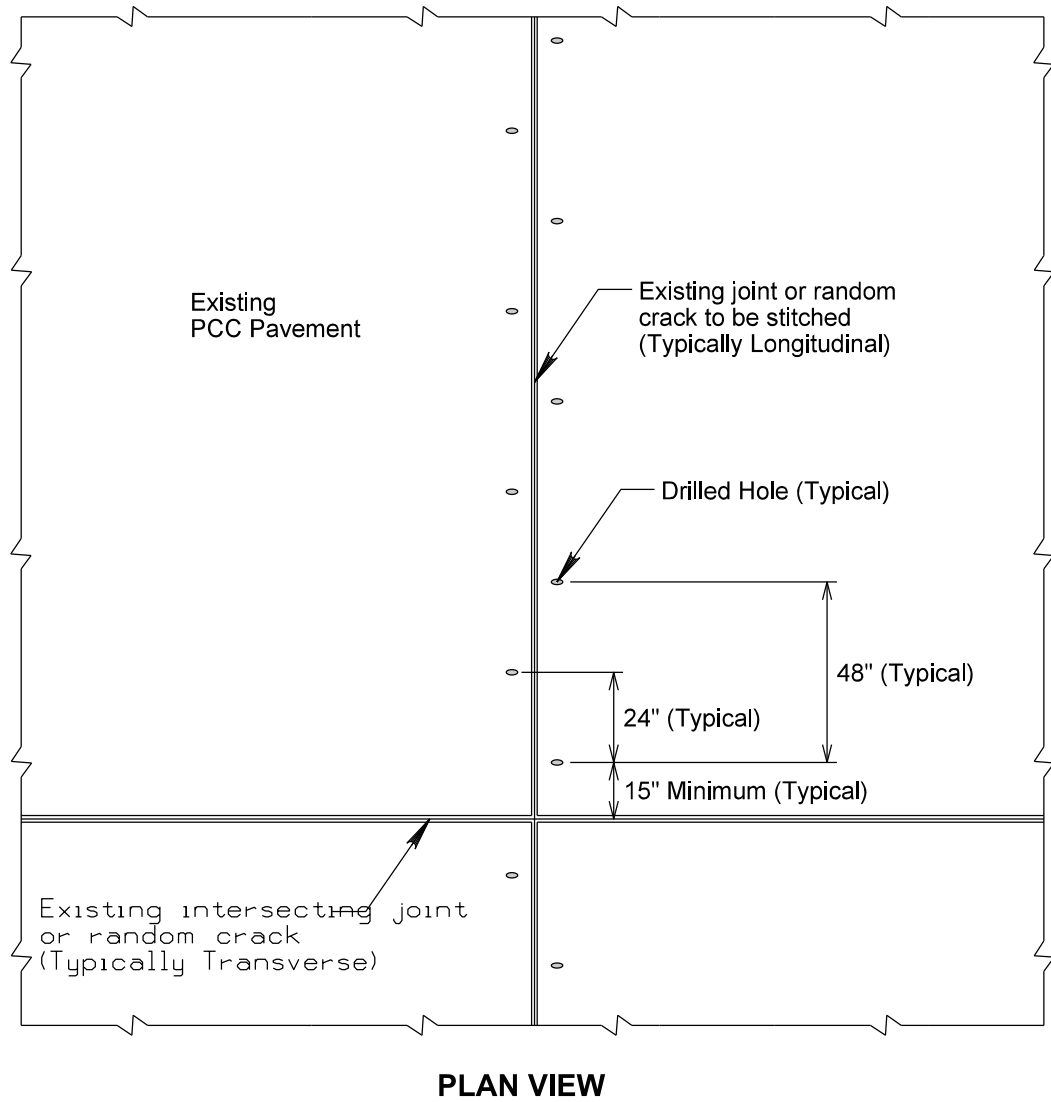
Subgrade Repair Detail

LONGITUDINAL SECTION ALONG CENTERLINE



STATE OF SOUTH DAKOTA	PROJECT	SHEET NO.	TOTAL SHEETS
	016-491	11	24

TIE BAR RETROFIT (STITCHING)



TIE BAR RETROFIT (STITCHING)

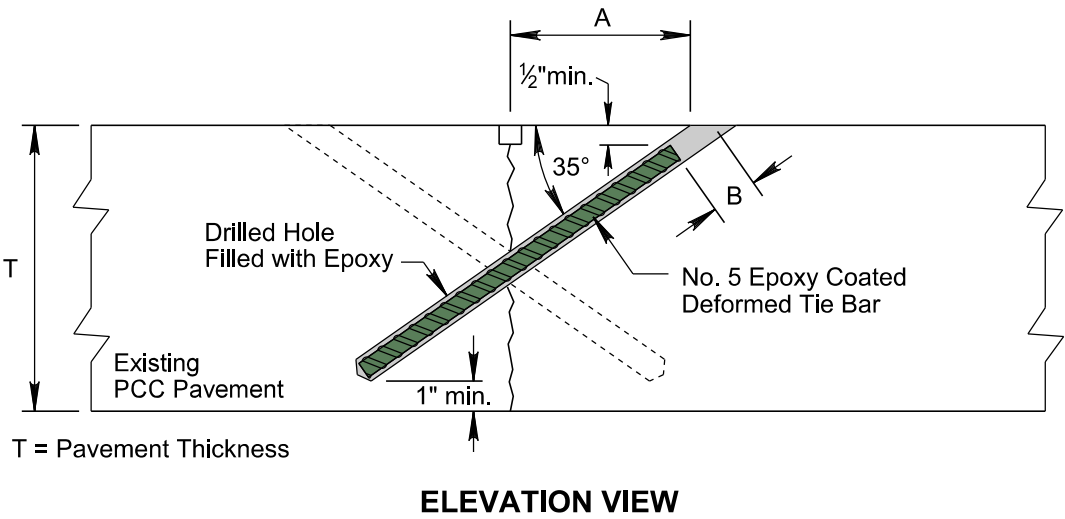


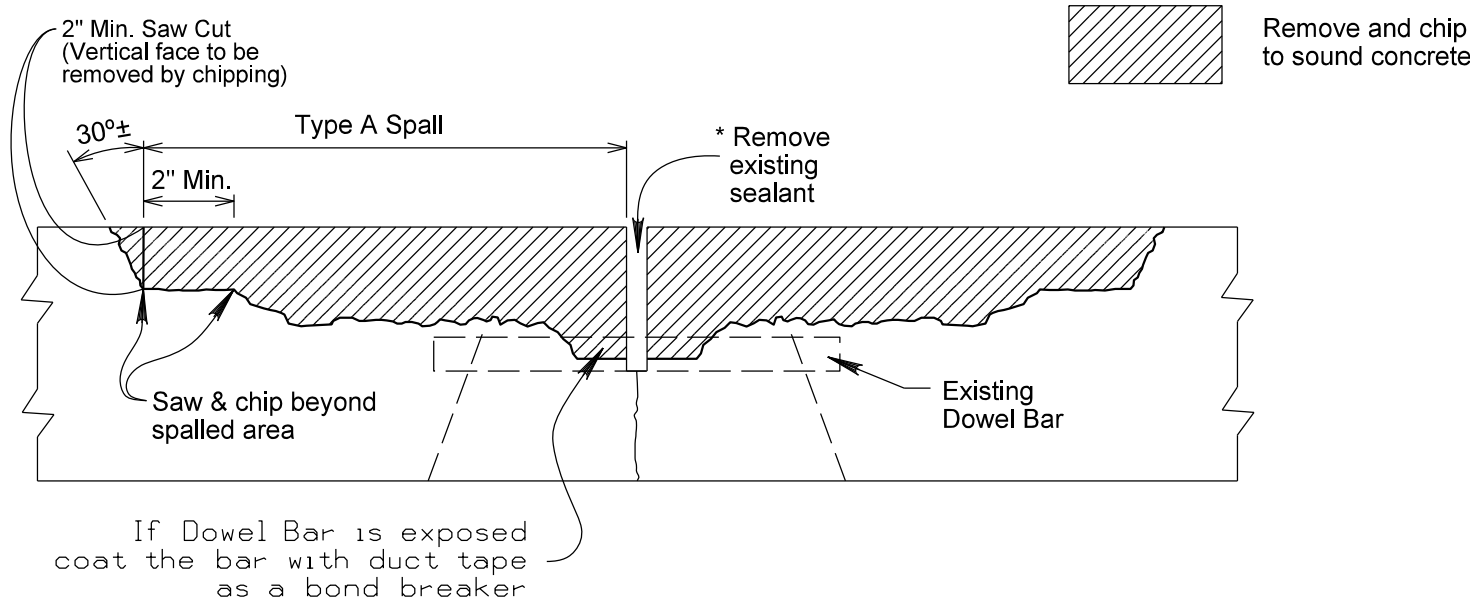
TABLE OF STITCHING DIMENSIONS			
T	A	B	Length of Tie Bar
8"	5"	1½"±	10"
8½"	5¼"	1⅜"±	11"
9"	5⅝"	1¼"±	12"
9½"	6"	1⅝"±	12½"
10"	6⅜"	1½"±	13½"
10½"	6¾"	1⅞"±	14½"
11"	7"	1¼"±	15½"
11½"	7⅜"	1⅜"±	16"
12"	7¾"	1⅝"±	16½"
12½"	8⅞"	1¼"±	17½"

STATE OF SOUTH DAKOTA	PROJECT	SHEET NO.	TOTAL SHEETS
	016-491	12	24

Plotting Date: 05/14/2019

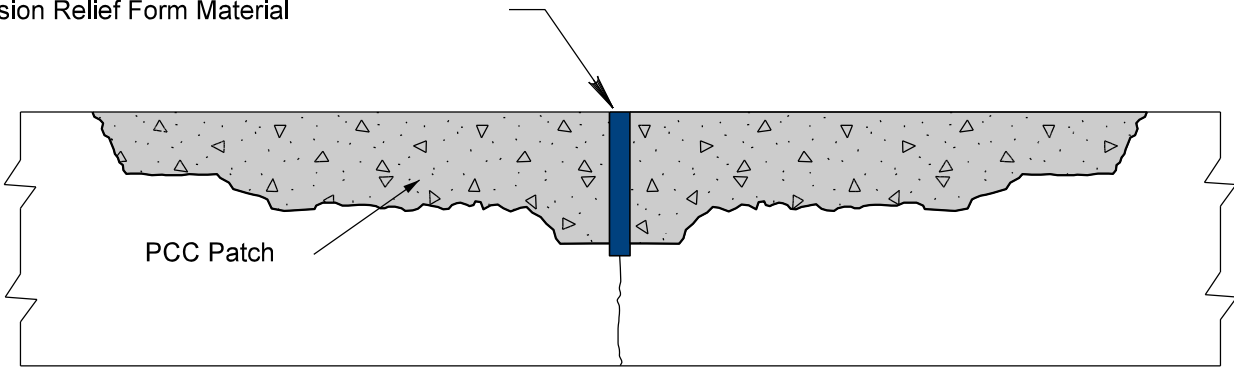
REPAIR OF TYPE A SPALLS

SPALL REMOVAL



SPALL PATCH

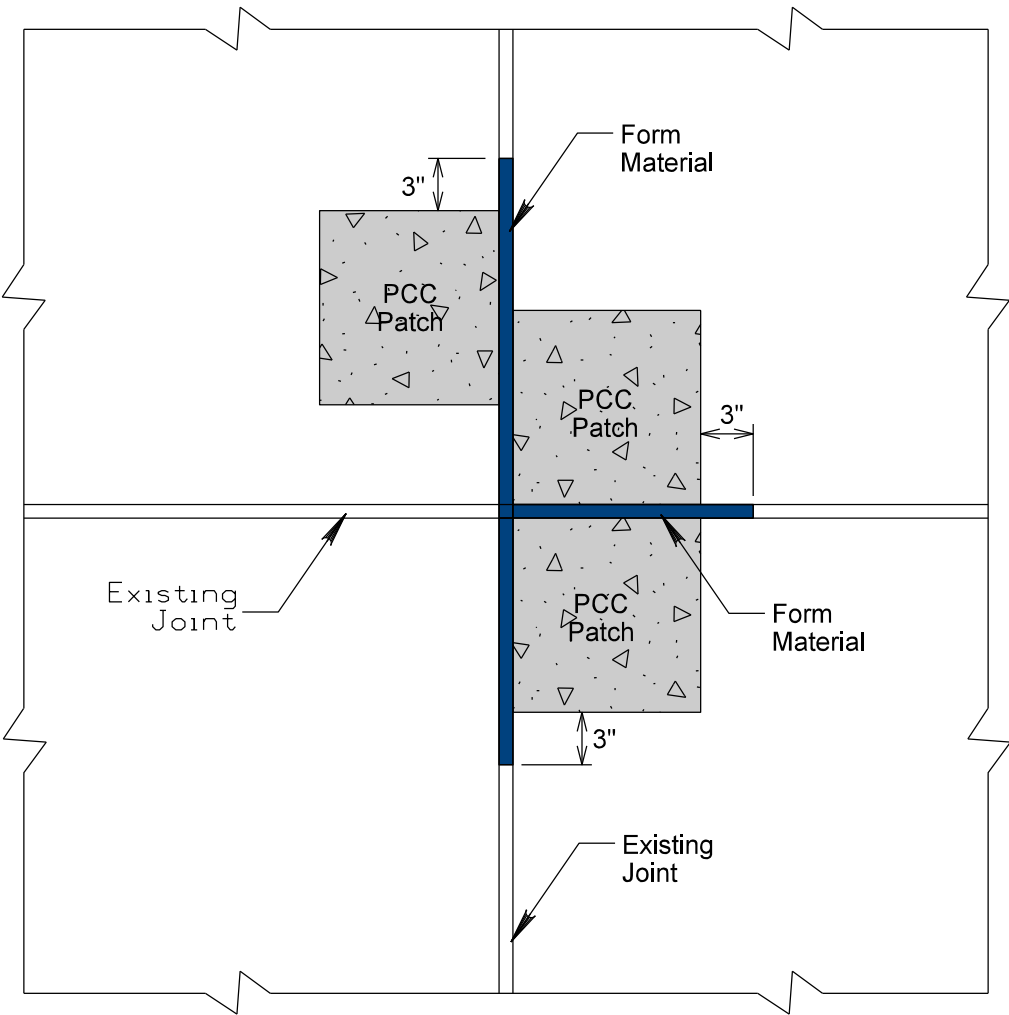
** 1/4" Compression Relief Form Material



** Compression Relief Form Material shall be removed by sawing or other means approved by the Engineer. Spall repaired joints shall then be sealed with Hot Poured Elastic Joint Sealer.

REPAIR OF TYPE A SPALLS

SPALL PATCHES (PLAN VIEW)



STATE OF SOUTH DAKOTA	PROJECT	SHEET NO.	TOTAL SHEETS
	016-491	13	24

Vehicle-mounted signs shall be mounted in a manner such that they are not obscured by equipment or supplies.

Sign legends on vehicle-mounted signs shall be covered or turned from view when work is not in progress.

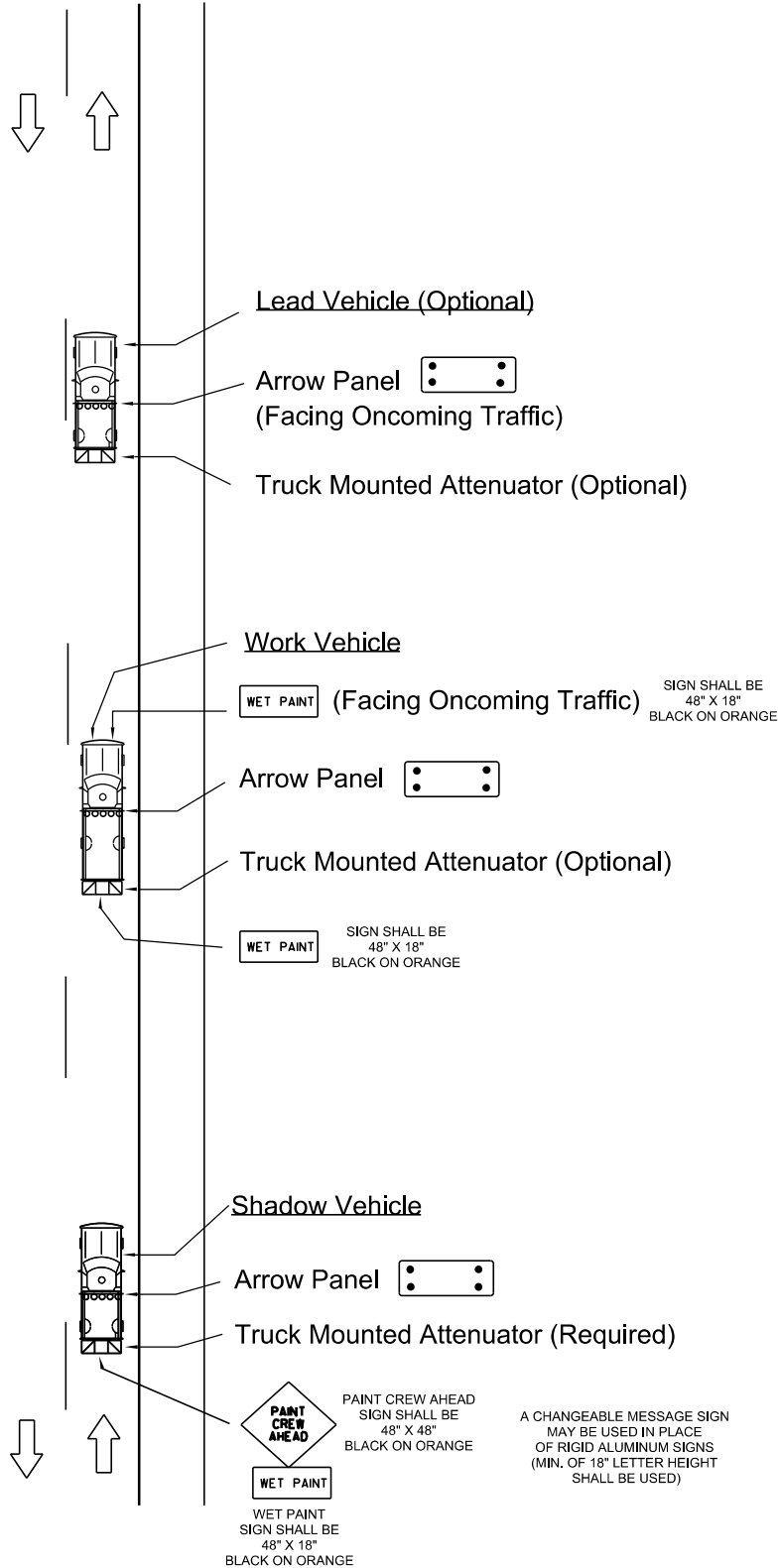
Shadow and Work vehicles shall display high-intensity rotating, flashing, oscillating, or strobe lights, flags, signs, or arrow panels.

Vehicle hazard warning signals shall not be used instead of the vehicle's high-intensity rotating, flashing, oscillating, or strobe lights

When an arrow panel is used, it shall be used in the caution mode.

Marching Diamonds are acceptable.

Arrow panels shall, as a minimum, be Type B, with a size of 60" x 30".



GUIDES FOR TRAFFIC CONTROL DEVICES
MOBILE OPERATIONS ON 2-LANE ROAD

MOBILE: Intermittent & Continuous Moving

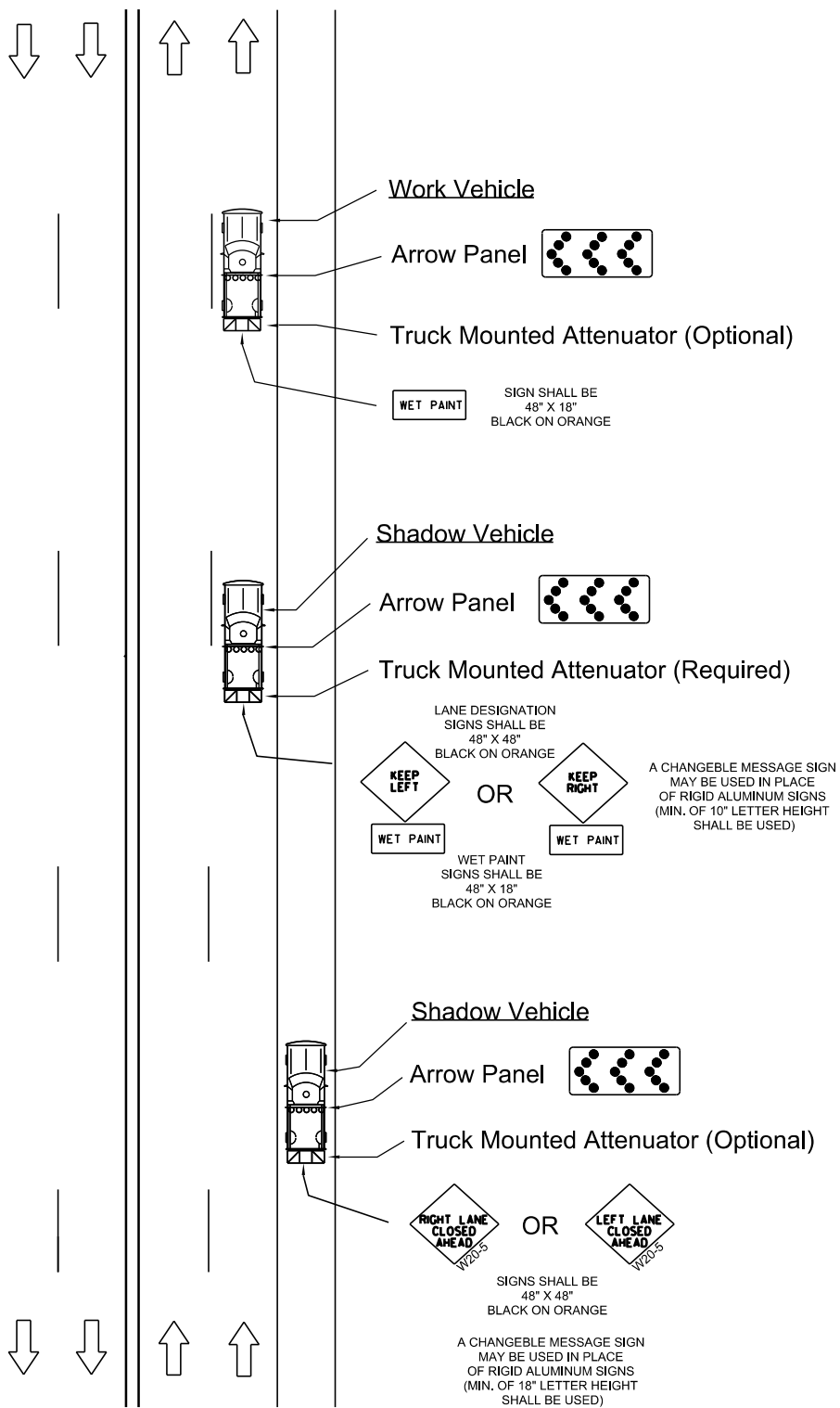
Vehicle-mounted signs shall be mounted in a manner such that they are not obscured by equipment or supplies.

Sign legends on vehicle-mounted signs shall be covered or turned from view when work is not in progress.

Shadow and Work vehicles shall display high-intensity rotating, flashing, oscillating, or strobe lights, flags, signs, or arrow panels.

Vehicle hazard warning signals shall not be used instead of the vehicle's high-intensity rotating, flashing, oscillating, or strobe lights

Arrow panels shall, as a minimum, be Type B, with a size of 60" x 30".



GUIDES FOR TRAFFIC CONTROL DEVICES
MOBILE OPERATIONS ON 4-LANE DIVIDED

MOBILE: Intermittent & Continuous Moving

PLOT SCALE - 1:20

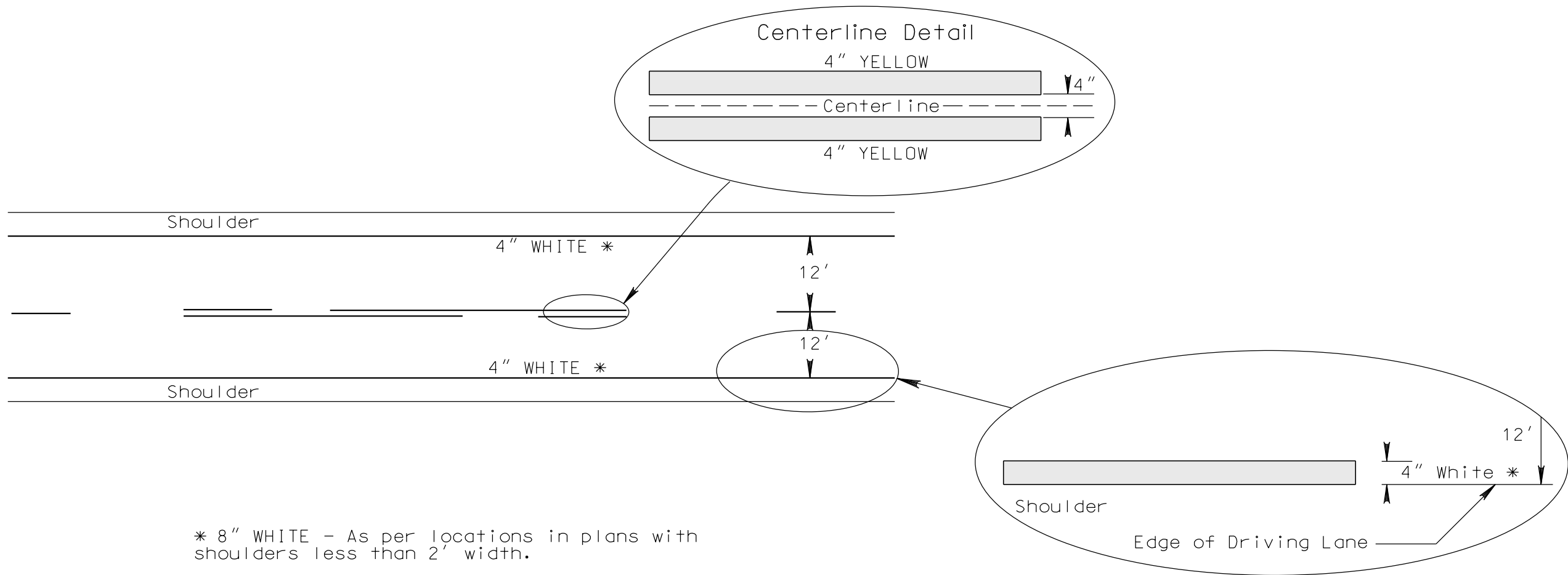
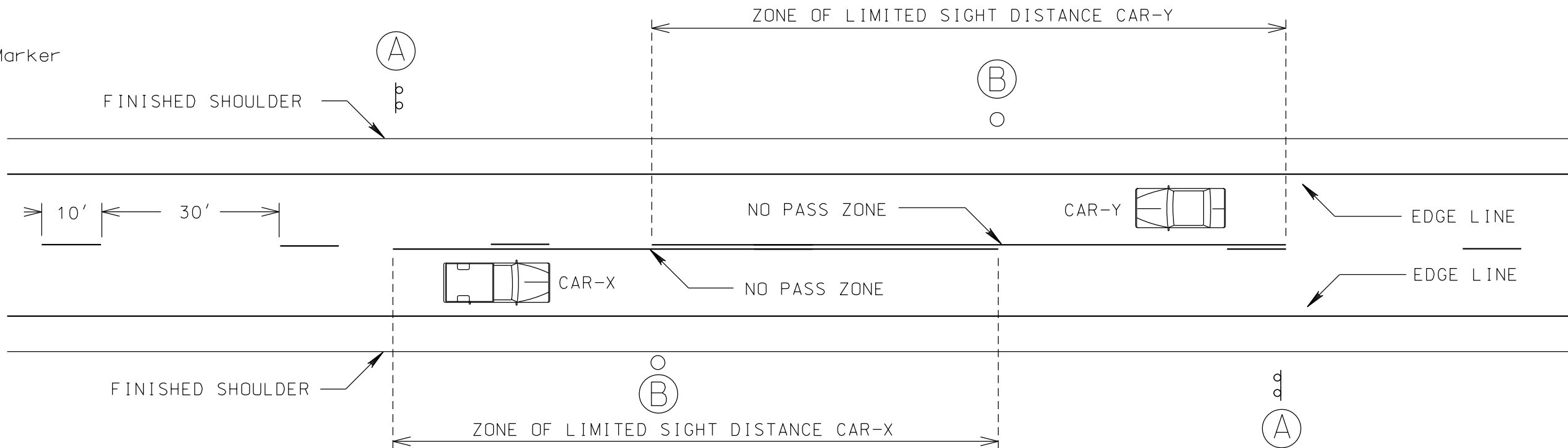
TYPICAL PAVEMENT MARKING LAYOUT

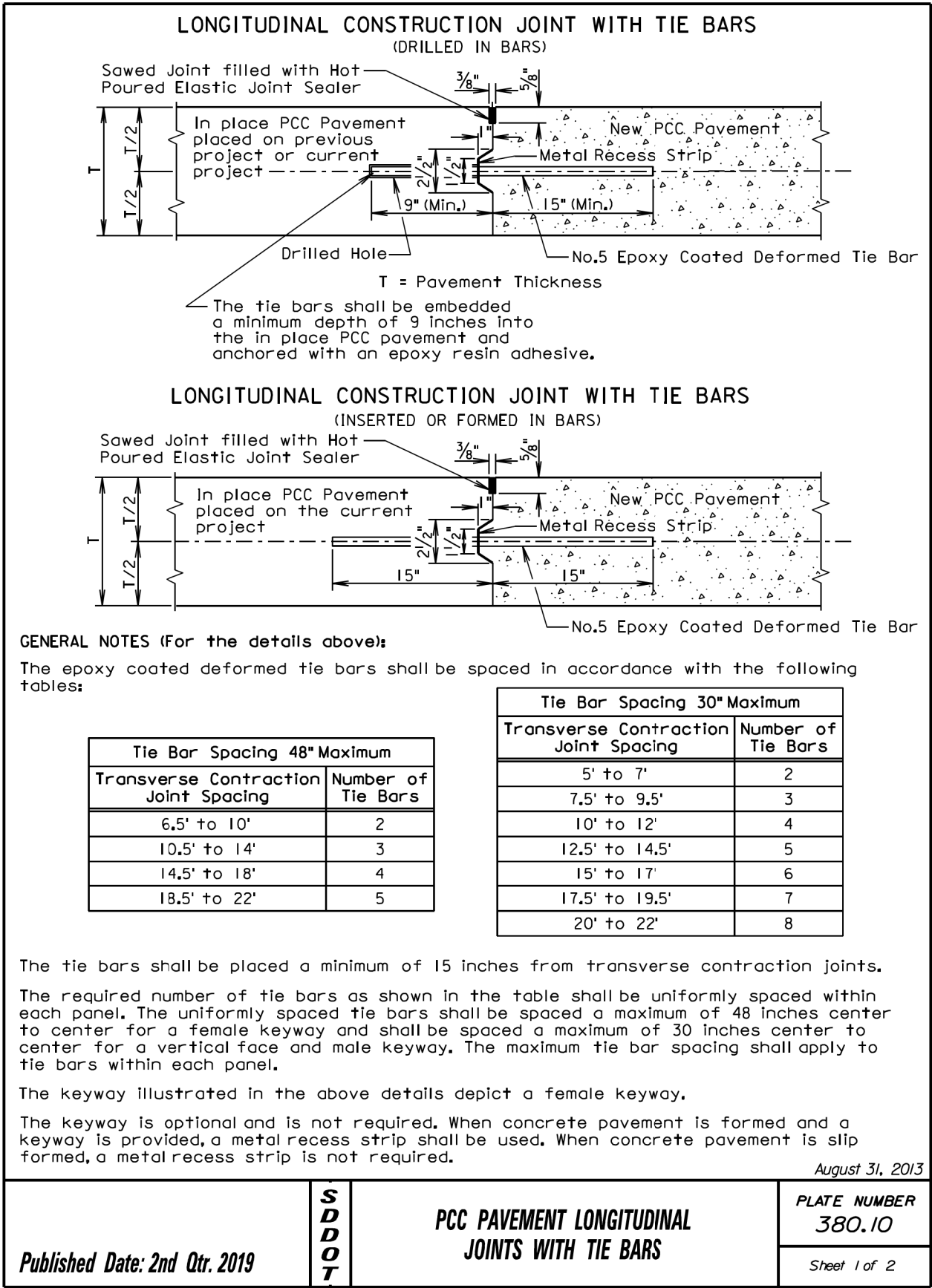
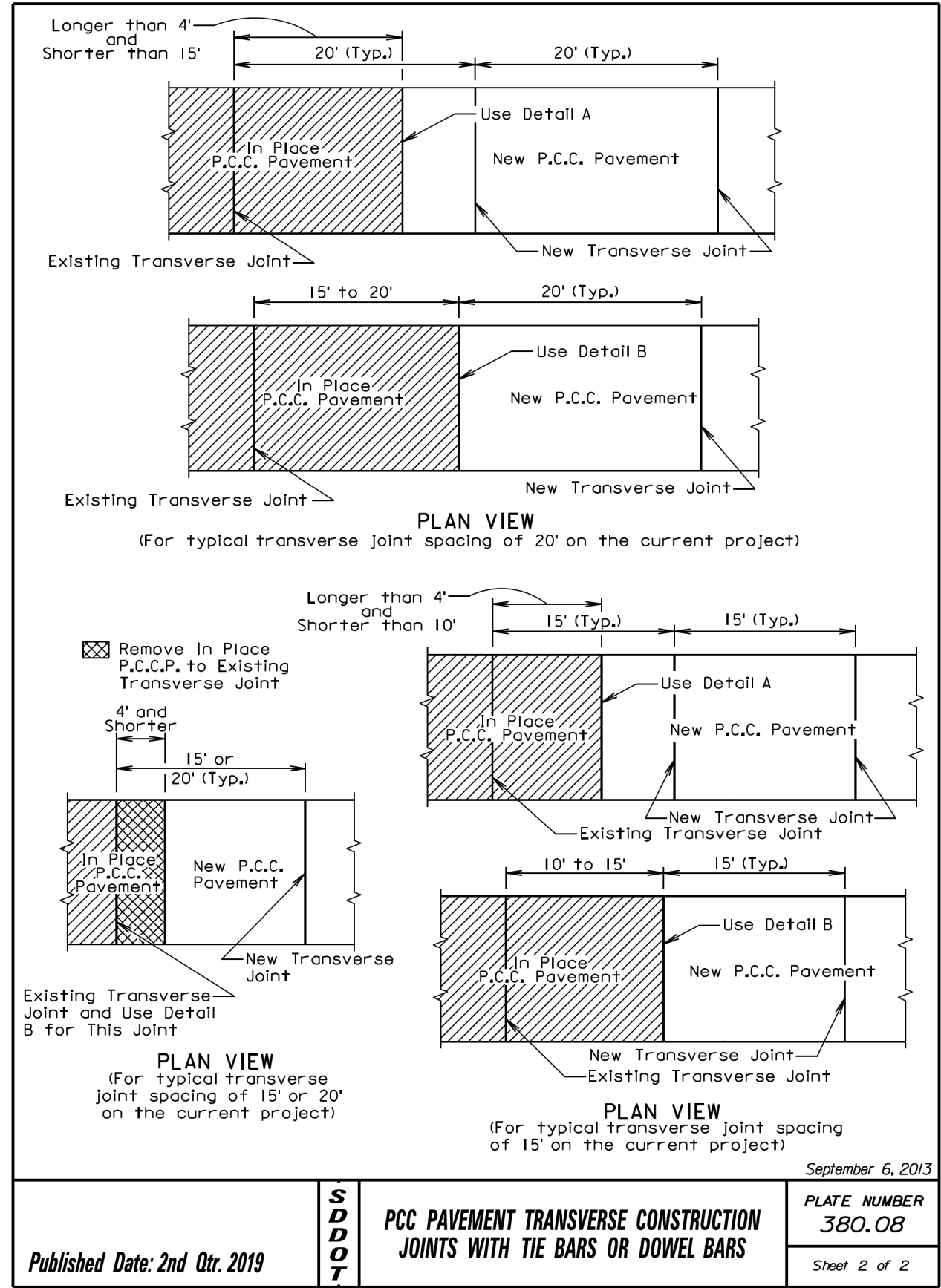
2-LANE ROAD

STATE OF SOUTH DAKOTA	PROJECT	SHEET NO.	TOTAL SHEETS
	016-491	14	24

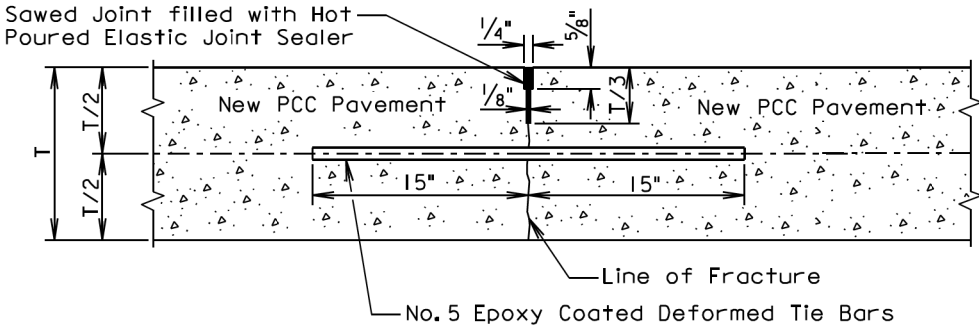


(B) End of Zone Marker





SAWED LONGITUDINAL JOINT WITH TIE BARS
(POURED MONOLITHICALLY)



T = Pavement Thickness

GENERAL NOTES (For the detail above):

The epoxy coated deformed tie bars shall be spaced in accordance with the following table:

Tie Bar Spacing 48" Maximum	
Transverse Contraction Joint Spacing	Number of Tie Bars
6.5' to 10'	2
10.5' to 14'	3
14.5' to 18'	4
18.5' to 22'	5

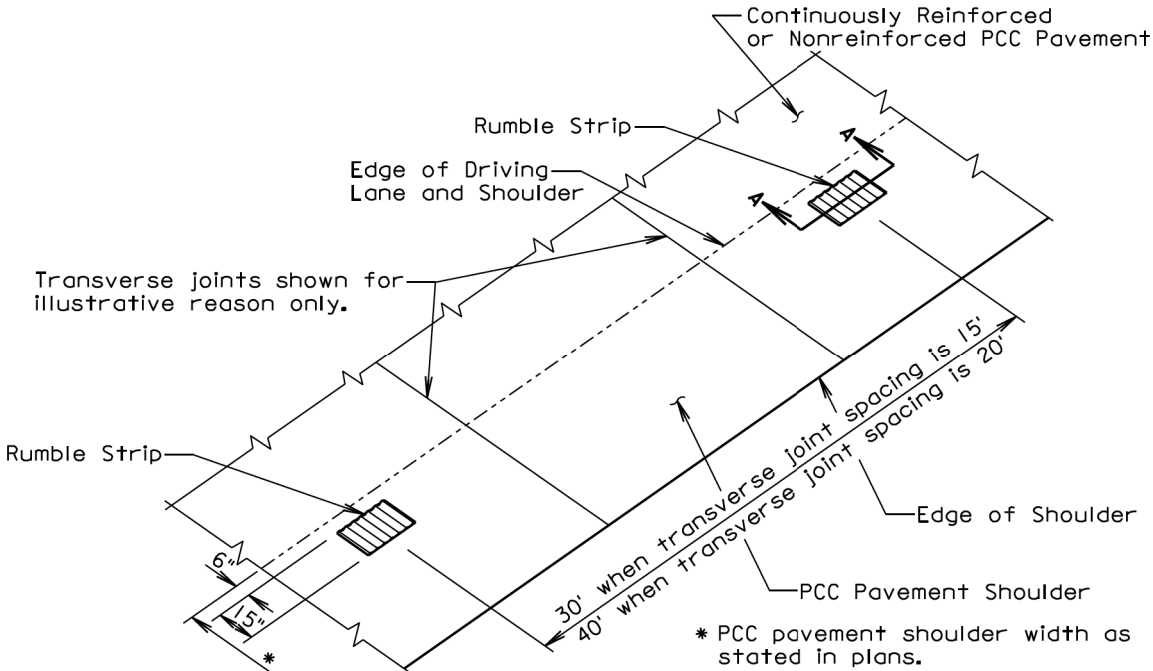
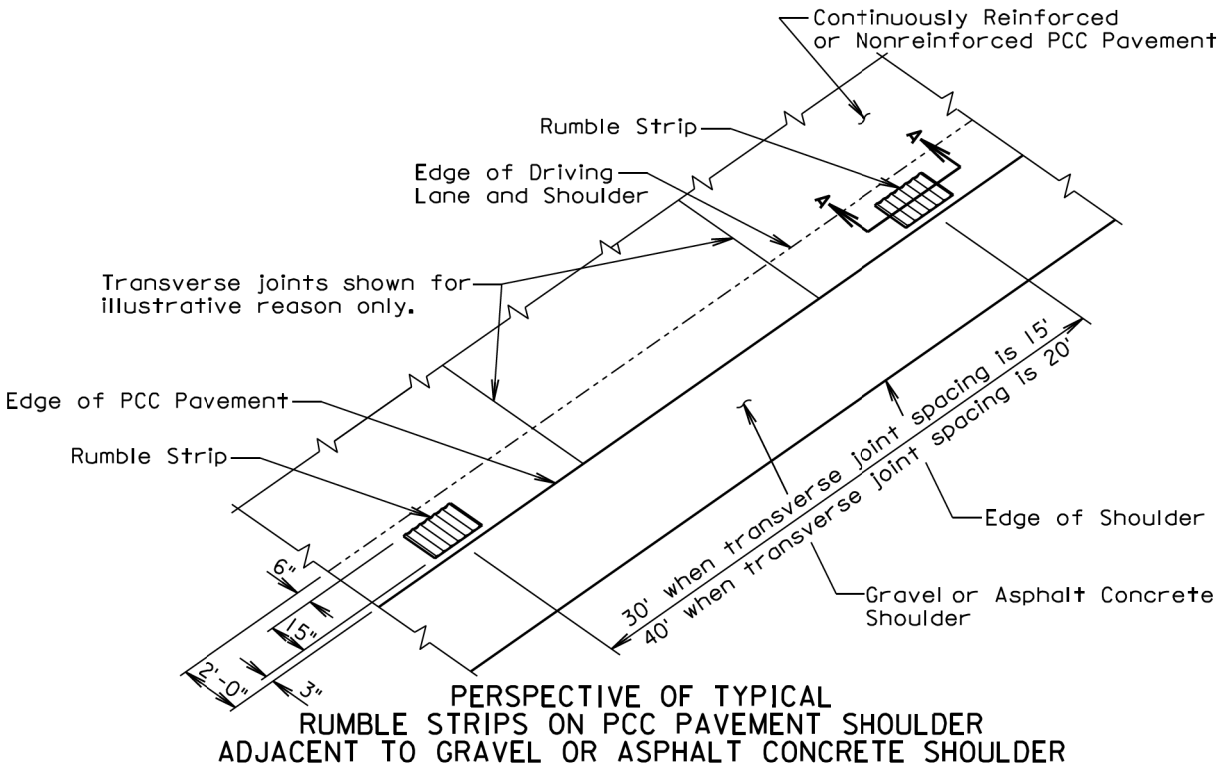
The tie bars shall be placed a minimum of 15 inches from the transverse contraction joints.

The required number of tie bars as shown in the table shall be uniformly spaced within each panel with a maximum space of 48 inches center to center. The maximum tie bar spacing shall apply to tie bars within each panel.

The first saw cut to control cracking shall be a minimum of 1/3 the thickness of the pavement. Additional sawing for widening the saw cut to provide the width for the installation of the hot poured elastic joint sealer is necessary.

August 31, 2013

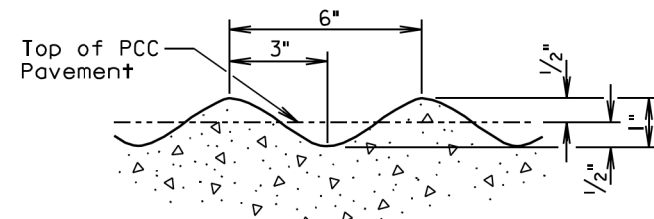
Published Date: 2nd Qtr. 2019	S D D O T	PCC PAVEMENT LONGITUDINAL JOINTS WITH TIE BARS	PLATE NUMBER 380.10
			Sheet 2 of 2



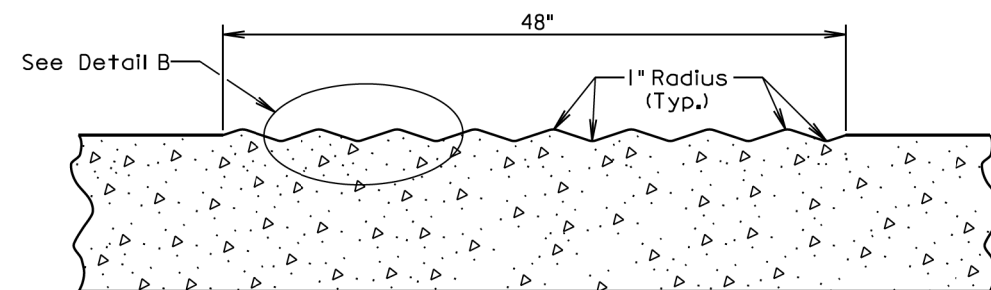
PERSPECTIVE OF TYPICAL
RUMBLE STRIPS ON PCC PAVEMENT SHOULDER

August 31, 2013

Published Date: 2nd Qtr. 2019	S D D O T	RUMBLE STRIP ON PCC PAVEMENT SHOULDER	PLATE NUMBER 380.15
			Sheet 1 of 2



DETAIL B



SECTION A-A

GENERAL NOTES:

The rumble strips shall be evenly spaced and shall not coincide with any transverse contraction joints.

The rumble strips shall NOT be placed along areas adjacent to entrance ramps, exit ramps, and gore areas.

Payment for constructing the PCC Pavement Rumble Strips shall be incidental to the contract unit price per square yard for the corresponding PCC Pavement bid item.

August 31, 2013

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RUMBLE STRIP ON PCC PAVEMENT SHOULDER

PLATE NUMBER
380.15

Sheet 2 of 2

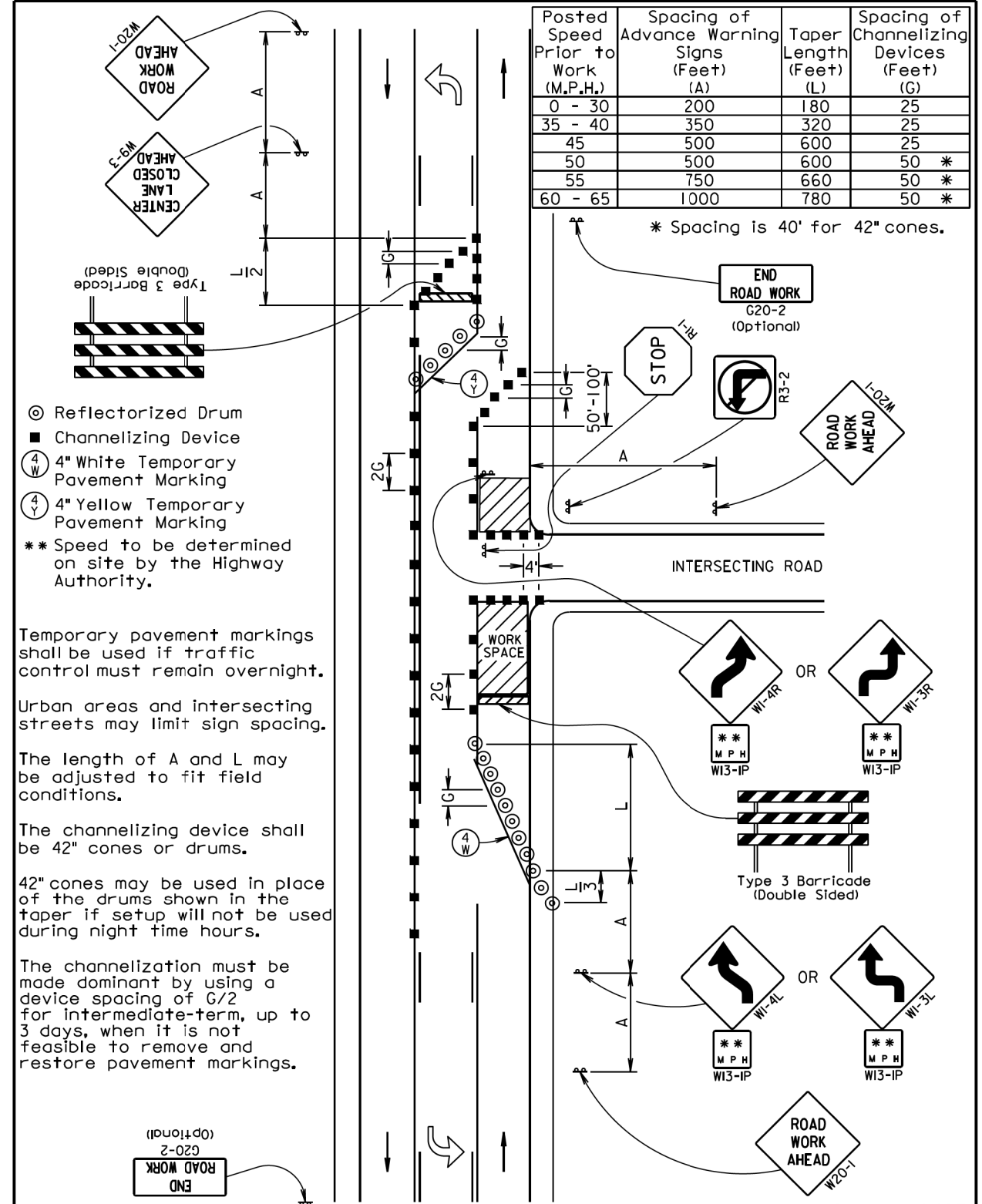
Published Date: 2nd Qtr. 2019

STATE OF SOUTH DAKOTA	PROJECT	SHEET	TOTAL SHEETS
	016-491	18	24

Plotting Date: 05/14/2019

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.



September 14, 2017

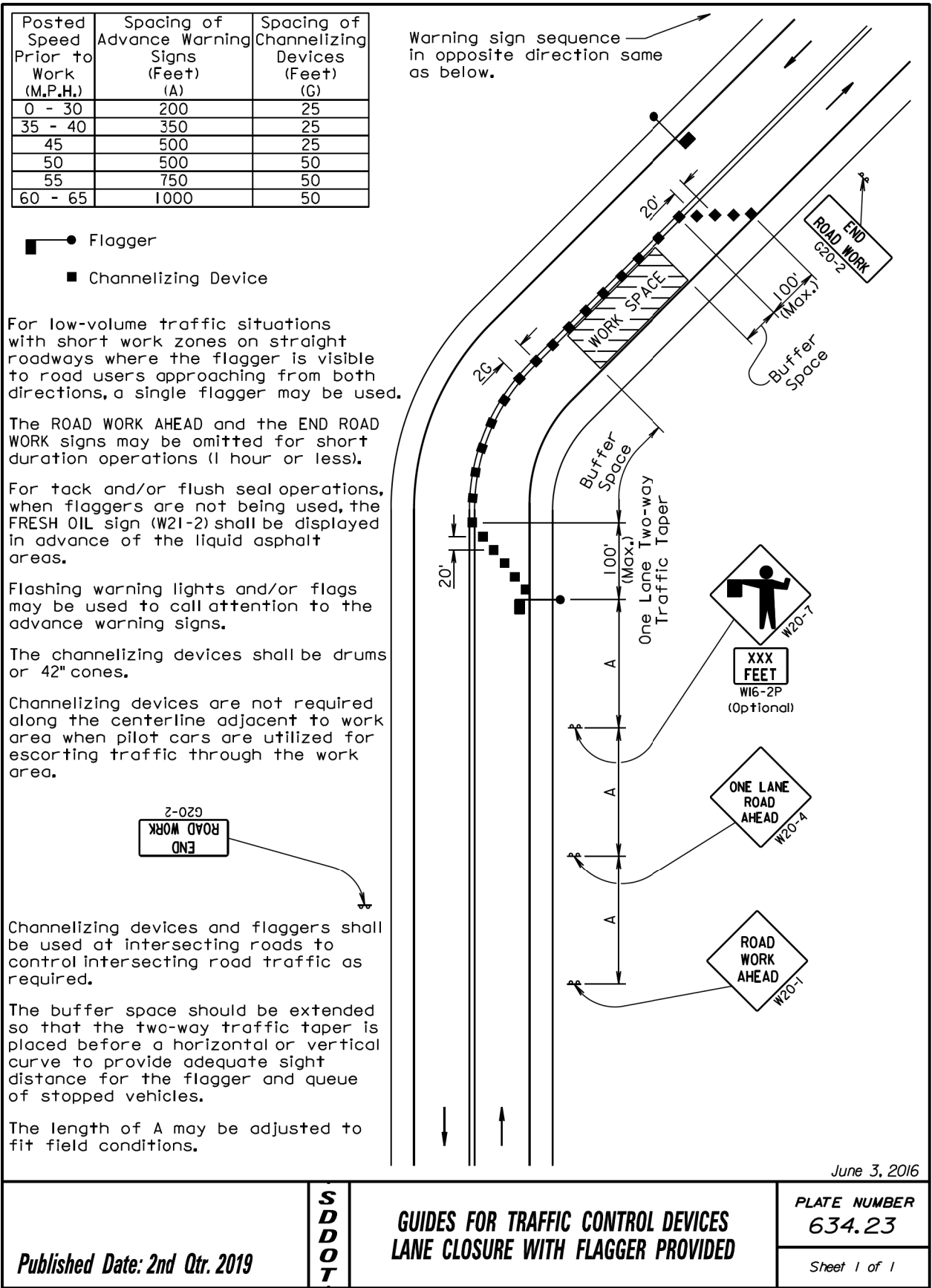
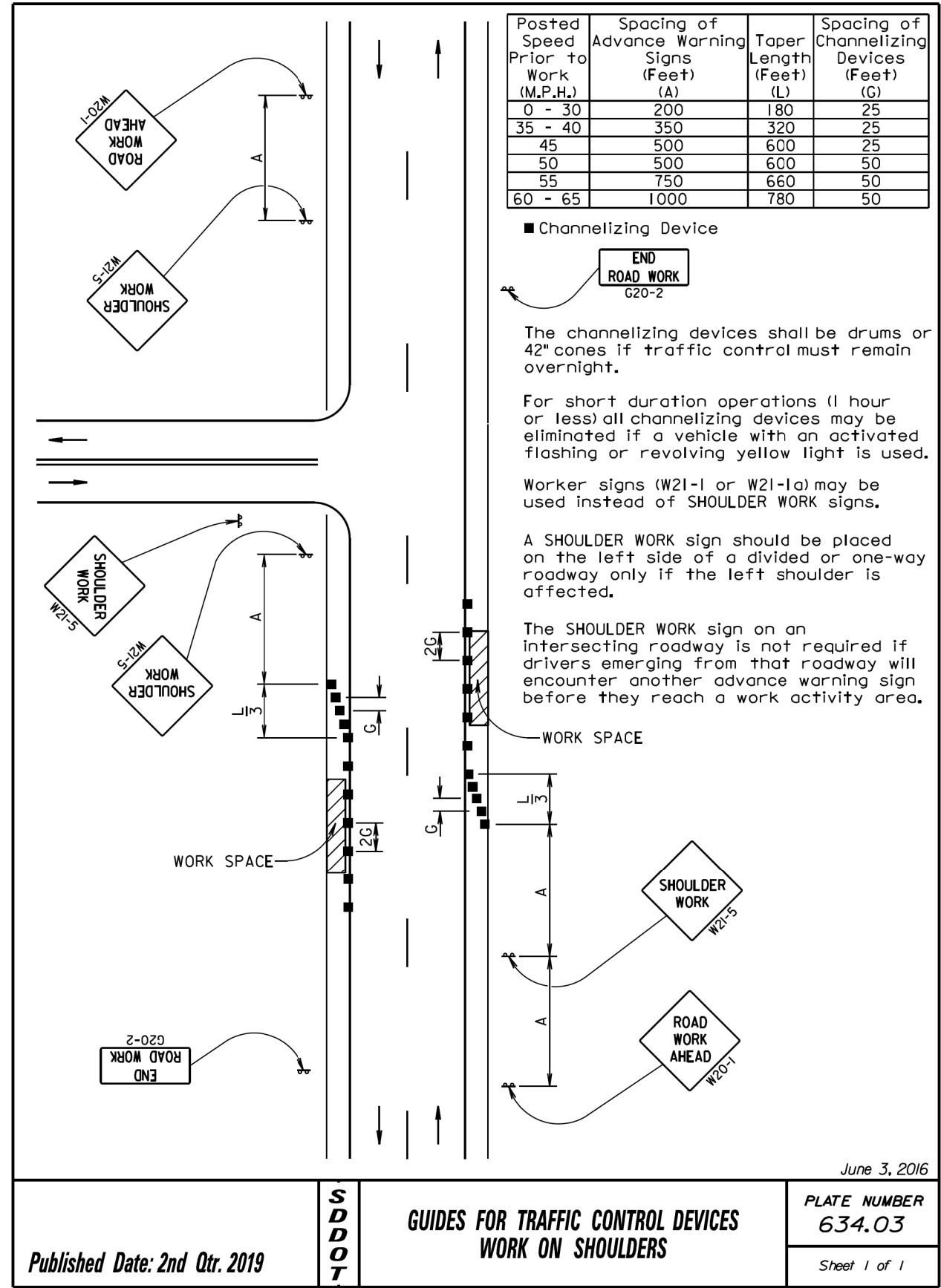
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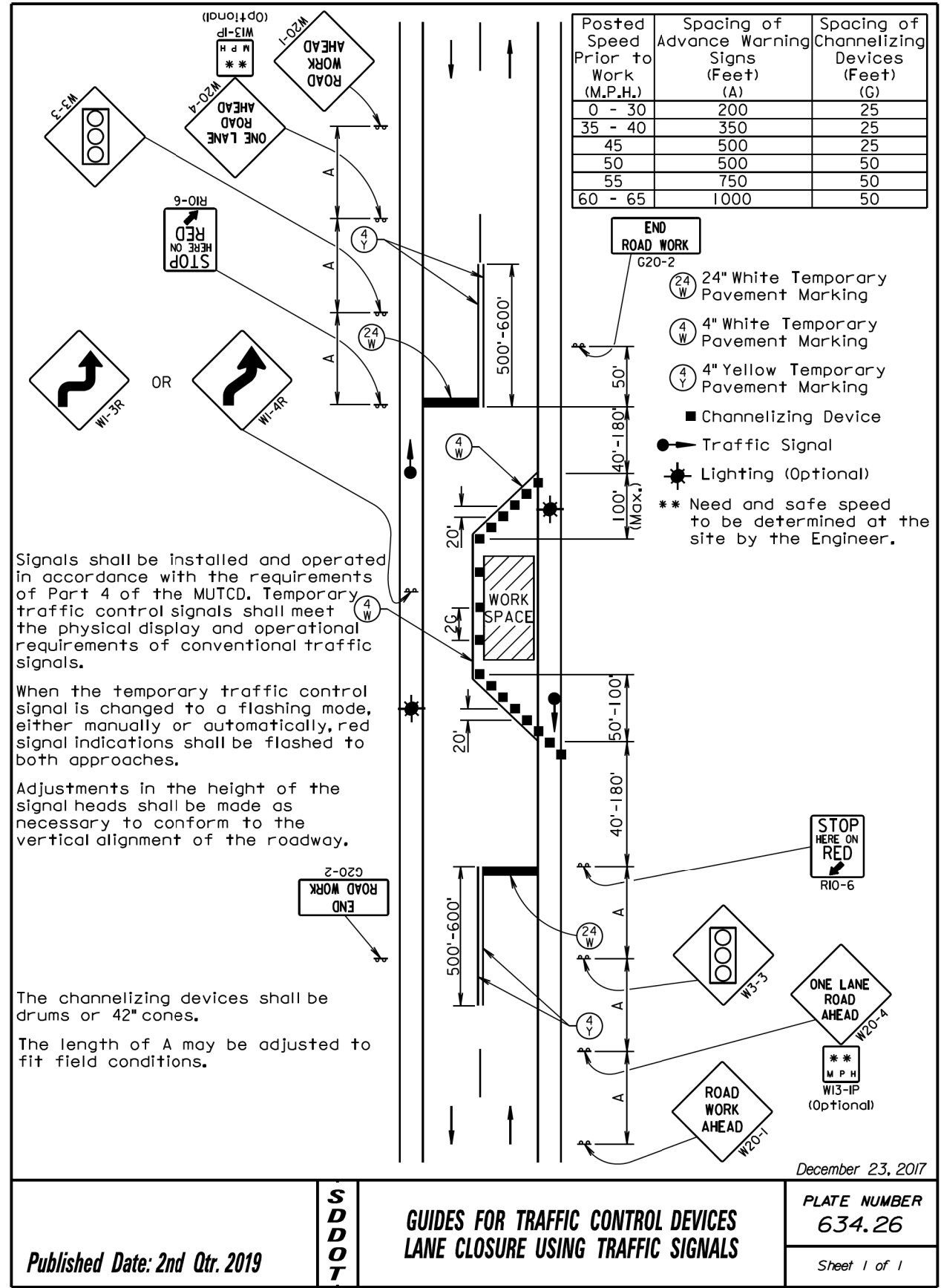
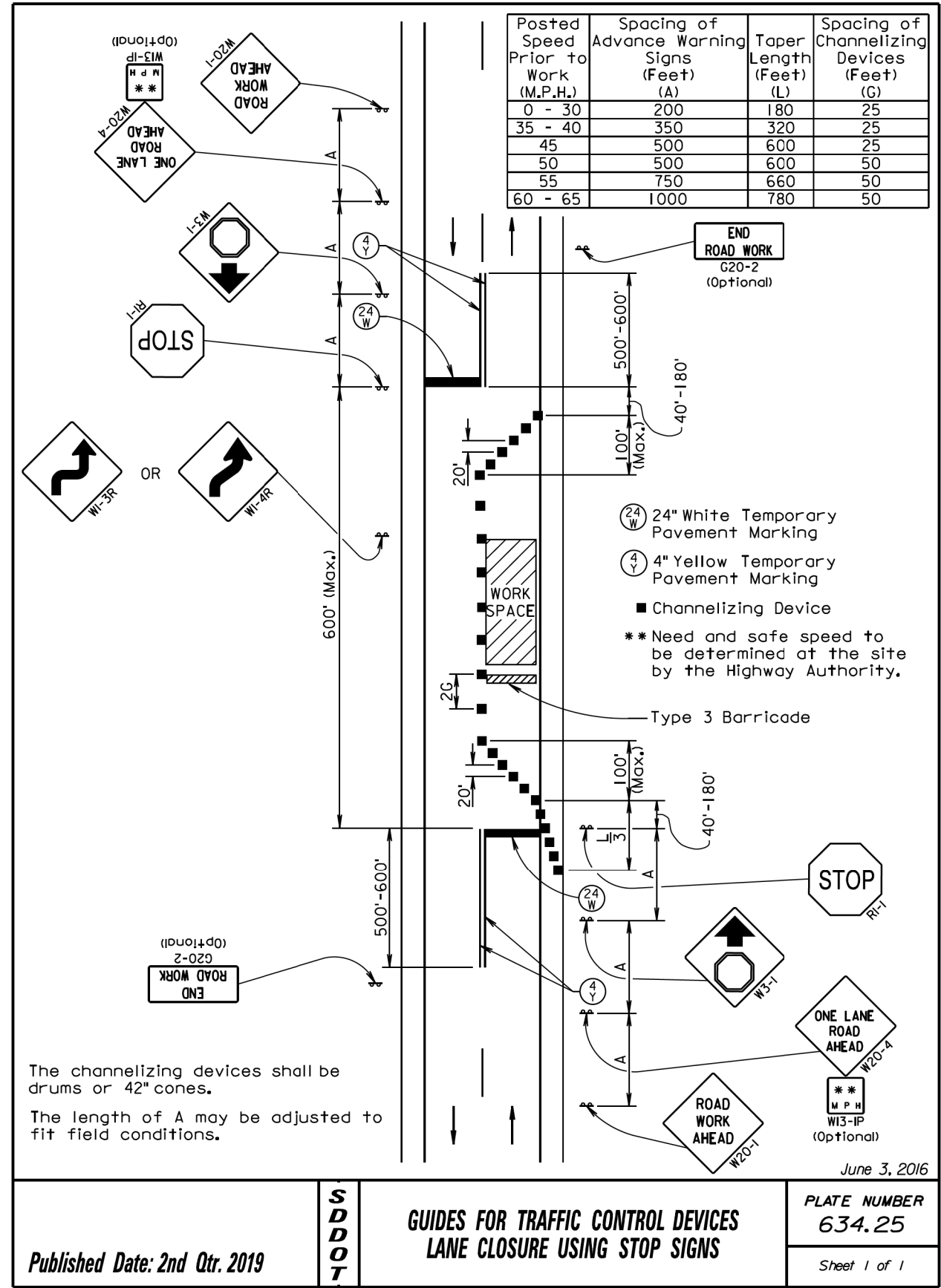
GUIDES FOR TRAFFIC CONTROL DEVICES 3-LANE, OUTSIDE LANE CLOSED

PLATE NUMBER
634.53

Sheet 1 of 1

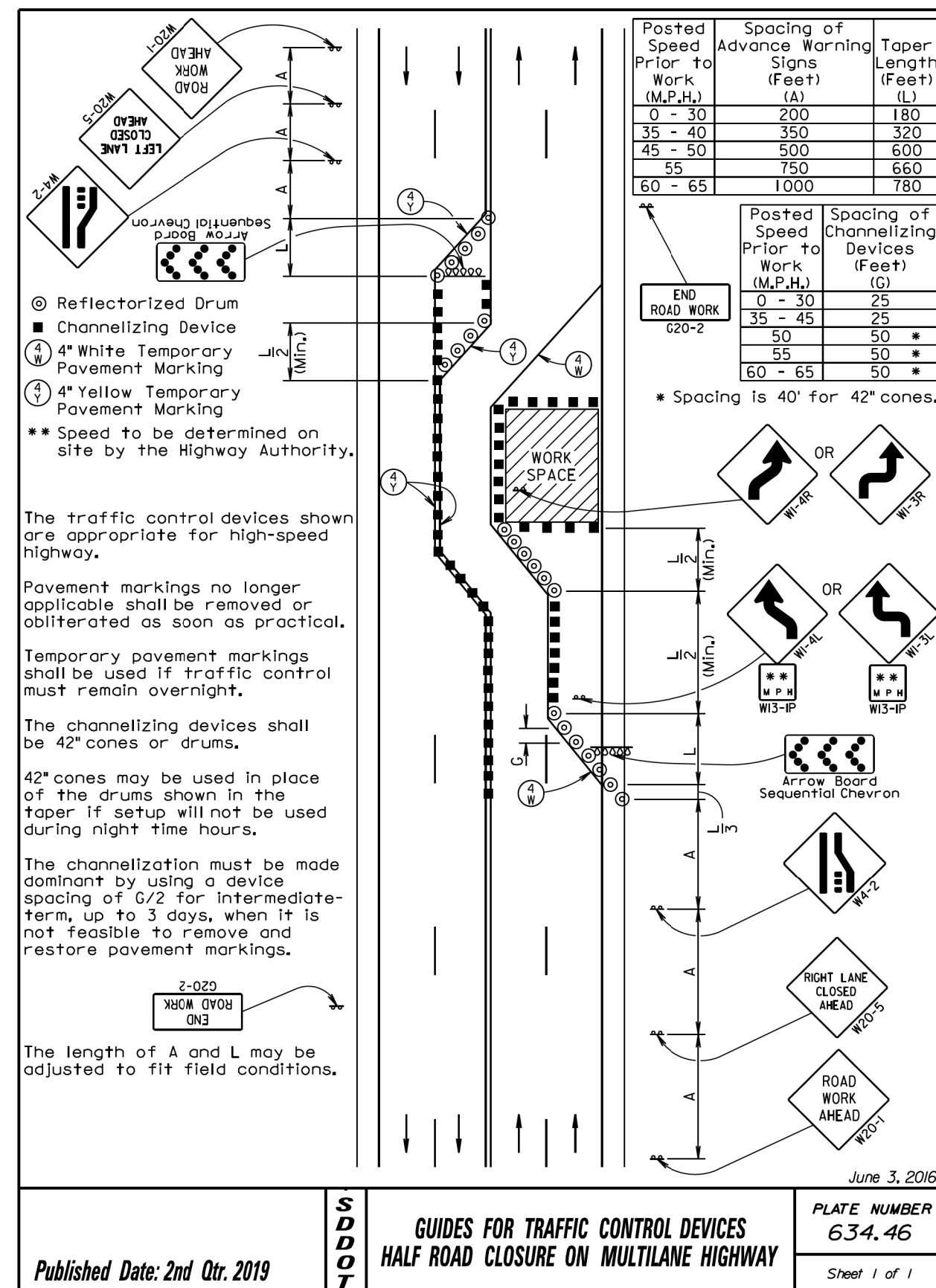
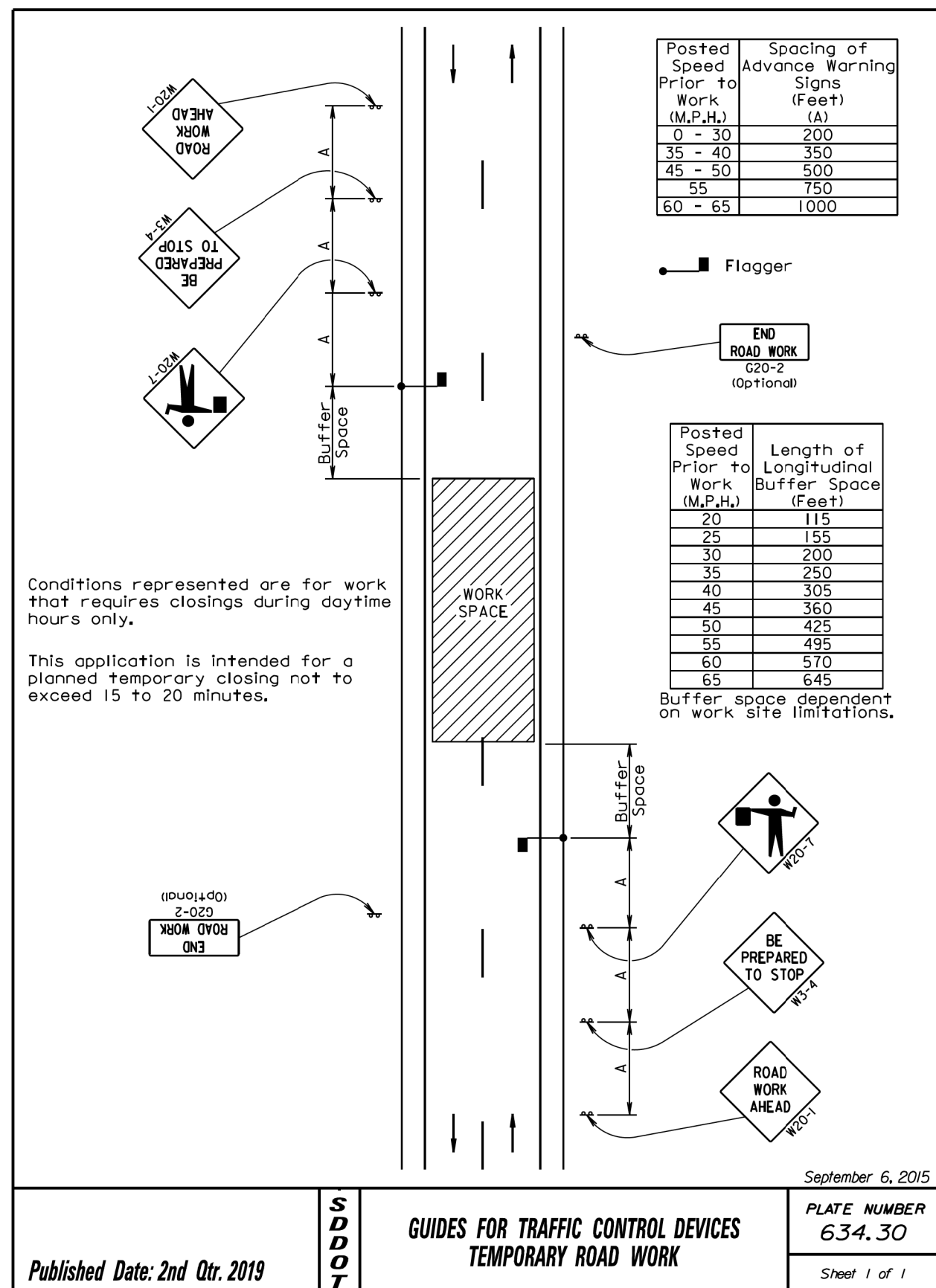
Published Date: 2nd Qtr. 2019





STATE OF SOUTH DAKOTA	PROJECT	SHEET	TOTAL SHEET
	016-491	21	24

Plotting Date: 05/14/2019



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

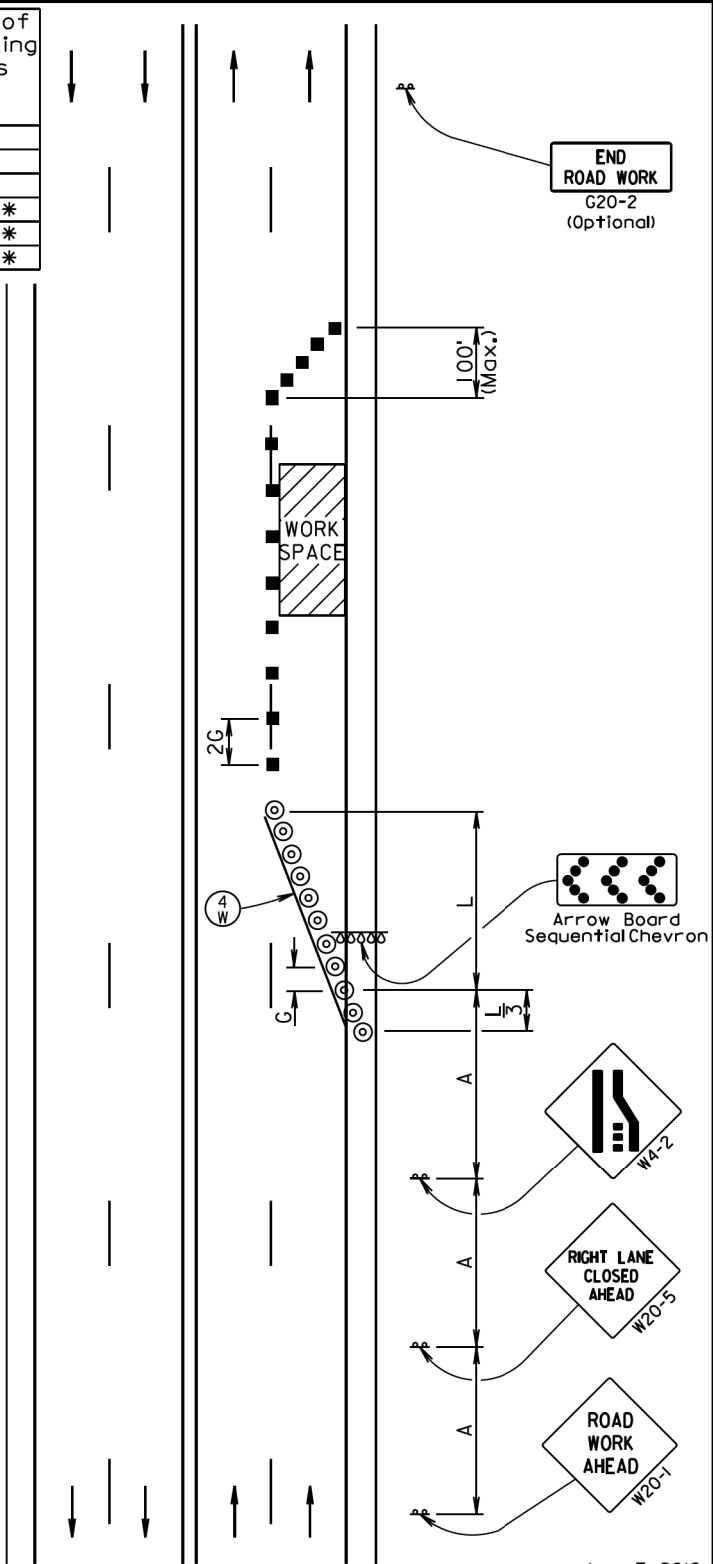
④ 4" White Temporary Pavement Marking

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.

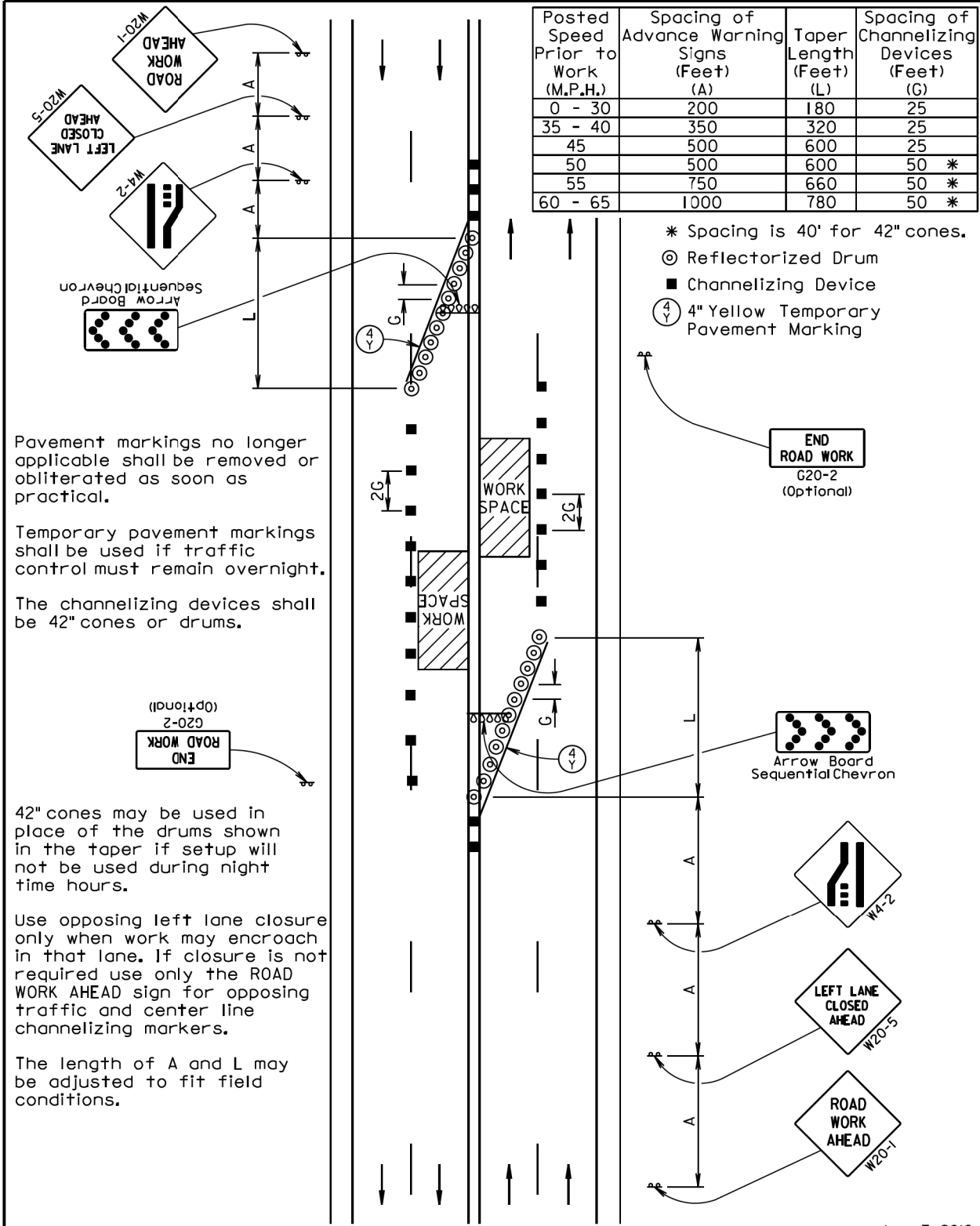
Temporary pavement markings shall be used if traffic control must remain overnight.

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



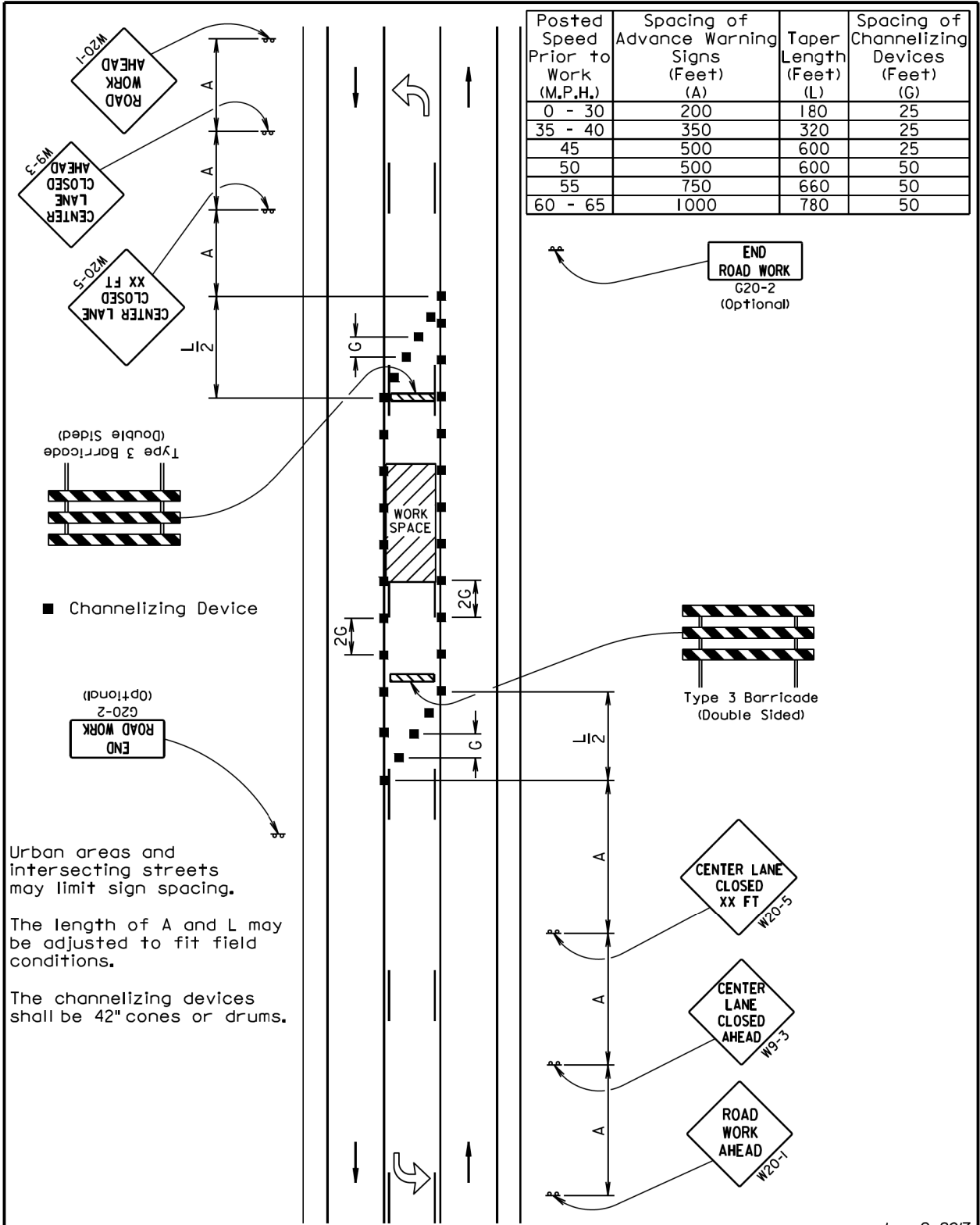
June 3, 2016

Published Date: 2nd Qtr. 2019	S D D O T	GUIDES FOR TRAFFIC CONTROL DEVICES	PLATE NUMBER
		4-LANE UNDIVIDED, RIGHT LANE CLOSED	634.47
			Sheet 1 of 1



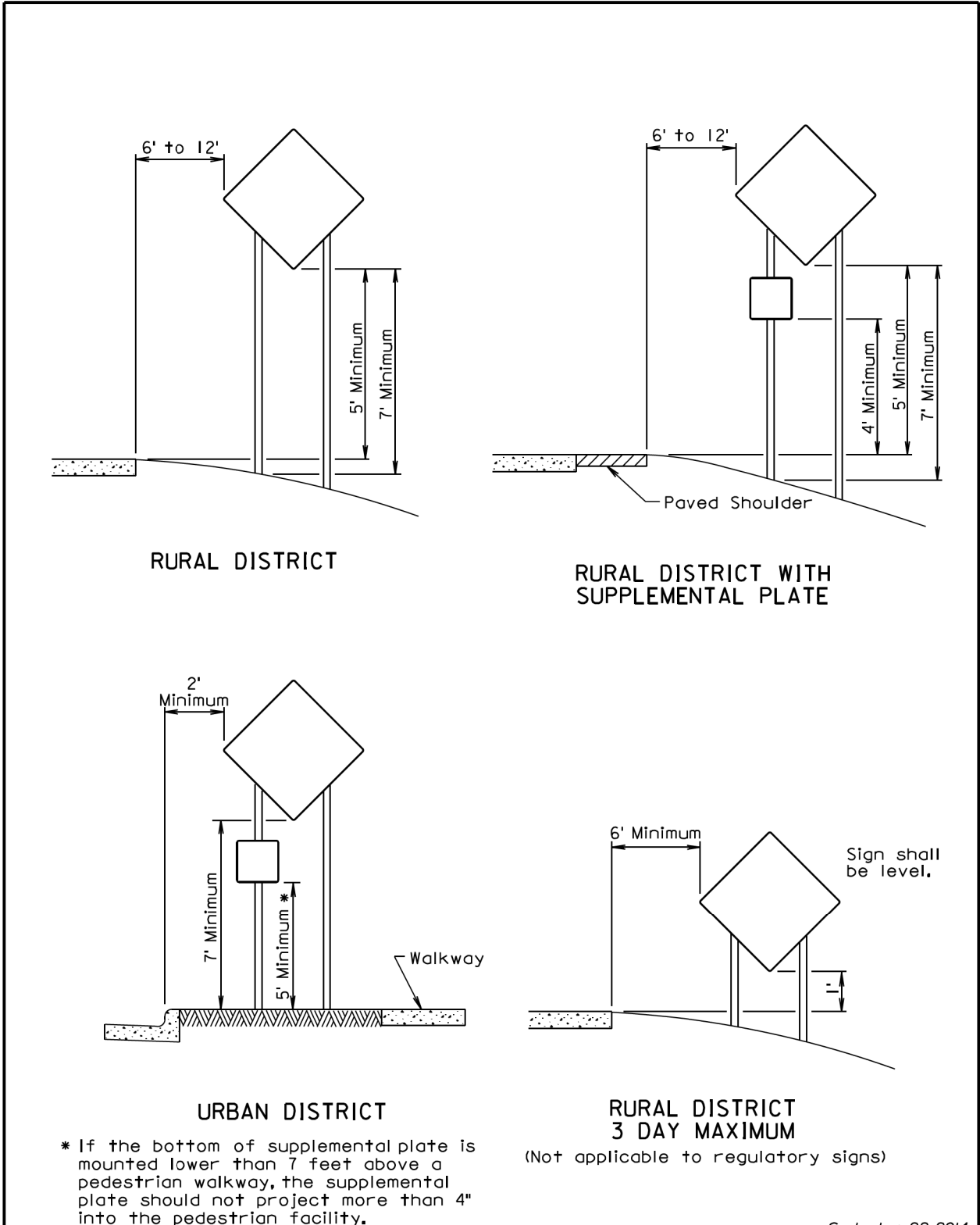
June 3, 2016

Published Date: 2nd Qtr. 2019	S D D O T	GUIDES FOR TRAFFIC CONTROL DEVICES	PLATE NUMBER
		4-LANE UNDIVIDED, LEFT LANE CLOSED	634.48
			Sheet 1 of 1



June 9, 2017

Published Date: 2nd Qtr. 2019	S D D O T	GUIDES FOR TRAFFIC CONTROL DEVICES 3-LANE, CENTER LANE CLOSED	PLATE NUMBER 634.52
			Sheet 1 of 1



September 22, 2014

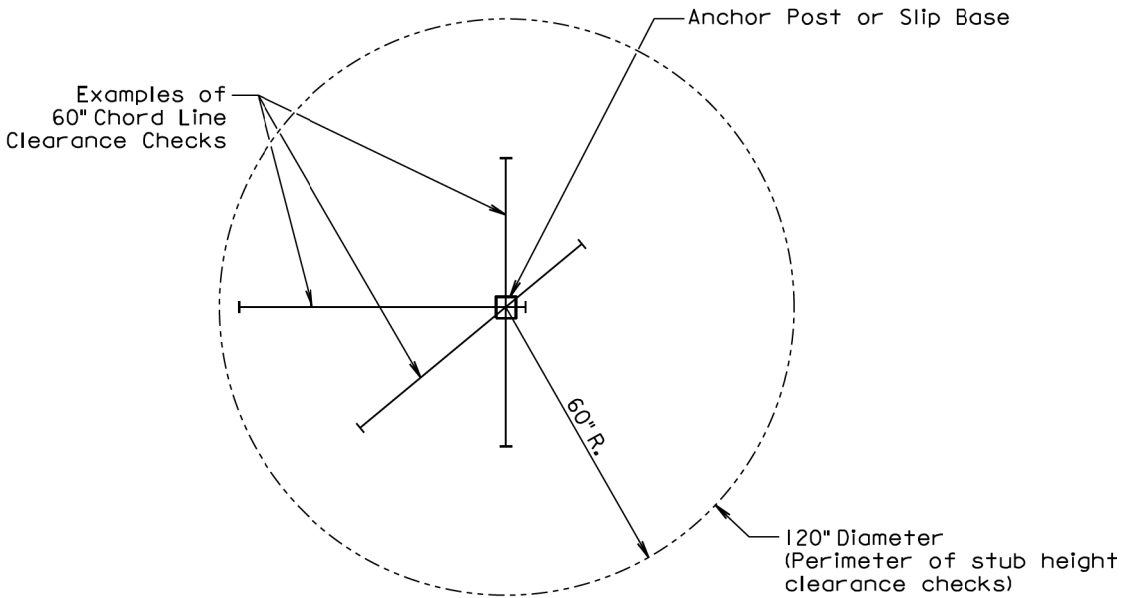
Published Date: 2nd Qtr. 2019	S D D O T	CRASHWORTHY SIGN SUPPORTS (Typical Construction Signing)	PLATE NUMBER 634.85
			Sheet 1 of 1

1:200
Plot Scale -

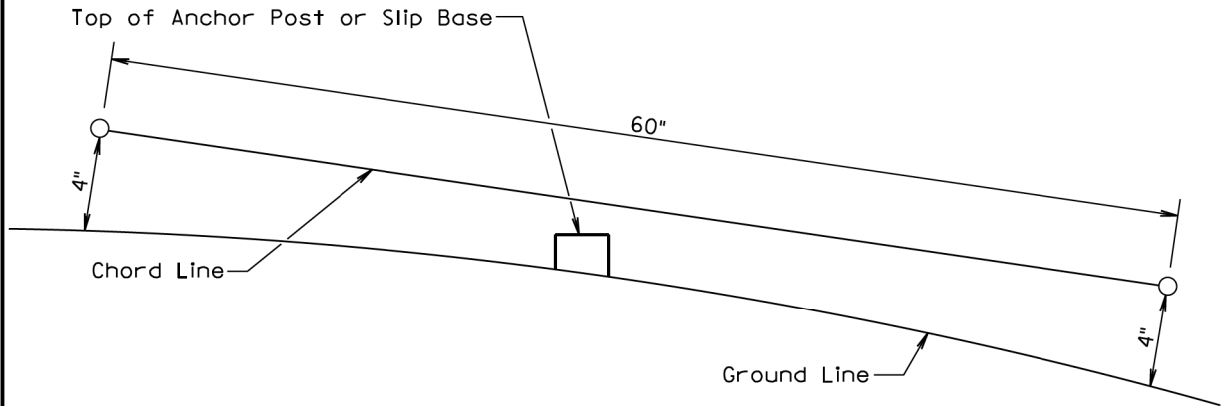
TRRC/2608
- Plotted From -

STATE OF SOUTH DAKOTA	PROJECT	SHEET	TOTAL SHEETS
	016-491	24	24

Plotting Date: 05/14/2019



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

Published Date: 2nd Qtr. 2019	S D D O T	BREAKAWAY SUPPORT STUB CLEARANCE	PLATE NUMBER 634.99
			Sheet 1 of 1

File - ...12019 Design\634_6.dgn