

**STATE OF SOUTH DAKOTA  
DEPARTMENT OF TRANSPORTATION**

**PLANS FOR PROPOSED**

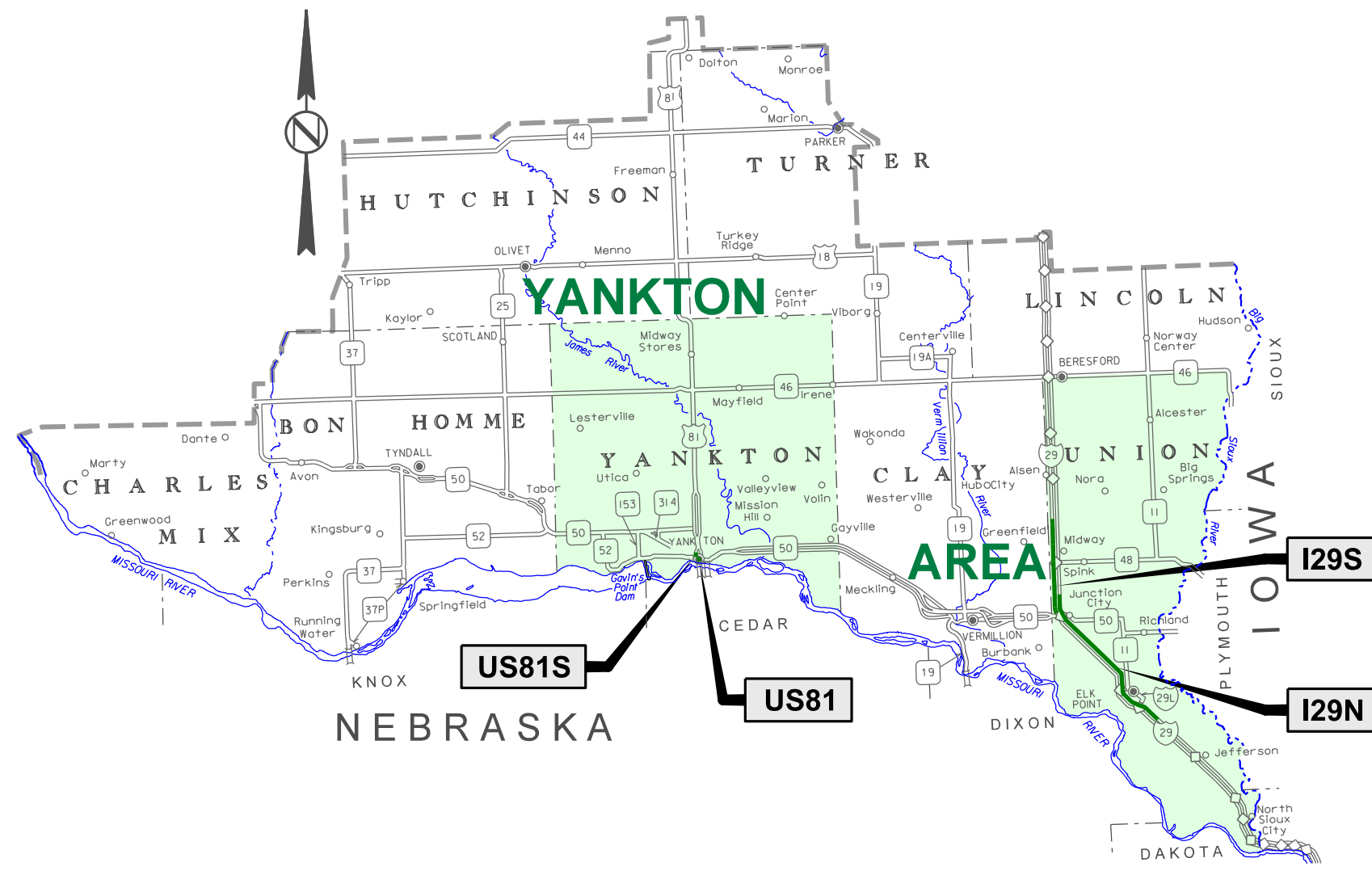
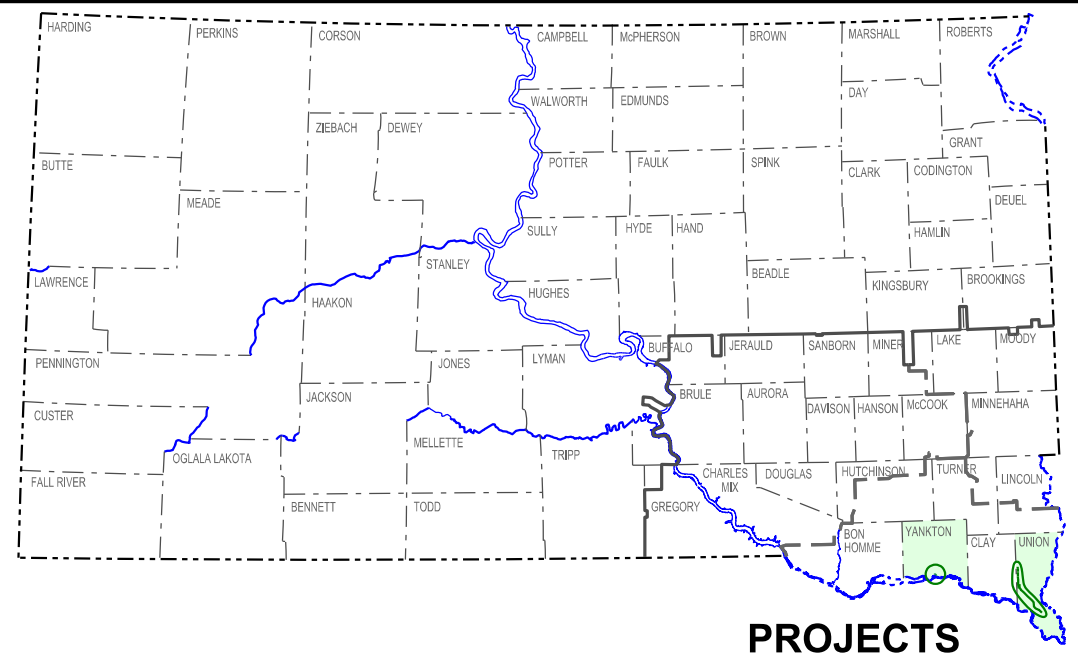
**PROJECTS 029S-291, 029N-291, 081-292 & 081S-292  
INTERSTATES 29S & 29N  
US HIGHWAYS 81 & 81S  
UNION & YANKTON COUNTIES  
CRC & PCC PAVEMENT REPAIR  
PCN I44R, I44T, I44U & I44V**

STATE OF SOUTH DAKOTA	PROJECT	SHEET	TOTAL SHEETS
	2016 Yankton Area PCCP Repair	1	25

**INDEX OF SHEETS**

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PLOT SCALE - 1:8750



**STORM WATER PERMIT**  
(None required)

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PLOT NAME - 1

**029S-291**  
**INTERSTATE 29 SBL**  
**UNION COUNTY**  
**CRC PAVEMENT REPAIR**  
**LENGTH: 7.522 MILES**  
**PCN I44R**

**029N-291**  
**INTERSTATE 29 NBL**  
**UNION COUNTY**  
**CRC & PCC PAVEMENT REPAIR**  
**LENGTH: 14.321 MILES**  
**PCN I44T**

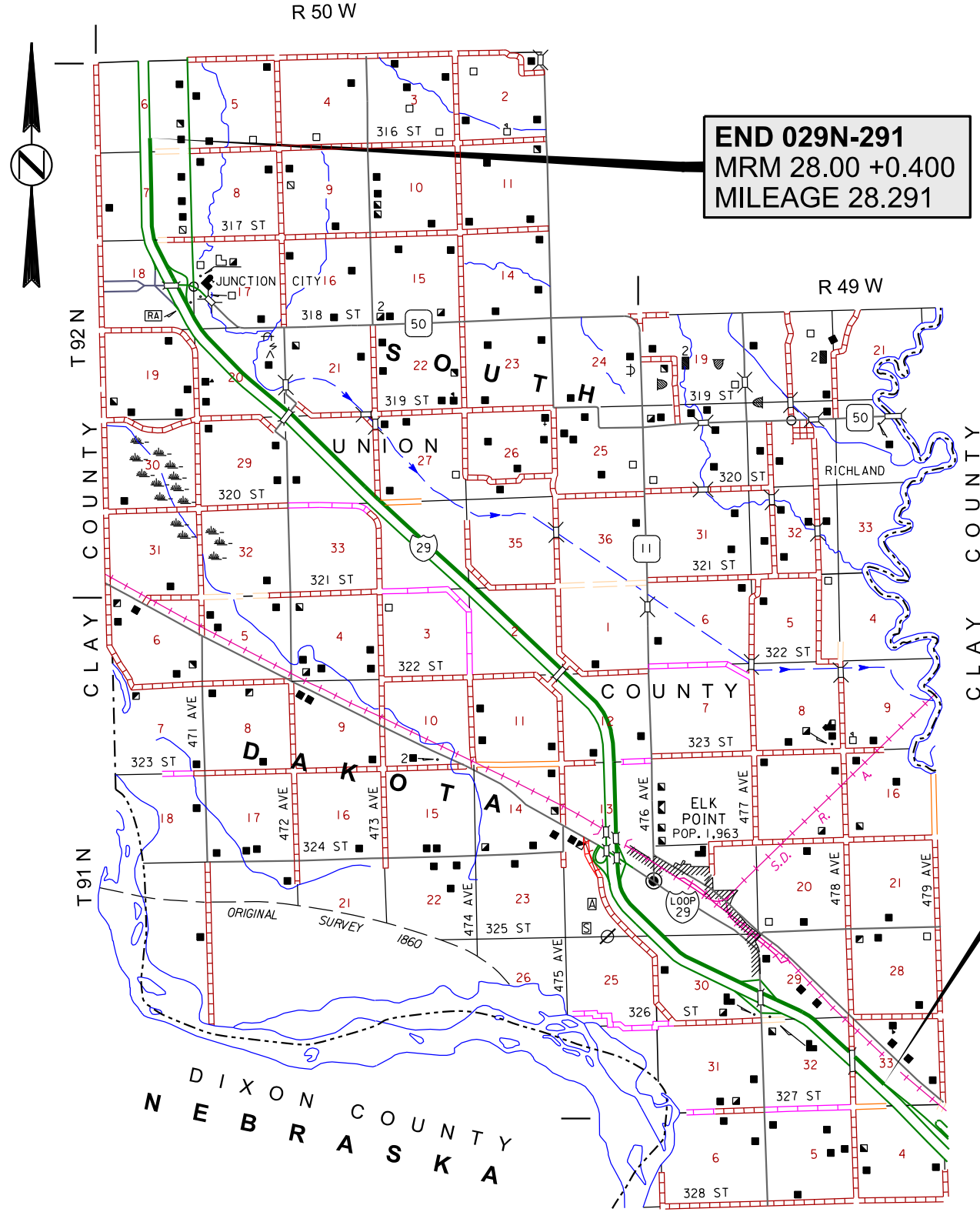
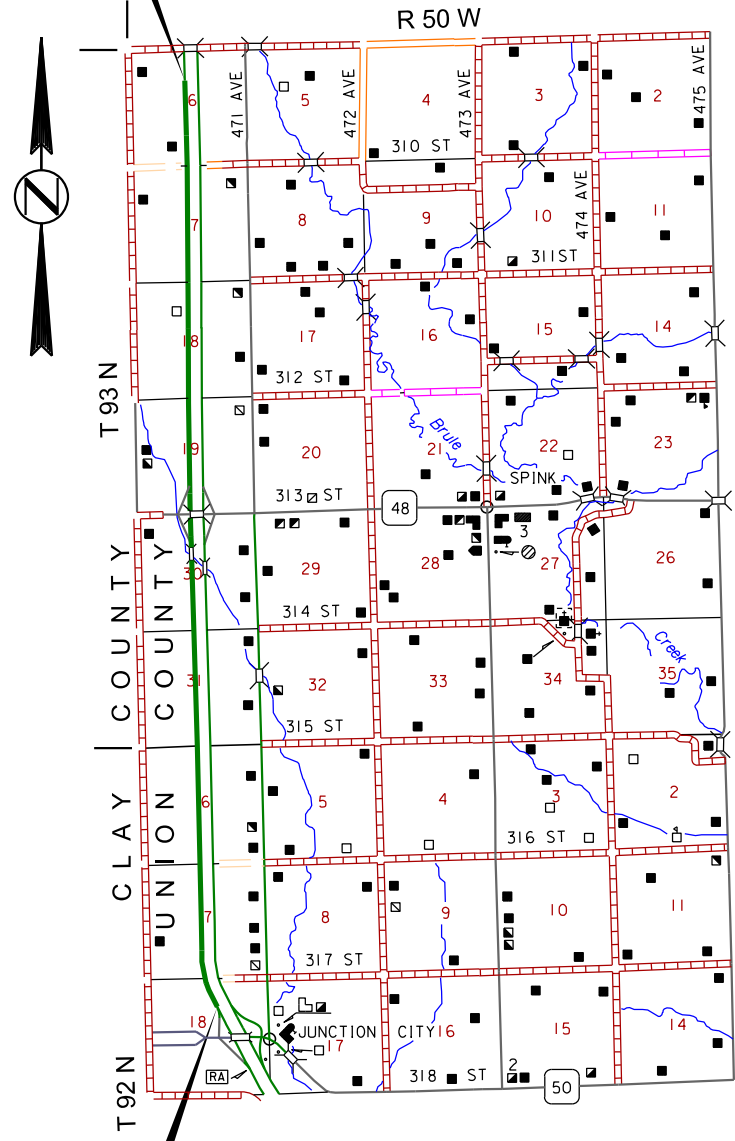
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 MILEAGE 34.424

**END 029N-291**  
 MRM 28.00 +0.400  
 MILEAGE 28.291

**BEGIN 029S-291**  
 MRM 27.00 +0.000  
 MILEAGE 26.902

**BEGIN 029N-291**  
 MRM 14.00 +0.000  
 MILEAGE 13.970

**I29S ADT (2015) 6,244**  
**I29N ADT (2015) 6,257**



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PLOT NAME - 2

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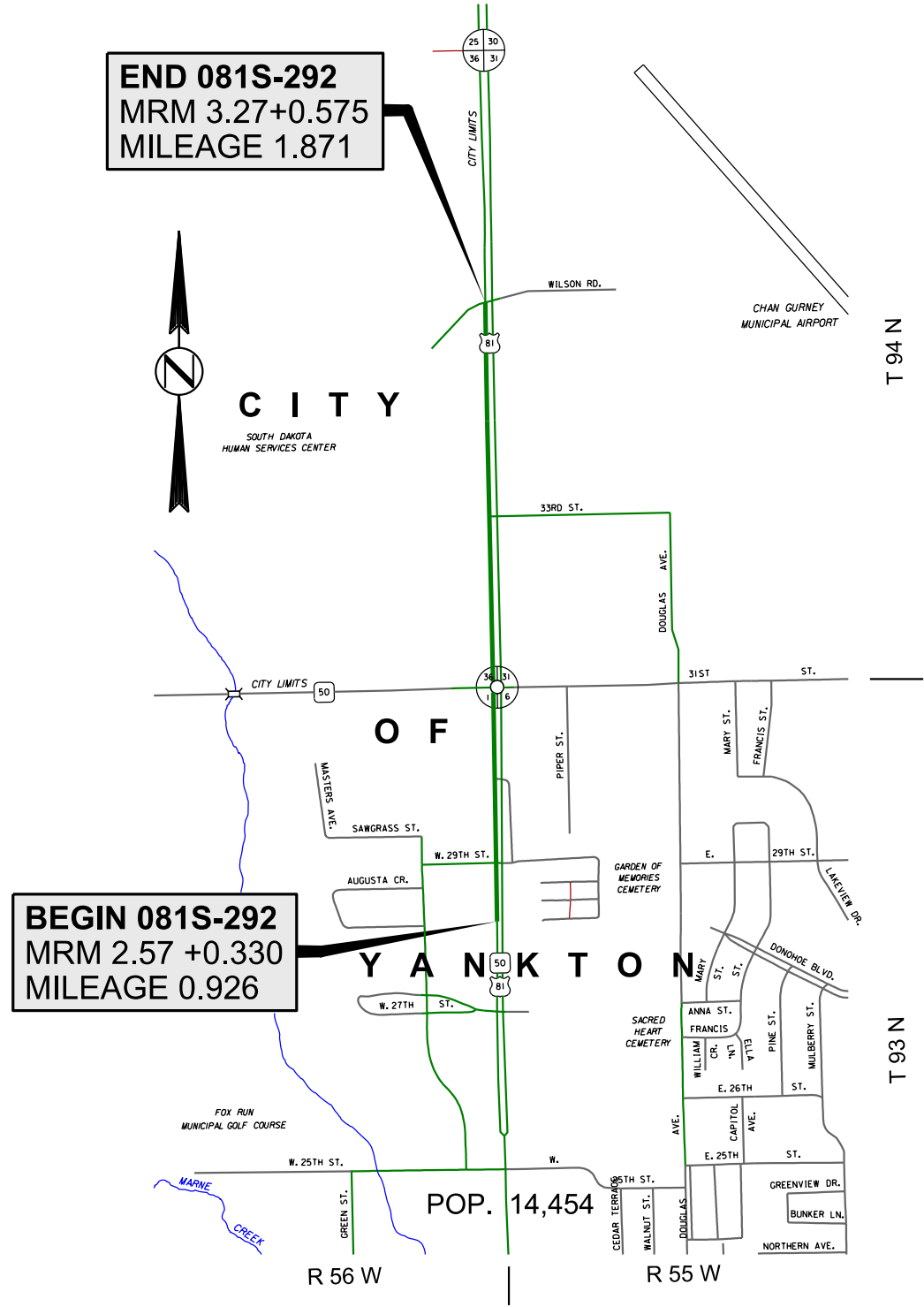
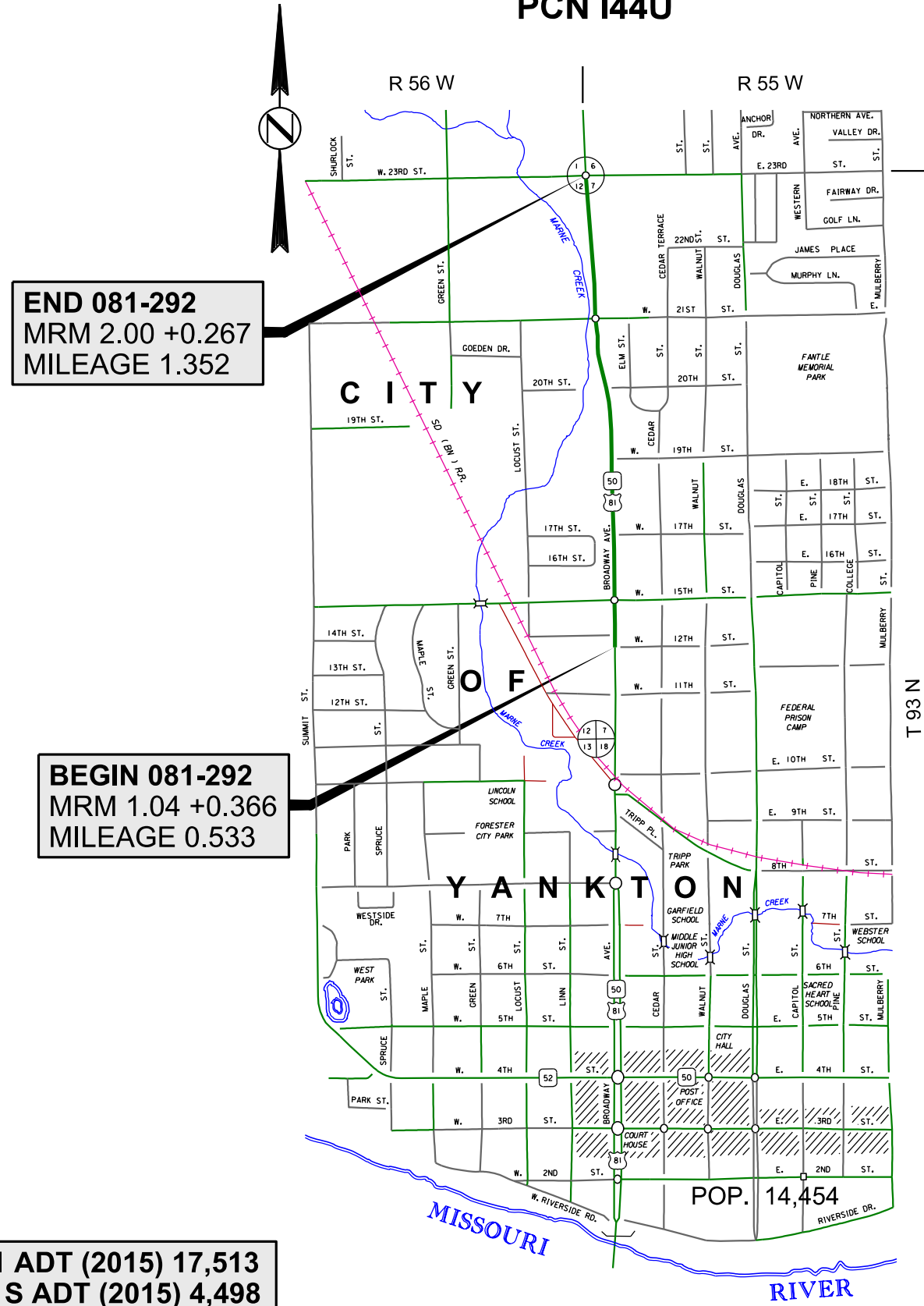
PLOT SCALE - 1:8750

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**081-292**  
**US HIGHWAY 81**  
**YANKTON COUNTY**  
**PCC PAVEMENT REPAIR**  
**LENGTH: 0.819 MILE**  
**PCN I44U**

**081S-292**  
**US HIGHWAY 81S**  
**YANKTON COUNTY**  
**PCC PAVEMENT REPAIR**  
**LENGTH: 0.945 MILE**  
**PCN I44V**

STATE OF SOUTH DAKOTA	PROJECT	SHEET	TOTAL SHEETS
	2016 Yankton Area PCCP Repair	3	25



PLOT NAME - 3

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# ESTIMATE OF QUANTITIES AND ENVIRONMENTAL COMMITMENTS

STATE OF SOUTH DAKOTA	PROJECT	SHEET	TOTAL SHEETS
	2016 Yankton Area PCCP Repair	4	25

## ESTIMATE OF QUANTITIES

BID ITEM NUMBER	ITEM	QUANTITY	UNIT
009E0010	Mobilization	Lump Sum	LS
380E5030	Nonreinforced PCC Pavement Repair	140.0	SqYd
380E5100	Continuously Reinforced PCC Pavement Repair	37.3	SqYd
380E6000	Dowel Bar	126	Each
380E6110	Insert Steel Bar in PCC Pavement	330	Each
634E0010	Flagging	20.0	Hour
634E0110	Traffic Control Signs	497	SqFt
634E0120	Traffic Control, Miscellaneous	Lump Sum	LS
634E0285	Type 3 Barricade, 8' Double Sided	6	Each
634E0310	Temporary Flexible Vertical Markers (Tabs)	6,480	Ft
634E0420	Type C Advance Warning Arrow Board	2	Each

## SPECIFICATIONS

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

## ENVIRONMENTAL COMMITMENTS

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

### COMMITMENT B2: WHOOPING CRANE

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

#### Action Taken/Required:

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

### COMMITMENT E: STORM WATER

Construction activities constitute less than 1 acre of disturbance.

#### Action Taken/Required:

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

### COMMITMENT H: WASTE DISPOSAL SITE

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

#### Action Taken/Required:

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

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

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

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

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

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

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

### COMMITMENT I: HISTORICAL PRESERVATION OFFICE CLEARANCES

The SDDOT has obtained concurrence with the State Historical Preservation Office (SHPO or THPO) for all work included within the project limits and all department designated sources and designated option material sources, stockpile sites, storage areas, and waste sites provided within the plans.

#### Action Taken/Required:

All earth disturbing activities not designated within the plans require review of cultural resources impacts. This work includes, but is not limited to: Contractor furnished material sources, material processing sites, stockpile sites, storage areas, plant sites, and waste areas.

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

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

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

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

SHPO/THPO review does not relieve the Contractor of the responsibility for obtaining any additional permits and clearances for 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 shall provide the required permits and clearances to the Project Engineer at the preconstruction meeting.

## ESTIMATE OF QUANTITIES

BID ITEM NUMBER	ITEM	029S-291 PCN I44R QUANTITY	029N-291 PCN I44T QUANTITY	081-292 PCN I44U QUANTITY	081S-292 PCN I44V QUANTITY	TOTAL QUANTITY	UNIT	
009E0010	Mobilization	<----- Lump Sum ----->					Lump Sum	LS
380E5030	Nonreinforced PCC Pavement Repair	-	64.0	52.0	24.0	140.0	SqYd	
380E5100	Continuously Reinforced PCC Pavement Repair	18.6	18.7	-	-	37.3	SqYd	
380E6000	Dowel Bar	-	24	78	24	126	Each	
380E6110	Insert Steel Bar in PCC Pavement	58	106	124	42	330	Each	
634E0010	Flagging	5	5	5	5	20	Hour	
634E0110	Traffic Control Signs	176	176	70	75	497	SqFt	
634E0120	Traffic Control, Miscellaneous	<----- Lump Sum ----->					Lump Sum	LS
634E0285	Type 3 Barricade, 8' Double Sided	2	2	1	1	6	Each	
634E0310	Temporary Flexible Vertical Markers (Tabs)	1,920	1,920	720	1,920	6,480	Ft	
634E0420	Type C Advance Warning Arrow Board	<----- 2 ----->					2	Each

**TABLE FOR CRC PAVEMENT REPAIR ON 029S-291 PCN I44R**

MRM	DISP	SB DRIVING LANE		CRCP REPAIR SqYds
		L Ft	W Ft	
27.00	0.510	6	14	9.3
34.00	0.250	6	14	9.3
<b>TOTALS:</b>				<b>18.6</b>

**TABLE FOR CRC PAVEMENT REPAIR ON 029S-291 PCN I44R**

REINFORCING STEEL (CRCP) FOR SB DRIVING LANE (STEEL FOR CRCP IS NOT A BID ITEM - ACTUAL STEEL QUANTITIES WILL VARY DUE TO LOCATION AND SIZE OF INDIVIDUAL REPAIR AREAS)																		INSERT STEEL BAR IN PCC PAVEMENT (CRCP) SB DRIVING LANE		
MRM	DISP	No. 6 Longitudinal Bars to be lap spliced with existing bars		Lap Splice & Stagger Cutoff		No. 6 Longitudinal Bars to be spliced together between every other existing longitudinal bar		Lap Splice & Stagger Cutoff		No. 6 Longitudinal Bars to be spliced together between every other existing longitudinal bar		Lap Splice & Stagger Cutoff		No. 4 Transverse Bars to be lap spliced with No. 5 x 24" bars		New Trans Bar Spacing	Reinforcing Steel Lbs	INSERT No. 6 LONG. BARS Each	INSERT No. 5 x 24" TIE BARS Each	INSERT BAR IN CRCP TOTAL Each
		# bars @ length	Length	Length	Cutoff	# bars @ length	Length	Length	Cutoff	# bars @ length	Length	Length	Cutoff	# bars @ length	Length					
27.00	0.510	26 bars @ 62" =	134.33'	19"	-	13 bars @ 55" =	59.58'	19"	-	13 bars @ 55" =	59.58'	19"	-	3 bars @ 162" =	40.50'	2'	407.796	26	3	29
34.00	0.250	26 bars @ 62" =	134.33'	19"	-	13 bars @ 55" =	59.58'	19"	-	13 bars @ 55" =	59.58'	19"	-	3 bars @ 162" =	40.50'	2'	407.796	26	3	29
<b>TOTALS:</b>		<b>52 bars</b>	<b>269'</b>			<b>26 bars</b>	<b>119'</b>			<b>26 bars</b>	<b>119'</b>			<b>6 bars</b>	<b>81'</b>		<b>816 Lbs</b>	<b>52</b>	<b>6</b>	<b>58</b>

**TABLE FOR CRC PAVEMENT REPAIR ON 029N-291 PCN I44T**

MRM	DISP	NB PASSING LANE		CRCP REPAIR SqYds
		L Ft	W Ft	
27.00	0.270	6	12	8.0
28.00	0.330	8	12	10.7
<b>TOTALS:</b>				<b>18.7</b>

**TABLE FOR CRC PAVEMENT REPAIR ON 029N-291 PCN I44T**

REINFORCING STEEL (CRCP) FOR NB PASSING LANE (STEEL FOR CRCP IS NOT A BID ITEM - ACTUAL STEEL QUANTITIES WILL VARY DUE TO LOCATION AND SIZE OF INDIVIDUAL REPAIR AREAS)																		INSERT STEEL BAR IN PCC PAVEMENT (CRCP) NB PASSING LANE		
MRM	DISP	No. 6 Longitudinal Bars to be lap spliced with existing bars		Lap Splice & Stagger Cutoff		No. 6 Longitudinal Bars to be spliced together between every other existing longitudinal bar		Lap Splice & Stagger Cutoff		No. 6 Longitudinal Bars to be spliced together between every other existing longitudinal bar		Lap Splice & Stagger Cutoff		No. 4 Transverse Bars to be lap spliced with No. 5 x 24" bars		New Trans Bar Spacing	Reinforcing Steel Lbs	INSERT No. 6 LONG. BARS Each	INSERT No. 5 x 24" TIE BARS Each	INSERT BAR IN CRCP TOTAL Each
		# bars @ length	Length	Length	Cutoff	# bars @ length	Length	Length	Cutoff	# bars @ length	Length	Length	Cutoff	# bars @ length	Length					
27.00	0.270	22 bars @ 62" =	113.67'	19"	-	11 bars @ 55" =	50.42'	19"	-	11 bars @ 55" =	50.42'	19"	-	3 bars @ 138" =	34.50'	1.75'	345.240	22	3	25
28.00	0.330	22 bars @ 85" =	155.83'	25"	3"	11 bars @ 70" =	64.17'	25"	4"	11 bars @ 70" =	64.17'	25"	4"	3 bars @ 138" =	34.50'	1.75'	449.869	22	3	25
<b>TOTALS:</b>		<b>44 bars</b>	<b>270'</b>			<b>22 bars</b>	<b>115'</b>			<b>22 bars</b>	<b>115'</b>			<b>6 bars</b>	<b>69'</b>		<b>795 Lbs</b>	<b>44</b>	<b>6</b>	<b>50</b>
<b>ADDITIONAL QUANTITIES:</b>		<b>10 bars</b>	<b>50'</b>			<b>-</b>	<b>20'</b>			<b>-</b>	<b>20'</b>			<b>-</b>	<b>10'</b>		<b>160 Lbs</b>	<b>10</b>	<b>-</b>	<b>10</b>
<b>GRAND TOTALS:</b>		<b>54 bars</b>	<b>320'</b>			<b>22 bars</b>	<b>135'</b>			<b>22 bars</b>	<b>135'</b>			<b>6 bars</b>	<b>79'</b>		<b>955 Lbs</b>	<b>54</b>	<b>6</b>	<b>60</b>

TABLE FOR PCC PAVEMENT REPAIR ON 029N-291 PCN I44T

MRM	DISP	LANE	NB DRIVING LANE		NRCP REPAIR SqYds	NEW JOINT CON-FIG. (NRCP)	INSERT STEEL BAR IN PCC PAVEMENT (NRCP)			DOWEL BAR Each
			L Ft	W Ft			No. 11 x 18" DEFORMED TIE BARS Each	No. 5 x 24" DEFORMED TIE BARS Each	INSERT BAR IN NRCP TOTAL Each	
14.00	0.094	NBDL *	96	6	64.0	R	8	38	46	24
<b>TOTALS:</b>					<b>64.0</b>		<b>8</b>	<b>38</b>	<b>46</b>	<b>24</b>

\* Port of Entry Ramp

TABLE FOR PCC PAVEMENT REPAIR ON 081-292 PCN I44U

MRM	DISP	SB DRIVING LANE		SB PASSING LANE		NB PASSING LANE		NB DRIVING LANE		NRCP REPAIR SqYds	NEW JOINT CON-FIG. (NRCP)	INSERT STEEL BAR IN PCC PAVEMENT (NRCP)			DOWEL BAR Each
		L Ft	W Ft	L Ft	W Ft	L Ft	W Ft	L Ft	W Ft			No. 9 x 18" DEFORMED TIE BARS Each	No. 5 x 24" DEFORMED TIE BARS Each	INSERT BAR IN NRCP TOTAL Each	
1.00	0.510			6	12					8.0	R	16	4	20	12
1.00	0.517	6	12	6	12					16.0	R	32	4	36	24
1.00	0.834					6	12			8.0	R	16	4	20	12
1.00	0.838							6	6	4.0	R	8	4	12	6
<b>TOTALS:</b>										<b>36.0</b>		<b>72</b>	<b>16</b>	<b>88</b>	<b>54</b>
<b>ADDITIONAL QUANTITIES:</b>										<b>16.0</b>		<b>32</b>	<b>4</b>	<b>36</b>	<b>24</b>
<b>GRAND TOTALS:</b>										<b>52.0</b>		<b>104</b>	<b>20</b>	<b>124</b>	<b>78</b>

TABLE FOR PCC PAVEMENT REPAIR ON 081S-292 PCN I44V

MRM	DISP	SB PASSING LANE		SB DRIVING LANE		NRCP REPAIR SqYds	NEW JOINT CON-FIG. (NRCP)	INSERT STEEL BAR IN PCC PAVEMENT (NRCP)			DOWEL BAR Each	
		L Ft	W Ft	L Ft	W Ft			1 1/4" x 18" PLAIN ROUND DOWEL BARS Each	No. 9 x 18" DEFORMED TIE BARS Each	No. 5 x 24" DEFORMED TIE BARS Each		INSERT BAR IN NRCP TOTAL Each
2.00	0.971			6	6	4.0	R		8	2	10	6
3.00	0.815	10	6	10	12	20.0	B	12	12	8	32	18
<b>TOTALS:</b>						<b>24.0</b>		<b>12</b>	<b>20</b>	<b>10</b>	<b>42</b>	<b>24</b>

**PCC PAVEMENT REPAIR AREA TYPES**

W = Two Working Joints (Use only if repair is full roadway width and uniform length (across all lanes))

T = Two Tied Joints

B = One Working & One Tied Joint

R = Two Tied Joints with Original Joint Restored with Dowel Bar Assembly

## UTILITIES

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

Utilities are not planned to be affected on this project. If utilities are identified near the improvement area, the Contractor shall contact the Project Engineer to determine modifications that will be necessary to avoid utility impacts.

## SCOPE OF WORK

This project consists of full depth replacement of Continuously Reinforced Concrete Pavement (CRCP) and Nonreinforced Concrete Pavement (NRCP) in areas where major failures have occurred. Full depth areas may vary in length and width; however the minimum length is 6 feet.

## EXISTING NRC PAVEMENT

I29N: Weigh Station: The existing pavement is 11.5" x variable width NRC Pavement. Existing contraction joints are spaced at approximately 20'. Longitudinal joints are reinforced with No. 5 x 30" deformed tie bars spaced 48" center to center. Transverse joints are reinforced with 1 1/4" x 18" plain round dowel bars spaced 12" center to center.

US81: The existing pavement is 9.5" x 76' NRC Pavement with B69.5 Curb and Gutter from 8<sup>th</sup> St. to 26<sup>th</sup> St. and 8.5" x 80' with a F68.5 Curb and Gutter having a concrete and grass raised median from 26<sup>th</sup> St. to 39<sup>th</sup> St. Existing contraction joints are spaced at approximately 20'. Longitudinal joints are reinforced with No. 5 x 30" deformed tie bars spaced 48" center to center. Transverse joints are reinforced with 1 1/4" x 18" plain round dowel bars spaced 12" center to center.

The aggregate in the existing NRC Pavement is quartzite.

## EXISTING CRC PAVEMENT

I29N - MRM 4.64+0.154 to MRM 15.58+0.111: The existing pavement is 10.5" x 26' CRC Pavement. The longitudinal reinforcing steel consists of No. 5 deformed bars spaced 4 1/2" center to center, and the transverse reinforcing steel consists of No. 4 deformed bars spaced 42" center to center.

I29N – MRM 27.00+0.051 to MRM 37.32+0.145: The existing pavement is 10" x 26' CRC Pavement. The longitudinal reinforcing steel consists of No. 6 deformed bars spaced 6 1/2" center to center, and the transverse reinforcing steel consists of No. 4 deformed bars spaced 42" center to center.

I29S – MRM 27.00+0.436 to MRM 37.32+0.141: The existing pavement is 10" x 26' CRC Pavement. The longitudinal reinforcing steel consists of No. 6 deformed bars spaced 6 1/2" center to center, and the transverse reinforcing steel consists of No. 4 deformed bars spaced 42" center to center.

The aggregate in the existing CRC Pavement is quartzite.

## RESTORATION OF GRAVEL CUSHION

An inspection of the gravel cushion 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 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 place and compact gravel cushion to the satisfaction of the Engineer at no additional cost to the State. Additional gravel cushion can be obtained from the Department of Transportation Maintenance shops located in Beresford, Junction City, or Yankton.

## RESTORATION OF GRAVEL CUSHION (CONTINUED)

Cost for this work shall be incidental to the contract unit prices per square yard for Nonreinforced PCC Pavement Repair and Continuously Reinforced PCC Pavement Repair.

## NONREINFORCED PCC PAVEMENT REPAIR - GENERAL

New pavement thickness shall equal existing pavement thickness ( $T_N = T$ ).

Locations and size (length or width) of concrete repair areas are subject to change in the field, at the discretion of the Engineer, at no additional cost to the state. Payment will be based on 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.

Saw cuts that extend beyond the repair area shall be minimized and filled with a non-shrinkage mortar mix at the Contractor's expense.

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. Any existing dowel bar assemblies/steel bars shall be sawed off and removed.

At full roadway width repairs and when specified, a working joint will be reconstructed at both ends of each pavement replacement area as shown in these plans.

Concrete placed adjacent to asphalt concrete shoulders shall be formed full depth to match the width of existing concrete pavement. Asphalt concrete shoulders adjacent to concrete pavement replacements shall be repaired with new hot-mix asphalt concrete.

At repair locations where the new working joint is not opposite the existing working joint, the Contractor shall place a 1/4" 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.

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

All joints (longitudinal and transverse) through and around the repair areas will be sawed and sealed in accordance with the details shown in these plans. Refer to Saw and Seal Joints notes.

## NONREINFORCED PCC PAVEMENT REPAIR

Concrete shall meet the requirements stated in Section 380 of the specifications, except as modified by the following notes:

The fine aggregate shall be screened over a one-inch square-opening screen just prior to introduction into the concrete paving mix if required by the Engineer.

## NONREINFORCED PCC PAVEMENT REPAIR (CONTINUED)

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. The concrete shall contain a minimum of 50% coarse aggregate by weight. 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 mix design shall contain at least 650 lbs of Type I or II cement or 600 lbs of Type 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 shall submit a mix design and supporting documentation for approval at least 2 weeks prior to use.

The use of a water reducer at manufacturer's recommended dosage will be required.

Concrete shall be cured with white pigmented curing compound (AASHTO M148, Type 2) 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°F or higher throughout the cure period. If the concrete temperature falls below 60°F, the cure time shall be extended or other measures taken, at no additional cost to the State. A strength of 4,000 psi must be attained prior to opening to traffic.

Upon placement of the concrete, repair areas shall be straight edged to ensure a smooth riding surface and shall be textured longitudinally with the pavement by finishing with a stiff broom. Repair areas shall then be checked with a 10' foot straight edge. The permissible longitudinal and transverse surface deviation shall be 1/8" in 10'.

Concrete shall be covered with suitable insulation blanket consisting of a layer of closed cell polystyrene foam protected by at least one layer of plastic. Insulation blanket shall have an R-value of at least 0.5, as rated by the manufacturer. Insulation blanket shall be left in place, except for joint sawing operations, until the 4,000 psi is attained. Insulation blanket shall be overlapped on to the existing concrete by 4'. This requirement for covering repair areas with insulation blankets may be waived during periods of hot weather upon approval of the Engineer.

Cost for performing the aforementioned work including sawing and removing concrete, furnishing and placing concrete, sawing and sealing joints, repairing asphalt concrete shoulders, labor, tools and equipment shall be included in the contract unit price per square yard for Nonreinforced PCC Pavement Repair.

## CONTINUOUSLY REINFORCED PCC PAVEMENT REPAIR

New pavement thickness shall equal existing pavement thickness ( $T_N = T$ ).

Locations and size (length or width) of pavement repair areas are subject to change in the field, at the discretion of the Engineer, at no additional cost to the state. Payment will be based on actual area replaced.

The Engineer will mark the location of the area to be repaired on construction. Where repair crosses both lanes, the passing lane should be repaired first.

The Contractor shall saw the in place concrete transversely at four locations for each repair area. Two saw cuts shall be full depth. The other two saw cuts shall be partial depth saw cuts and shall be made to a depth just above the in place reinforcing steel, and be placed outside of the previous full depth saw cuts. The outside cuts shall be a minimum of 6" from the nearest tight crack outside of the patch.



### **CONTINUOUSLY REINFORCED PCC PAVEMENT REPAIR (CONTINUED)**

Saw cuts that extend beyond the repair area shall be minimized and filled with a non-shrinkage mortar mix at the Contractor's expense.

The Contractor shall lift out or break out the center section (including reinforcing steel) and then use light chipping hammers (not exceeding 15 pounds) to remove the remaining concrete at each end of the repair area, leaving the reinforcing steel in place. Care shall be taken not to cut, bend or otherwise damage the in place reinforcing steel. Damage to in place reinforcing steel or to in place concrete beyond the repair area will be replaced at the Contractor's expense, to the satisfaction of the Engineer.

The Contractor shall remove and dispose of the in place concrete and in place asphalt concrete.

Existing exposed reinforcing steel and concrete faces shall be cleaned by sandblasting and compressed air to remove dirt and debris prior to placement of concrete.

Place reinforcing steel according to the notes for REINFORCING STEEL (CRC Pavement) and STEEL BAR INSERTION (CRC Pavement).

Concrete placed adjacent to asphalt concrete shoulders shall be formed full depth to match the width of existing concrete pavement. The excavated area of the asphalt concrete shoulder adjacent to repair areas shall be filled with asphalt concrete.

Concrete shall not be placed in the repair areas before 12:00pm and should be placed in the late afternoon. Temperature of the concrete at the time of placement shall be between 50°F and 90°F. The temperature of the concrete shall be maintained above 40°F during the curing period.

Concrete shall meet the requirements stated in Section 380 of the specifications, except as modified by the following notes:

The fine aggregate shall be screened over a one-inch square-opening screen just prior to introduction into the concrete paving mix if required by the Engineer.

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. The concrete shall contain a minimum of 50% coarse aggregate by weight. 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 mix design shall contain at least 650 lbs of Type I or II cement or 600 lbs of Type 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 shall submit a mix design and supporting documentation for approval at least 2 weeks prior to use.

The use of a water reducer at manufacturer's recommended dosage will be required.

Concrete shall be cured with white pigmented curing compound (AASHTO M148, Type 2) applied as soon as practical at a rate of 125 square feet per gallon. Concrete shall be cured a minimum of 48 hours before opening to traffic. The 48 hours is based upon a concrete surface temperature of 60°F or higher throughout the cure period. If the concrete temperature falls below 60°F, the cure time shall be extended or other measures taken, at no additional cost to the State. A strength of 4,000 psi must be obtained prior to opening to traffic.

### **CONTINUOUSLY REINFORCED PCC PAVEMENT REPAIR (CONTINUED)**

Concrete shall be covered with suitable insulation blanket consisting of a layer of closed cell polystyrene foam protected by at least one layer of plastic. Insulation blanket shall have an R-value of at least 0.5, as rated by the manufacturer. Insulation blanket shall be left in place, except for joint sawing operations. Insulation blanket shall be overlapped on to the existing concrete by 4'. This requirement for covering repair areas with insulation blankets may be waived during periods of hot weather upon approval of the Engineer.

Upon placement of the concrete, repair areas shall be straight edged to ensure a smooth riding surface and shall be textured longitudinally with the pavement by finishing with a stiff broom. Repair areas shall then be checked with a 10' foot straight edge. The permissible longitudinal and transverse surface deviation shall be 1/8" in 10'.

Cost for performing the aforementioned work including sawing, chipping and removing concrete, sandblasting, cleaning, furnishing and placing concrete and reinforcing steel, finishing and curing, replacing asphalt concrete shoulders, labor and equipment shall be included in the contract unit price per square yard for Continuously Reinforced PCC Pavement Repair.

### **REINFORCING STEEL (CRCP)**

After removal of the in place concrete and repair of the gravel cushion subgrade, new reinforcing steel shall be installed. Refer to the CRC Pavement Repair Area layouts for details.

1. New longitudinal bars shall be lap spliced with the preserved in place longitudinal bars (New bar diameter to match in place bar diameter).
2. At full lane width repair areas, additional longitudinal bars shall be centered between every other set of two spliced longitudinal bars throughout the width of the repair area. The additional longitudinal bars shall overlap into the existing concrete 9" on both sides of the repair area. Drilled holes will be required and the additional longitudinal bars shall be inserted in accordance with the notes for STEEL BAR INSERTION (CRCP). The additional longitudinal bars shall then be lap spliced.
3. Additional transverse bars shall be centered between the in place transverse bars throughout the length of the repair area. The spacing of transverse bars in the completed repair area should be half the spacing of the in place transverse reinforcing steel.

The additional transverse bars shall be lap spliced with No. 5 x 24" epoxy coated deformed tie bars inserted 9" into the existing concrete. Drilled holes will be required. Tie bars shall be inserted according to the notes for STEEL BAR INSERTION (CRCP).

Cost for this work, including reinforcing steel, ties, labor and equipment shall be incidental to the contract unit price per square yard for Continuously Reinforced PCC Pavement Repair.

### **STEEL BAR INSERTION (CRCP)**

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.

Longitudinal deformed tie bars shall be inserted 9 inches into the in place concrete at the transverse joint and centered between every other set of two spliced longitudinal bars throughout the width of the repair area. Transverse deformed bars shall be lap spliced with deformed tie bars which are inserted 9 inches into the in place concrete at the longitudinal joint throughout the length of the repair area. Refer to the notes for REINFORCING STEEL (CRCP). An epoxy resin adhesive must be used to anchor the steel bar in the drilled hole.

### **STEEL BAR INSERTION (CRCP) (CONTINUED)**

Holes drilled into the existing concrete pavement shall be located at mid-depth of the slab and true and normal except that in transverse joints, the drilled in longitudinal steel bar angle will be slightly under 90° to allow for centering of the lap splice between existing longitudinal steel.

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.

Cost for reinforcing steel (except the inserted No. 5 x 24" epoxy coated deformed tie bars) shall be incidental to the contract unit price per square yard for Continuously Reinforced PCC Pavement Repair.

Cost for drilling holes, furnishing and applying epoxy resin adhesive, furnishing and inserting No. 5 x 24" epoxy coated deformed tie bars into the drilled holes and inserting all other reinforcing steel bars into the drilled holes, and any incidentals necessary to complete the work shall be included in the contract unit price per each for Insert Steel Bar in PCC Pavement.

### **STEEL BAR INSERTION (NRCP)**

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.

For existing pavement thickness greater than or equal to 10.5" (T >= 10.5"):

The Contractor shall insert the steel bars (1½" x 18" epoxy coated plain round dowel bars and No. 11 x 18" epoxy coated deformed tie bars for transverse joints and No. 5 x 24" epoxy coated deformed tie bars for longitudinal joints) into drilled holes in the existing concrete pavement. An epoxy resin adhesive must be used to anchor the steel bar in the drilled hole.

For existing pavement thickness greater than or equal to 8.5" and less than 10.5" (T >= 8.5" and T < 10.5"):

The Contractor shall insert the steel bars (1¼" x 18" epoxy coated plain round dowel bars and No. 9 x 18" epoxy coated deformed tie bars for transverse joints and No. 5 x 24" epoxy coated deformed tie bars for longitudinal joints) into drilled holes in the existing concrete pavement. An epoxy resin adhesive must be used to anchor the steel bar in the drilled hole.

For existing pavement thickness less than 8.5" (T < 8.5"):

The Contractor shall insert the steel bars (1" x 18" epoxy coated plain round dowel bars and No. 8 x 18" epoxy coated deformed tie bars for transverse joints and No. 5 x 24" epoxy coated deformed tie bars for longitudinal joints) into drilled holes in the existing concrete pavement. An epoxy resin adhesive must be used to anchor the steel bar in the drilled hole.

Plain round dowel bars shall be cut to the specified length by sawing and shall be free from burring or other deformations. Shearing will not be permitted.

Steel bars shall be inserted in the transverse joint on 18" centers. The first steel bar in the transverse joint shall be placed 9" from the edge of the slab closest to centerline. Steel bars shall be inserted in the longitudinal joint on 30" centers and shall be a minimum of 15" from either transverse joint. A typical one-lane patch 12' wide and 6' long will require 18 steel bars (8 in each transverse joint and 2 in the longitudinal joint). It will be necessary to laterally adjust the location of some of the inserted steel bars when the dimensions above interfere with existing steel bar locations.

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.

Cost for the epoxy resin adhesive, steel bars, drilling of holes, inserting the steel bars into the drilled holes and all other items incidental to the insertion of the steel bars shall be included in the contract unit price per each for Insert Steel Bar in PCC Pavement.

STATE OF SOUTH DAKOTA	PROJECT	SHEET	TOTAL SHEETS
	2016 Yankton Area PCCP Repair	10	25

### **SAW AND SEAL JOINTS**

All longitudinal and transverse joints at concrete repair areas shall be sawed and sealed on Nonreinforced PCC Pavement Repairs and only longitudinal joints (in line with existing longitudinal joints) at concrete repair areas shall be sawed and sealed at Continuously Reinforced PCC Pavement Repairs.

Joints shall not be sealed unless they are thoroughly clean and dry. Cleaning shall be accomplished by sand blasting and other tools as necessary. Just prior to sealing, each joint shall be blown out using a jet of compressed air to remove all traces of dust.

Longitudinal and transverse joints in urban sections may be sealed with either Hot Poured Elastic Joint Sealer or Low Modulus Silicone Sealant. Transverse joints in rural sections shall be sealed with Low Modulus Silicone Sealant. Longitudinal joints in rural sections may be sealed with either Hot Poured Elastic Joint Sealer or Low Modulus Silicone Sealant.

Acceptance of the Low Modulus Silicone Sealant and Hot Poured Elastic Joint Sealer will be based on visual inspection by the Engineer

Cost for sawing and sealing of the longitudinal construction joint and both transverse joints shall be incidental to the contract unit prices per square yard for Nonreinforced PCC Pavement Repair and/or Continuously Reinforced PCC Pavement Repair.

### **TEMPORARY PAVEMENT MARKING**

Temporary pavement marking on lane closure tapers shall consist of temporary flexible vertical markers (tabs) or raised pavement markers. (Estimate four workspaces with 960' tapers on I29, two workspaces with 660' tapers on US81 (Broadway Ave. in Yankton) divided, one workspace with 600' taper on US81 divided, and four workspaces with 180' tapers on US81 undivided.

Cost shall be included in the contract unit price per foot for Temporary Flexible Vertical Markers (Tabs).

### **GENERAL MAINTENANCE OF TRAFFIC**

Sufficient traffic control devices have been included in these plans to sign two workspaces on a four-lane divided or multi-lane highway. If the Contractor elects to work on additional sites simultaneously, the cost for additional traffic control devices shall be incidental to the contract unit price per square foot for Traffic Control Signs.

Joints in approaches to signalized intersections containing vehicle detector loops shall not be sawed, sealed or otherwise disturbed.

The Contractor will be required to contact the City of Yankton to adjust signal timings to accommodate traffic when a lane is closed near a signalized intersection.

Reflectorized cones (42" minimum height), reflectorized drums or Type 2 Barricades shall be used to maintain a minimum of two-way traffic at intersecting roads or streets. The Contractor shall mark and maintain alternating one-way access to businesses and residences along the project with cones, drums or Type 1 Barricades. The Contractor shall advise affected businesses before restriction and anticipated duration of construction time.

The Contractor shall maintain pedestrian access at crosswalk locations. Additional traffic control devices shall be used as necessary to accommodate the pedestrian traffic if work activities block an existing crosswalk.

### **MAINTENANCE OF TRAFFIC – PCC PAVEMENT REPAIR**

A Type 3 Barricade shall be installed at the end of a lane closure taper as detailed in these plans. Additional Type 3 Barricades shall be installed facing traffic within the closed lane at a spacing of 1/4 mile. At intersecting roadways, two additional Type 3 Barricades shall be used to block the entire closed lane and shoulder.

Each mainline concrete repair location from which the in place concrete has been removed shall be marked with a minimum of two reflectorized cones (42" minimum height) or two reflectorized drums. In areas containing numerous concrete repair locations, two reflectorized drums should be installed at a spacing of 660' alternating with the Type 3 Barricades.

Signs may be mounted on portable supports for a period of 3 days or less.

Construction workspaces on divided roadways shall be limited to 3 miles in length. The distance between the closest points of any two construction workspaces, including channeling devices, shall not be less than 3 miles.

Construction workspaces in urban areas shall be limited to 3 blocks in length. The minimum distance between workspaces shall be 3 blocks.

When work is in progress within an intersection, Flaggers will be required to direct traffic.

Holes adjacent to centerline in the lane open to traffic created during removal and replacement of PCC Pavement Repair areas shall be filled with gravel cushion material and cold-mix asphalt concrete prior to opening the lane to traffic. Gravel cushion material and cold-mix asphalt concrete can be obtained from the Department of Transportation Maintenance shops located in Beresford, Junction City, or Yankton.

Holes in the gravel and asphalt concrete shoulders created during removal and replacement of PCC Pavement Repair areas shall be filled with gravel cushion material and hot-mix asphalt concrete (to match the shoulder surfacing) prior to opening the lane to traffic. Gravel cushion material can be obtained from the Department of Transportation Maintenance shops located in Beresford, Junction City, or Yankton. Hot-mix asphalt concrete shall be furnished by the Contractor at no additional cost to the State.

Cost for furnishing, hauling and placing gravel cushion material and asphalt concrete shall be incidental to the contract unit price per square yard for Nonreinforced PCC Pavement Repair and/or Continuously Reinforced PCC Pavement Repair.

Routing traffic onto the shoulders during any phase of the construction will not be allowed.

Damage to the shoulders, median or ditch due to the Contractor's operations shall be repaired by the Contractor, to the satisfaction of the Engineer, at no expense to the State. This includes the apparent routing of traffic onto these shoulders around the work zones.

Extra care shall be taken to protect the in place asphalt concrete shoulders on Interstate 29. In all workspaces in these areas, the same channelizing devices and spacing used on centerline, will also be required on the shoulders. These channelizing devices shall be placed in locations to adequately keep traffic completely off these shoulders. Continuous maintenance of the shoulder devices will be required to keep them in place. Cost for these extra channelizing devices shall be incidental to the contract lump sum price for Traffic Control, Miscellaneous.

The Contractor shall notify businesses/homeowners a minimum of two weeks prior to construction to inform them of upcoming construction and again a minimum of 48 hours prior to any blocked access to make appropriate arrangements.

### **MAINTENANCE OF TRAFFIC – PCC PAVEMENT REPAIR (CONTINUED)**

Additional sets of flagger warning signs and additional flagger hours have been included in the Estimate of Quantities for use on intersecting roads. These flaggers will be used as directed by the Engineer and will be used primarily during daytime hours.

Work activities (not including flagging) during non-daylight hours are subject to prior approval.

### **MAINTENANCE OF TRAFFIC (INTERSTATE HIGHWAYS)**

Work activities shall not be conducted simultaneously on the median and outside shoulders of the same directional set of lanes.

The use of interstate maintenance crossovers will not be permitted.

Traffic will be permitted on the ramp shoulders when necessary to allow traffic around a workspace.

### **REFLECTORIZED SHEETING REQUIREMENTS FOR TEMPORARY TRAFFIC CONTROL DEVICES**

Delete the first paragraph of Section 984.1 and replace with the following:

Temporary traffic control devices, including signs, drums, cones, tubular markers, barricades, vertical panels, and direction indicator barricades shall be reflectorized with sheeting applied to a satisfactory backing. For all temporary traffic control warning signs, the reflective sheeting shall meet or exceed the standards of Type VII, Type VIII, Type IX, or Type XI as defined by AASHTO M 268 (ASTM D4956). For all other temporary traffic control signs, the reflective sheeting shall meet or exceed the standards of Type IV, Type V, Type VII, Type VIII, Type IX, or Type XI as defined by AASHTO M 268 (ASTM D4956). For barricades, vertical panels, and direction indicator barricades; the reflective sheeting shall meet or exceed the standards of Type III as defined by AASHTO M 268 (ASTM D4956). Round surfaced temporary traffic control devices including, but not limited to; drums, cones, and tubular markers shall be reflectorized with reflectorized sheeting meeting or exceeding the standards of Type IV as defined by AASHTO M 268 (ASTM D4956). All orange colored material shall be fluorescent.

**ITEMIZED LIST FOR TRAFFIC CONTROL SIGNS**

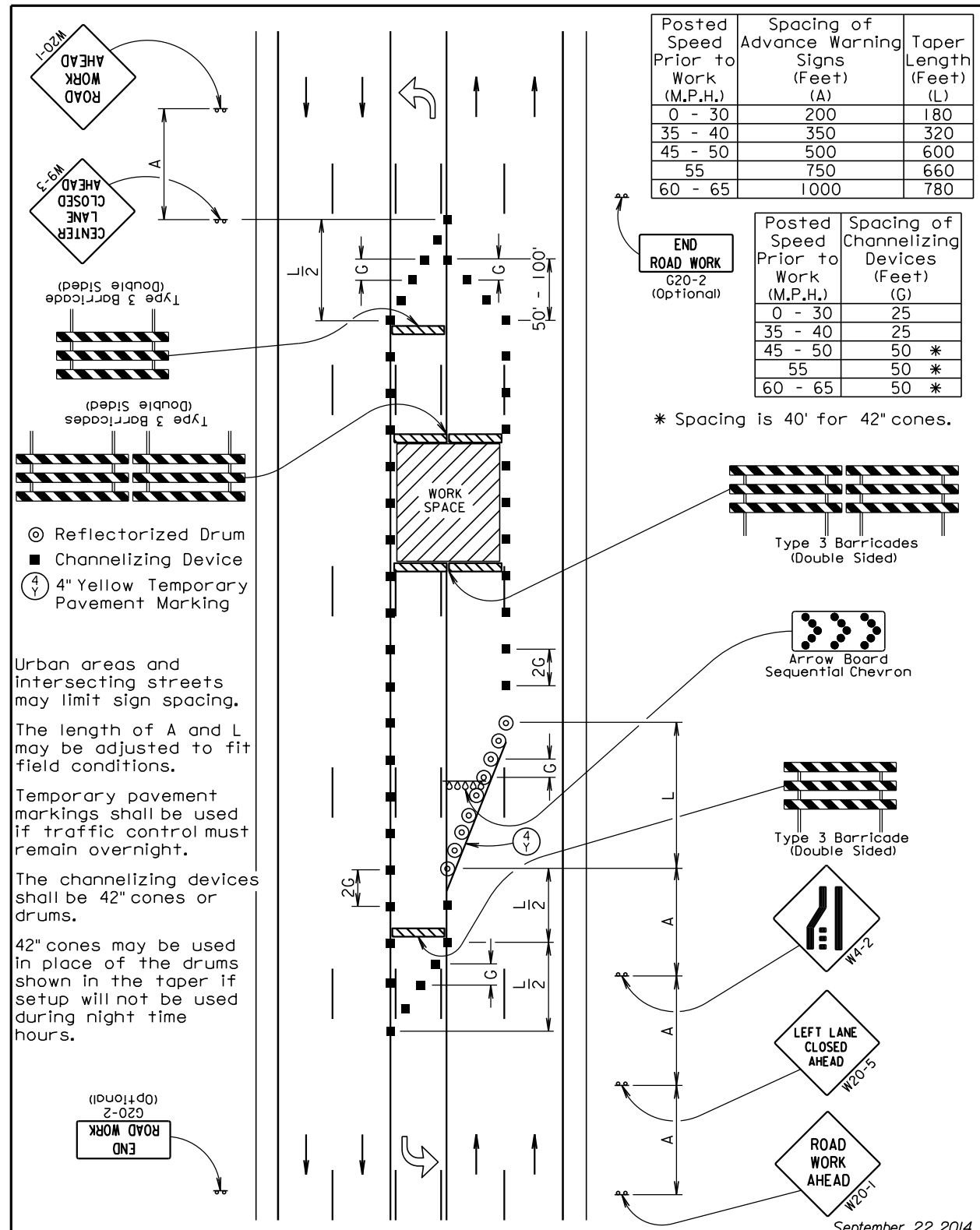
SIGN CODE	SIGN DESCRIPTION	CONVENTIONAL ROAD				EXPRESSWAY / INTERSTATE				
		NUMBER	SIGN SIZE	SQFT PER SIGN	SQFT	NUMBER	SIGN SIZE	SQFT PER SIGN	SQFT	
R1-1	STOP	2	30" x 30"	6	12		36" x 36"	9		
R2-1	SPEED LIMIT 45		24" x 30"	5		2	36" x 48"	12	24	
R2-1	SPEED LIMIT 65		24" x 30"	5		4	36" x 48"	12	48	
R2-1	SPEED LIMIT 80		24" x 30"	5		2	36" x 48"	12	24	
R2-6aP	FINES DOUBLE (plaque)		24" x 18"	3		4	36" x 24"	6	24	
W3-5	SPEED REDUCTION AHEAD (4- 65 MPH & 2 - 45 MPH)		48" x 48"	16		6	48" x 48"	16	96	
W4-2	LEFT or RIGHT LANE ENDS (symbol)	2	48" x 48"	16	32	2	48" x 48"	16	32	
W4-3	ADDED LANE (symbol)		48" x 48"	16		1	48" x 48"	16	16	
W9-3	CENTER LANE CLOSED AHEAD	1	48" x 48"	16	16		48" x 48"	16		
W20-1	ROAD WORK AHEAD	2	48" x 48"	16	32	2	48" x 48"	16	32	
W20-5	LEFT or RIGHT LANE CLOSED AHEAD	2	48" x 48"	16	32	2	48" x 48"	16	32	
W20-7	FLAGGER (symbol)	1	48" x 48"	16	16	1	48" x 48"	16	16	
G20-2	END ROAD WORK	1	36" x 18"	5	5	1	48" x 24"	8	8	
<b>TRAFFIC CONTROL SIGNS TOTAL</b>		<b>497 SQFT</b>	<b>CONVENTIONAL ROAD TRAFFIC CONTROL SIGNS SQFT</b>			<b>145</b>	<b>EXPRESSWAY / INTERSTATE TRAFFIC CONTROL SIGNS SQFT</b>			<b>352</b>

**TYPE 3 BARRICADES**

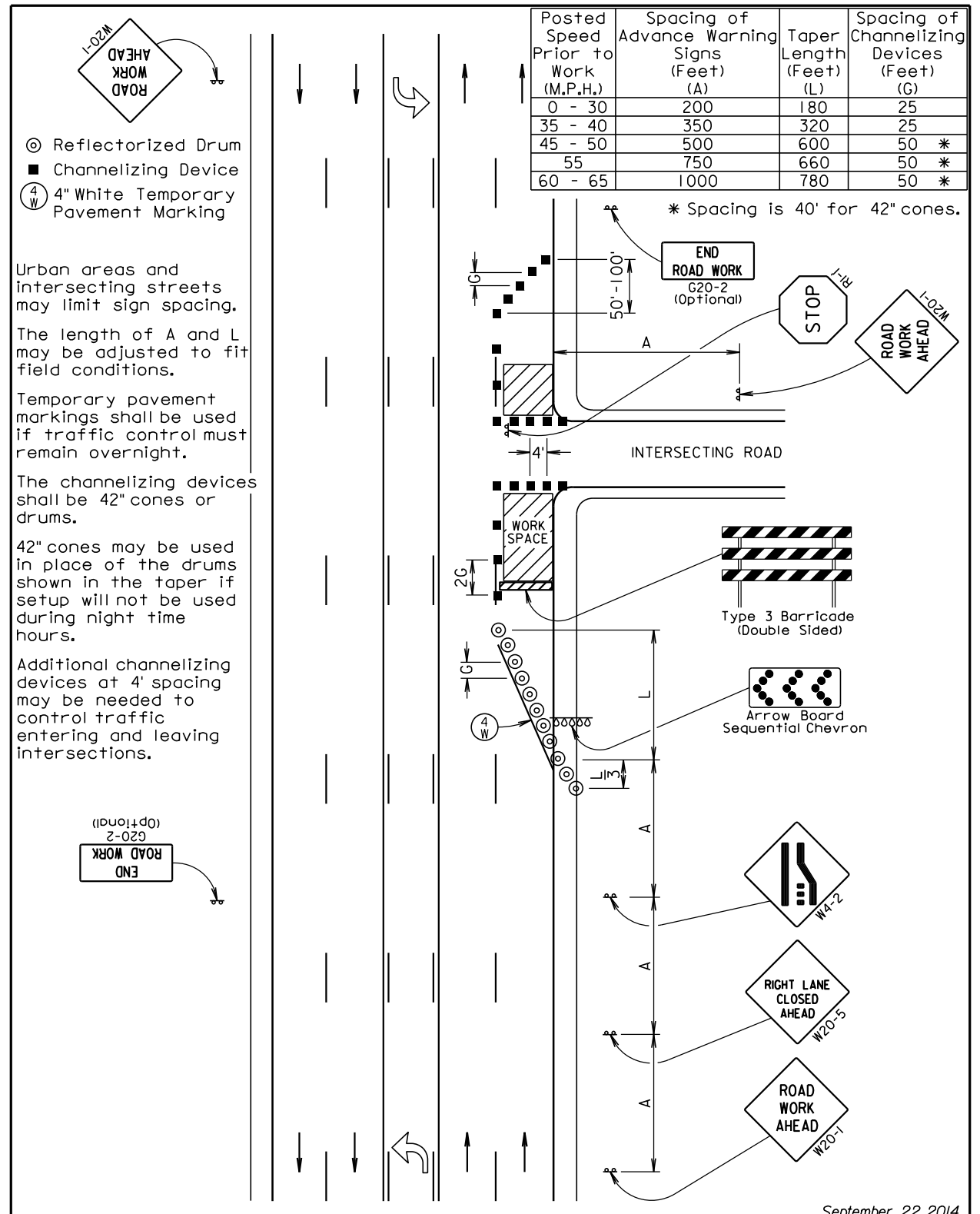
ITEM DESCRIPTION	QUANTITY
Type 3 Barricade, 8' Double Sided	6 Each

**ARROW BOARDS**

ITEM DESCRIPTION	QUANTITY
Type C Advance Warning Arrow Board	2 Each



September 22, 2014



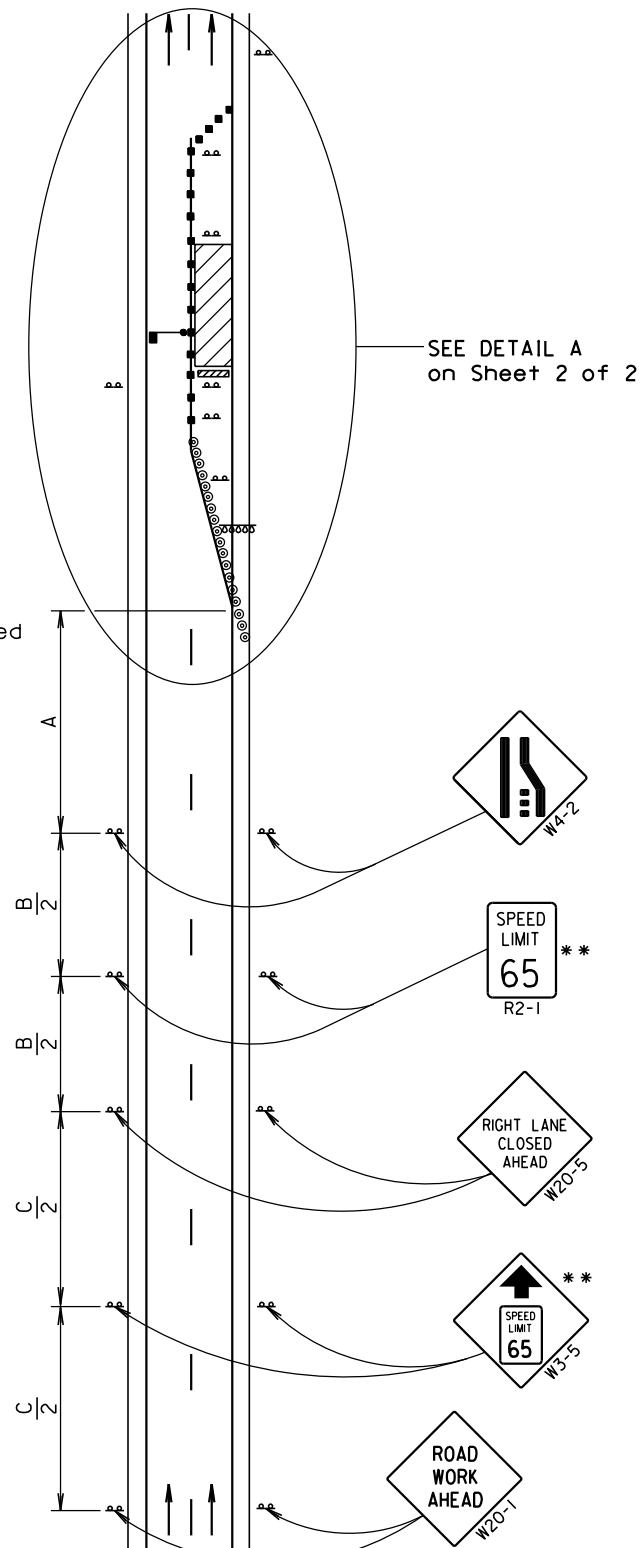
September 22, 2014

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

- \*\* Speed appropriate for location.
- ⊙ Reflectorized Drum
- Channelizing Device

ROAD WORK AHEAD sign is only required in advance of the first lane closure.

High speed is defined as having a posted speed limit greater than 45 mph.



April 15, 2015

Posted Speed Prior to Work (M.P.H.)	Spacing of Channelizing Devices (Feet)	Taper Length (Feet)
0 - 30	25	180
35 - 40	25	320
45 - 50	50 *	600
55	50 *	660
60 - 65	50 *	780
70 - 80	50 *	960

- \* Spacing is 40' for 42" cones.
- \*\* Speed appropriate for location.
- \*\*\* Use speed limit designated for the condition when workers are present in the work space. Signs shall be covered or removed when workers are not present.

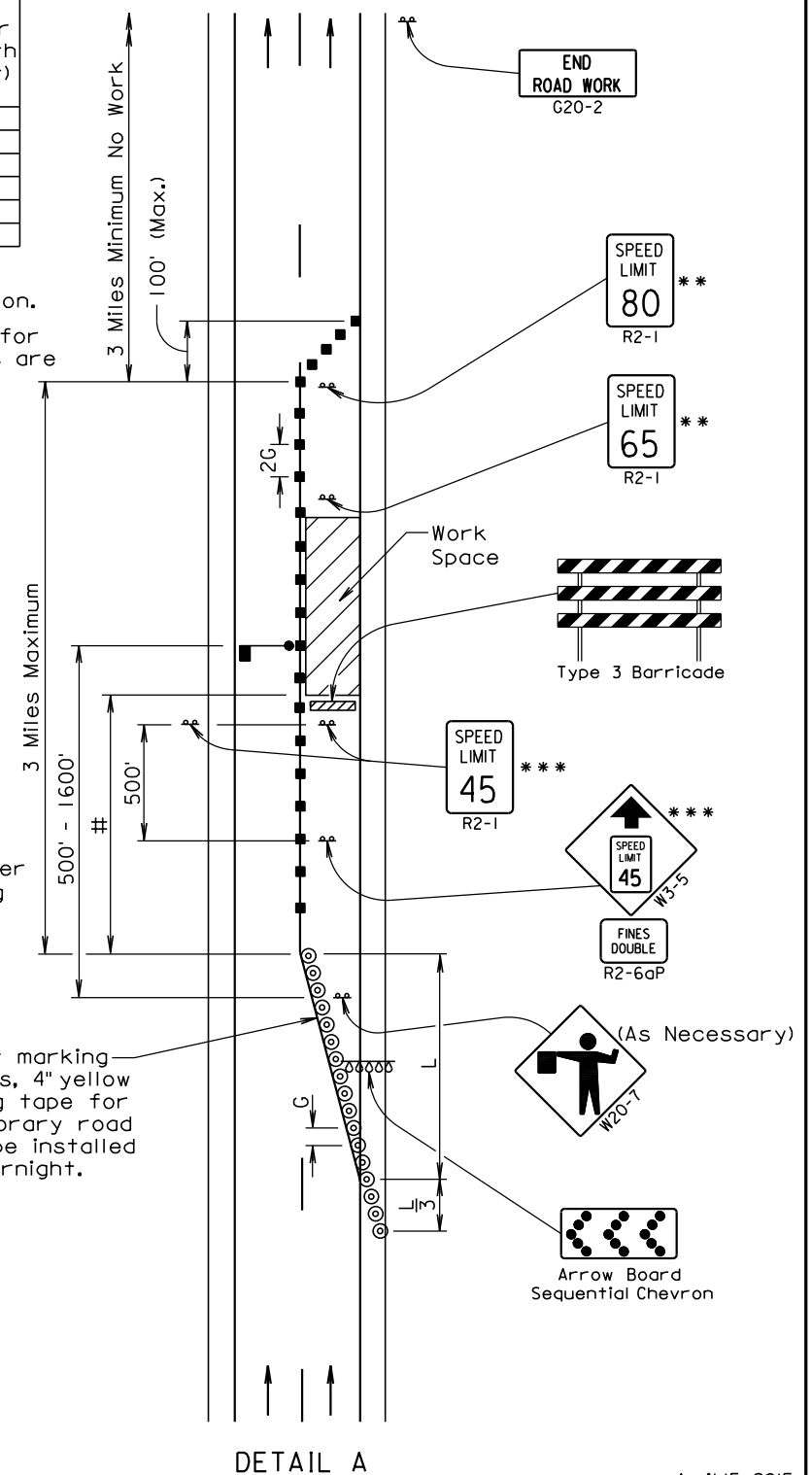
- Flagger (As Necessary)
- ⊙ Reflectorized Drum
- Channelizing Device
- # The Work Space shall be a minimum of 500' from the end of the taper.

The FLAGGER sign shall be used whenever there is a Flagger present.

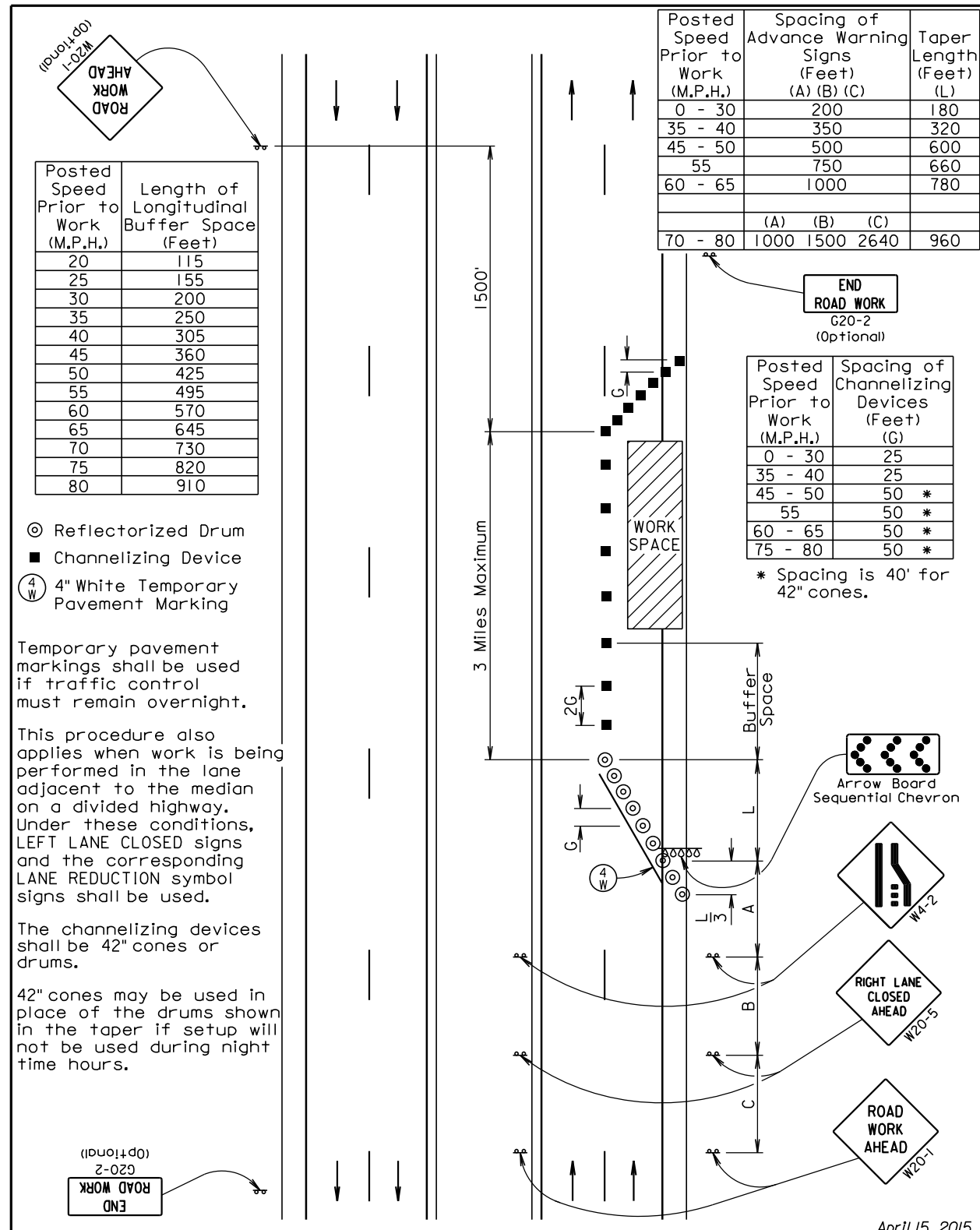
The channelizing devices shall be 42" cones or drums.

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

4" white temporary pavement marking tape for right lane closures, 4" yellow temporary pavement marking tape for left lane closures, or temporary road markers at 5' spacing shall be installed when the lane is closed overnight.



April 15, 2015



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

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

\* Spacing is 40' for 42" cones.

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

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

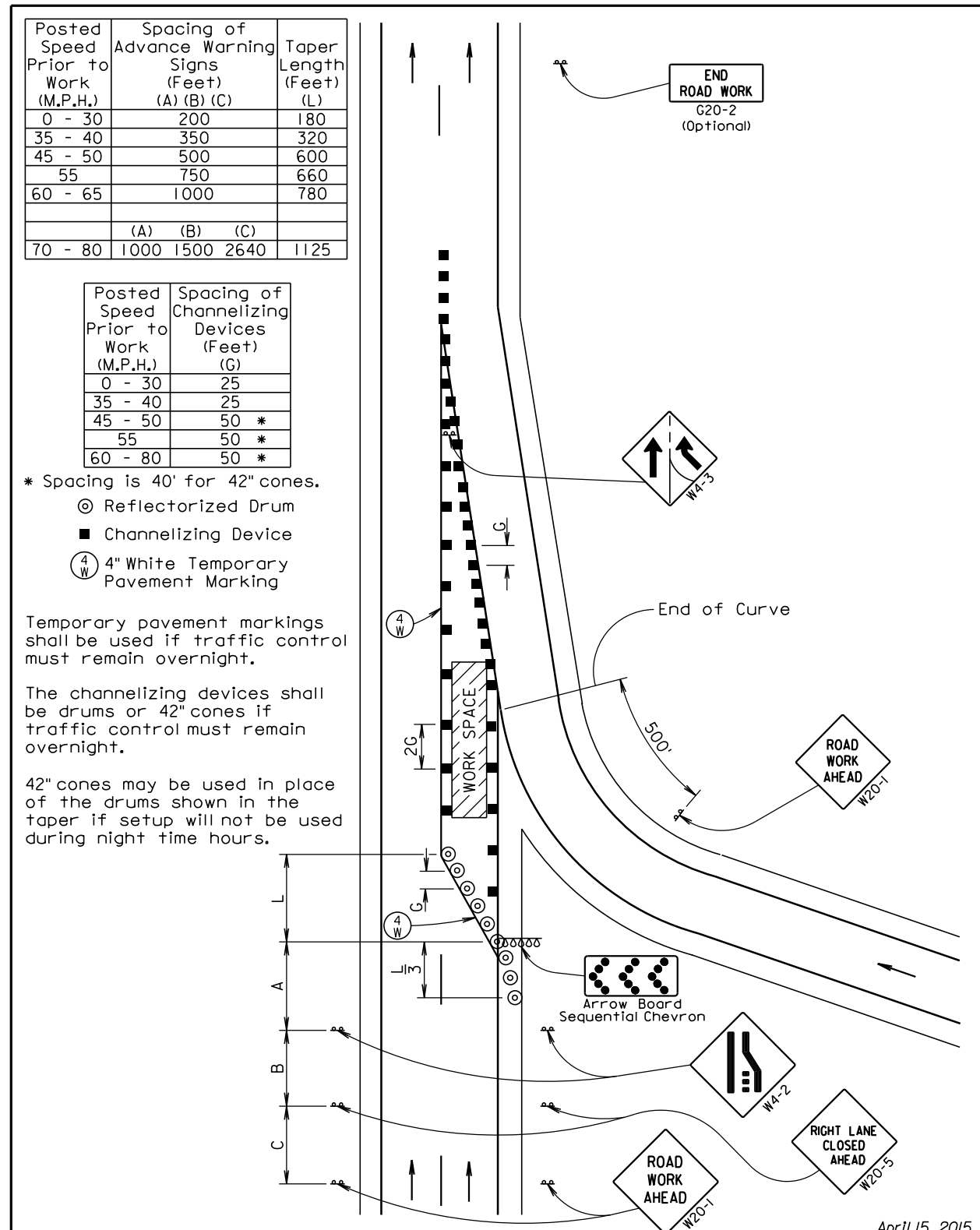
Temporary pavement markings shall be used if traffic control must remain overnight.

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

The channelizing devices shall be 42" cones or drums.

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

April 15, 2015



Posted Speed Prior to Work (M.P.H.)	Spacing of Advance Warning Signs (Feet)			Taper Length (Feet)
	(A)	(B)	(C)	
0 - 30	200			180
35 - 40	350			320
45 - 50	500			600
55	750			660
60 - 65	1000			780
	(A)	(B)	(C)	
70 - 80	1000	1500	2640	1125

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

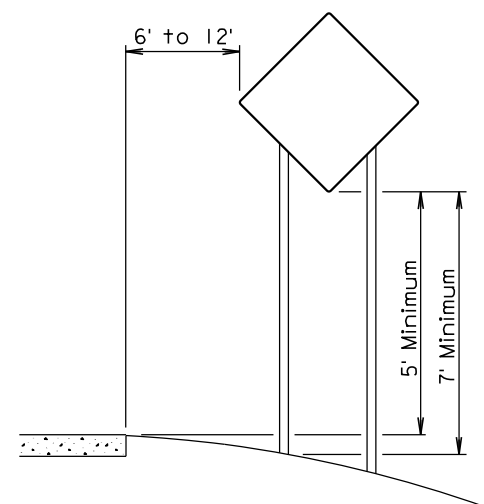
- \* Spacing is 40' for 42" cones.
- ⊙ Reflectorized Drum
- Channelizing Device
- Ⓞ 4" White Temporary Pavement Marking

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

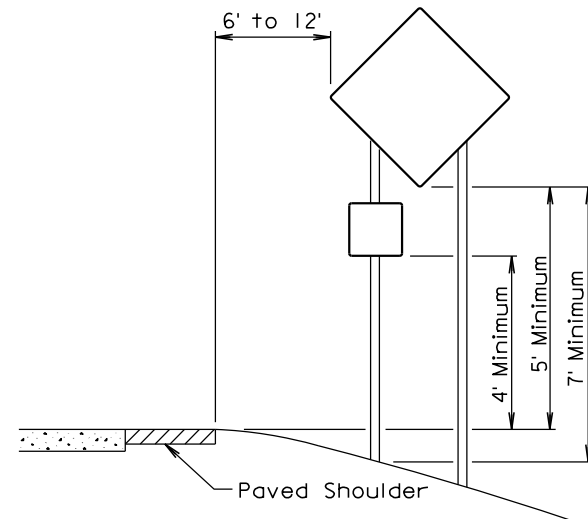
The channelizing devices shall be drums or 42" cones if traffic control must remain overnight.

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

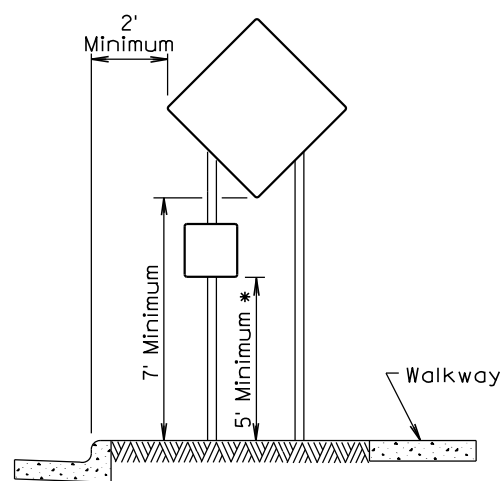
April 15, 2015



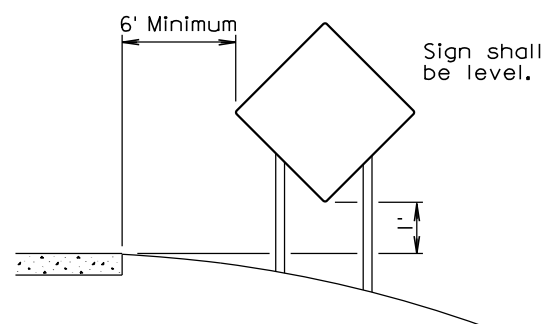
RURAL DISTRICT



RURAL DISTRICT WITH  
SUPPLEMENTAL PLATE



URBAN DISTRICT

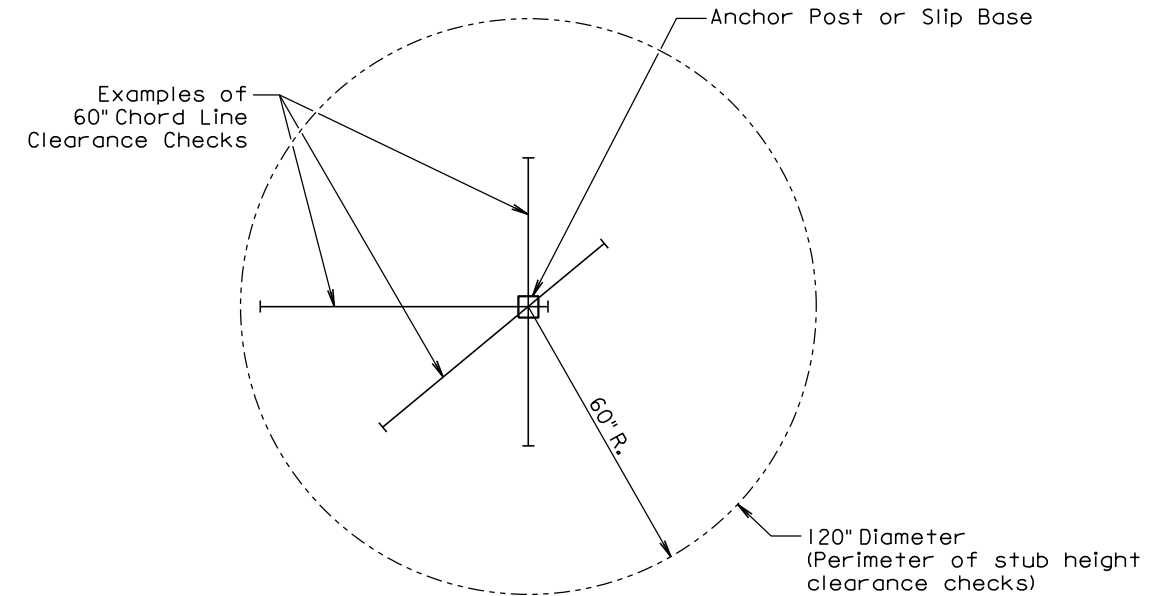


RURAL DISTRICT  
3 DAY MAXIMUM  
(Not applicable to regulatory signs)

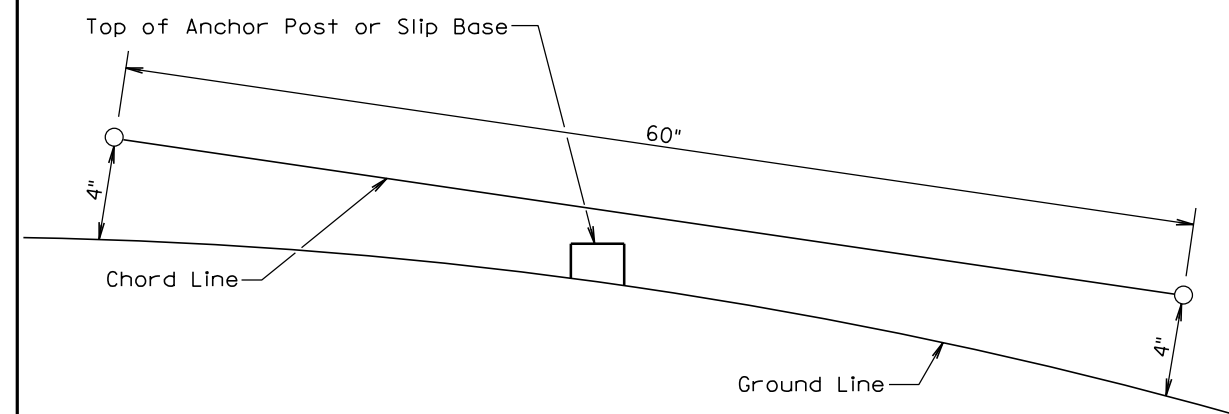
\* If the bottom of supplemental plate is mounted lower than 7 feet above a pedestrian walkway, the supplemental plate should not project more than 4" into the pedestrian facility.

September 22, 2014

Published Date: 1st Qtr. 2016	S D D O T	CRASHWORTHY SIGN SUPPORTS (Typical Construction Signing)	PLATE NUMBER 634.85
			Sheet 1 of 1



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

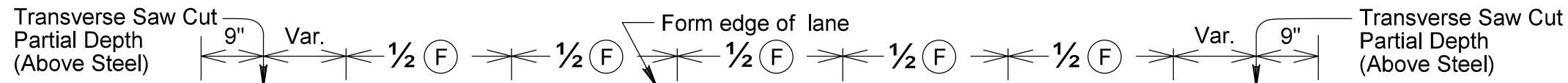
Published Date: 1st Qtr. 2016	S D D O T	BREAKAWAY SUPPORT STUB CLEARANCE	PLATE NUMBER 634.99
			Sheet 1 of 1





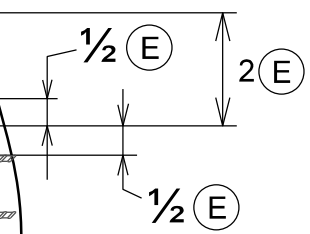
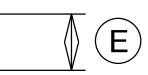
# CRC PAVEMENT REPAIR (FULL LANE WIDTH) - TYPICAL

Plotting Date: 02/23/2016



Traffic Lane Width W (12' Shown)

Place No. (C) Longitudinal Deformed Tie Bar (Place bars into drilled holes in existing concrete on both sides of the repair area and tie the bars to each other and to in place No. (L) Transverse Bars)



No. (C) Longitudinal Deformed Tie Bars In Place

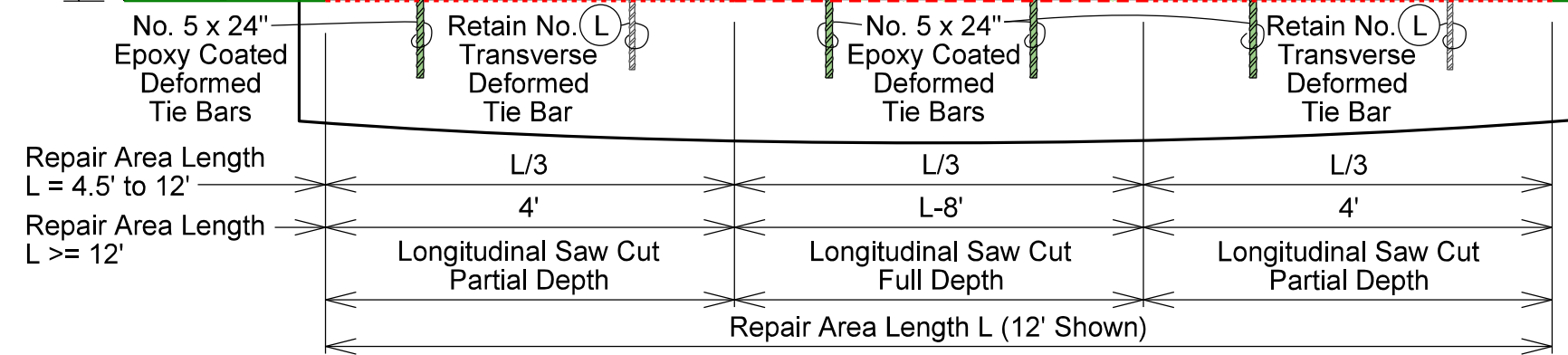
Place No. (C) Longitudinal Deformed Tie Bars (Lap splice to In Place No. (C) Longitudinal Bars).

For Repair Area Length L = 8' or more - every other in place No. (C) Longitudinal Deformed Tie Bar shall be cut off and lap splices shall be staggered.

Place No. (L) Transverse Deformed Tie Bars

See Detail A

See Detail B



DEFORMED TIE BAR DIMENSIONS KEY					
Underlying Plans	CRC Depth	Longitudinal Steel		Transverse Steel	
		Size (C)	Spacing (E)	Size (L)	Spacing (F)
6176	11.5"	5	4 1/2"	4	42"
5587	10"	6	6 1/2"	4	42"
5886	10"	6	6 1/2"	4	48"

CRC REPAIR AREA KEY	
	Remove Concrete Retain Reinforcing Steel
	Remove Concrete Remove Reinforcing Steel

PLOT SCALE - 1:1.7

PLOTTED FROM - TRMLINT15

PLOT NAME - 2

FILE - ... \CRC FULL WIDTH REPAIR.DGN

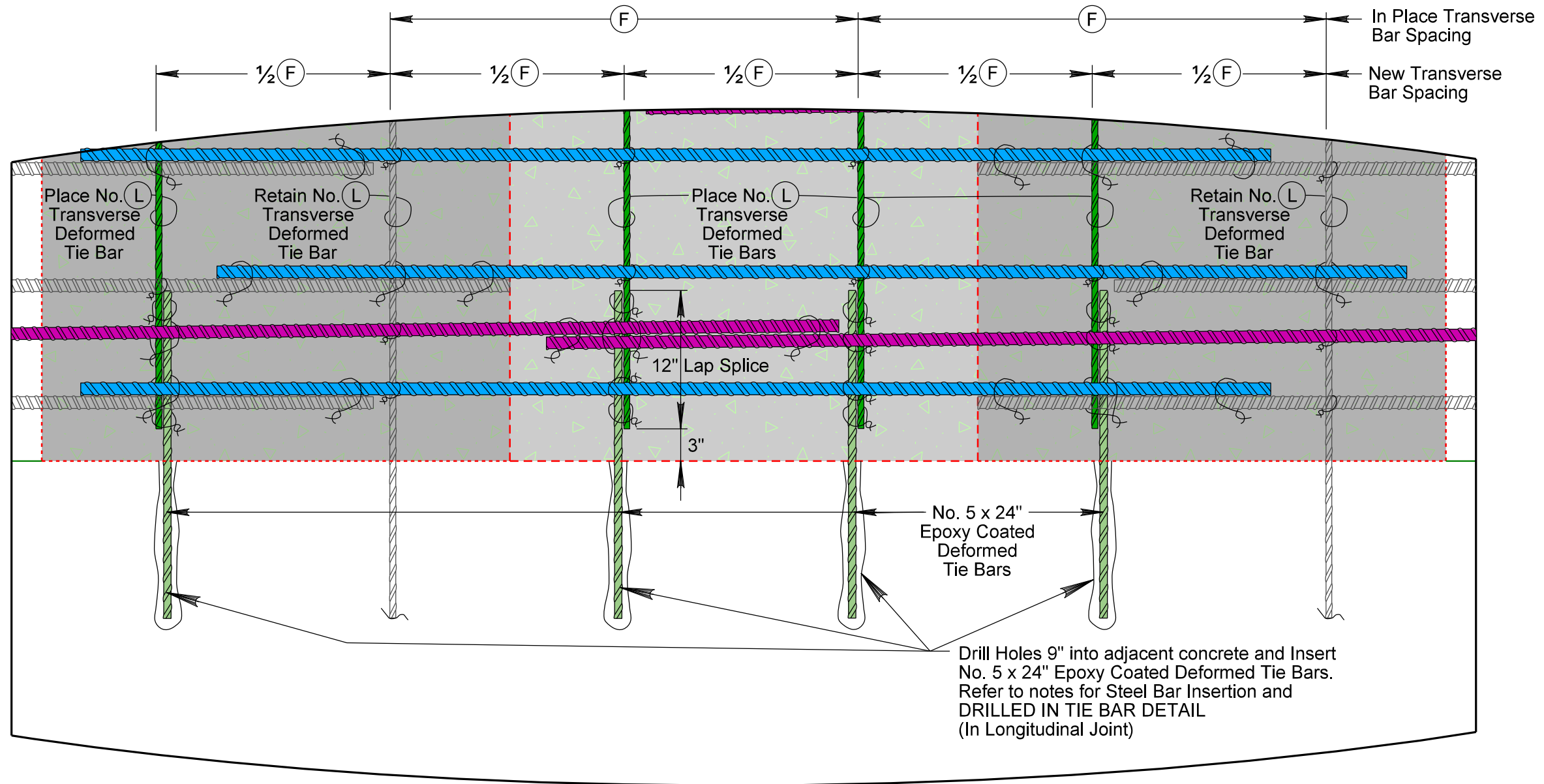


# CRC PAVEMENT REPAIR (FULL LANE WIDTH)

## Detail B

STATE OF SOUTH DAKOTA	PROJECT 2016 Yankton Area PCCP Repair	SHEET 19	TOTAL SHEETS 25
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Plotting Date: 02/23/2016



Drill Holes 9" into adjacent concrete and Insert No. 5 x 24" Epoxy Coated Deformed Tie Bars. Refer to notes for Steel Bar Insertion and DRILLED IN TIE BAR DETAIL (In Longitudinal Joint)

### DEFORMED TIE BAR KEY

<p> No. (C) Longitudinal Deformed Tie Bar In Place (Retain)</p> <p> Place No. (C) Longitudinal Deformed Tie Bar (Tie to In Place No. (C) Longitudinal Bars)</p> <p> Place No. (C) Longitudinal Deformed Tie Bar (Place bars into drilled holes in existing concrete on both sides of the repair area and tie the bars to each other and to No. (L) Transverse Bars)</p>	<p> No. (L) Transverse Deformed Tie Bar In Place (Retain)</p> <p> Place No. (L) Transverse Deformed Tie Bar (Tie to No. (C) Longitudinal Bars)</p>
---	--

### DEFORMED TIE BAR DIMENSIONS KEY

Underlying Plans	CRC Depth	Longitudinal Steel		Transverse Steel	
		Size	Spacing	Size	Spacing
PCN	T	(C)	(E)	(L)	(F)
6176	11.5"	5	4 1/2"	4	42"
5587	10"	6	6 1/2"	4	42"
5886	10"	6	6 1/2"	4	48"

### CRC REPAIR AREA KEY

	Remove Concrete Retain Reinforcing Steel
	Remove Concrete Remove Reinforcing Steel

Note: All lapped bars shall have a minimum of two ties per lap.

PLOT SCALE - 1:1.07

PLOTTED FROM - TRMLINT15

PLOT NAME - 4

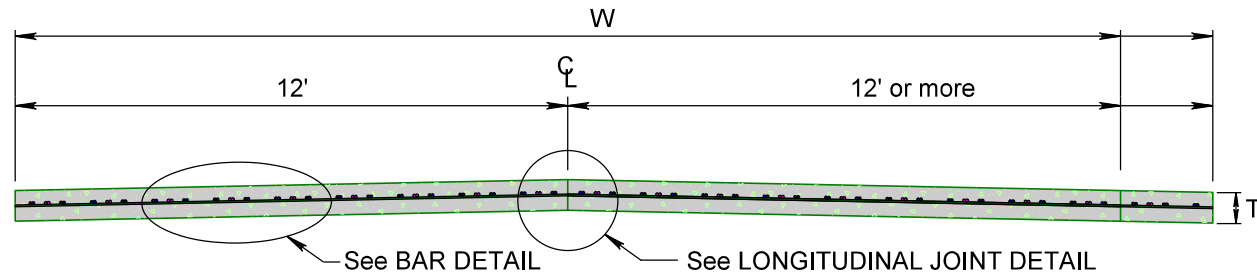
FILE - ... \CRC FULL WIDTH REPAIR.DGN

# CRC PAVEMENT REPAIR - REINFORCING STEEL DETAILS

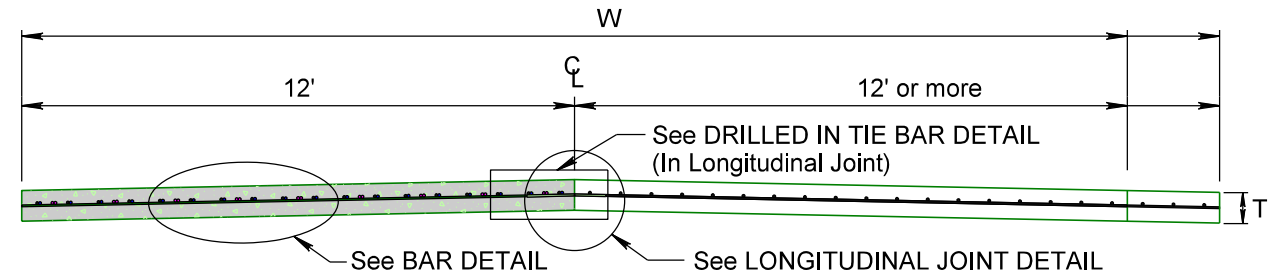
STATE OF SOUTH DAKOTA	PROJECT	SHEET	TOTAL SHEETS
	2016 Yankton Area PCCP Repair	20	25

Plotting Date: 02/23/2016

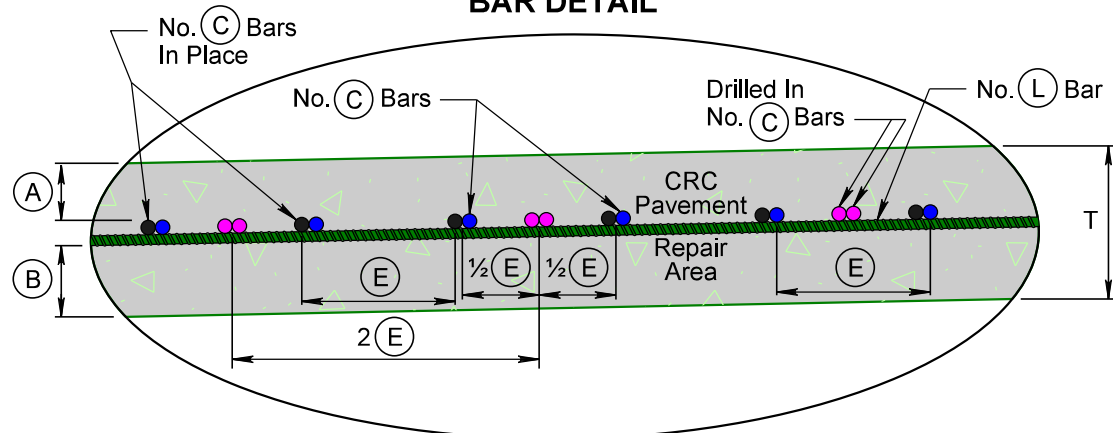
TRANSVERSE SECTION SHOWING STEEL PLACEMENT



TRANSVERSE SECTION SHOWING STEEL PLACEMENT



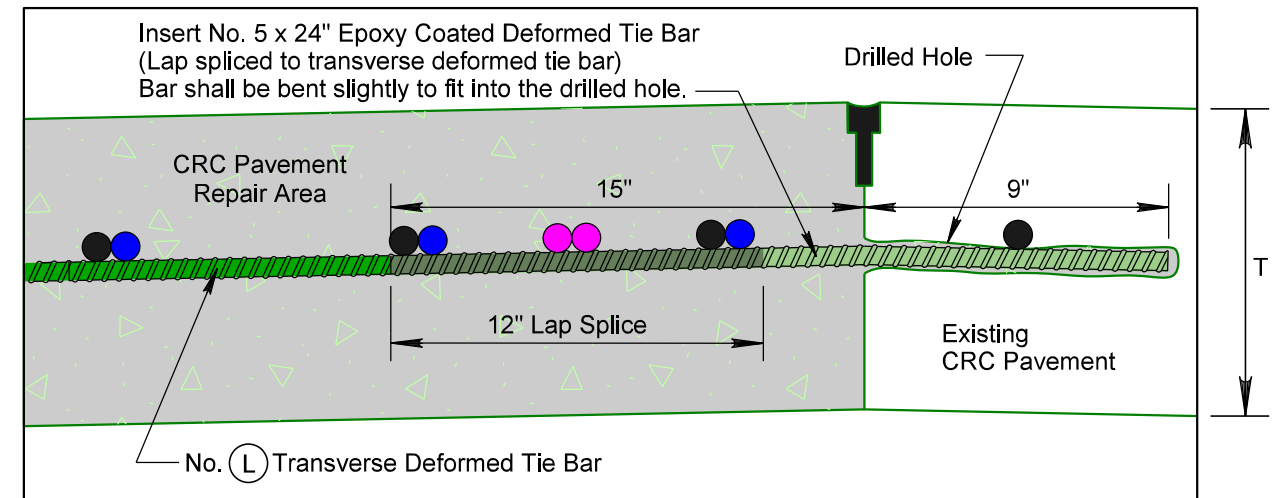
BAR DETAIL



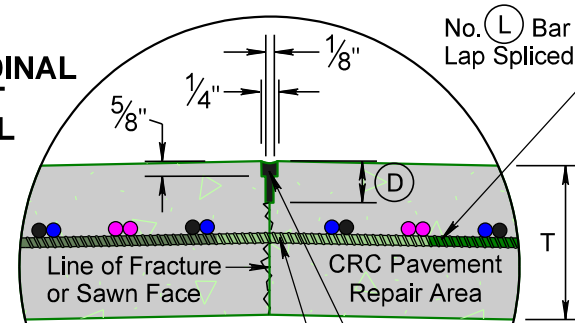
Placement of longitudinal steel bars may vary from +1/2" to -1/2" vertically and 3/4" horizontally. Placement of transverse steel bars may vary from +1/2" to -1/2" vertically and 2" horizontally.

The transverse deformed steel bars will be positioned on acceptable chairs.

DRILLED IN TIE BAR DETAIL (In Longitudinal Joint)



LONGITUDINAL JOINT DETAIL



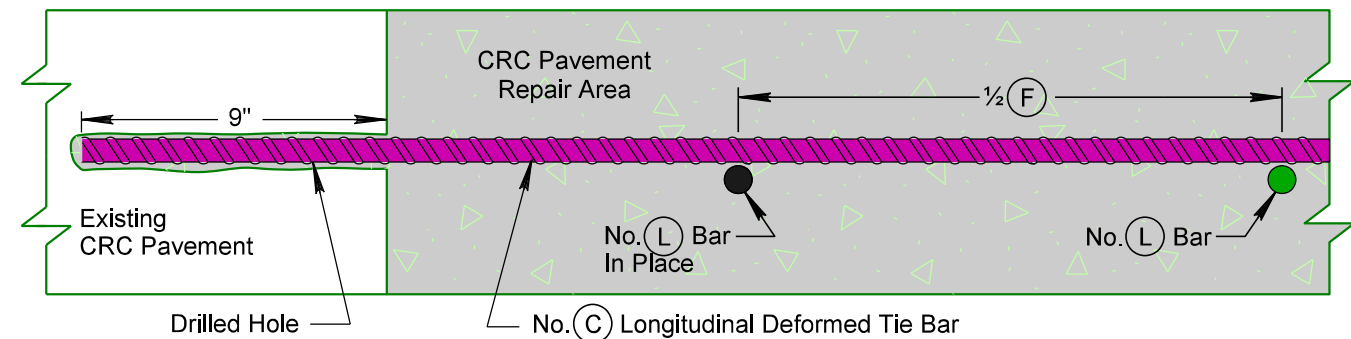
NOTE:

Steel bars for concrete reinforcement shall conform to the requirements of Specification M31 (Grade 60) of the AASHTO Standard Specifications for Deformed Billet Steel Bars for Concrete Reinforcement.

Insert No. 5 x 24" Epoxy Coated Deformed Tie Bar (Lap spliced to transverse deformed tie bar) Bar shall be bent slightly to fit into the drilled hole.

See DRILLED IN TIE BAR DETAIL (In Longitudinal Joint)

LONGITUDINAL SECTION SHOWING STEEL PLACEMENT DRILLED IN TIE BAR DETAIL (In Transverse Joint)



CRC PAVEMENT IN PLACE & CRC PAVEMENT REPAIR KEY & DIMENSIONS

Location	Underlying Plans	CRC Depth	CRC Width	Clearance		Longitudinal Steel		Saw Cut Depth	Transverse Steel		Longitudinal Bar Count (full lane width repair)						Lap Splice Length (for Repair Length L)			Not Assigned	Perimeter Bar Spacing				Chair Width
				Top	Bottom	Size	Spacing		Size	Spacing	12' Wide Slab			14' Wide Slab			L < 4.5'	L = 4.5' to 8'9"	L >= 8'9"		(K)	(M)	(N)	(P)	
				(A)	(B)	(C)	(E)		(D)	(L)	(F)	(G)	(H <sub>1</sub> )	(H <sub>2</sub> )	(G)	(H <sub>1</sub> )	(H <sub>2</sub> )	(I <sub>1</sub> )	(I <sub>2</sub> )		(I <sub>3</sub> )				
I29N MRM 4.35 +0.463 to MRM 17.00 +0.406	6176	11.5"	26'	3 1/2"	6 7/8"	5	4 1/2"	2 7/8"	4	42"	32	16	16	37	18	18	14"	14" to 30"	30"	-	3"	3"	4 1/2"	4 1/2"	5"
I29N MRM 27.00 + 0.076 to MRM 37.32 +0.144	5587	10"	26'	3 1/2"	5 1/4"	6	6 1/2"	2 1/2"	4	42"	22	11	11	26	13	13	14"	14" to 25"	25"	-	3 3/4"	6 1/2"	6 1/2"	4 1/2"	5"
I29S MRM 27.00 + 0.058 to MRM 37.32 +0.138	5886	10"	26'	3 1/2"	5 1/4"	6	6 1/2"	2 1/2"	4	48"	22	11	11	26	13	13	14"	14" to 25"	25"	-	3 3/4"	6 1/2"	6 1/2"	4 1/2"	5"

PLOTTED FROM: 118.33333

PLOTTED FROM: TRMLINT15

PLOT NAME: 5

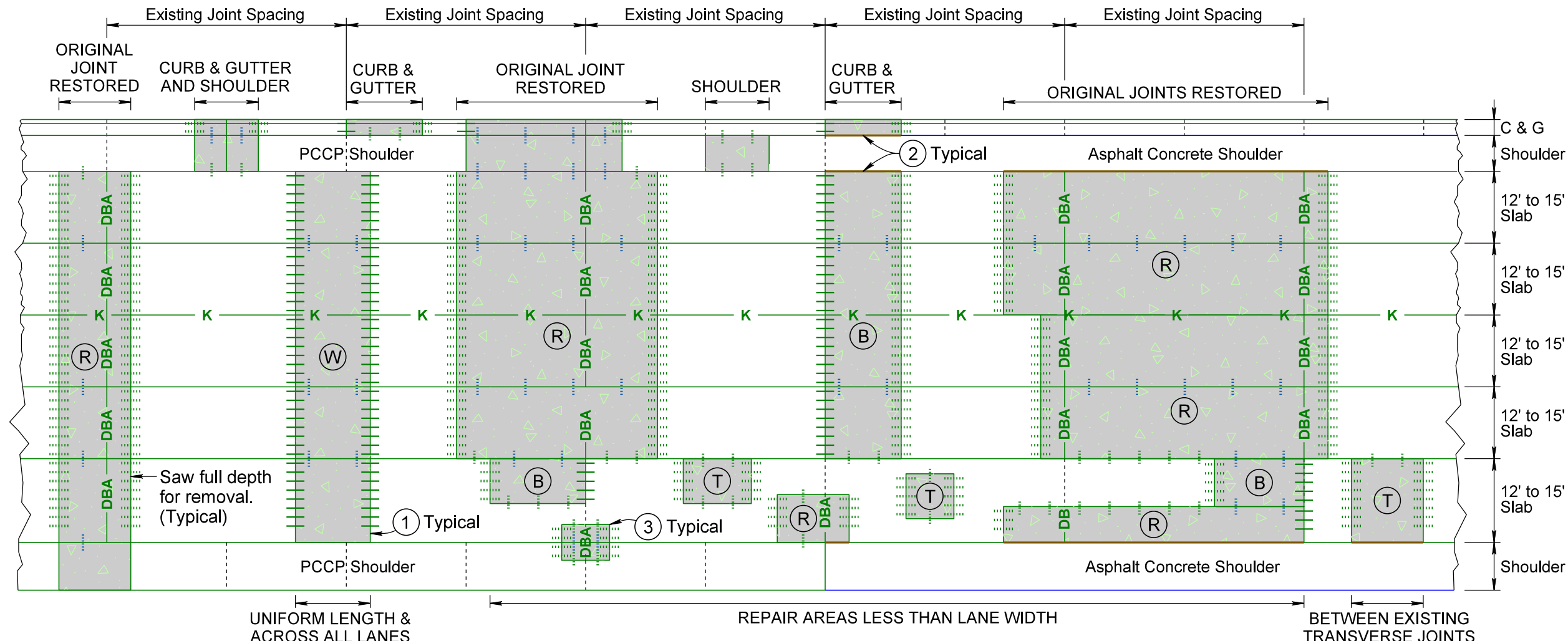
FILE: ... \CRC BARS.DGN

# NONREINFORCED PCC PAVEMENT REPAIR

STATE OF SOUTH DAKOTA	PROJECT	SHEET	TOTAL SHEETS
	2016 Yankton Area PCCP Repair	21	25

Plotting Date: 02/23/2016

## UP TO FOUR LANE ROADWAY WITH CENTER TURN LANE OR UP TO TEN LANE DIVIDED ROADWAY TYPICAL REPAIR AREAS



**KEY:**

PCC Pavement Repair Area

**PCC PAVEMENT REPAIR AREA TYPES:**

- (W) Two Working Joints (Use only if repair is full roadway width and uniform length (across all lanes))
- (T) Two Tied Joints
- (B) One Working & One Tied Joint
- (R) Two Tied Joints with Original Joint Restored with Dowel Bar Assembly

**Longitudinal Keyway Joints Without Bars**

— K — Where a repair area intersects an existing longitudinal keyway joint without tie bars, the newly constructed joint should also be a keyway without tie bars.

**Steel Bars for Transverse Joints**

- Pavement Thickness  $\geq 10.5"$** 
  - Drilled in  $1\frac{1}{2}"$  x 18" epoxy coated plain round dowel bars spaced 18" center to center.
  - ..... Drilled in No. 11 x 18" epoxy coated deformed tie bars spaced 18" center to center.
- Pavement Thickness  $\geq 8.5"$  and  $< 10.5"$** 
  - Drilled in  $1\frac{1}{4}"$  x 18" epoxy coated plain round dowel bars spaced 18" center to center.
  - ..... Drilled in No. 9 x 18" epoxy coated deformed tie bars spaced 18" center to center.
- Pavement Thickness  $< 8.5"$** 
  - Drilled in 1" x 18" epoxy coated plain round dowel bars spaced 18" center to center.
  - ..... Drilled in No. 8 x 18" epoxy coated deformed tie bars spaced 18" center to center.

**DBA** Dowel Bar Assembly

**Steel Bars for Longitudinal Joints**

- ..... No. 5 x 30" epoxy coated deformed tie bars. Sawn Joint - spaced 48" center to center. Construction Joint - spaced 48" center to center.
- ..... No. 5 x 24" epoxy coated deformed tie bars. Drilled In - spaced 30" center to center.

**NOTES:** Saw around repair areas full depth for removal.

- (1) Where possible, transverse joints shall be constructed/maintained full roadway width.
- (2) Edges of repair areas shall be formed to match the width of the existing concrete pavement.
- (3) Need for bars in small repair areas on/near the shoulder to be determined on a case-by-case basis, on construction by the Engineer.

PLOT SCALE - 1:10

PLOT NAME - 7

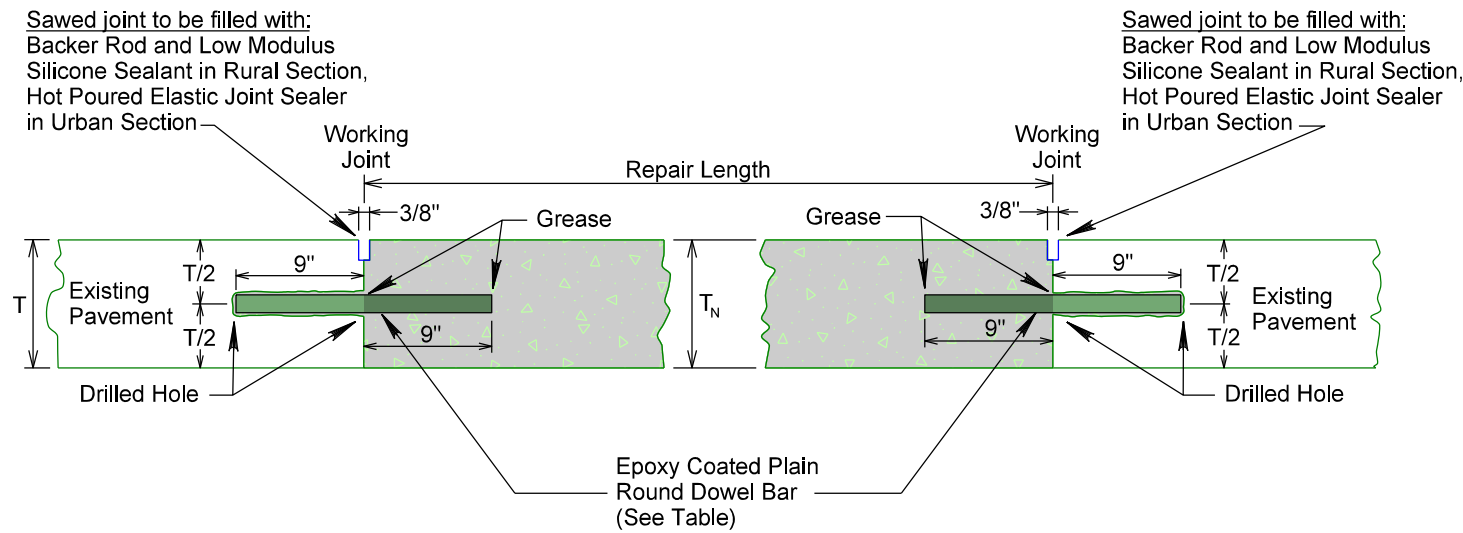
FILE - ... \PATCH5.DGN

PLOTTED FROM - TRMLINT15

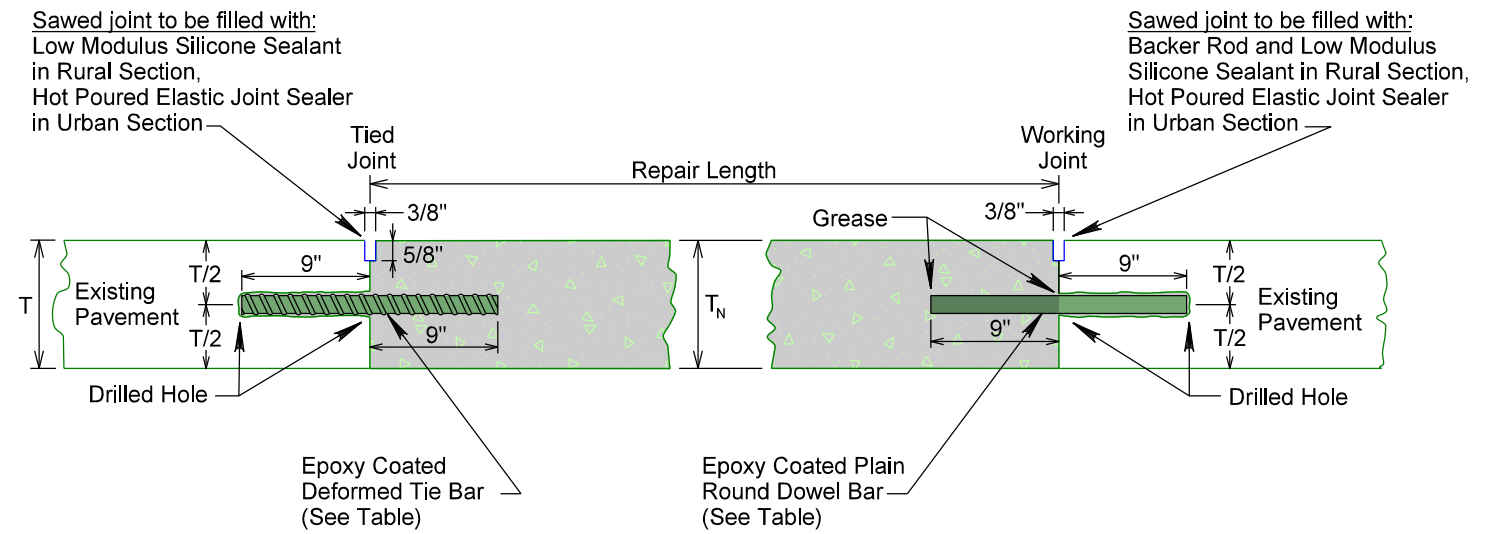
# NONREINFORCED PCC PAVEMENT REPAIR

Plotting Date: 02/23/2016

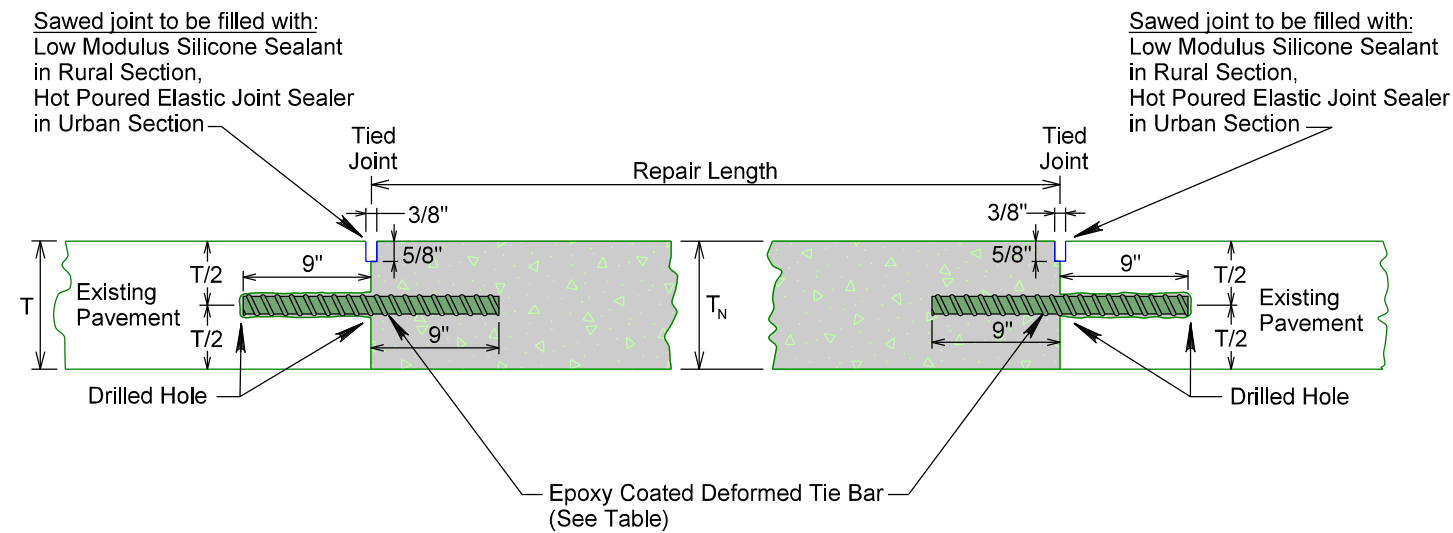
**PLAIN ROUND DOWEL BAR INSERTION  
TYPE W - (TWO WORKING JOINTS)**



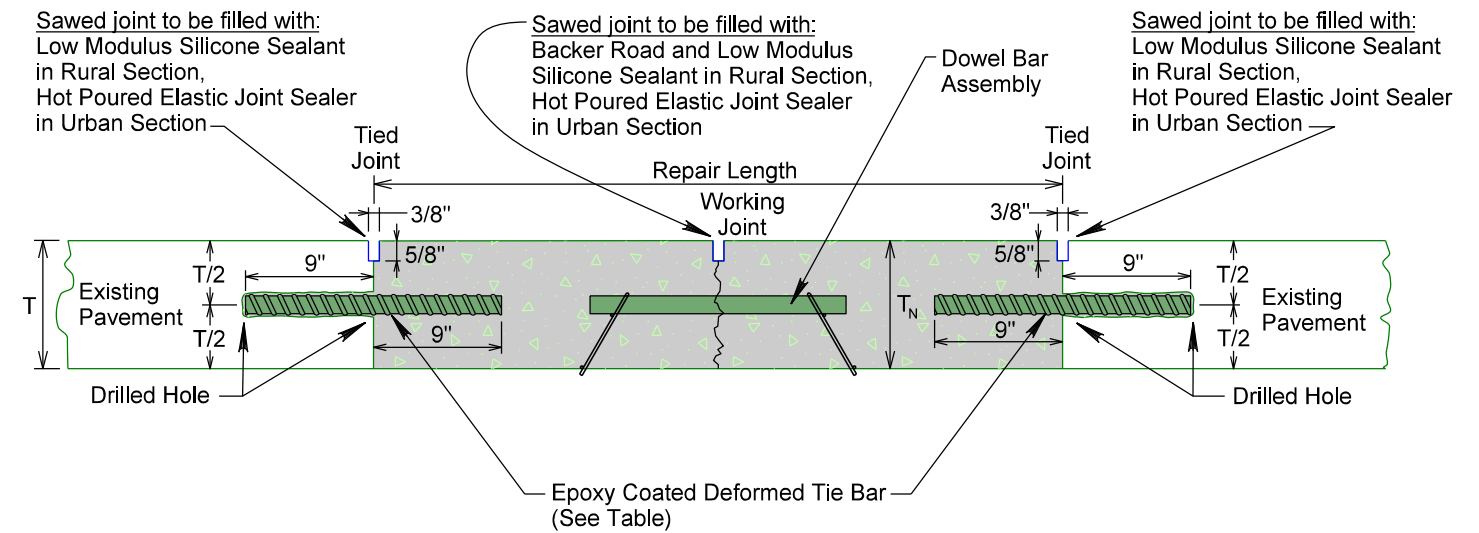
**DEFORMED TIE BAR AND PLAIN ROUND DOWEL BAR INSERTION  
TYPE B - (ONE TIED JOINT AND ONE WORKING JOINT)**



**DEFORMED TIE BAR INSERTION  
TYPE T - (TWO TIED JOINTS)**



**DEFORMED TIE BAR INSERTION WITH DOWEL BAR ASSEMBLY  
TYPE R - (TWO TIED JOINTS AND ONE WORKING JOINT - ORIGINAL JOINT RESTORED)**



Existing Pavement Thickness	Epoxy Coated Deformed Tie Bar Size	Epoxy Coated Plain Round Dowel Bar Size
$T \geq 10.5"$	No. 11 x 18"	1½" x 18"
$T \geq 8.5"$ & $T < 10.5"$	No. 9 x 18"	1¼" x 18"
$T < 8.5"$	No. 8 x 18"	1" x 18"

$T$  = Existing pavement thickness.  
 $T_N$  = New pavement thickness.

Bar embedded to a minimum depth of 9 inches into the existing pavement by utilizing an epoxy resin adhesive.

Cost for furnishing and inserting steel bars (deformed tie and plain round dowel) shall be included in the contract unit price per each for Insert Steel Bar in PCC Pavement.

Cost for furnishing and installing dowel bar assembly shall be included in the contract unit price per each for Dowel Bar.

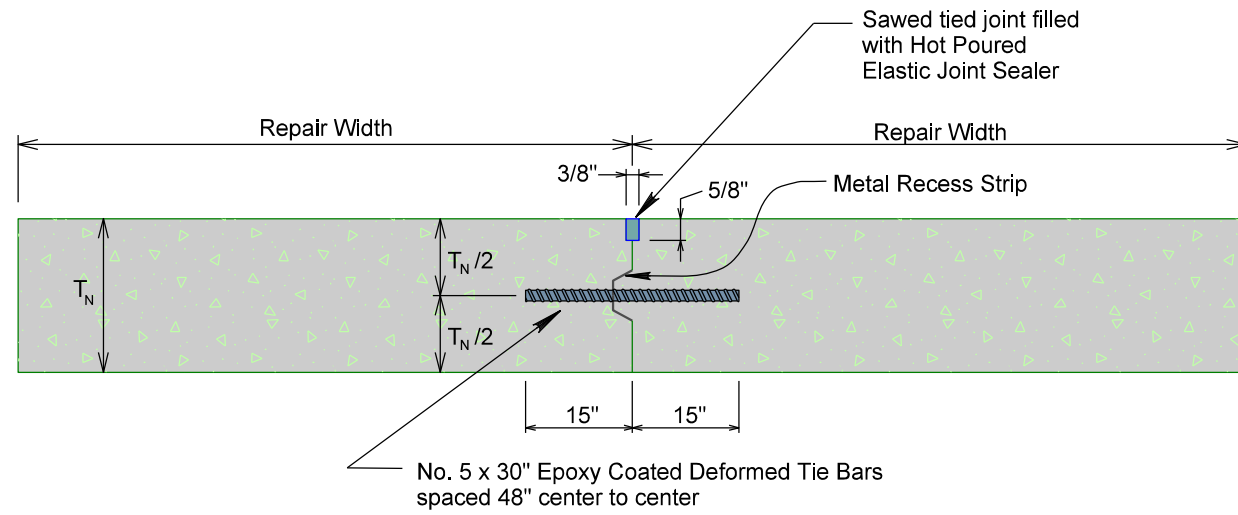
$T_N = T$   
(top of new pavement shall be flush with top of existing pavement)

# NONREINFORCED PCC PAVEMENT REPAIR

STATE OF SOUTH DAKOTA	PROJECT	SHEET	TOTAL SHEETS
	2016 Yankton Area PCCP Repair	23	25

Plotting Date: 02/23/2016

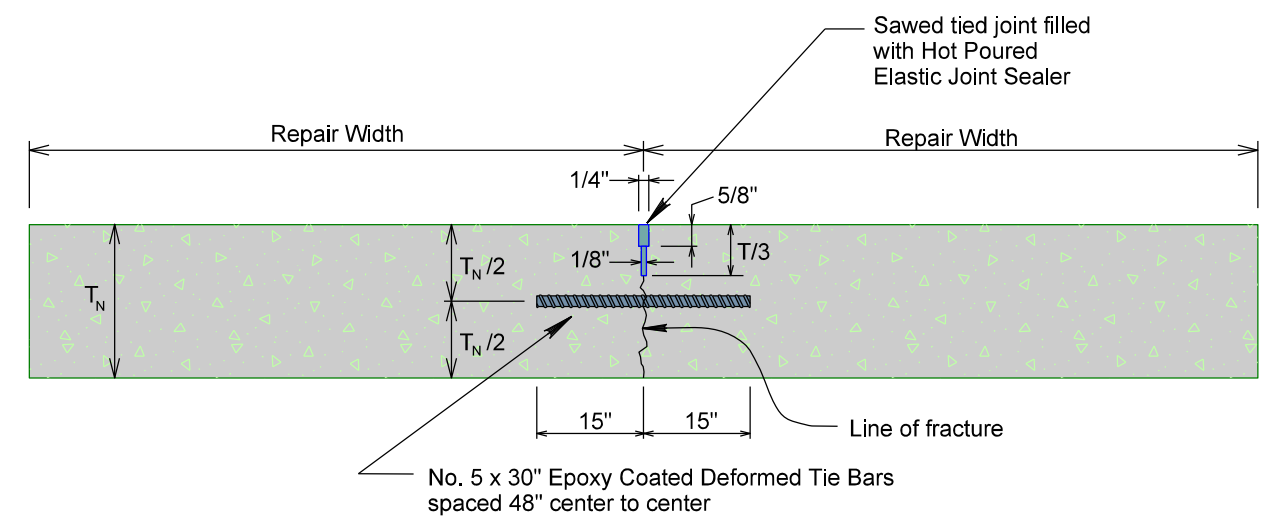
## LONGITUDINAL CONSTRUCTION JOINT WITH TIE BARS & KEYWAY



$T_N$  = New pavement thickness.

Cost for furnishing and inserting tie bars shall be incidental to the contract unit price per square yard for Nonreinforced PCC Pavement Repair.

## SAWED LONGITUDINAL JOINT

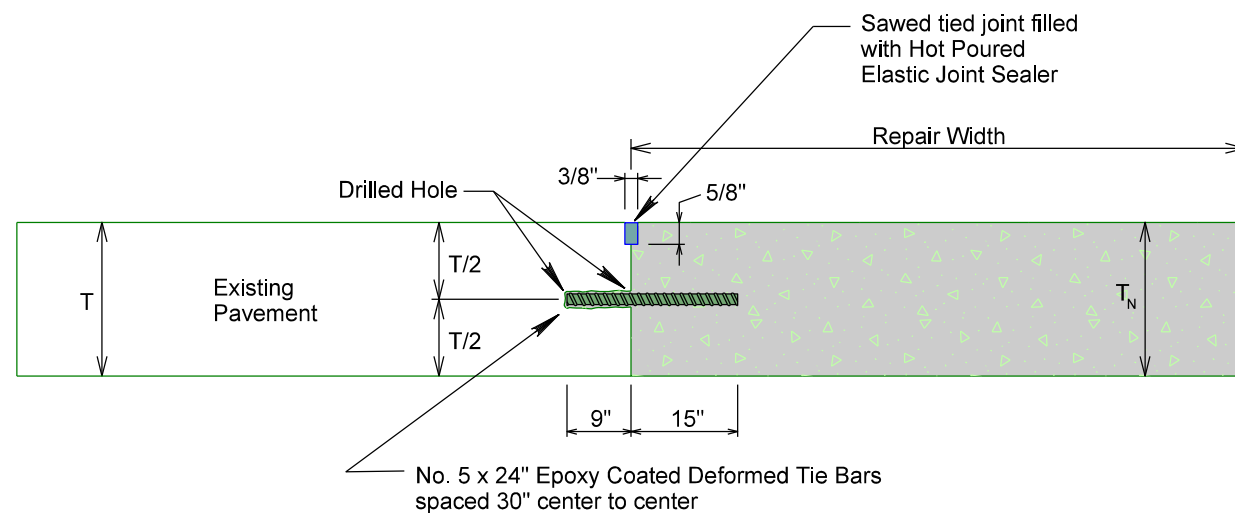


$T_N$  = New pavement thickness.

The first saw cut to control cracking shall be a minimum of 1/3 the depth of the pavement. Additional sawing for widening the saw cut will be necessary.

Cost for furnishing and inserting tie bars shall be incidental to the contract unit price per square yard for Nonreinforced PCC Pavement Repair.

## LONGITUDINAL CONSTRUCTION JOINT WITH DRILLED IN TIE BARS



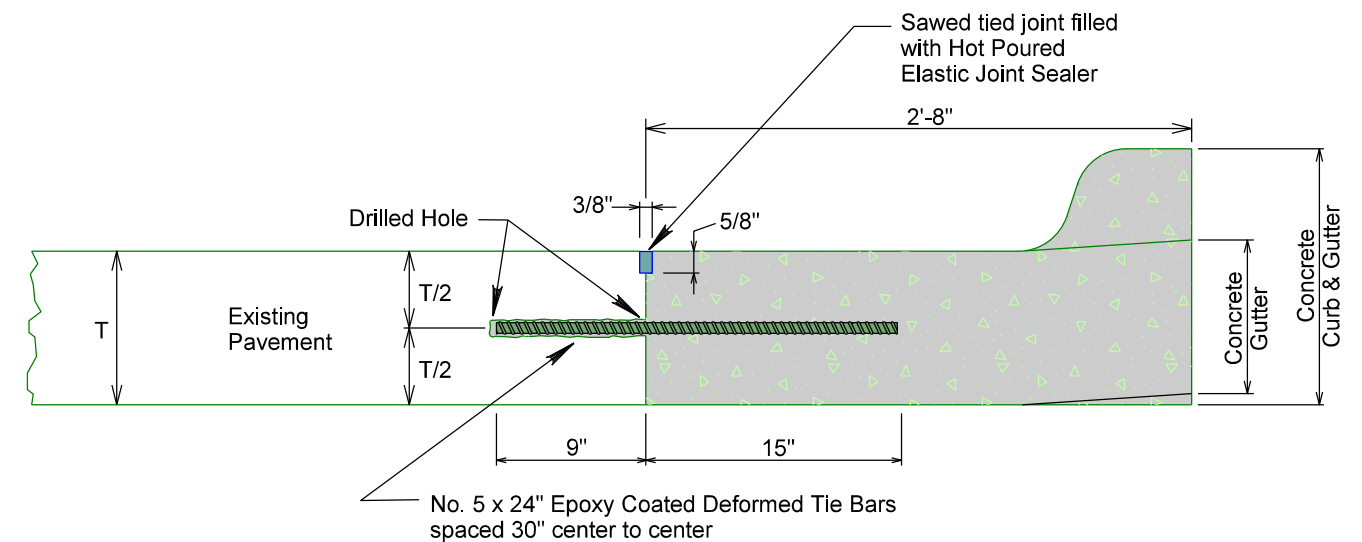
$T$  = Existing pavement thickness.  
 $T_N$  = New pavement thickness.

Bar embedded a minimum depth of 9 inches into the existing pavement by utilizing an epoxy resin adhesive.

Bars shall be placed a minimum of 15 inches from existing transverse contraction joints.

Cost for furnishing and inserting drilled in tie bars shall be included in the contract unit price per each for Insert Steel Bar in PCC Pavement.

## LONGITUDINAL CONSTRUCTION JOINT WITH DRILLED IN TIE BARS

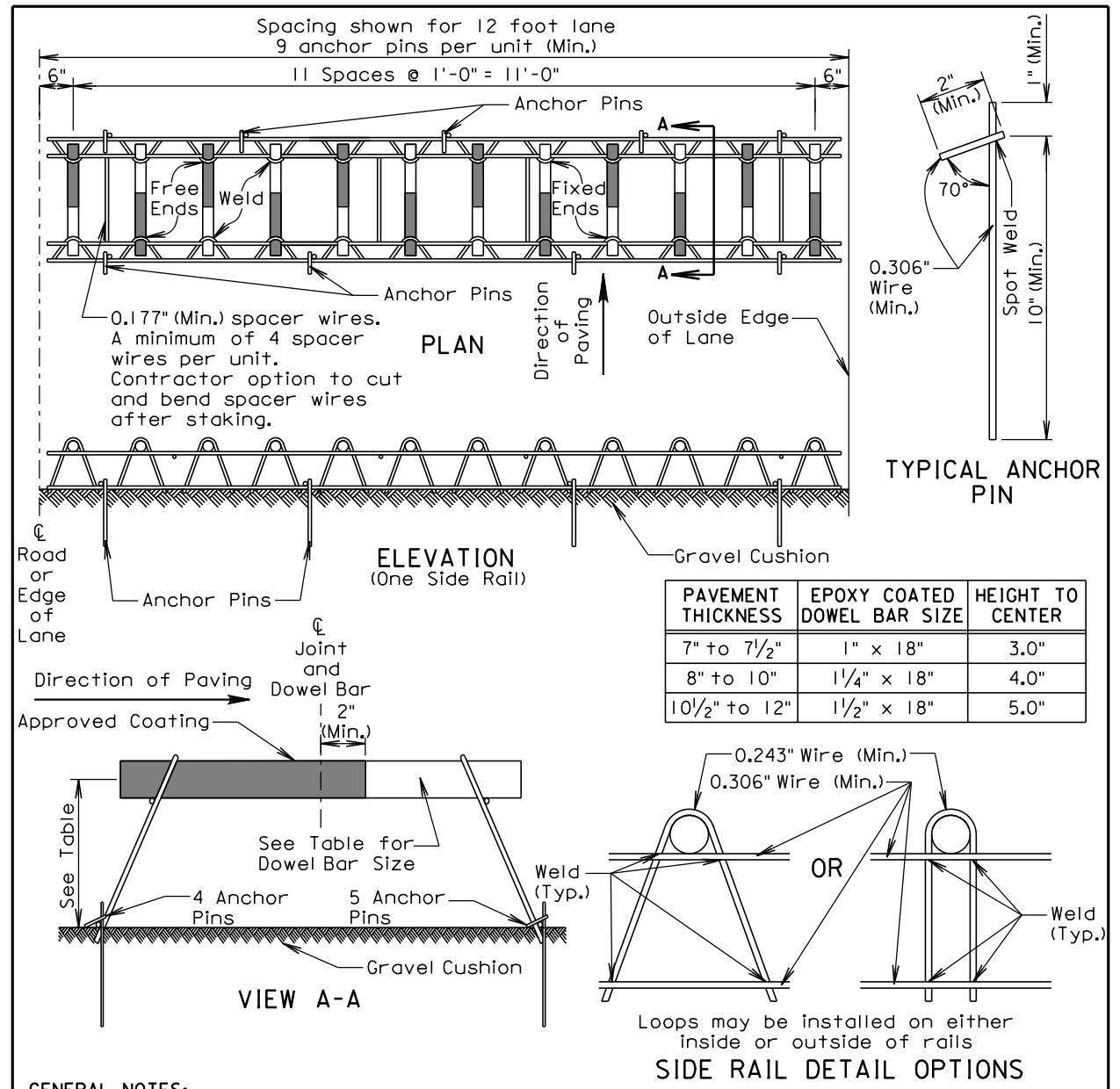


$T$  = Existing pavement thickness.

Bar embedded a minimum depth of 9 inches into the existing pavement by utilizing an epoxy resin adhesive.

Bars shall be placed a minimum of 15 inches from existing transverse contraction joints.

Cost for furnishing and inserting drilled in tie bars shall be included in the contract unit price per each for Insert Steel Bar in PCC Pavement.



**GENERAL NOTES:**

Longitudinal joint tie bars shall be placed a minimum of 15 inches from the transverse contraction joint.

Centerline of individual dowel bars shall be parallel to top of subgrade  $\pm 1/8$  inch in 18 inches and to all other dowel bars in the assembly  $\pm 1/16$  inch in 18 inches.

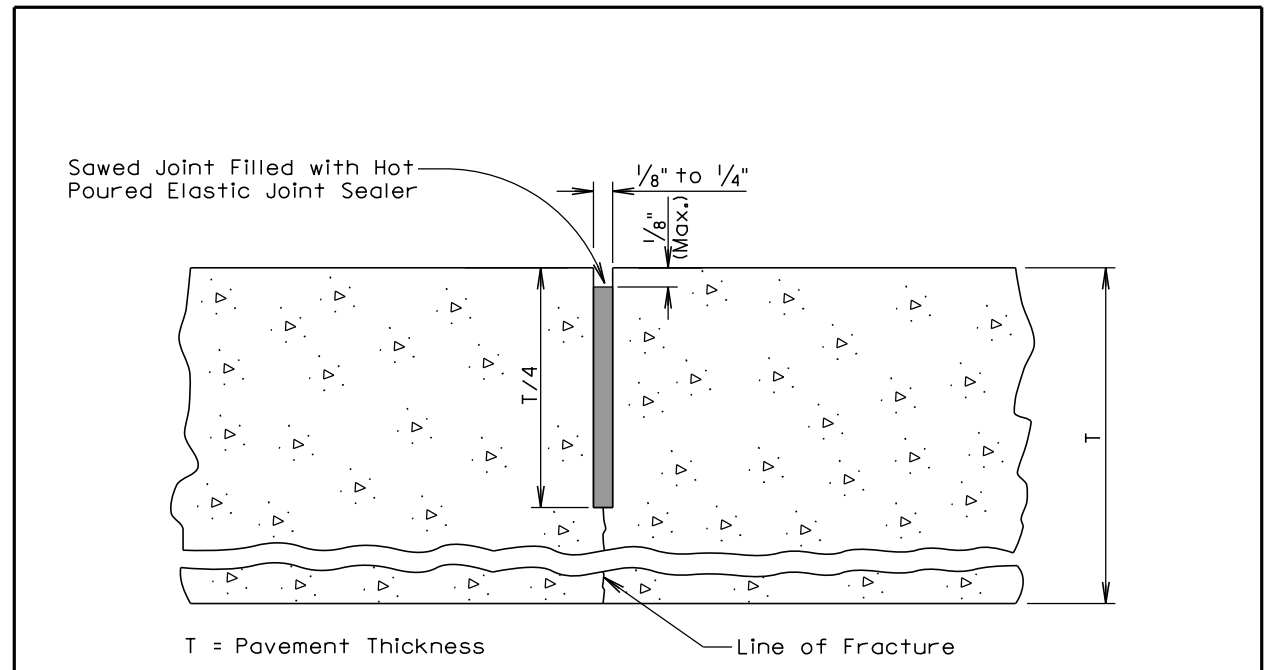
Centerline of individual dowel bars shall be parallel to the centerline of the roadway  $\pm 1/2$  inch in 18 inches.

The transverse contraction joints shall be sawed perpendicular to the centerline of the roadway and the dowel bars shall be centered on the sawed joint  $\pm 1$  inch.

Supporting devices as shown on this sheet, or equivalent as approved by the Engineer, shall be used to maintain proper horizontal and vertical alignment of the dowel bars.

August 30, 2013

Published Date: 1st Qtr. 2016	S D D O T	PCC PAVEMENT DOWEL BAR ASSEMBLY FOR TRANSVERSE CONTRACTION JOINTS 12 Bar Assembly on Granular Base Material	PLATE NUMBER 380.01
			Sheet 1 of 1



**GENERAL NOTES:**

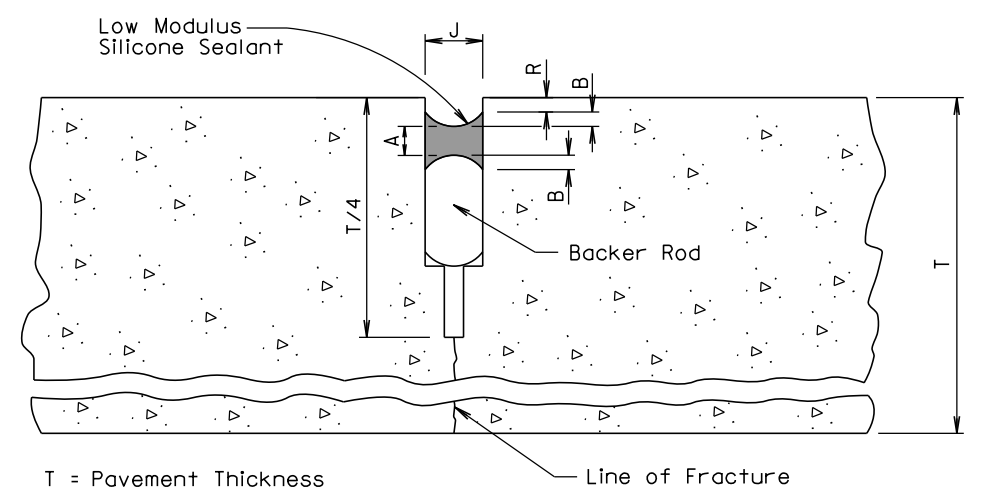
If an early entrance sawcut does not develop the full transverse crack, then the saw cut to control cracking shall be a minimum of  $1/4$  the thickness of the pavement.

All hot poured elastic joint sealer material spilled on the surface of the concrete pavement shall be removed as soon as the material has cooled. The extent of removal of material shall be to the satisfaction of the Engineer. All costs for removal of the spilled joint sealer material shall be borne by the Contractor.

June 26, 2015

Published Date: 1st Qtr. 2016	S D D O T	PCC PAVEMENT TRANSVERSE CONTRACTION JOINT WITH OR WITHOUT DOWEL BAR ASSEMBLY	PLATE NUMBER 380.05
			Sheet 1 of 1





LOW MODULUS SILICONE SEALANT ALLOWABLE CONSTRUCTION TOLERANCES				
J = 3/8"				
A (Min.) (In)	A (Max.) (In)	B (Min.) (In)	B (Max.) (In)	R (In)
3/16	5/16	1/8	1/4	1/4
J = 1/2"				
A (Min.) (In)	A (Max.) (In)	B (Min.) (In)	B (Max.) (In)	R (In)
3/16	3/8	1/8	1/4	1/4
J = 5/8"				
A (Min.) (In)	A (Max.) (In)	B (Min.) (In)	B (Max.) (In)	R (In)
1/4	7/16	1/8	5/16	1/4
J = 3/4"				
A (Min.) (In)	A (Max.) (In)	B (Min.) (In)	B (Max.) (In)	R (In)
5/16	1/2	3/16	3/8	5/16
J = 1"				
A (Min.) (In)	A (Max.) (In)	B (Min.) (In)	B (Max.) (In)	R (In)
3/8	5/8	3/16	1/2	5/16

**GENERAL NOTE:**

The backer rod shall be a nonmoisture absorbing resilient material approximately 25% larger in diameter than the width of the joint to be sealed.

February 14, 2011

<b>S D D O T</b>	<b>RESEAL PCC PAVEMENT JOINT (SILICONE)</b>	PLATE NUMBER <b>380.13</b>
		Sheet 1 of 1

Published Date: 1st Qtr. 2016