

**STATE OF SOUTH DAKOTA
DEPARTMENT OF TRANSPORTATION**

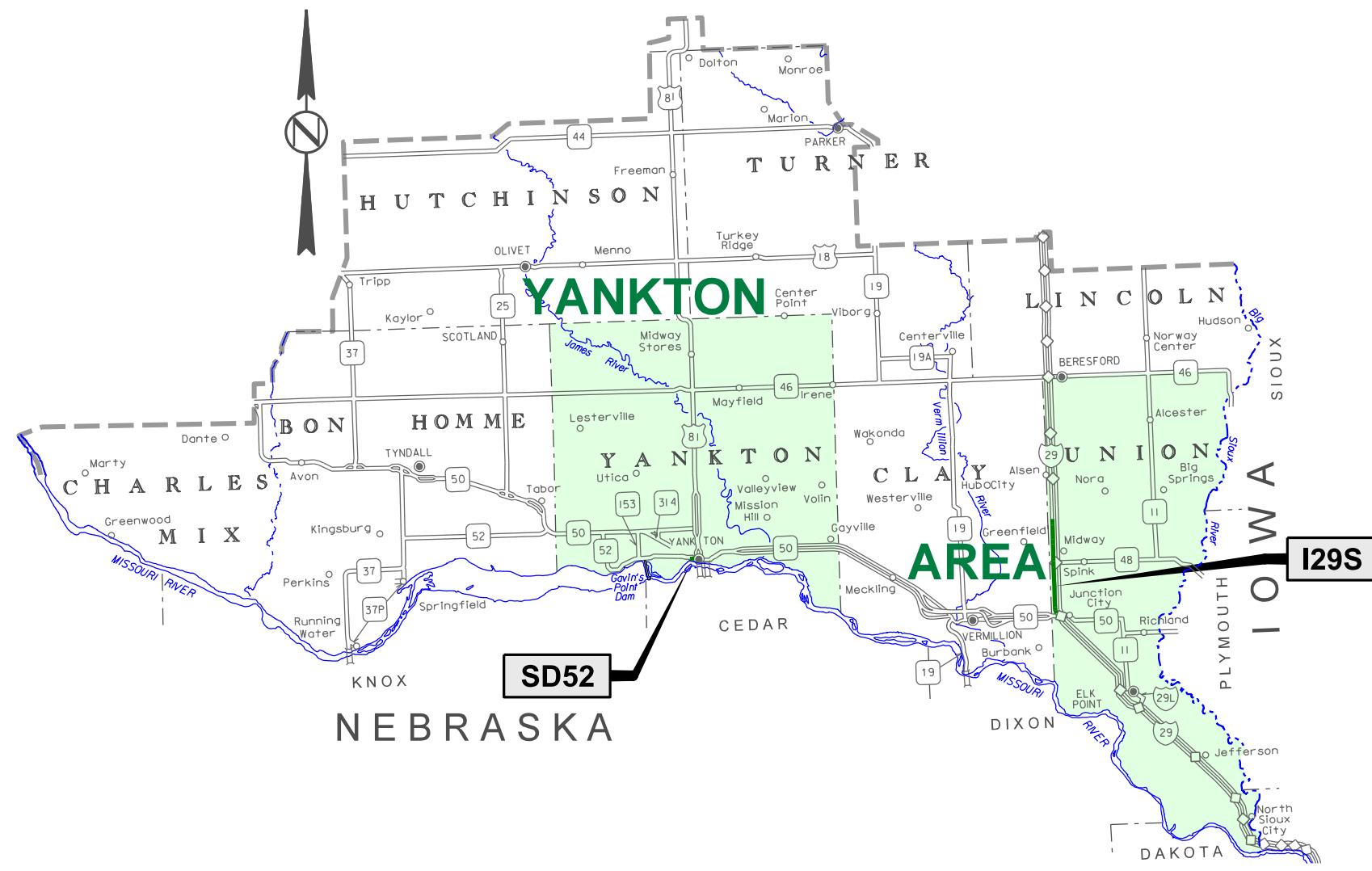
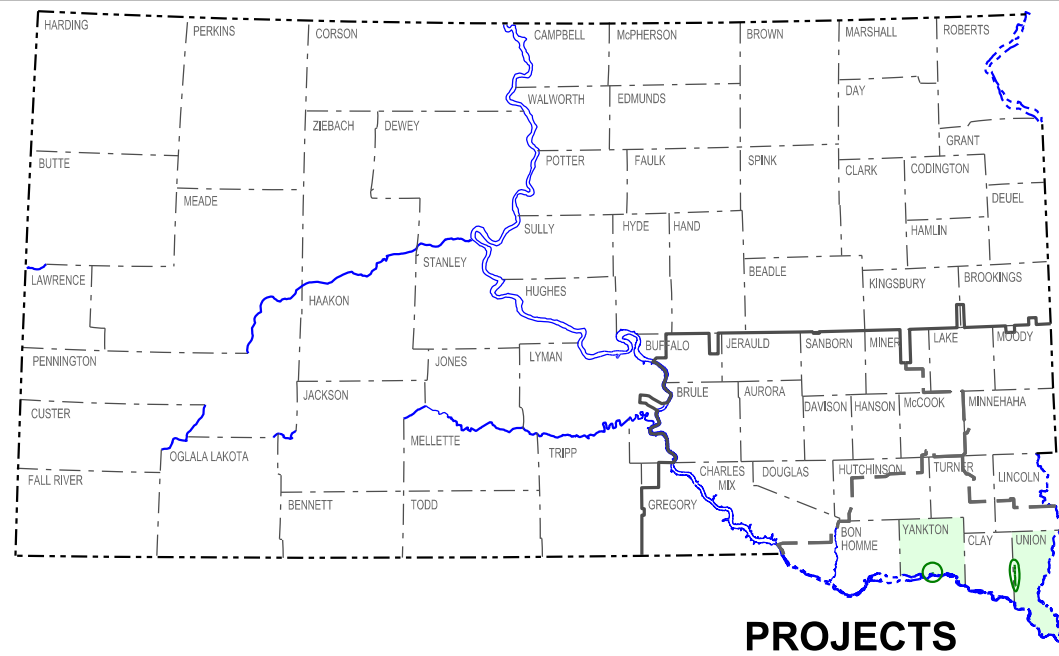
PLANS FOR PROPOSED

**PROJECTS 029S-291 & 052-292
INTERSTATE 29 SBL
SD HIGHWAY 52
UNION & YANKTON COUNTIES
CRC & NRC PAVEMENT REPAIR
PCN I59A & I59E**

STATE OF SOUTH DAKOTA	PROJECT	SHEET	TOTAL SHEETS
	2018 Yankton Area PCC Repair	1	28

INDEX OF SHEETS

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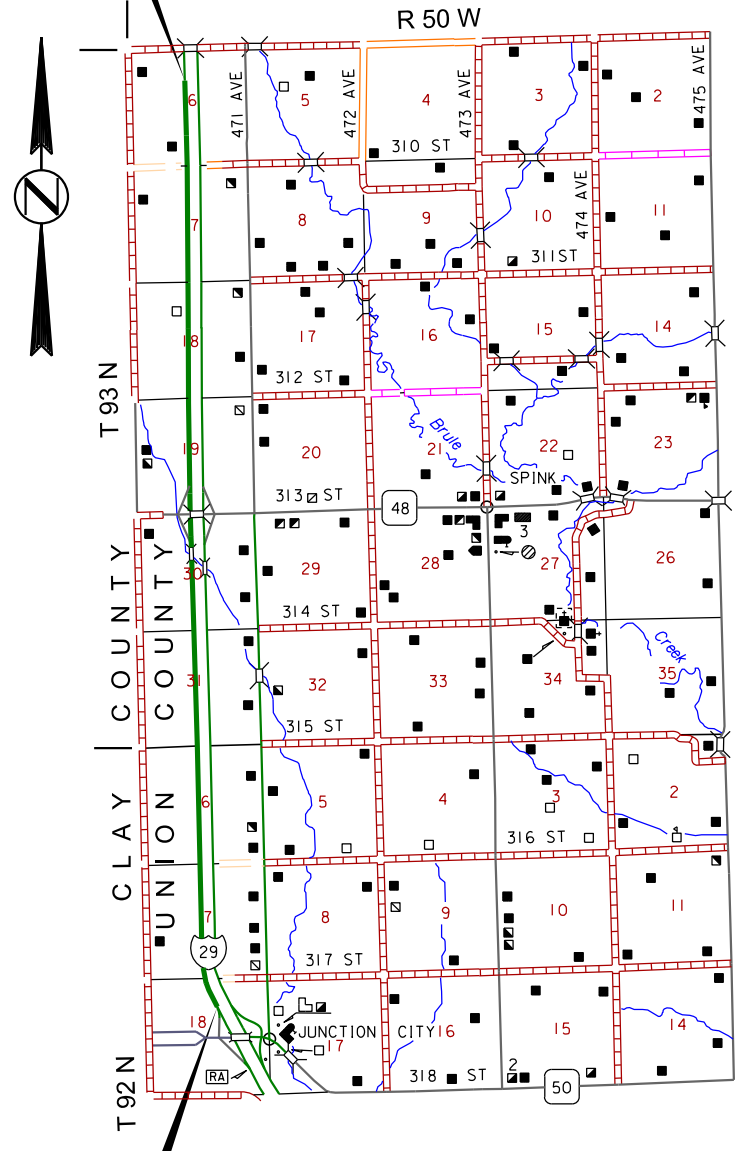
STORM WATER PERMIT
(None required)

**029S-291
INTERSTATE 29 SBL
UNION COUNTY
CRC PAVEMENT REPAIR
LENGTH: 7.500 MILES
PCN I59A**

**052-292
SD HIGHWAY 52
YANKTON COUNTY
NRC PAVEMENT REPAIR
PCN I59E**

CITY OF YANKTON

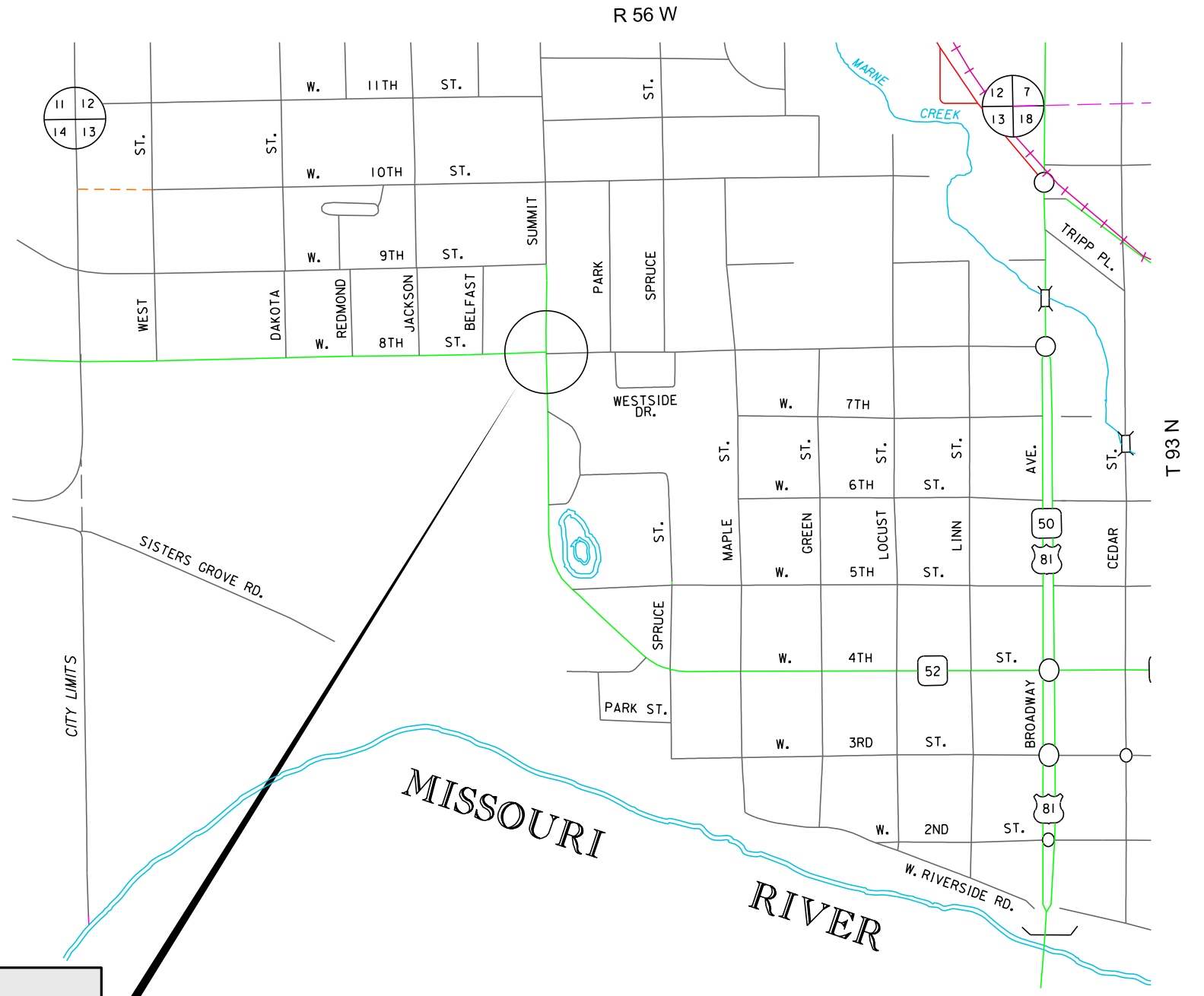
**END 029S-291
MRM 34.00 +0.500**



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

**I29S ADT (2017) 6,358
SD52 ADT (2017) 6,378**

**052-292
MRM 342.96+0.00**



ESTIMATE OF QUANTITIES

STATE OF SOUTH DAKOTA	PROJECT	SHEET	TOTAL SHEETS
	2018 Yankton Area PCC Repair	3	28

029 S-291 PCN I59A

BID ITEM NUMBER	ITEM	QUANTITY	UNIT
009E0010	Mobilization	Lump Sum	LS
380E5100	Continuously Reinforced PCC Pavement Repair	23.9	SqYd
380E6110	Insert Steel Bar in PCC Pavement	31	Each
634E0010	Flagging	10.0	Hour
634E0110	Traffic Control Signs	300.0	SqFt
634E0120	Traffic Control, Miscellaneous	Lump Sum	LS
634E0275	Type 3 Barricade	12	Each
634E0310	Temporary Flexible Vertical Markers (Tabs)	1,920	Ft
634E0420	Type C Advance Warning Arrow Board	1	Each

052-292 PCN I59E

BID ITEM NUMBER	ITEM	QUANTITY	UNIT
009E0010	Mobilization	Lump Sum	LS
380E5030	Nonreinforced PCC Pavement Repair	22.4	SqYd
380E6110	Insert Steel Bar in PCC Pavement	20	Each
634E0010	Flagging	10.0	Hour
634E0110	Traffic Control Signs	128.3	SqFt
634E0120	Traffic Control, Miscellaneous	Lump Sum	LS
634E0275	Type 3 Barricade	4	Each
634E0310	Temporary Flexible Vertical Markers (Tabs)	180	Ft
634E0420	Type C Advance Warning Arrow Board	1	Each

SPECIFICATIONS

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

ESTIMATE OF QUANTITIES

STATE OF SOUTH DAKOTA	PROJECT	SHEET	TOTAL SHEETS
	2018 Yankton Area PCC Repair	4	28

ENVIRONMENTAL COMMITMENTS

The SDDOT is committed to protecting the environment and uses Section A 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 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.

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) will 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 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.

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 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.

TABLE FOR CRC PAVEMENT REPAIR ON 029S-291 - PCN I59A

MRM	DISP	SB DRIVING LANE		SB PASSING LANE		CRCP REPAIR SqYds
		L Ft	W Ft	L Ft	W Ft	
29.00	0.186			5	2	1.1
29.00	0.383	6	4			2.7
29.00	0.402			6	6	4.0
30.00	0.133			6	12	8.0
30.00	0.773	3	2			0.7
31.00	0.406			8	6	5.3
32.00	0.080			4	4	1.8
32.00	0.205	3	1			0.3
TOTALS:						23.9

TABLE FOR CRC PAVEMENT REPAIR ON 029S-291 - PCN I59A

REINFORCING STEEL (CRCP) FOR SB PASSING LANE
(STEEL FOR CRCP IS NOT A BID ITEM - ACTUAL STEEL QUANTITIES WILL VARY DUE TO LOCATION AND SIZE OF INDIVIDUAL REPAIR AREAS)

MRM	DISP	No. 6 Longitudinal Bars to be lap spliced with existing bars				No. 6 Longitudinal Bars to be spliced together betw een every other existing longitudinal bar				No. 6 Longitudinal Bars to be spliced together betw een every other existing longitudinal bar				No. 4 Transverse Bars to be lap spliced with No. 5 x 24" bars		New Trans Bar Spacing	Reinforcing Steel Lbs	INSERT STEEL BAR IN PCC PAVEMENT (CRCP) SB PASSING LANE			INSERT STEEL BAR IN CRCP TOTAL
		# bars @ length	Length	Lap Splice Length	Lap Stagger & Cutoff	# bars @ length	Length	Lap Splice Length	Lap Stagger & Cutoff	# bars @ length	Length	Lap Splice Length	Lap Stagger & Cutoff	# bars @ length	Length			Each	Each	Each	
29.00	0.402	11 bars @ 62" =	56.83'	19"	-									3 bars @ 66" =	16.50'	2'	96.381		3	3	3
30.00	0.133	22 bars @ 62" =	113.67'	19"	-	11 bars @ 55" =	50.42'	19"	-	11 bars @ 55" =	50.42'	19"	-	3 bars @ 138" =	34.50'	2'	345.240	22	3	25	25
31.00	0.406	11 bars @ 85" =	77.92'	25"	3"									3 bars @ 66" =	16.50'	2'	128.058		3	3	3
TOTALS:		44 bars	248'			11 bars	50'			11 bars	50'			9 bars	68'		570 Lbs	22	9	31	31
ADDITIONAL QUANTITIES:		10 bars	50'			-	10'			-	10'			-	10'		110 Lbs	-	-	-	-
GRAND TOTAL		54 bars	298'			11 bars	60'			11 bars	60'			9 bars	78'		680 Lbs	22	9	31	31

TABLE FOR NRC PAVEMENT REPAIR ON 052-292 - PCN I59E

MRM	DISP	WB DRIVING LANE		NRCP REPAIR SqYds	NEW JOINT CON- FIG. (NRCP)	INSERT STEEL BAR IN PCC PAVEMENT (NRCP)		INSERT STEEL BAR IN NRCP TOTAL Each
		L Ft	W Ft			1 1/4" x 18" PLAIN ROUND DOWEL BARS Each	No. 5 x 24" DEFORMED TIE BARS Each	
342.00	0.962	11.2	18	22.4	W	16	4	20
TOTALS:				22.4		16	4	20

NRC 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 through the SD One Call process as required by South Dakota Codified Law 49-7A and Administrative Rule Article 20:25; the Contractor shall contact the Project Engineer to determine if project changes are necessary to avoid utility impacts.

SCOPE OF WORK

This project consists of full depth replacement of Nonreinforced Concrete Pavement (NRCP) and Continuously Reinforced Concrete Pavement (CRCP) in areas where concrete pavement blowups or major failures have occurred.

Full depth CRCP areas may vary in length and width; however, the minimum length is 4 feet for partial lane width repair areas and the minimum length is 4.5 feet for full lane width repair areas. Minimum size for small repair areas – existing steel maintained, is 1 foot x 1 foot.

EXISTING NRC PAVEMENT

SD52: The existing pavement is 9" 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.

The aggregate in the existing NRC Pavement is quartzite.

EXISTING CRC PAVEMENT

I29S: 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 48" 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 Junction City or Yankton.

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.

NONREINFORCED PCC PAVEMENT REPAIR – GENERAL (CONTINUED)

Existing concrete pavement shall be sawed full depth at the beginning and end of the NRCP repair areas. When either the beginning or end of a NRCP repair area falls close to an existing joint or crack, the NRCP 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.

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.

NONREINFORCED PCC PAVEMENT REPAIR (CONTINUED)

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 3,500 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 3,500 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.

Full Lane Width Repair and Partial Lane Width Repair

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.

The Contractor shall lift out or break out the center section (including reinforcing steel). Light chipping hammers (not exceeding 15 pounds) shall be used to remove the remaining concrete at each end of the repair area, leaving the reinforcing steel in place.

Small Repair – Existing Steel Retained

The Contractor shall saw the in place concrete around the periphery of each repair area to a depth of 2" (above the in place reinforcing steel). The cuts shall be a minimum of 6" from the nearest tight crack outside of the patch.

Light chipping hammers (not exceeding 15 pounds) shall be used to remove the concrete from the repair area, leaving all of the reinforcing steel in place.

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

CONTINUOUSLY REINFORCED PCC PAVEMENT REPAIR (CONTINUED)

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 (CRCP) and STEEL BAR INSERTION (CRCP).

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 3,500 psi must be attained prior to opening to traffic.

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 3,500 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.

CONTINUOUSLY REINFORCED PCC PAVEMENT REPAIR (CONTINUED)

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)

Reinforcing steel shall conform to Section 1010.

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

At full lane and partial lane width repair areas:

New longitudinal bars shall be lap spliced with the preserved in place longitudinal bars (New bar diameter to match in place bar diameter).

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).

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. These additional bars will extend 9" into the existing concrete 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.

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)

Steel bars shall conform to Section 1010.

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 as per Section 380.3 C.1.

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.

SAW AND SEAL LONGITUDINAL JOINTS (CRCP)

Longitudinal joints (in line with existing longitudinal joints) at concrete repair areas shall be sawed and sealed.

Joint sealing shall conform to Section 380.3 P.

Longitudinal joints shall be sealed with Low Modulus Silicone Sealant or Hot Poured Elastic Joint Sealer.

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 shall be incidental to the contract unit price per square yard for Continuously Reinforced PCC Pavement Repair.

STEEL BAR INSERTION (NRCP)

Steel bars shall conform to Section 1010.

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 8.5" and less than 10.5" (T >= 8.5" and T < 10.5"):

The Contractor shall insert the steel bars (1 1/4" 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 as per Section 380.3 C.1.

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.

SAW AND SEAL JOINTS (NRCP)

All longitudinal and transverse joints at concrete repair areas shall be sawed and sealed.

Joint sealing shall conform to Section 380.3 P.

Longitudinal and transverse joints in urban sections shall be sealed with Hot Poured Elastic Joint Sealer. 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.

TEMPORARY PAVEMENT MARKING

Temporary pavement marking on lane closure tapers shall consist of temporary flexible vertical markers (tabs). (Estimate two workspaces with 960' tapers on I29 and one workspace with 180' taper on SD52).

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 one workspace on a four-lane divided highway and one workspace on a multi-lane undivided 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.

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.

Each mainline concrete repair location from which the in place concrete has been removed shall be marked with a minimum of 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.

Construction workspaces on divided roadways shall be limited to 5 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.

MAINTENANCE OF TRAFFIC – PCC PAVEMENT REPAIR

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 Junction City or Yankton.

MAINTENANCE OF TRAFFIC – PCC PAVEMENT REPAIR (CONTINUED)

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 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 mainline 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 will be required to keep them in place.

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 (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.

MAINTENANCE OF TRAFFIC (SD52)

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 Engineer two weeks in advance so that the Region Traffic Engineer can arrange for signal timings to be adjusted to accommodate traffic when a lane is closed near a signalized intersection.

MAINTENANCE OF TRAFFIC

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.

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
R2-1	SPEED LIMIT 65		24" x 30"	5.0		4	36" x 48"	12.0	48.0
R2-1	SPEED LIMIT 45		24" x 30"	5.0		2	36" x 48"	12.0	24.0
R2-1	SPEED LIMIT 80		24" x 30"	5.0		1	36" x 48"	12.0	12.0
R2-6aP	FINES DOUBLE (plaque)		24" x 18"	3.0		2	36" x 24"	6.0	12.0
R3-7L	LEFT LANE MUST TURN LEFT	1	30" x 30"	6.3	6.3				
R4-7	KEEP RIGHT (symbol)	2	24" x 30"	5.0	10.0		36" x 48"	12.0	
W3-5	SPEED REDUCTION AHEAD (2 - 65 MPH) (1 - 45 MPH)		48" x 48"	16.0		3	48" x 48"	16.0	48.0
W4-2	LEFT or RIGHT LANE ENDS (symbol)	1	48" x 48"	16.0	16.0	2	48" x 48"	16.0	32.0
W9-3	CENTER LANE CLOSED AHEAD	1	48" x 48"	16.0	16.0		48" x 48"	16.0	
W20-1	ROAD WORK AHEAD	4	48" x 48"	16.0	64.0	3	48" x 48"	16.0	48.0
W20-5	LEFT or RIGHT LANE CLOSED AHEAD	1	48" x 48"	16.0	16.0	2	48" x 48"	16.0	32.0
W20-7	FLAGGER (symbol)		48" x 48"	16.0		1	48" x 48"	16.0	16.0
SPECIAL	EXIT 31 with 45° ARROW (1 or 2 digits)					1	60" x 48"	20.0	20.0
G20-2	END ROAD WORK		36" x 18"	4.5		1	48" x 24"	8.0	8.0
		CONVENTIONAL ROAD TRAFFIC CONTROL SIGNS SQFT 128.3				EXPRESSWAY / INTERSTATE TRAFFIC CONTROL SIGNS SQFT 300.0			

TYPE 3 BARRICADES

ITEM DESCRIPTION	QUANTITY
Type 3 Barricade, 8' Single Sided	16 Each

ARROW BOARDS

ITEM DESCRIPTION	QUANTITY
Type C Advance Warning Arrow Board	2 Each

SD HWY 52 & SUMMIT STREET TRAFFIC CONTROL PCC PAVEMENT REPAIR

NOTES:

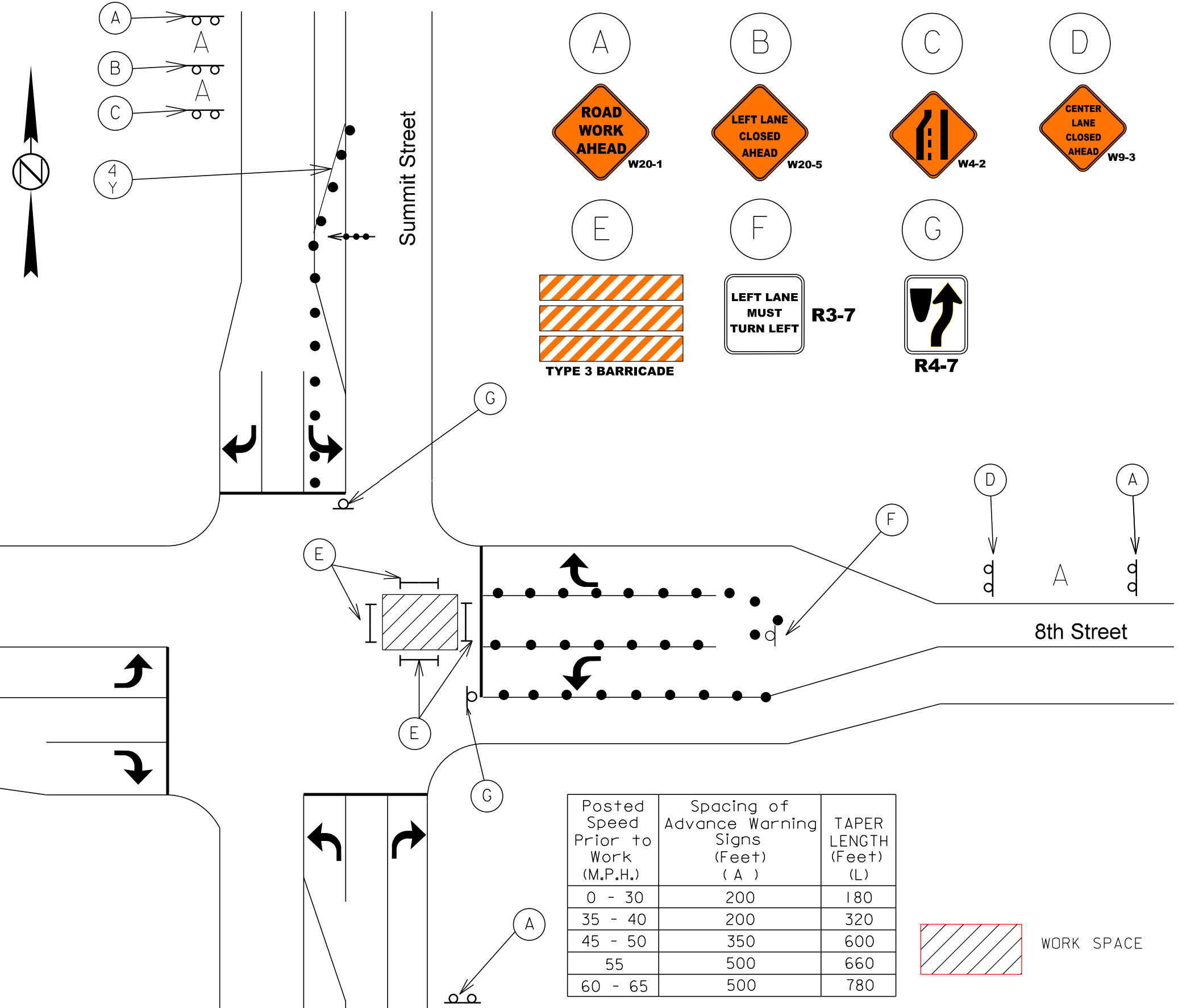
The Contractor will be required to maintain two way traffic and exclusive turn lanes at all times in all four directions, except as shown.

● REFLECTORIZED DRUMS or 42" CONES - 25 ft. spacing on tapers & 50 ft maximum spacing on tangent unless otherwise shown.

←←←← - Advance Warning Arrow Panel

Ⓞ
4
Y - 4" Yellow Temporary Pavement Marking

LAYOUT NOT TO SCALE



Posted Speed Prior to Work (M.P.H.)	Spacing of Advance Warning Signs (Feet) (A)	TAPER LENGTH (Feet) (L)
0 - 30	200	180
35 - 40	200	320
45 - 50	350	600
55	500	660
60 - 65	500	780

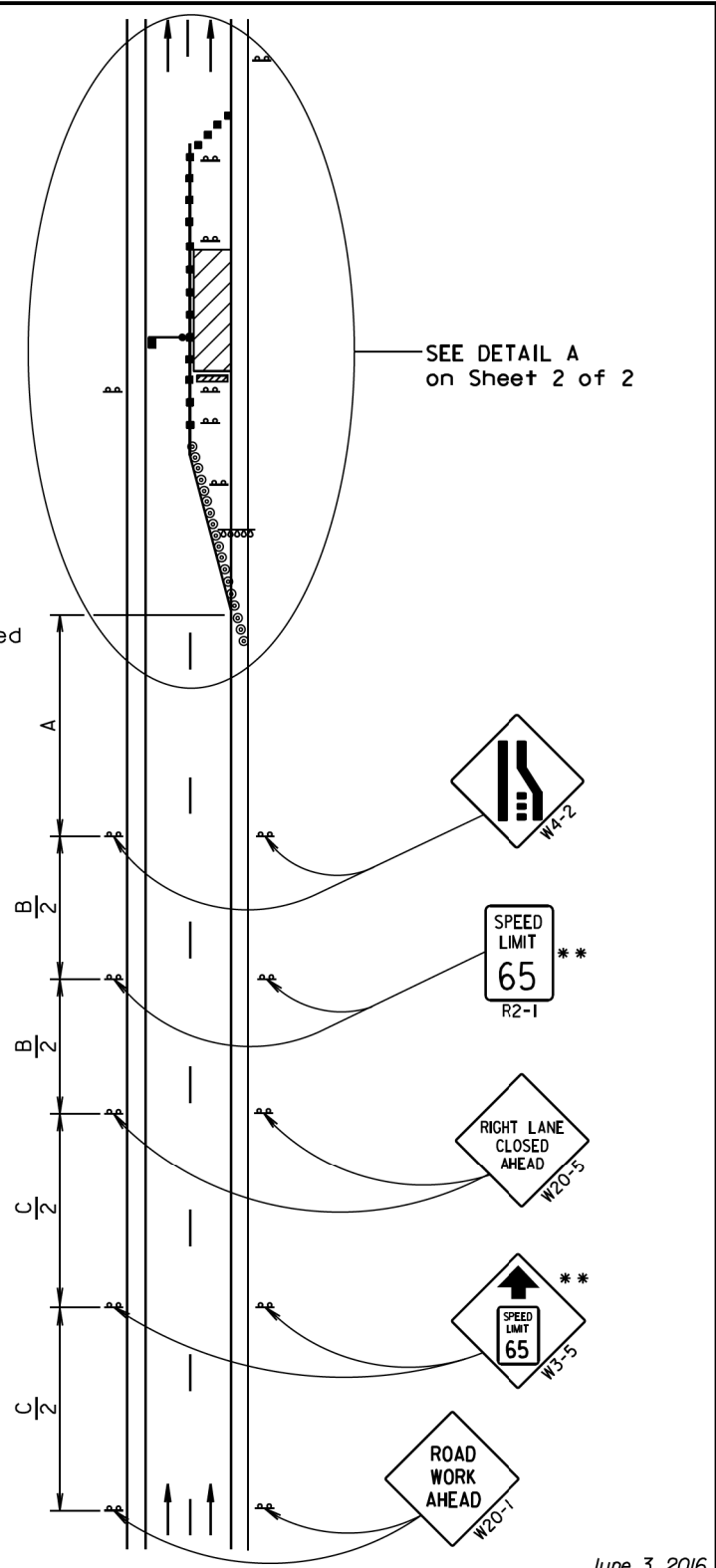
WORK SPACE

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.



SEE DETAIL A on Sheet 2 of 2

June 3, 2016

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	25	600
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.

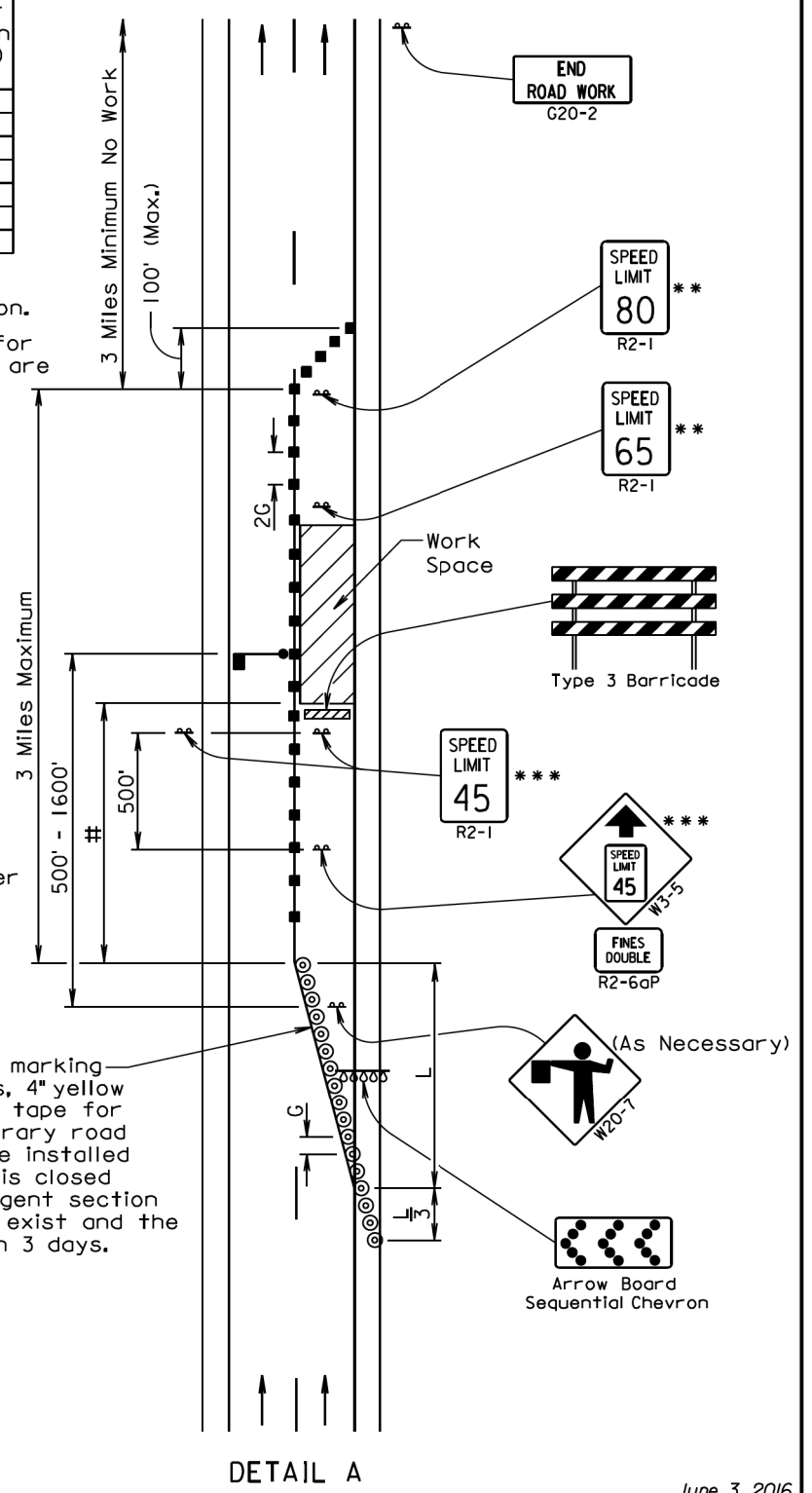
- Flagger (As Necessary)
- ⊙ Reflectorized Drum
- Channelizing Device
- # The Work Space shall be a minimum of 500' from the end of the taper.

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

The channelizing devices shall be 42" cones or drums.

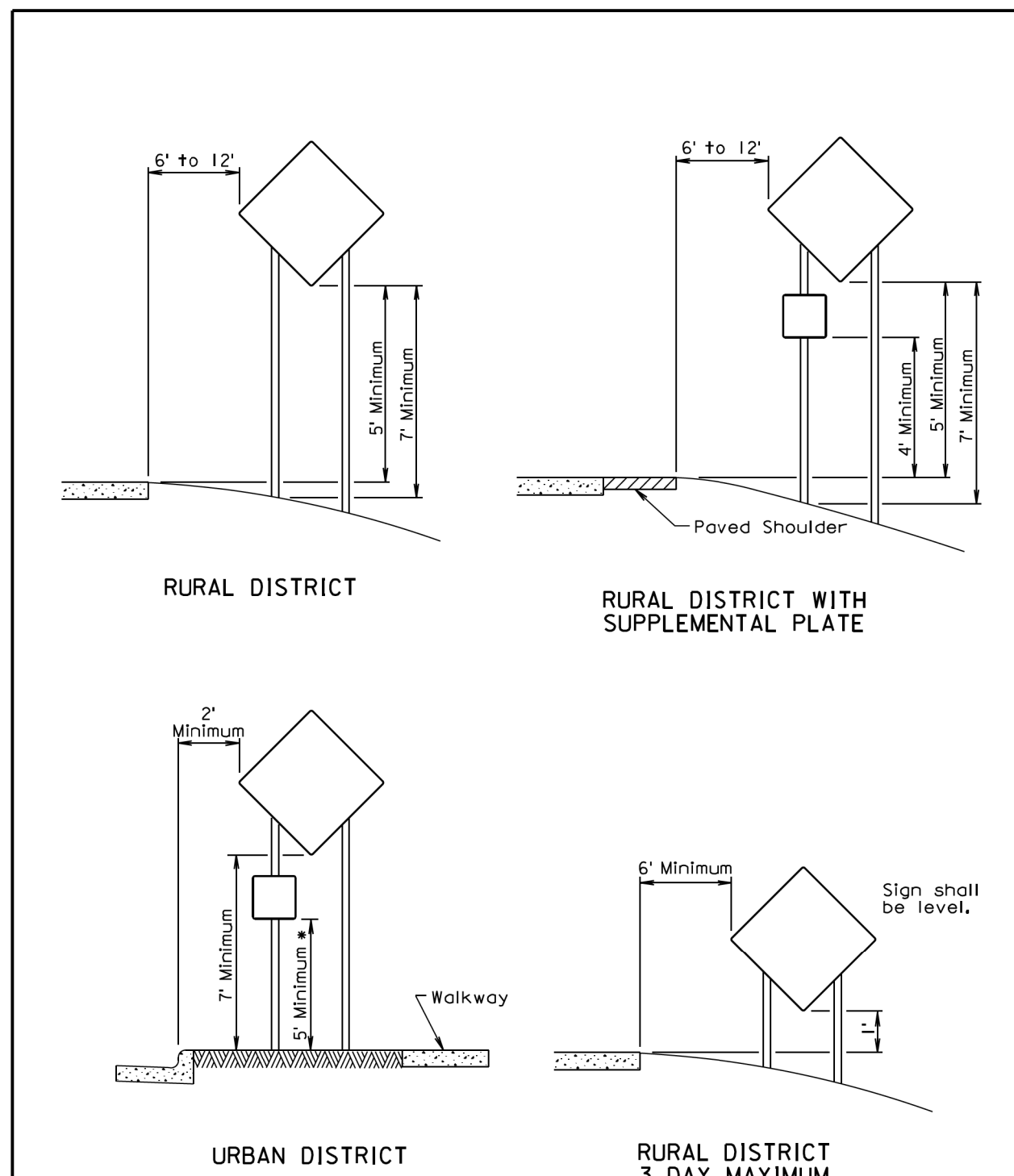
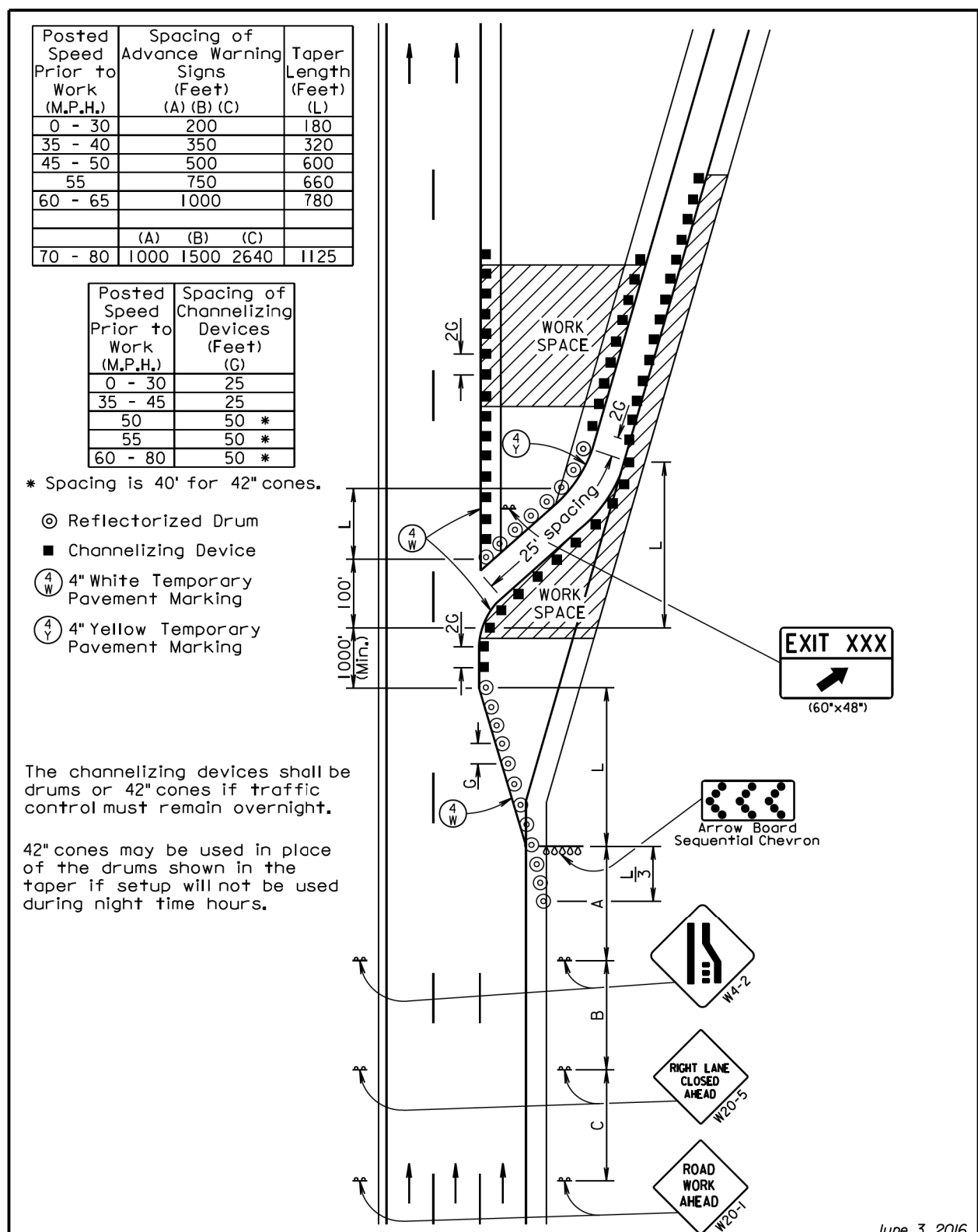
42" cones may be used in place of the drums shown in the taper if setup will not be used during night time hours.

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 in the taper when the lane is closed overnight, and along the tangent section where the skip lines do not exist and the lane is closed for more than 3 days.



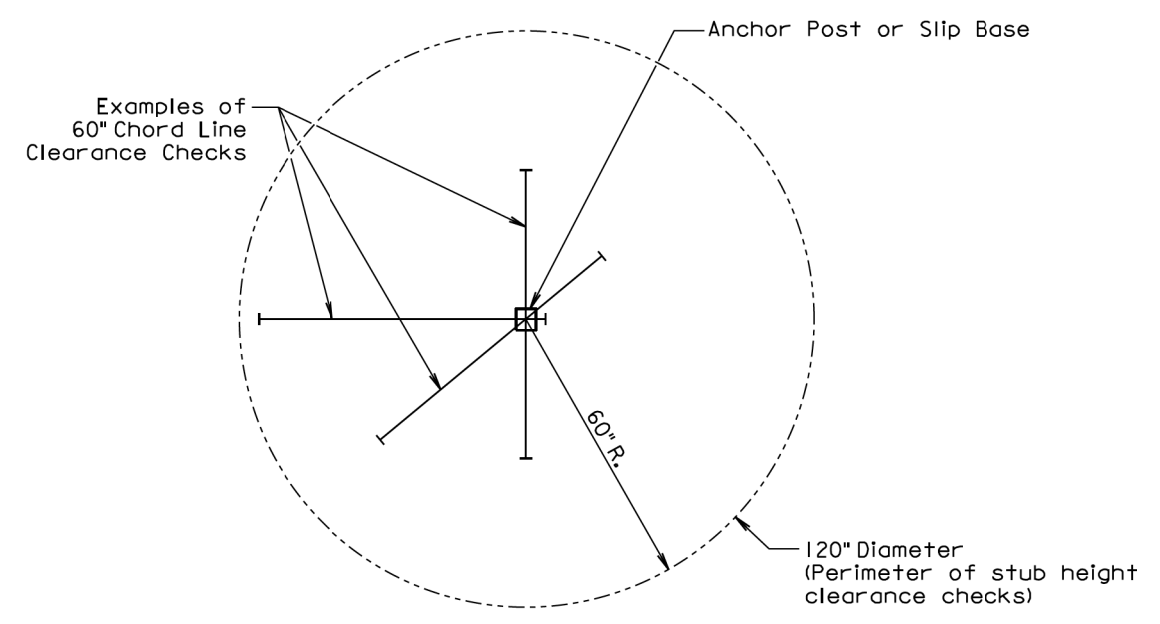
DETAIL A

June 3, 2016

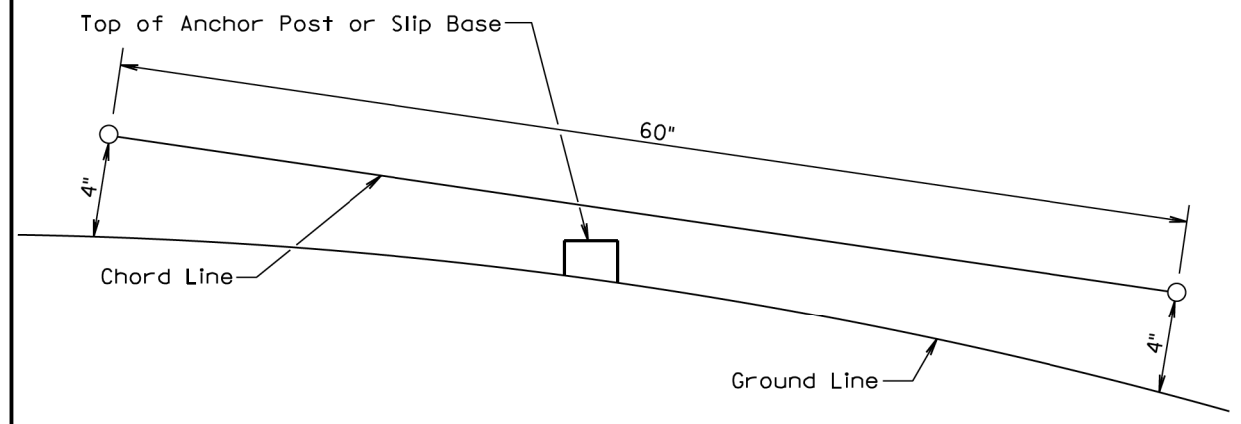


* If the bottom of supplemental plate is mounted lower than 7 feet above a pedestrian walkway, the supplemental plate should not project more than 4" into the pedestrian facility.

(Not applicable to regulatory signs)



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.

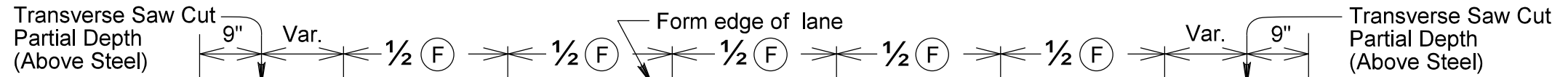
At locations where there is curb and gutter adjacent to the breakaway sign support, the stub height shall be a maximum of 4" above the ground line at the localized area adjacent to the breakaway support stub.

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

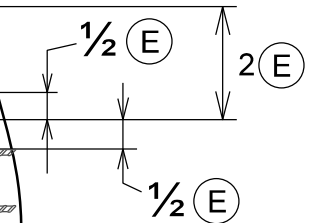
Published Date: 1st Qtr. 2018	S D D O T	BREAKAWAY SUPPORT STUB CLEARANCE	PLATE NUMBER 634.99
			Sheet 1 of 1

CRC PAVEMENT REPAIR (FULL LANE WIDTH) - TYPICAL



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)

(E)



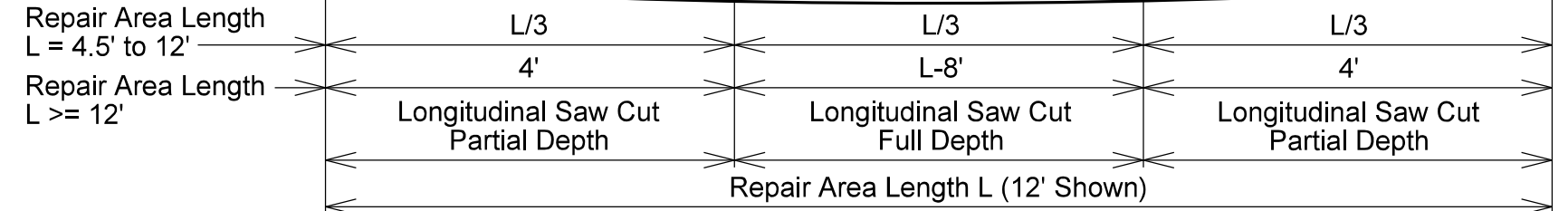
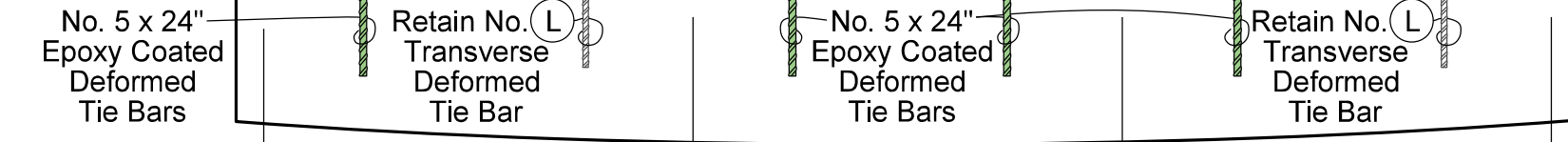
No. (C) Longitudinal Deformed Tie Bars In Place

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

Traffic Lane Width W (12' Shown)



DEFORMED TIE BAR DIMENSIONS KEY					
Underlying Plans	CRC Depth	Longitudinal Steel		Transverse Steel	
		Size (C)	Spacing (E)	Size (L)	Spacing (F)
PCN	T	(C)	(E)	(L)	(F)
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 - TRYPRINT48

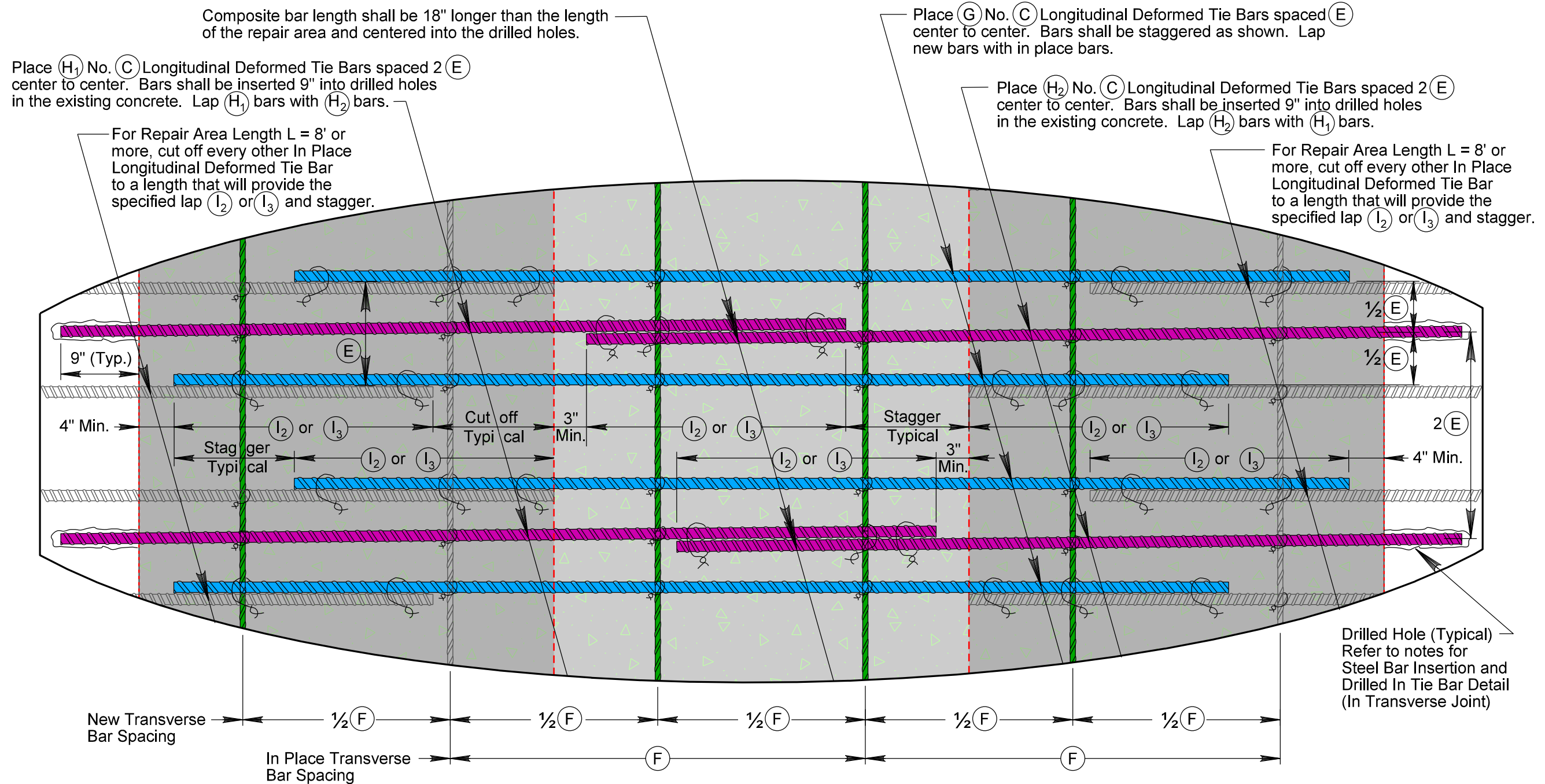
PLOT NAME - 5

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

CRC PAVEMENT REPAIR (FULL LANE WIDTH)

Detail A

Plotting Date: 04/12/2018



DEFORMED TIE BAR KEY

	No. (C) Longitudinal Deformed Tie Bar In Place (Retain)		No. (L) Transverse Deformed Tie Bar In Place (Retain)
	Place No. (C) Longitudinal Deformed Tie Bar (Tie to In Place No. (C) Longitudinal Bars)		Place No. (L) Transverse Deformed Tie Bar (Tie to No. (C) Longitudinal Bars)
	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)		

DEFORMED TIE BAR DIMENSIONS KEY

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

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

LAP SPLICE LENGTH KEY

(I_1)	Lap Splice length for Repair Area Length $L < 4.5'$ (Not Available).
(I_2)	Lap Splice length for Repair Area Length $L = 4.5'$ to $8'$.
(I_3)	Lap Splice length for Repair Area Length $L > 8'$.

See CRC Pavement Repair - Reinforcing Steel Details for Longitudinal Bar Counts:

(G) , (H_1) & (H_2)

CRC REPAIR AREA KEY

	Remove Concrete Retain Reinforcing Steel
	Remove Concrete Remove Reinforcing Steel

PLOT SCALE - 1:1.07

PLOT NAME - 6

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

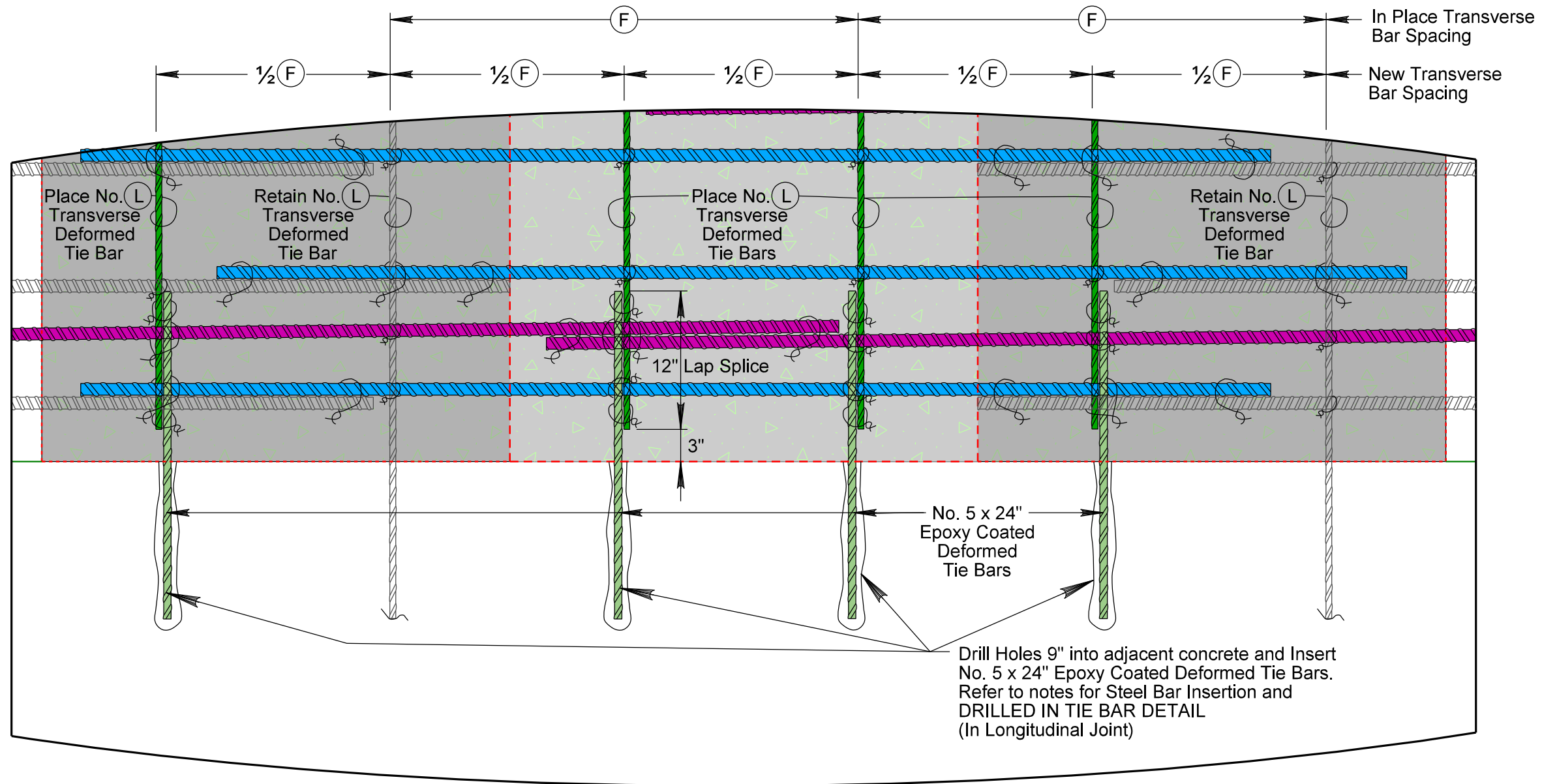
PLOTTED FROM - TRYPRINT48

CRC PAVEMENT REPAIR (FULL LANE WIDTH)

Detail B

STATE OF SOUTH DAKOTA	PROJECT 2018 Yankton Area PCC Repair	SHEET 18	TOTAL SHEETS 28
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Plotting Date: 04/12/2018



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>
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DEFORMED TIE BAR DIMENSIONS KEY

Underlying Plans	CRC Depth	Longitudinal Steel		Transverse Steel	
		Size	Spacing	Size	Spacing
PCN	T	(C)	(E)	(L)	(F)
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.

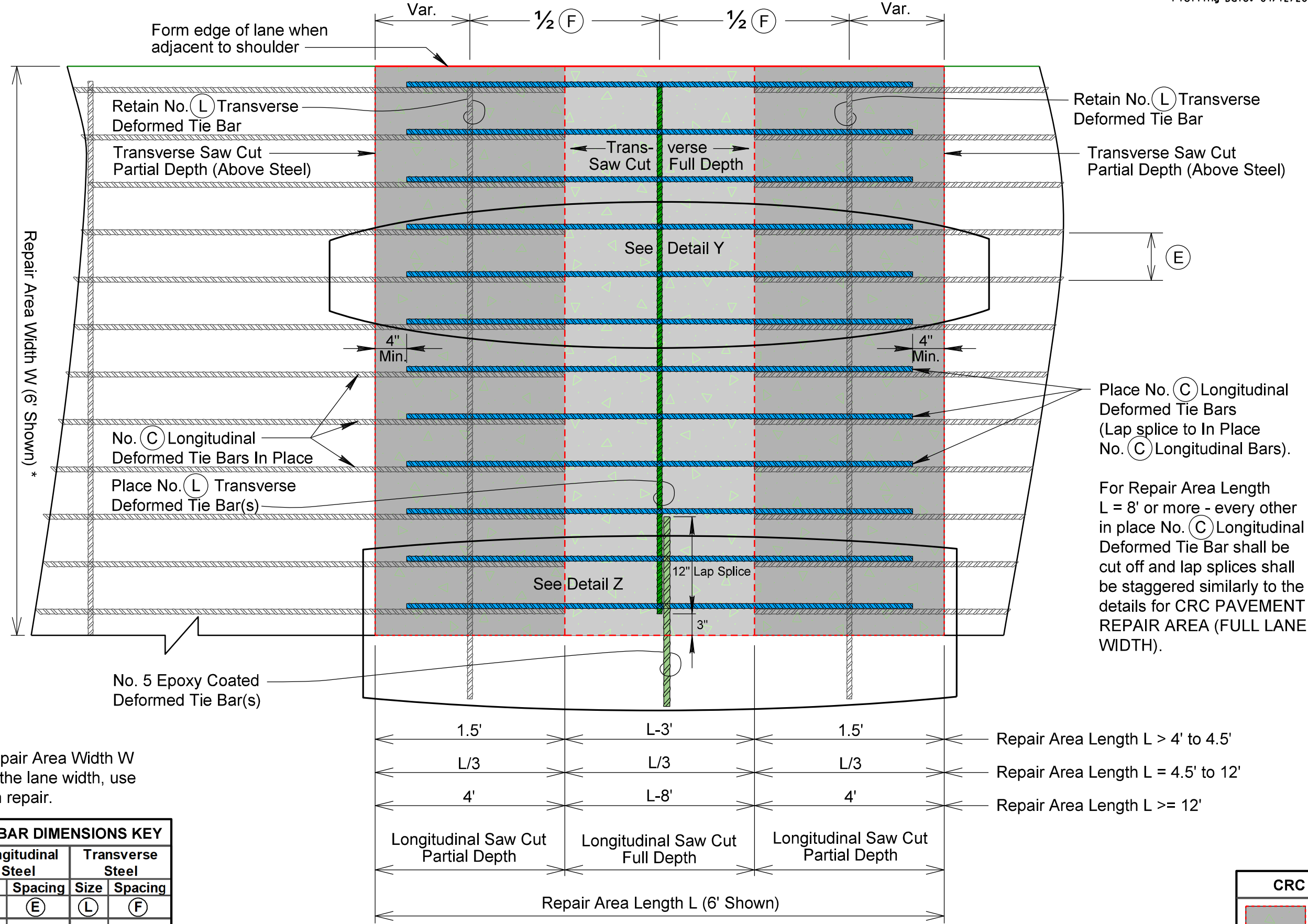
PLOT SCALE - 1:1.07

PLOT NAME - 7

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

PLOTTED FROM - TRYPRINT48

CRC PAVEMENT REPAIR (PARTIAL LANE WIDTH) - TYPICAL



* When the Repair Area Width W exceeds half the lane width, use full lane width repair.

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

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

PLOT SCALE - 1:1.06

PLOTTED FROM - TRYPRINT48

PLOT NAME - 8

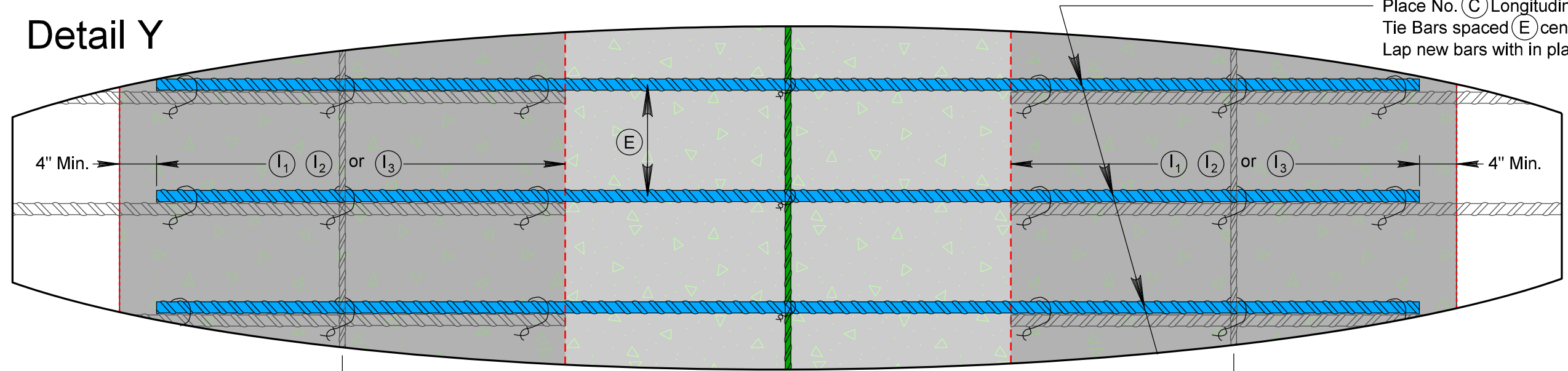
FILE - ... \CRC PARTIAL WIDTH REPAIR.DGN

CRC PAVEMENT REPAIR (PARTIAL LANE WIDTH)

STATE OF SOUTH DAKOTA	PROJECT	SHEET	TOTAL SHEETS
	2018 Yankton Area PCC Repair	20	28

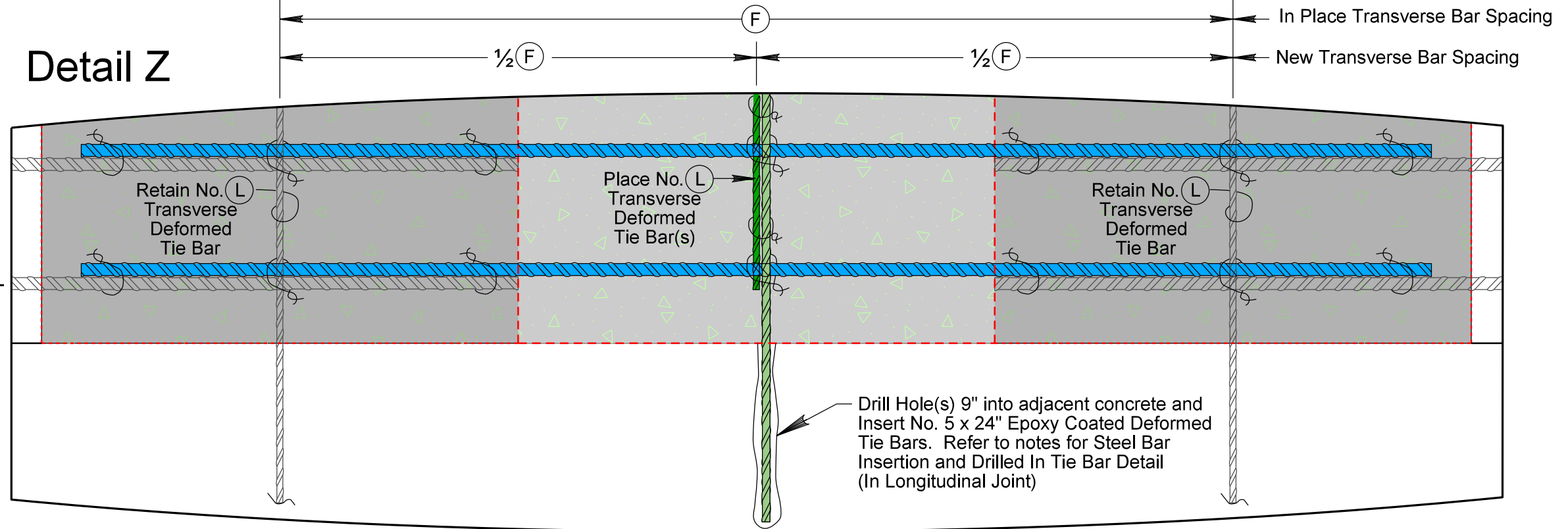
Plotting Date: 04/12/2018

Detail Y



Place No. (C) Longitudinal Deformed Tie Bars spaced (E) center to center. Lap new bars with in place bars.

Detail Z



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 similarly to the details for CRC PAVEMENT REPAIR AREA (FULL LANE WIDTH).

Drill Hole(s) 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 DIMENSIONS KEY

No. (L) Transverse Deformed Tie Bar In Place (Retain)	Place No. (C) Longitudinal Deformed Tie Bar (Tie to In Place No. (C) Longitudinal Bars)
Place No. (L) Transverse Deformed Tie Bar (Tie to No. (C) Longitudinal Bars)	Place No. (C) Longitudinal Deformed Tie Bar (Tie to In Place No. (C) Longitudinal Bars)

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

LAP SPLICE LENGTH KEY

(I ₁)	Lap Splice length for Repair Area Length L = 4' to 4.5'.
(I ₂)	Lap Splice length for Repair Area Length L = 4.5' to 8'.
(I ₃)	Lap Splice length for Repair Area Length L > 8'.

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

CRC REPAIR AREA KEY

	Remove Concrete Retain Reinforcing Steel
	Remove Concrete Remove Reinforcing Steel

PLOT SCALE - 1:1.06

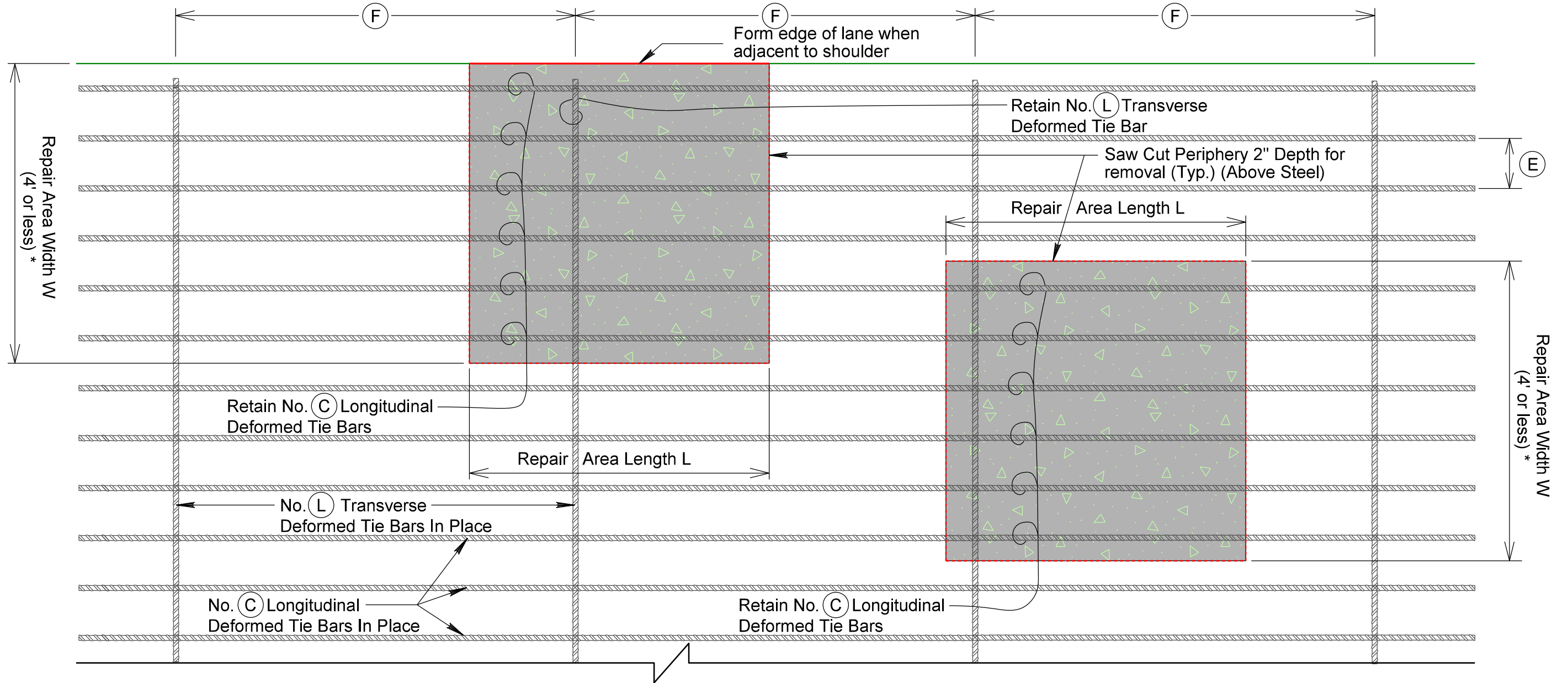
PLOTTED FROM - TRYPRINT48

PLOT NAME - 9

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

CRC PAVEMENT REPAIR - EXISTING STEEL RETAINED (TYPICAL)

PLAN VIEW

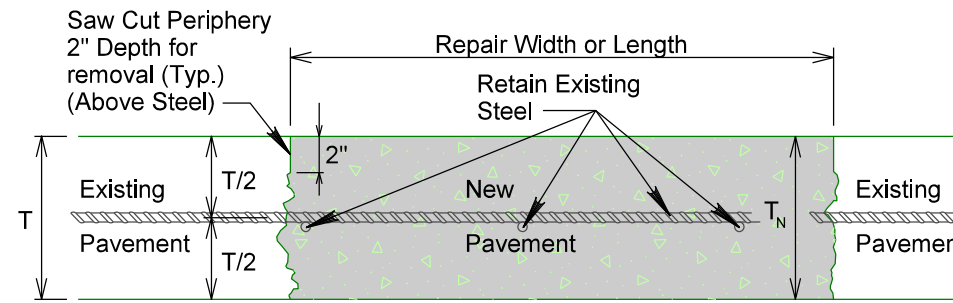


* When Repair Width W exceeds 4', use partial lane width repair.
 When Repair Width W exceeds half the lane width, use full lane width repair.

DEFORMED TIE BAR DIMENSIONS KEY

	Underlying Plans	CRC Depth	Longitudinal Steel		Transverse Steel	
			Size	Spacing	Size	Spacing
No. (L) Transverse Deformed Tie Bar In Place (Retain)	PCN	T	(C)	(E)	(L)	(F)
No. (C) Longitudinal Deformed Tie Bar In Place (Retain)	5886	10"	6	6 1/2"	4	48"

PROFILE VIEW



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

CRC REPAIR AREA KEY



PLOT SCALE - 1:1.06

PLOTTED FROM - TRYPRINT48

PLOT NAME - 10

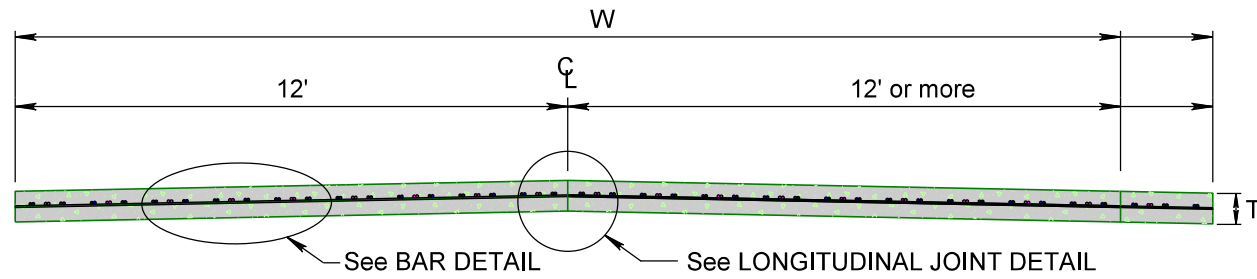
FILE - ... \CRC SMALL REPAIR.DGN

CRC PAVEMENT REPAIR - REINFORCING STEEL DETAILS

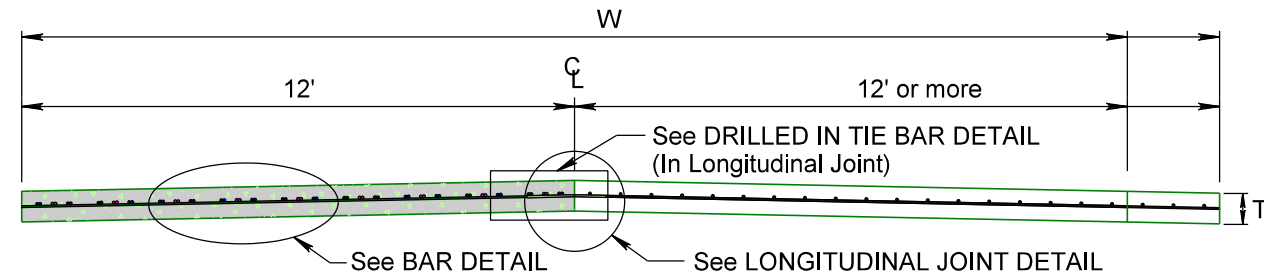
STATE OF SOUTH DAKOTA	PROJECT	SHEET	TOTAL SHEETS
	2018 Yankton Area PCC Repair	22	28

Plotting Date: 04/12/2018

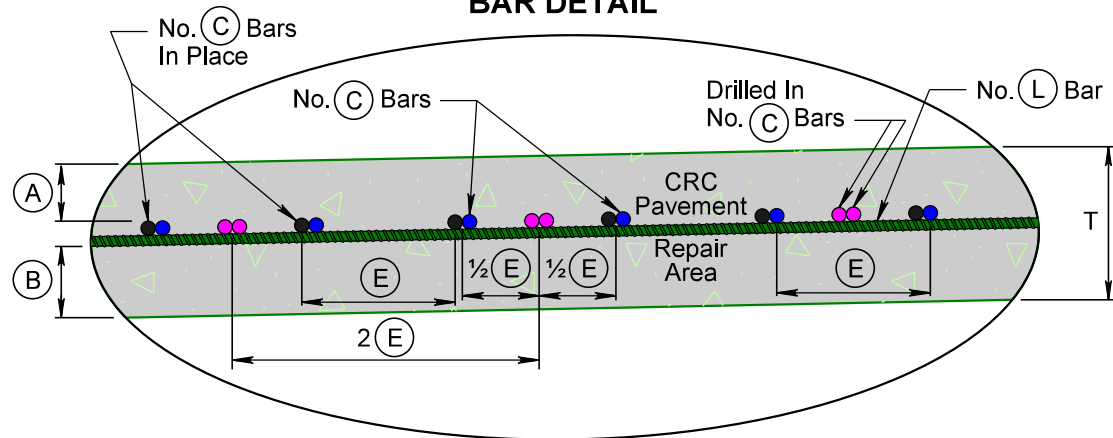
TRANSVERSE SECTION SHOWING STEEL PLACEMENT



TRANSVERSE SECTION SHOWING STEEL PLACEMENT



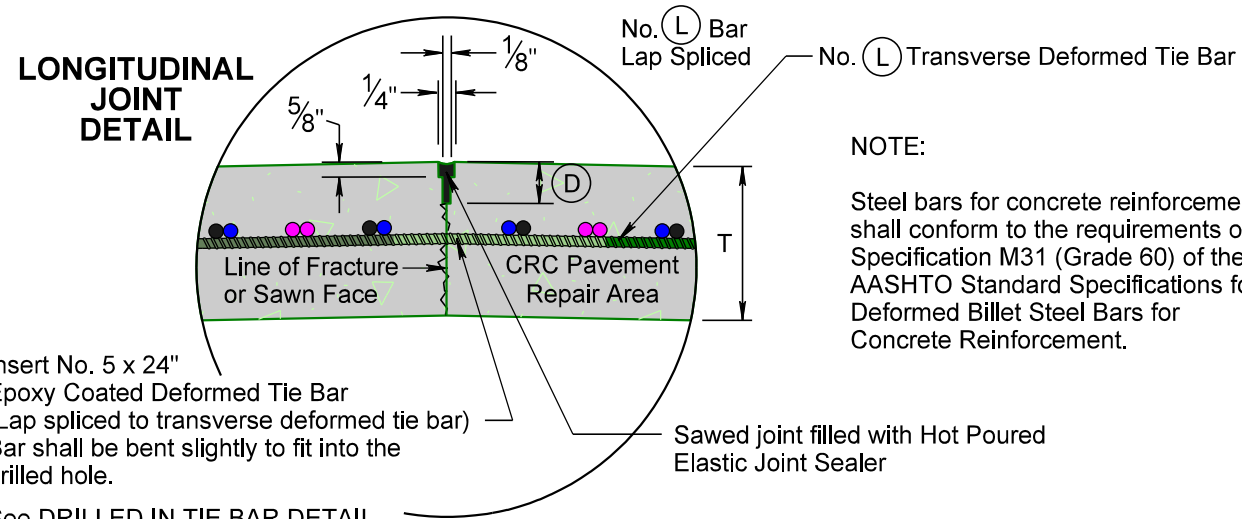
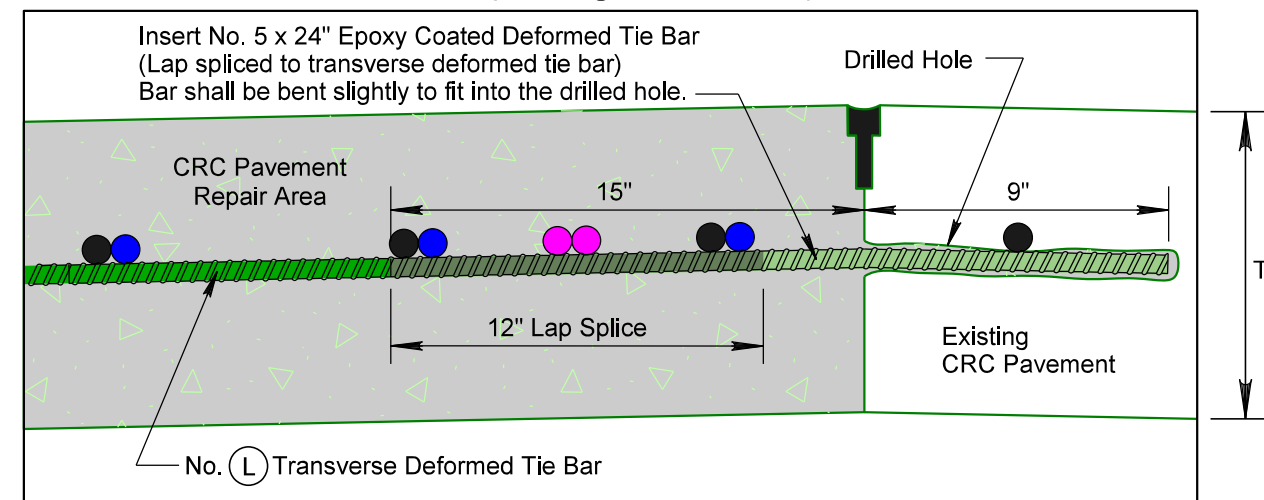
BAR DETAIL



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)



NOTE:

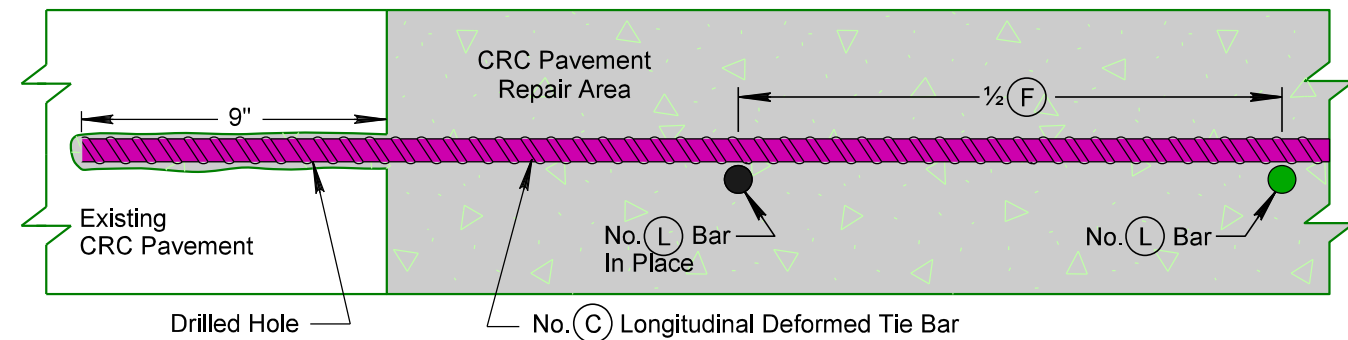
Steel bars for concrete reinforcement shall conform to the requirements of Specification M31 (Grade 60) of the AASHTO Standard Specifications for Deformed Billet Steel Bars for Concrete Reinforcement.

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.

Sawed joint filled with Hot Poured Elastic Joint Sealer

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 PCN	CRC Depth T	CRC Width W	Clearance		Longitudinal Steel		Saw Cut Depth D	Transverse Steel		Longitudinal Bar Count (full lane width repair)						Lap Splice Length (for Repair Length L)			Not Assigned	Perimeter Bar Spacing				Chair Width R
				Top A	Bottom B	Size C	Spacing E		Size L	Spacing F	12' Wide Slab			14' Wide Slab			L1	L2	L3		K	M	N	P	
											G	H1	H2	G	H1	H2									
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"

PLOT SCALE - 1/8"=33.3333

PLOTTED FROM - TRYPRINT48

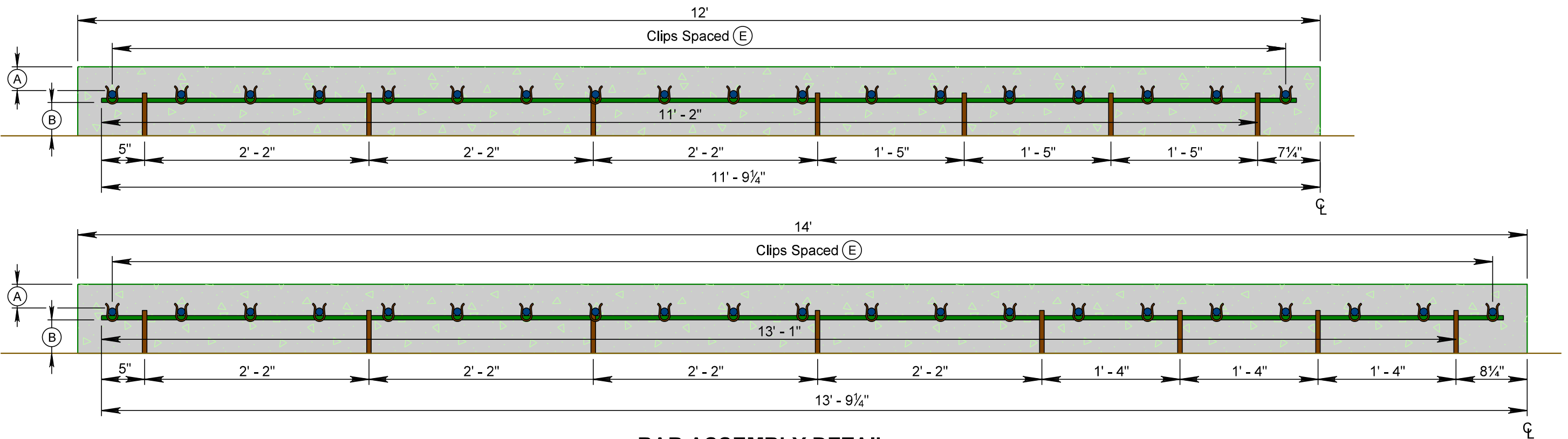
PLOT NAME - 11

FILE - ... \2018 CRC REPAIR\CRC BARS.DGN

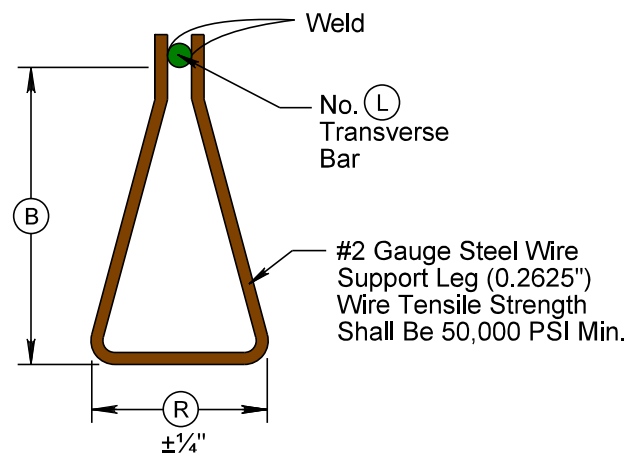
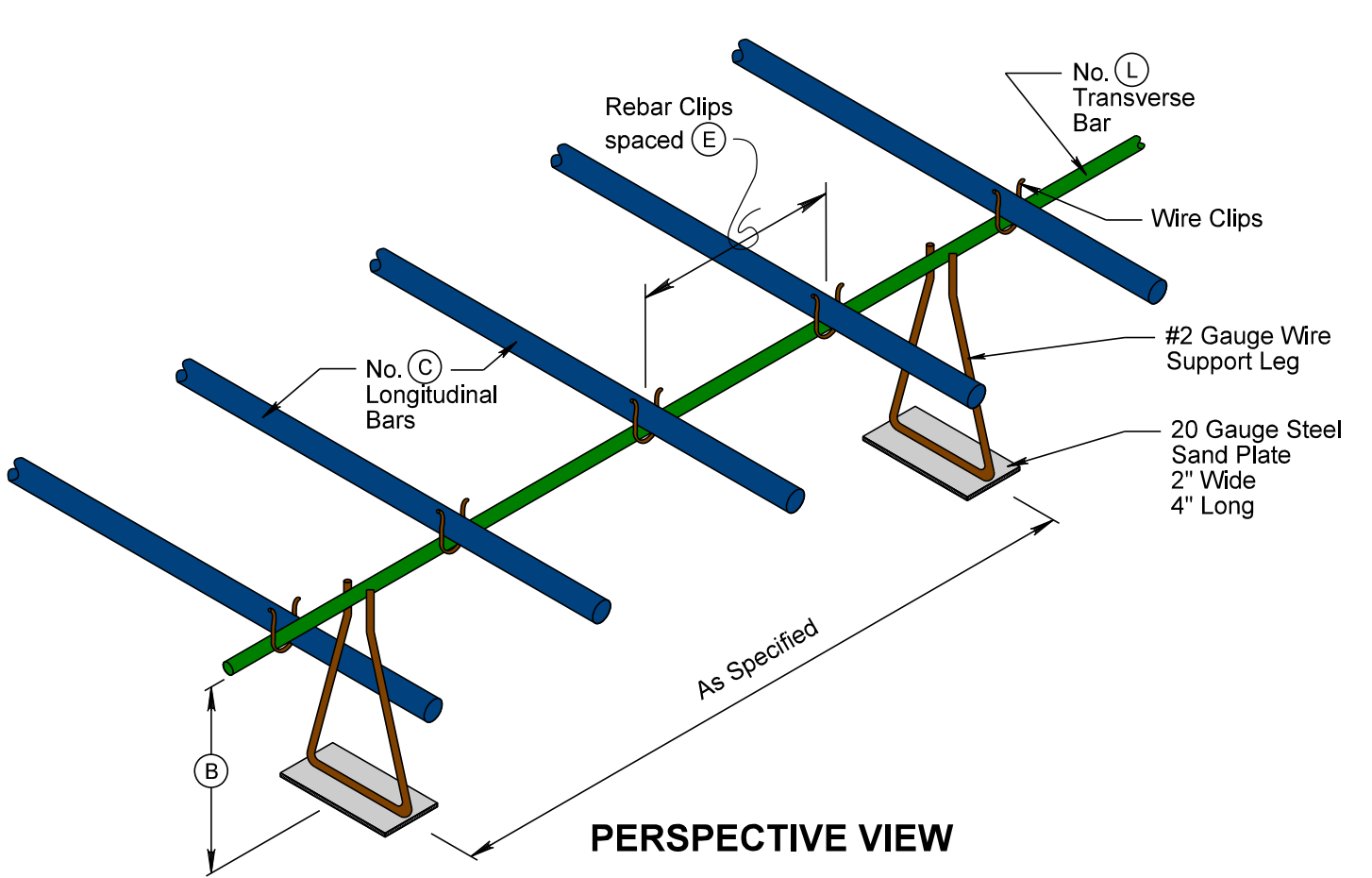
CRC PAVEMENT CHAIR DETAILS

STATE OF SOUTH DAKOTA	PROJECT	SHEET	TOTAL SHEETS
	2018 Yankton Area PCC Repair	23	28

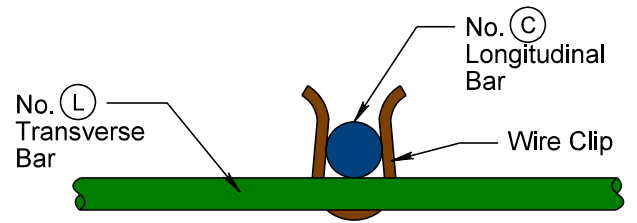
Plotting Date: 04/12/2018



BAR ASSEMBLY DETAIL



CHAIR DETAIL



CLIP DETAIL

DEFORMED TIE BAR DIMENSIONS KEY										
Underlying Plans	CRC Depth	CRC Width	Clearance		Longitudinal Steel		Saw Cut Depth	Transverse Steel		Chair Width
			Top	Bottom	Size	Spacing		Size	Spacing	
PCN	T	W	(A)	(B)	(C)	(E)	(D)	(L)	(F)	(R)
5886	10"	26'	3 1/2"	5 1/4"	6	6 1/2"	2 1/2"	4	48"	5"

PLOT SCALE - 1:1

PLOT NAME - 12

FILE - ... \CRC CHAIR DETAILS.DGN

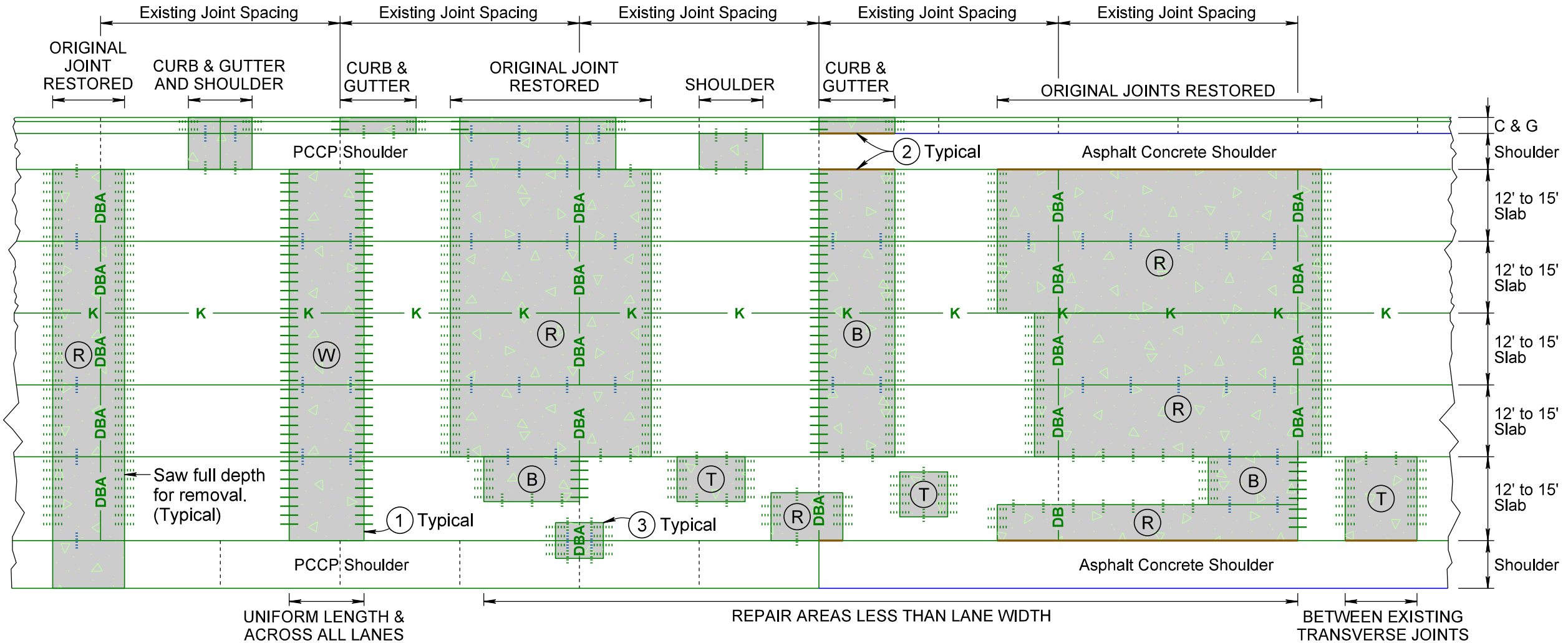
PLOTTED FROM - TRYPRINT48

NONREINFORCED PCC PAVEMENT REPAIR

STATE OF SOUTH DAKOTA	PROJECT	SHEET	TOTAL SHEETS
	2018 Yankton Area PCC Repair	24	28

Plotting Date: 04/12/2018

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 $1\frac{1}{2}" \times 18"$ 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 $1\frac{1}{4}" \times 18"$ 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 $1" \times 18"$ 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 - 13

FILE - ...VPATCH5.DGN

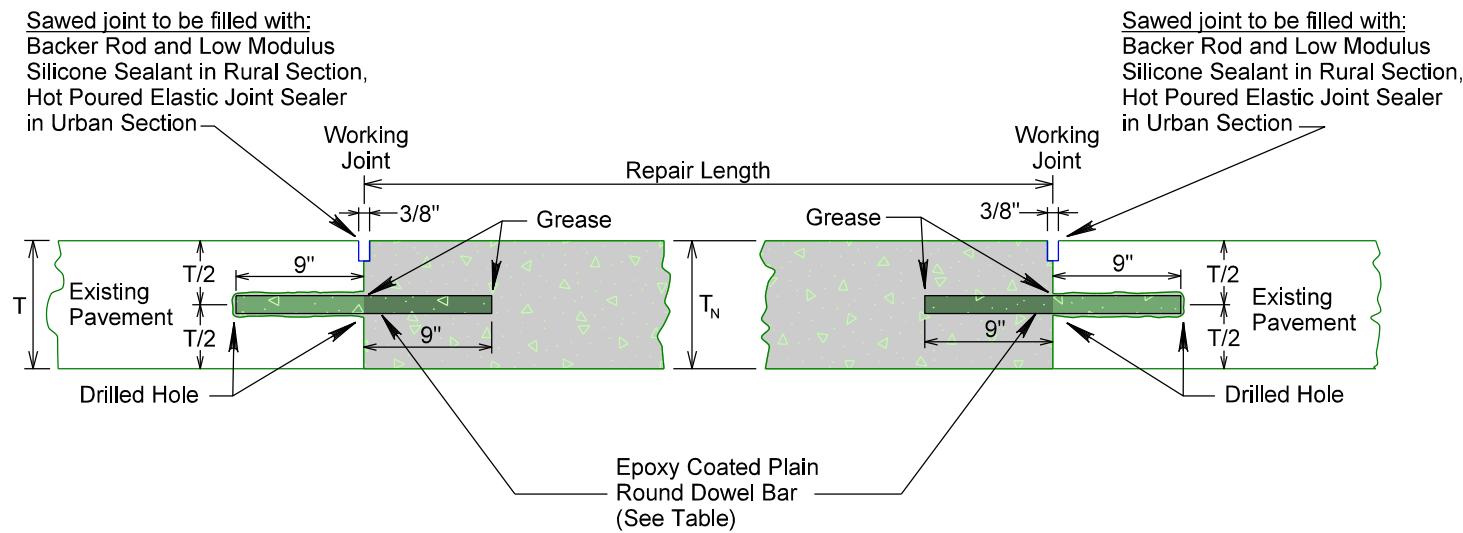
PLOTTED FROM - TRYPRINT48

NONREINFORCED PCC PAVEMENT REPAIR

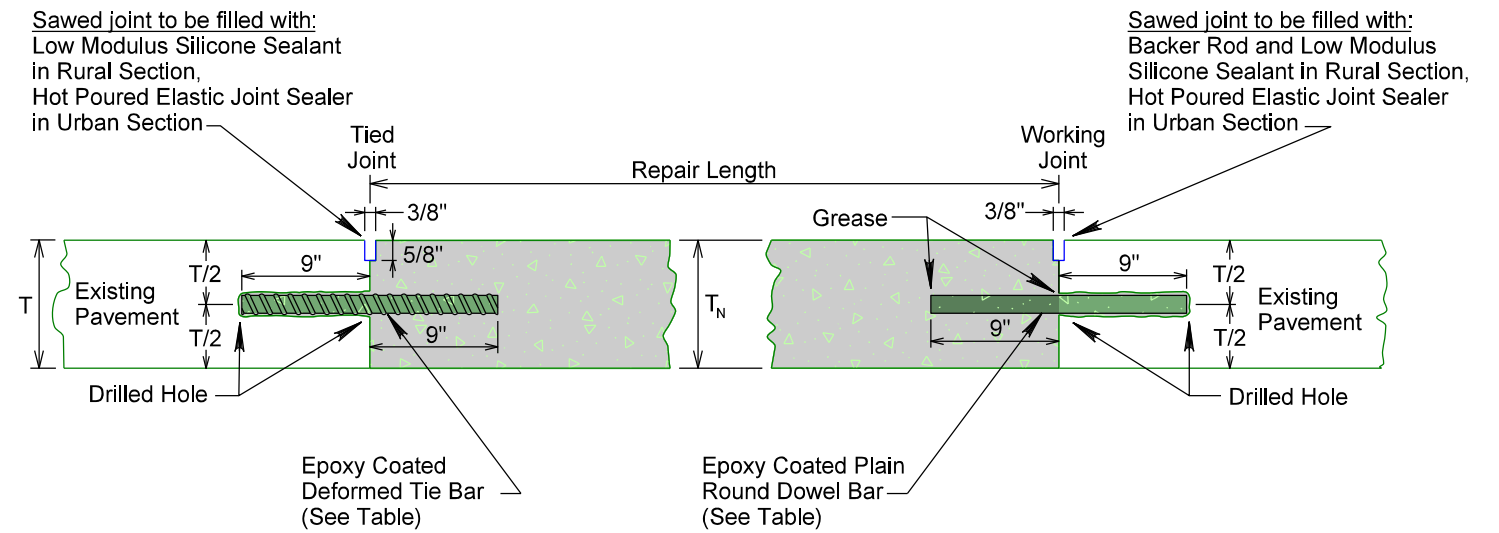
STATE OF SOUTH DAKOTA	PROJECT	SHEET	TOTAL SHEETS
	2018 Yankton Area PCC Repair	25	28

Plotting Date: 04/12/2018

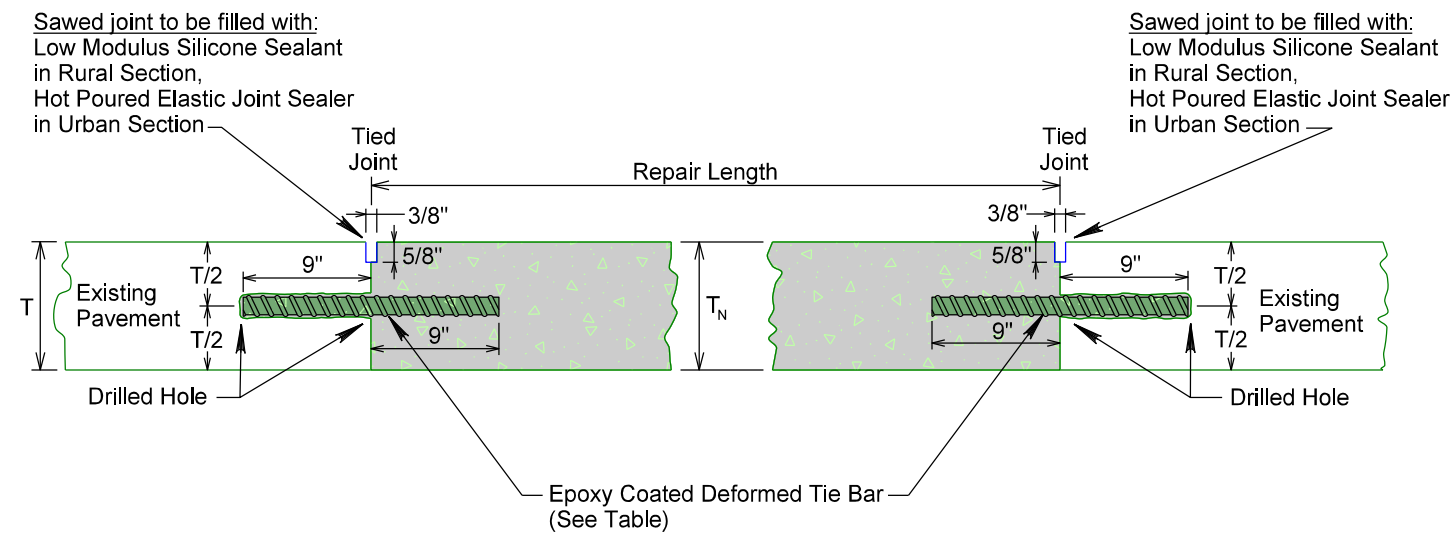
**PLAIN ROUND DOWEL BAR INSERTION
TYPE W - (TWO WORKING JOINTS)**



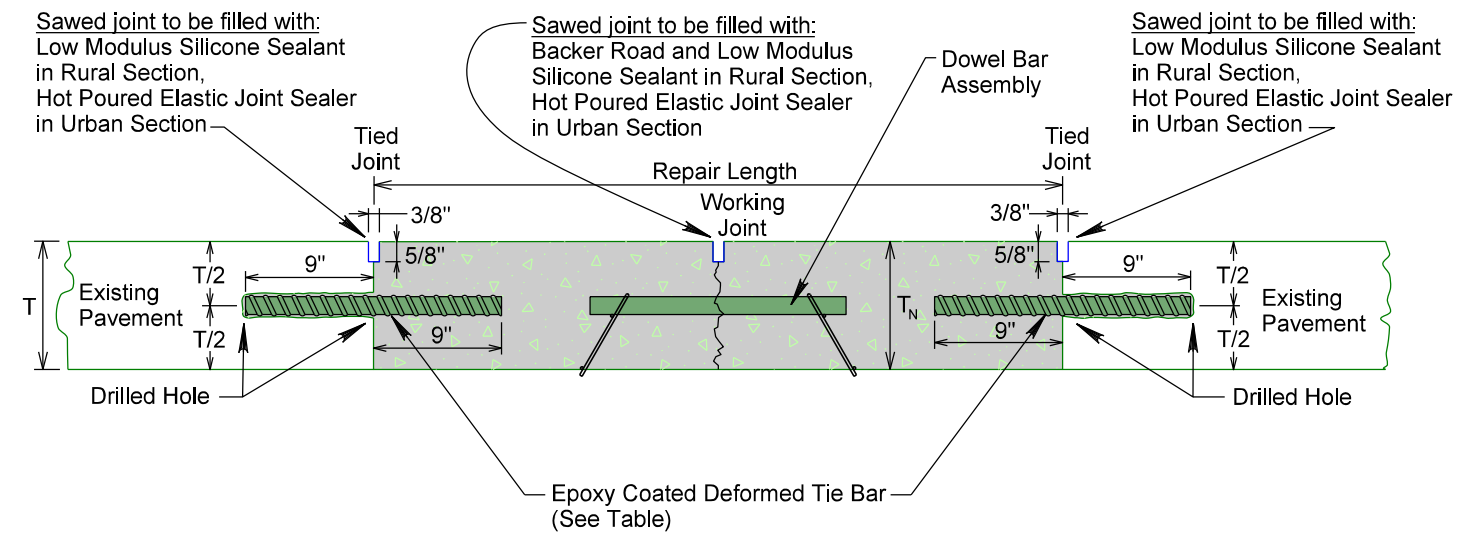
**DEFORMED TIE BAR AND PLAIN ROUND DOWEL BAR INSERTION
TYPE B - (ONE TIED JOINT AND ONE WORKING JOINT)**



**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)

PLOT SCALE - 1/4"=1'-0"

PLOTTED FROM - TRYAINT48

PLOT NAME - 14

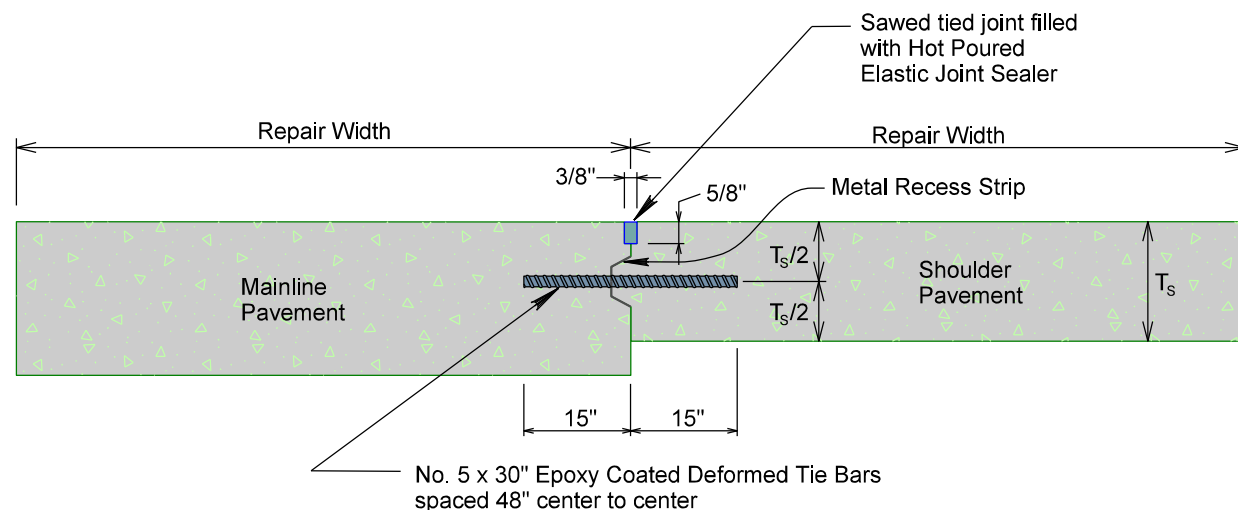
FILE - ... \BARS.DGN

NONREINFORCED PCC PAVEMENT REPAIR

STATE OF SOUTH DAKOTA	PROJECT	SHEET	TOTAL SHEETS
	2018 Yankton Area PCC Repair	26	28

Plotting Date: 04/12/2018

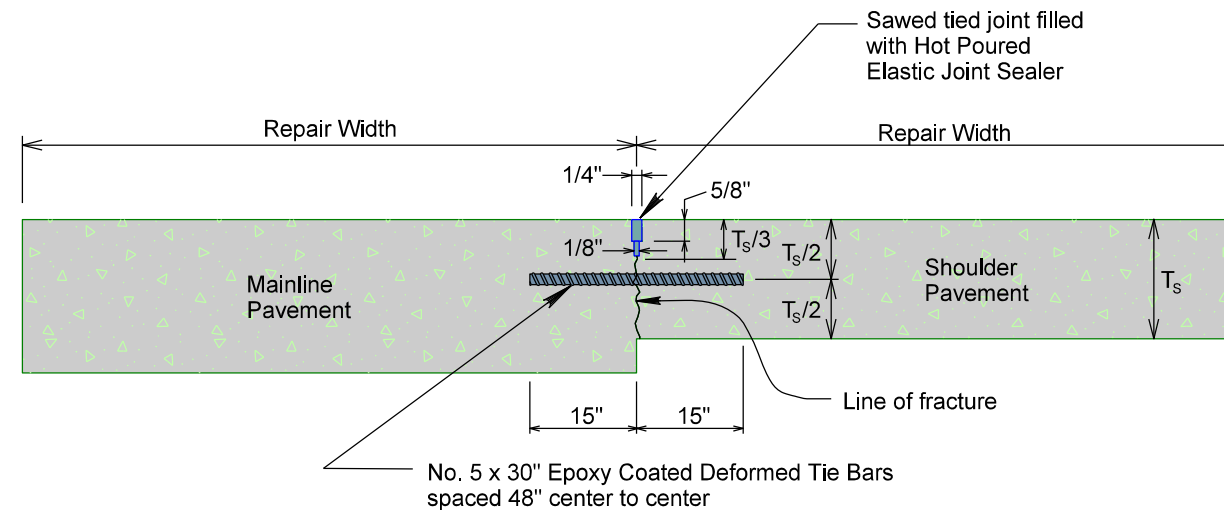
LONGITUDINAL SHOULDER CONSTRUCTION JOINT WITH TIE BARS & KEYWAY



T_s = New shoulder 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 SHOULDER JOINT

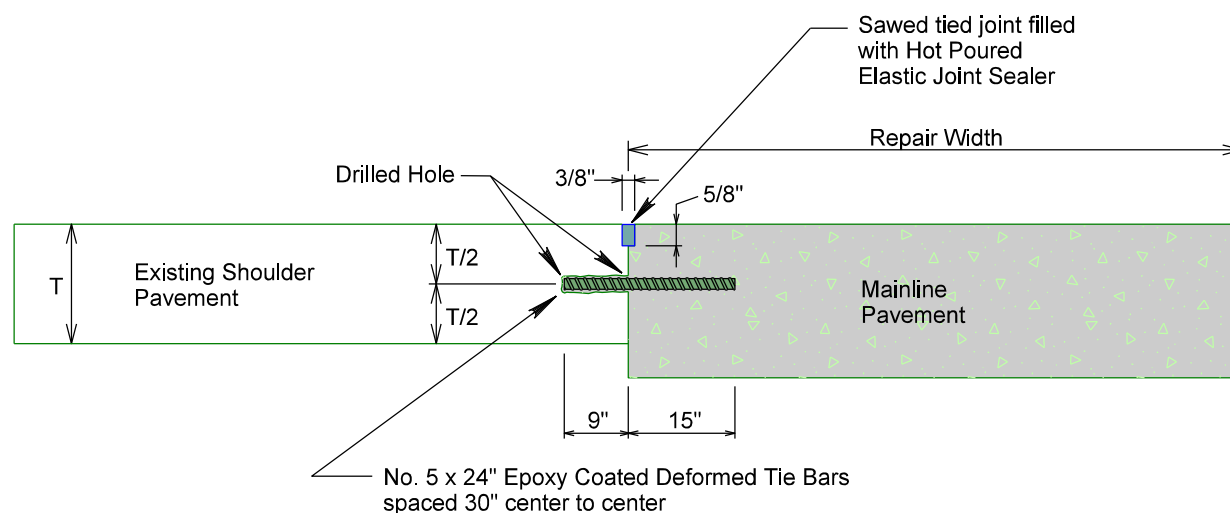


T_s = New shoulder pavement thickness.

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 SHOULDER JOINT WITH DRILLED IN TIE BARS



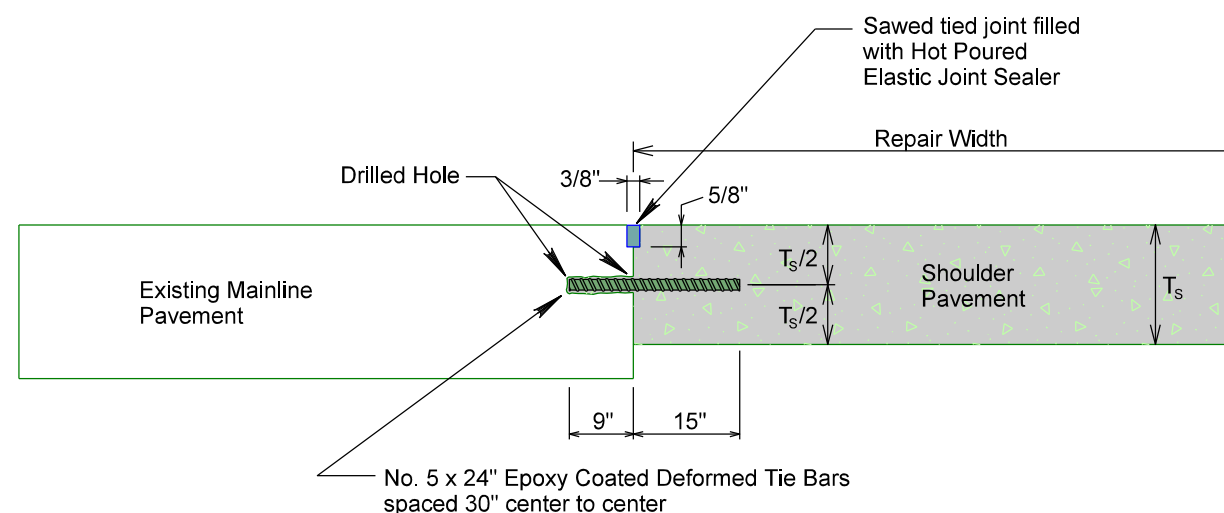
T = Existing shoulder pavement thickness.

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 SHOULDER JOINT WITH DRILLED IN TIE BARS



T_s = New shoulder 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.

PLOT SCALE - 1:11.25

PLOTTED FROM - TRYAINT48

PLOT NAME -

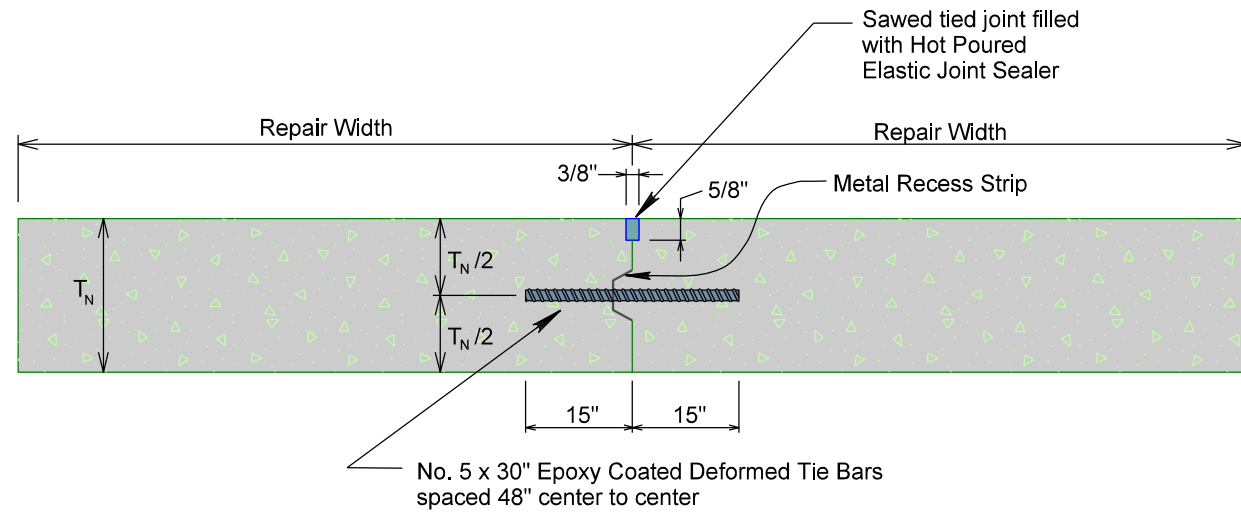
FILE - ... \BARS.DGN

NONREINFORCED PCC PAVEMENT REPAIR

STATE OF SOUTH DAKOTA	PROJECT	SHEET	TOTAL SHEETS
	2018 Yankton Area PCC Repair	27	28

Plotting Date: 04/20/2018

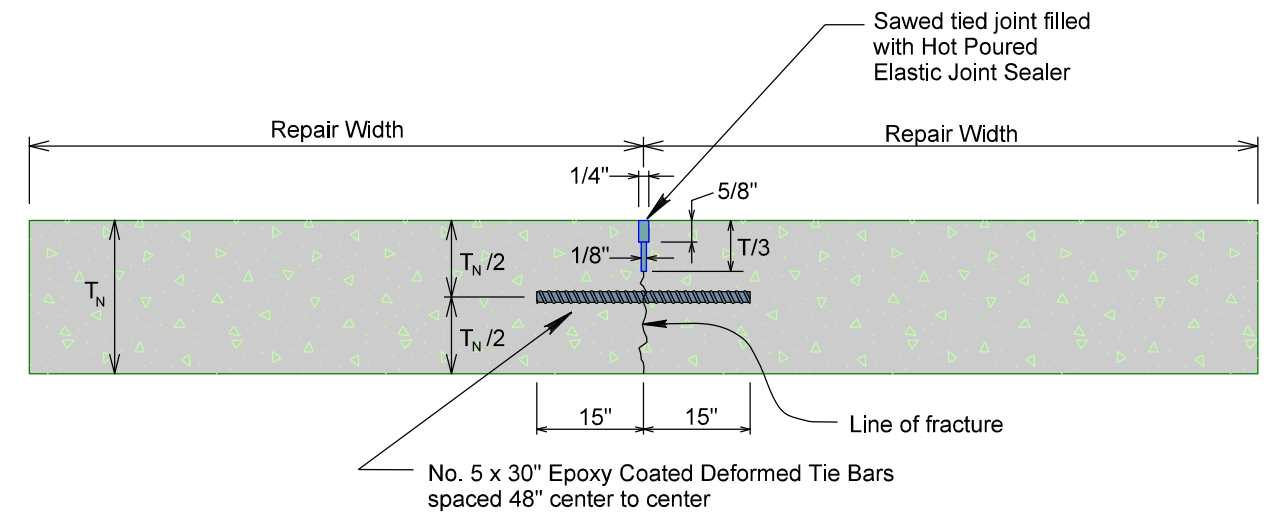
LONGITUDINAL CONSTRUCTION JOINT WITH TIE BARS & KEYWAY



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

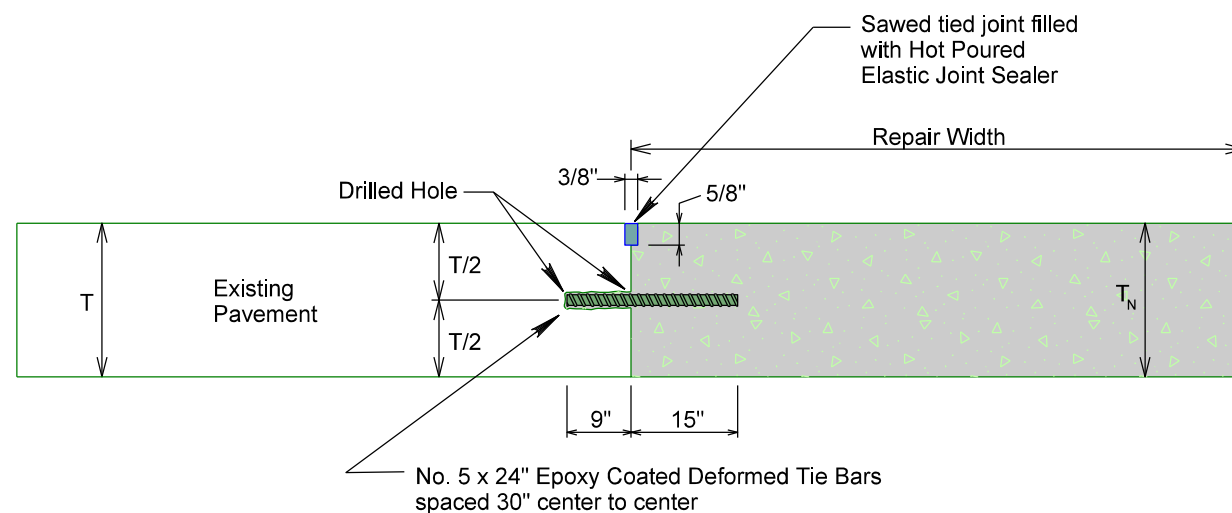


T_N = New pavement thickness.

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



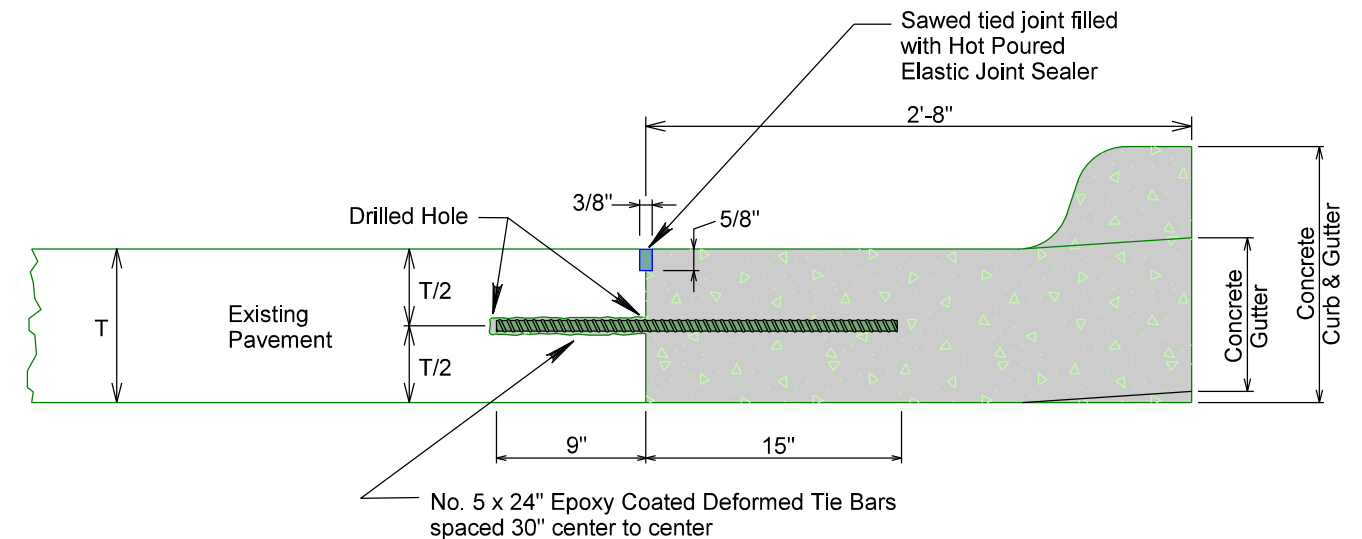
T = Existing pavement thickness.
 T_N = New pavement thickness.

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

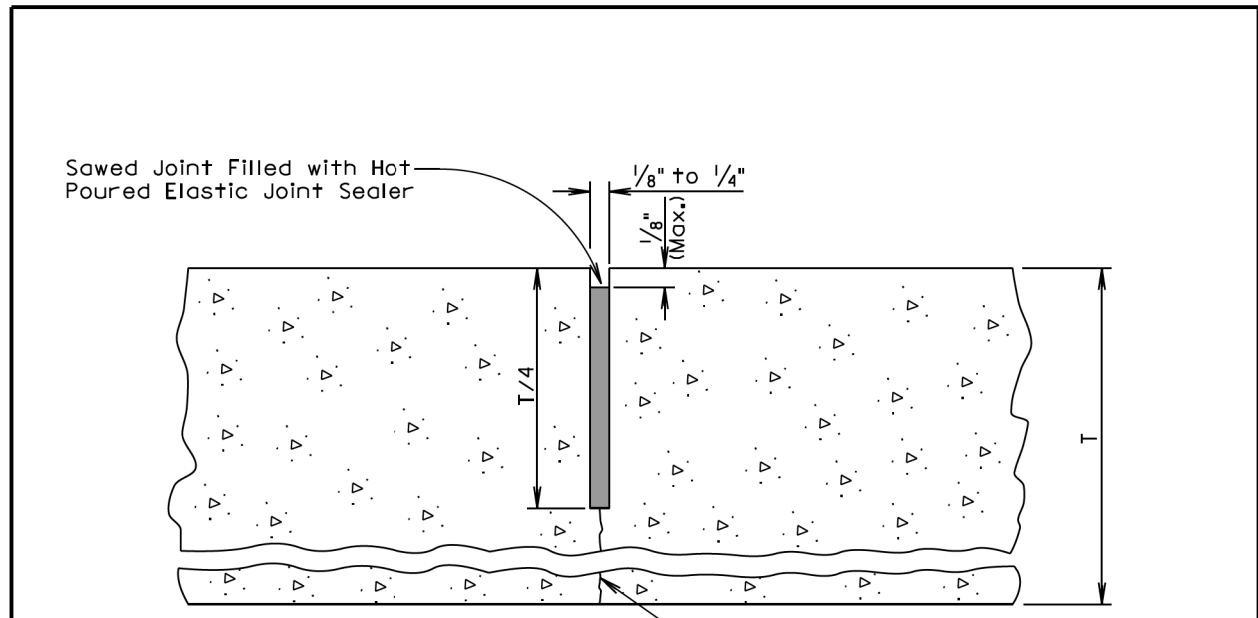


T = Existing pavement thickness.

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.



T = Pavement Thickness
Line of Fracture

GENERAL NOTES:

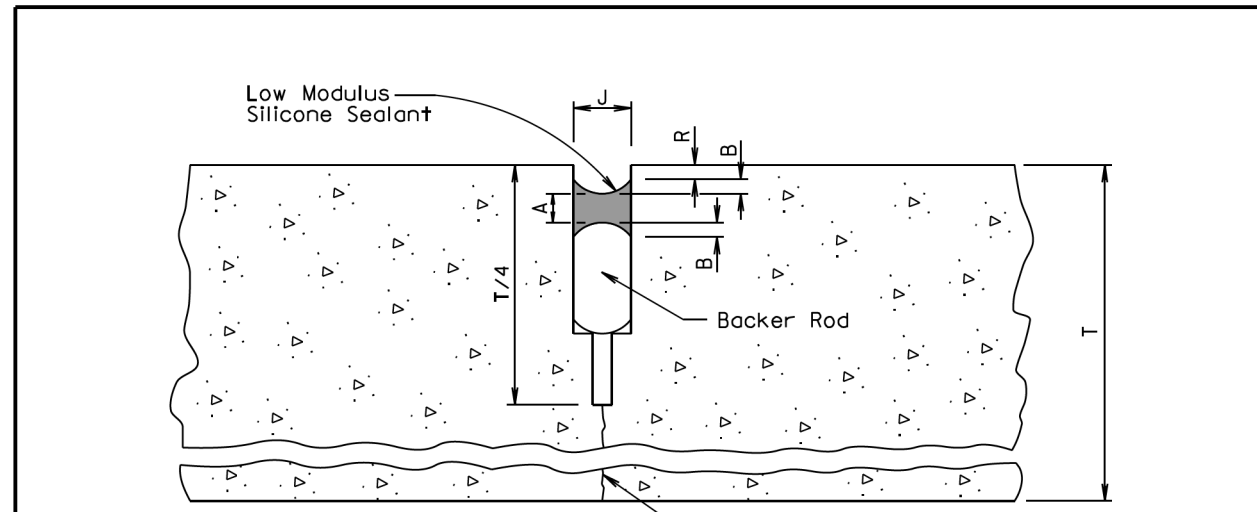
If an early entrance sawcut does not develop the full transverse crack, then the saw cut to control cracking shall be a minimum of 1/4 the thickness of the pavement.

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

S D D O T	PCC PAVEMENT TRANSVERSE CONTRACTION JOINT WITH OR WITHOUT DOWEL BAR ASSEMBLY	PLATE NUMBER 380.05
		Sheet 1 of 1

Published Date: 1st Qtr. 2018



T = Pavement Thickness
Line of Fracture

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

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

Published Date: 1st Qtr. 2018