

PLOT SCALE - 1:20000

PLOTTED FROM - TRWAINT22

STATE OF SOUTH DAKOTA  
DEPARTMENT OF TRANSPORTATION

PLANS FOR PROPOSED

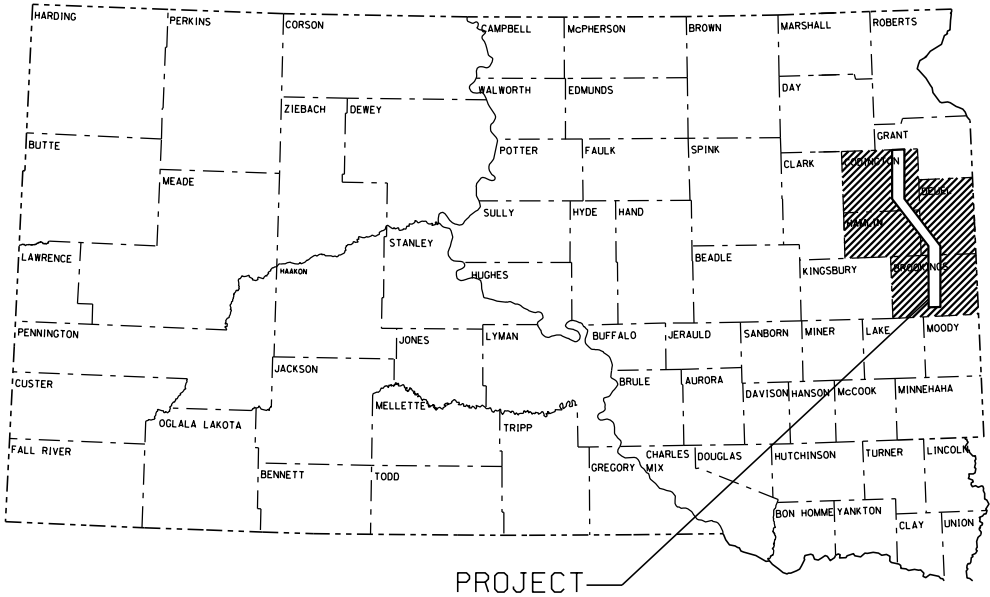
PROJECT  
029 S - 171  
INTERSTATE 29 SBL  
CODINGTON, HAMLIN,  
DEUEL & BROOKINGS COUNTIES

CONCRETE PAVEMENT REPAIR  
PCN 15NL

STATE OF SOUTH DAKOTA	PROJECT	SHEET NO.	TOTAL SHEETS
	029 S - 171	1	27
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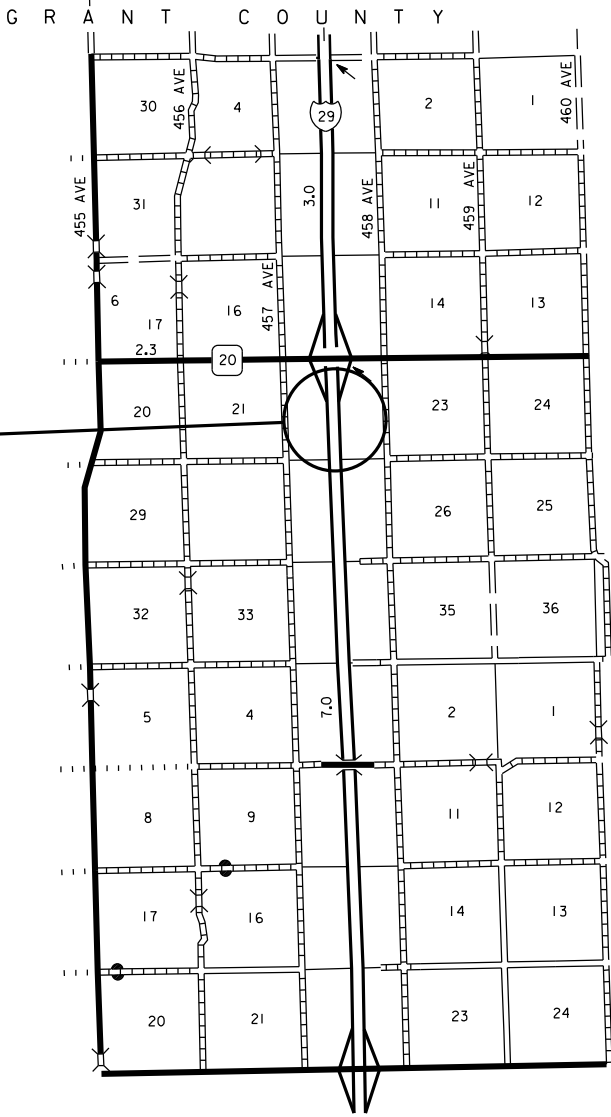
Sheet No. 1	Title Sheet
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PROJECT



REPAIR AREA  
MRM 192.402 SB

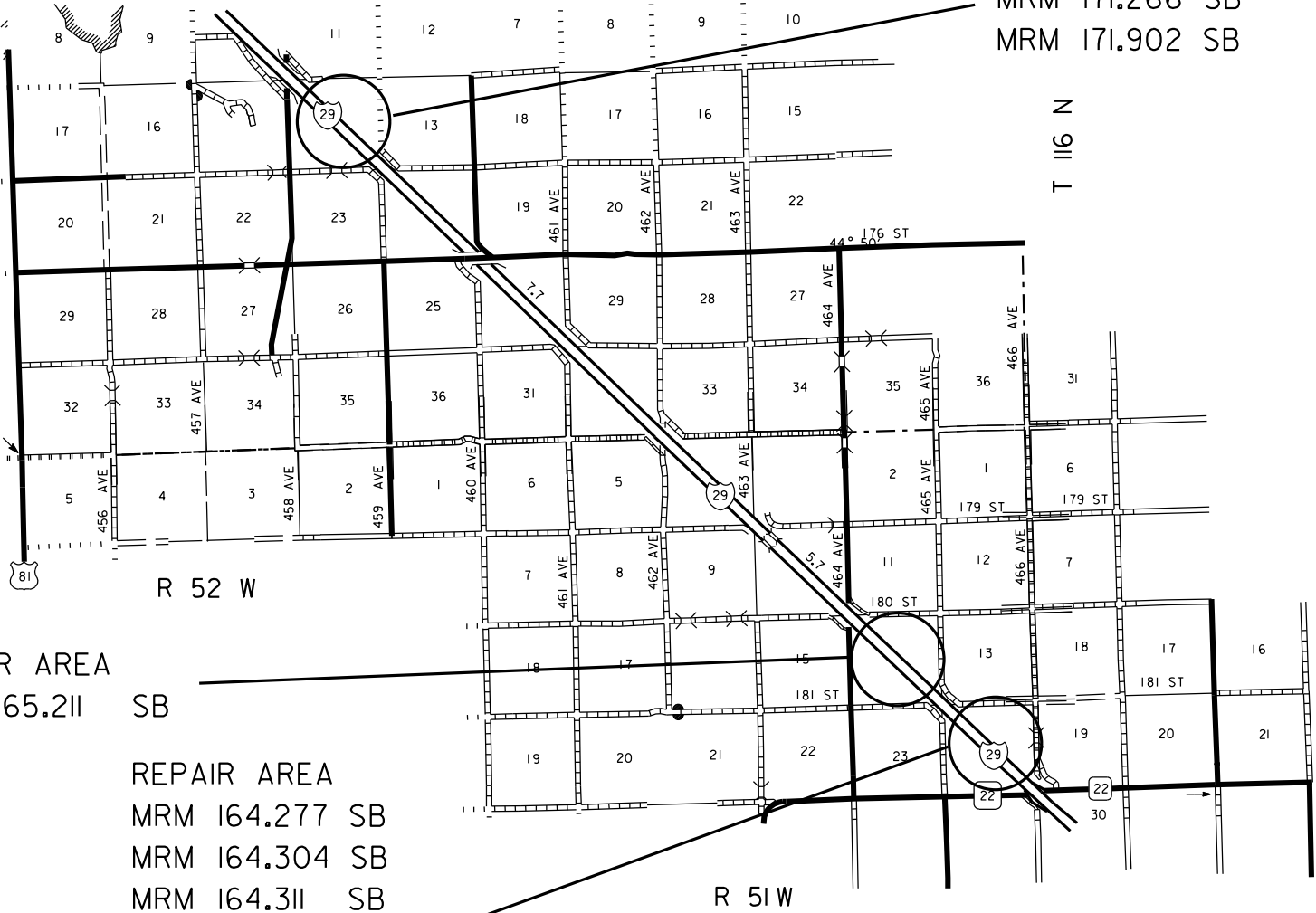


R 52 W

T 118 N

T 119 N

REPAIR AREA  
MRM 165.211 SB



REPAIR AREA  
MRM 164.277 SB  
MRM 164.304 SB  
MRM 164.311 SB  
MRM 164.336 SB  
MRM 164.344 SB  
MRM 164.347 SB  
MRM 164.351 SB  
MRM 164.795 SB

REPAIR AREA  
MRM 171.266 SB  
MRM 171.902 SB

T 115 N

T 116 N

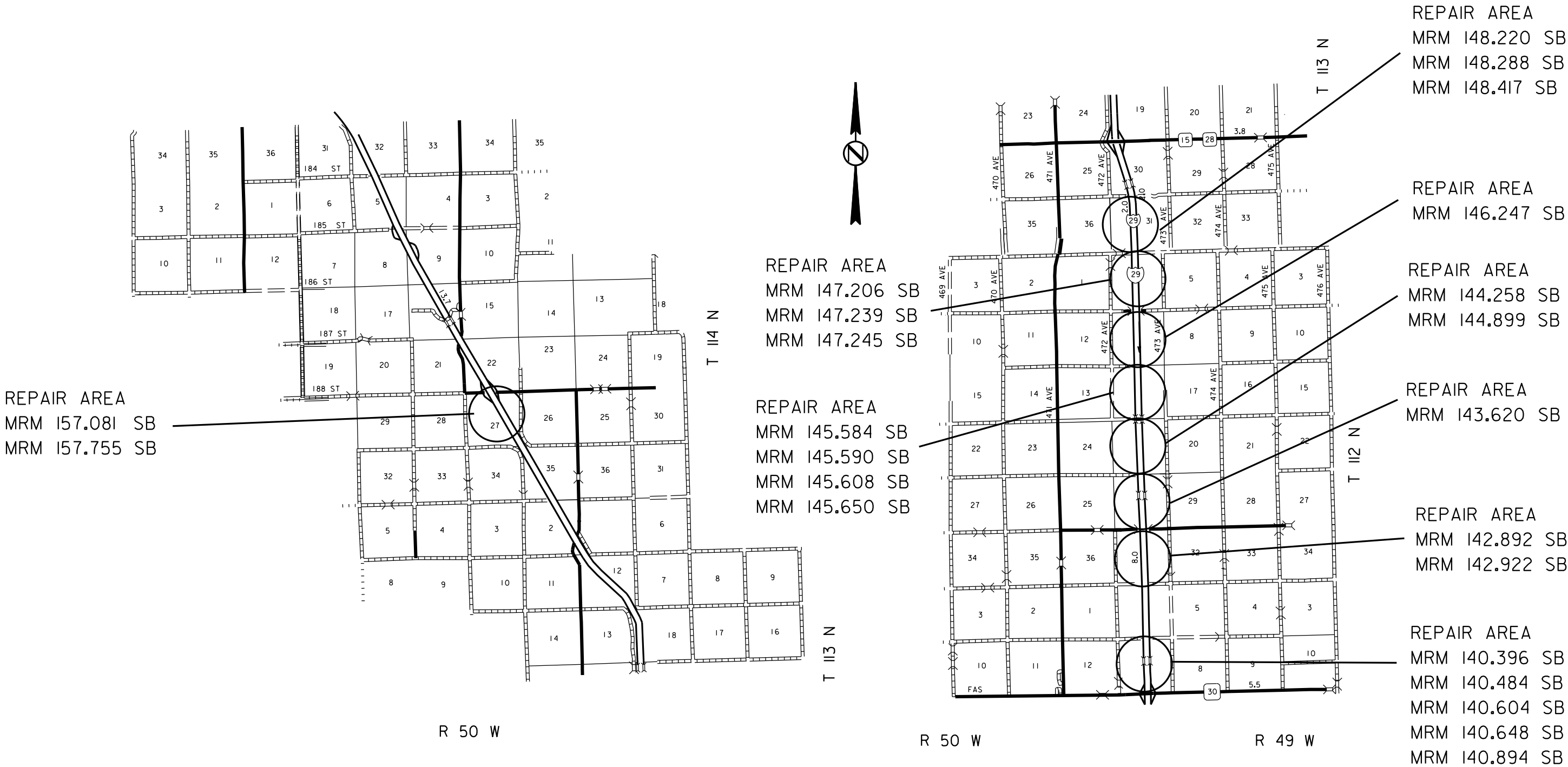
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PROJECT LAYOUT MAPS

029 S - 171  
PCN i5NL

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ESTIMATE OF QUANTITIES

PCN I5NL			
BID ITEM NUMBER	ITEM	QUANTITY	UNIT
009E0010	Mobilization	Lump Sum	LS
110E1100	Remove Concrete Pavement	284.3	SqYd
380E5030	Nonreinforced PCC Pavement Repair	43.3	SqYd
380E5100	Continuously Reinforced PCC Pavement Repair	241.0	SqYd
380E6000	Dowel Bar	24	Each
380E6110	Insert Steel Bar in PCC Pavement	300	Each
634E0010	Flagging	20	Hour
634E0110	Traffic Control Signs	754.0	SqFt
634E0120	Traffic Control, Miscellaneous	Lump Sum	LS
634E0420	Type C Advance Warning Arrow Board	3	Each
634E0640	Temporary Pavement Marking	3840	Ft
634E0275	Type 3 Barricade	9	Each
734E5010	Sweeping	20	Hour

SPECIFICATIONS

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

ENVIRONMENTAL COMMITMENTS

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

An agency with permitting authority can delay a project if identified environmental impacts have not been adequately addressed. Unless otherwise designated, the Contractor's primary contact regarding matters associated with these commitments will be the Project Engineer. These environmental commitments are not subject to change without prior written approval from the SDDOT Environmental Office.

Additional guidance on SDDOT's Environmental Commitments can be accessed through the Environmental Procedures Manual found at: <http://www.sddot.com/resources/Manuals/EnviroProcManual.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 B4: BALD EAGLE

Bald eagles are known to occur in this area.

Action Taken/Required:

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

COMMITMENT C: WATER SOURCE

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

The Contractor will not withdraw water directly from streams of the James, Big Sioux, and Vermillion watersheds without prior approval from the SDDOT Environmental Office.

Action Taken/Required:

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

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

COMMITMENT E: STORM WATER

Construction activities constitute less than 1 acre of disturbance.

Action Taken/Required:

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

COMMITMENT H: WASTE DISPOSAL SITE

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

Action Taken/Required:

Construction and/or demolition debris may not be disposed of within the Public ROW. The waste disposal site(s) will be managed and reclaimed in accordance with the following from the General Permit for Construction/Demolition Debris Disposal Under the South Dakota Waste

Management Program issued by the Department of Environment and Natural Resources.

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

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

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

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

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

COMMITMENT H: WASTE DISPOSAL SITE (Cont.)

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

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

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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.

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PCCP Repair Areas

INTERSTATE 29

MRM	Dimensions		PCCP Repair (sqyd)	PCCP Repair (sqyd)	Description	Bars				Dowel Bar ( EACH )	Depth of Concrete	
	L (ft)	W (ft)	Continuously Reinforced	Nonreinforced		#5	*#6	#9	#11		10"	10.5"
140.396	6	13		8.7	SBAC	6		8		8		10.5
140.484	6	13		8.7	SBAC	6		16				10.5
140.604	6	8	5.3		SBDL	6	14					10.5
140.648	6	8	5.3		SBDL	6	14					10.5
140.894	6	14	9.3		SBDL	6	26					10.5
142.892	4	14	6.2		SBDL	4	26					10.5
142.922	6	14	9.3		SBDL	6	26					10.5
143.620	8	14	12.4		SBDL	8	26					10.5
144.258	8	14	12.4		SBPL	8	26					10.5
144.899	4	14	6.2		SBDL	4	26					10.5
145.584	4	14	6.2		SBDL	4	26					10.5
145.590	4	14	6.2		SBDL	4	26					10.5
145.608	4	14	6.2		SBDL	4	26					10.5
145.650	4	14	6.2		SBDL	4	26					10.5
146.247	8	14	12.4		SBDL	8	26					10.5
147.206	5	8	4.4		SBDL	5	14					10.5
147.239	5	8	4.4		SBDL	5	14					10.5
147.245	5	8	4.4		SBDL	5	14					10.5
148.220	8	14	12.4		SBDL	8	26					10.5
148.288	8	14	12.4		SBDL	8	26					10.5
148.417	8	14	12.4		SBDL	8	26					10.5
157.081	8	14	12.4		SBDL	8	26				10	
157.755	8	14	12.4		SBDL	8	26				10	
164.277	4	4		1.8	SBAC	4		4		4	10	
164.304	4	4		1.8	SBAC	4		4		4	10	
164.311	4	4		1.8	SBAC	4		4		4	10	
164.336	4	13		5.8	SBAC	4		18			10	
164.344	4	4		1.8	SBAC	4		8			10	
164.347	4	4		1.8	SBAC	4		8			10	
164.351	4	4		1.8	SBAC	4		8			10	
164.795	10	14	15.6		SBDL	10	26				10	
165.211	8	14	12.4		SBDL	8	26				10	
171.266	8	14	12.4		SBDL	8	26				10	
171.902	14	14	21.8		SBDL	14	26				10	
192.402	21	4		9.3	SBDL	9			6	4		10.5
Total			241.0	43.3		216	590	78	6	24		

LEGEND: NB (North Bound), SB (South Bound)  
DL (Driving Lane), PL (Passing Lane)  
AC (Acceleration Lane), DC (Deceleration Lane)  
\*#6 bars are included for informational purposes only. #6 bars are not included in the bid item "Insert Steel Bar in PCC Pavement"  
Note: Number of steel bars is for information only. Actual quantity to be determined on construction.  
Quantity of steel bars shall be paid for at the contract unit price per each for  
INSERT STEEL BAR IN PCC PAVEMENT.

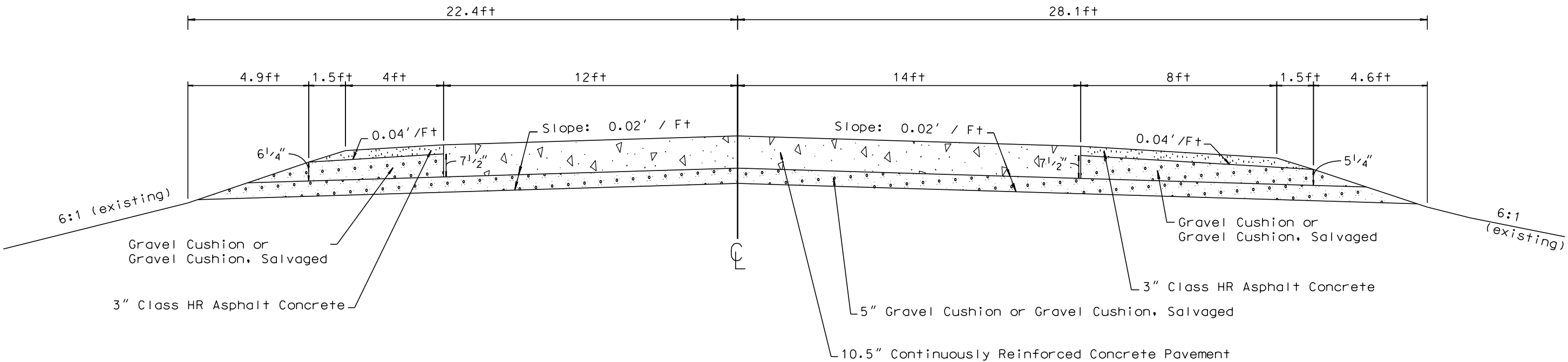
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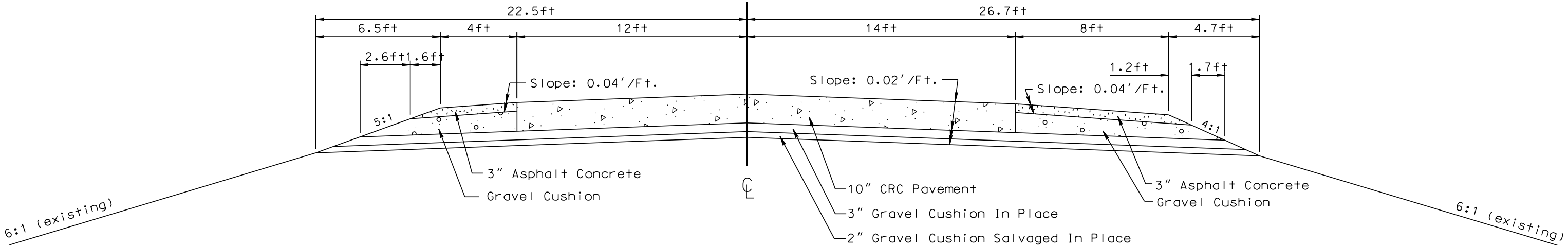
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Interstate 29  
MRM 139.8 to MRM 151.7  
South Bound Lane



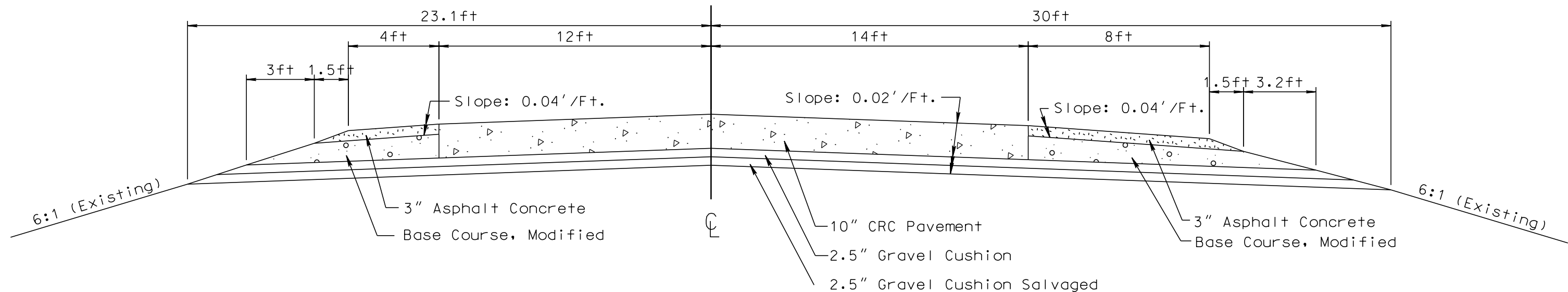
Interstate 29  
MRM 151.7 to MRM 165.3  
South Bound Lane



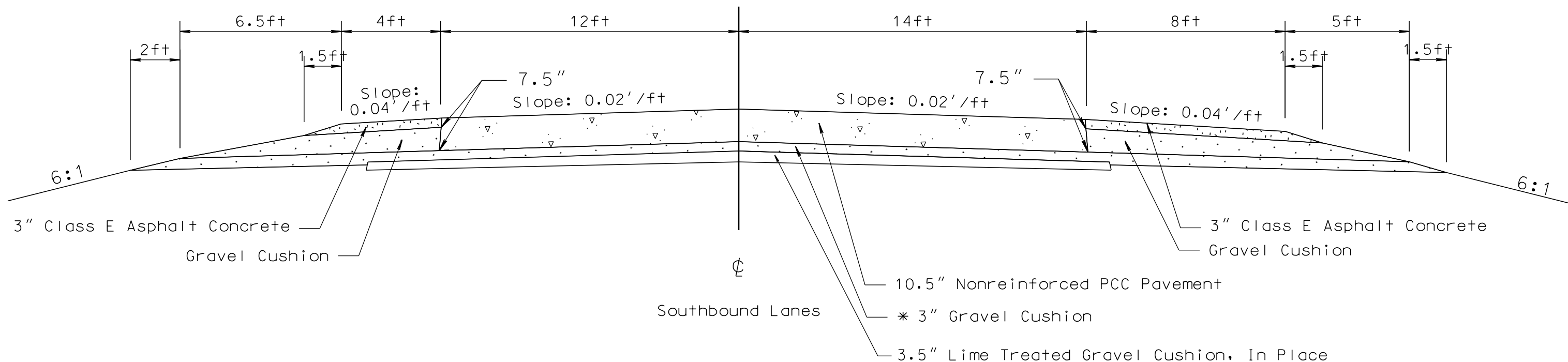
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# IN PLACE TYPICAL SECTIONS

Interstate 29  
MRM 165.3 to MRM 179.3  
South Bound Lane



Interstate 29  
MRM 179.3 to MRM 193.7  
South Bound Lane



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SCOPE OF WORK

Work on this project includes, but is not limited to, removal and replacement of concrete pavement.

MAINTENANCE OF TRAFFIC

The Contractor shall submit a traffic control and phasing plan for all repairs, a minimum of 1 week prior to the preconstruction meeting. The traffic control and phasing plan shall be approved by the Engineer prior to starting any work on the project.

The traffic control and phasing plan shall meet the following requirements:

- Open repairs will not be permitted overnight.
- Lanes may be reduced to one lane as per Standard Plate 634.63.
- Work Zones maybe up to 2 miles in length with a minimum of 2 miles between work zones.
- Traffic may not be placed on the asphalt shoulders.

The Contractor shall accommodate over-width vehicles through the work areas.

Locations of signs on traffic control layouts are diagrammatic. Portable stands may be used on the shoulders or on driving lanes closed to traffic if the duration is less than 3 days. If the duration is more than 3 days, the signs shall be mounted on fixed location, ground mounted, breakaway supports. The bottom of signs on portable or temporary supports shall not be less than seven feet above the pavement in urban areas and one foot above the pavement in rural areas.

A maximum of three traffic control closures shall be paid for. If more closures are utilized, additional cost of signing shall be at the Contractor's expense. No payment will be made for signs being reused at different repair areas.

Not more than four Type C Advanced Warning Arrow Boards will be measured and paid for.

The Contractor will be allowed to encroach on the traffic lane approximately 3 feet if FLAGGER signs and a flagger are used. The FLAGGER signs and flagging are included in the Estimate of Quantities.

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 routing of traffic onto these shoulders around the work zones.

Type 3 Barricades 8' wide shall protect PCC Pavement replacement during open excavation and concrete cure periods.

Open excavations at repair area locations shall not be allowed to be left open overnight. The Contractor shall complete the placement of PCCP on the same day as the existing PCCP is removed.

Maintenance of existing delineators shall be the Contractor's responsibility.

Work activities during non-daylight hours are subject to prior approval.

All costs associated with furnishing and installing interim white and/or yellow edge line for a lane closure and/or for tapers and stop bars shall be incidental to the contract unit price per foot for TEMPORARY PAVEMENT MARKING. Removal of interim white and/or yellow edge line for a lane closure shall also be incidental to the contract unit price per foot for TEMPORARY PAVEMENT MARKING.

The Contractor shall not park equipment on or alongside of the roadway within a 30 foot clear distance from the edge of the driving lane. The Contractor shall remove all equipment from the roadway during non-working hours.

The Contractor shall designate an employee to maintain traffic as described in Section 634.3 of the Specification. This person shall be required to do weekend checks to ensure traffic control devices are in satisfactory condition. The Contractor shall submit a weekly log stating time and date of all such inspections. The log shall be signed by the person doing the inspections. The cost of the traffic control person shall be incidental to the contract lump sum price for TRAFFIC CONTROL MISCELLANEOUS. The employee selected must be approved by the Engineer.

A night inspection of traffic control signing shall be done by the Contractor's designated employee after the signs are revised for each phase of construction. The Contractor shall submit additional log information for this inspection to the Engineer.

The Contractor shall designate a traffic control individual(s) to on call 24/7. This person(s) shall have experience as a Flagger and have experience in supervision of others. This person(s) shall be approved by the Engineer. This person shall work with the Engineer, monitor traffic flow, and have the authority to call in additional flagging personnel. This person may be one of the Flaggers actively working on the project.

The Contractor shall be responsible for maintaining all existing traffic control signing for the safety of the traveling public.

All traffic control devices used on this project shall be new or in like-new condition, as approved by the Engineer.

Channelizing Devices, Drums and/or Type 2 Barricades shall be maintained to a minimum height of 3' above the surface which is being used to maintain traffic.

All temporary speed limit signs will have a minimum mounting height of 5 feet in rural locations, even when mounted on portable supports. Portable sign supports will not be located on sidewalks, bicycle facilities, or other areas designated for pedestrian or bicycle traffic.

A Type 3 Barricade will be installed at the end of a lane closure taper as detailed in these plans. Additional Type 3 Barricades will be installed facing traffic within the closed lane at a spacing of ¼ mile.

Channelizing devices shall be placed on the shoulder of the roadway to reduce traffic from driving on the asphalt shoulders. Devices shall be installed as directed by the Engineer.

Construction vehicles will exit or enter the construction work zone at locations identified by the Engineer. At no time will construction vehicles utilize the maintenance crossovers or the Interstate median to exit or enter Interstate traffic.

The Department is required to obtain a speed reduction resolution prior to the installation of any SPEED LIMIT (R2-1) signs shown on standard plate 634.63 or as shown in the plans. To provide adequate time for the resolution to be enacted, the Contractor will inform the Engineer a minimum of 3 weeks prior to the scheduled installation of any work zone speed reduction signs on the project. The information provided by the Contractor will include the anticipated date of sign installation, the newly reduced speed limit, the location of the work zone, and the anticipated completion date of work requiring the speed reduction.

TEMPORARY PAVEMENT MARKING

If inappropriate or conflicting pavement markings exist, the markings will be removed and replaced with applicable temporary pavement markings when the work duration is more than 3 days. When the work duration is less than 3 days, the channelizing devices in the area where the pavement markings conflict will be placed at one-half of the normal channelizing device spacing. Temporary pavement marking will be paid for at the contract unit price per foot for "Temporary Pavement Marking". The additional channelizing devices will be incidental to the contract lump sum price for "Traffic Control, Miscellaneous".

SHEETING FOR TRAFFIC CONTROL SIGNS

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

REMOVE CONCRETE PAVEMENT

Approximate locations of existing continuously reinforced concrete pavement to be removed are provided in the Table of PCCP Repair Areas. Prior to the removal of continuously reinforced concrete pavement, the Contractor shall saw cut full depth at a distance of 22 inches inside the ends of the removal areas as directed by the Engineer. At the ends of the removal areas a partial depth saw cut (2 inch) shall be made in order to preserve a minimum of 22 inches of the longitudinal reinforcing steel for lap splices. During Concrete breakout, care shall be taken not to damage the reinforcing steel to be reused. Concrete shall be chipped out to expose existing reinforcing steel.

The Contractor shall notify the Engineer two working days prior to beginning work at each location so the Engineer may mark out removal limits. The Engineer shall mark exact dimensions prior to removal of concrete pavement. Payment will be made for quantity marked out and measured in the field. Variations from plans estimated quantities and/or locations will not be considered cause for re-negotiation of the contract unit prices.



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REMOVE CONCRETE PAVEMENT CONTINUED

Care shall be exercised in the removal of concrete slab panels to avoid damage to adjacent pavement, manholes and growth joints. Damage to adjacent pavement, manholes and/or growth joints shall be repaired to the satisfaction of the Engineer at the Contractor's expense.

After concrete removal has been accomplished, the Contractor shall shape, water and recompact the remaining granular material prior to placement of concrete. Payment for this work shall be incidental to the contract unit price per square yard for REMOVE CONCRETE PAVEMENT. Any additional gravel cushion required to prepare the area shall be furnished and placed by the

Contractor and shall be incidental to the contract unit price per square yard for REMOVE CONCRETE PAVEMENT.

Gravel cushion material shall be from a Contractor furnished source. Water content and compaction shall be to the satisfaction of the Engineer.

Removal of Concrete Pavement will be incidental to the contract unit bid price per square yard for REMOVE CONCRETE PAVEMENT. This payment will be full compensation for full depth sawing, concrete breakout and removal of all PCC Pavement, disposal of all removed material, restoration of gravel cushion, and all equipment, labor, and incidentals necessary to satisfactorily complete work.

All removed concrete shall be removed from the right of way by the end of the workday and disposed of at the Contractor's waste disposal site.

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.

PCC PAVEMENT REPAIR - GENERAL

New pavement thickness shall equal existing pavement thickness.

Locations and size (length and 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 the actual area replaced.

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 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 repair 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 gravel and 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 ¼" preformed asphalt expansion joint material along the longitudinal joint from the existing working joint to the new working joint. The expansion 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.

The fine aggregate will 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 will contain 4.5% to 7.0% entrained air. The concrete will contain a minimum of 50% coarse aggregate by weight. Coarse aggregate will 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 will 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 will be 4,000 psi. The Contractor is responsible for the mix design used. The Contractor will 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 pigment 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 degrees F or higher throughout the cure period. If the concrete temperature falls below 60 degrees 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' 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 manufacture. Insulation blanket shall be left in place, except for joint sawing operations, until the 3,500 psi is attained. Insulation blanket shall be overlapped onto 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 gravel and 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.

Locations and size (length and 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 the actual area replaced.

The Engineer will mark the location of the areas 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 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 remaining concrete at each end of the repair area, leaving 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.

PLOT SCALE - 1:20000

PLOTTED FROM - TRWAINT22

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

Care shall be taken not to cut, bend or otherwise damage the in place reinforcing steel. Damage to the 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 degrees F and 90 degrees F. The temperature of the concrete shall be maintained above 40 degrees F during the curing period.

Concrete shall meet the requirements stated in Section 380 of the Specifications.

The fine aggregate will 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 will contain 4.5% to 7.0% entrained air. The concrete will contain a minimum of 50% coarse aggregate by weight. Coarse aggregate will 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 will 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 will be 4,000 psi. The Contractor is responsible for the mix design used. The Contractor will 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 pigment 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 degrees F or higher throughout the cure period. If the concrete temperature falls below 60 degrees 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' 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 manufacture. Insulation blanket shall be left in place, except for joint sawing operations, until the 3,500 psi is attained. Insulation blanket shall be overlapped onto 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 furnishing and placing concrete, sawing and sealing joints, repairing gravel and asphalt concrete shoulders, labor, tools 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 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 with of the repair area. Transverse deformed bars shall be lap spliced with deformed tie bars which are inserted 9" 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.

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 degrees 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 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 Hot Poured Elastic Joint Sealer

Acceptance of the Hot Poured Elastic Joint Sealer will be based on visual inspection by the Engineer.

Cost for sawing and sealing longitudinal construction joints shall be incidental to the contract unit price per square yard for CONTINOULSY REINFORCED PCC PAVEMENT REPAIR.

PLOT NAME - 1

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PLOT SCALE - 1:20000

PLOTTED FROM - TRWAINT22

PLOT NAME - 1

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STATE OF SOUTH DAKOTA	PROJECT	SHEET NO.	TOTAL SHEETS
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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 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 as per Section 380. C.1.

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 as per Section 380. C.1.

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 as per Section 380. C.1.

Steel Bars shall be inserted in the transverse joint of 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 shall be sealed with Low Modulus Silicone Joint Sealant

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

Cost for sawing and sealing longitudinal construction joints shall be incidental to the contract unit price per square yard for NONREINFORCED PCC PAVEMENT REPAIR.

ASPHALT CONCRETE SHOULDERS

To allow for form placement at locations where full depth repairs are adjacent to asphalt concrete shoulders, the Contractor shall saw cut full depth existing asphalt concrete shoulder. The saw cut shall be parallel to and no more than one foot from existing pavement edge. All costs incurred in performing the above-mentioned work, and for equipment, labor, and incidentals necessary to complete work shall be incidental to the contract unit price per square yard for REMOVE CONCRETE PAVEMENT.

Upon completion of pavement repair, the Contractor shall re-establish the asphalt concrete shoulder. Asphalt Concrete Composite shall be placed at a depth that matches that of the existing asphalt concrete shoulder. All costs for furnishing and installing granular material, for Asphalt Concrete Composite, and for all equipment, labor, and incidentals necessary to complete work shall be incidental to the contract unit price per square yard for REMOVE CONCRETE PAVEMENT.

ASPHALT CONCRETE COMPOSITE

The asphalt binder used in the mixture shall be PG 58-34, 64-22, or 64-28 asphalt Binder.

All other requirements in the specifications for Asphalt Concrete Composite shall apply except Asphalt for Flush Seal will NOT be required.

STREET SWEEPING

Vehicle tracking of sediment from the construction site will be minimized. Street sweeping will be used if erosion and sediment control best management practices are not adequate to prevent sediment from being tracked onto the street.

The Contractor will use a pickup broom having integral self-contained storage to clean the roadway. The pickup broom used will be a minimum of 6 feet wide and have working gutter brooms.

At a minimum, sweeping will be required:  
1.Prior to opening any segment or roadway to traffic.  
2.When sawing operations are underway in the inside driving lanes, the outside driving lanes and gutter may need to be swept to control dust.

All costs for cleaning the roadway with a pickup broom will be incidental to the contract unit price per hour for SWEEPING.

ITEMIZED LIST FOR TRAFFIC CONTROL SIGNS  
PCN i5NL

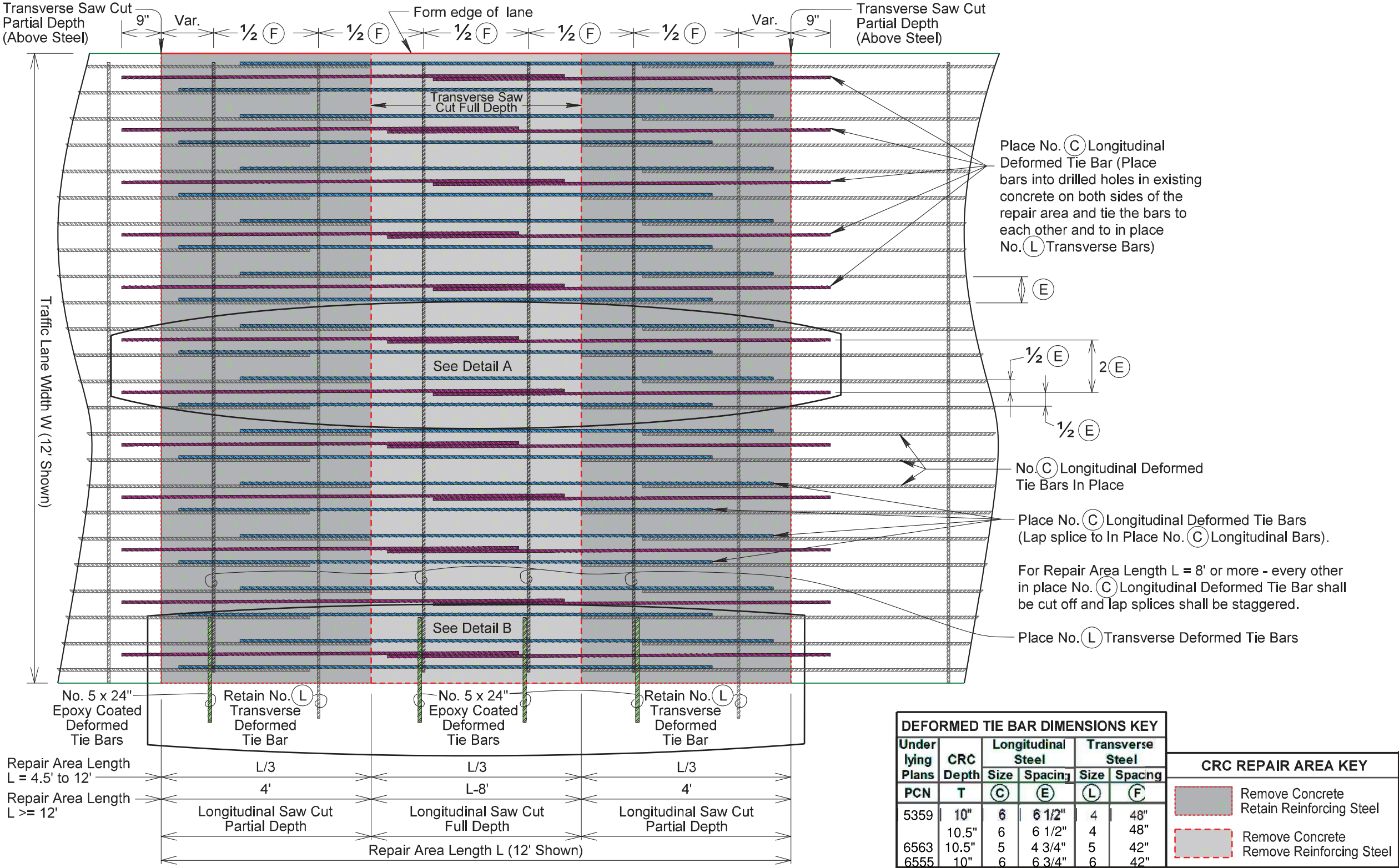
SIGN CODE	SIGN DESCRIPTION	EXPRESSWAY / INTERSTATE			
		NUMBER	SIGN SIZE	SQFT PER SIGN	SQFT
R2-1	SPEED LIMIT 65	9	36" x 48"	12.0	108.0
R2-1	SPEED LIMIT 80	3	36" x 48"	12.0	36.0
R2-1	SPEED LIMIT 45	6	36" x 48"	12.0	72.0
R2-6aP	FINES DOUBLE (plaque)	3	36" x 24"	6.0	18.0
W3-5	SPEED REDUCTION AHEAD (45 MPH)	3	48" x 48"	16.0	48.0
W3-5	SPEED REDUCTION AHEAD (65 MPH)	6	48" x 48"	16.0	96.0
W4-2	LEFT or RIGHT LANE ENDS (symbol)	6	48" x 48"	16.0	96.0
W20-1	ROAD WORK AHEAD	6	48" x 48"	16.0	96.0
W20-5	LEFT or RIGHT LANE CLOSED AHEAD	6	48" x 48"	16.0	96.0
W20-7	FLAGGER (symbol)	3	48" x 48"	16.0	48.0
G20-2	END ROAD WORK	3	48" x 24"	8.0	24.0
		EXPRESSWAY / INTERSTATE TRAFFIC CONTROL SIGNS SQFT			
		754.0			

PLOT SCALE - 1:20000

PLOTTED FROM - TRWAINT22

STATE OF SOUTH DAKOTA	PROJECT	SHEET NO.	TOTAL SHEETS
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CRC PAVEMENT REPAIR (FULL LANE WIDTH) - TYPICAL



DEFORMED TIE BAR DIMENSIONS KEY					
Under lying Plans	CRC Depth	Longitudinal Steel		Transverse Steel	
		Size	Spacing	Size	Spacing
PCN	T	C	E	L	F
5359	10"	6	6 1/2"	4	48"
	10.5"	6	6 1/2"	4	48"
6563	10.5"	5	4 3/4"	5	42"
6555	10"	6	6 3/4"	6	42"

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

PLOT NAME - 1

FILE - ... \15NL-TITLE.DGN

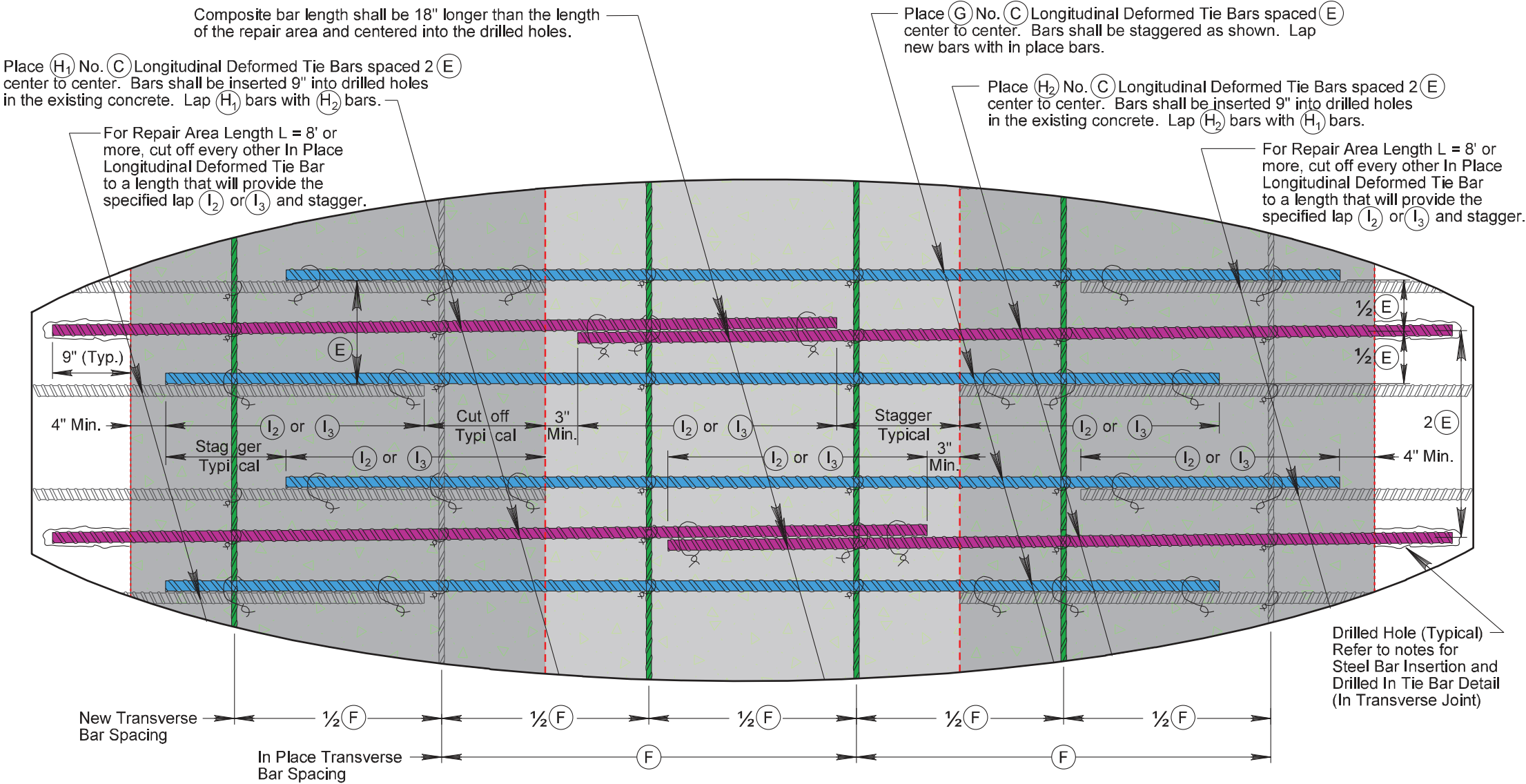


PLOT SCALE - 1:20000






PLOTTED FROM - TRWAINT22

STATE OF SOUTH DAKOTA	PROJECT	SHEET NO.	TOTAL SHEETS
	029 S - 171	14	27
Plotting Date: 06/25/2019			

CRC PAVEMENT REPAIR (FULL LANE WIDTH)  
Detail A



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

DEFORMED TIE BAR DIMENSIONS KEY

Under lying Plans	CRC Depth T	Longitudinal Steel		Transverse Steel	
		Size (C)	Spacing (E)	Size (L)	Spacing (F)
PCN					
5359	10"	6	6 1/2"	4	48"
	10.5"	6	6 1/2"	4	48"
6563	10.5"	5	4 3/4"	5	42"
6555	10"	6	6 3/4"	6	42"

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



LAP SPLICE LENGTH KEY

- (I<sub>1</sub>) Lap Splice length for Repair Area Length L < 4.5' (Not Available).
- (I<sub>2</sub>) Lap Splice length for Repair Area Length L = 4.5' to 8'.
- (I<sub>3</sub>) Lap Splice length for Repair Area Length L > 8'.

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

(G), (H<sub>1</sub>) & (H<sub>2</sub>)

CRC REPAIR AREA KEY

	Remove Concrete Retain Reinforcing Steel
	Remove Concrete Remove Reinforcing Steel

PLOT NAME - 1

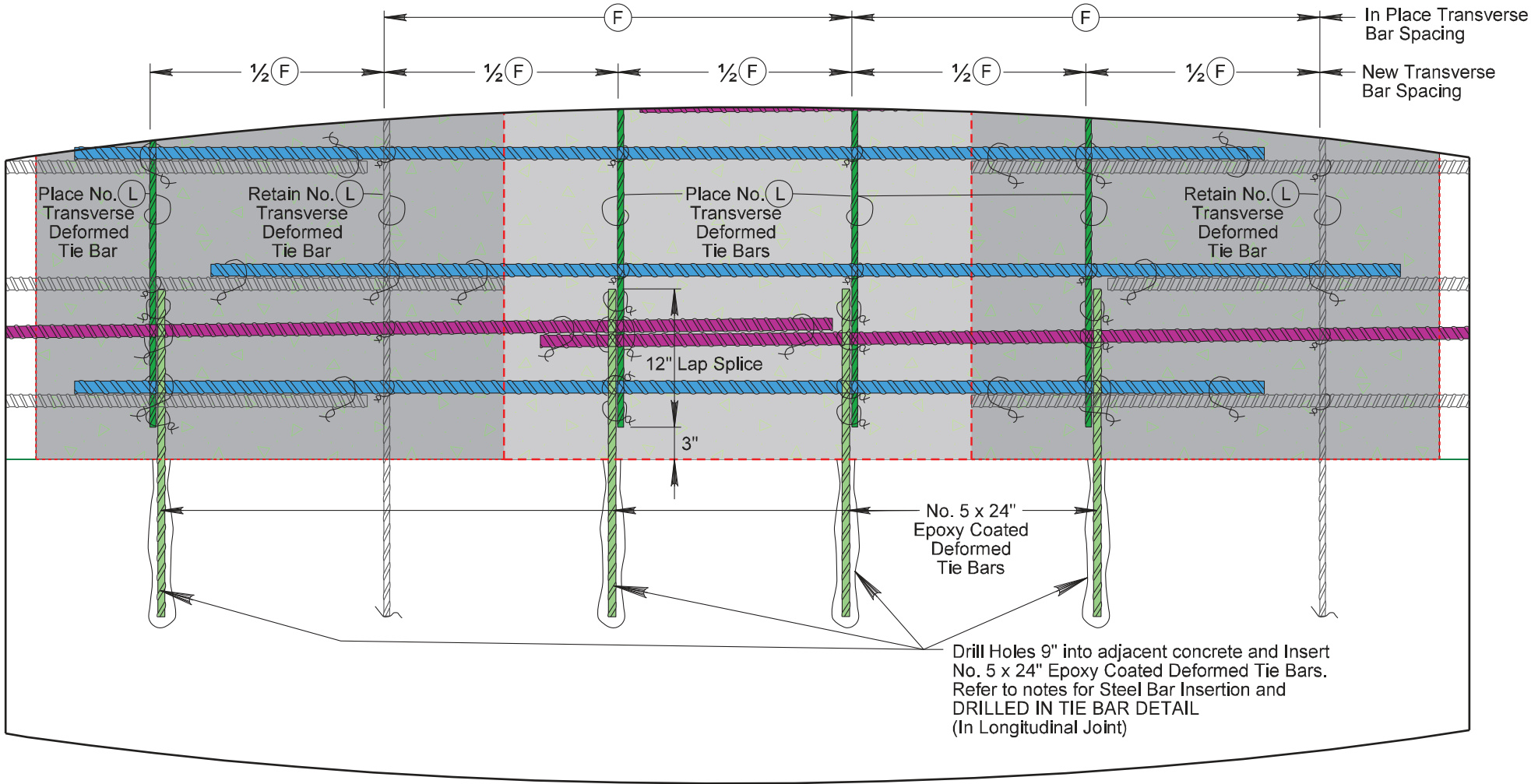
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PLOT SCALE - 1:20000

PLOTTED FROM - TRWAINT22

STATE OF SOUTH DAKOTA	PROJECT	SHEET NO.	TOTAL SHEETS
	029 S - 171	15	27
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CRC PAVEMENT REPAIR (FULL LANE WIDTH)  
Detail B



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					
Under lying Plans	CRC Depth	Longitudinal Steel		Transverse Steel	
		Size	Spacing	Size	Spacing
PCN	T	(C)	(E)	(L)	(F)
5359	10"	6	6 1/2"	4	48"
6563	10.5"	6	6 1/2"	4	48"
6563	10.5"	5	4 3/4"	5	42"
6555	10"	6	6 3/4"	6	42"

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 NAME - 1

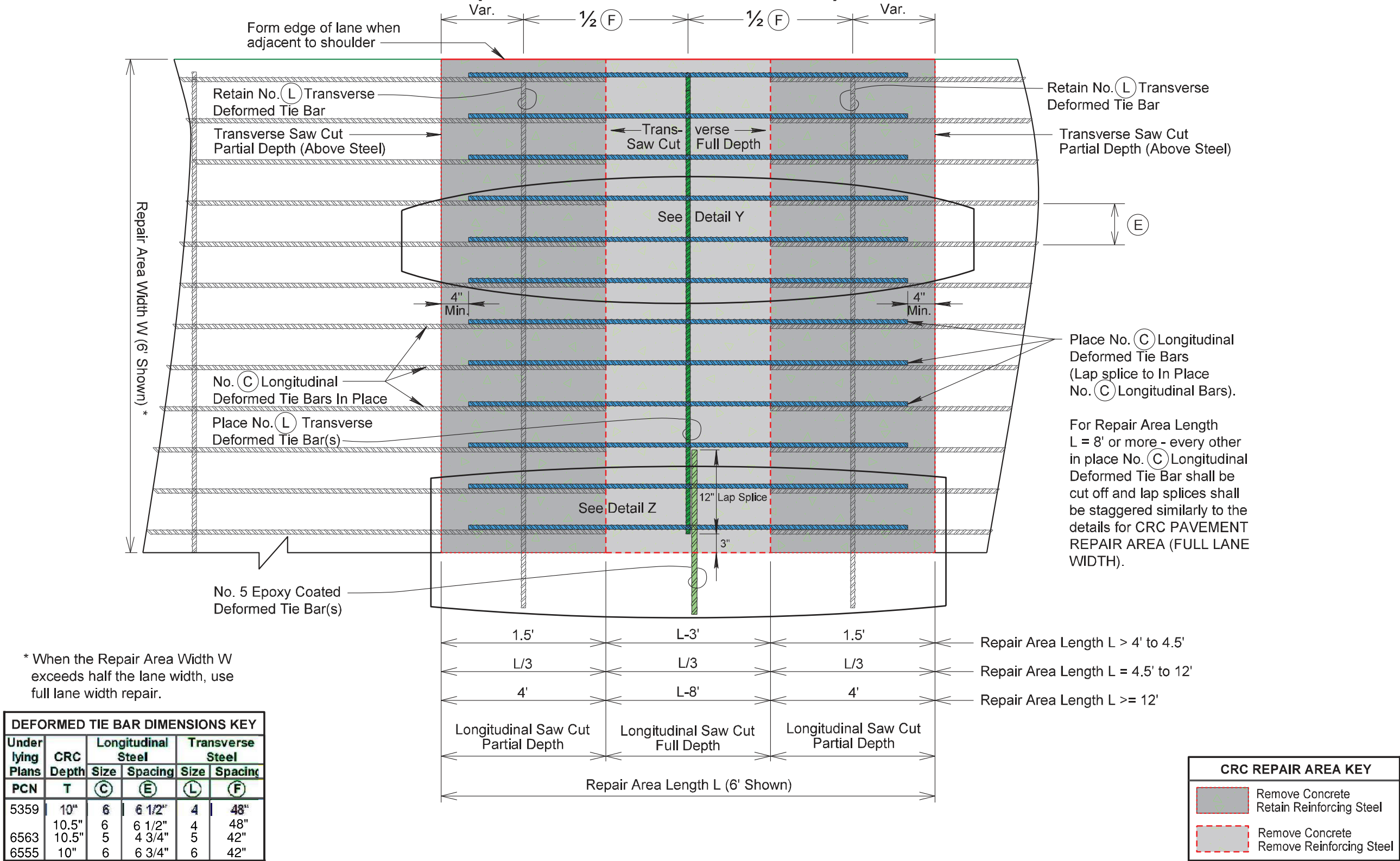
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PLOT SCALE - 1:20000

PLOTTED FROM - TRWAINT22

STATE OF SOUTH DAKOTA	PROJECT	SHEET NO.	TOTAL SHEETS
	029 S - 171	16	27
Plotting Date: 06/25/2019			

CRC PAVEMENT REPAIR (PARTIAL LANE WIDTH) - TYPICAL



PLOT NAME - 1

FILE - ... \15NL-TITLE.DGN



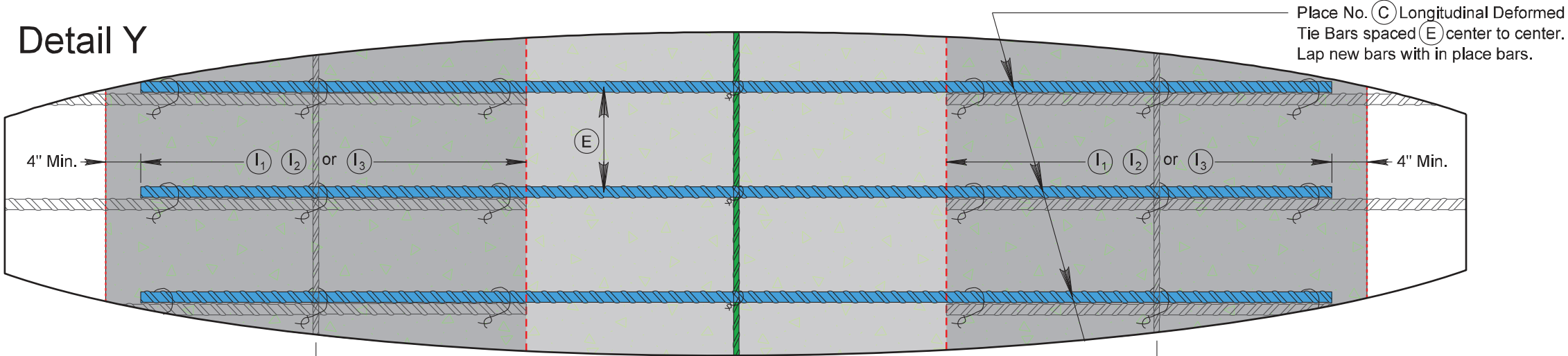
PLOT SCALE - 1:20000

PLOTTED FROM - TRWAINT22

STATE OF SOUTH DAKOTA	PROJECT	SHEET NO.	TOTAL SHEETS
	029 S - 171	17	27
Plotting Date: 06/25/2019			

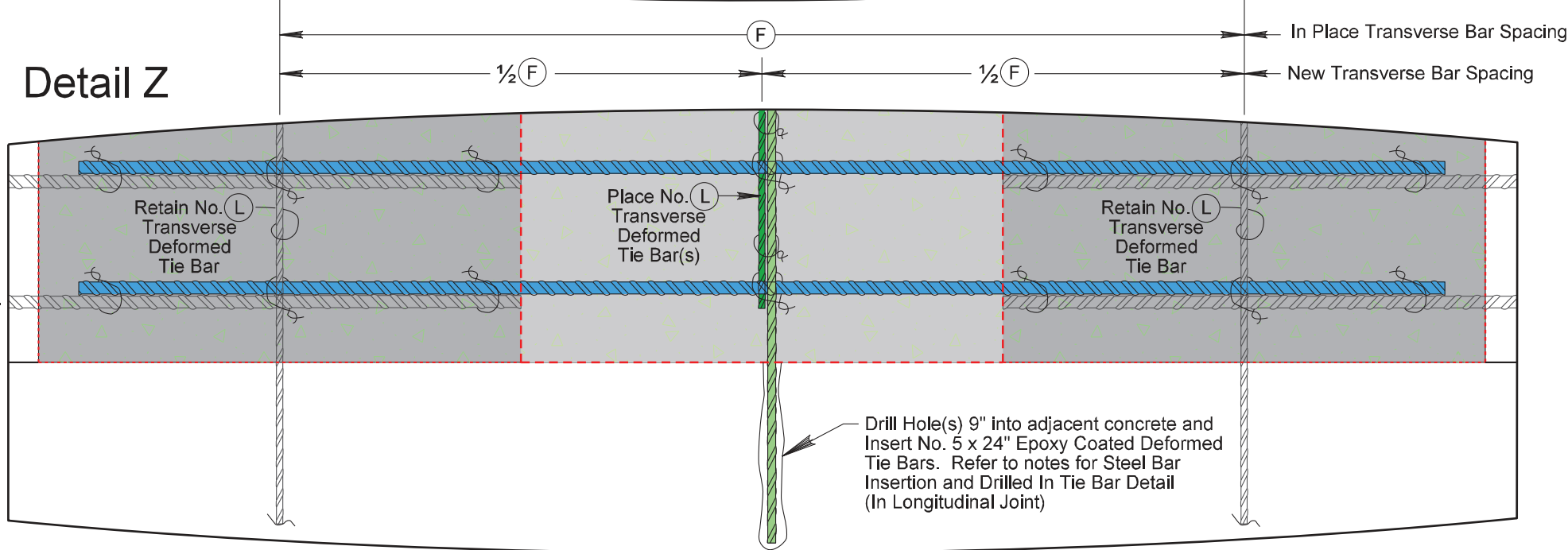
CRC PAVEMENT REPAIR (PARTIAL LANE WIDTH)

Detail Y



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).



DEFORMED TIE BAR DIMENSIONS KEY						LAP SPLICE LENGTH KEY			
		Under lying Plans	CRC Depth	Longitudinal Steel					
				Size	Spacing				
No. (L) Transverse Deformed Tie Bar In Place (Retain)	No. (C) Longitudinal Deformed Tie Bar In Place (Retain)	PCN	T	(C)	(E)	(L)	(F)	I <sub>1</sub>	I <sub>2</sub>
		5359	10"	6	6 1/2"	4	48"		
		6563	10.5"	6	6 1/2"	4	48"		
		6555	10"	5	4 3/4"	5	42"		
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)							I <sub>3</sub>	

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 NAME - 1

FILE - ... \15NLTITLE.DGN

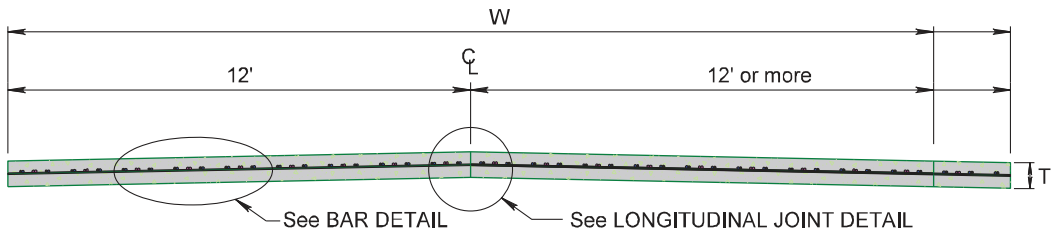
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PLOTTED FROM - TRWAINT22

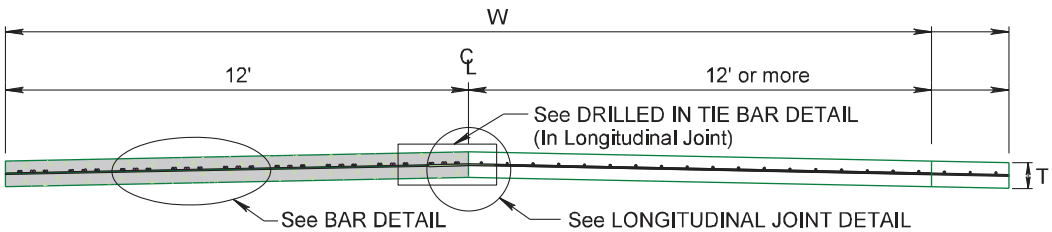
STATE OF SOUTH DAKOTA	PROJECT	SHEET NO.	TOTAL SHEETS
	029 S - 171	18	27
Plotting Date: 06/25/2019			

CRC PAVEMENT REPAIR - REINFORCING STEEL DETAILS

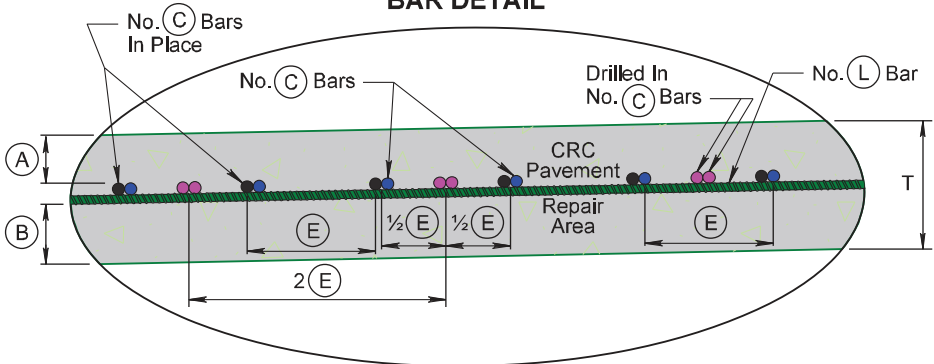
TRANSVERSE SECTION SHOWING STEEL PLACEMENT



TRANSVERSE SECTION SHOWING STEEL PLACEMENT



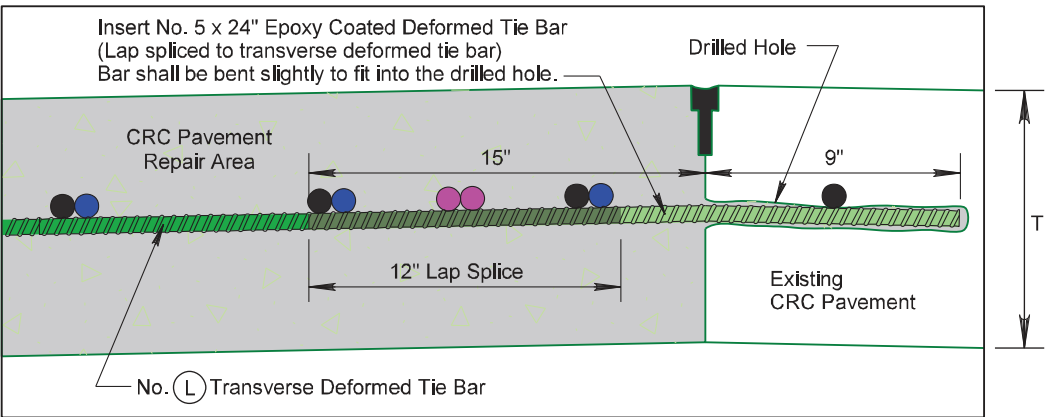
BAR DETAIL



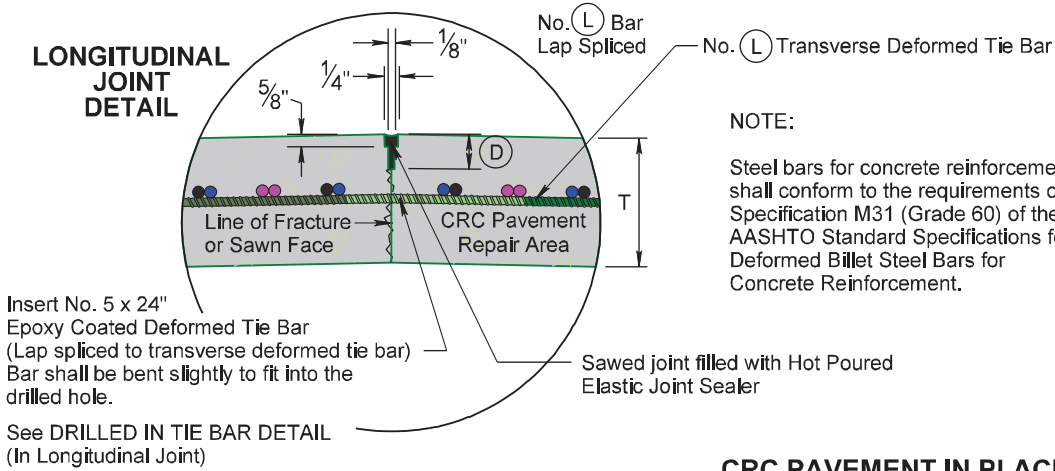
Placement of longitudinal steel bars may vary from +1/2" to -1/2" vertically and 3/4" horizontally. Placement of transverse steel bars may vary from +1/2" to -1/2" vertically and 2" horizontally.

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

DRILLED IN TIE BAR DETAIL  
(In Longitudinal Joint)



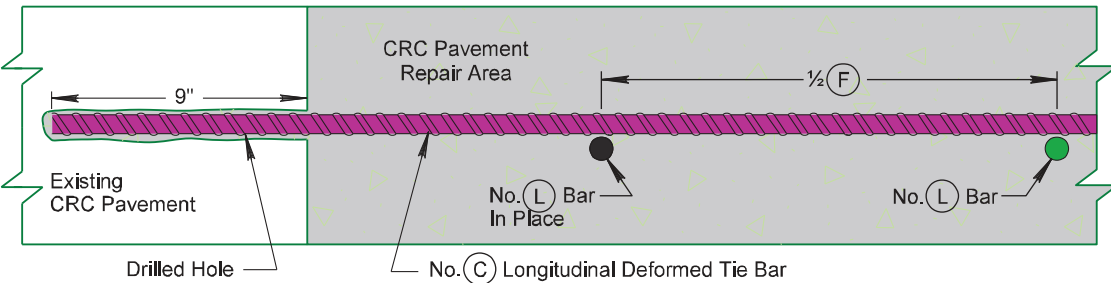
LONGITUDINAL  
JOINT  
DETAIL



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.

LONGITUDINAL SECTION SHOWING STEEL PLACEMENT

DRILLED IN TIE BAR DETAIL  
(In Transverse Joint)



CRC PAVEMENT IN PLACE & CRC PAVEMENT REPAIR KEY & DIMENSIONS

	Under lying 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 Assign red	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> )				
PCN	T	W																		-	(K)	(M)	(N)	(P)	(R)
	5359	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"
		10.5"	26'	4"	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"
	6563	10.5"	26'	3 1/8"	4 3/4"	5	4 3/4"	2 1/2"	5	42"															
	6555	10"	26'	3"	6 1/4"	5	6 3/4"	2 1/2"	6	42"															

PLOT NAME - 1

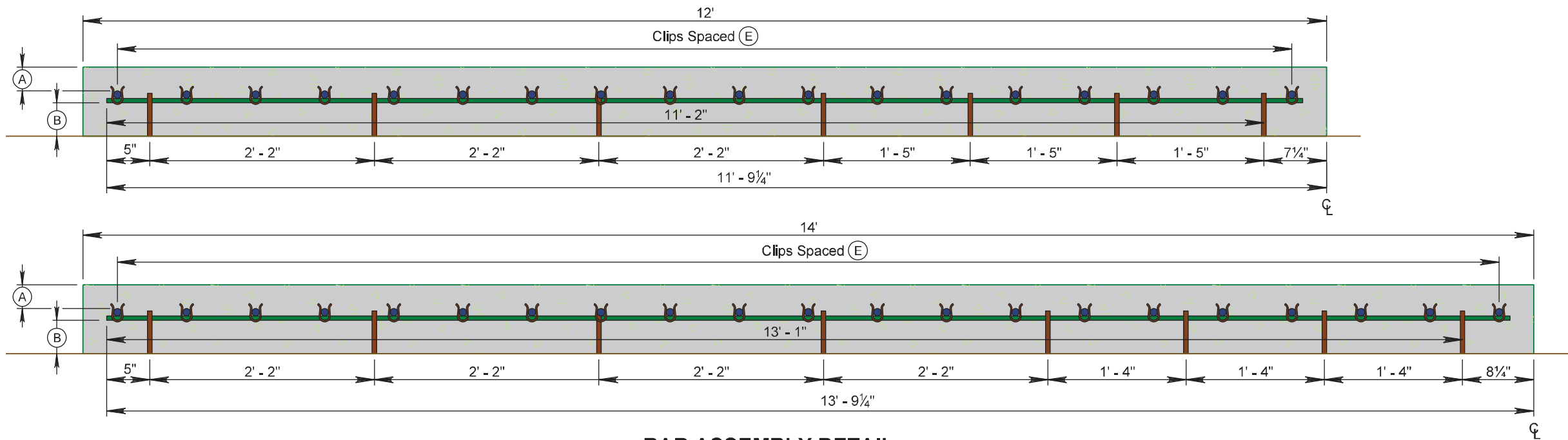
FILE - ... \15NLTITLE.DGN

PLOT SCALE - 1:20000

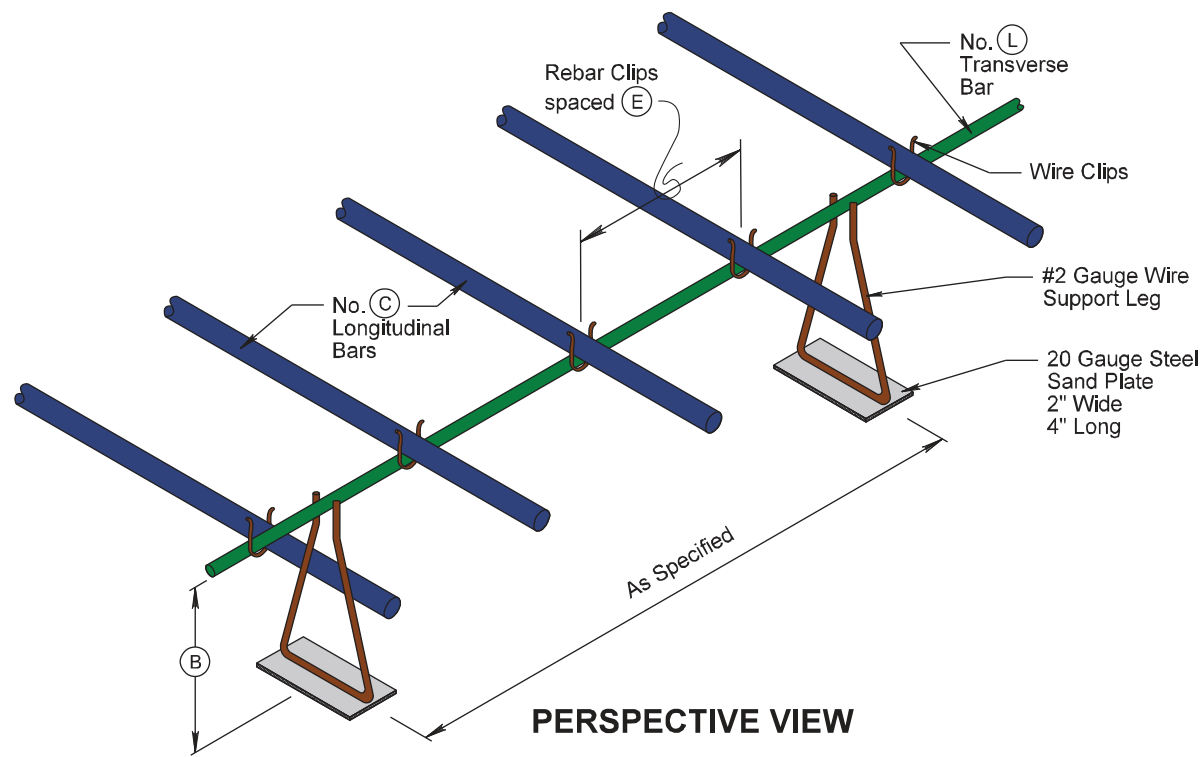
PLOTTED FROM - TRWAINT22

STATE OF SOUTH DAKOTA	PROJECT	SHEET NO.	TOTAL SHEETS
	029 S - 171	19	27
Plotting Date: 06/25/2019			

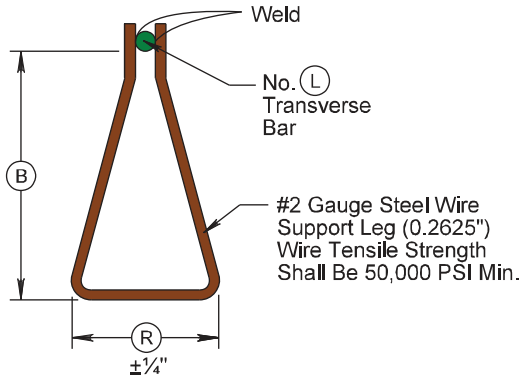
CRC PAVEMENT CHAIR DETAILS



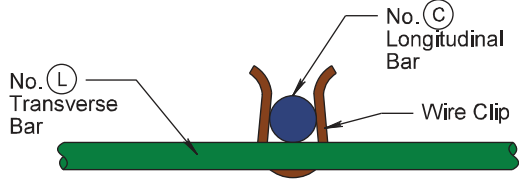
BAR ASSEMBLY DETAIL



PERSPECTIVE VIEW



CHAIR DETAIL



CLIP DETAIL

DEFORMED TIE BAR DIMENSIONS KEY										
Under lying 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)
5359	10"	26'	3 1/2"	5 1/4"	6	6 1/2"	2 1/2"	4	48"	5"
	10.5"	26'	4"	5 1/4"	6	6 1/2"	2 1/2"	4	48"	5"
6563	10.5"	26'	3 1/8"	4 3/4"	5	4 3/4"	2 1/2"	5	42"	5"
6555	10"	26'	3"	6 1/4"	5	6 3/4"	2 1/2"	6	42"	5"

PLOT NAME - 1

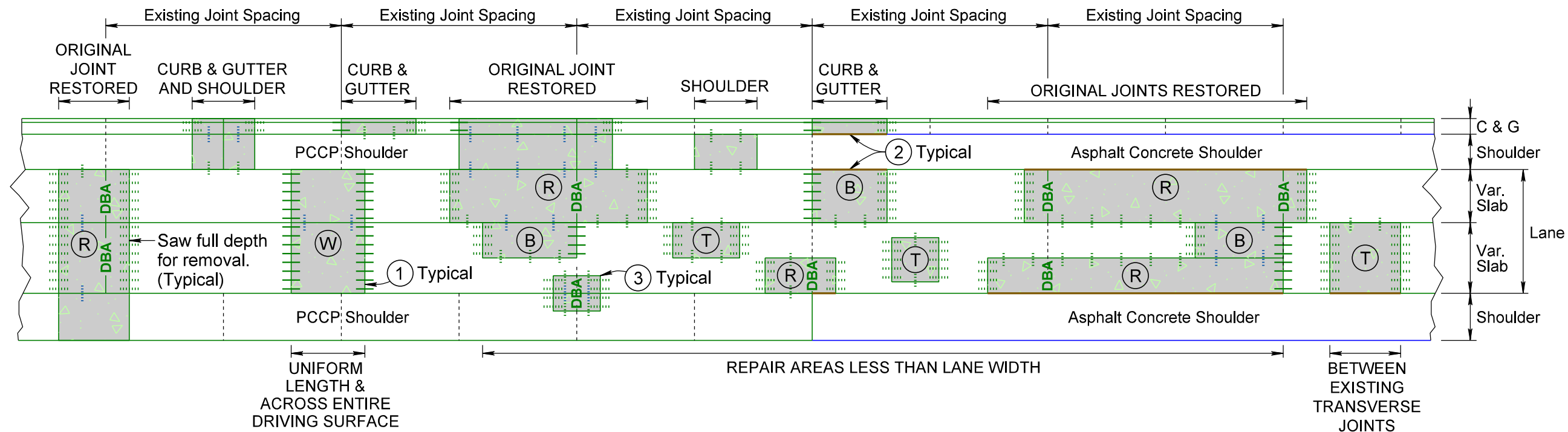
FILE - ... \15NLTITLE.DGN

# NONREINFORCED PCC PAVEMENT REPAIR

## ANY SINGLE LANE ROADWAY (RAMPS, ETC.)

### TYPICAL REPAIR AREAS

STATE OF SOUTH DAKOTA	PROJECT	SHEET NO.	TOTAL SHEETS
	029 S - 171	20	27
Plotting Date: 06/25/2019			



#### 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 entire driving surface))
- (T) Two Tied Joints
- (B) One Working & One Tied Joint
- (R) Two Tied Joints with Original Joint Restored with Dowel Bar Assembly

#### 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.  
Sawed 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.

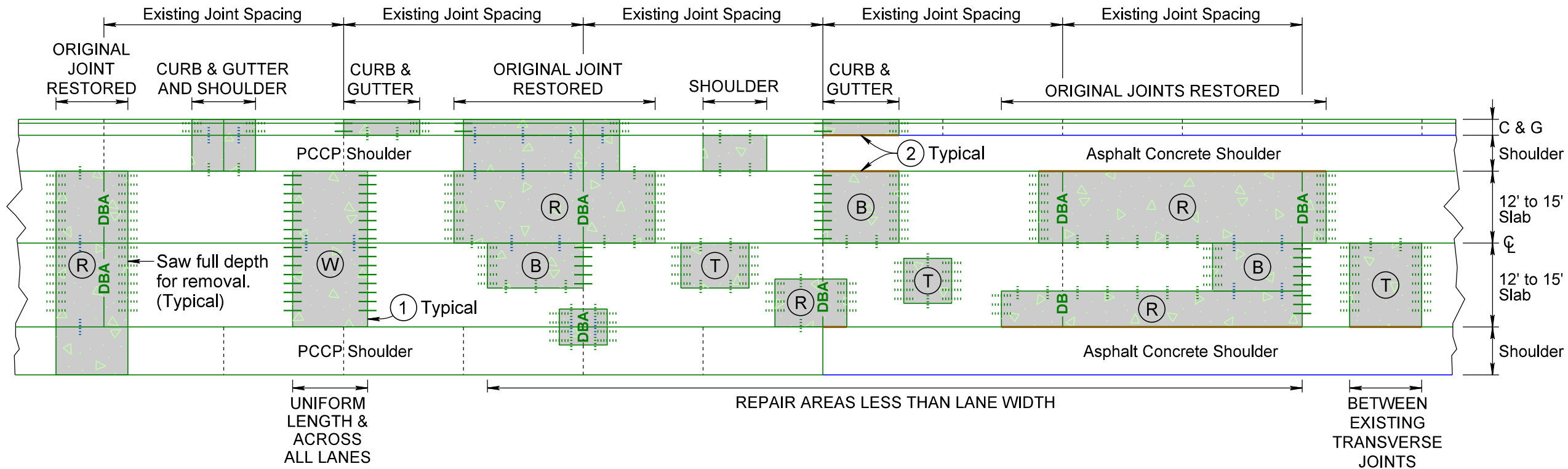
#### NOTES: Saw around repair areas full depth for removal.

- 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.



NONREINFORCED PCC PAVEMENT REPAIR  
UP TO TWO LANE ROADWAY OR UP TO FOUR LANE DIVIDED ROADWAY  
TYPICAL REPAIR AREAS





STATE OF SOUTH DAKOTA	PROJECT	SHEET NO.	TOTAL SHEETS
	029 S - 171	21	27
Plotting Date: 06/25/2019			



KEY:

 PCC Pavement Repair Area

PCC PAVEMENT REPAIR AREA TYPES:

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

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.




 Dowel Bar Assembly

Steel Bars for Longitudinal Joints

..... No. 5 x 30" epoxy coated deformed tie bars.  
Sawed 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.

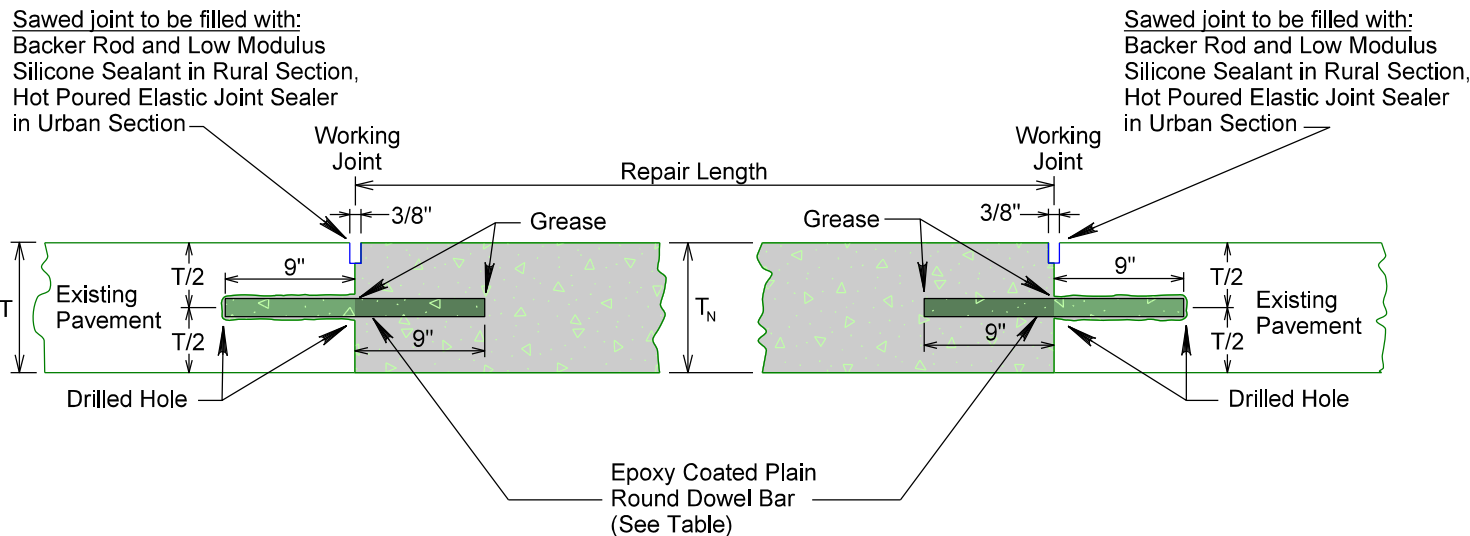
NOTES: Saw around repair areas full depth for removal.

-  Where possible, transverse joints shall be constructed/maintained full roadway width.
-  Edges of repair areas shall be formed to match the width of the existing concrete pavement.
-  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.

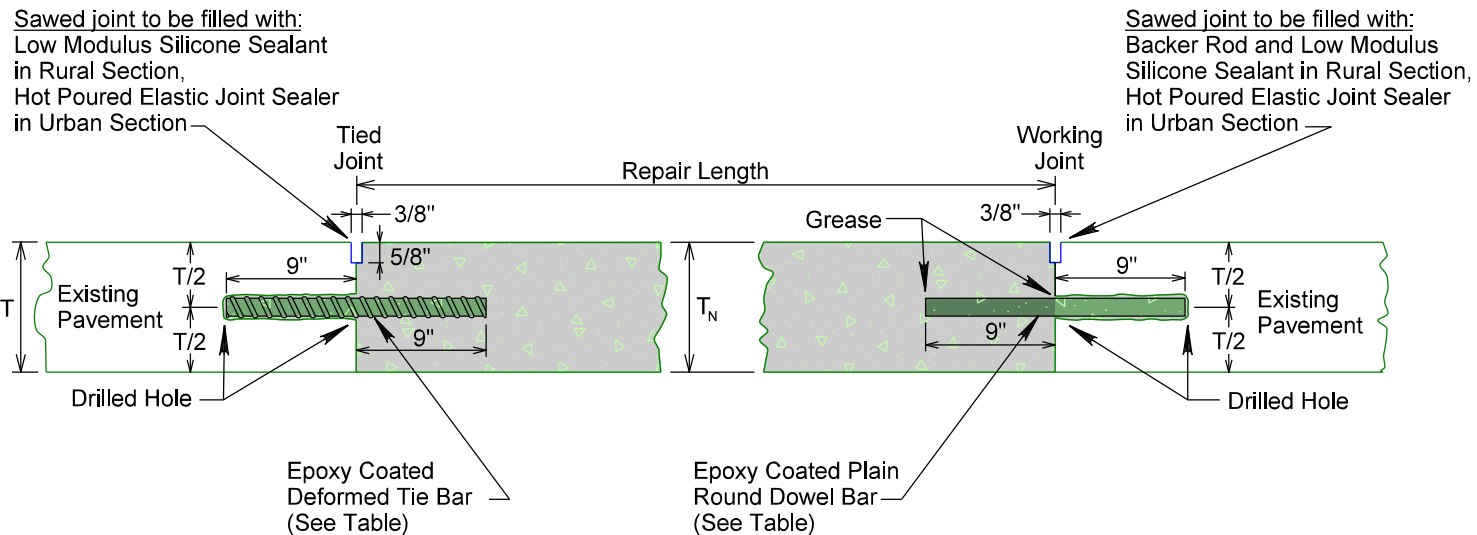
# NONREINFORCED PCC PAVEMENT REPAIR

STATE OF SOUTH DAKOTA	PROJECT	SHEET NO.	TOTAL SHEETS
	029 S - 171	22	27
Plotting Date: 06/25/2019			

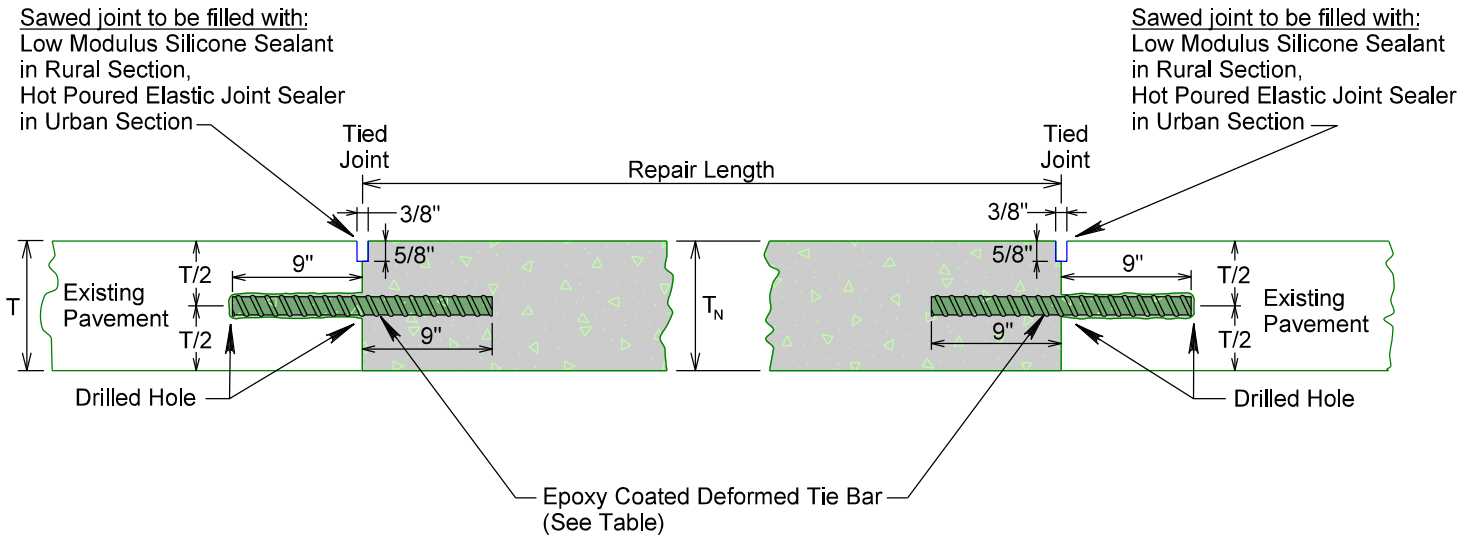
PLAIN ROUND DOWEL BAR INSERTION  
TYPE W - (TWO WORKING JOINTS)



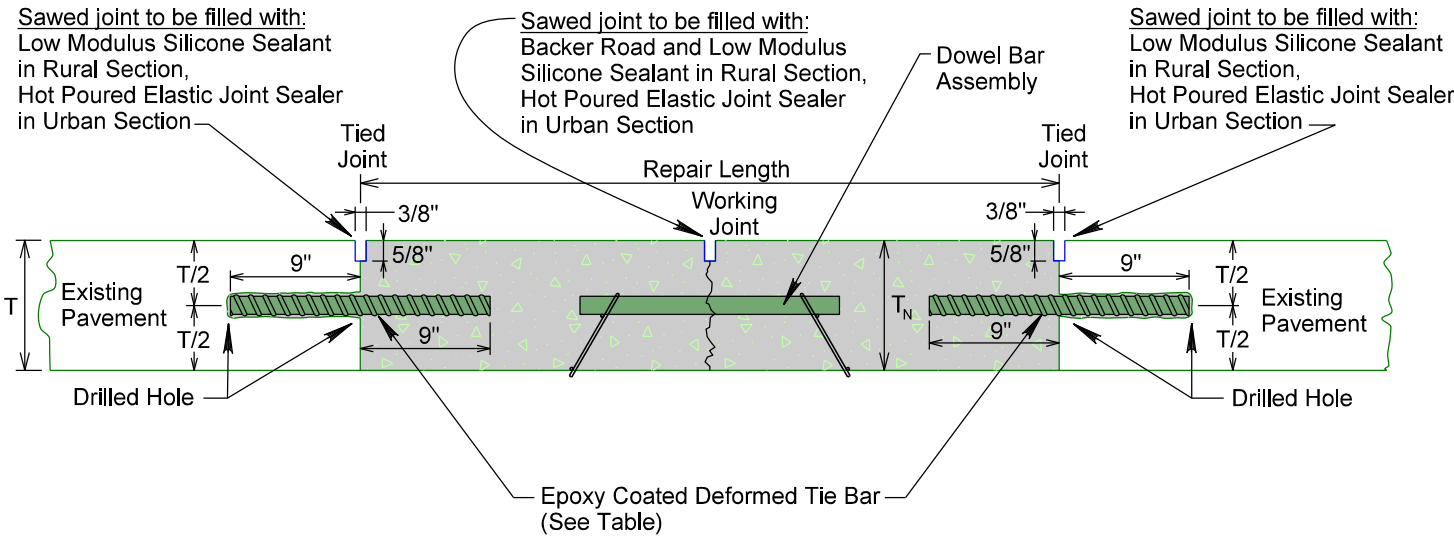
DEFORMED TIE BAR AND PLAIN ROUND DOWEL BAR INSERTION  
TYPE B - (ONE TIED JOINT AND ONE WORKING JOINT)



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 ≥ 10.5"	No. 11 x 18"	1½" x 18"
T ≥ 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<sub>N</sub> = 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<sub>N</sub> = T  
(top of new pavement shall be flush with top of existing pavement)

PLOT SCALE - 1:20000

PLOTTED FROM - TRWAINT22

PLOT NAME - 1

FILE - ... \15NL\_TITILE.DGN

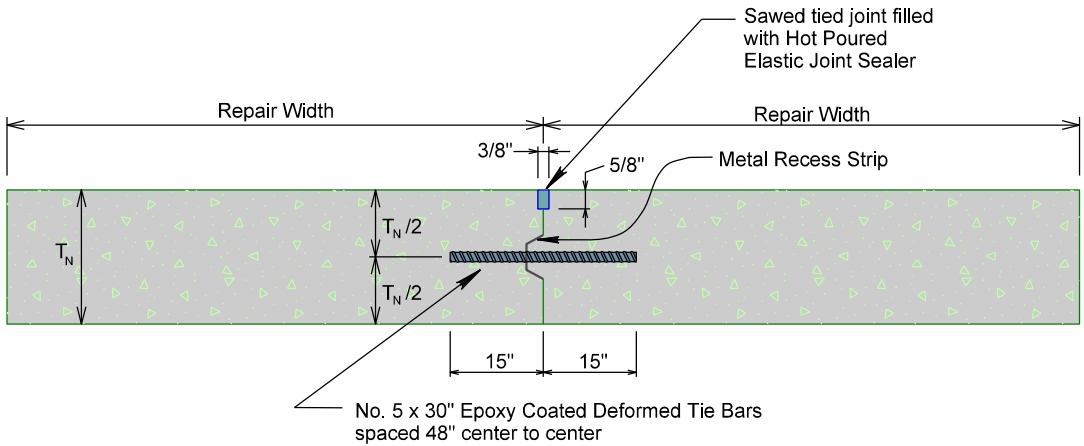
PLOT SCALE - 1:20000

PLOTTED FROM - TRWAINT22

STATE OF SOUTH DAKOTA	PROJECT	SHEET NO.	TOTAL SHEETS
	029 S - 171	23	27
Plotting Date: 06/25/2019			

# NONREINFORCED PCC PAVEMENT REPAIR

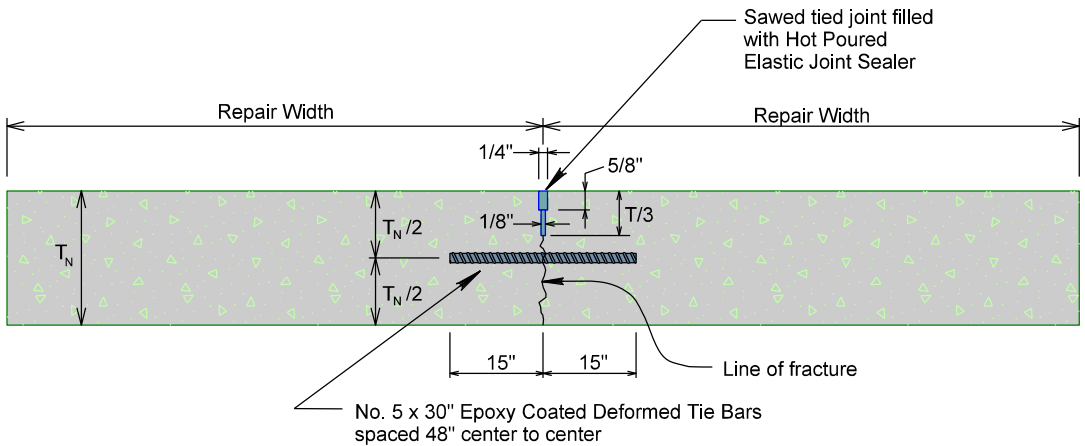
LONGITUDINAL CONSTRUCTION JOINT WITH TIE BARS & KEYWAY



T<sub>N</sub> = 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 and/or Fast Track Concrete for PCC Pavement Repair.

SAWED LONGITUDINAL JOINT

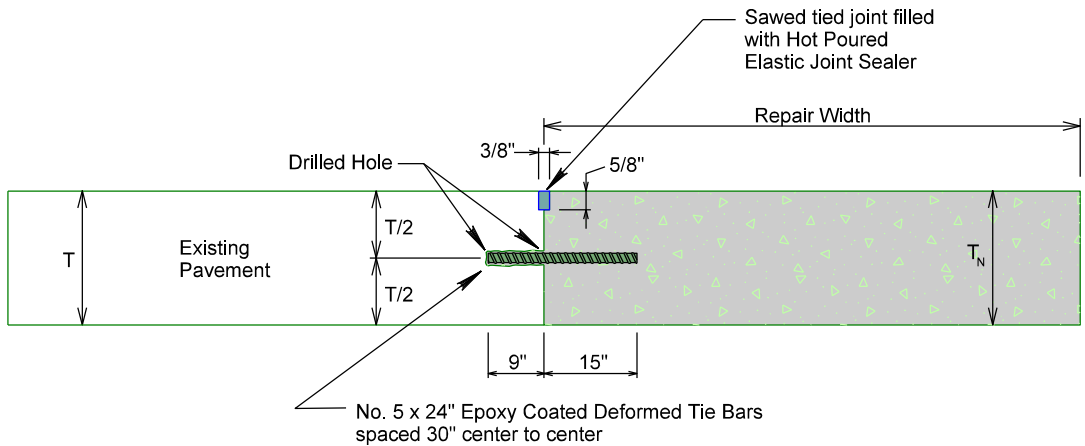


T<sub>N</sub> = New pavement thickness.

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 and/or Fast Track Concrete for PCC Pavement Repair.

LONGITUDINAL CONSTRUCTION JOINT WITH DRILLED IN TIE BARS



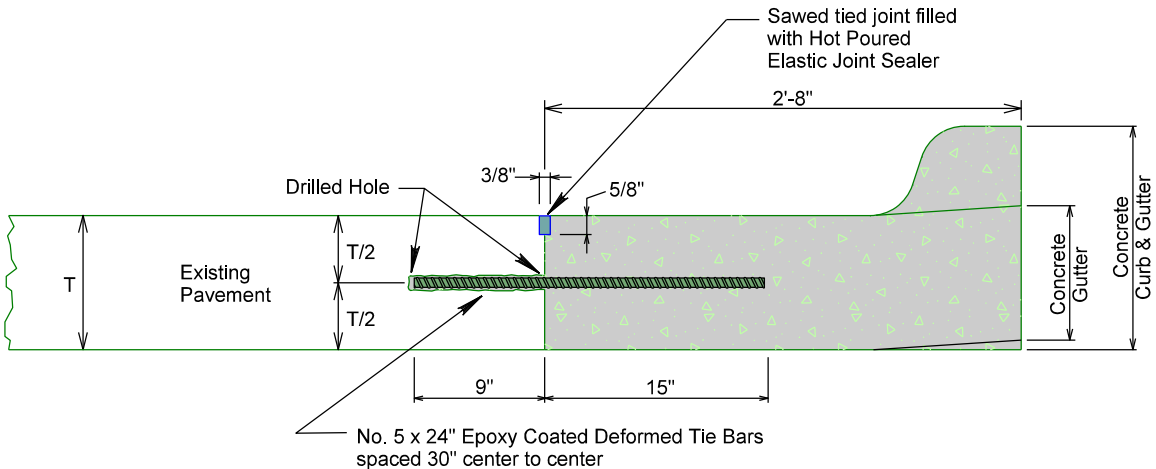
T = Existing pavement thickness.  
T<sub>N</sub> = New pavement thickness.

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

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

PLOT NAME - 1

FILE - ... \15NL-TITLE.DGN

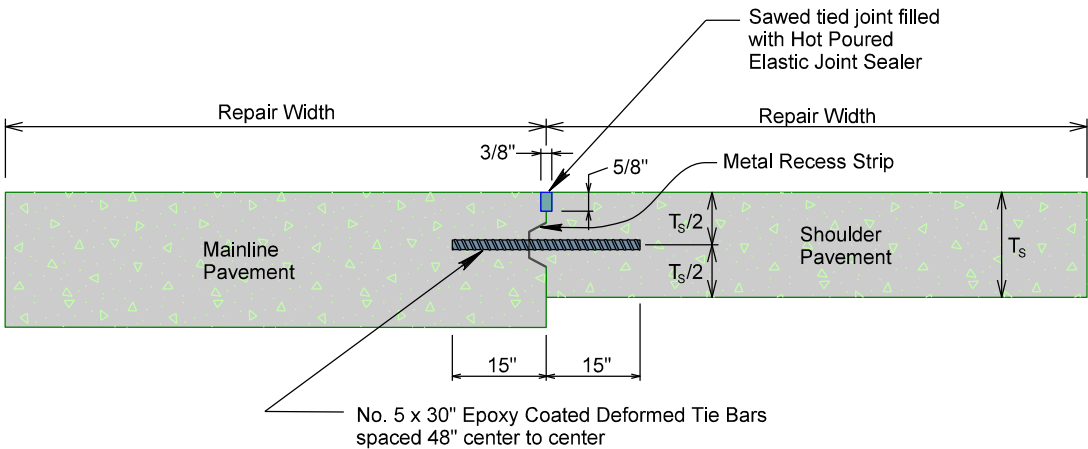
PLOT SCALE - 1:20000

PLOTTED FROM - TRWAINT22

STATE OF SOUTH DAKOTA	PROJECT	SHEET NO.	TOTAL SHEETS
	029 S - 171	24	27
Plotting Date: 06/25/2019			

# NONREINFORCED PCC PAVEMENT REPAIR

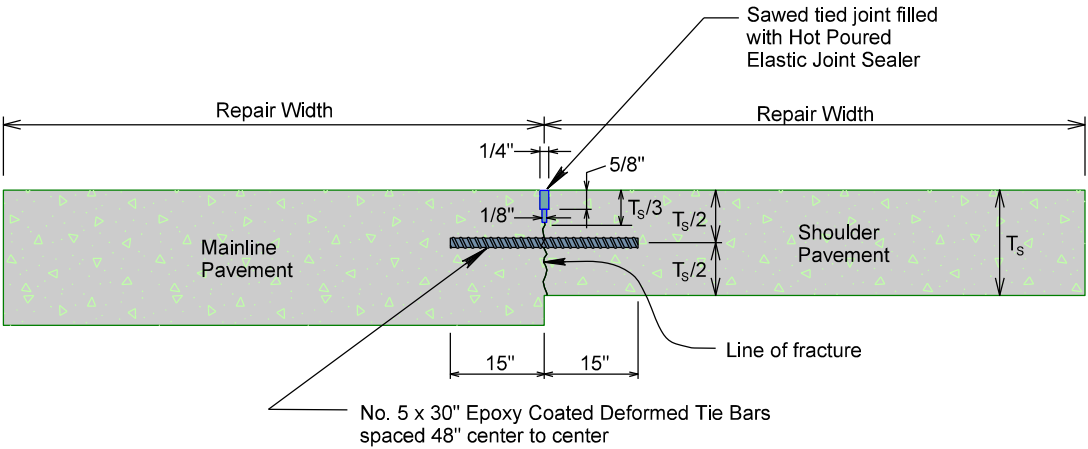
LONGITUDINAL SHOULDER CONSTRUCTION JOINT WITH TIE BARS & KEYWAY



T<sub>s</sub> = 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

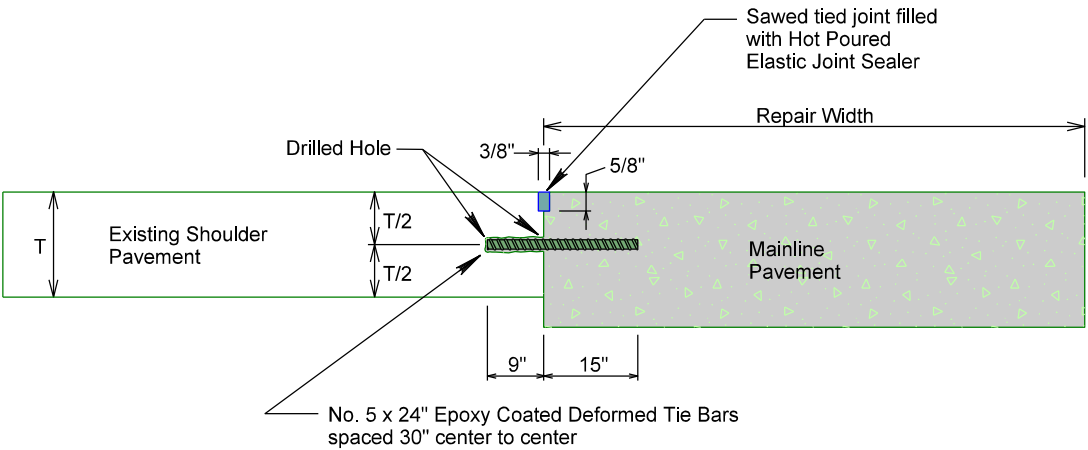


T<sub>s</sub> = New shoulder pavement thickness.

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



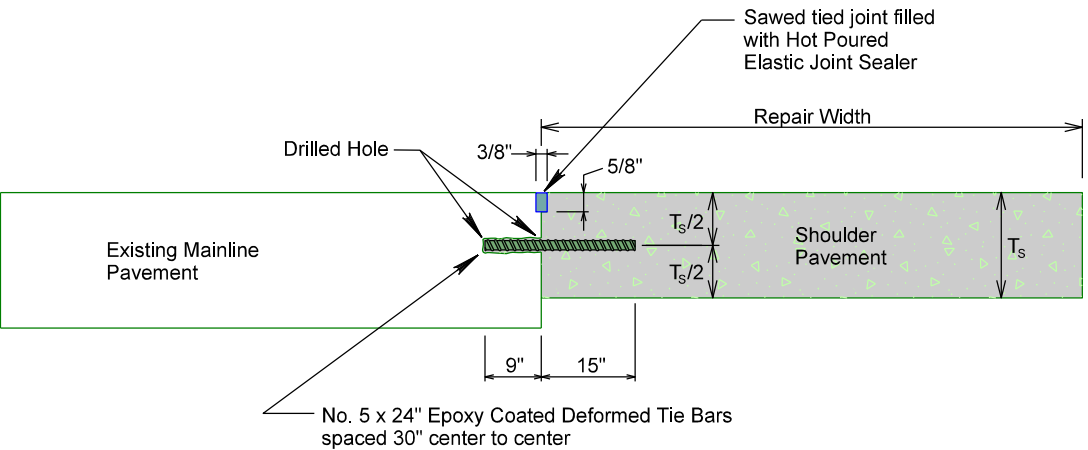
T = Existing shoulder pavement thickness.

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

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

Cost for furnishing and inserting drilled in tie bars will 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<sub>s</sub> = 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 NAME - 1

FILE - ... \15NL\_TITLE.DGN



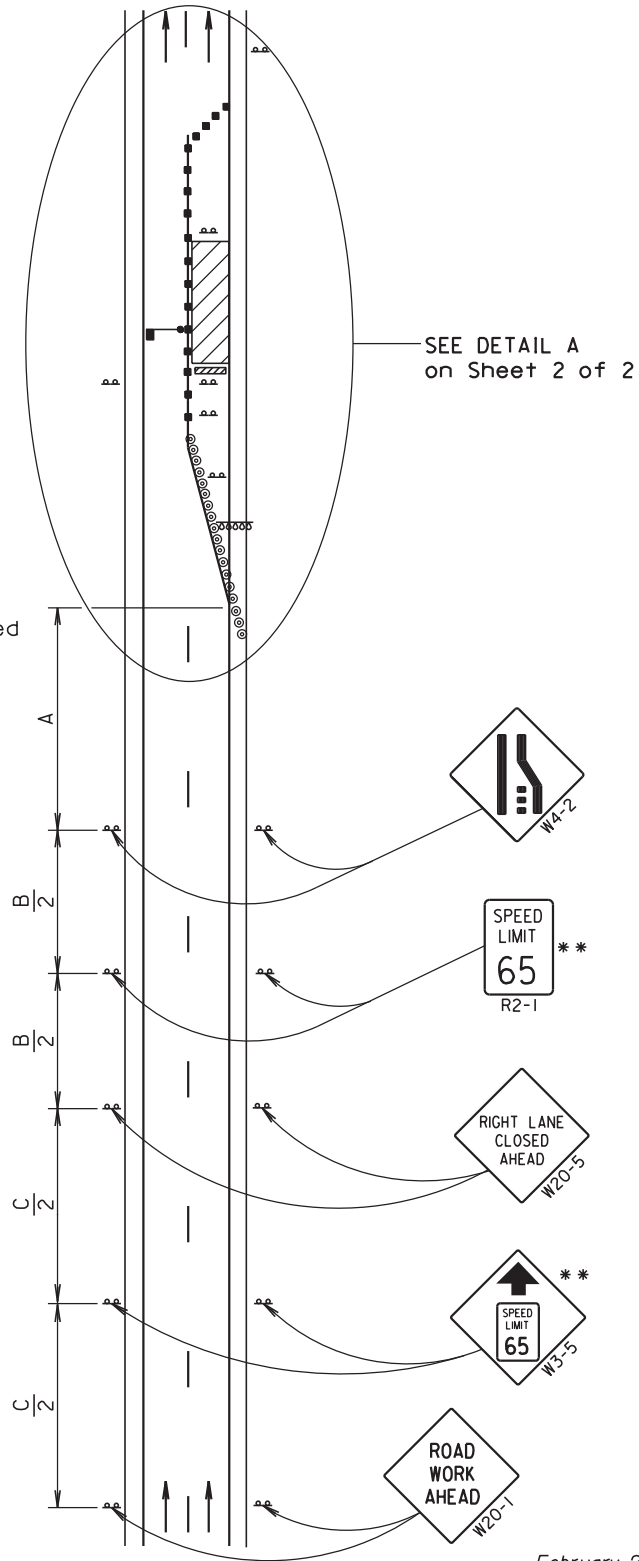
Posted Speed Prior to Work (M.P.H.)	Spacing of Advance Warning Signs (Feet) (A) (B) (C)		
0 - 30	200		
35 - 40	350		
45 - 50	500		
55	750		
60 - 65	1000		
	(A)	(B)	(C)
70 - 80	1000	1500	2640

\*\* 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.



February 25, 2019

Published Date: 2nd Qtr. 2019	S D D O T	WORK ZONE SPEED REDUCTION FOR INTERSTATE AND HIGH SPEED MULTI-LANE HIGHWAYS	PLATE NUMBER 634.63
			Sheet 1 of 2

Posted Speed Prior to Work (M.P.H.)	Spacing of Channelizing Devices (Feet) (G)	Taper Length (Feet) (L)
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 will be covered or removed when workers are not present.

● Flagger (As Necessary)

● Reflectorized Drum

■ Channelizing Device

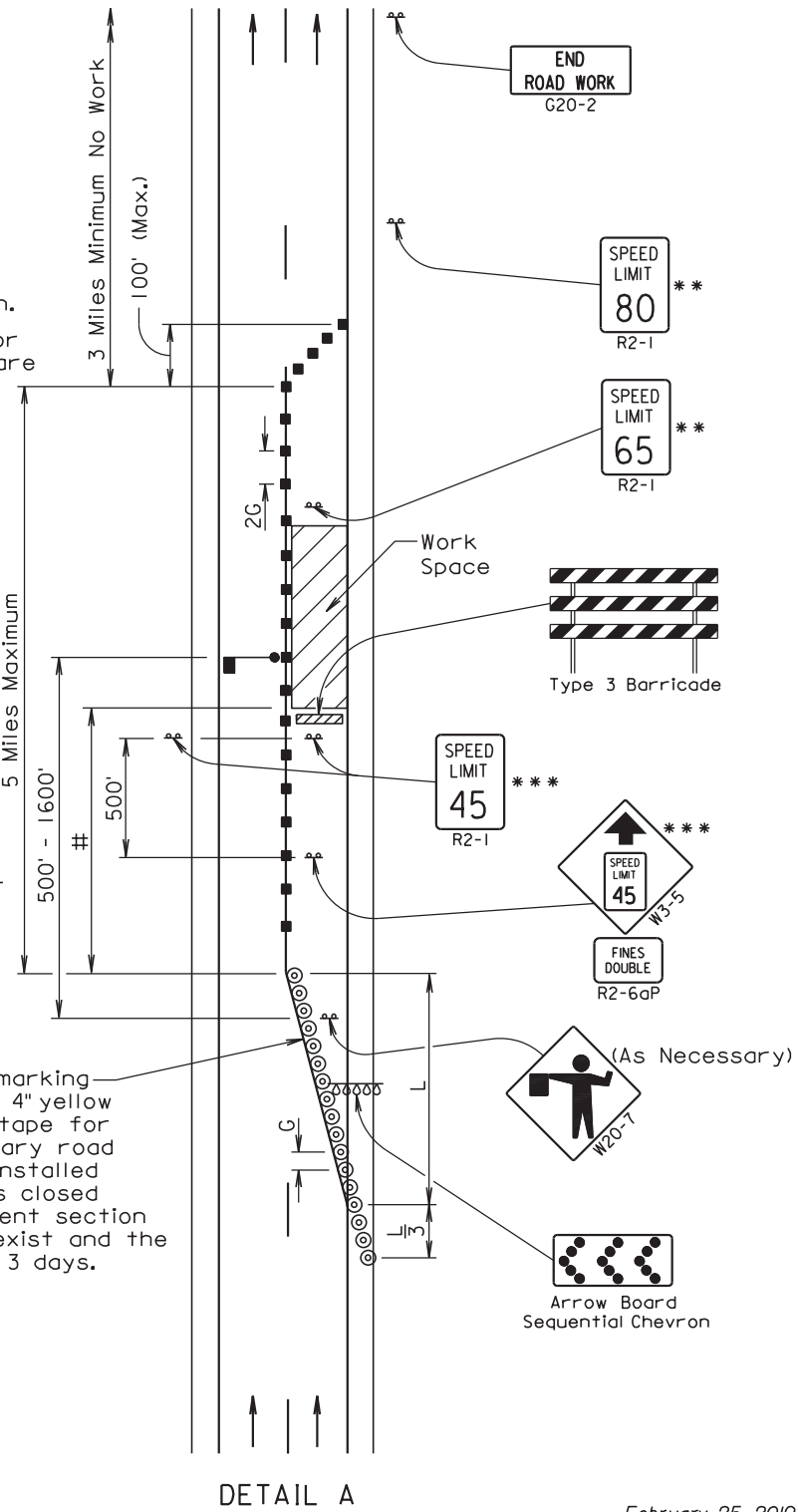
# The Work Space will be a minimum of 500' from the end of the taper.

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

The channelizing devices will be 42" cones or drums.

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

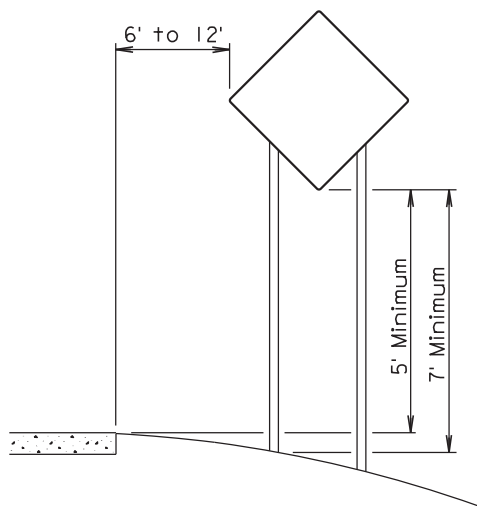
4" white temporary pavement marking tape for right lane closures, 4" yellow temporary pavement marking tape for left lane closures, or temporary road markers at 5' spacing will be installed in the taper when the lane is closed overnight, and along the tangent section where the skip lines do not exist and the lane is closed for more than 3 days.



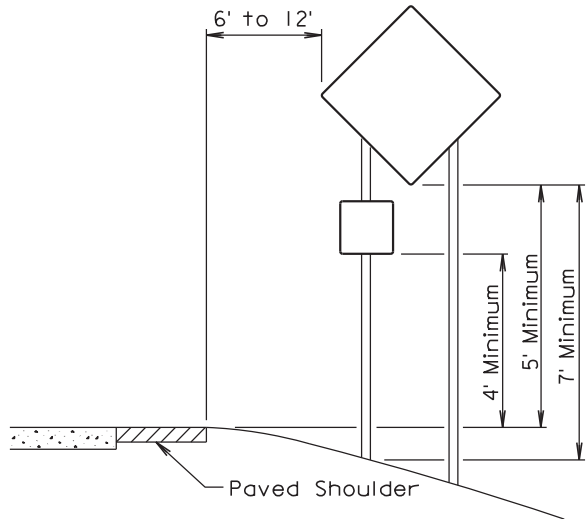
February 25, 2019

Published Date: 2nd Qtr. 2019	S D D O T	WORK ZONE SPEED REDUCTION FOR INTERSTATE AND HIGH SPEED MULTI-LANE HIGHWAYS	PLATE NUMBER 634.63
			Sheet 2 of 2

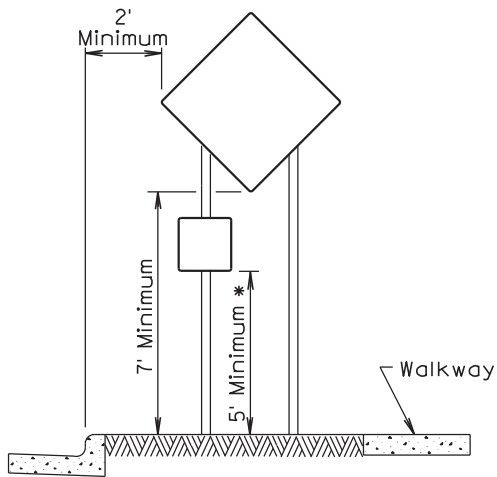
STATE OF SOUTH DAKOTA	PROJECT	SHEET NO.	TOTAL SHEETS
	029 S - 171	26	27
Plotting Date: 06/25/2019			



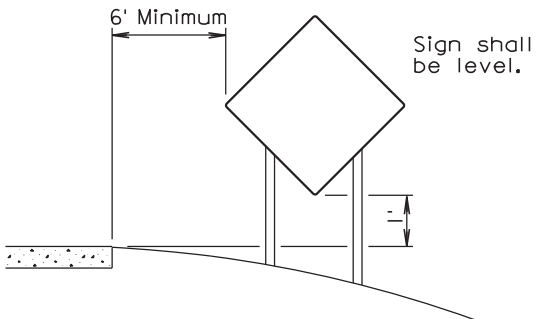
RURAL DISTRICT



RURAL DISTRICT WITH  
SUPPLEMENTAL PLATE



URBAN DISTRICT

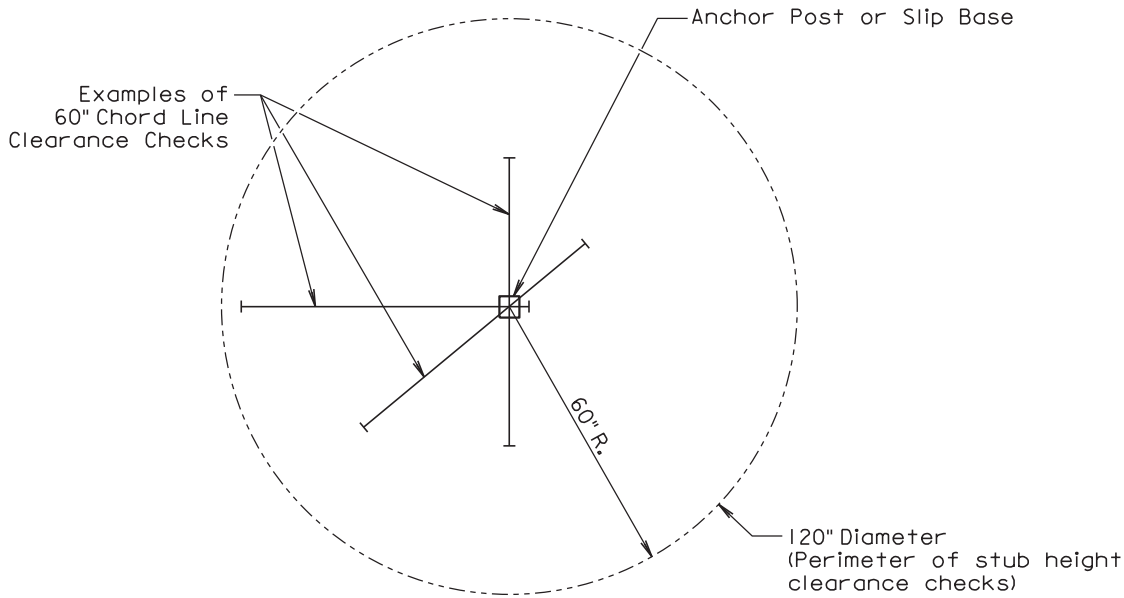


RURAL DISTRICT  
3 DAY MAXIMUM  
(Not applicable to regulatory signs)

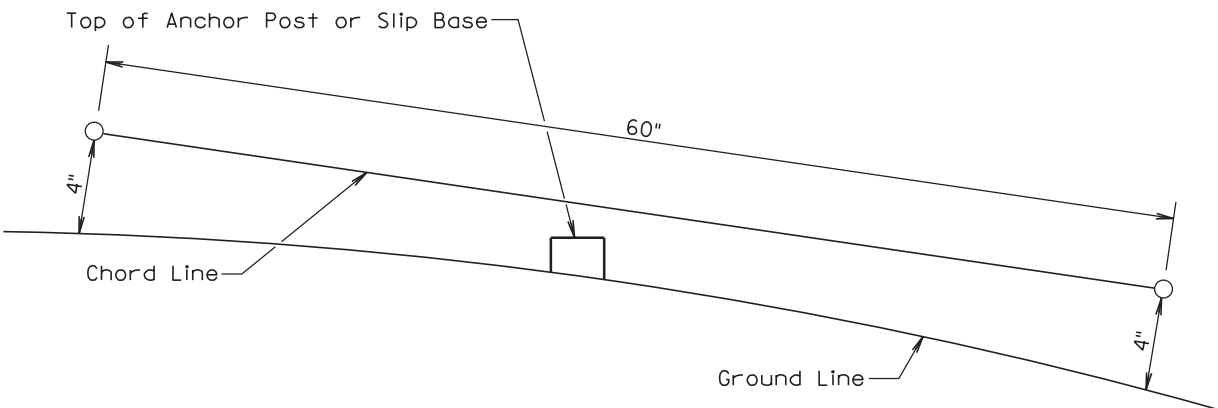
\* If the bottom of supplemental plate is mounted lower than 7 feet above a pedestrian walkway, the supplemental plate should not project more than 4" into the pedestrian facility.

September 22, 2014

Published Date: 2nd Qtr. 2019	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.

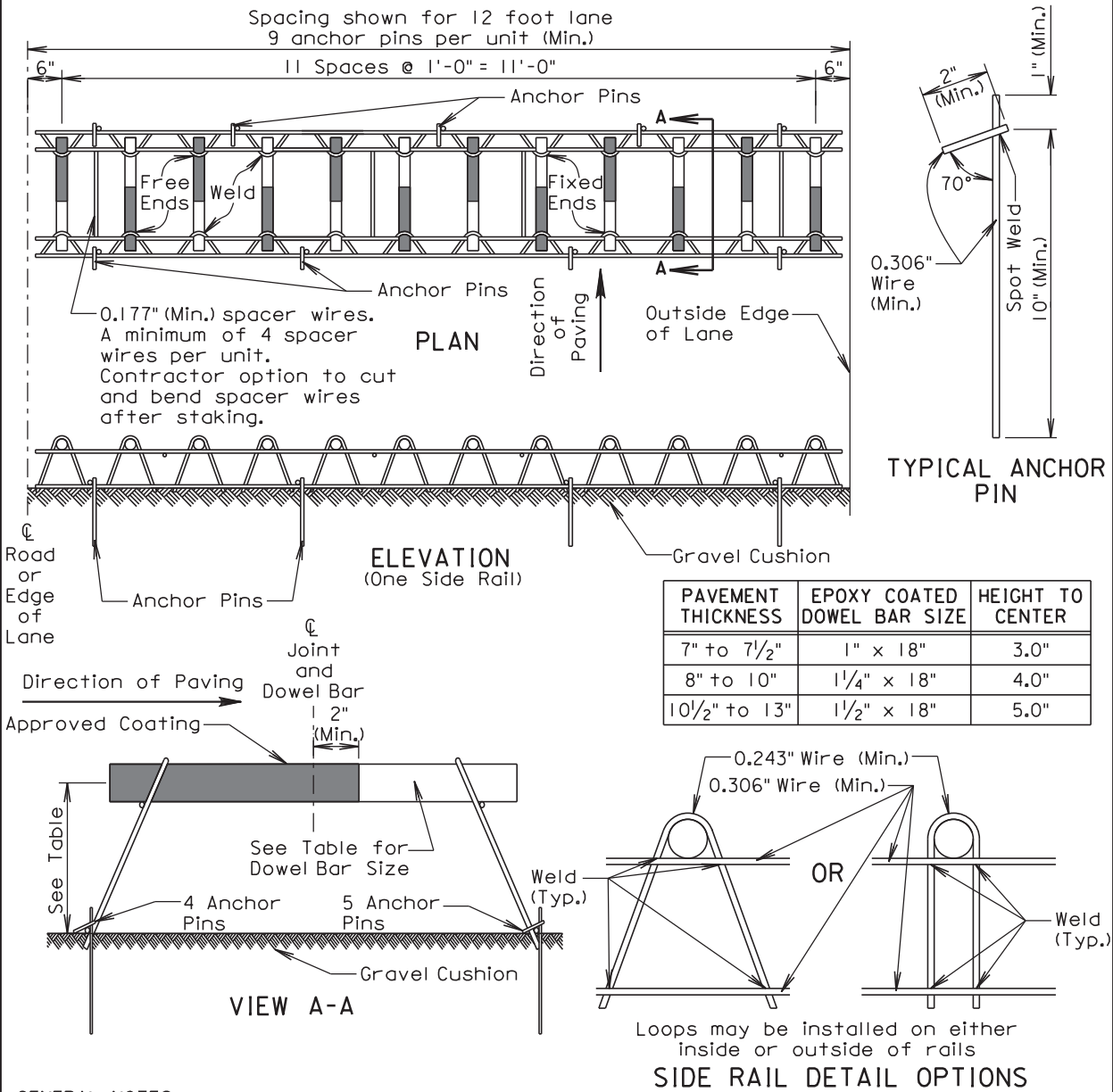
July 1, 2005

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

PLOT SCALE - 1:20000

PLOTTED FROM - TRWAINT22

STATE OF SOUTH DAKOTA	PROJECT	SHEET NO.	TOTAL SHEETS
	029 S - 171	27	27
Plotting Date: 06/25/2019			



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.

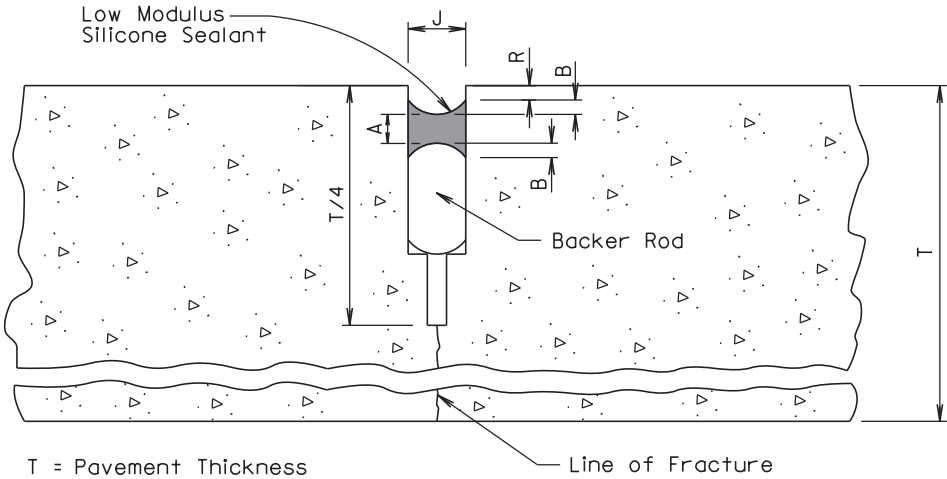
Centerline of individual dowel bars shall be parallel to the centerline of the roadway  $\pm 1/2$  inch in 18 inches.

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.

June 9, 2017

Published Date: 2nd Qtr. 2019	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



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

Published Date: 2nd Qtr. 2019	S D D O T	RESEAL PCC PAVEMENT JOINT (SILICONE)	PLATE NUMBER 380.13
			Sheet 1 of 1

PLOT NAME - 1

FILE - ... \15NL-TITLE.DGN