

STATE OF SOUTH DAKOTA  
DEPARTMENT OF TRANSPORTATION

STATE OF SOUTH DAKOTA	PROJECT	SHEET	TOTAL SHEETS
	090W-253 & 090W-252	1	28

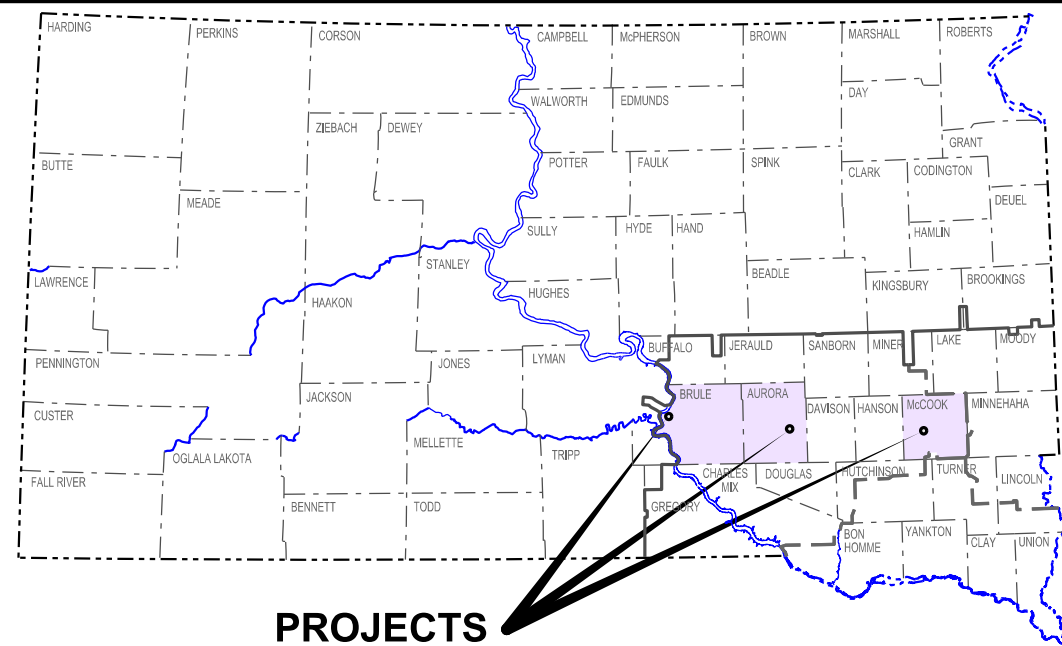
Plotting Date: 05/31/2018

PLANS FOR PROPOSED  
**PROJECTS 090W-253 & 090W-252**  
INTERSTATE 90 WBL  
BRULE, AURORA & McCOOK COUNTIES  
CRC & NRC PAVEMENT REPAIR  
PCN I54M & I54L

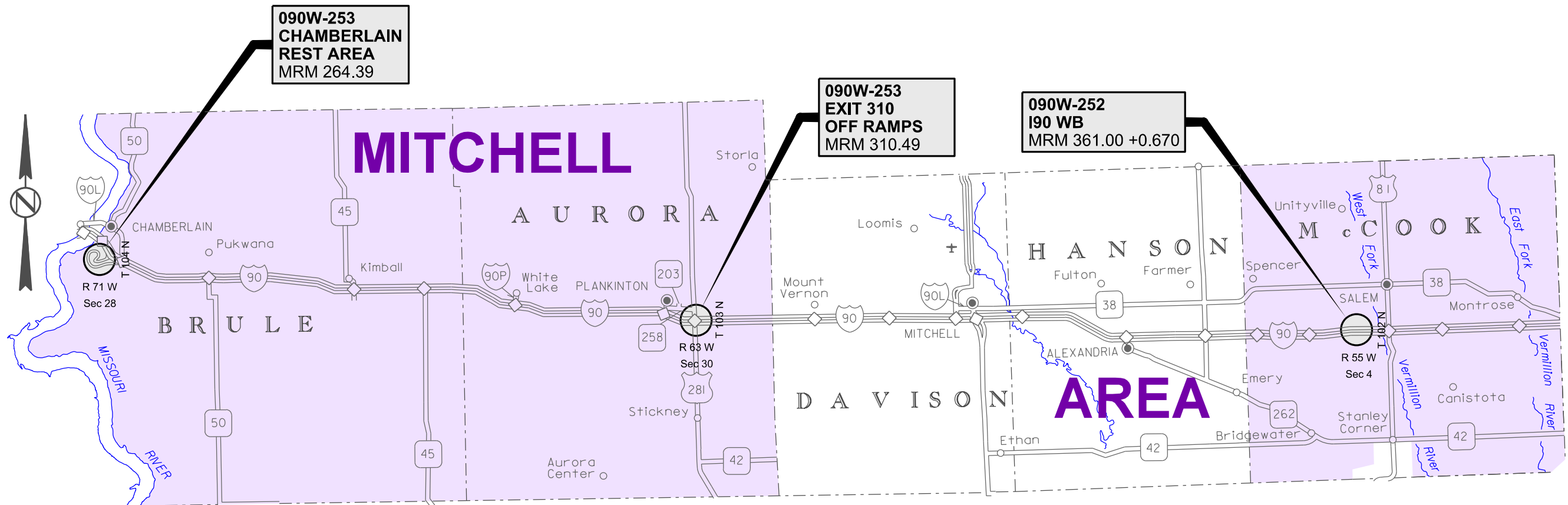
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PLOT SCALE - 1"=45500'



PROJECTS



**090W-253  
CHAMBERLAIN  
REST AREA  
MRM 264.39**

**090W-253  
EXIT 310  
OFF RAMP  
MRM 310.49**

**090W-252  
I90 WB  
MRM 361.00 +0.670**

**I90 CHAMBERLAIN REST AREA ADT (2017) NA**  
**I90W EXIT 310 OFF RAMP ADT (2017) 1,072**  
**I90W MCCOOK COUNTY ADT (2017) 5,311**

**STORM WATER PERMIT**  
(None required)

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# ESTIMATE OF QUANTITIES & ENVIRONMENTAL COMMITMENTS

STATE OF SOUTH DAKOTA	PROJECT	SHEET	TOTAL SHEETS
	090W-253 & 090W-252	2	28

## ESTIMATE OF QUANTITIES – 090W-253 – PCN I54M

BID ITEM NUMBER	ITEM	QUANTITY	UNIT
009E0010	Mobilization	Lump Sum	LS
380E5030	Nonreinforced PCC Pavement Repair	518.7	SqYd
380E6000	Dowel Bar	111	Each
380E6110	Insert Steel Bar in PCC Pavement	239	Each
634E0010	Flagging	10.0	Hour
634E0110	Traffic Control Signs	66.3	SqFt
634E0120	Traffic Control, Miscellaneous	Lump Sum	LS
634E0275	Type 3 Barricade	6	Each

## ESTIMATE OF QUANTITIES – 090W-252 – PCN I54L

BID ITEM NUMBER	ITEM	QUANTITY	UNIT
009E0010	Mobilization	Lump Sum	LS
380E5100	Continuously Reinforced PCC Pavement Repair	14.0	SqYd
380E6110	Insert Steel Bar in PCC Pavement	26	Each
634E0010	Flagging	10.0	Hour
634E0110	Traffic Control Signs	242.0	SqFt
634E0120	Traffic Control, Miscellaneous	Lump Sum	LS
634E0275	Type 3 Barricade	1	Each
634E0420	Type C Advance Warning Arrow Board	1	Each

### 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 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.

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.

# ENVIRONMENTAL COMMITMENTS

STATE OF SOUTH DAKOTA	PROJECT	SHEET	TOTAL SHEETS
	090W-253 & 090W-252	3	28

## **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 NRC PAVEMENT REPAIR ON 090-253 REST AREA - PCN I54M

STA.	OFF RAMP LEFT LANE		NRCP REPAIR SqYds	NEW JOINT CON-FIG. (NRCP)	INSERT STEEL BAR IN PCC PAVEMENT (NRCP)			DOWEL BAR Each	
	L Ft	W Ft			1½" x 18" PLAIN ROUND DOWEL BARS Each	No. 11 x 18" DEFORMED TIE BARS Each	No. 5 x 24" DEFORMED TIE BARS Each		INSERT STEEL BAR IN NRCP TOTAL Each
0+00	111	30	370.0	Truck On Ramp	20	6	33	59	90
7+40	172.5	5	95.8	Valley Gutter	6	-	95	101	18
<b>TOTALS:</b>			465.8		26	6	128	160	108

TABLE FOR NRC PAVEMENT REPAIR ON 090W-253 - PCN I54M WB

MRM	DISP	WB OFF RAMP LEFT LANE		WB OFF RAMP RIGHT 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	L Ft	W Ft			1½" x 18" PLAIN ROUND DOWEL BARS Each	No. 11 x 18" DEFORMED TIE BARS Each	No. 5 x 24" DEFORMED TIE BARS Each	
310.00	0.490	9	11	9	14	25.0	B	15	15	3	33
<b>TOTALS:</b>						25.0		15	15	3	33

**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

TABLE FOR NRC PAVEMENT REPAIR ON 090W-253 - PCN I54M EB

MRM	DISP	EB OFF RAMP LEFT LANE		EB OFF RAMP RIGHT LANE		NRCP REPAIR SqYds	NEW JOINT CON-FIG. (NRCP)	INSERT STEEL BAR IN PCC PAVEMENT (NRCP)			INSERT STEEL BAR IN NRCP TOTAL Each	DOWEL BAR Each
		L Ft	W Ft	L Ft	W Ft			1½" x 18" PLAIN ROUND DOWEL BARS Each	No. 11 x 18" DEFORMED TIE BARS Each	No. 5 x 24" DEFORMED TIE BARS Each		
310.00	0.230	7.5	11	7.5	12	19.2	B	15	15	3	33	
310.00	0.233			26	3	8.7	R		4	9	13	3
<b>TOTALS:</b>						27.9		15	19	12	46	3

**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

TABLE FOR CRC PAVEMENT REPAIR ON 090 W-252 - PCN I54L WB

MRM	DISP	LANE	WB PASSING LANE		CRCP REPAIR SqYds
			L Ft	W Ft	
361.00	0.670	Passing	10.5	12	14.0
<b>TOTALS:</b>					<b>14.0</b>

TABLE FOR CRC PAVEMENT REPAIR ON 090 W-252 - PCN I54L WB

MRM	DISP	LANE	REINFORCING STEEL (CRCP) FOR WB PASSING LANE (STEEL FOR CRCP IS NOT A BID ITEM - ACTUAL STEEL QUANTITIES WILL VARY DUE TO LOCATION AND SIZE OF INDIVIDUAL REPAIR AREAS)												INSERT STEEL BAR IN PCC PAVEMENT (CRCP) WB PASSING LANE						
			# bars @ length	Length	Lap Splice Length	Lap Stagger & Cutoff	# bars @ length	Length	Lap Splice Length	Lap Stagger & Cutoff	# bars @ length	Length	New Trans Bar Spacing	Reinforcing Steel Lbs	INSERT No. 6 LONG. BARS Each	INSERT No. 5 x 24" TIE BARS Each	INSERT BAR TOTAL Each				
361.00	0.670	Passing	22 bars @ 105" =	192.50'	25"	13"	11 bars @ 79" =	72.42'	25"	14"	11 bars @ 90" =	82.50'	25"	14"	4 bars @ 138" =	46.00'	2'	552.553	22	4	26
<b>TOTALS:</b>			<b>22 bars</b>	<b>193'</b>			<b>11 bars</b>	<b>72'</b>			<b>11 bars</b>	<b>83'</b>			<b>4 bars</b>	<b>46'</b>		<b>553 Lbs</b>	<b>22</b>	<b>4</b>	<b>26</b>

## SUMMARY OF PCC PAVEMENT REPAIR QUANTITIES

Location	Item	PCC PAVEMENT REPAIR		INSERT STEEL BAR IN PCC PAVEMENT				NABI *		Dowel Bars (in Baskets)	
		Nonreinforced	Continuously Reinforced	1 1/2" Plain Round Dowel Bars	No. 11 x 18" Deformed Tie Bars	No. 5 x 24" Deformed Tie Bars	No. 6 Longitudinal Deformed Tie Bars	Total All Inserted Bars	No. 6 Longitudinal Deformed Tie Bars		No. 4 Transverse Deformed Tie Bars
Unit		SqYds	SqYds	Each	Each	Each	Each	Each	Each	Each	
<b>PCN I54M</b>											
Exit 310 WB Off Ramp		27.9	-	15	19	12	-	46	-	-	3
Exit 310 WB Off Ramp		25	-	15	15	3	-	33	-	-	-
Chamberlain Rest Area		-	-	-	-	-	-	-	-	-	-
Valley Gutter		95.8	-	6	-	95	-	101	-	-	18
Chamberlain Rest Area		-	-	-	-	-	-	-	-	-	-
Truck On Ramp		370	-	20	6	33	-	59	-	-	90
<b>PCN I54M Totals:</b>		<b>518.7</b>	<b>-</b>	<b>56</b>	<b>40</b>	<b>143</b>	<b>-</b>	<b>239</b>	<b>-</b>	<b>-</b>	<b>111</b>
<b>PCN I54L</b>											
CRC WB 361.67			14.0		-	4	22	26	22	4	-
<b>PCN I54L Totals:</b>		<b>-</b>	<b>14.0</b>	<b>-</b>	<b>-</b>	<b>4</b>	<b>22</b>	<b>26</b>	<b>22</b>	<b>4</b>	<b>-</b>
<b>Grand Totals:</b>		<b>518.7</b>	<b>14.0</b>	<b>56</b>	<b>40</b>	<b>147</b>	<b>22</b>	<b>265</b>	<b>22 *</b>	<b>4 *</b>	<b>111</b>

\* NABI = Not A Bid Item (Cost is included in the CRC Repair).

### **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.

### **EXISTING NRC PAVEMENT**

The existing pavement is 10.5" x 25' NRC Pavement at the 281 Exit and 9" x varying widths at the Chamberlain Rest Area.

The aggregate in the existing NRC Pavement is quartzite

### **EXISTING CRC PAVEMENT**

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 furnish, place and compact gravel cushion to the satisfaction of the Engineer at no additional cost to the State.

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

### **NONREINFORCED PCC PAVEMENT REPAIR - GENERAL**

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

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

Existing concrete pavement shall be sawed full depth at the beginning and end of the 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 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 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.

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'.

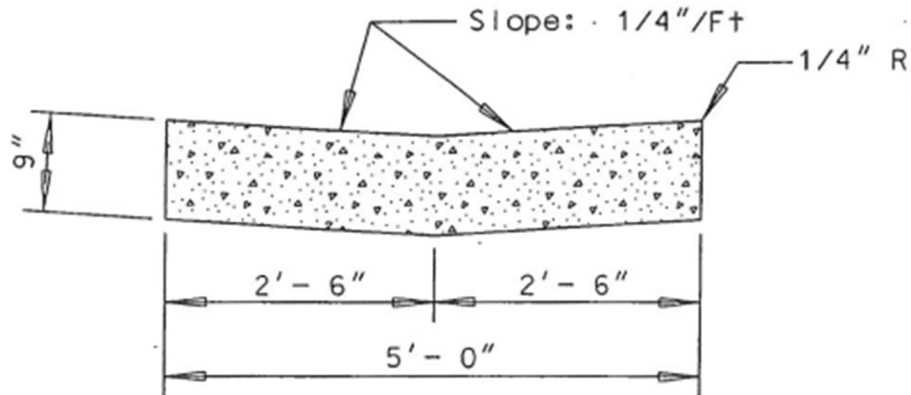
Concrete shall be covered with suitable insulation blanket consisting of a layer of closed cell polystyrene foam protected by at least one layer of plastic. Insulation blanket shall have an R-value of at least 0.5, as rated by the manufacturer. Insulation blanket shall be left in place, except for joint 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 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.



### 9 INCH CONCRETE VALLEY GUTTER

Concrete Valley Gutter (9 inch thick) shall be constructed as shown below and in accordance with Section 380. The concrete for the Concrete Valley Gutter shall be the same mix as the 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.

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

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).

### CONTINUOUSLY REINFORCED PCC PAVEMENT REPAIR (CONTINUED)

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.

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.

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 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 380.3 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 (1½" x 18" epoxy coated plain round dowel bars and No. 11 x 18" or 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.

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 380.3 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

**ITEMIZED LIST FOR TRAFFIC CONTROL SIGNS - PCN I54M**

SIGN CODE	SIGN DESCRIPTION	EXPRESSWAY / INTERSTATE			
		NUMBER	SIGN SIZE	SQFT PER SIGN	SQFT
R2-1	SPEED LIMIT 45	1	36" x 48"	12.0	12.0
R2-1	SPEED LIMIT 65	3	36" x 48"	12.0	36.0
R2-1	SPEED LIMIT 80	1	36" x 48"	12.0	12.0
R2-6aP	FINES DOUBLE (plaque)	1	36" x 24"	6.0	6.0
W3-5	SPEED REDUCTION AHEAD (45 MPH)	1	48" x 48"	16.0	16.0
W3-5	SPEED REDUCTION AHEAD (65 MPH)	2	48" x 48"	16.0	32.0
W4-2	LEFT or RIGHT LANE ENDS (symbol)	2	48" x 48"	16.0	32.0
W20-1	ROAD WORK AHEAD	2	48" x 48"	16.0	32.0
W20-5	LEFT or RIGHT LANE CLOSED AHEAD	2	48" x 48"	16.0	32.0
W20-7	FLAGGER (symbol)	1	48" x 48"	16.0	16.0
G20-2	END ROAD WORK	2	48" x 24"	8.0	16.0
<b>EXPRESSWAY / INTERSTATE TRAFFIC CONTROL SIGNS SQFT</b>					<b>242.0</b>

**ITEMIZED LIST FOR TRAFFIC CONTROL SIGNS - PCN I54L**

SIGN CODE	SIGN DESCRIPTION	EXPRESSWAY / INTERSTATE			
		NUMBER	SIGN SIZE	SQFT PER SIGN	SQFT
R11-2	ROAD CLOSED	2	48" x 30"	10.0	20.0
W5-4	RAMP NARROWS	1	48" x 48"	16.0	16.0
W13-1P	ADVISORY SPEED (plaque)	1	30" x 30"	6.3	6.3
SPECIAL	RAMP WORK AHEAD	1	48" x 48"	16.0	16.0
G20-2	END ROAD WORK	1	48" x 24"	8.0	8.0
<b>EXPRESSWAY / INTERSTATE TRAFFIC CONTROL SIGNS SQFT</b>					<b>66.3</b>

### **SEQUENCE OF OPERATION**

Due to the Sturgis Motorcycle Rally, no lane closures will be allowed (except for emergency repair) in:

- The Westbound lanes of I90 from Friday, August 3 through Friday, August 10, 2018
- The Eastbound lanes of I90 from Wednesday, August 8 through Sunday, August 12, 2018.
- The Chamberlain Rest Area from Friday, August 3 through Sunday, August 12, 2018.

### **SHEETING FOR TRAFFIC CONTROL SIGNS**

All fluorescent orange background material on traffic control signs, all temporary delineators, and all temporary STOP (R1-1), YIELD (R2-1), 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.

### **GENERAL MAINTENANCE OF TRAFFIC**

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

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

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

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

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 shall be furnished by the Contractor.

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 and hot-mix asphalt concrete shall be furnished and installed 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 or Continuously Reinforced PCC Pavement Repair.

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

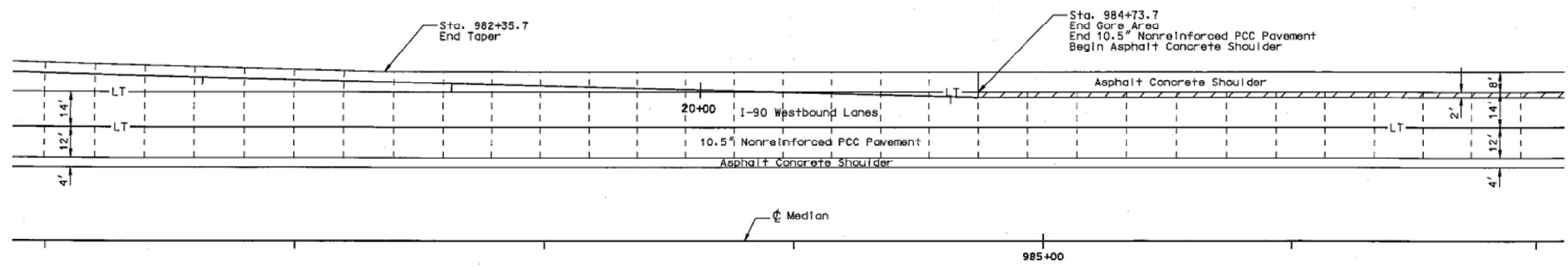
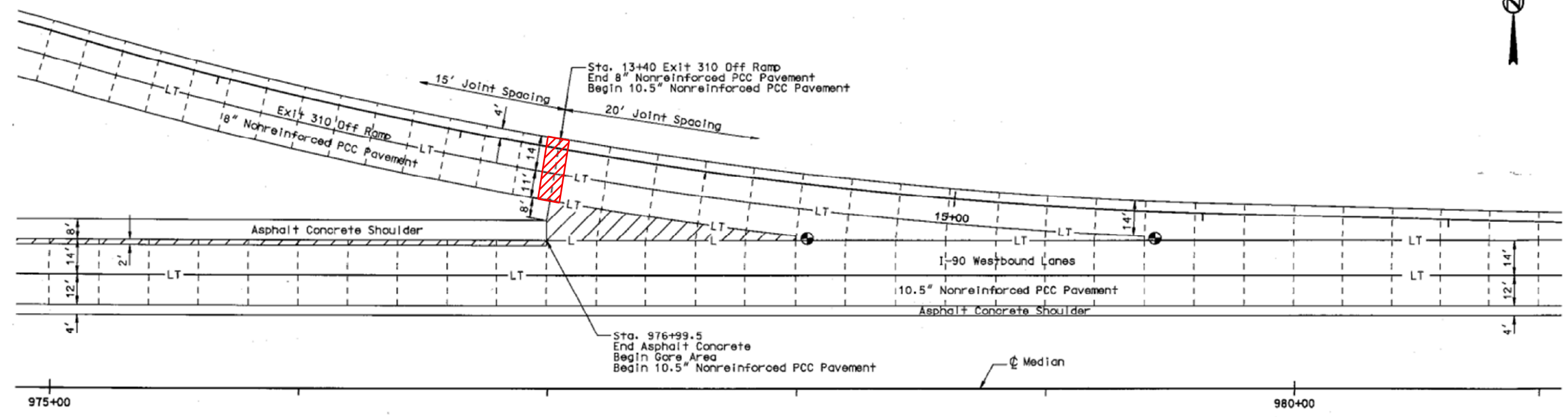
Damage to the shoulders, median or ditch due to the Contractor's operations shall be repaired by the Contractor, to the satisfaction of the Engineer, at no expense to the State. This includes the apparent routing of traffic onto these shoulders around the work zones.

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.

# EXIT 310 WB OFFRAMP



PLOT SCALE - 1:220

PLOTTED FROM - TRMLINT15

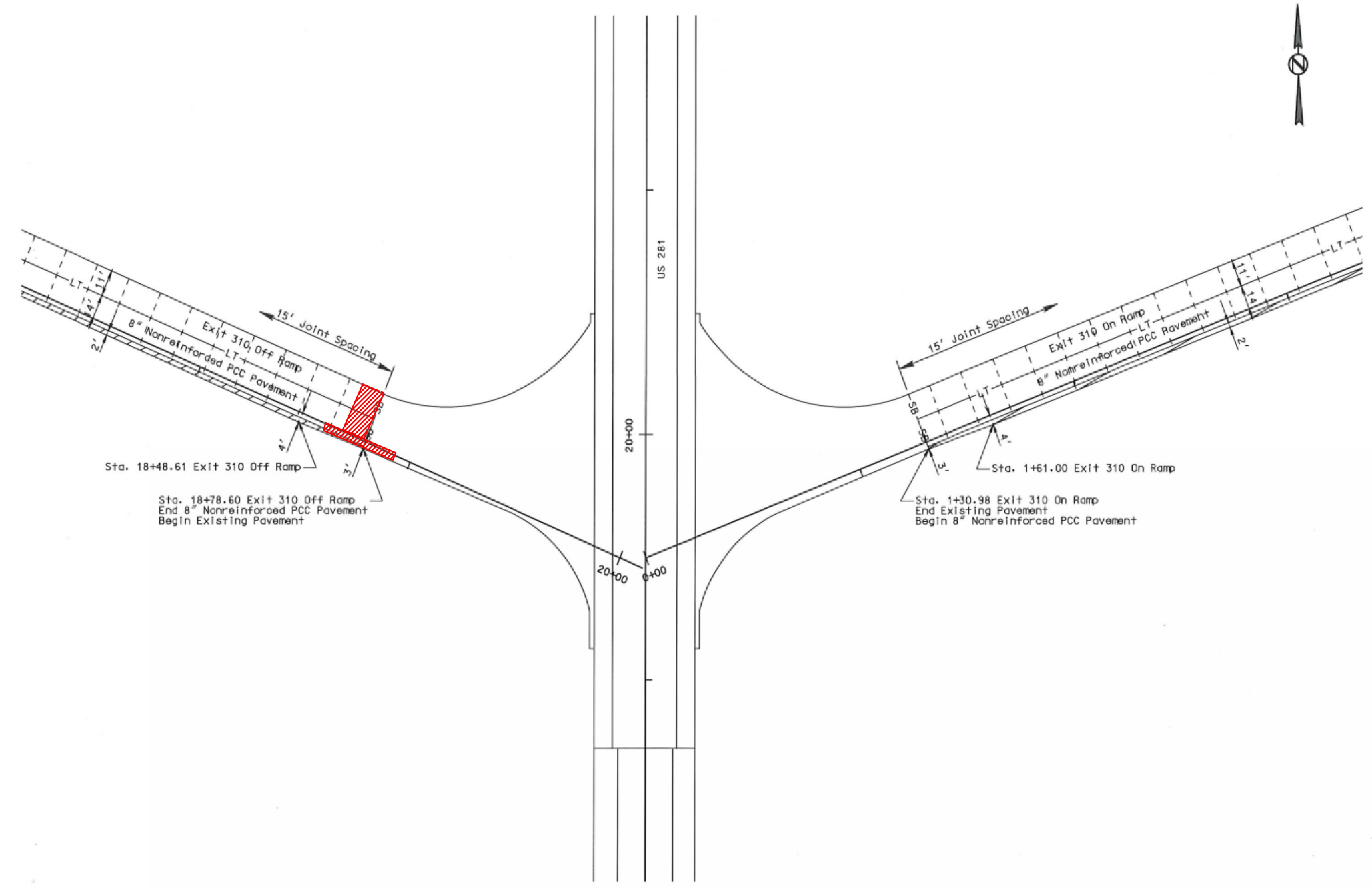
PLOT NAME - 2

FILE - ... \PCCP REPAIR 154M & 154L.DGN

STATE OF SOUTH DAKOTA	PROJECT	SHEET	TOTAL SHEETS
	090W-253 & 090W-252	12	28

Plotting Date: 05/31/2018

# EXIT 310 EB OFFRAMP



PLOT SCALE - 1:220

PLOTTED FROM - TRMLINT15




PLOT NAME - 3

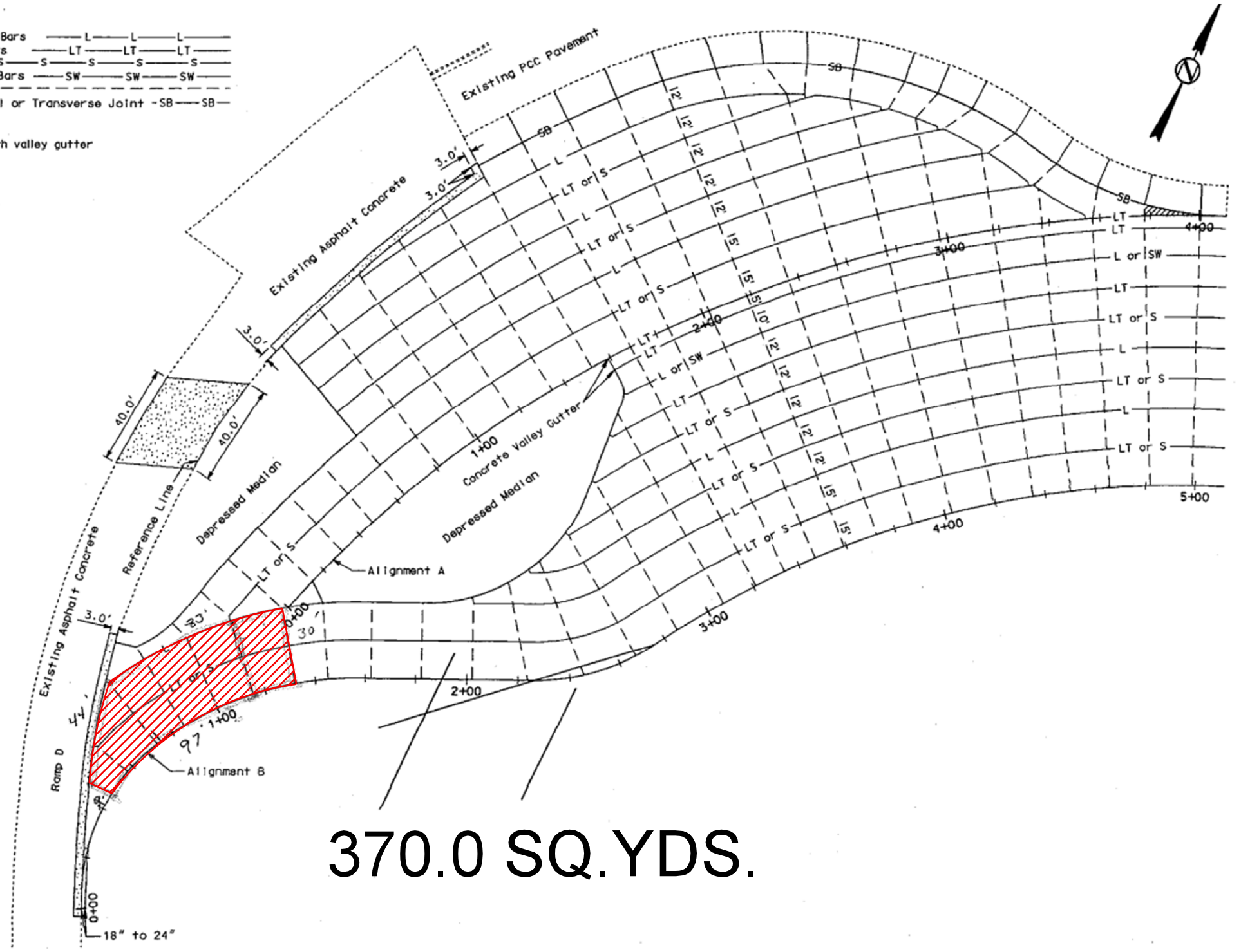
FILE - ... \PCCP REPAIR 154M & 154L.DGN

# CHAMBERLAIN REST AREA TRUCK EXIT RAMP

**LEGEND:**

- Longitudinal Construction Joint Without Tie Bars — L — L — L —
- Longitudinal Construction Joint With Tie Bars — LT — LT — LT —
- Sawed Longitudinal Joint — S — S — S — S — S — S —
- Sawed Longitudinal Joint Without Tie Bars — SW — SW — SW — SW —
- Transverse Contraction Joint — SB — SB —
- Steel Bar Installation in Longitudinal or Transverse Joint — SB — SB —

-  Area to be poured monolithically with valley gutter
-  Asphalt Concrete Composite
-  Existing PCC Pavement & Joints



**370.0 SQ. YDS.**

PLOT SCALE - 1:220

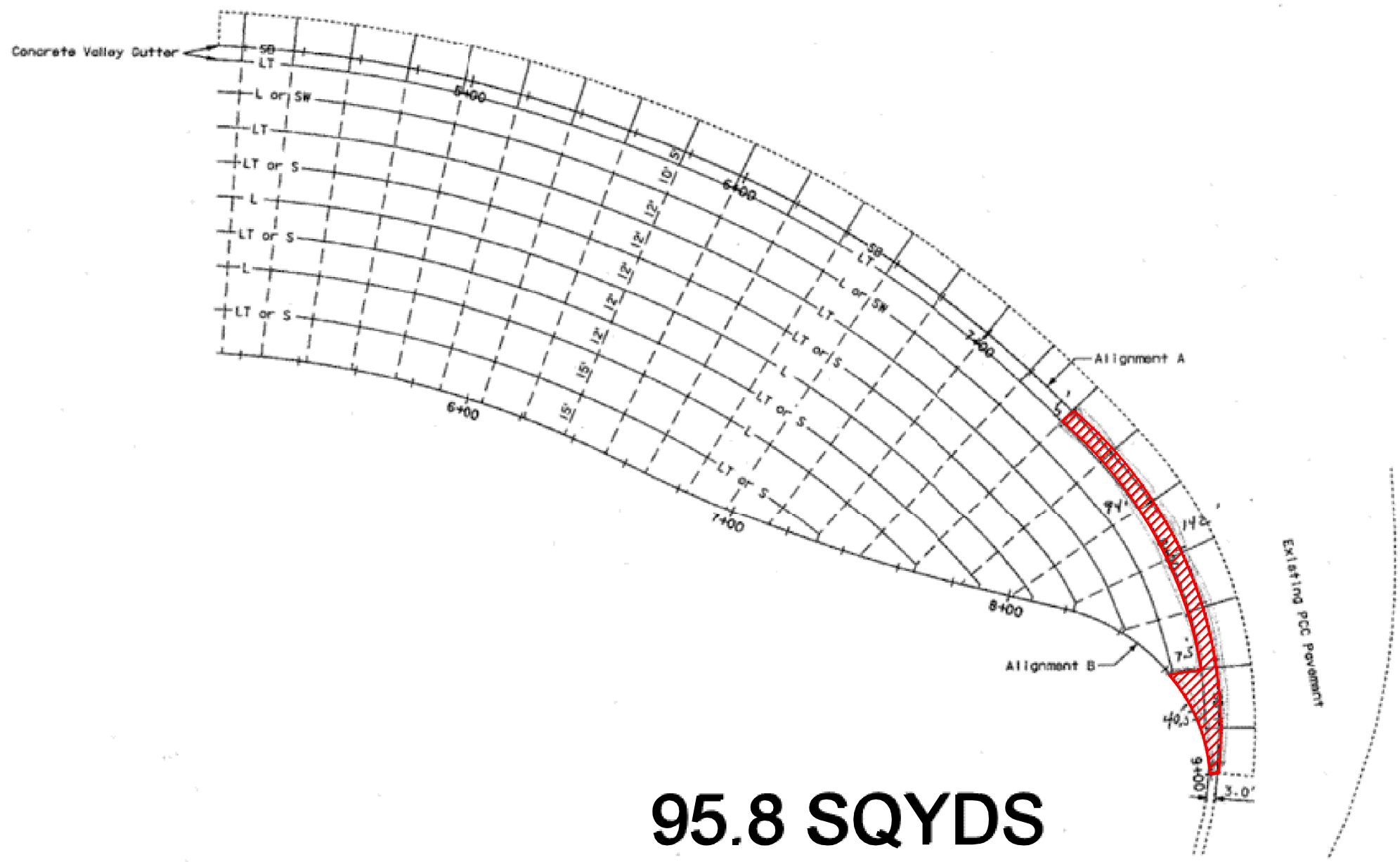
PLOTTED FROM - TRMLINT15

PLOT NAME - 4

FILE - ... \PCCP REPAIR 154M & 154L.DGN



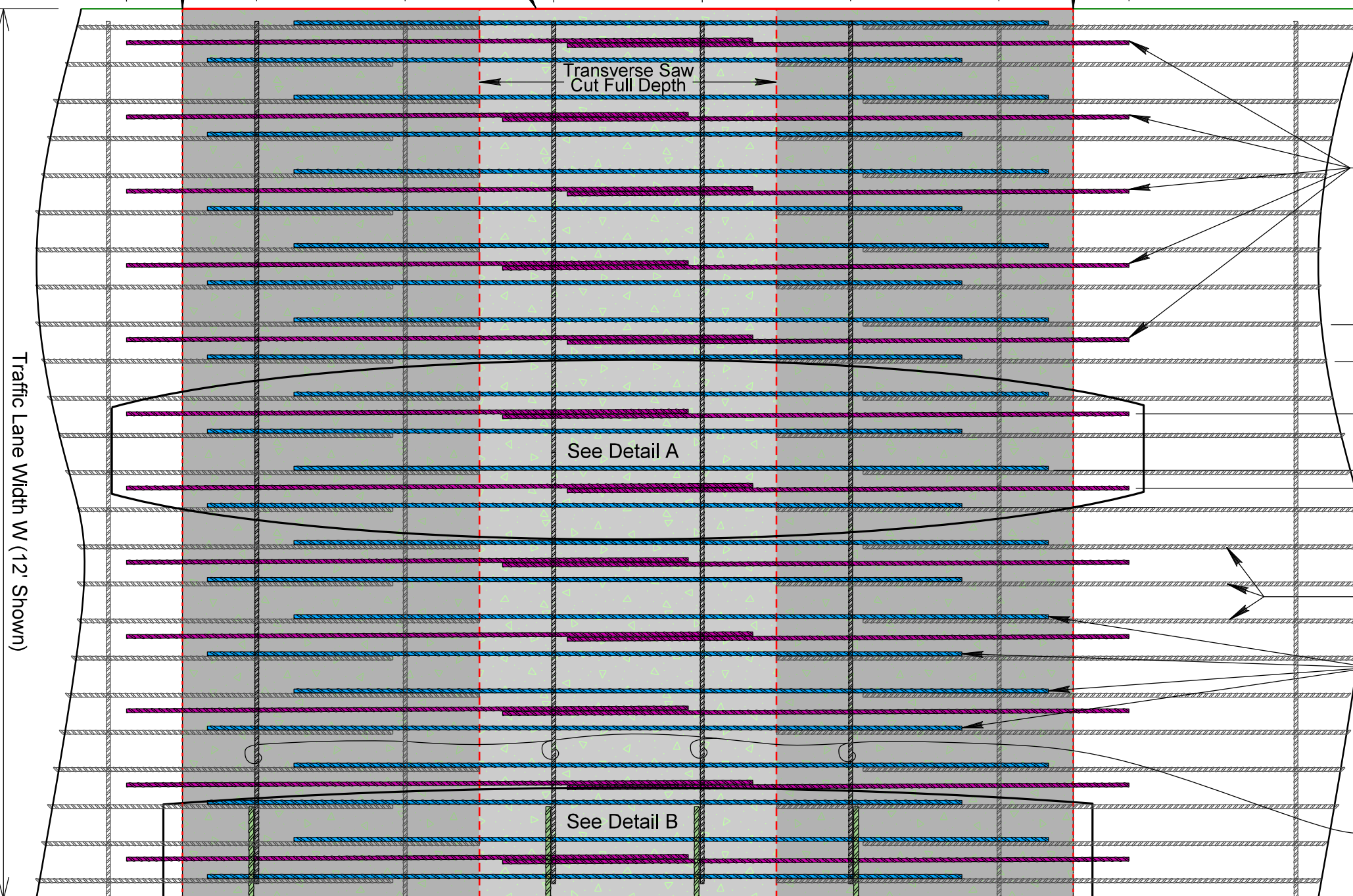
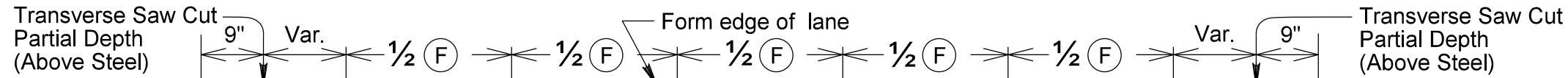
# CHAMBERLAIN REST AREA VALLEY GUTTER



**95.8 SQYDS**

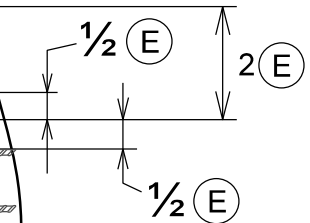


# CRC PAVEMENT REPAIR (FULL LANE WIDTH) - TYPICAL



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)

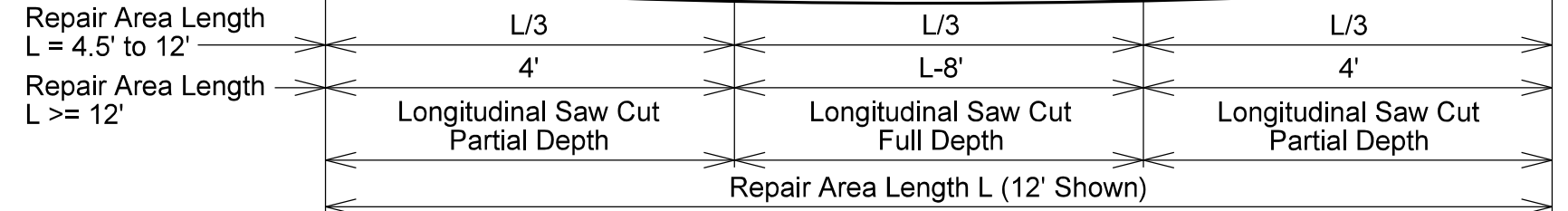
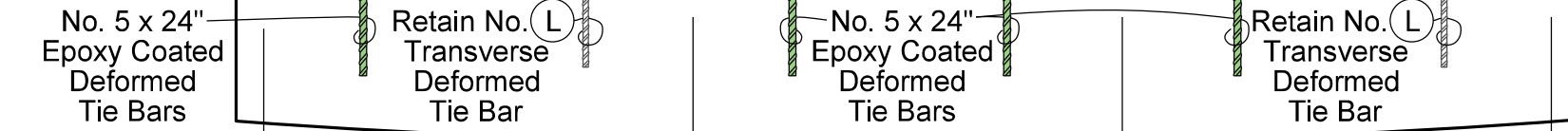


No. (C) Longitudinal Deformed Tie Bars In Place

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



DEFORMED TIE BAR DIMENSIONS KEY					
Underlying 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"

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

PLOT SCALE - 1:1.7

PLOTTED FROM - TRMLINT15

PLOT NAME - 10

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



# CRC PAVEMENT REPAIR (FULL LANE WIDTH)

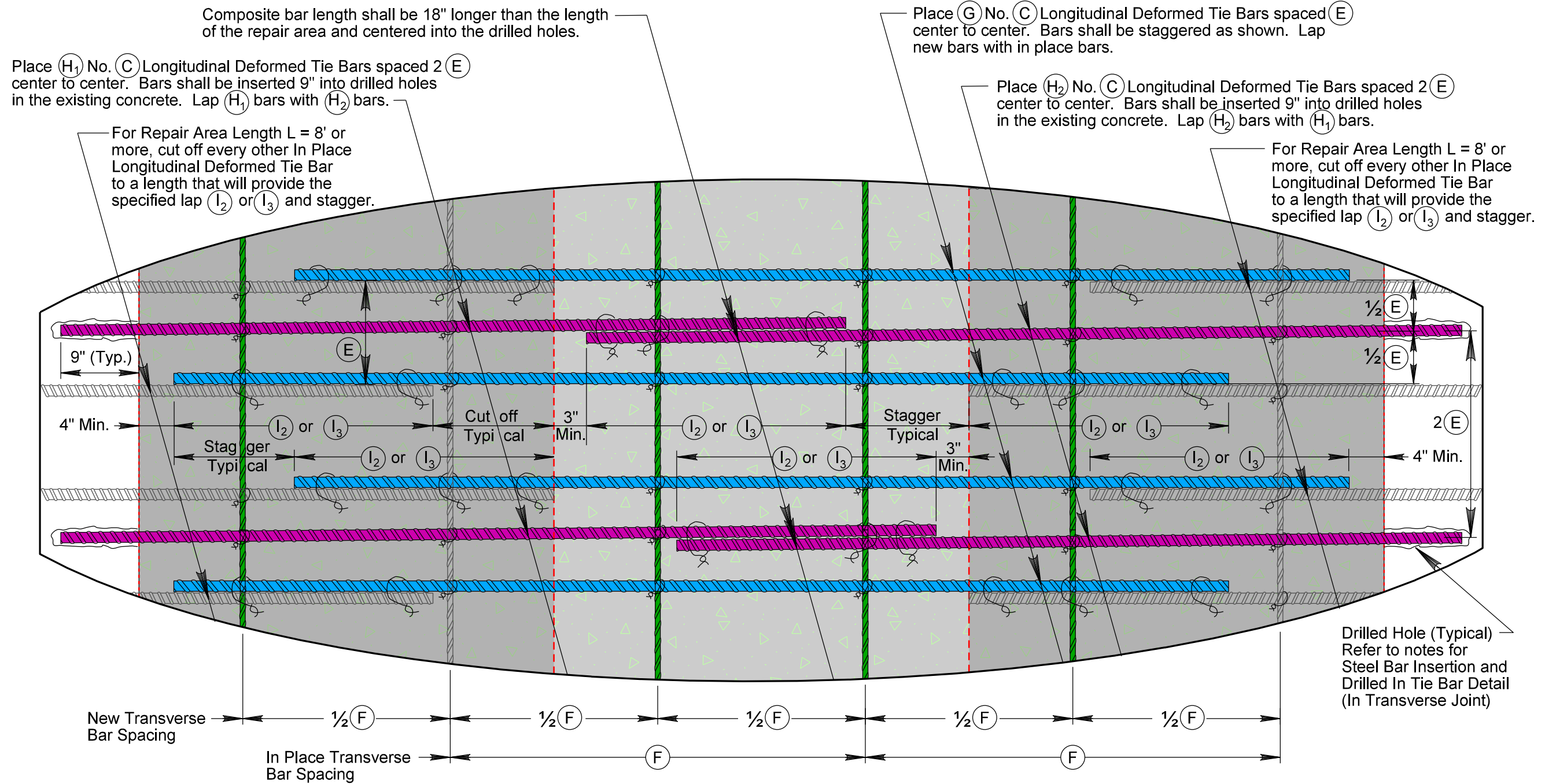
## Detail A

Plotting Date: 05/31/2018

PLOT SCALE - 1:1.07

PLOT NAME - 11

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



### 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	$(C)$	$(E)$	$(L)$	$(F)$
5359	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:

$(G)$ ,  $(H_1)$  &  $(H_2)$

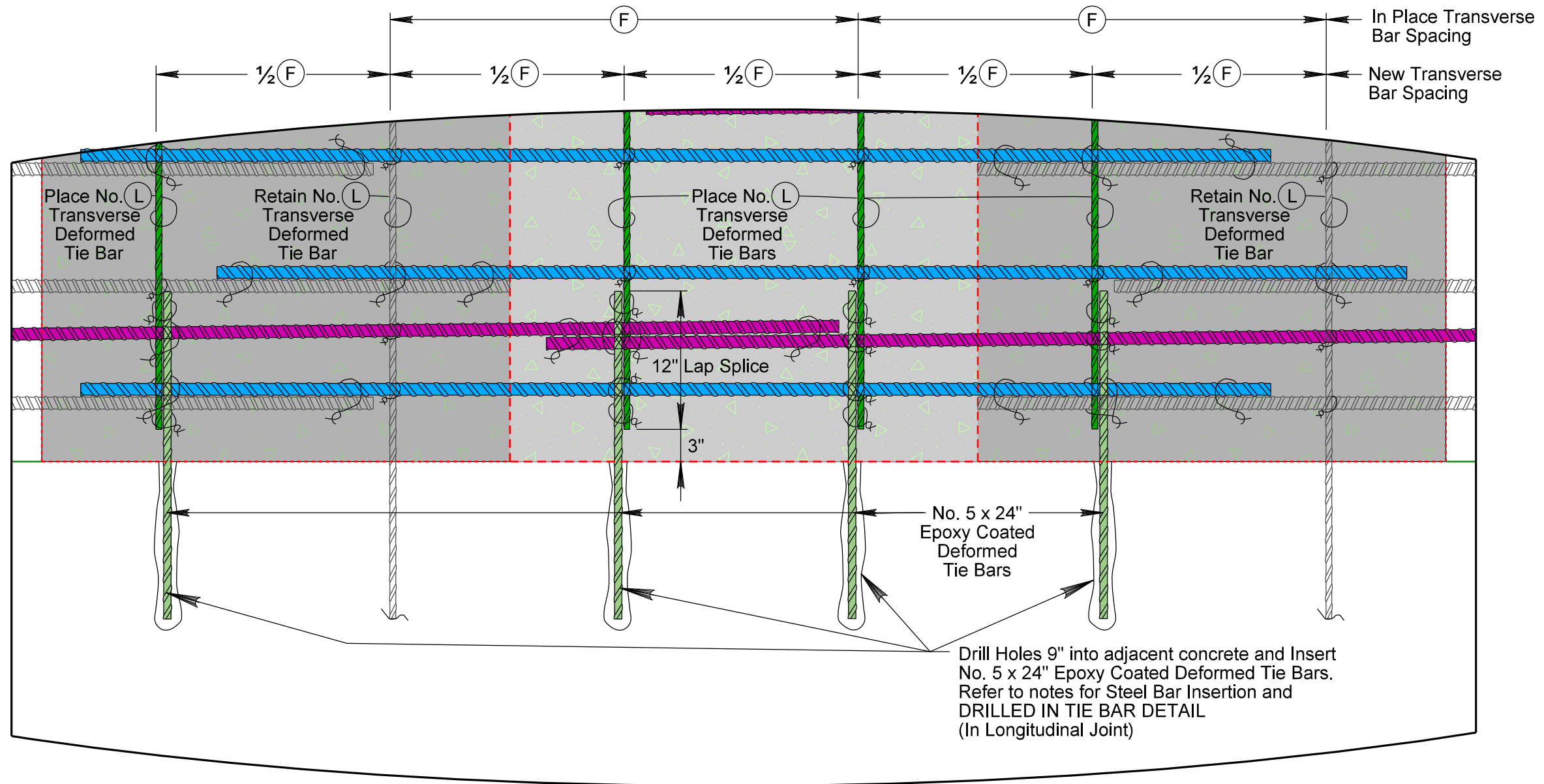
### CRC REPAIR AREA KEY

- Remove Concrete Retain Reinforcing Steel
- Remove Concrete Remove Reinforcing Steel

PLOTTED FROM - TRMLINT15

# CRC PAVEMENT REPAIR (FULL LANE WIDTH)

## Detail B



### DEFORMED TIE BAR KEY

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

### DEFORMED TIE BAR DIMENSIONS KEY

Underlying Plans	CRC Depth	Longitudinal Steel		Transverse Steel	
		Size	Spacing	Size	Spacing
PCN	T	(C)	(E)	(L)	(F)
5359	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

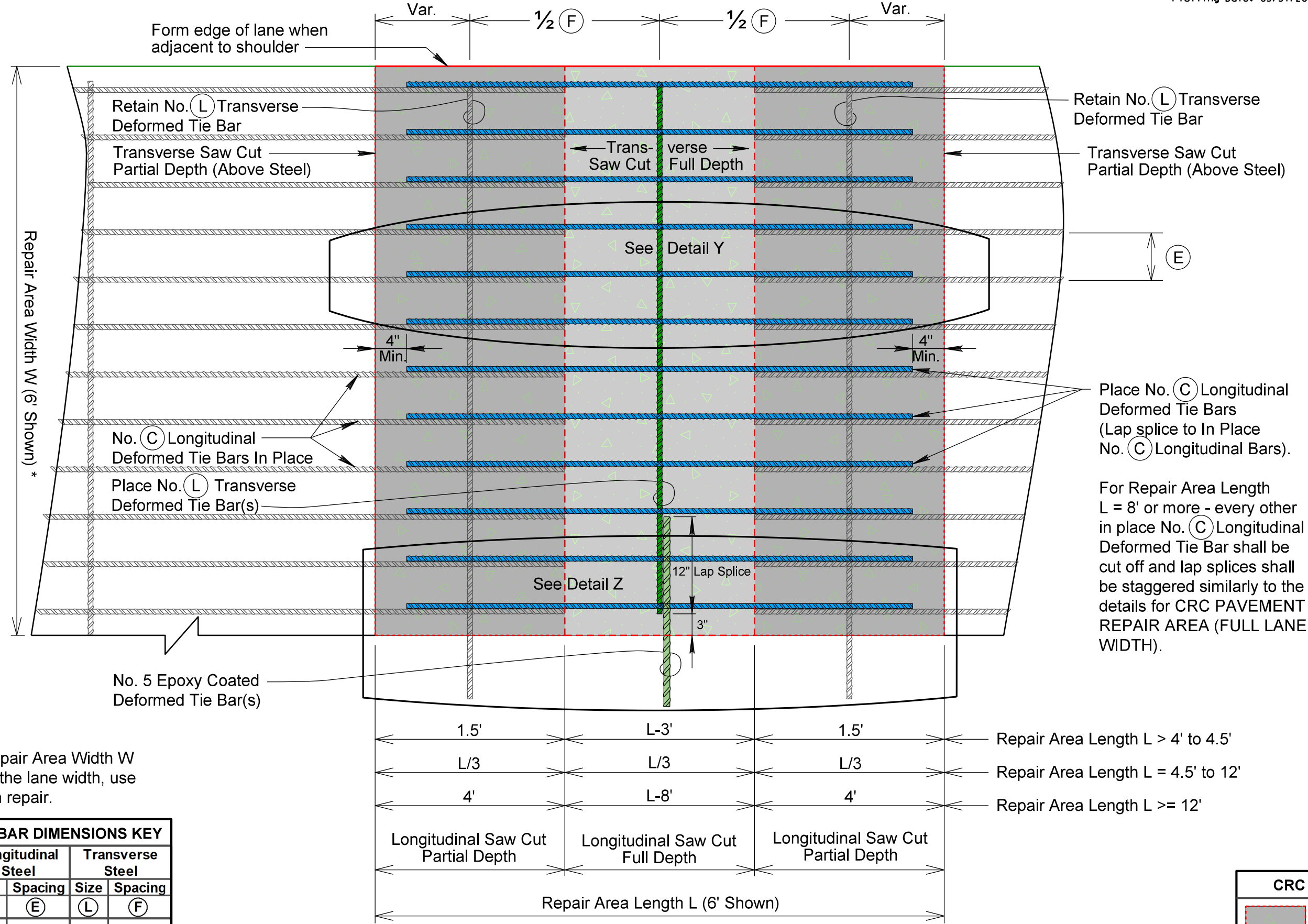
PLOT NAME - 12

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

PLOTTED FROM - TRMLINT15



# CRC PAVEMENT REPAIR (PARTIAL LANE WIDTH) - TYPICAL



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

\* 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)
5359	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

PLOT NAME - 13

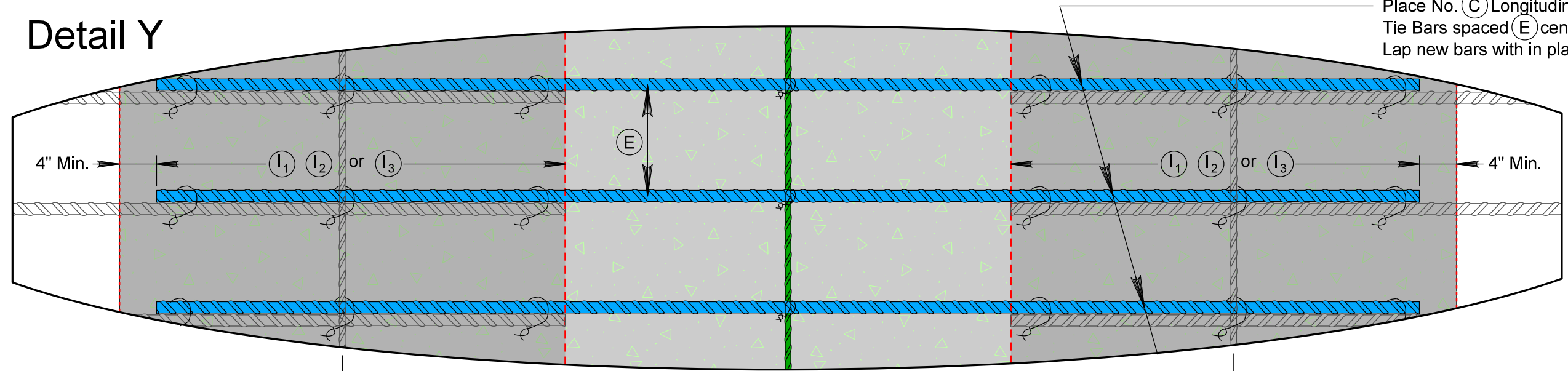
FILE - ... \CRC PARTIAL WIDTH REPAIR.DGN

# CRC PAVEMENT REPAIR (PARTIAL LANE WIDTH)

STATE OF SOUTH DAKOTA	PROJECT	SHEET	TOTAL SHEETS
	090W-253 & 090W-252	20	28

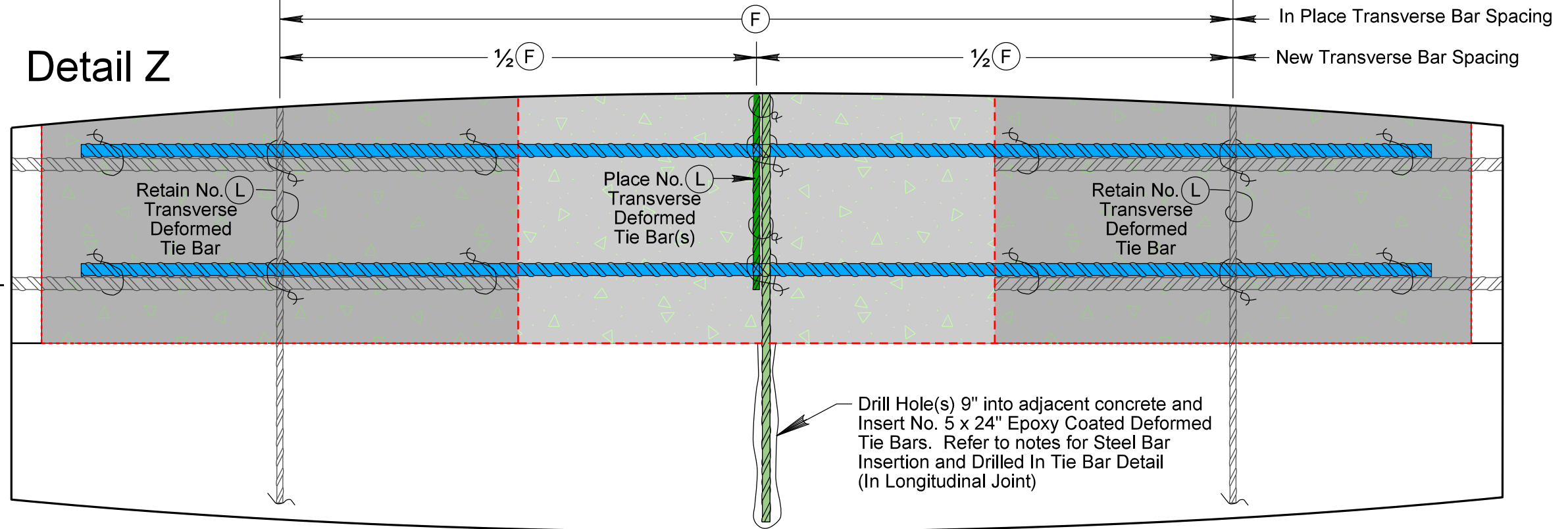
Plotting Date: 05/31/2018

## 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).

### 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)
5359	10"	6	6 1/2"	4	48"

### LAP SPLICE LENGTH KEY

(I <sub>1</sub> )	Lap Splice length for Repair Area Length L = 4' to 4.5'.
(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'.

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

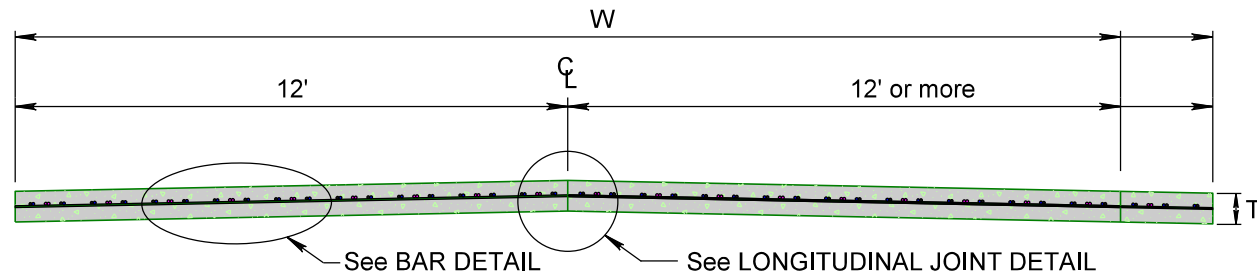
PLOT NAME - 14

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

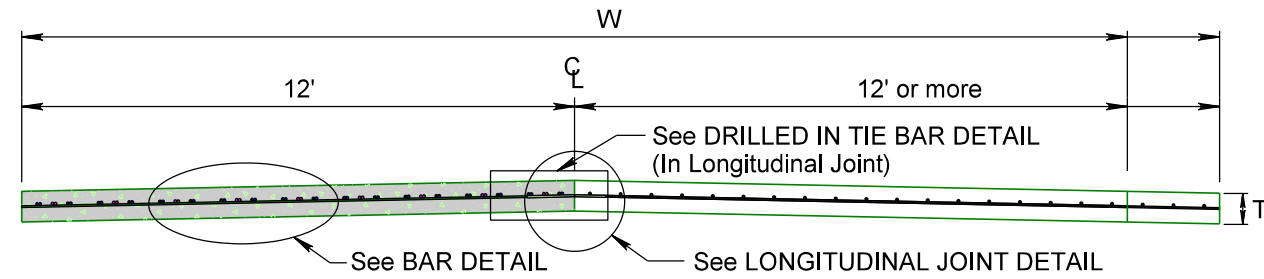
# CRC PAVEMENT REPAIR - REINFORCING STEEL DETAILS

Plotting Date: 05/31/2018

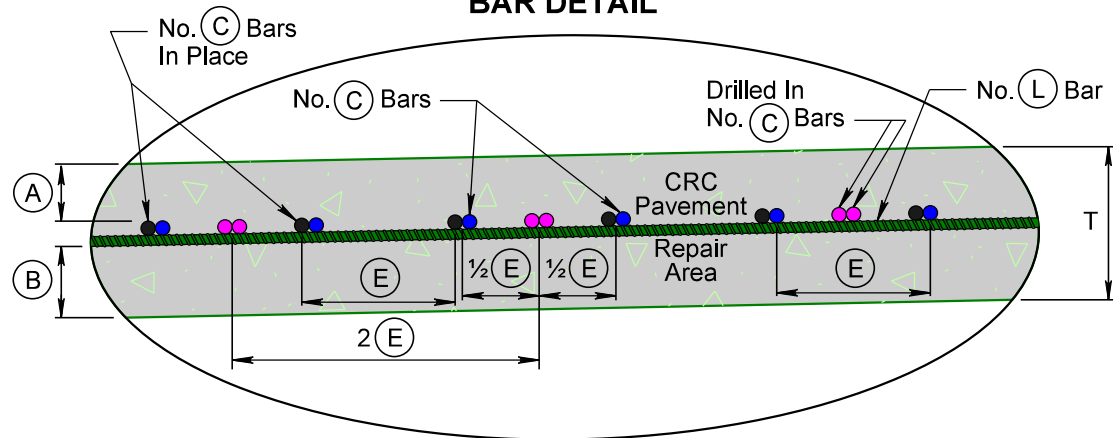
### TRANSVERSE SECTION SHOWING STEEL PLACEMENT



### TRANSVERSE SECTION SHOWING STEEL PLACEMENT



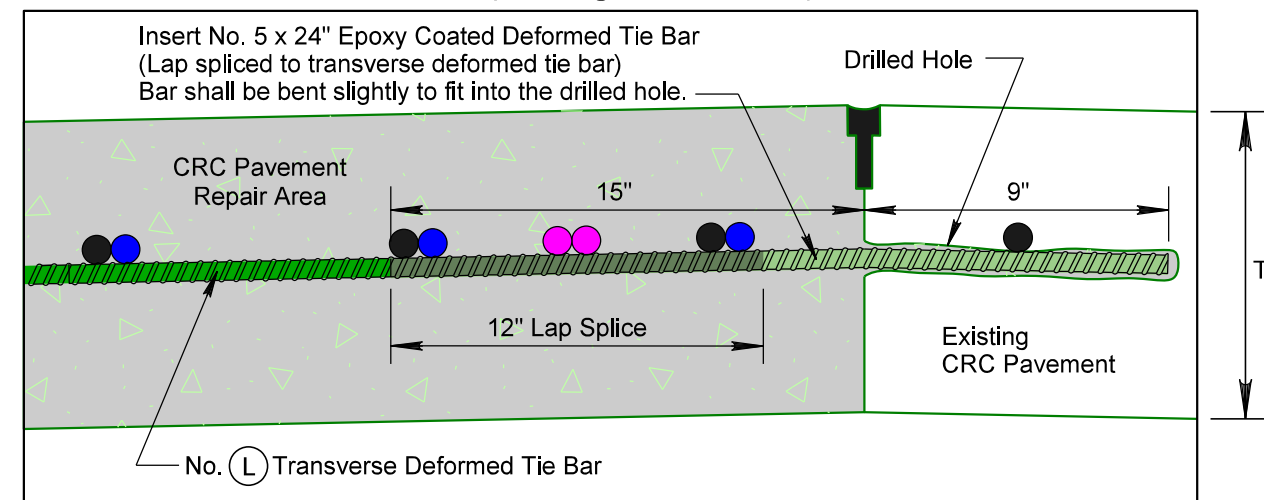
### BAR DETAIL



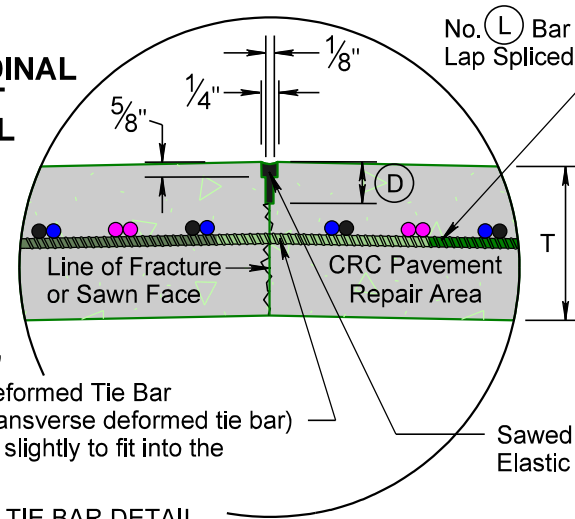
Placement of longitudinal steel bars may vary from +1/2" to -1/2" vertically and 3/4" horizontally. Placement of transverse steel bars may vary from +1/2" to -1/2" vertically and 2" horizontally.

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

### DRILLED IN TIE BAR DETAIL (In Longitudinal Joint)



### LONGITUDINAL JOINT DETAIL



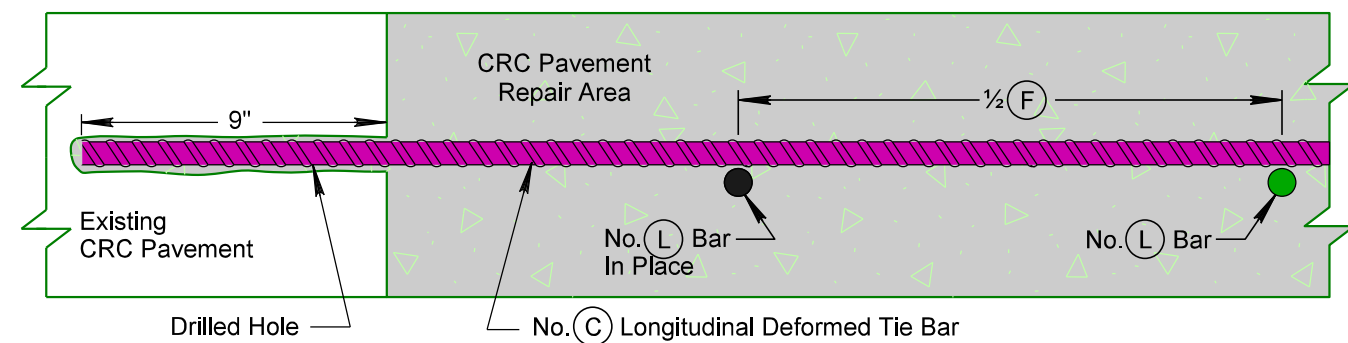
NOTE:

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

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

See DRILLED IN TIE BAR DETAIL (In Longitudinal Joint)

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



### CRC PAVEMENT IN PLACE & CRC PAVEMENT REPAIR KEY & DIMENSIONS

Location	Underlying Plans 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			L<4.5' l1	L=4.5' to 8'9" l2	L>=8'9" l3		K	M	N	P	
											G	H1	H2	G	H1	H2									
190W MRM 353.07 +0.006 to MRM 362.00 +0.045	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"

PLOT SCALE - 1/8"=33.3333

PLOTTED FROM - TRMLINT15

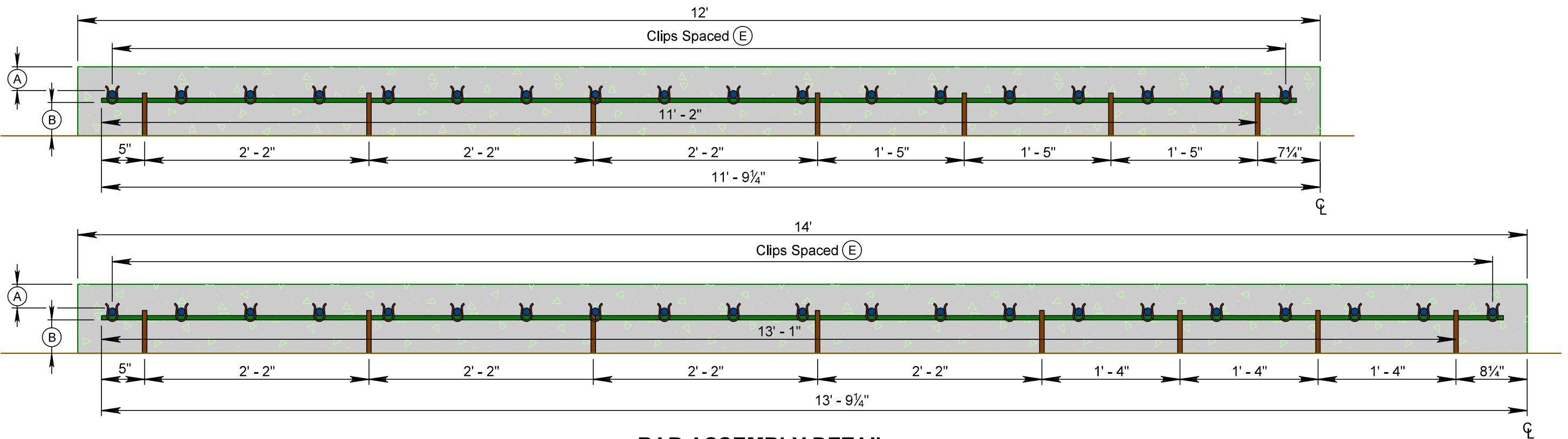
PLOT NAME - 15

FILE - ... \CRC BARS.DGN

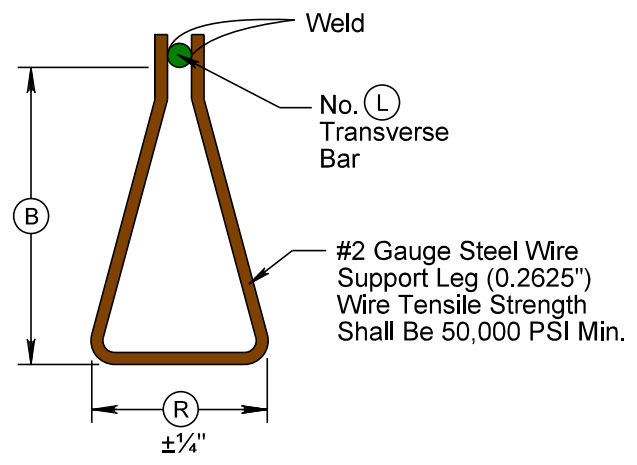
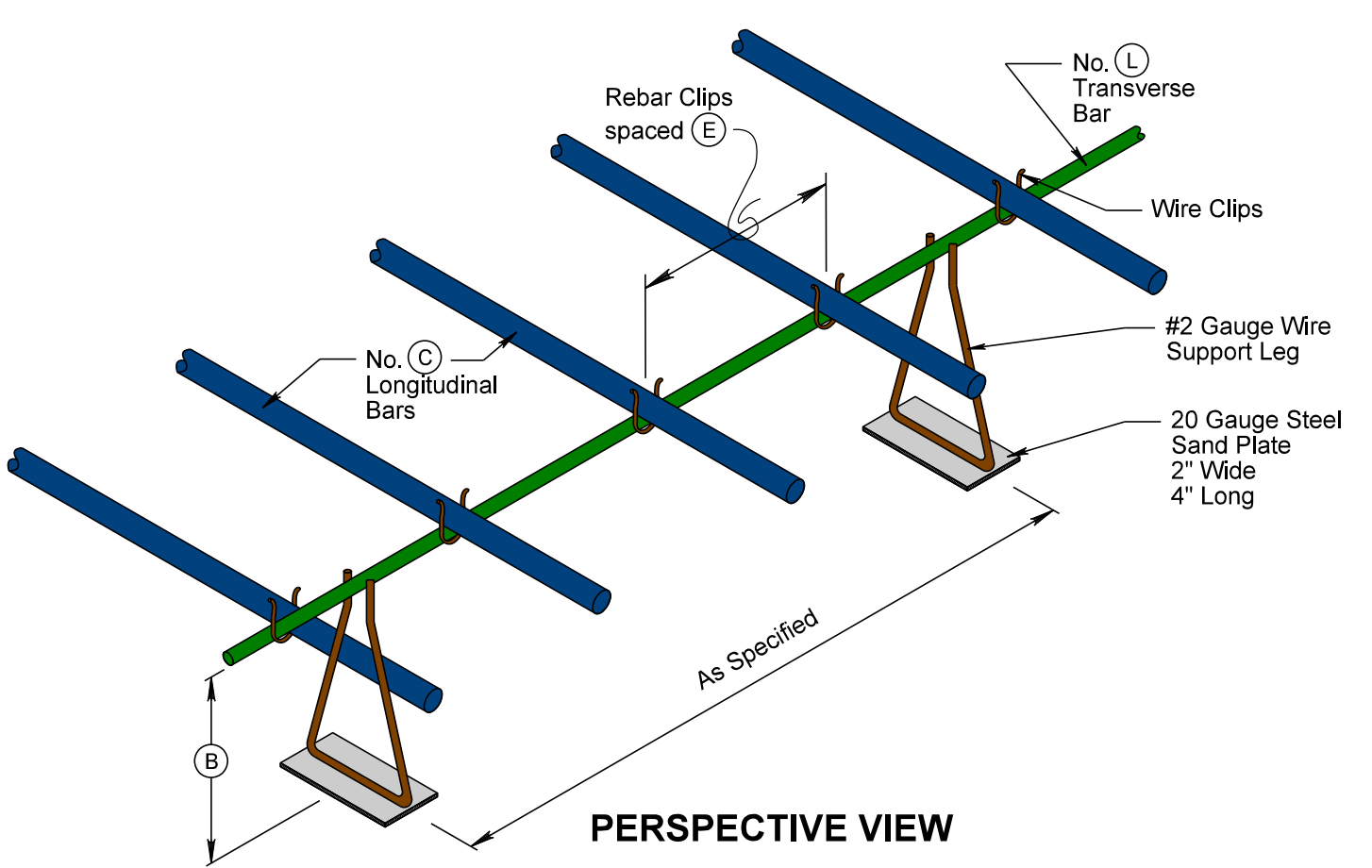


# CRC PAVEMENT CHAIR DETAILS

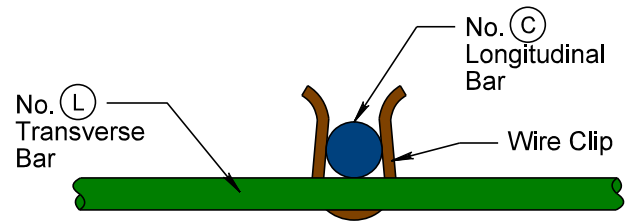
Plotting Date: 05/31/2018



## 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)
5359	10"	26'	3 1/2"	5 1/4"	6	6 1/2"	2 1/2"	4	48"	5"

PLOT SCALE - 1:1

PLOTTED FROM - TRMLINT15

PLOT NAME - 16

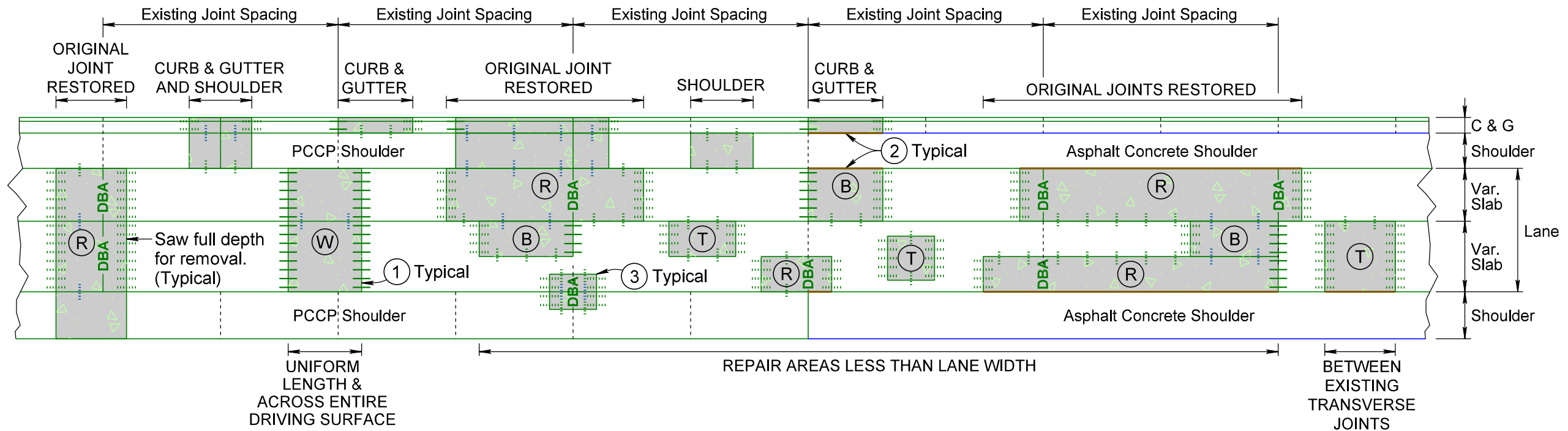
FILE - ... \CRC CHAIR DETAILS.DGN

# NONREINFORCED PCC PAVEMENT REPAIR

## ANY SINGLE LANE ROADWAY (RAMPS, ETC.) TYPICAL REPAIR AREAS

STATE OF SOUTH DAKOTA	PROJECT	SHEET	TOTAL SHEETS
	090W-253 & 090W-252	23	28

Plotting Date: 05/31/2018



### 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. 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.

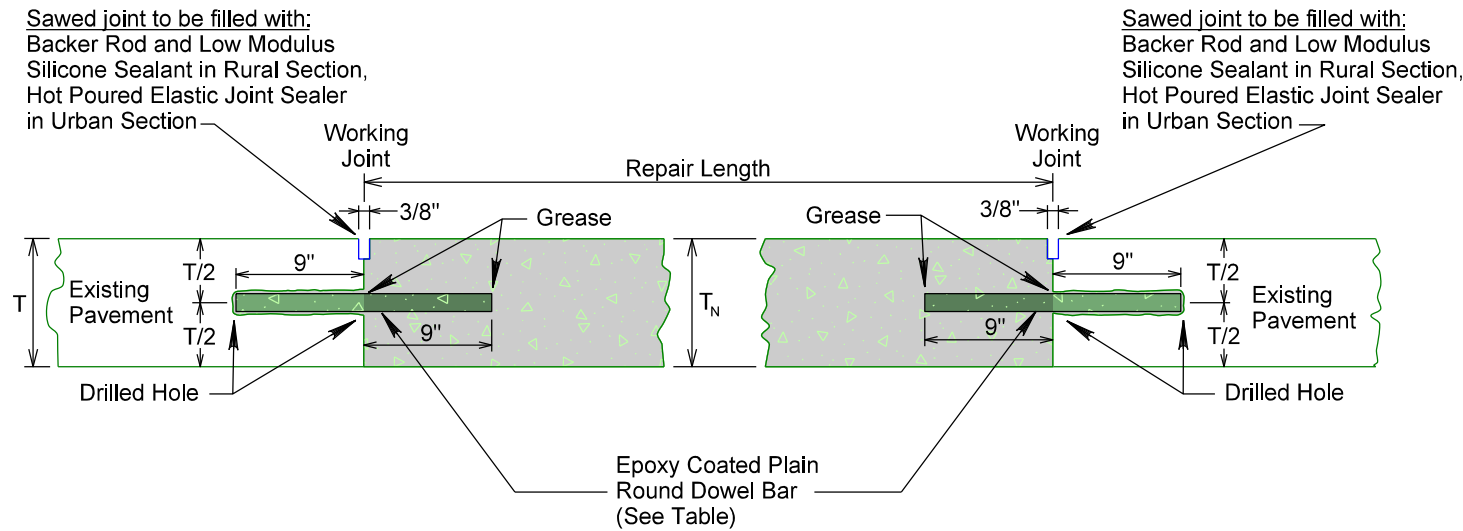
- (1) Where possible, transverse joints shall be constructed/maintained full roadway width.
- (2) Edges of repair areas shall be formed to match the width of the existing concrete pavement.
- (3) Need for bars in small repair areas on/near the shoulder to be determined on a case-by-case basis, on construction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



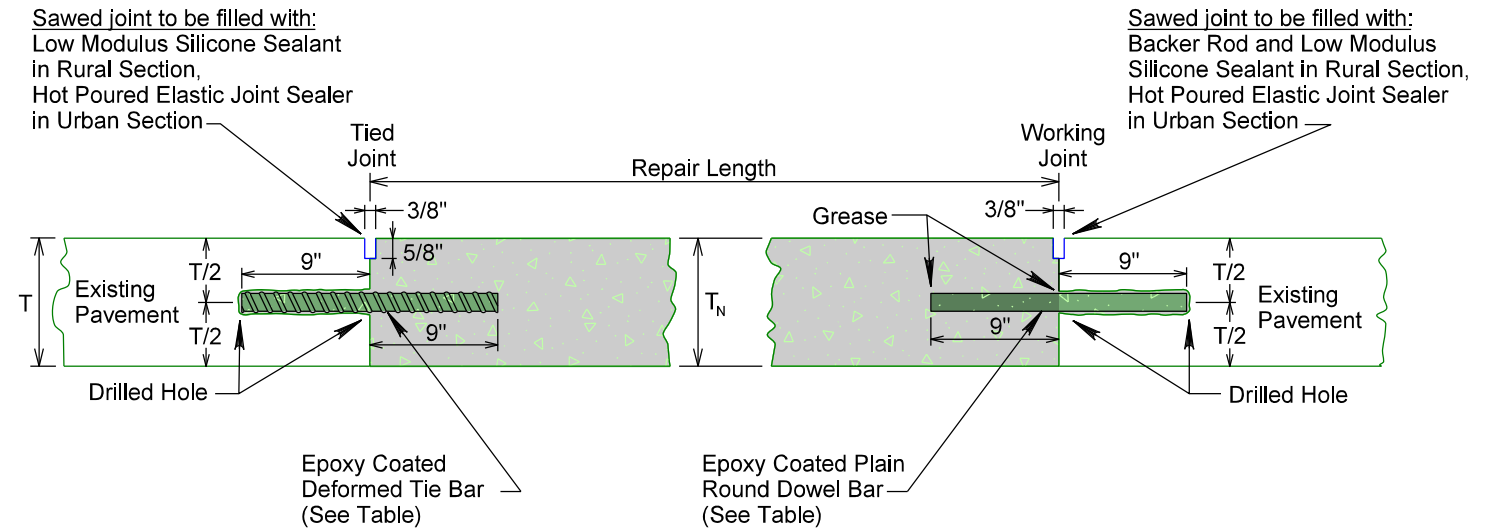
# NONREINFORCED PCC PAVEMENT REPAIR

Plotting Date: 05/31/2018

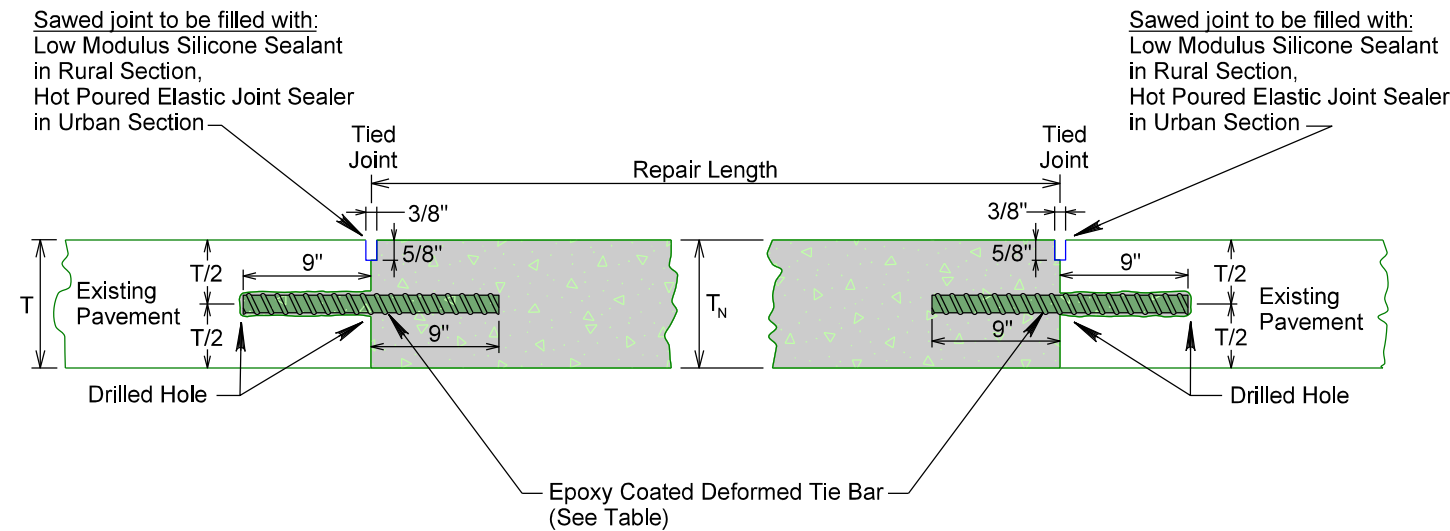
**PLAIN ROUND DOWEL BAR INSERTION  
TYPE W - (TWO WORKING JOINTS)**



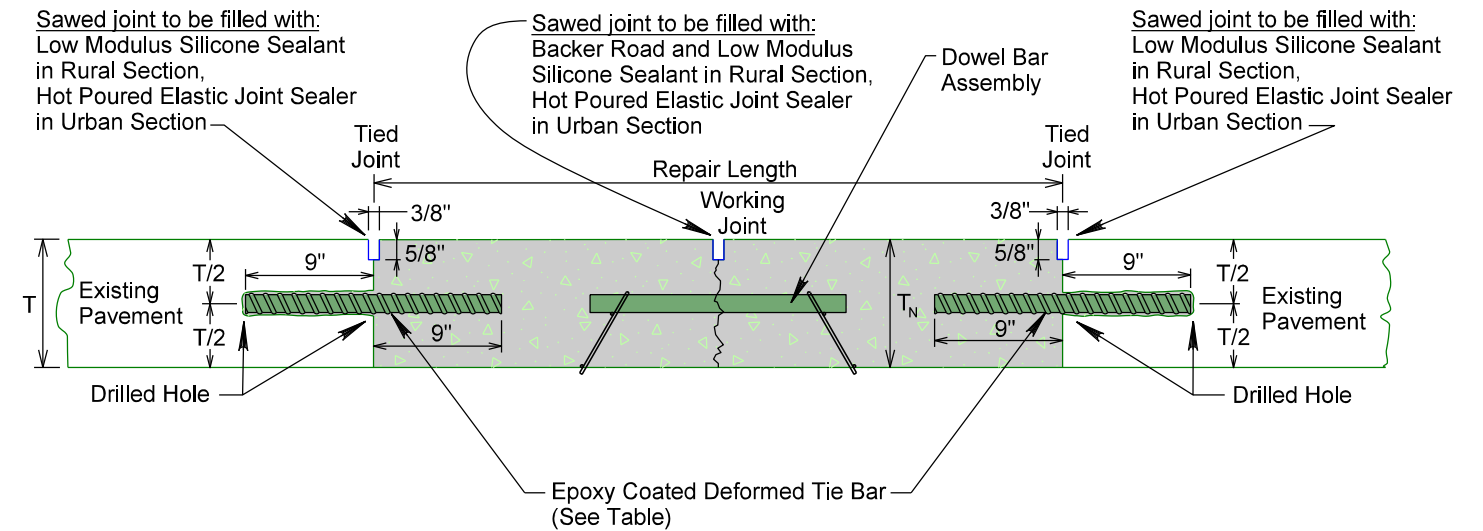
**DEFORMED TIE BAR AND PLAIN ROUND DOWEL BAR INSERTION  
TYPE B - (ONE TIED JOINT AND ONE WORKING JOINT)**



**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 ≥ 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 - 1/4"=1'-0"

PLOTTED FROM - TRMLINT15

PLOT NAME - 7

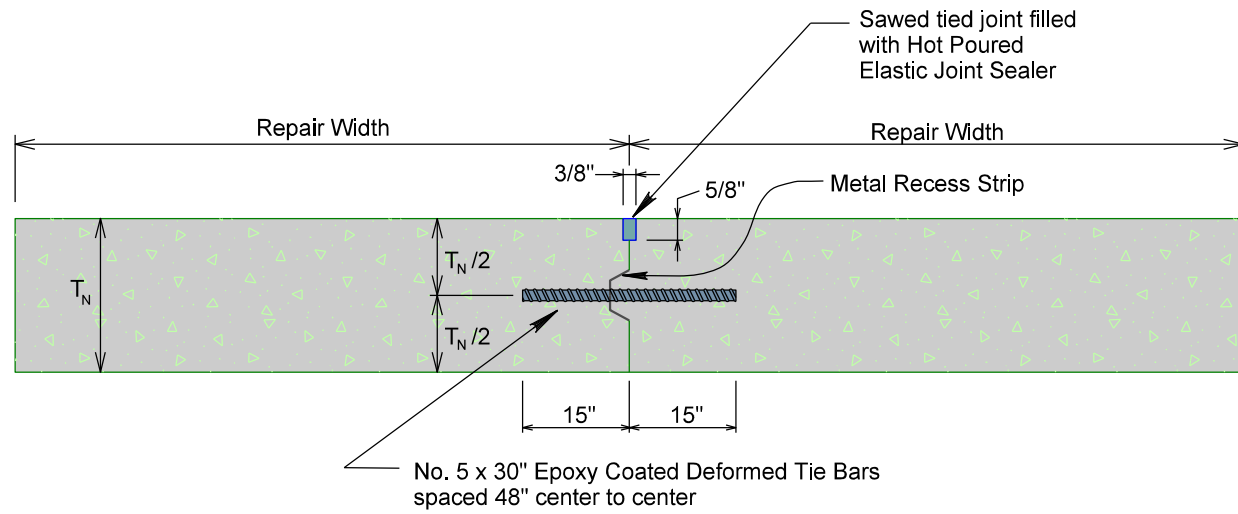
FILE - ... \154M - PCCP REPAIR\BARS.DGN

# NONREINFORCED PCC PAVEMENT REPAIR

STATE OF SOUTH DAKOTA	PROJECT	SHEET	TOTAL SHEETS
	090W-253 & 090W-252	25	28

Plotting Date: 05/31/2018

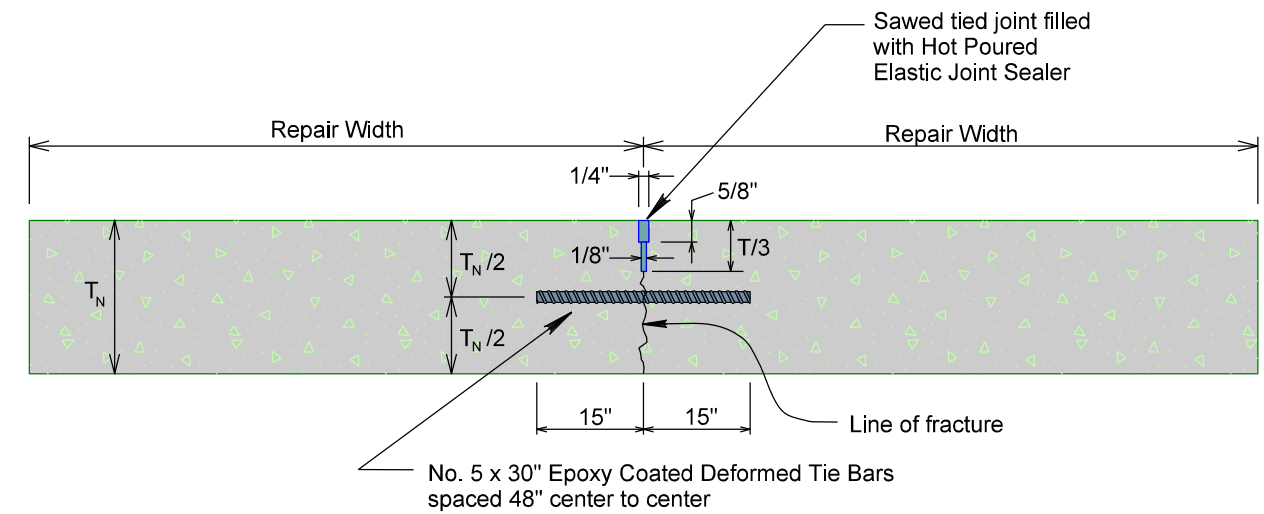
## LONGITUDINAL CONSTRUCTION JOINT WITH TIE BARS & KEYWAY



$T_N$  = 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

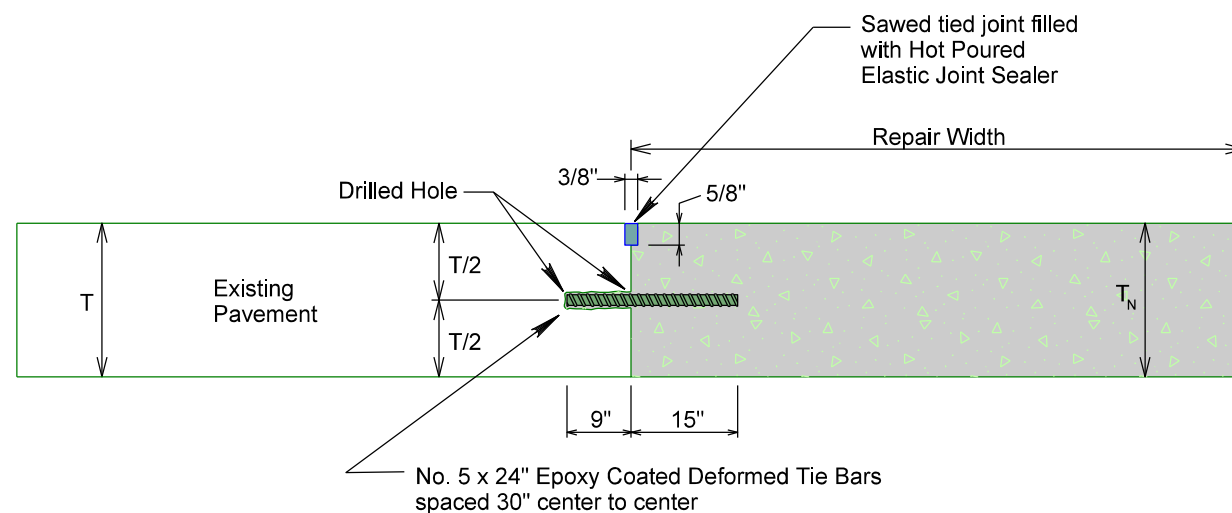


$T_N$  = New pavement thickness.

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



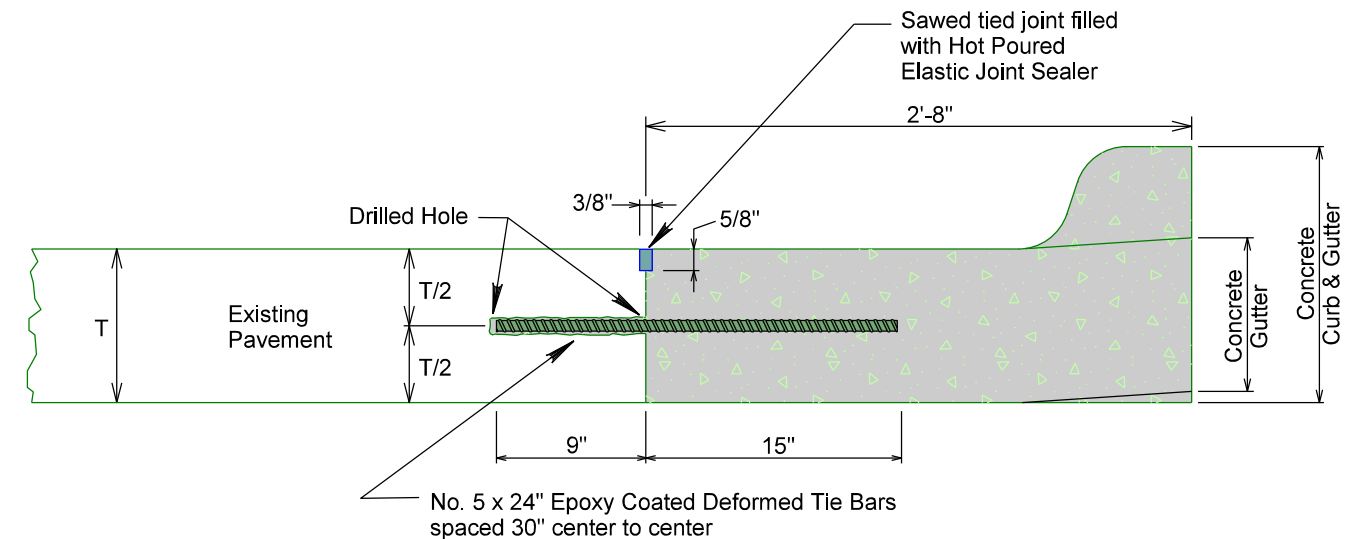
$T$  = Existing pavement thickness.  
 $T_N$  = New pavement thickness.

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.

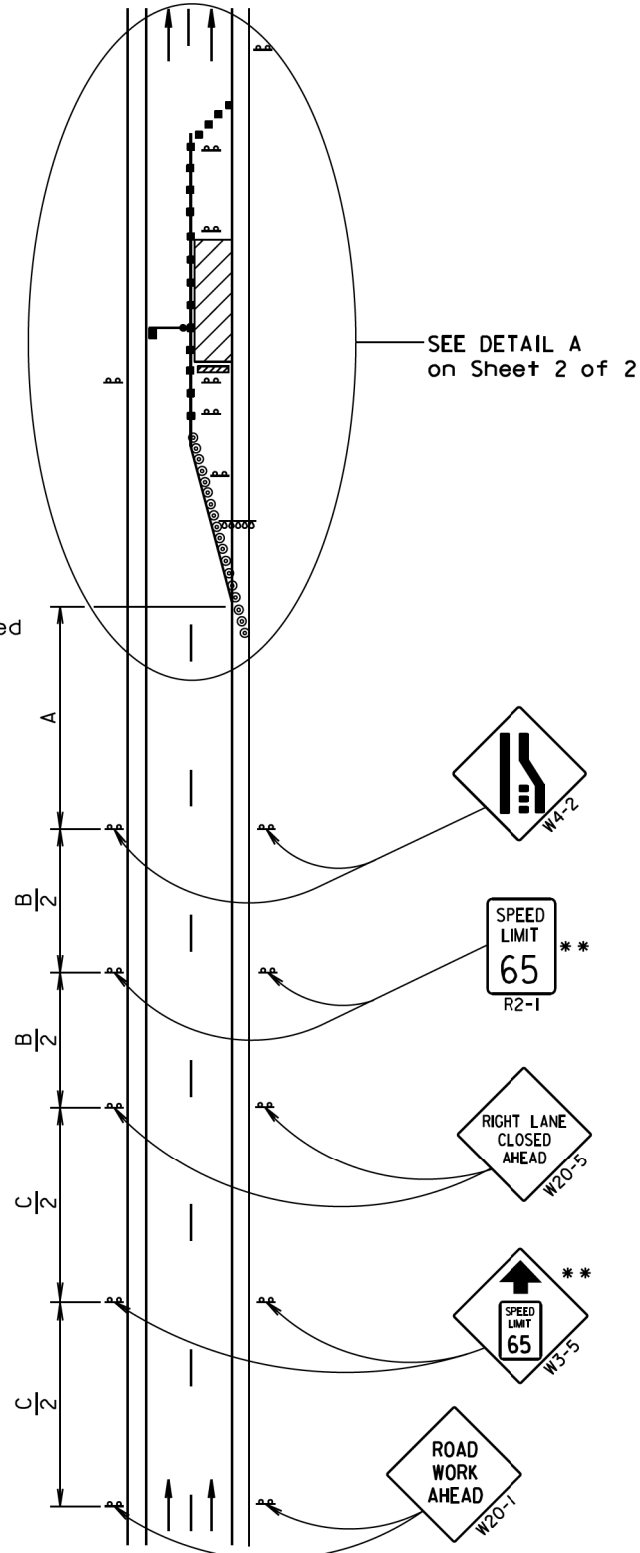
Plotting Date: 05/31/2018

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.



June 3, 2016

<b>S D D O T</b>	<b>WORK ZONE SPEED REDUCTION FOR INTERSTATE AND HIGH SPEED MULTI-LANE HIGHWAYS</b>	PLATE NUMBER <b>634.63</b>
	Published Date: 2nd Qtr. 2018	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 shall be covered or removed when workers are not present.

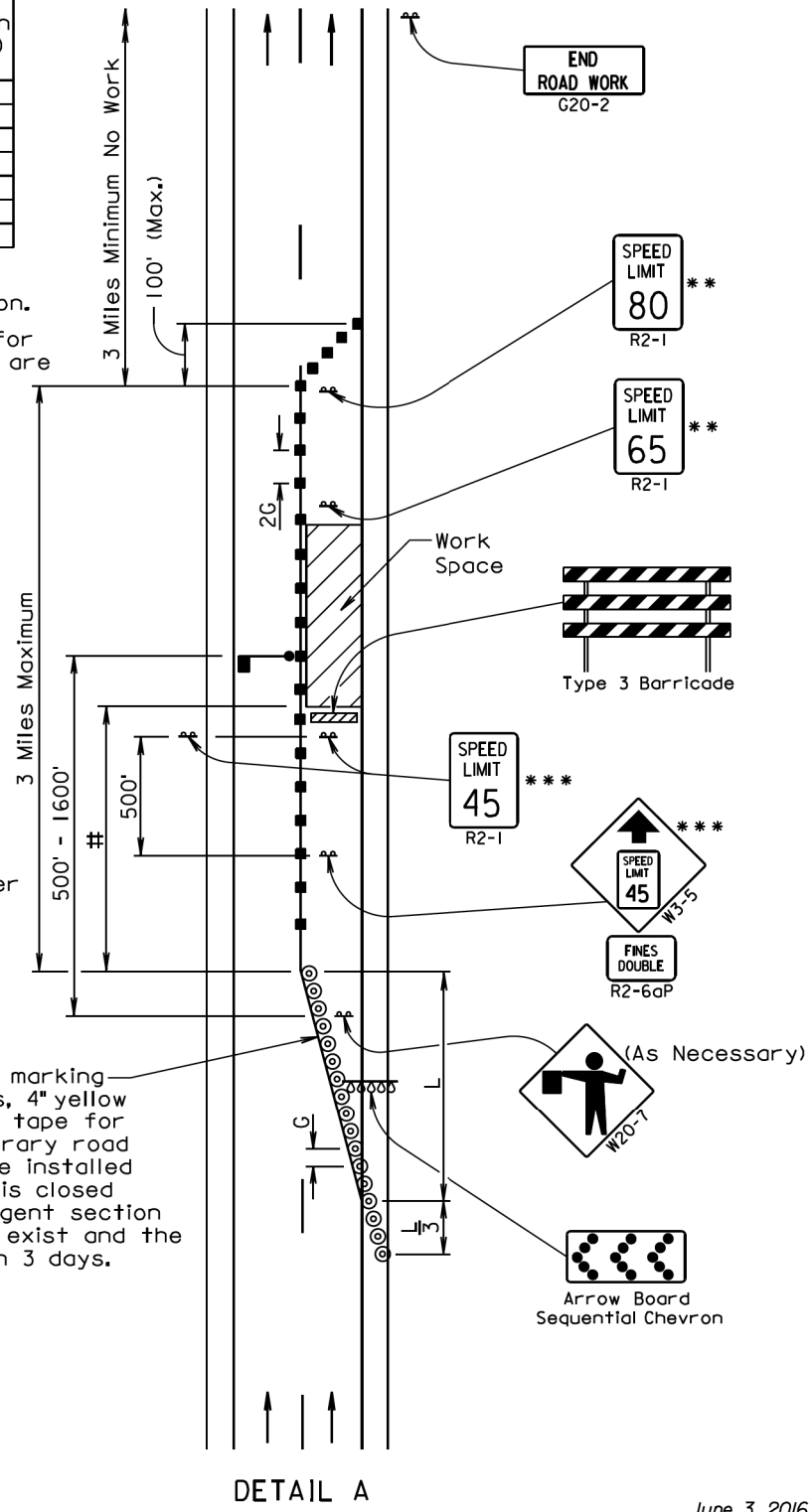
- Flagger (As Necessary)
- ⊙ Reflectorized Drum
- Channelizing Device
- # The Work Space shall be a minimum of 500' from the end of the taper.

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.



June 3, 2016

<b>S D D O T</b>	<b>WORK ZONE SPEED REDUCTION FOR INTERSTATE AND HIGH SPEED MULTI-LANE HIGHWAYS</b>	PLATE NUMBER <b>634.63</b>
	Published Date: 2nd Qtr. 2018	Sheet 2 of 2

PLOT SCALE - 1:200

PLOTTED FROM - IRMLINT15

PLOT NAME - 17

FILE - ... \STD PLATES 154M & 154L.DGN

Posted Speed Prior to Work (M.P.H.)	Spacing of Advance Warning Signs (Feet)		L (Feet)
	(A)	(B)	
45 - 50	500		600
55	750		660
60 - 65	1000		780
	(A)	(B)	
70 - 80	1000	1500	1125

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

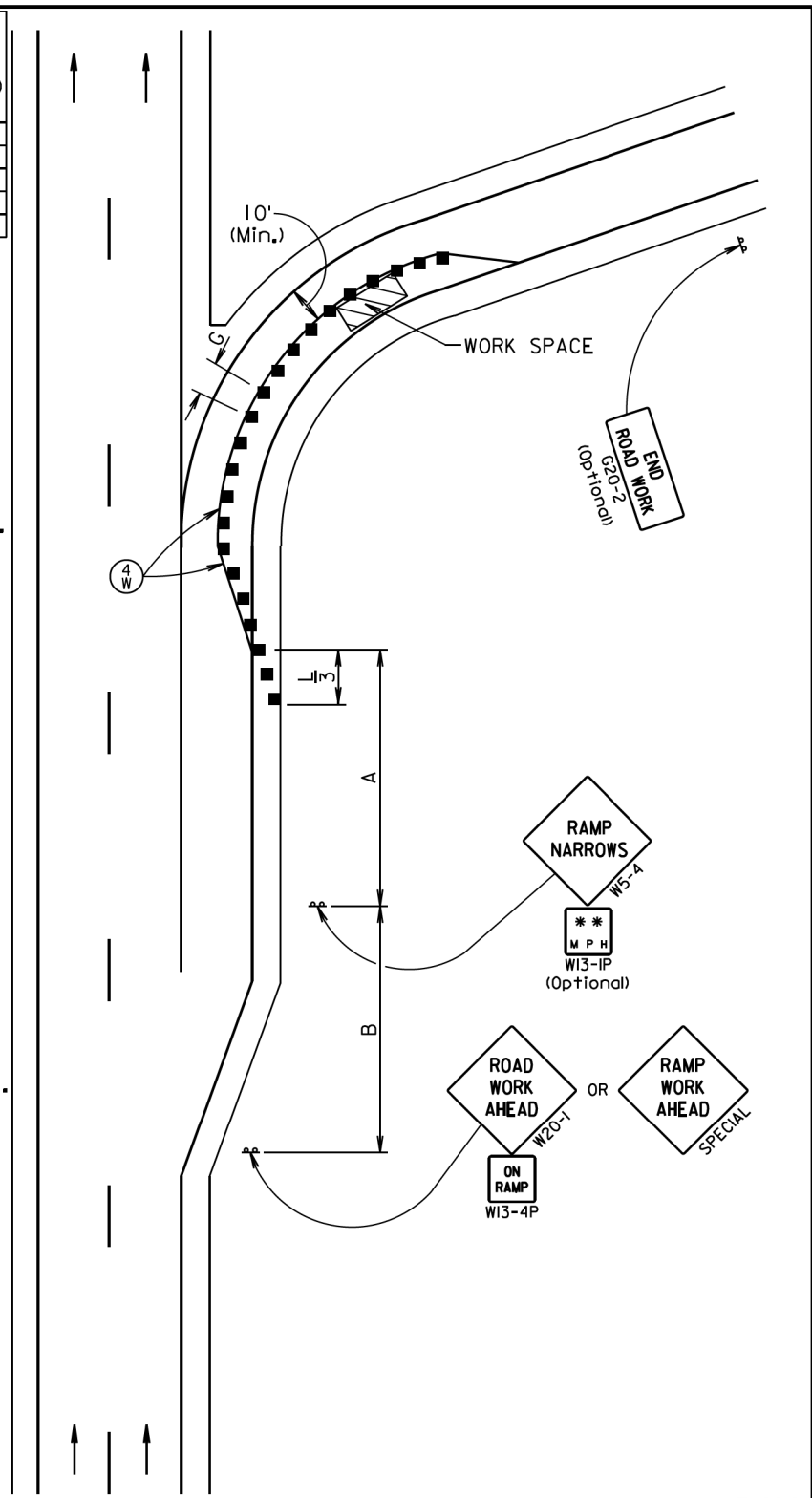
\* Spacing is 40' for 42" cones.

- Channelizing Device
- Ⓞ 4" White Temporary Pavement Marking
- \*\* Need and safe speed to be determined by the Highway Authority.

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

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

Truck off-tracking should be considered when determining whether the 10-foot minimum lane width is adequate.



June 3, 2016

<b>S D D O T</b>	<b>GUIDES FOR TRAFFIC CONTROL DEVICES PARTIAL EXIT RAMP CLOSURE</b>	PLATE NUMBER <b>634.69</b>
	Published Date: 2nd Qtr. 2018	Sheet 1 of 1

PLOT SCALE - 1:200

PLOTTED FROM - IRMLINT15

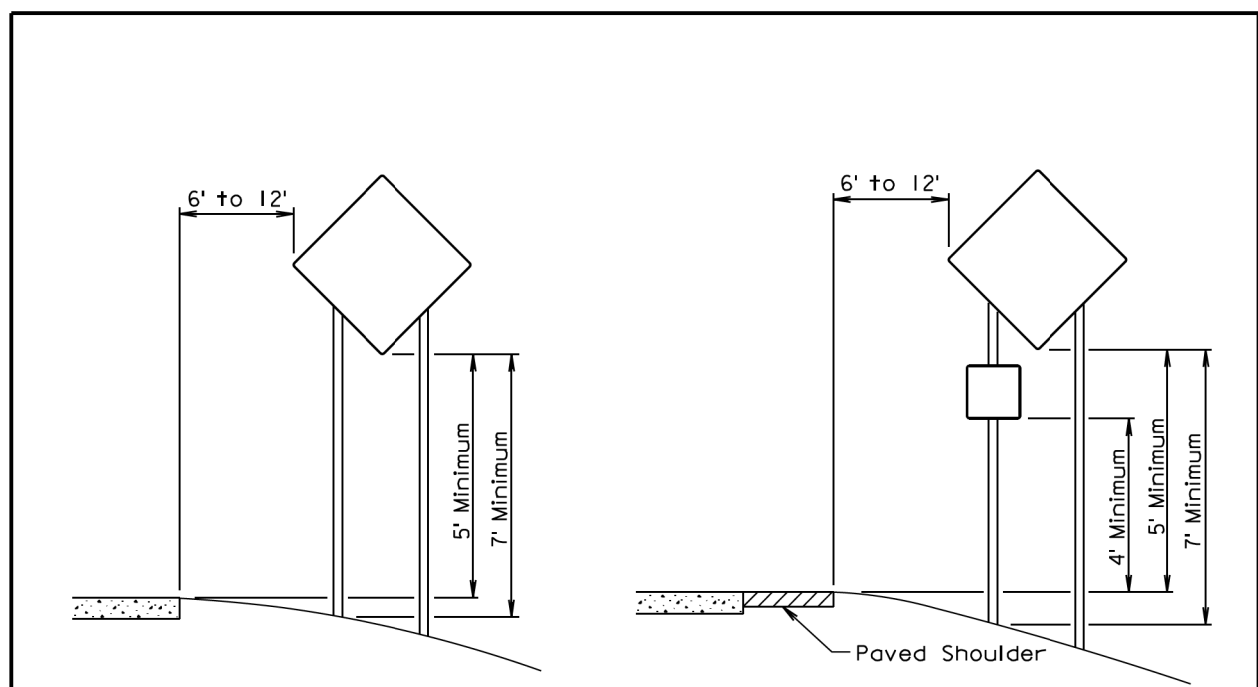
PLOT NAME - 18

FILE - ... \STD PLATES 154M & 154L.DGN

PLOT SCALE - 1:200

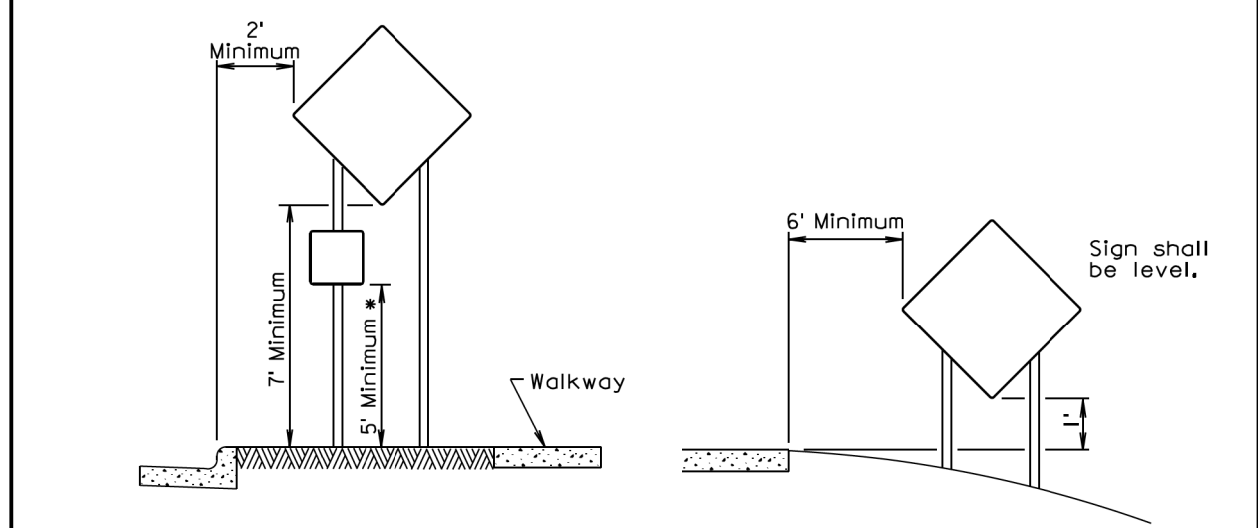
PLOT NAME - 19

FILE - ... \STD PLATES 154M & 154L.DGN



RURAL DISTRICT

RURAL DISTRICT WITH SUPPLEMENTAL PLATE



URBAN DISTRICT

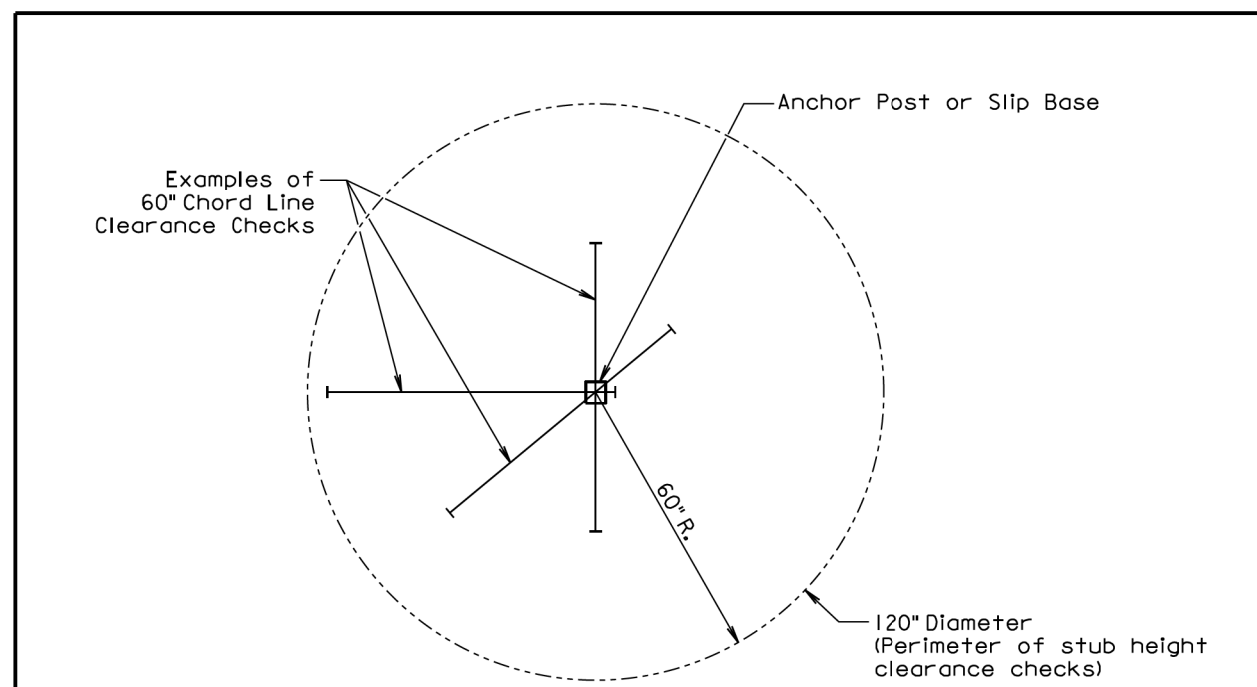
RURAL DISTRICT 3 DAY MAXIMUM

\* 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.

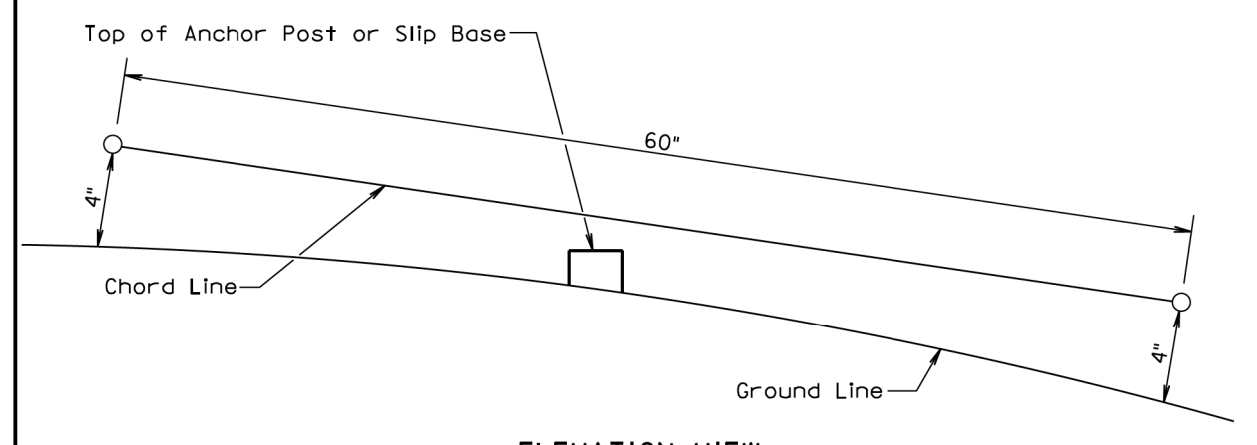
(Not applicable to regulatory signs)

September 22, 2014

Published Date: 2nd Qtr. 2018	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. 2018	S D D O T	BREAKAWAY SUPPORT STUB CLEARANCE	PLATE NUMBER 634.99
			Sheet 1 of 1

PLOTTED FROM - IRMLINT15