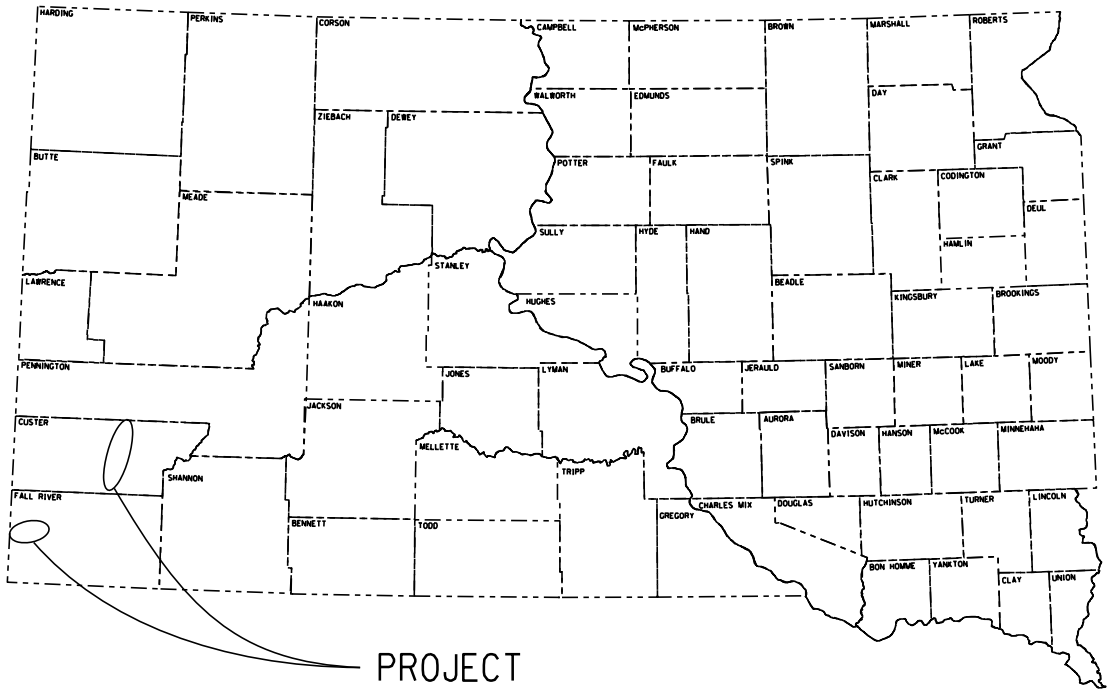


PLOT SCALE - 1:200

PLOTTED FROM - TRRC11951



PROJECT

STATE OF SOUTH DAKOTA
DEPARTMENT OF TRANSPORTATION

PLANS FOR PROPOSED
PROJECT 018-492 & 079S-492
HIGHWAYS US 18 & SD 79
FALL RIVER &
CUSTER COUNTIES
PCC PAVEMENT REPAIR
PCNs i2wx & i2wy

STATE OF SOUTH DAKOTA	PROJECT	SHEET	TOTAL SHEETS
	018-492 & 079S-492	1	19

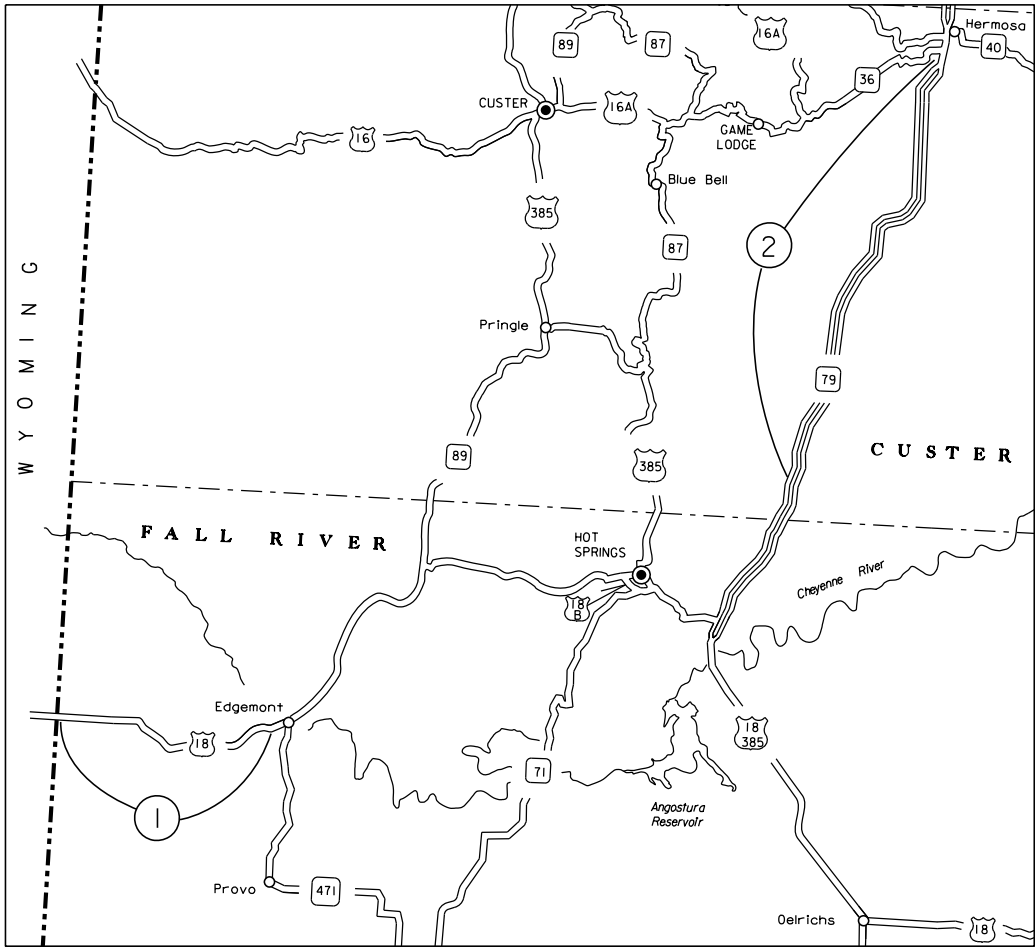
Plotting Date: 04/15/2013

INDEX OF SHEETS

Sheet 1: Title Sheet
Sheets 2-7: Estimate of Quantities
& Plan Notes
Sheets 8-13: PCCP Repair Details
Sheets 14-19: Standard Plates

- ① US 18, MRM 0.0 to MRM 12.1, PCN i2wx
- ② SD 79S, MRM 33.7 to MRM 59.5, i2wy

Storm Water Permit
No Permit Required



PLOT NAME - 5

FILE - ...\\12WXTITLE.DGN

ESTIMATE OF QUANTITIES (US 18, PCN i2wx)

Bid Item Number	Item	Quantity	Unit
009E0010	Mobilization	Lump Sum	LS
120E0100	Unclassified Excavation, Digouts	33	CuYd
260E2010	Gravel Cushion	16.7	Ton
260E5000	Shot Rock	37.5	Ton
380E5030	Nonreinforced PCC Pavement Repair	723.9	SqYd
380E6000	Dowel Bar	132	Each
380E6110	Insert Steel Bar in PCC Pavement	598	Each
380E6200	Tie Bar Retrofit, Stitching	1,920	Each
380E6310	Seal Random Cracks in PCC Pavement	1,920	Ft
633E1400	Pavement Marking Paint, 4" White	345	Ft
633E1405	Pavement Marking Paint, 4" Yellow	90	Ft
634E0010	Flagging	100	Hour
634E0100	Traffic Control	2,288	Unit
634E0120	Traffic Control, Miscellaneous	Lump Sum	LS
680E0240	4" Corrugated Polyethylene Drainage Tubing	20	Ft
680E2010	Precast Concrete Headwall for Drain	1	Each
831E0300	MSE Geotextile Fabric	117	SqYd

ESTIMATE OF QUANTITIES (SD 79, PCN i2wy)

Bid Item Number	Item	Quantity	Unit
009E0010	Mobilization	Lump Sum	LS
120E0100	Unclassified Excavation, Digouts	308	CuYd
260E2010	Gravel Cushion	154.1	Ton
260E5000	Shot Rock	346.7	Ton
380E5030	Nonreinforced PCC Pavement Repair	714.4	SqYd
380E6000	Dowel Bar	132	Each
380E6110	Insert Steel Bar in PCC Pavement	342	Each
380E6200	Tie Bar Retrofit, Stitching	20	Each
380E6310	Seal Random Cracks in PCC Pavement	20	Ft
390E0200	Repair Type A Spall	20.0	SqFt
633E1400	Pavement Marking Paint, 4" White	298	Ft
633E1405	Pavement Marking Paint, 4" Yellow	192	Ft
634E0010	Flagging	100	Hour
634E0100	Traffic Control	1,678	Unit
634E0120	Traffic Control, Miscellaneous	Lump Sum	LS
634E0420	Type C Advance Warning Arrow Panel	1	Each
634E0640	Temporary Pavement Marking	238	Ft
680E0240	4" Corrugated Polyethylene Drainage Tubing	40	Ft
680E2010	Precast Concrete Headwall for Drain	2	Each
831E0300	MSE Geotextile Fabric	953	SqYd

SPECIFICATIONS

Standard Specifications for Roads & Bridges, 2004 Edition and Required Provisions, Supplemental Specifications and/or Special Provisions as included in the Proposal.

SEQUENCE OF OPERATIONS

1. Set up traffic control to close one lane. The 12' passing lane on SD 79S shall be closed first.
2. Repair PCC Pavement.
3. Install Temporary Pavement Marking.
4. Switch traffic control to close adjacent lane.
5. Repair PCC Pavement.
6. Install Temporary Pavement Marking.
7. Install Permanent Pavement Marking.
8. Remove traffic control.

HISTORICAL PRESERVATION OFFICE CLEARANCES

To obtain State Historical Preservation Office (SHPO) clearance, a cultural resources survey may need to be conducted by a qualified archaeologist. In lieu of a cultural resources survey, the Contractor could request a records search from Jim Donohue, State Archaeological Research Center (SARC). Provide SARC with the following: a topographical map or aerial view on which the site is clearly outlined, site dimensions, project number, and PCN. If applicable, provide evidence that the site has been previously disturbed by farming, mining, or construction activities with a landowner statement that no artifacts have been found on the site. The Contractor shall arrange and pay for the cultural resource survey and/or records search.

If any earth disturbing activities occur within the current geographical or historic boundaries of any South Dakota reservation, the Contractor shall obtain Tribal Historical Preservation Office (THPO) clearance. If no THPO exists, the required SHPO clearance shall suffice, with documentation of Tribal contact efforts provided to SHPO.

To facilitate SHPO or THPO responses, the Contractor should submit a records search or cultural resources survey report to the DOT Environmental Engineer, 700 East Broadway Avenue, Pierre, SD 57501-2586 (605-773-3268). Allow 30 days from the date this information is submitted to the Environmental Engineer for SHPO/THPO approval. The Contractor is responsible for obtaining all required permits and clearances for staging areas, borrow sites, waste disposal sites, and all material processing sites. The Contractor shall provide the required permits and clearances to the Engineer at the preconstruction meeting.

WASTE DISPOSAL SITE

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

Construction/demolition debris may not be disposed of within the State ROW.

The waste disposal site(s) shall be managed and reclaimed in accordance with the following from the General Permit for Highway, Road, and Railway Construction/Demolition Debris Disposal Under the South Dakota Waste Management Program issued by the Department of Environment and Natural Resources.

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

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

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

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

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

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) shall be incidental to the various contract items.

EXISTING PCC PAVEMENT

The existing pavement on US 18 is 8” Nonreinforced PCC Pavement with limestone aggregate. Longitudinal joints are reinforced with No. 5x30” deformed tie bars spaced 30” center to center. The transverse joints are spaced 15’ and are skewed 2.5’, right hand forward from perpendicular for a 12’ wide lane. The transverse joints have been retrofitted with 6 – 1 ½” diameter steel bars.

The existing pavement on SD 79 is 8.5” Nonreinforced PCC Pavement with limestone aggregate. Longitudinal joints are reinforced with No. 5x30” deformed tie bars spaced 30” center to center. The transverse joints are spaced 20’. The transverse joints have 1 ¼” diameter steel bars spaced 12” apart.

RESTORATION OF GRAVEL CUSHION

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

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

All costs associated with this work shall be incidental to the contract unit price per square yard for Nonreinforced PCC Pavement Repair.

NONREINFORCED PCC PAVEMENT REPAIR

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

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

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

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

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

NONREINFORCED PCC PAVEMENT REPAIR (CONTINUED)

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

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

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

New pavement thickness shall match existing pavement thickness.

The slump requirement will be limited to 3" maximum after water reducer is added and the concrete shall contain 4.5% to 7.0% entrained air. Coarse aggregate shall be crushed ledge rock, Size No. 1, unless an alternative gradation is approved by the concrete engineer as part of the mix design submittal. The concrete mixture shall contain a minimum of 50% coarse aggregate by weight. The concrete mix shall contain at least 600 lbs. of type I, II or III cement per cubic yard. The minimum 28 day compressive strength shall be 4,000 psi. The Contractor is responsible for the mix design used. The Contractor shall submit a mix design and supporting documentation for approval at least 2 weeks prior to use.

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

Concrete shall be cured with white pigmented curing compound (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 Fahrenheit or higher throughout the cure period. If the concrete temperature falls below 60 degrees Fahrenheit, the cure time shall be extended or other measures shall be taken, at no additional cost to the State. In addition to the curing requirements, strength of 4,000 psi must be obtained prior to opening to traffic.

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 until the concrete has obtained strength of 4,000 psi. The initial contraction joint sawing shall be performed as soon practical to avoid random cracking. Insulation blanket shall be overlapped on to the existing concrete.

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

STATE OF SOUTH DAKOTA	PROJECT	SHEET	TOTAL SHEETS
	018-492 & 079S-492	3	19

STEEL BAR INSERTION

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

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.

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

Epoxy resin adhesive shall be of the type intended for horizontal applications, and shall conform to the requirements of ASTM C 881, Type IV, Grade 3 (equivalent to AASHTO M235, Type IV, Grade 3).

The diameter of the drilled holes in the existing concrete pavement for the steel bars shall not be less than 1/8 inch nor more than 3/8 inch greater than the overall diameter of the steel bar. Holes drilled into the existing concrete pavement shall be located at mid-depth of the slab and true and normal. The drilled holes shall be blown out with compressed air using a device that will reach to the back of the hole to ensure that all debris or loose material has been removed prior to epoxy injection.

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.

Mix the epoxy resin as recommended by the manufacturer and apply by an injection method approved by the Engineer. If an epoxy pump is utilized, it shall be capable of metering the components at the manufacturer’s designated rate and be equipped with an automatic shut-off. The pump shall shut off when any of the components are not being metered at the designated rate.

Fill the drilled holes 1/3 to 1/2 full of epoxy, or as recommended by the manufacturer, prior to insertion of the steel bar. Care shall be taken to prevent epoxy from running out of the horizontal holes prior to steel bar insertion. Rotate the steel bar during insertion to eliminate voids and ensure complete bonding of the bar. Insertion by the dipping method will not be allowed.

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

TABLE OF REPAIR PCCP REPAIR (PCN i2wx)

MRM	Direction	Width	Length	Nonreinforced PCC Pavement Repair	1 1/4" Bar	#9 Bar	#5 Bar	Insert Steel Bar in PCC Pavement	Dowel Bar
US 18		Ft	Ft	SqYd	Each	Each	Each	Each	Each
0.41	WB	15	18	30.0	24		7	31	
4.56	EB	15	21	35.0	24		8	32	12
4.56	WB	15	28	46.7	12	10	11	33	24
4.94	WB	15	18	30.0	24		7	31	
6.25	WB	15	20	33.3	24		8	32	12
6.25	EB	15	33	55.0	24		13	37	24
8.91	WB	15	32	53.3	24		13	37	12
8.92	WB	15	47	78.3	24		19	43	24
8.95	WB	15	52	86.7	24		21	45	12
10.73	EB	15	32	53.3	24		13	37	12
11.69	EB	22	20	48.9	44		8	52	
11.69	WB	22	20	48.9	44		8	52	
11.70	EB	22	20	48.9	44		8	52	
11.70	WB	22	20	48.9	44		8	52	
12.06	WB	12	20	26.7	24		8	32	
			Totals	723.9	428	10	160	598	132

TABLE OF REPAIR PCCP REPAIR (PCN i2wy)

MRM	Lane	Width	Length	Nonreinforced PCC Pavement Repair	1 1/4" Bar	#9 Bar	#5 Bar	Insert Steel Bar in PCC Pavement	Dowel Bar
SD 79 S		Ft	Ft	SqYd	Each	Each	Each	Each	Each
59.48	DL	14	20	31.1	24		8	32	
59.05	DL	14	20	31.1	24		8	32	
56.25	DL	14	20	31.1		16	8	24	12
47.56	DL & PL	26	15	43.3	24		6	30	
45.12	DL & PL	26	20	57.8	48		8	56	
45.01	DL & PL	26	20	57.8	48		8	56	
43.70	DL & PL	26	20	57.8	48		8	56	
34.16	DL & PL	26	80	231.1			32	32	72
33.72	DL & PL	26	60	173.3			24	24	48
			Totals	714.4	216	16	110	342	132

REPAIR TYPE A SPALL

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

The concrete patching material shall be packaged, dry, rapid-hardening cementitious mortar or concrete materials conforming to the requirements of ASTM C 928, Type R-3 and shall contain no chloride ions. Concrete patching material as per Section 390.2.B.3 of the Supplemental Specifications will not be allowed.

Grout for bonding the concrete patching material to the existing concrete shall consist of equal parts by weight of Portland Cement and sand, mixed with sufficient water to form a thick slurry. A grout admixture shall be added to the grout mixture in accordance with the manufacturer's recommendations. Grout admixture shall be a one component acrylic bonding additive. The additive shall be one of the grout admixtures from the Approved Products List, or an approved equal.

Grout shall be applied on all of the existing concrete surfaces within the removal area immediately prior to placement of the concrete patching material. The grout shall be scrubbed into the surface with a stiff bristle brush in a thin and uniform coat. Care shall be taken to ensure that excess grout does not collect in low areas, that the grout is confined only to the immediate area in which concrete patching material is to be placed, and that the rate of application is limited to an amount such that the grout will be covered with concrete patching material before the grout dries.

The patching product may be extended with aggregate as recommended by the manufacturer. The aggregate extender shall meet the requirements of Section 820 of the Standard Specifications. Section 820.2 D shall not apply to the aggregate extender. The Contractor's supplier of the patching product shall provide a concrete mix design, including all additives, to meet a minimum compressive strength of 4000 psi in six hours. This mix design shall be performed with the materials that will be used on the project.

The spall repair locations may be opened to traffic once the patch material has obtained a compressive strength of 4000 psi.

The Contractor shall provide test results to the Engineer to verify that the suppliers mix design is acceptable prior to beginning work. If the suppliers mix design is not satisfactory, the Contractor shall provide the Department with a mix design that meets the requirement prior to beginning work.

TABLE OF REPAIR TYPE A SPALL (SD 79, PCN i2wy)

MRM	Lane	Direction	#	Width	Length	Repair Type A Spall
				Ft	Ft	SqFt
59.05	DL	SB	2	1.0	1.0	2.0
46.32	DL & PL	SB	3	1.0	1.0	3.0
36.36	PL	SB	2	1.0	1.0	2.0
As per the discretion of the Engineer						13.0
					Total	20.0

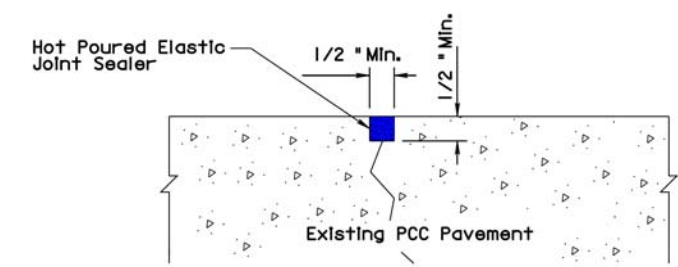
SEAL RANDOM CRACKS IN PCC PAVEMENT

The groove shall be formed with a saw or router designed for that purpose. The maximum width of the routed reservoir shall not be greater than 3/4" and over sawing will not be allowed.

Random cracks wider than 1/2 inch will not require widening. A blocking medium maybe used in the crack, so that the depth of sealant matches the width.

Sealing Random Cracks shall be done in accordance with Sec. 380.3 R of the Standard Specifications.

All costs associated with this work shall be incidental to the contract unit price per foot "Seal Random Cracks in PCC Pavement".



STATE OF SOUTH DAKOTA	PROJECT	SHEET	TOTAL SHEETS
	018-492 & 079S-492	5	19

TABLE OF REPAIR OF LONGITUDINAL CRACKS (US 18, i2wx)

MRM	Direction	Tie Bar Retrofit, Stitching	Seal Random Cracks in PCC Pavement
		Each	Ft
0.01	EB	135	135
1.52	WB	45	45
6.39	WB	45	45
7.33	WB	60	60
7.37	EB	15	15
7.58	EB	45	45
7.78	EB	165	165
8.73	WB	30	30
8.77	EB	120	120
8.84	WB	45	45
8.86	WB	105	105
8.91	WB	30	30
8.95	WB	60	60
9.78	EB	75	75
9.86	EB	105	105
9.92	EB	75	75
10.16	WB	60	60
10.46	WB	60	60
10.46	EB	135	135
10.73	EB	75	75
10.88	WB	45	45
11.14	WB	30	30
11.30	WB	60	60
11.30	EB	45	45
11.35	WB	90	90
11.53	EB	60	60
11.53	WB	30	30
11.56	EB	45	45
11.60	WB	30	30
	Total	1920	1920

TABLE OF REPAIR OF LONGITUDINAL CRACKS (SD 79, i2wy)

MRM	Direction	Tie Bar Retrofit, Stitching	Seal Random Cracks in PCC Pavement
		Each	Ft
46.32	SB	20	20

RETROFITTING TIE BARS (STITCHING)

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

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

Epoxy resin adhesive shall be of the type intended for horizontal applications, and shall conform to the requirements of ASTM C 881, Type IV, Grade 3 (equivalent to AASHTO M235, Type IV, Grade 3).

The diameter of the drilled holes in the existing concrete pavement for the steel bars shall not be less than 1/8 inch nor more than 3/8 inch greater than the overall diameter of the steel bar. The holes shall be drilled at an angle alternating from opposite sides of the joint to produce a cross-stitching pattern. The drilled holes shall be blown out with compressed air using a device that will reach to the back of the hole to ensure that all debris or loose material has been removed prior to epoxy injection. Damage to pavement shall be repaired to the satisfaction of the Engineer at the Contractor's expense.

Mix the epoxy resin as recommended by the manufacturer and apply by an injection method approved by the Engineer. If an epoxy pump is utilized, it shall be capable of metering the components at the manufacturers designated rate and be equipped with an automatic shut-off. The pump shall shut-off when any of the components are not being metered at the designated rate. Fill the drilled holes sufficiently with epoxy prior to the insertion of the tie bar such that the epoxy will be level with the top of the concrete pavement after insertion of the tie bar. Rotate the steel bar during installation to eliminate voids and ensure complete bonding of the bar. Insertion of the bars by the dipping method will not be allowed. The top of the drilled hole shall be filled with epoxy or excess epoxy removed such that the epoxy is level with the existing pavement. The epoxy shall harden sufficiently prior to opening to traffic.

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

Cost for the epoxy resin adhesive, tie bars, drilling of holes, debris or loose material removal, applying the adhesive, installing the tie bars into the drilled holes and all other items incidental to the installation of the tie bars shall be included in the contract unit price per each for "Tie Bar Retrofit, Stitching".

SUBGRADE REPAIR

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

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

The MSE Geotextile Fabric shall be placed on the bottom and the sides of the excavated subgrade. Additional fabric shall be provided to allow for wrapping the top of the shot rock backfill. Shot rock shall be placed in lifts not to

exceed 8 inches. The shot rock shall be watered and compacted by at least 4 complete vibratory roller passes per lift.

SUBGRADE REPAIR (CONTINUED)

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

The Contactor shall saw cut the asphalt shoulder for installation of the drainage tubing. The drainage tubing shall be backfilled with material that was removed from the trench. 6” of Gravel Cushion shall be placed on top of the trench backfill. 3” of Asphalt Concrete Composite shall be placed on top of the Gravel Cushion. All costs associated with installation of the drainage tubing through the shoulder shall be incidental to the contract unit price per foot “4” Corrugated Polyethylene Drainage Tubing”.

SHOT ROCK

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

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

TABLE OF SUBGRADE REPAIR (US 18, i2wx)

			Unclass Exc, Digouts	Shot Rock	MSE Geo Fabric	4" Corr Poly Drain Tube	Pre Conc Head Wall for Drain	Gravel Cushion
Location	L	W	CuYd	Ton	SqYd	Ft	Each	Ton
MRM	Ft	Ft						
6.25	15	30	33	37.5	116.7	20	1	16.7

TABLE OF SUBGRADE REPAIR (SD 79, i2wy)

			Unclass Exc, Digouts	Shot Rock	MSE Geo Fabric	4" Corr Poly Drain Tube	Pre Conc Head Wall for Drain	Gravel Cushion
Location	L	W	CuYd	Ton	SqYd	Ft	Each	Ton
MRM	Ft	Ft						
33.72	80	26	154	173.3	476.7	20	1	77.0
34.16	80	26	154	173.3	476.7	20	1	77.0
	Total		308	346.7	953.3	40	2	154.1

MAINTENANCE OF TRAFFIC

Requests to deviate from the sequence of operations shall be submitted in writing to the Engineer for review. Approval of an alternate sequence of operations will only be allowed when the proposed changes meet with the Department's intent for traffic control and sequencing of the work. An alternate sequence shall be submitted for review a minimum of one week prior to potential implementation.

Unless otherwise stated in these plans, no work will be allowed during hours of darkness. Hours of darkness are defined, as ½ hour after sunset until ½ hour before sunrise.

Storage of vehicles and equipment shall be as near the right-of-way as possible. Contractor's employees should mobilize at a location off the right-of-way and arrive at the work sites in a minimum number of vehicles necessary to perform the work. Indiscriminate driving and parking of vehicles within the right-of-way will not be permitted. Any damage of the vegetation, surfacing, embankment, delineators, and existing signs resulting from such indiscriminate use shall be repaired and/or restored by the Contractor, at no expense to the State, and to the satisfaction of the Engineer.

Existing guide, route, informational logo, regulatory, and warning signs shall be temporarily reset and maintained during construction. Removing, relocating, covering, salvaging and resetting of existing traffic control devices, including delineation, shall be the responsibility of the Contractor. Non-applicable signing shall be covered or removed during periods of inactivity. Periods of inactivity shall be defined as no work taking place for a period of more than 36 hours. The cost of removing or covering non-applicable signs shall be incidental to the contract lump sum price for, Traffic Control, Miscellaneous.

Construction signing mounted on portable supports shall not be used for a duration of more than 3 days, unless approved by the Engineer. Construction signing that remains in the same location for more than 3 days shall be mounted on fixed location, ground mounted, breakaway supports.

If inappropriate/conflicting pavement markings exist, the markings shall 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 shall be placed at a spacing of ½ G. Pavement marking removals shall be paid for at the contract unit price for Remove Pavement Marking, 4” or equivalent. Temporary pavement marking shall be paid for at the contract unit bid price for Temporary Pavement Marking. The additional channelizing devices shall be incidental to the contract lump sum price for Traffic Control, Miscellaneous.

The quantity of signs paid for will be for the greatest number of installations per sign per PCN in place at any one time regardless of the number of set-ups on the project.

Any delineators and signs damaged or lost shall be replaced by the Contractor at no cost to the State.

All materials and equipment shall be stored a minimum distance of 30' from the traveled way during nonworking hours.

MAINTENANCE OF TRAFFIC

The Contractor shall provide documentation that all breakaway sign supports comply with FHWA NCHRP 350 or MASH crash-worthy requirements. The Contractor shall provide installation details at the preconstruction meeting for all breakaway sign support assemblies.

The Contractor shall be required to have a person available 24 hour/day, 7 days/week to maintain traffic control devices. The name and cellular telephone number of this individual shall be given to the Engineer at the preconstruction meeting.

The Contractor or designated traffic control subcontractor shall make night inspections at the initial set up of traffic control and every week thereafter to ensure the adequacy, legibility and reflectivity of each sign and device. A written summary of each inspection shall be given to the Engineer within 24 hours after completion of the inspection. The cost for the nighttime inspection work shall be incidental to the contract lump sum price for Traffic Control, Miscellaneous.

Vehicles working in traffic or alongside traffic shall be equipped with a flashing amber light visible from all directions. The amber light shall be mounted on the uppermost part of the contractor's vehicle. Lights must have peak intensity within the range of 40 to 400 candelas and must flash at 75 ± 15 flashes per minute. Vehicle flasher/hazard lights are not acceptable.

All construction operations shall be conducted in the general direction of traffic movement.

If there is a discrepancy between the traffic control plans, standard plates, and the MUTCD – whichever is more stringent shall be used.

Temporary Road Markers shall be used for lane closure tapers or lane shift tapers and lane lines. Temporary Pavement Marking installed in accordance with the traffic control standard plates will not be measured for payment and will be incidental to the contract lump sum price for Traffic Control, Miscellaneous.

Drums are required in all lane closure tapers.

Traffic shall be maintained on the driving lanes. Use of the shoulder as a driving lane will not be permitted. Any damage to the shoulder due to rerouted traffic or Contractor's equipment shall be repaired at the Contractor's expense and no expense to the State.

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

On US 18, 6 sets of work zone signing for standard plate 634.25 are provided in the estimate of quantities. The Contractor shall try to group the work zones together, so that vehicle speeds are kept low traveling from one work zone to the next. The length of the lane closures shall provide adequate sight distance to oncoming vehicles and be kept to a minimum to reduce the delay to the traveling public.

42" cones shall be placed on the passing lane asphalt shoulder at an interval of 500' to prevent vehicles from driving on the asphalt shoulders causing damage.

TABLE OF TRAFFIC CONTROL (US 18, PCN i2wx)

SIGN CODE	SIGN SIZE	DESCRIPTION	#	UNITS PER SIGN	UNITS
G20-2	36" x 18"	END ROAD WORK	12	17	204
R1-1	30" x 30"	STOP	12	21	252
W1-3	48" x 48"	REVERSE TURN SIGN (L or R)	6	34	204
W3-1	48" x 48"	STOP AHEAD (SYMBOL)	12	34	408
W20-1	48" x 48"	ROAD WORK AHEAD	12	34	408
W20-4	48" x 48"	ONE LANE ROAD AHEAD	12	34	408
W20-7a	48" x 48"	FLAGGER	2	34	68
*****		SIDED	6	56	336
TOTAL UNITS					2288

TABLE OF TRAFFIC CONTROL (SD 79, PCN i2wy)

SIGN CODE	SIGN SIZE	DESCRIPTION	#	UNITS PER SIGN	UNITS
G20-2	36" x 18"	END ROAD WORK	2	17	34
R2-1	24" x 30"	SPEED LIMIT ##	6	18	108
R2-6aP	24" x 18"	FINES DOUBLE	4	7	28
W3-5	48" x 48"	REDUCED SPEED LIMIT AHEAD	4	34	136
W4-2	48" x 48"	LEFT OR RIGHT LANE ENDS (SYMBOL)	4	34	136
W20-1	48" x 48"	ROAD WORK AHEAD	4	34	136
W20-5	48" x 48"	LT. OR RT. LANE CLOSED AHEAD	4	34	136
W20-7a	48" x 48"	FLAGGER	2	34	68
*****		SIDED	16	56	896
TOTAL UNITS					1678

TEMPORARY PAVEMENT MARKING

Temporary Road Markers shall be used for temporary pavement marking.

The Contractor shall be responsible for maintaining a visible and reflective centerline throughout the project. Any marking covered or damaged shall be replaced prior to the end of the day.

All costs for temporary pavement marking including furnishing, applying, maintenance, removal and disposing of tabs shall be incidental to the contract unit price per lump sum for "Traffic Control, Miscellaneous".

It is estimated that 345 feet of Temporary Pavement Marking will be required for US 18 and 238 feet for SD 79 on the project for opening completed section to traffic.

STATE OF SOUTH DAKOTA	PROJECT	SHEET	TOTAL SHEETS
	018-492 & 079S-492	7	19

PERMANENT PAVEMENT MARKINGS

The location of the existing pavement marking shall be documented prior to removal, so that replacement can be at the existing location.

Application of permanent pavement marking shall be completed within 14 calendar days following completion of the pavement repair.

It is estimated that 345 feet of 4" white and 90 feet of 4" yellow pavement marking will be required on US 18. It is estimated that 298 feet of 4" white and 192 feet of 4" yellow pavement marking will be required on SD 79.

RATES OF APPLICATION

*Edgeline striping – 16.9 gallons per mile
Glass beads – 8.0 pounds per gallon

*Rate is the Region average and is for one 4" edgeline.

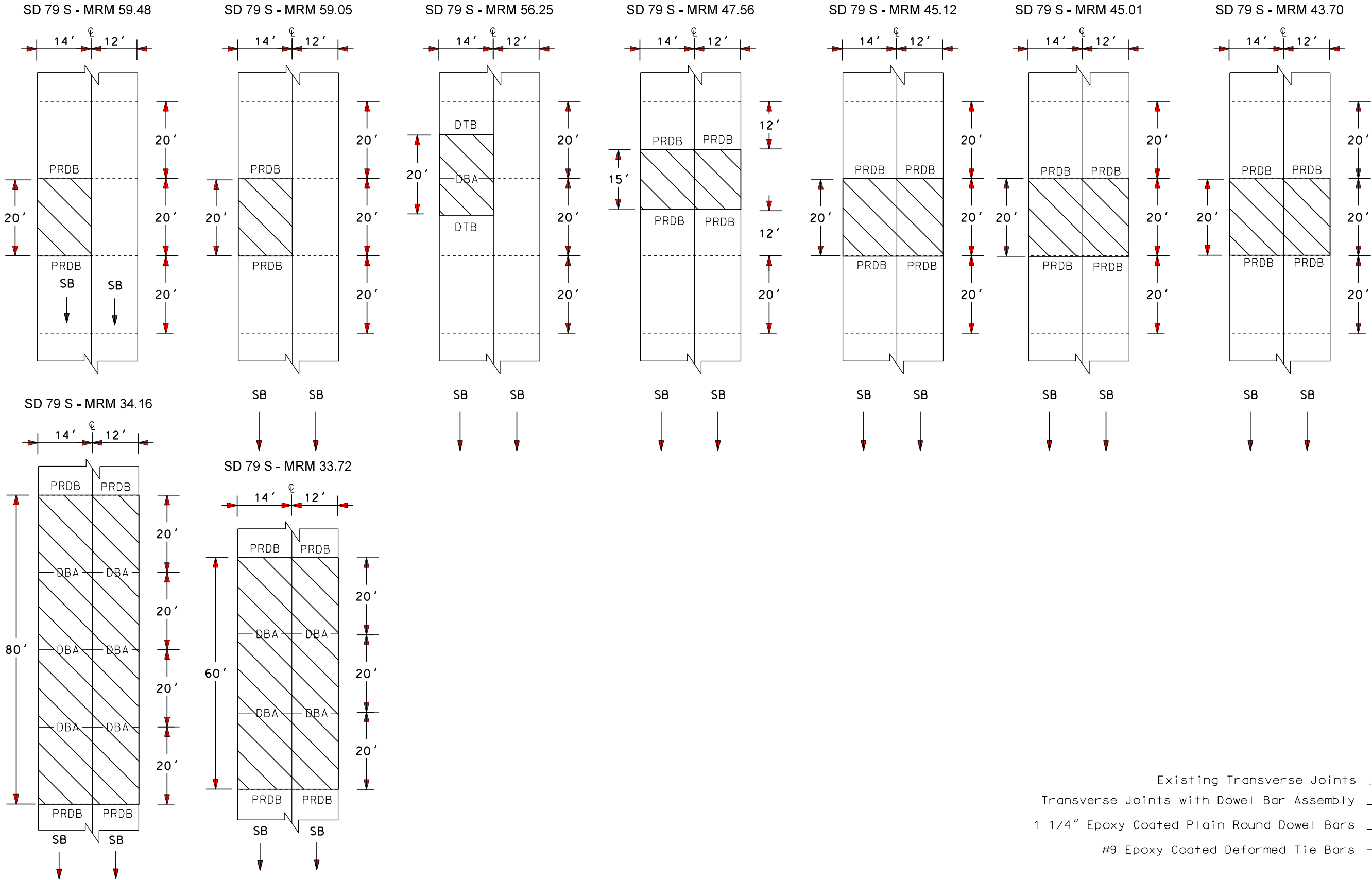
PLOT SCALE - 1:25.6

PLOTTED FROM - TRRC11951

STATE OF SOUTH DAKOTA	PROJECT	SHEET NO.	TOTAL SHEETS
	018-492 & 079S-492	9	19

Plotting Date: 05/03/2013

NONREINFORCED PCC PAVEMENT REPAIR LOCATIONS



PLOT NAME - 2

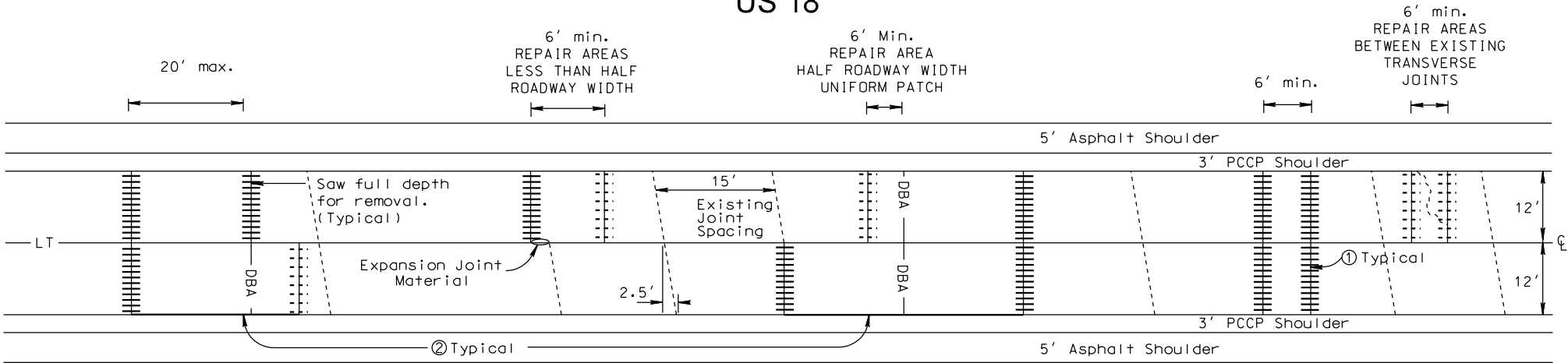
FILE - ... \REPAIRDETAILS.DGN

STATE OF SOUTH DAKOTA	PROJECT	SHEET	TOTAL SHEETS
	018-492 & 079S-492	10	19

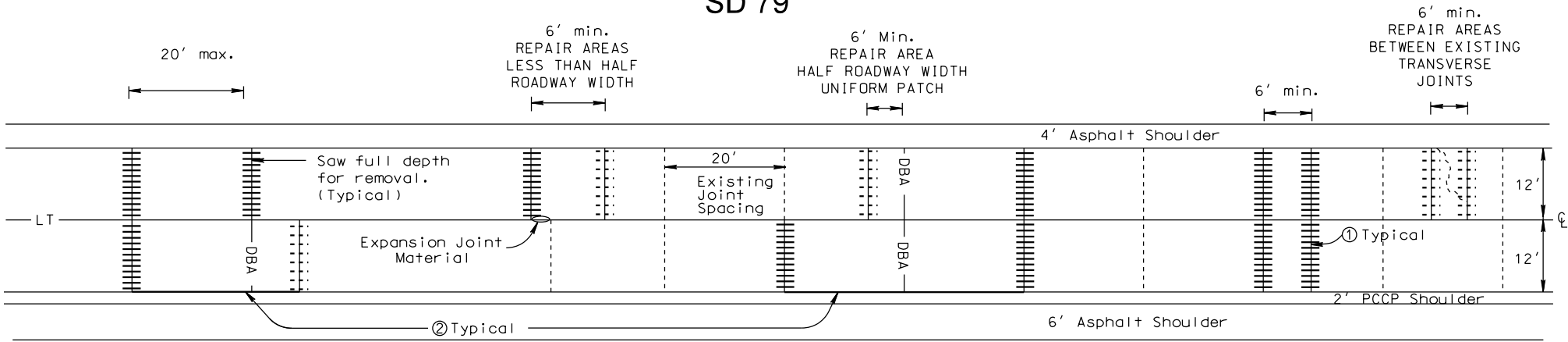
Plotting Date: 04/08/2013

NONREINFORCED PCC PAVEMENT REPAIR TYPICAL REPAIR AREAS

US 18



SD 79



NOTES:

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

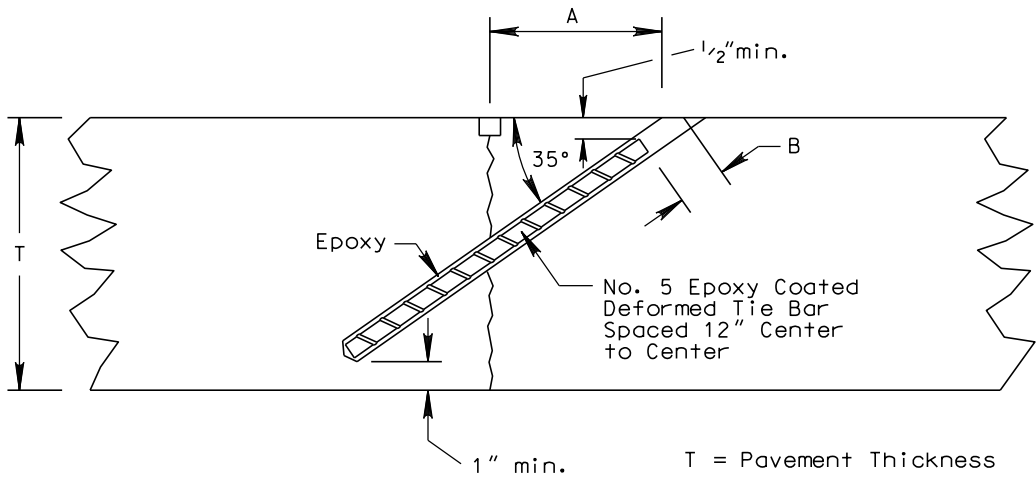
Legend:

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

STATE OF SOUTH DAKOTA	PROJECT	SHEET NO.	TOTAL SHEETS
	018-492 & 079S-492	11	19

Plotting Date: 04/10/2013

TIE BAR RETROFIT, STITCHING



T	A	B	Length of Tie Bar
8"	5"	1 1/2" +/-	10"
8 1/2"	5 1/4"	1 3/8" +/-	11"
9"	5 5/8"	1 1/4" +/-	12"
9 1/2"	6"	1 5/8" +/-	12 1/2"
10"	6 3/8"	1 1/2" +/-	13 1/2"
10 1/2"	6 3/4"	1 3/8" +/-	14 1/2"
11"	7"	1 1/4" +/-	15 1/2"
12"	7 3/4"	1 3/8" +/-	16 1/2"
12 1/2"	8 1/8"	1 1/4" +/-	17 1/2"

GENERAL NOTES:

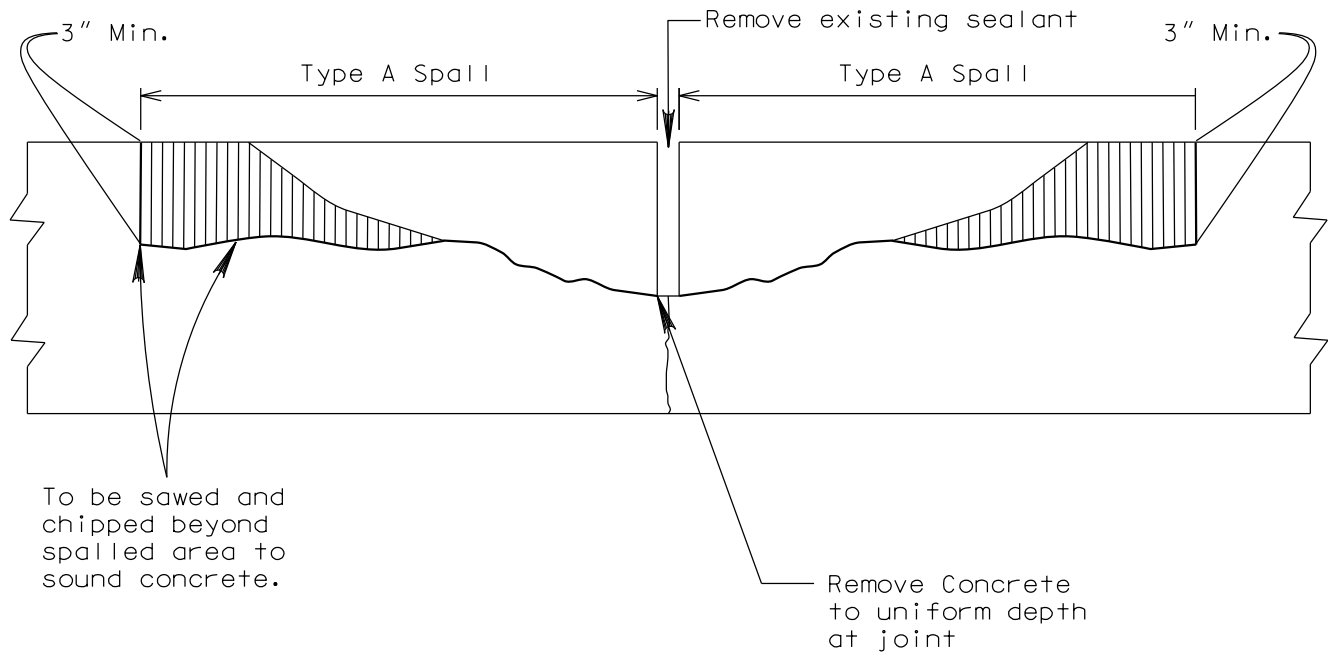
The tie bars shall alternate from opposite sides of the joint to produce a cross-stitching pattern

STATE OF SOUTH DAKOTA	PROJECT	SHEET NO.	TOTAL SHEETS
	018-492 & 079S-492	12	19

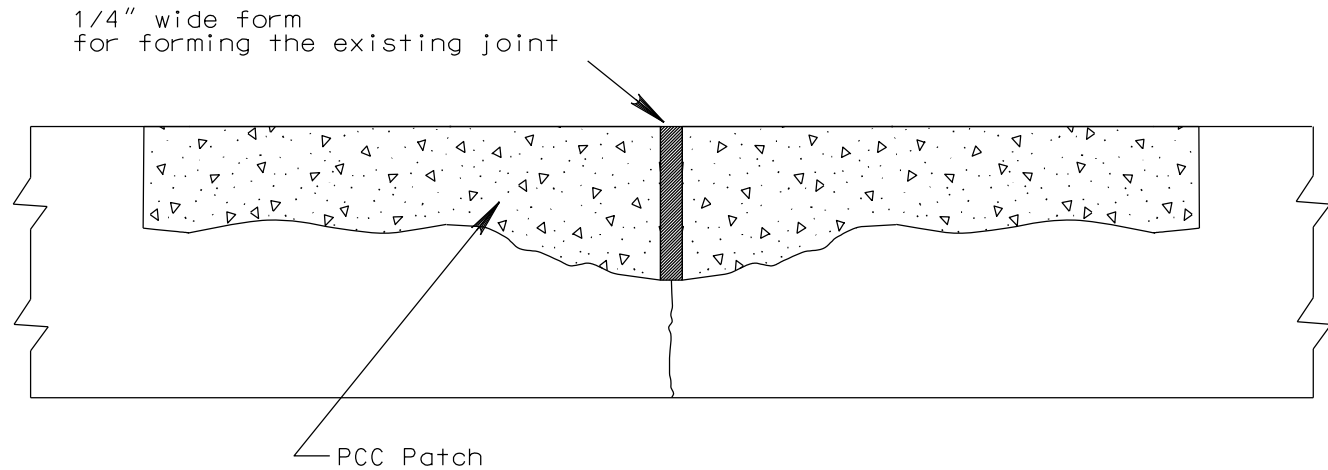
Plotting Date: 04/08/2013

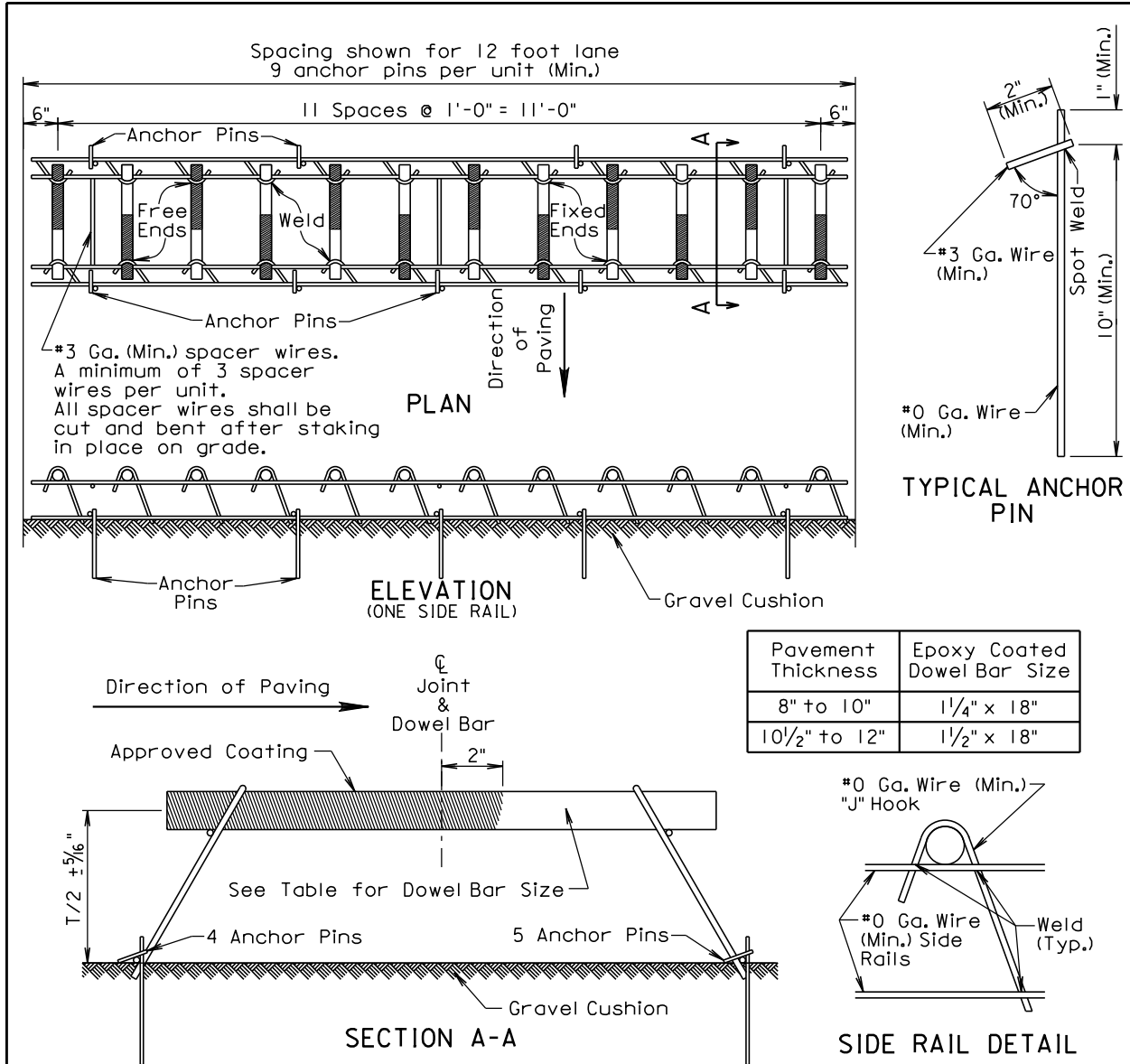
REPAIR OF TYPE A SPALLS

SPALL REMOVAL



SPALL PATCH





GENERAL NOTES:

Longitudinal construction 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.

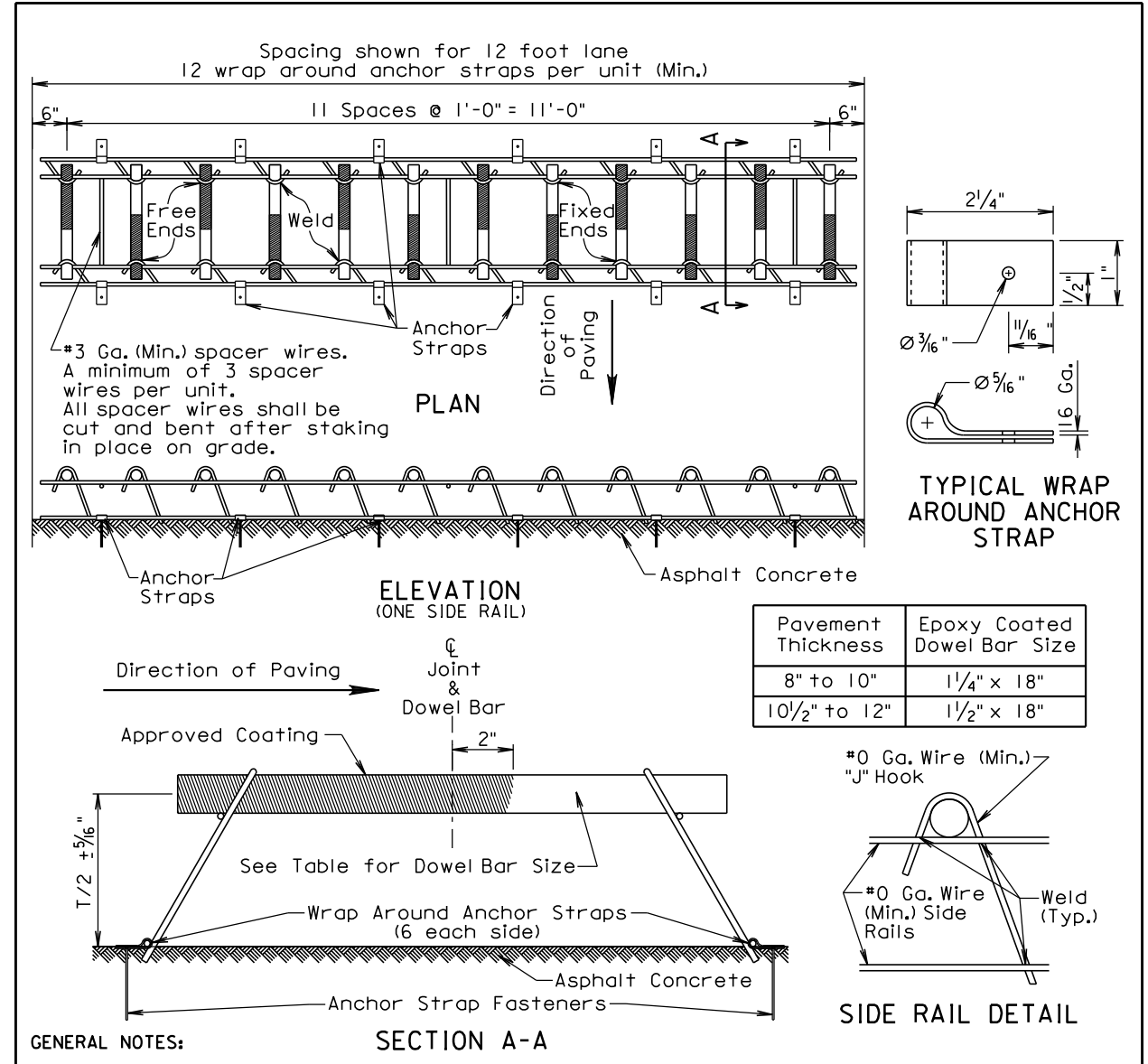
Centerline of individual dowel bars shall be parallel to the centerline of the roadway $\pm 1/2$ inch in 18 inches.

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 ± 1 inch.

Supporting devices of the type 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.

December 23, 2007

Published Date: 2nd Qtr. 2013	S D D O T	PCC PAVEMENT DOWEL BAR ASSEMBLY FOR TRANSVERSE CONTRACTION JOINTS	PLATE NUMBER 380.01
			Sheet 1 of 1



GENERAL NOTES:

Longitudinal construction 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.

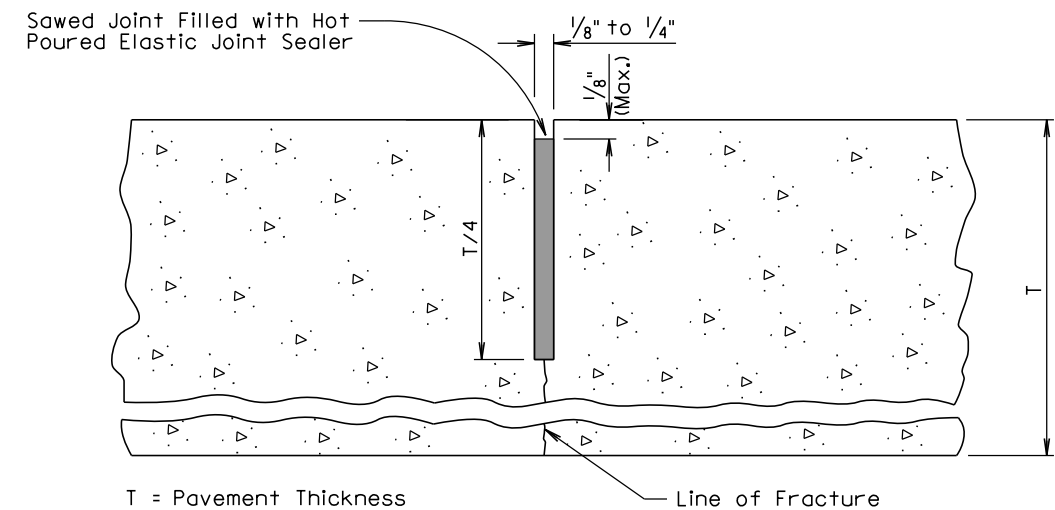
The transverse contraction joints shall be sawed perpendicular to the centerline of the roadway and the dowel bars shall be centered on the sawed joint ± 1 inch.

Supporting devices of the type 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.

Appropriate strap fasteners shall be used to prevent movement of the dowel bar assemblies during the paving operation.

December 23, 2007

Published Date: 2nd Qtr. 2013	S D D O T	PCC PAVEMENT DOWEL BAR ASSEMBLY FOR TRANSVERSE CONTRACTION JOINTS	PLATE NUMBER 380.02
			Sheet 1 of 1



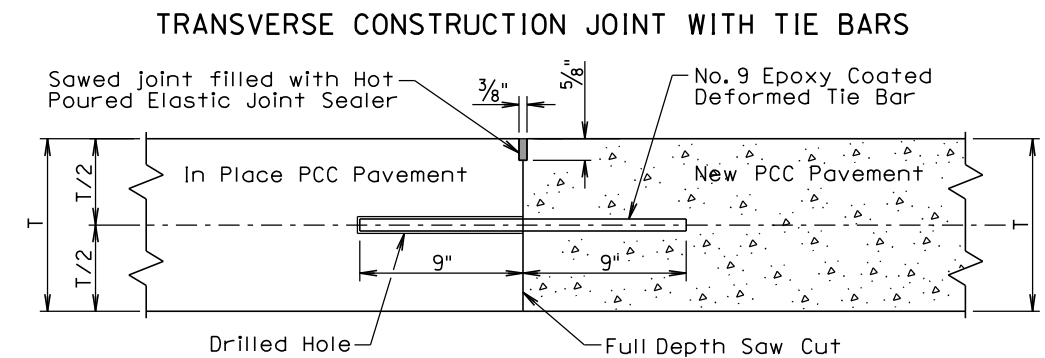
GENERAL NOTES:

The saw cut to control cracking shall be a minimum of 1/4 the thickness of the pavement.

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

December 23, 2007

Published Date: 2nd Qtr. 2013	S D D O T	PCC PAVEMENT TRANSVERSE CONTRACTION JOINT WITH OR WITHOUT DOWEL BAR ASSEMBLY	PLATE NUMBER 380.03
			Sheet 1 of 1



GENERAL NOTES:

T = In Place PCC Pavement and New PCC Pavement Thickness

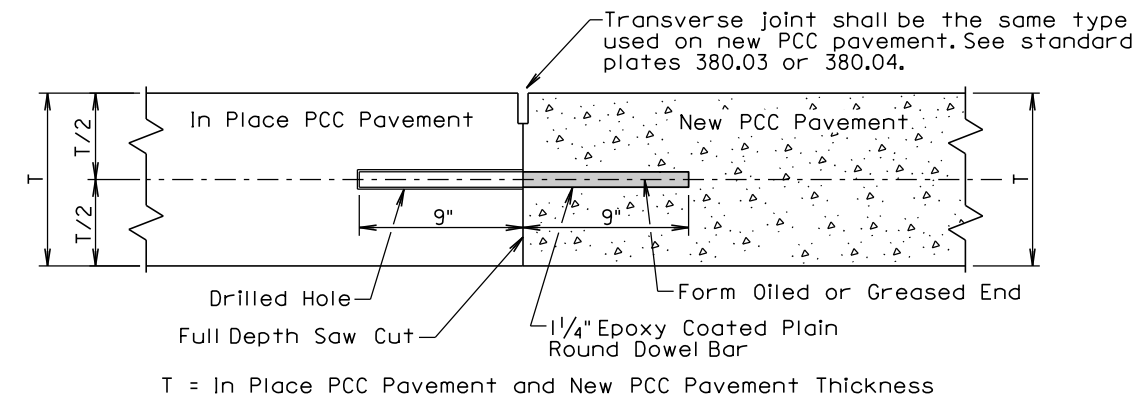
This detail shall be used when the transverse joint is less than 15 feet from the existing transverse contraction joint.

The tie bars shall be embedded a minimum depth of 9 inches into the in place PCC pavement and anchored with an epoxy resin adhesive.

No.9 epoxy coated deformed tie bars shall be spaced 18 inches center to center and shall be a minimum of 3 inches and a maximum of 9 inches from the pavement edges.

The term "In Place PCC Pavement" in the above drawing indicates that the in place PCC pavement was placed on a previous project.

TRANSVERSE CONSTRUCTION JOINT WITH DOWEL BARS



GENERAL NOTES:

This detail shall be used when the transverse joint is 15 feet or greater from the existing transverse contraction joint.

The plain round dowel bars shall be embedded a minimum depth of 9 inches into the in place PCC pavement and anchored with an epoxy resin adhesive.

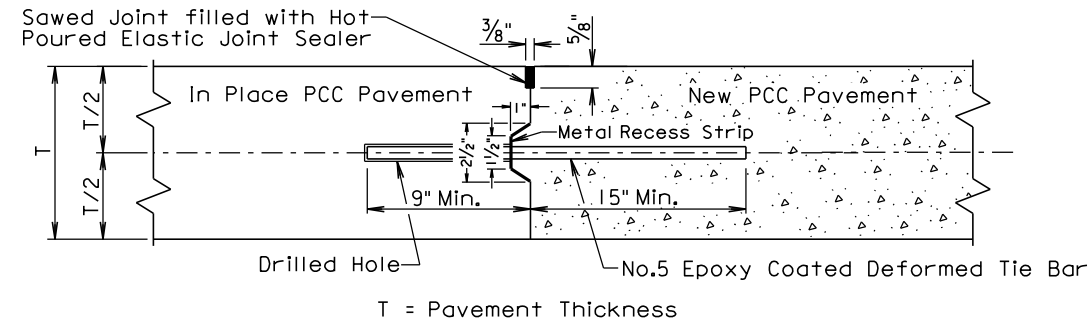
The 1 1/4" epoxy coated plain round dowel bars shall be spaced 12 inches center to center and shall be a minimum of 3 inches and a maximum of 6 inches from the pavement edges.

The term "In Place PCC Pavement" in the above drawing indicates that the in place PCC pavement was placed on a previous project or current project.

September 6, 2006

Published Date: 2nd Qtr. 2013	S D D O T	PCC PAVEMENT TRANSVERSE CONSTRUCTION JOINTS WITH TIE BARS OR DOWEL BARS	PLATE NUMBER 380.06
			Sheet 1 of 1

LONGITUDINAL CONSTRUCTION JOINT WITH TIE BARS
(DRILLED IN BARS)



GENERAL NOTES:

The tie bars shall be embedded a minimum depth of 9 inches into the in place PCC pavement and anchored with an epoxy resin adhesive.

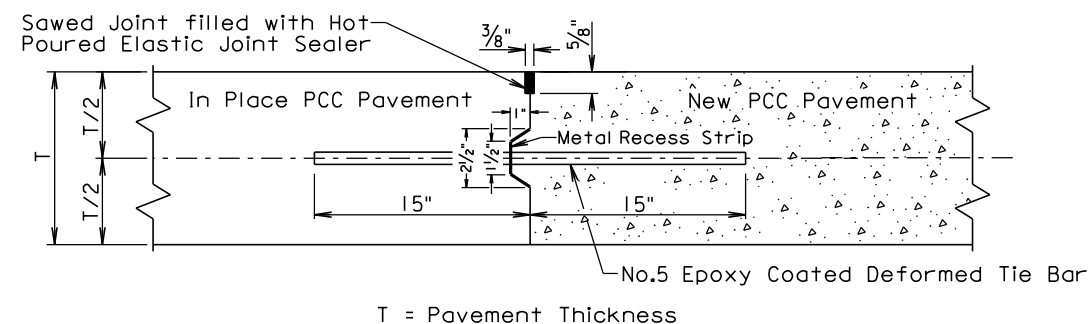
No.5 epoxy coated deformed tie bars shall be spaced 48" center to center for a female keyway or 30" center to center for a vertical face and male keyway. The keyway shown above is a female keyway.

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

The keyway is optional and is not required. When concrete pavement is formed and a keyway is provided, a metal recess strip shall be used. When concrete pavement is slip formed, a metal recess strip is not required.

The term "In Place PCC Pavement" in the above drawing indicates that the in place PCC pavement was placed on a previous project or current project.

LONGITUDINAL CONSTRUCTION JOINT WITH TIE BARS
(INSERTED OR FORMED IN BARS)



GENERAL NOTES:

No.5 epoxy coated deformed tie bars shall be spaced 48" center to center for a female keyway or 30" center to center for a vertical face and male keyway. The keyway shown above is a female keyway.

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

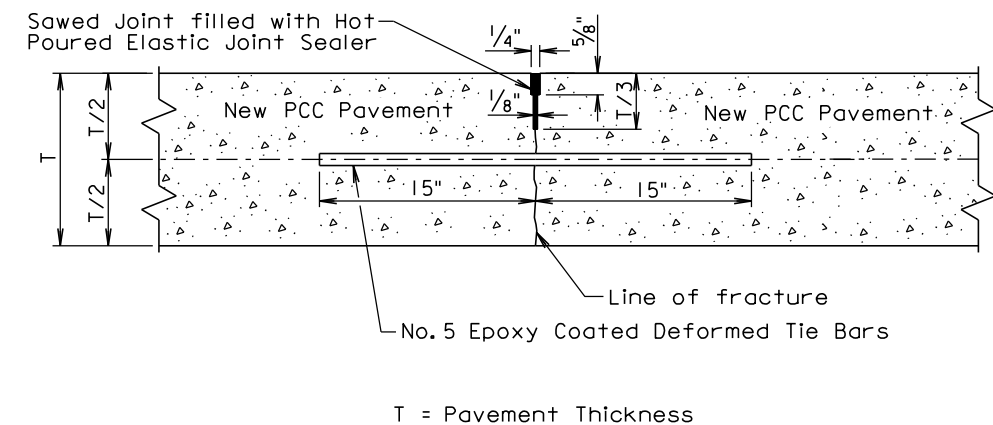
The keyway is optional and is not required. When concrete pavement is formed and a keyway is provided, a metal recess strip shall be used. When concrete pavement is slip formed, a metal recess strip is not required.

The term "In Place PCC Pavement" in the above drawing indicates that the in place PCC pavement was placed on the current project.

September 14, 2001

Published Date: 2nd Qtr. 2013	S D D O T	PCC PAVEMENT LONGITUDINAL JOINTS WITH TIE BARS	PLATE NUMBER 380.10
			Sheet 1 of 2

SAWED LONGITUDINAL JOINT WITH TIE BARS
(POURED MONOLITHICALLY)



GENERAL NOTES:

No.5 epoxy coated deformed tie bars shall be spaced 48 inches center to center.

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

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

September 14, 2001

Published Date: 2nd Qtr. 2013	S D D O T	PCC PAVEMENT LONGITUDINAL JOINTS WITH TIE BARS	PLATE NUMBER 380.10
			Sheet 2 of 2

Posted Speed Prior to Work (M.P.H.)	Spacing of Advance Warning Signs (Feet) (A)	Spacing of Channelizing Devices (Feet) (G)
0 - 30	200	25
35 - 40	350	25
45 - 50	500	50
55	750	50
60 - 65	1000	50

- Flagger
■ Channelizing Device

For low-volume traffic situations with short work zones on straight roadways where the flagger is visible to road users approaching from both directions, a single flagger may be used.

The ROAD WORK AHEAD and the END ROAD WORK signs may be omitted for short duration operations (1 hour or less).

For tack and/or flush seal operations, when flaggers are not being used, the FRESH OIL sign (W21-2) shall be displayed in advance of the liquid asphalt areas.

Flashing warning lights and/or flags may be used to call attention to the advance warning signs.

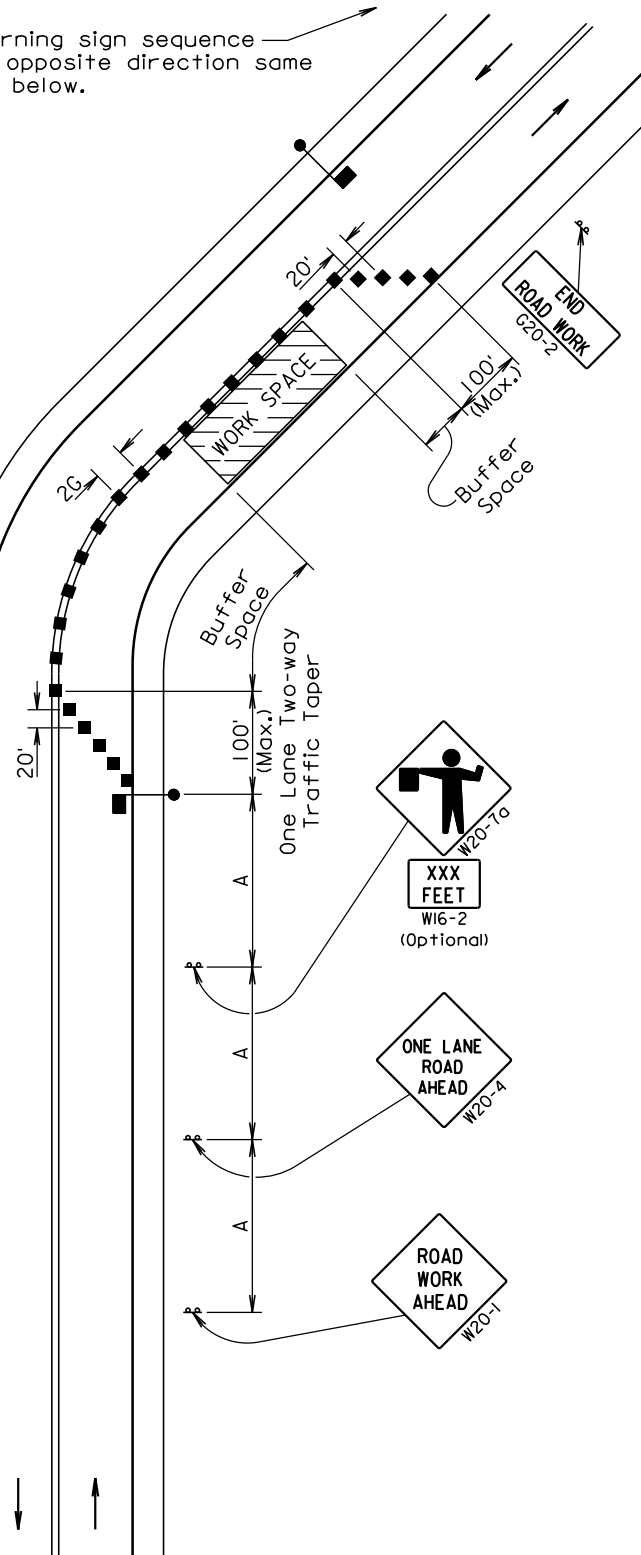
The channelizing devices shall be drums or 42" cones.

Channelizing devices are not required along the centerline adjacent to work area when pilot cars are utilized for escorting traffic through the work area.

Channelizing devices and flaggers shall be used at intersecting roads to control intersecting road traffic as required.

The buffer space should be extended so that the two-way traffic taper is placed before a horizontal or vertical curve to provide adequate sight distance for the flagger and queue of stopped vehicles.

Warning sign sequence in opposite direction same as below.



February 14, 2011

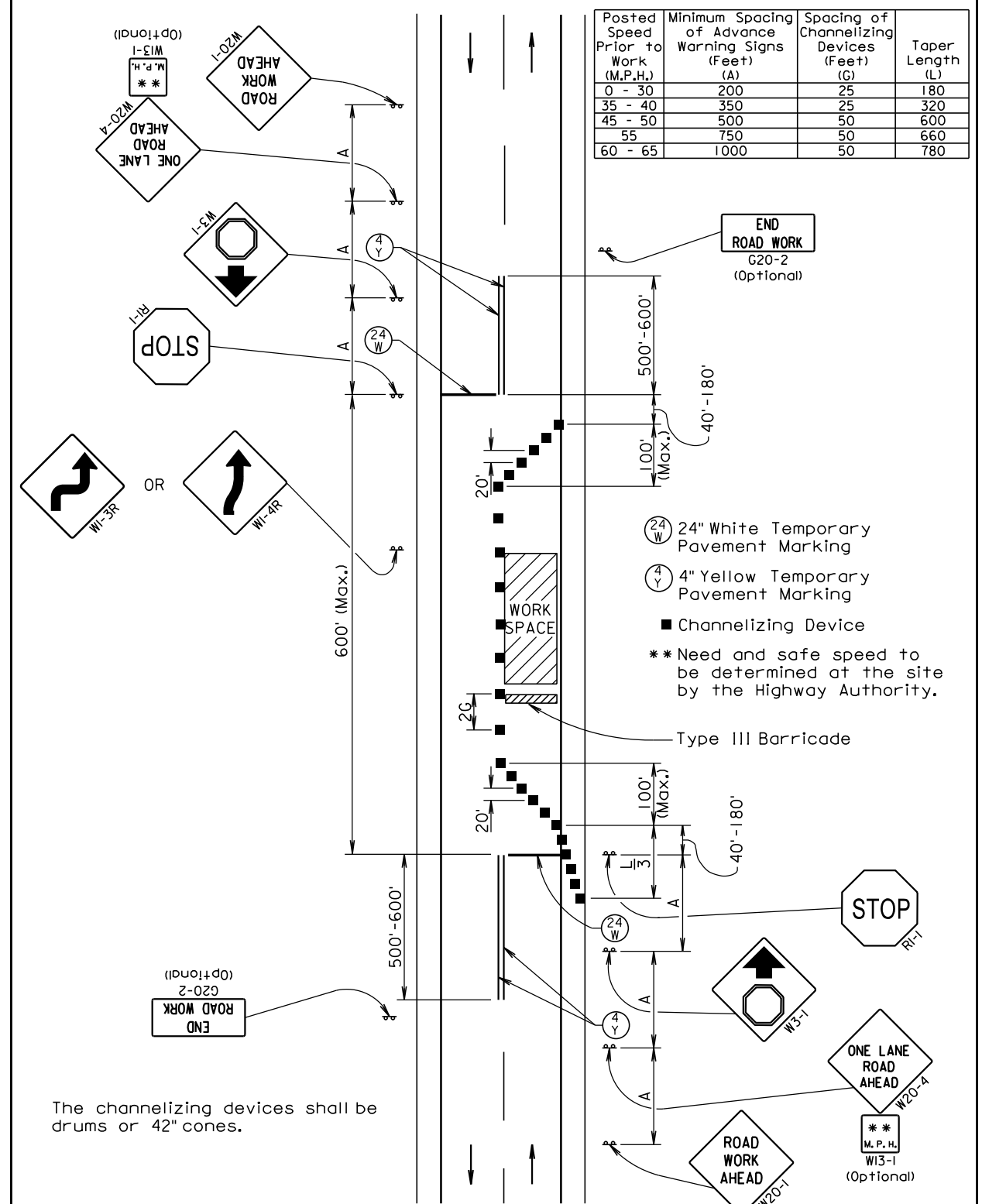
Published Date: 2nd Qtr. 2013

SDOT

GUIDES FOR TRAFFIC CONTROL DEVICES LANE CLOSURE WITH FLAGGER PROVIDED

PLATE NUMBER
634.23

Sheet 1 of 1



Posted Speed Prior to Work (M.P.H.)	Minimum Spacing of Advance Warning Signs (Feet) (A)	Spacing of Channelizing Devices (Feet) (G)	Taper Length (L)
0 - 30	200	25	180
35 - 40	350	25	320
45 - 50	500	50	600
55	750	50	660
60 - 65	1000	50	780

24" White Temporary Pavement Marking

4" Yellow Temporary Pavement Marking

Channelizing Device

** Need and safe speed to be determined at the site by the Highway Authority.

Type III Barricade

The channelizing devices shall be drums or 42" cones.

December 23, 2010

Published Date: 2nd Qtr. 2013

SDOT

GUIDES FOR TRAFFIC CONTROL DEVICES LANE CLOSURE USING STOP SIGNS

PLATE NUMBER
634.25

Sheet 1 of 1

