

PLOT SCALE - 1:200

PLOTTED FROM - TRRC11951

STATE OF SOUTH DAKOTA	PROJECT	SHEET	TOTAL SHEETS
	090E-451 & 090E-425	1	16

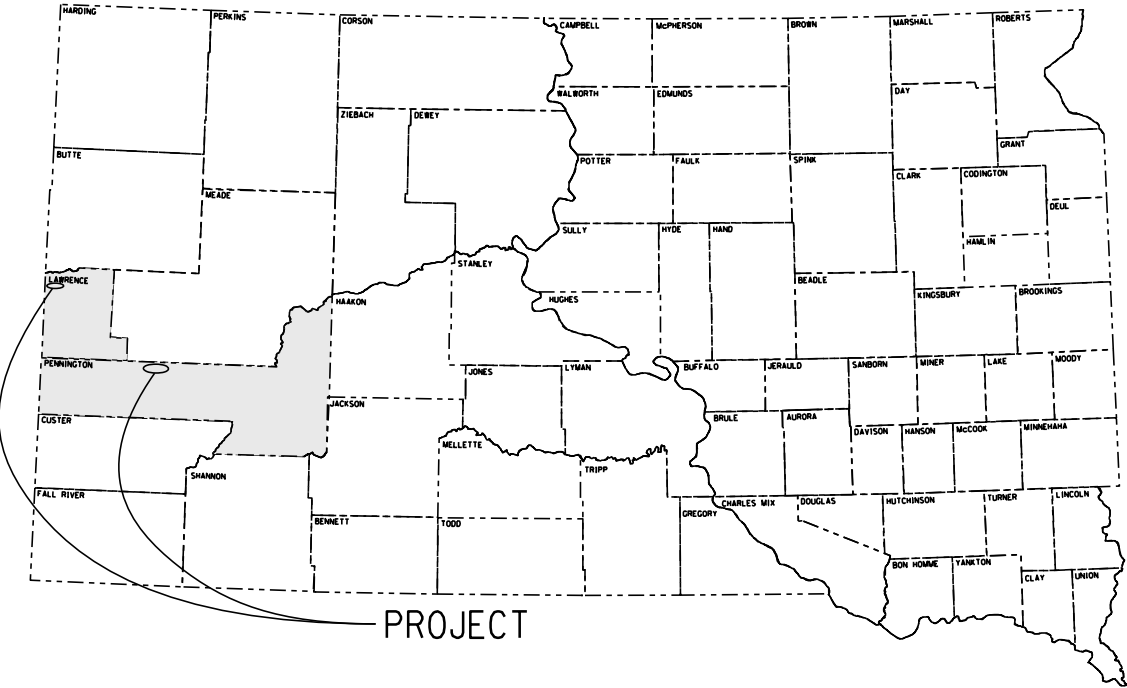
Plotting Date: 04/24/2013

STATE OF SOUTH DAKOTA  
DEPARTMENT OF TRANSPORTATION  
PLANS FOR PROPOSED  
**PROJECT 090E-451 & 090E-452**  
**HIGHWAY I-90**  
**EXIT 8 CROSSROAD, EXIT 57 RAMP**  
**& EXIT 67 RAMP**  
**LAWRENCE & PENNINGTON**  
**COUNTIES**

PCC PAVEMENT REPAIR  
PCNs i2w4 & i2wh

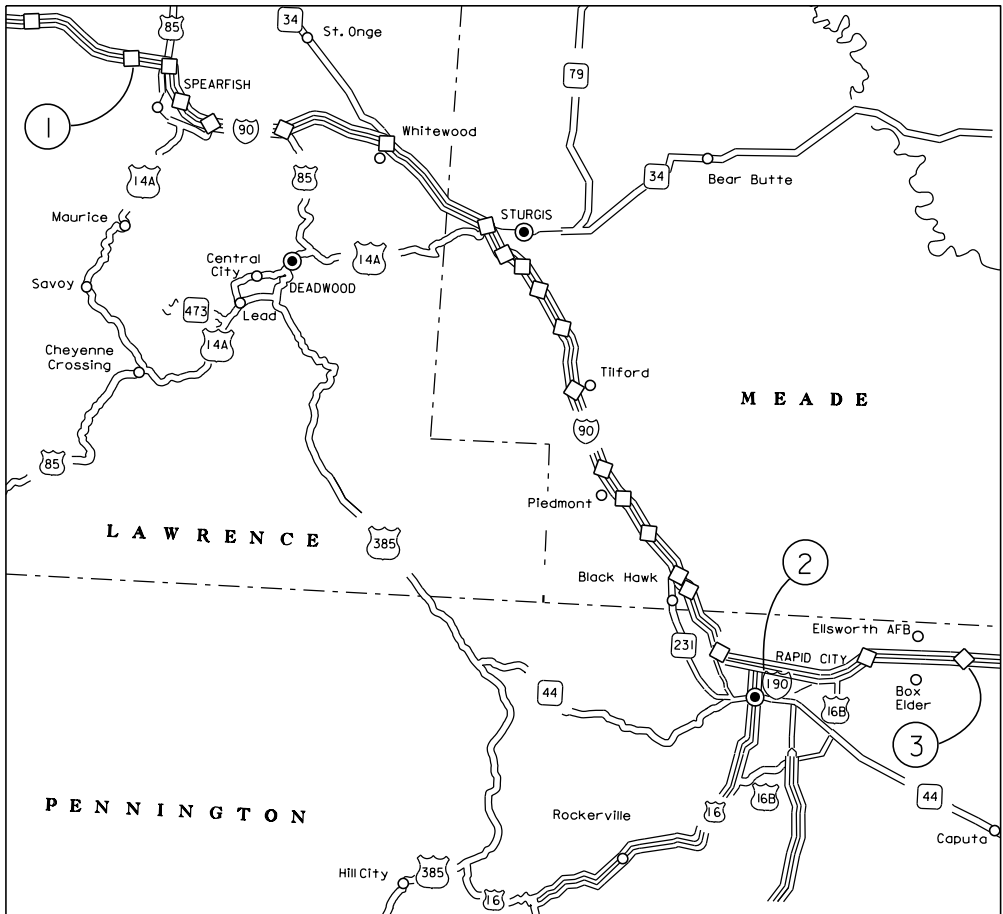
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& Plan Notes  
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- ② I-90, Exit 57, Eastbound On Ramp, PCN i2wh
- ③ I-90, Exit 67, Eastbound On Ramp, PCN i2wh

Storm Water Permit  
No Permit Required



PLOT NAME - 1

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ESTIMATE OF QUANTITIES (Exit 8 Crossroad, PCN i2w4)

Bid Item Number	Item	Quantity	Unit
009E0010	Mobilization	Lump Sum	LS
380E5030	Nonreinforced PCC Pavement Repair	730.0	SqYd
380E6000	Dowel Bar	36	Each
380E6110	Insert Steel Bar in PCC Pavement	1,075	Each
380E6200	Tie Bar Retrofit, Stitching	210	Each
380E6310	Seal Random Cracks in PCC Pavement	210	Ft
390E0200	Repair Type A Spall	10.0	SqFt
633E1400	Pavement Marking Paint, 4" White	214	Ft
633E1405	Pavement Marking Paint, 4" Yellow	428	Ft
634E0010	Flagging	100	Hour
634E0100	Traffic Control	522	Unit
634E0420	Type C Advance Warning Arrow Panel	1	Each
634E0640	Temporary Pavement Marking	214	Ft

ESTIMATE OF QUANTITIES (Exit 57 & 67 Ramps, PCN i2wh)

Bid Item Number	Item	Quantity	Unit
009E0010	Mobilization	Lump Sum	LS
380E5020	Fast Track Concrete for PCC Pavement Repair	55.6	SqYd
380E5030	Nonreinforced PCC Pavement Repair	316.7	SqYd
380E6000	Dowel Bar	24	Each
380E6110	Insert Steel Bar in PCC Pavement	656	Each
633E1400	Pavement Marking Paint, 4" White	128	Ft
633E1405	Pavement Marking Paint, 4" Yellow	128	Ft
634E0010	Flagging	100	Hour
634E0100	Traffic Control	337	Unit
634E0640	Temporary Pavement Marking	128	Ft

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.
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.

HISTORICAL PRESERVATION OFFICE CLEARANCES (CONTINUED)

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.

STATE OF SOUTH DAKOTA	PROJECT	SHEET	TOTAL SHEETS
	090E-451 & 090E-425	2	16

WASTE DISPOSAL SITE (CONTINUED)

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 for the crossroad at I-90 Exit 8 (McGuigan Road) is 8” Nonreinforced PCC Pavement with limestone aggregate. Longitudinal joints are reinforced with No. 5x30” deformed tie bars spaced 48” center to center. The transverse joints are spaced 20’ apart. Transverse joints are reinforced with 1 ¼” steel dowel bars spaced 12” center to center.

The existing pavement for the eastbound on ramp at I-90 Exit 57 and Exit 67 is 9” Nonreinforced PCC Pavement with limestone aggregate. Longitudinal joints are reinforced with No. 5x30” deformed tie bars spaced 48” center to center. The transverse joints are spaced 20’ apart. Transverse joints are reinforced with 1 ¼” steel dowel bars spaced 12” center to center.

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.

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 may need to modify the mix design to meet contract time requirements on the project. The Contractor shall submit a mix design and supporting documentation for approval at least 2 weeks prior to use.

**NONREINFORCED PCC PAVEMENT REPAIR (CONTINUED)**

The use of a 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.

**NONREINFORCED PCC PAVEMENT REPAIR ALONG CONCRETE BARRIER RAIL**

As per the original construction plans, 8' of the existing PCCP is reinforced with steel in front of the Concrete Barrier Rail. The reinforced concrete within this area shall not be disturbed. A full depth saw cut, approximately 8' away from the face of the concrete barrier rail shall be made for any PCCP repair necessary within this area.

**FAST TRACK CONCRETE FOR PCC PAVEMENT REPAIR**

Fast Track Concrete for PCC Pavement Repair shall be used at Exit 57. New pavement thickness shall be a minimum thickness of 9".

Fast Track Concrete shall be used to ensure that the pavement repair area can be opened to traffic within 24 hours after placement of concrete. The concrete repair area shall be removed and replaced in the same day during daylight hours. The repair area shall be opened to traffic when the concrete has attained a minimum compressive strength of 3800 psi. If the concrete does not meet 3800 psi within 24 hours after placement, that section of concrete shall be paid as Nonreinforced PCC Pavement Repair. If the concrete does not meet 3800 psi within 48 hours of placement, payment for this section of concrete shall be at 50% of the contract bid price for Nonreinforced PCC Pavement Repair. If the concrete does not attain a minimum of 3800 psi within 72 hours of placement, all work on the project shall be suspended. All lane closures currently in place that are not required due to non-compliant pavement marking, lane drop-offs or low strength concrete shall be removed. Work will not resume until the Contractor makes adjustments to the concrete mix design and adequately verifies that the mix will meet the required Fast Track Concrete mix design criteria of a minimum strength of 3800 psi within 24 hours. The Contractor will be required to prepare trial batches of the revised mix design to confirm the adequacy of the mix. Work will not commence until the Contractor receives written authorization from the Engineer to proceed with the work.

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	090E-451 & 090E-425	3	16

**FAST TRACK CONCRETE FOR PCC PAVEMENT REPAIR (CONTINUED)**

The slump requirement prior to use of a set accelerator or super-plasticizer will be limited to 2" maximum. After the addition of all admixtures the maximum slump shall be 8 inches and the concrete shall contain 4.5% to 7.0% entrained air. The concrete mixture shall contain a minimum of 50% coarse aggregate by weight. The minimum 28 day compressive strength shall be 4000 psi. 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 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 set accelerator and super-plasticizer at manufacturer's recommended dosage will be required. Both admixtures shall be added at the project site.

Fast Track 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. In addition, the concrete shall be immediately covered with suitable insulation blanket consisting of a layer of closed cell polystyrene foam protected by at least one layer of plastic. The insulation blanket shall have an R value of at least 0.5, as rated by the manufacturer. Insulation blanket shall be overlapped on to the existing concrete. The insulation blanket shall be left in place, except for joint sawing operations, until 3,800 psi strength is attained. The contraction joint sawing shall be performed as soon as possible after placement of concrete to avoid random cracking. Contraction joints shall be initially sawed to the plans detailed depth and to a width of 1/8".

Cost for performing the aforementioned work including sawing and removing concrete, furnishing and placing Fast Track 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 Fast Track Concrete for PCC Pavement Repair.

**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).

**STEEL BAR INSERTION (CONTINUED)**

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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 PCCP REPAIR (PCN i2w4, I-90 Exit 8 Crossroad)

Distance from North End of PCCP Ft	Description	Width Ft	Length Ft	Nonreinforced PCC Pavement Repair SqYd	1 1/4" Bar Each	#9 Bar Each	#5 Bar Each	Insert Steel Bar in PCC Pavement Each	Dowel Bar Each
22	NB, SB & CL	40	6	26.7	72		5	77	
62	NB, SB & CL	40	6	26.7	72		5	77	
142	NB	14	6	9.3		16	5	21	
164	NB	14	6	9.3		16	5	21	
182	NB	14	6	9.3		16	5	21	
201	NB	14	6	9.3		16	5	21	
223	NB	14	6	9.3		16	5	21	
239	NB	14	6	9.3		16	5	21	
438	SB	14	6	9.3		16	5	21	
562	NB, SB & CL	40	20	88.9	72		16	88	
645	NB, SB & CL	40	10	44.4	72		8	80	
676	NB	14	6	9.3		16	5	21	
700	NB, SB & CL	40	40	177.8	72		32	104	36
739	NB	14	6	9.3		16	5	21	
761	SB	14	6	9.3		16	5	21	
783	SB	14	6	9.3		16	5	21	
821	SB	14	6	9.3		16	5	21	
839	SB	14	6	9.3		16	5	21	
940	SB	14	6	9.3		16	5	21	
985	NB	14	6	9.3		16	5	21	
995	SB	14	6	9.3		16	5	21	
1092	NB	14	6	9.3		16	5	21	
EB On Ramp		38	10	42.2	38	26	8	72	
EB Off Ramp		38	10	42.2	38	26	8	72	
WB Off Ramp		15	10	16.7	15	10	4	29	
			Totals	624.2	451	334	167	952	36

TABLE OF PCCP REPAIR (PCN i2wh, I-90, Exit 57 & Exit 67 Ramps)

Distance from Crossroad Ft	Description	Width Ft	Length Ft	Nonreinforced PCC Pavement Repair SqYd	1 1/4" Bar Each	#9 Bar Each	#5 Bar Each	Insert Steel Bar in PCC Pavement Each	Dowel Bar Each	Fast Track Concrete for PCC Pavement Repair SqYd
809	Exit 57, On Ramp	25	20		48		8	56		55.6
10	Exit 67, On Ramp	40	10	44.4	80		4	84		
138	Exit 67, On Ramp	25	6	16.7	48		2	50		
308	Exit 67, On Ramp	25	6	16.7	48		2	50		
344	Exit 67, On Ramp	25	6	16.7	48		2	50		
356	Exit 67, On Ramp	25	6	16.7	48		2	50		
370	Exit 67, On Ramp	25	6	16.7	48		2	50		
384	Exit 67, On Ramp	25	6	16.7	48		2	50		
397	Exit 67, On Ramp	25	6	16.7	48		2	50		
478	Exit 67, On Ramp	25	6	16.7	48		2	50		
689	Exit 67, On Ramp	25	10	27.8	48		4	52		
821	Exit 67, On Ramp	25	40	111.1	48		16	64	24	
			Totals	316.7	560	0	43	656	24	55.6



REPAIR TYPE A SPALL

Included in the estimate of quantities is 10 sqft of "Repair Type A Spall". The estimated number of locations is 20.

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.

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".

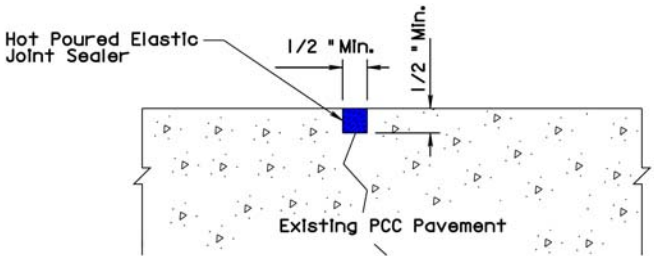


TABLE OF REPAIR OF LONGITUDINAL CRACKS (Exit 8, i2w4)

Distance from North End of PCCP	Lane	Tie Bar Retrofit, Stitching	Seal Random Cracks in PCC Pavement
		Each	Ft
310 to 360	SB	50	50
450 to 530	SB	80	80
700 to 780	NB	80	80
	Total	210	210

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. The drill used shall be hydraulic percussive type and not a hand held.

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.

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".

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.

Due to conflicting pavement markings on the Exit 8 crossroad location the “G” for spacing of channelizing devices shall be changed to 10’. 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.

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.

MAINTENANCE OF TRAFFIC (CONTINUED)

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 Road Markers installed in accordance with the standard plates will not be measured for payment and shall 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 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.

TABLE OF TRAFFIC CONTROL (Exit 8, PCN i2w4)

SIGN CODE	SIGN SIZE	DESCRIPTION	#	UNITS PER SIGN	UNITS
G20-2	36" x 18"	END ROAD WORK	2	17	34
W1-6	60" x 30"	ONE DIRECTION LARGE ARROW	2	30	60
W9-3	48" x 48"	CENTER LANE CLOSED ##### FT. OR AHEAD	4	34	136
W20-7a	48" x 48"	FLAGGER	2	34	68
*****		SIDED	4	56	224
TOTAL UNITS					522

TABLE OF TRAFFIC CONTROL (Exit 57 & 67, PCN i2wh)

SIGN CODE	SIGN SIZE	DESCRIPTION	#	UNITS PER SIGN	UNITS
G20-2	36" x 18"	END ROAD WORK	2	17	34
W5-4	48" x 48"	RAMP NARROWS	1	34	34
W13-1P	30" x 30"	ADVISORY SPEED PLATE	1	21	21
W20-1a	48" x 48"	RAMP WORK AHEAD	2	34	68
W20-7a	48" x 48"	FLAGGER	2	34	68
*****		SIDED	2	56	112
TOTAL UNITS					337

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 associated with this work shall be incidental to the contract unit price per mile “Temporary Pavement Marking”.

All costs for temporary pavement marking including furnishing, applying, maintenance, removal and disposing of tabs shall be incidental to the contract unit price per mile for Temporary Pavement Marking.

It is estimated that 214 feet of Temporary Pavement Marking will be required at Exit 8 and 128 feet on the ramps for the project. The quantity is only provided for opening completed sections to traffic. Temporary Pavement Marking as per standard plates shall be incidental to the contract unit price per lump sum “Traffic Control, Miscellaneous”.

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 214 feet of 4” white and 428 feet of 4” yellow pavement marking will be required at Exit 8 and 128 feet of 4” white and 128 feet of 4” yellow pavement marking will be required at Exit 67 on the project.

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

PLOTTED FROM - TRRC11951

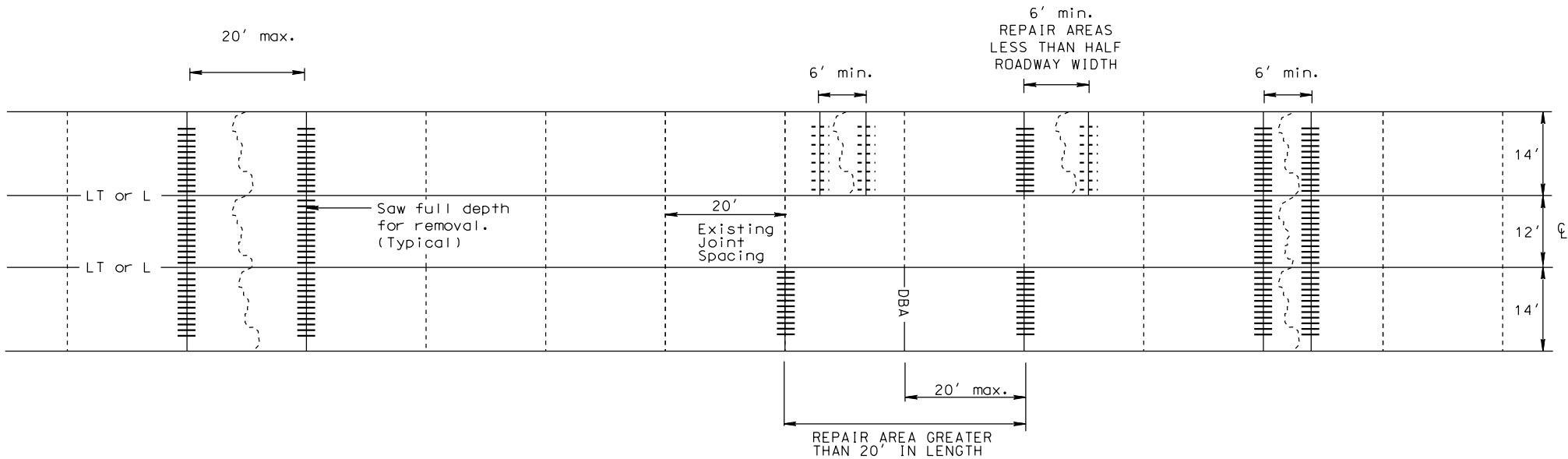
STATE OF SOUTH DAKOTA	PROJECT	SHEET	TOTAL SHEETS
	090E-451 & 090E-425	8	16

Plotting Date: 04/19/2013

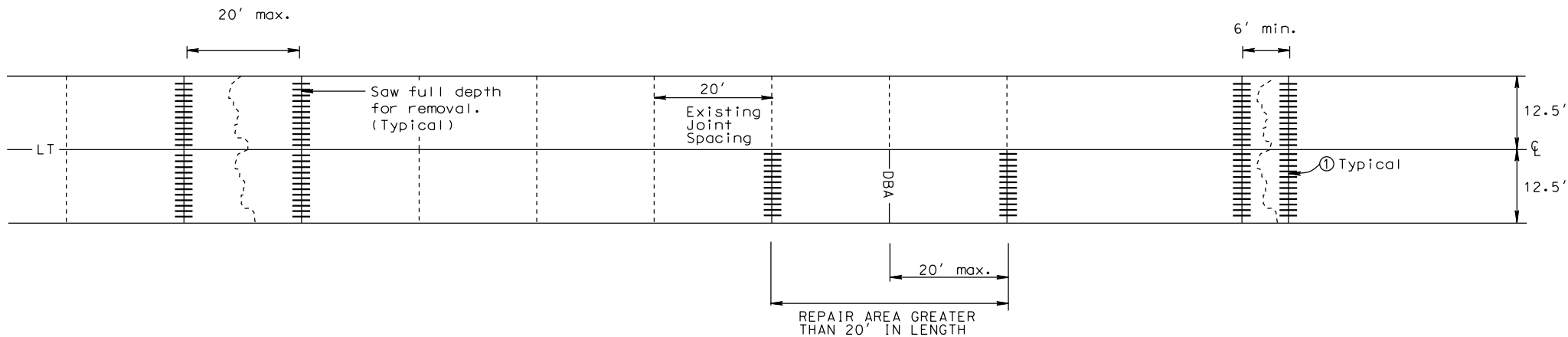
# NONREINFORCED PCC PAVEMENT REPAIR

## TYPICAL REPAIR AREAS

### Exit 8 Crossroad (McGuigan Road)



### Exit 57 & Exit 67 EB On Ramp



#### NOTES:

- ① Where possible, transverse joints shall be constructed full roadway width.

#### 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)

PLOT NAME - 3

FILE - ... \PCCREPAIR.DGN

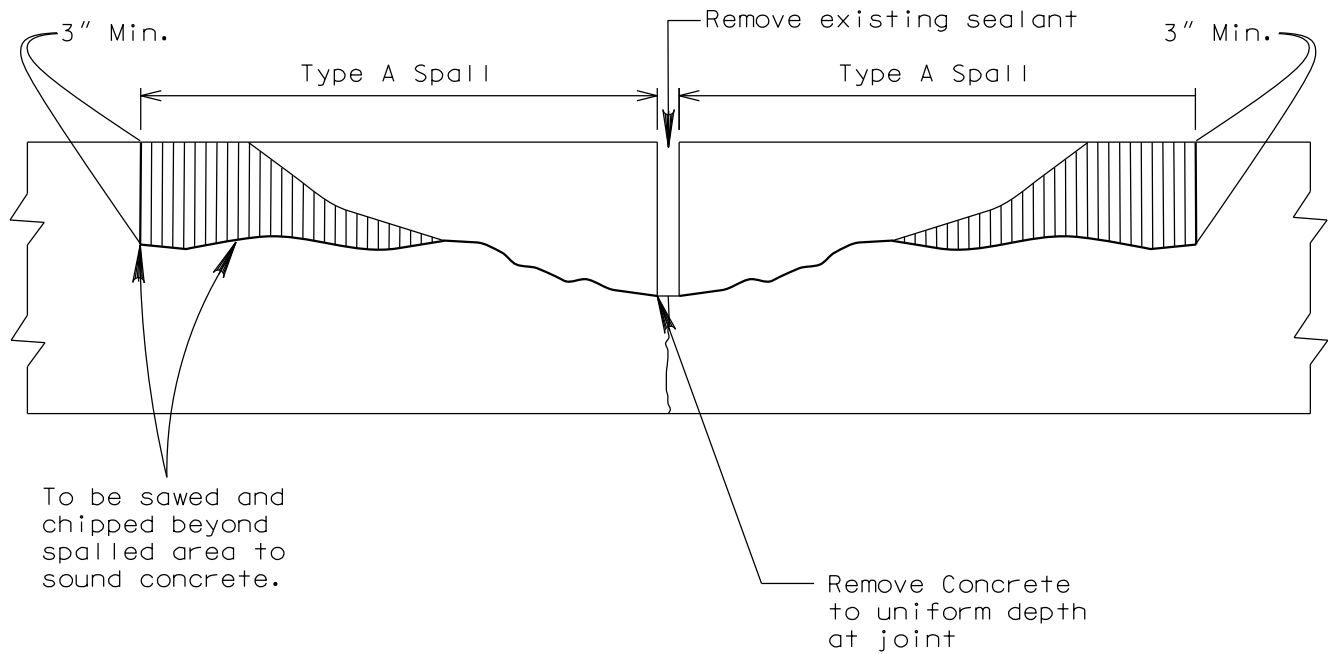


STATE OF SOUTH DAKOTA	PROJECT	SHEET NO.	TOTAL SHEETS
	090E-451 & 090E-425	9	16

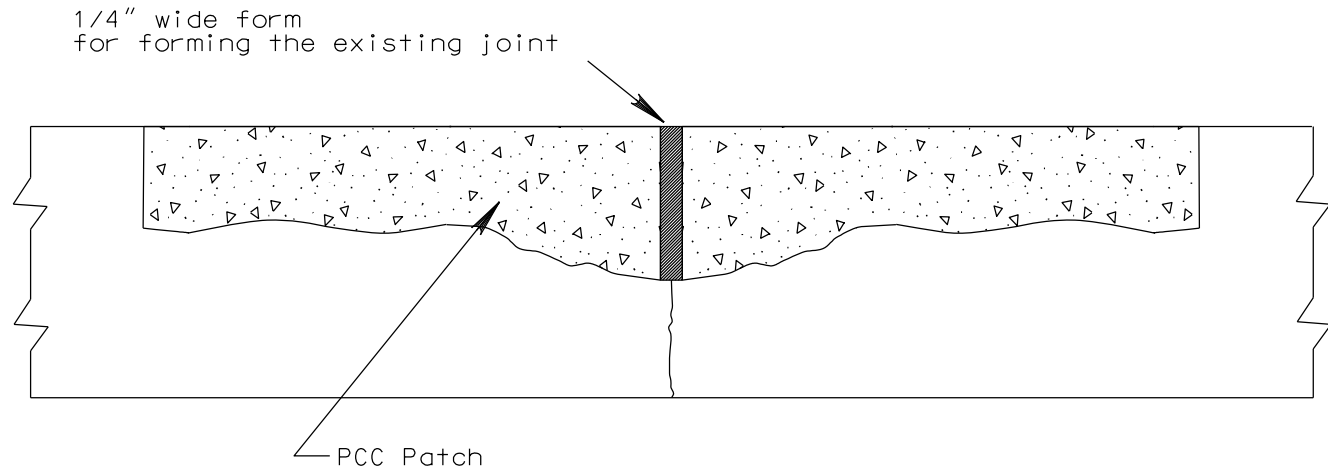
Plotting Date: 03/19/2013

# REPAIR OF TYPE A SPALLS

## SPALL REMOVAL



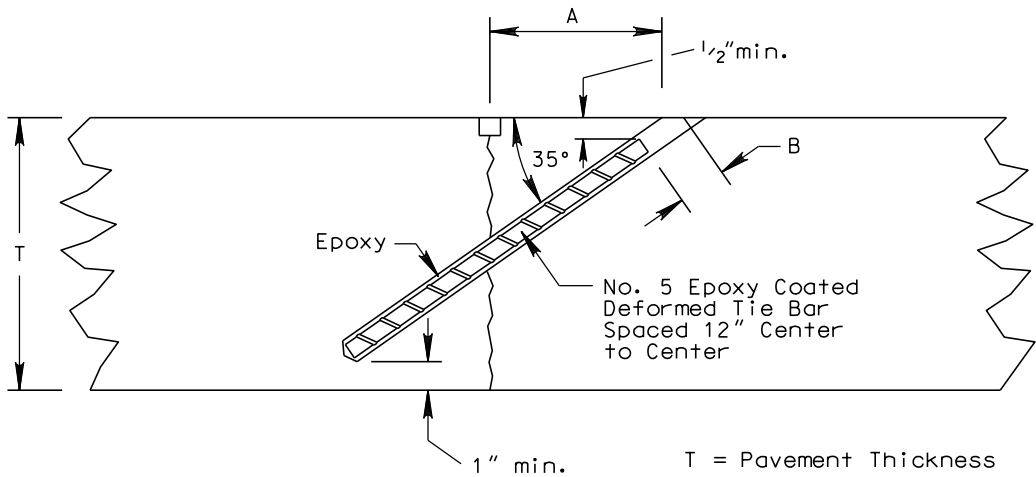
## SPALL PATCH



STATE OF SOUTH DAKOTA	PROJECT	SHEET NO.	TOTAL SHEETS
	090E-451 & 090E-425	10	16

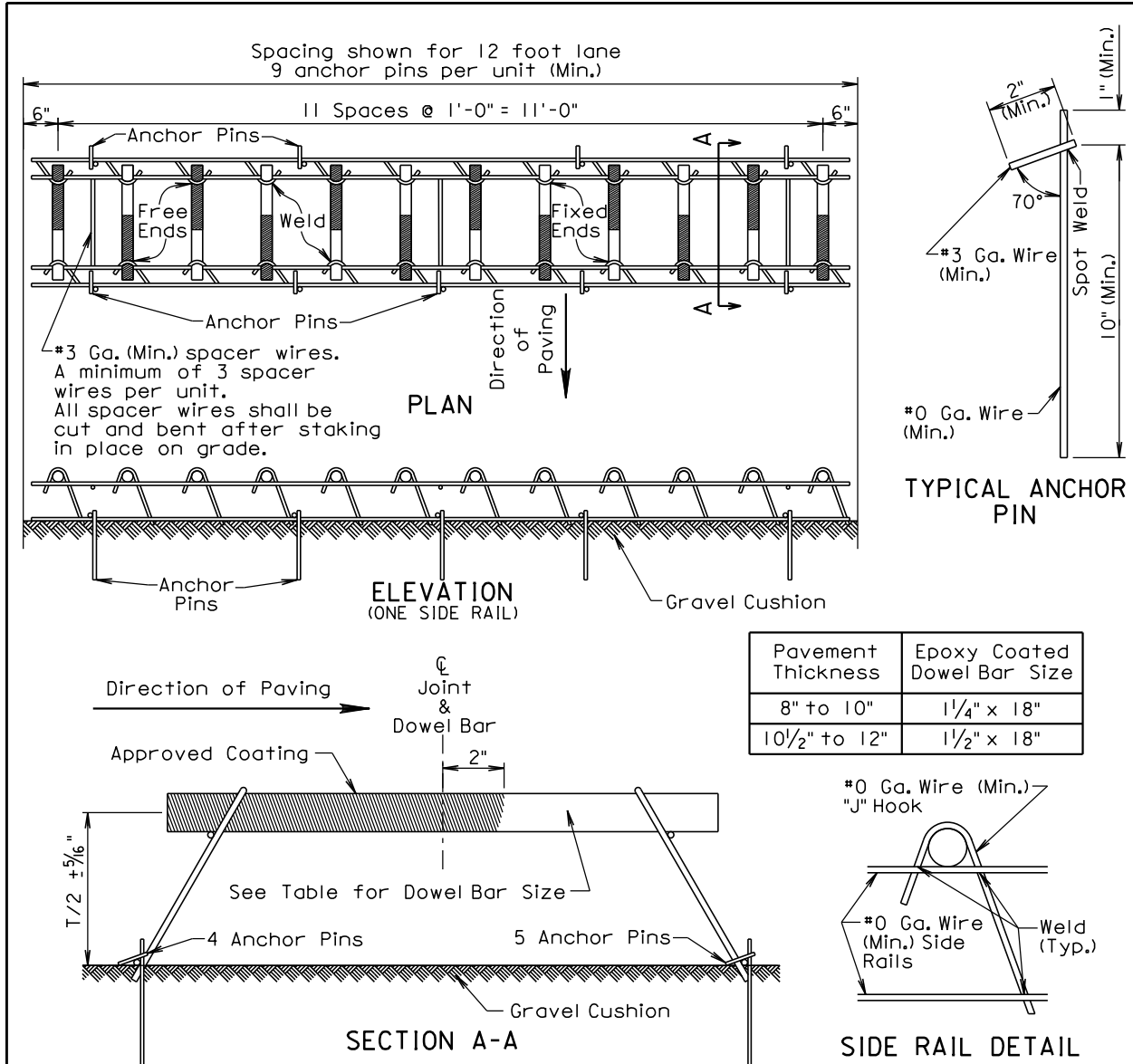
Plotting Date: 04/19/2013

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



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.

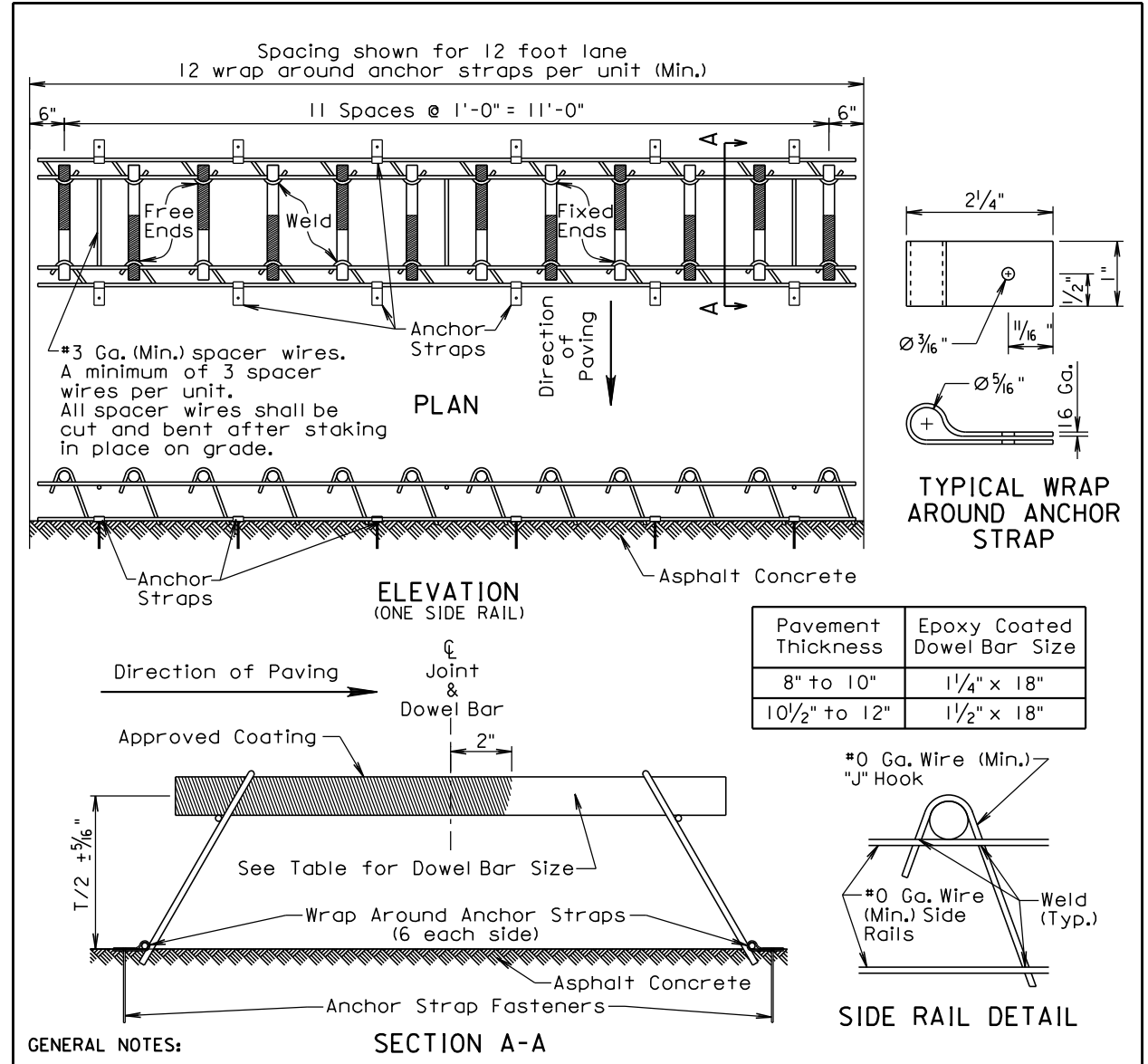
Centerline of individual dowel bars shall be parallel to the centerline of the roadway  $\pm 1/2$  inch in 18 inches.

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  $\pm 1$  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: 1st 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.

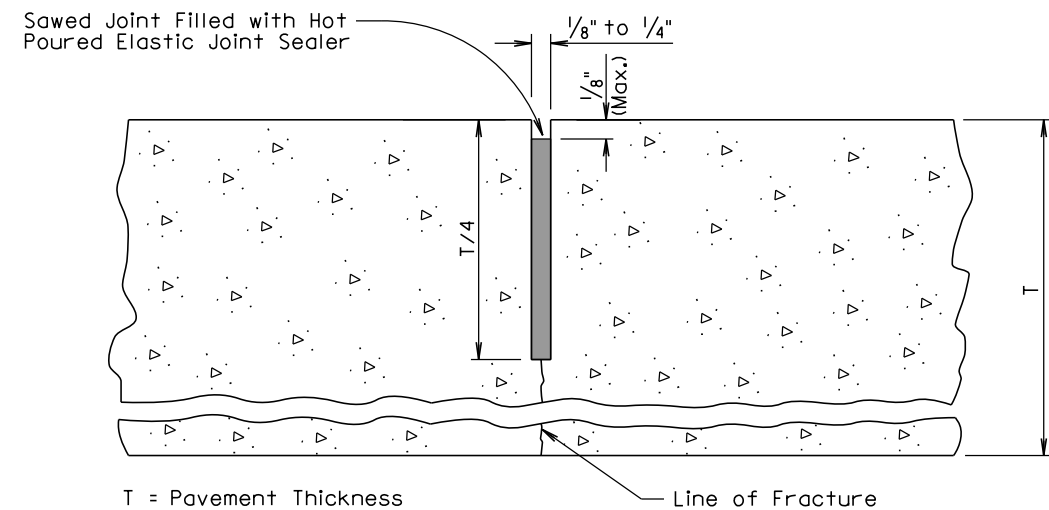
The transverse contraction joints shall be sawed perpendicular to the centerline of the roadway and the dowel bars shall be centered on the sawed joint  $\pm 1$  inch.

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



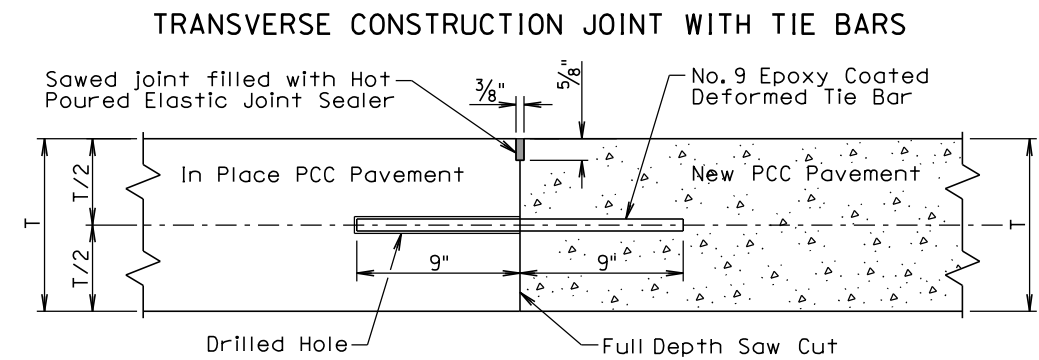
**GENERAL NOTES:**

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: 1st 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



T = In Place PCC Pavement and New PCC Pavement Thickness

**GENERAL NOTES:**

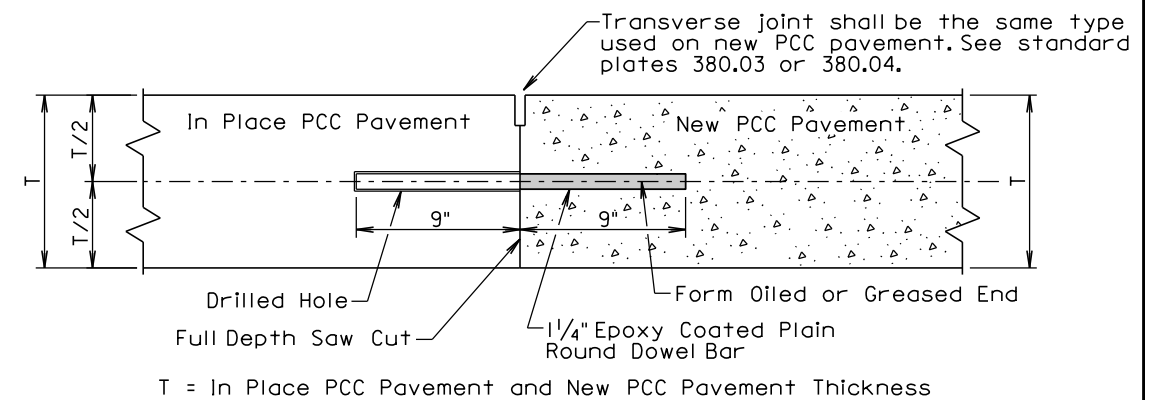
This detail shall be used when the transverse joint is less than 15 feet from the existing transverse contraction joint.

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.

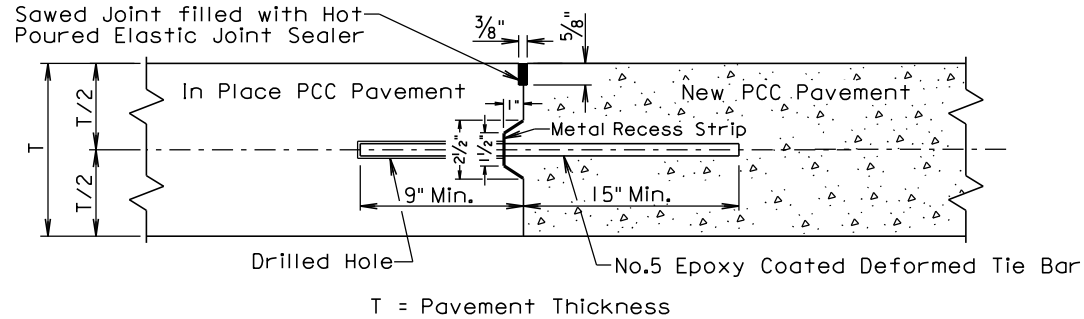
The 1 1/4" epoxy coated plain round dowel bars shall be spaced 12 inches center to center and shall be a minimum of 3 inches and a maximum of 6 inches from the pavement edges.

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: 1st 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.

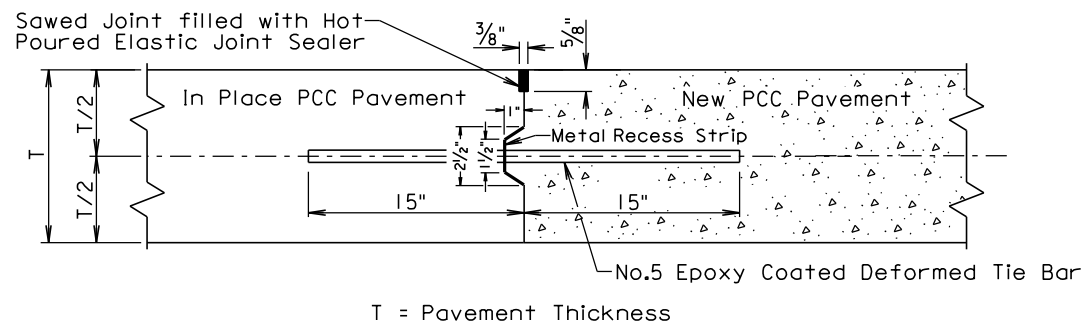
No.5 epoxy coated deformed tie bars shall be spaced 48" center to center for a female keyway or 30" center to center for a vertical face and male keyway. The keyway shown above is a female keyway.

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.

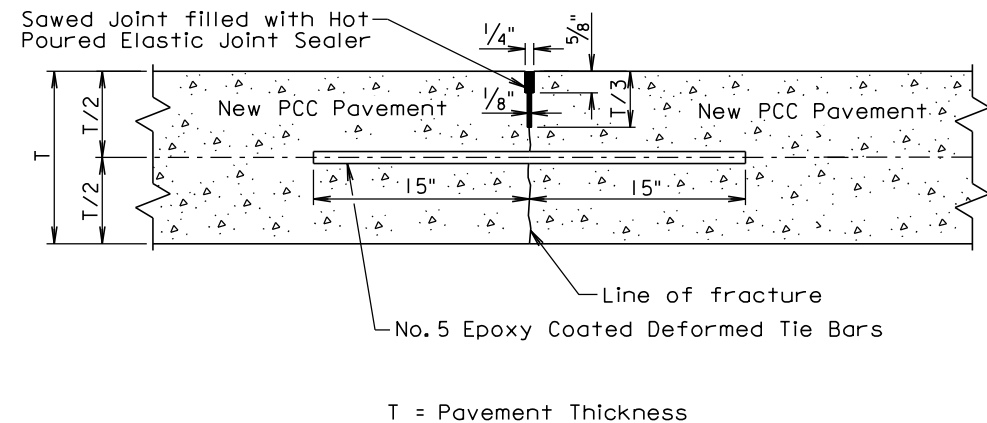
The keyway is optional and is not required. When concrete pavement is formed and a keyway is provided, a metal recess strip shall be used. When concrete pavement is slip formed, a metal recess strip is not required.

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: 1st 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:

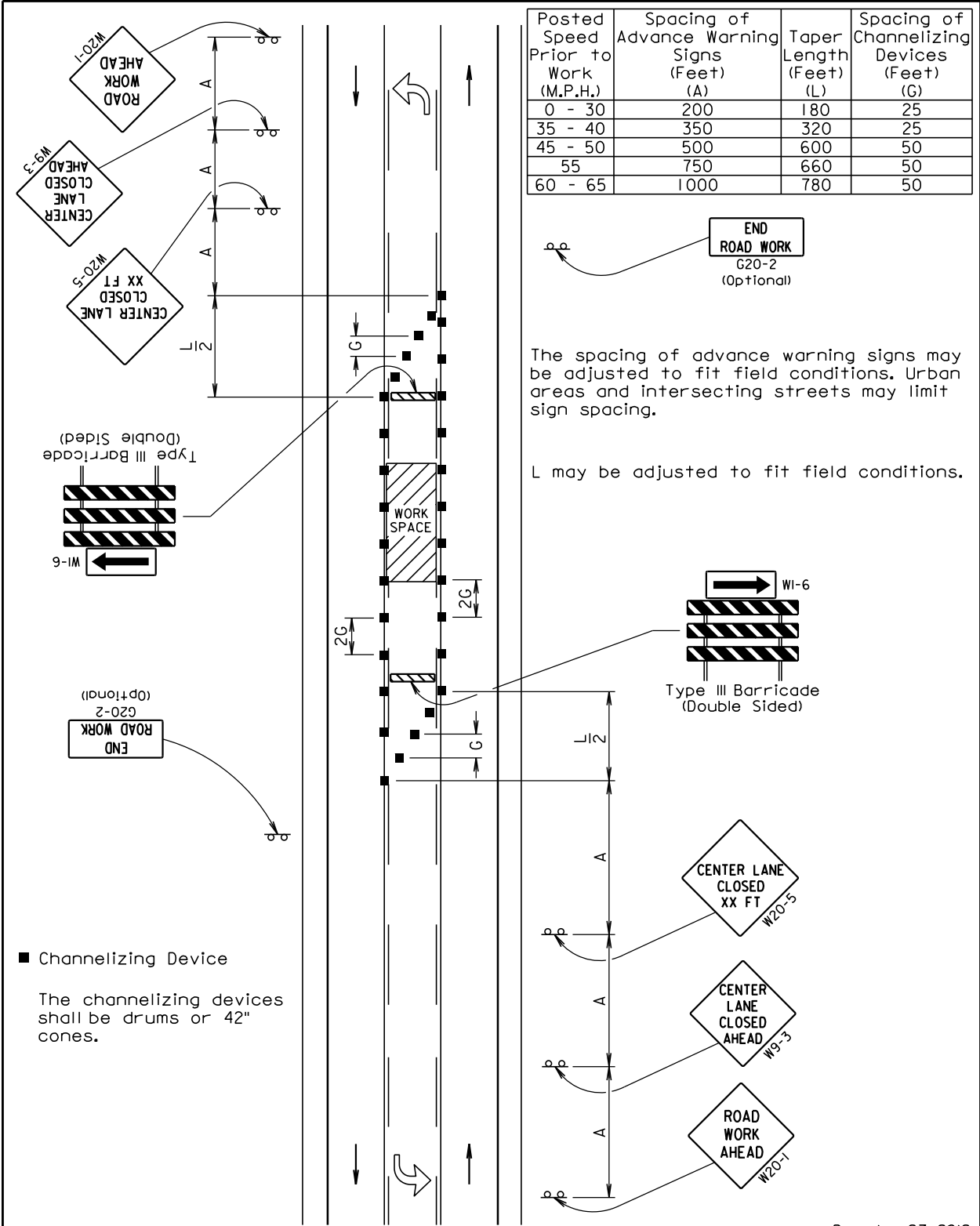
No.5 epoxy coated deformed tie bars shall be spaced 48 inches center to center.

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



December 23, 2012

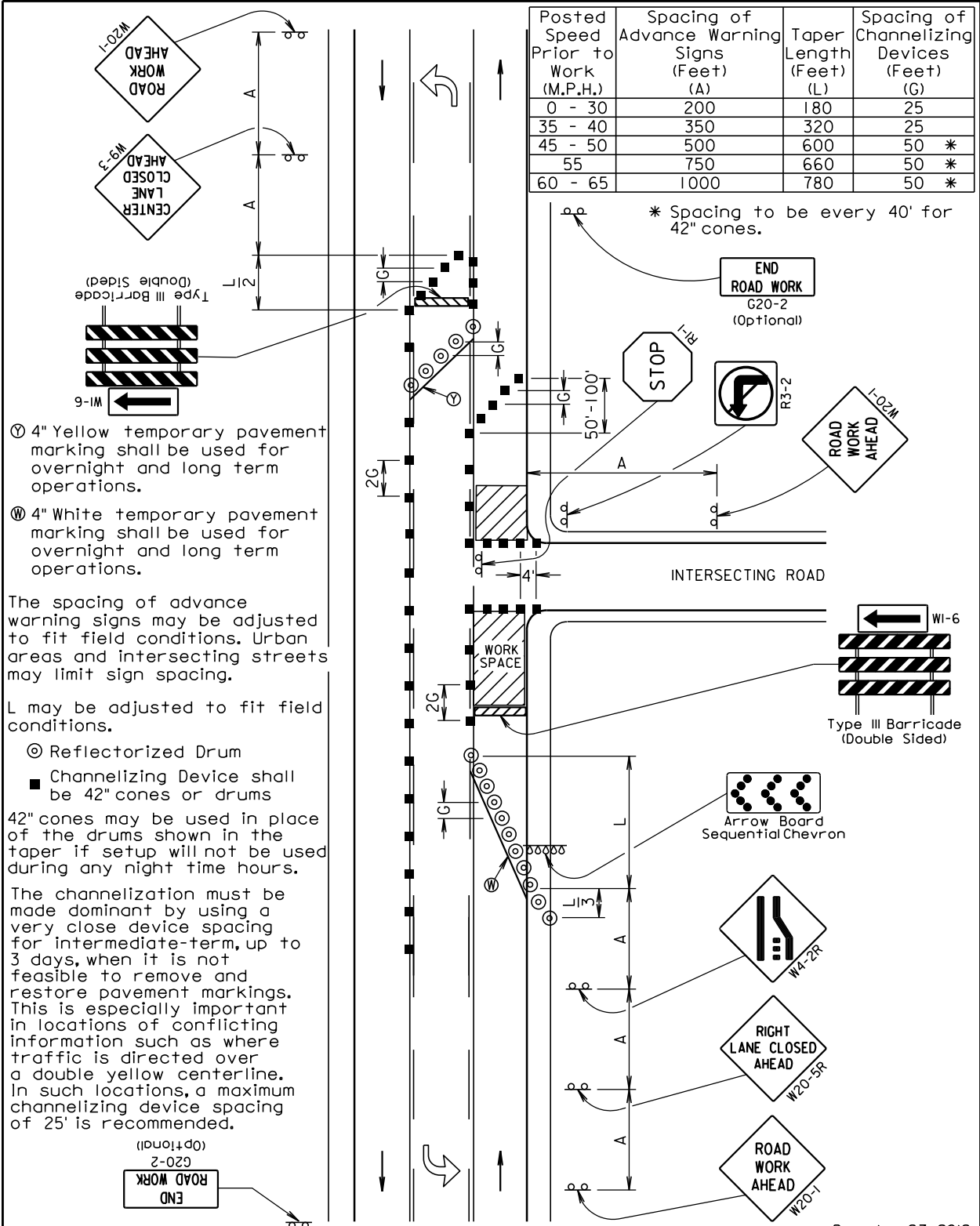
Published Date: 2nd Qtr. 2013

SDOT

GUIDES FOR TRAFFIC CONTROL DEVICES  
3-LANE, CENTER LANE CLOSED

PLATE NUMBER  
634.52

Sheet 1 of 1



December 23, 2012

Published Date: 2nd Qtr. 2013

SDOT

GUIDES FOR TRAFFIC CONTROL DEVICES  
3-LANE, OUTSIDE LANE CLOSED

PLATE NUMBER  
634.53

Sheet 1 of 1



Posted Speed Prior to Work (M.P.H.)	Spacing of Advance Warning Signs (Feet) (A) (B)		L
45 - 50	500		600
55	750		660
60 - 65	1000		780
70 - 75	(A)	(B)	1125
	1000	1600	

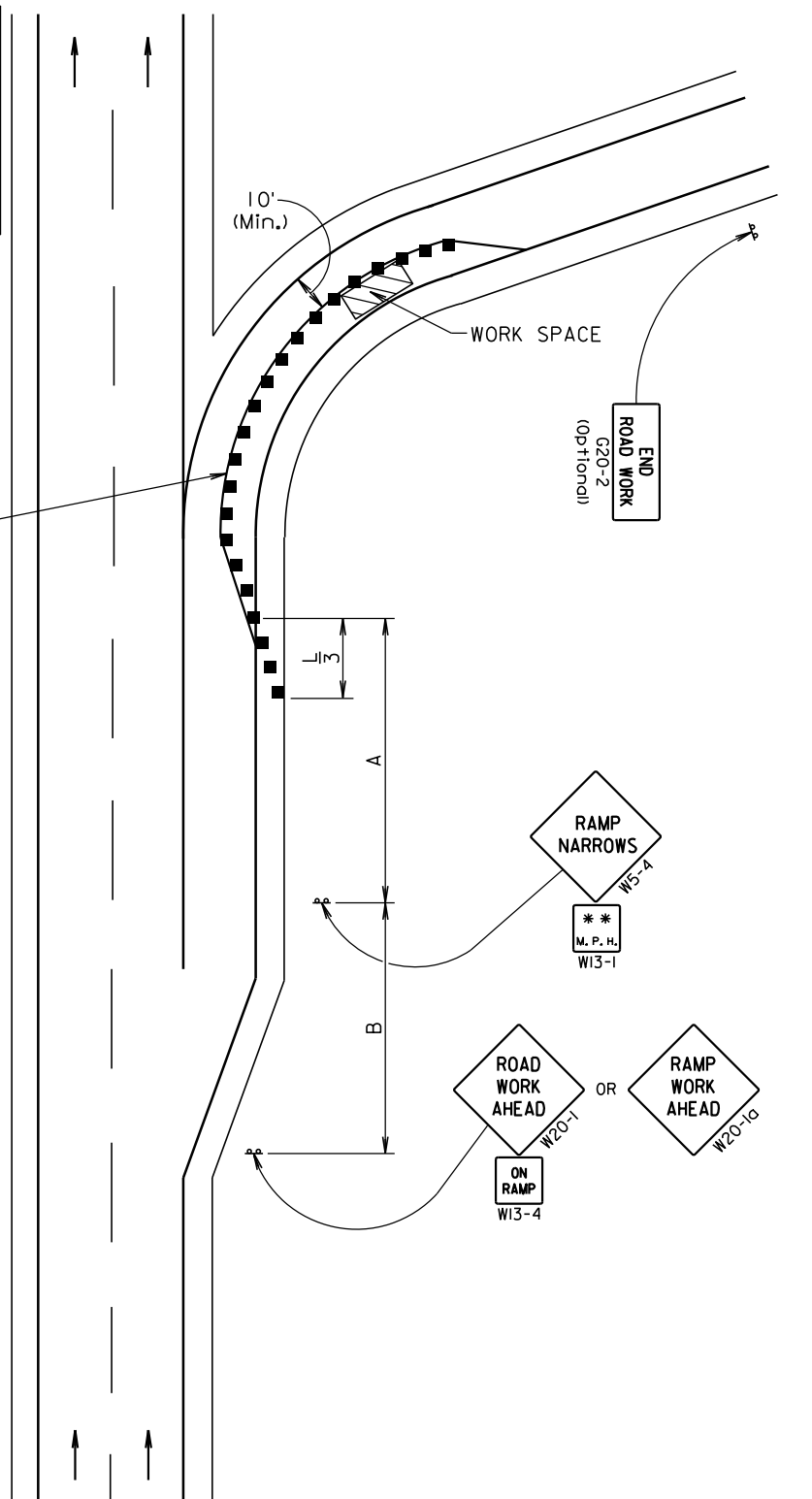
■ Channelizing Device

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

Four inch white temporary pavement marking shall be used if traffic control must remain overnight or longer.

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

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



February 14, 2011

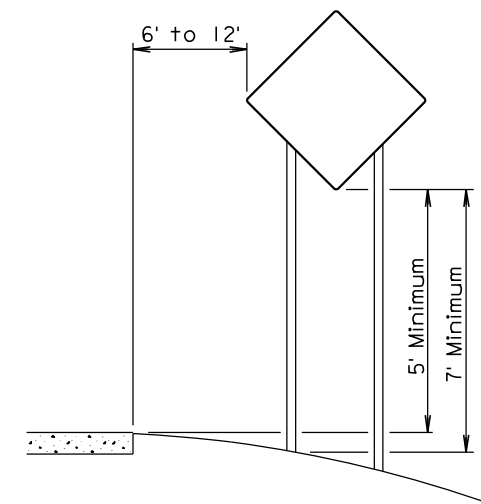
Published Date: 2nd Qtr. 2013

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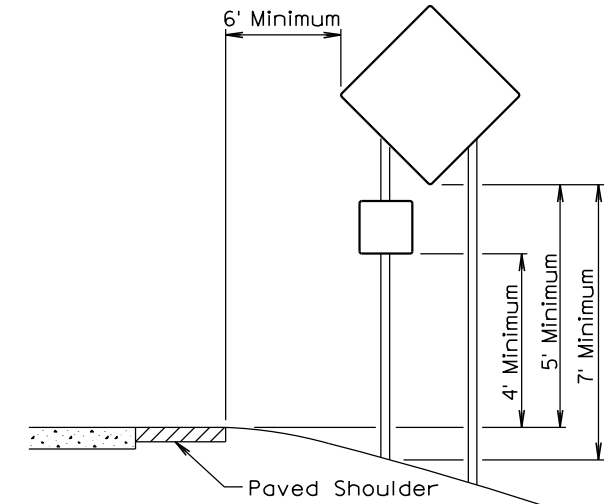
### GUIDES FOR TRAFFIC CONTROL DEVICES PARTIAL EXIT RAMP CLOSURE

PLATE NUMBER  
634.69

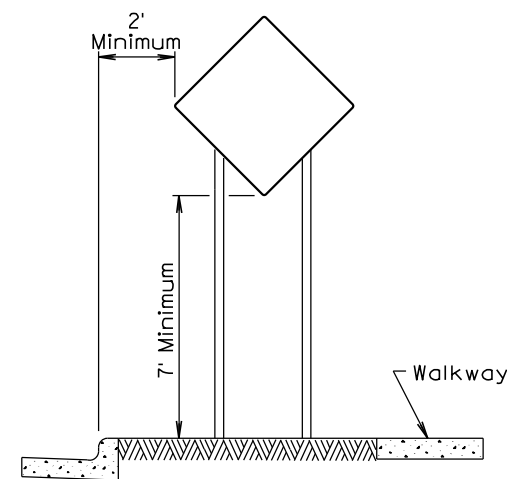
Sheet 1 of 1



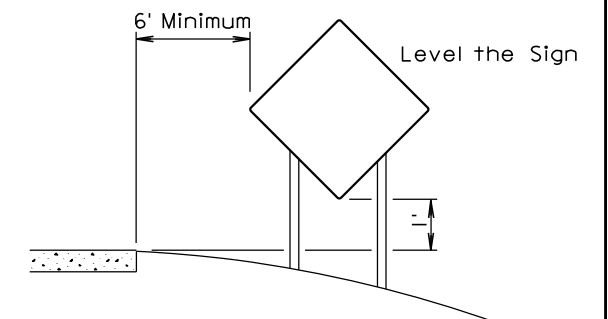
RURAL DISTRICT



RURAL DISTRICT WITH  
SUPPLEMENTAL PLATE



URBAN DISTRICT



RURAL DISTRICT  
3 DAY MAXIMUM

February 14, 2011

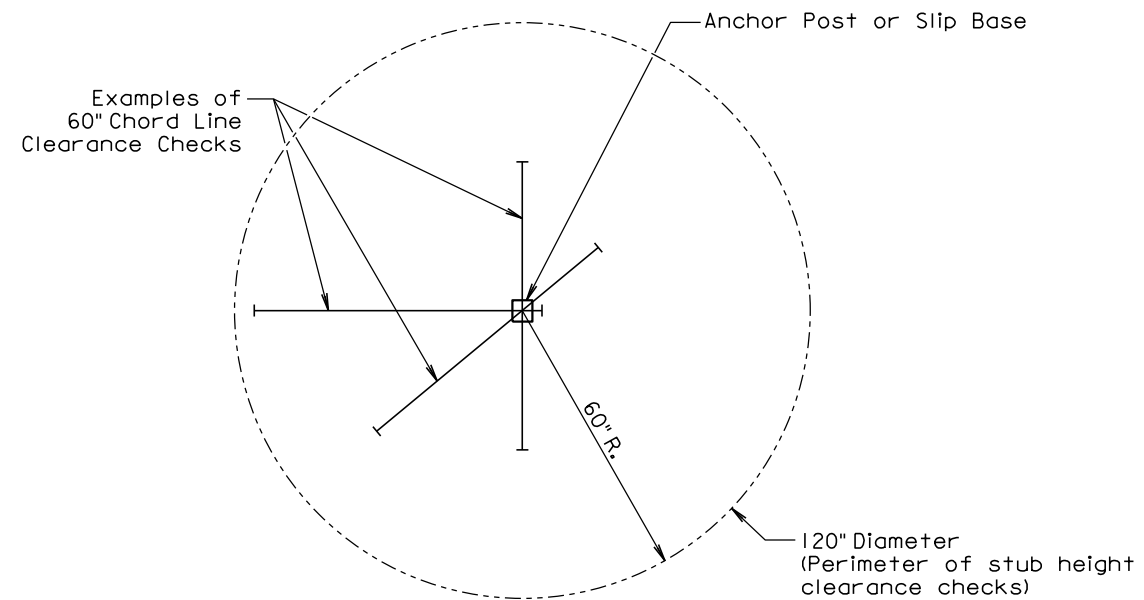
Published Date: 1st Qtr. 2013

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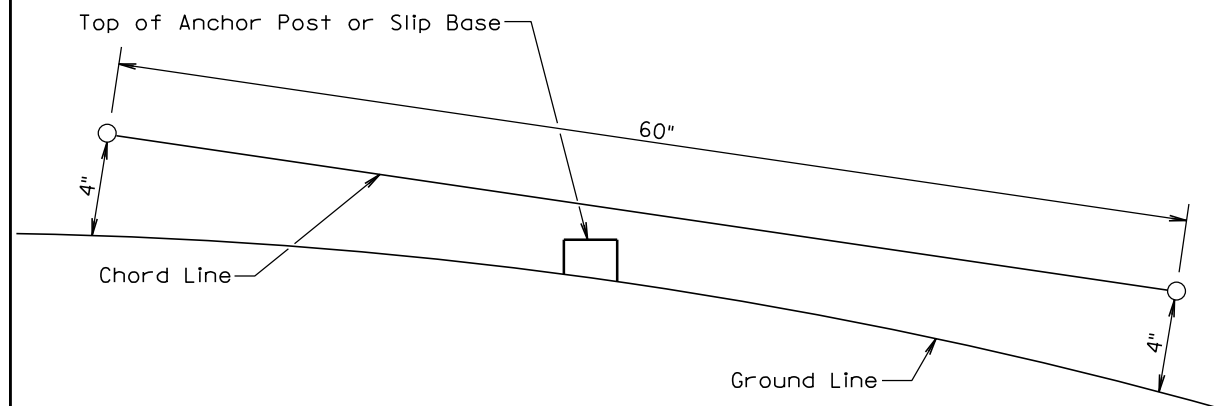
### CRASHWORTHY SIGN SUPPORTS (Typical Construction Signing)

PLATE NUMBER  
634.85

Sheet 1 of 1



PLAN VIEW  
(Examples of stub height clearance checks)



ELEVATION VIEW

GENERAL NOTES:

The top of anchor posts and slip bases SHALL NOT extend above a 60" chord line within a 120" diameter circle around the post with ends 4" above the ground.

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

The 4" stub height clearance is not necessary for U-channel lap splices where the support is designed to yield (bend) at the base.

July 1, 2005

Published Date: 1st Qtr. 2013	S D D O T	BREAKAWAY SUPPORT STUB CLEARANCE	PLATE NUMBER 634.99
			Sheet 1 of 1