

PLOT SCALE - 200,000,000:1,000,000

STATE OF SOUTH DAKOTA  
DEPARTMENT OF TRANSPORTATION  
PLANS FOR PROPOSED

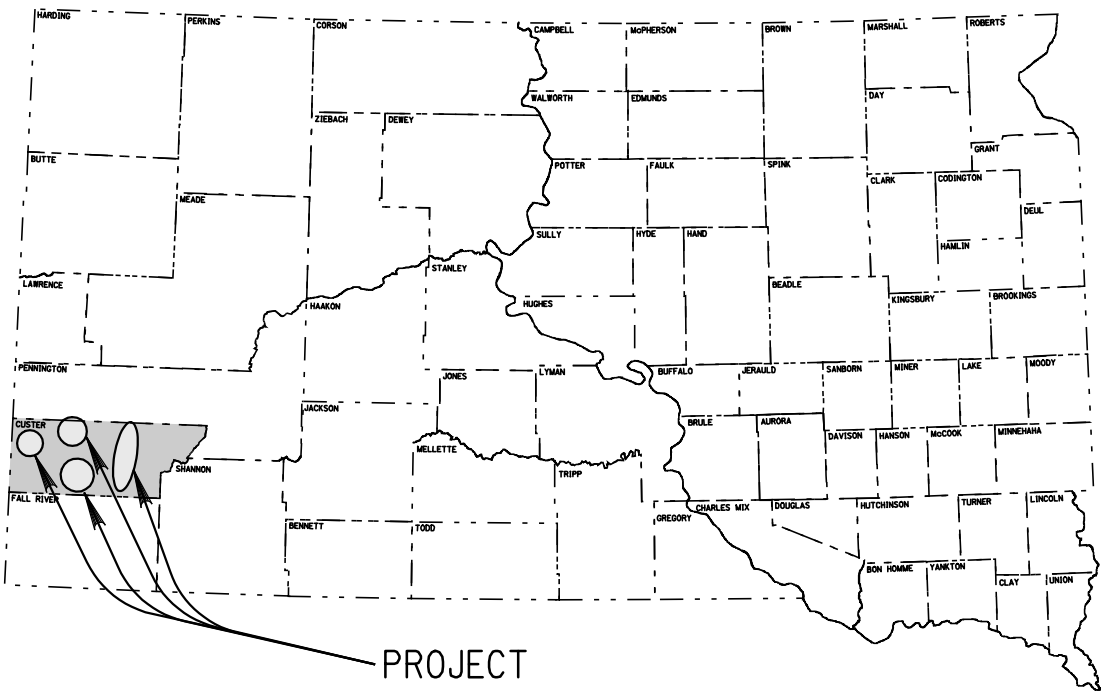
PROJECTS 016-491, 385-491,  
016-491 & 079S-492  
US HIGHWAY 16 & 385  
and SD HIGHWAY 79S  
CUSTER COUNTY

STATE OF SOUTH DAKOTA	PROJECT	SHEET NO.	TOTAL SHEETS
	016-491, 385-491 016-491 079S-492	1	19

Plotting Date: 05-OCT-2009

INDEX OF SHEETS

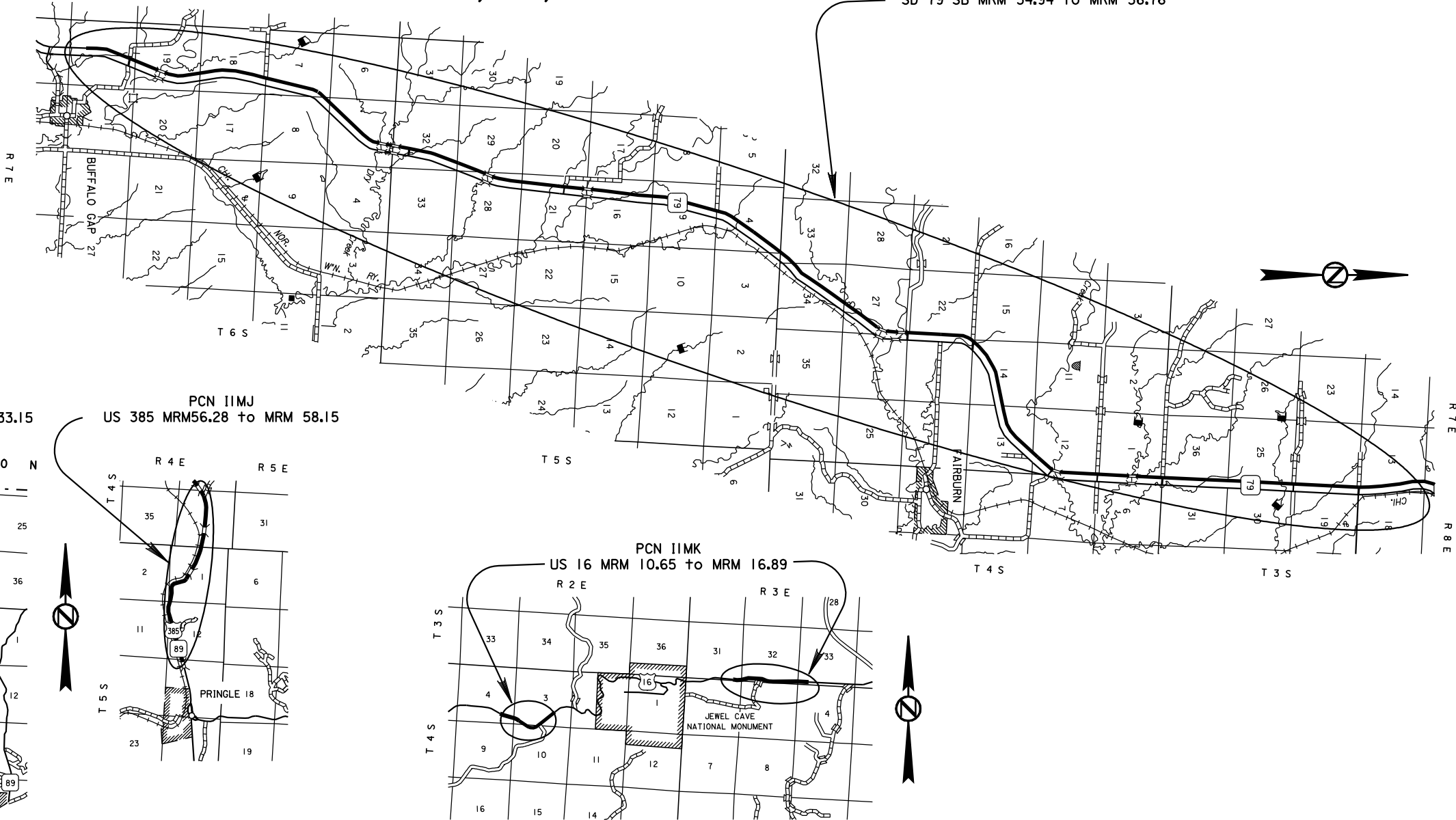
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PROJECT

PCC PAVEMENT REPAIR  
PCN IIMH, IIMJ, IIMK & IIML

PCN IIML  
SD 79 SB MRM 34.94 to MRM 56.76



DESIGN DESIGNATION PCN IIMH  
US 16/385 MRM 33.0 to MRM 33.15

ADT (2008)	4000
ADT (2028)	4775
DHV	715
D	50%
T DHV	3.3%
T ADT	7.3%
V	65

DESIGN DESIGNATION PCN IIMJ  
US 385 MRM 56.28 to MRM 58.15

ADT (2008)	1980
ADT (2028)	2525
DHV	380
D	50%
T DHV	2.6%
T ADT	5.7%
V	65

DESIGN DESIGNATION PCN IIMK  
US 16 MRM 10.65 to MRM 16.89

ADT (2008)	1285
ADT (2028)	1680
DHV	255
D	50%
T DHV	3.8%
T ADT	8.4%
V	65

DESIGN DESIGNATION PCN IIML  
SD 79 MRM 34.94 to MRM 54.95

ADT (2008)	2990
ADT (2028)	4165
DHV	625
D	50%
T DHV	8.1%
T ADT	17.9%
V	70

TRC11610

ESTIMATE OF QUANTITIES

BID ITEMS PCN I1MH

Bid Item Number	Item	Quantity	Unit
009E0010	Mobilization	Lump Sum	LS
120E0100	Unclassified Excavation, Digouts	15	CuYd
260E1010	Base Course	30.0	Ton
380E5030	Nonreinforced PCC Pavement Repair	225.6	SqYd
380E6000	Dowel Bar	48	Each
380E6110	Insert Steel Bar in PCC Pavement	162	Each
633E1400	Pavement Marking Paint, 4" White	125	Ft
633E1405	Pavement Marking Paint, 4" Yellow	125	Ft
634E0010	Flagging	40	Hour
634E0100	Traffic Control	546	Unit
634E0120	Traffic Control, Miscellaneous	Lump Sum	LS
634E0420	Type C Advance Warning Arrow Panel	2	Each

BID ITEMS PCN I1MJ

Bid Item Number	Item	Quantity	Unit
009E0010	Mobilization	Lump Sum	LS
120E0100	Unclassified Excavation, Digouts	15	CuYd
260E1010	Base Course	30.0	Ton
380E5030	Nonreinforced PCC Pavement Repair	280.0	SqYd
380E6000	Dowel Bar	36	Each
380E6110	Insert Steel Bar in PCC Pavement	208	Each
380E6310	Seal Random Cracks in PCC Pavement	45	Ft
633E1400	Pavement Marking Paint, 4" White	180	Ft
633E1405	Pavement Marking Paint, 4" Yellow	100	Ft
634E0010	Flagging	40	Hour
634E0100	Traffic Control	732	Unit
634E0120	Traffic Control, Miscellaneous	Lump Sum	LS

BID ITEMS PCN I1MK

Bid Item Number	Item	Quantity	Unit
009E0010	Mobilization	Lump Sum	LS
120E0100	Unclassified Excavation, Digouts	15	CuYd
260E1010	Base Course	30.0	Ton
380E5030	Nonreinforced PCC Pavement Repair	266.6	SqYd
380E6000	Dowel Bar	24	Each
380E6110	Insert Steel Bar in PCC Pavement	236	Each
380E6310	Seal Random Cracks in PCC Pavement	85	Ft
633E1400	Pavement Marking Paint, 4" White	160	Ft
633E1405	Pavement Marking Paint, 4" Yellow	120	Ft
634E0010	Flagging	40	Hour
634E0100	Traffic Control	1,122	Unit
634E0120	Traffic Control, Miscellaneous	Lump Sum	LS
634E0420	Type C Advance Warning Arrow Panel	2	Each

BID ITEMS PCN I1ML

Bid Item Number	Item	Quantity	Unit
009E0010	Mobilization	Lump Sum	LS
120E0100	Unclassified Excavation, Digouts	15	CuYd
260E1010	Base Course	30.0	Ton
380E5030	Nonreinforced PCC Pavement Repair	551.1	SqYd
380E6000	Dowel Bar	120	Each
380E6110	Insert Steel Bar in PCC Pavement	368	Each
633E1400	Pavement Marking Paint, 4" White	140	Ft
633E1405	Pavement Marking Paint, 4" Yellow	155	Ft
634E0010	Flagging	40	Hour
634E0100	Traffic Control	1,350	Unit
634E0120	Traffic Control, Miscellaneous	Lump Sum	LS
634E0420	Type C Advance Warning Arrow Panel	1	Each

SPECIFICATIONS

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

UTILITIES

The Contractor shall contact the involved utility companies through South Dakota One Call (1-800-781-7474) prior to starting work. It shall be the responsibility of the Contractor to coordinate work with the utility owners to avoid damage to existing facilities.

SCOPE OF WORK

Work on this project consists of:

1. Full depth replacement of concrete pavement in areas where concrete pavement major failures have occurred. Full depth areas vary in length and width, however the minimum length is 6 feet.
2. Sawing and sealing joints.
3. Sealing random cracks.

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 Tom Lehmkuhl, DOT Environmental Engineer, 700 East Broadway Avenue, Pierre, SD 57501-2586 (605-773-3721). 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.

STATE OF SOUTH DAKOTA	PROJECT	SHEET	TOTAL SHEETS
	016-491, 385-491, 016-491 & 079S-492	2	19

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.

SAWING EXISTING SURFACING

Where new Portland Cement Concrete Pavement (PCCP) or new asphalt concrete is placed adjacent to existing asphalt concrete or PCCP, the existing pavement shall be sawed full depth to a true line with a vertical face (except cold milled areas). No separate payment shall be made for sawing.

EXISTING PCC PAVEMENT

The existing pavement on US 16 is 28’ & 38’ wide 8” Nonreinforced PCC Pavement. The existing pavement on US 16/385 is 42’ wide 8.5” Nonreinforced PCC Pavement. The existing pavement on US 385 is 28’ wide 8” Nonreinforced PCC Pavement. The existing pavement on SD 79 is 26’ wide 8.5” Nonreinforced PCC Pavement.

Existing transverse contraction joints are spaced at approximately 20’.

The aggregate in the existing PCC Pavement is limestone.

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.

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

EXCAVATION OF UNSTABLE MATERIAL

Included in the Estimate of Quantities are 60 cubic yards (15 CuYd per PCN) of Unclassified Excavation, Digouts for necessary removal of unstable material.

Backfill shall be Base Course paid for at the contract unit price per ton for Base Course.

NONREINFORCED PCC PAVEMENT REPAIR - GENERAL

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

Existing concrete pavement shall be sawed full depth at the beginning and end of the 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. Any existing dowel bar assemblies shall be sawed off or removed.

Concrete placed adjacent to gravel or 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 new hot-mix asphalt.

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 will be sawed and sealed in accordance with the details shown in these plans. Refer to Saw and Seal Joints notes.

NONREINFORCED PCC PAVEMENT REPAIR

New pavement thickness on US 16 & US 385 shall be a minimum thickness of 8” where the existing pavement thickness is 8”. New pavement thickness on US 16/385 & SD 79 shall be a minimum thickness of 8.5” where the existing pavement thickness is 8.5”.

Concrete shall meet the requirements of the Standard Specifications Section 380, except as modified by the following notes:

The fine aggregate shall be screened over a one-inch square-opening screen just prior to introduction into the concrete paving mix.

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. 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. In lieu of submitting a mix design the Contractor may use one of the following dependent upon type of cement to be used:

	<u>LB./CU.YD.</u>	<u>LB./CU.YD.</u>
CEMENT	800 (TYPE I or II)	710 (TYPE III)
WATER	282	300
FINE AGGREGATE	1039	1114
COARSE AGGREGATE	1726	1668

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

Concrete shall be cured with Curing Compound (AASHTO M148 Type 2) A.S.A.P. @ 125 ft<sup>2</sup>/gal. 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 a 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, except for joint sawing operations. Insulation blanket shall be overlapped on to the existing concrete by 4’.

Cost for performing the aforementioned work including sawing and removing concrete, furnishing and placing concrete, curing, sawing and sealing joints, repairing asphalt shoulders, labor, tools and equipment shall be included in the contract unit price per square yard for Nonreinforced PCC Pavement Repair.

STATE OF SOUTH DAKOTA	PROJECT	SHEET	TOTAL SHEETS
	016-491, 385-491, 016-491 & 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).

Steel bars shall be inserted in the transverse joint on 12" centers. The first steel bar in the transverse joint shall be placed 6" from the outside edge of the slab. Steel bars shall be inserted in the longitudinal joint on 30" centers and shall be a minimum of 15" from either transverse joint. A typical one-lane patch 12' wide and 6' long will require 26 steel bars (12 in each transverse joint and 2 in the longitudinal joint).

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".

SAW AND SEAL JOINTS

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

Joints shall not be sealed unless they are thoroughly clean and dry. Cleaning shall be accomplished by sand blasting and other tools as necessary. Just prior to sealing, each joint shall be blown out using a jet of compressed air to remove all traces of dust.

Transverse joints shall be sealed with Hot Poured Elastic Joint Sealer. Longitudinal joints may be sealed with Hot Poured Elastic Joint Sealer. Acceptance of the Hot Poured Elastic Joint Sealer will be based on visual inspection by the Engineer.

Cost for sawing and sealing of the longitudinal construction joint and both transverse joints shall be incidental to the contract unit price per square yard for "Nonreinforced PCC Pavement Repair ".

SEAL RANDOM CRACKS IN PCC PAVEMENT

Random cracks shall be repaired in accordance with the detail for Sealing Random Cracks In Concrete Pavement. Reservoir dimensions may vary slightly from the details, due to the nature of this operation. However, any variance due to Contractor negligence will be repaired at the Contractor's expense.

Only those random cracks in the existing concrete pavement that are open and accept water and incompressible materials as selected by the Engineer shall be prepared and sealed with either Hot Poured Elastic Sealant.

Prior to sealing, each random crack shall be routed and thoroughly cleaned with compressed air or by other methods satisfactory to the Engineer. Routing shall be performed with a saw designed for that purpose.

Random cracks narrower than ½ inch shall be routed and sealed ½ inch wide by ½ inch deep. Random cracks wider than ½ inch may require the placement of a backer rod prior to sealing.

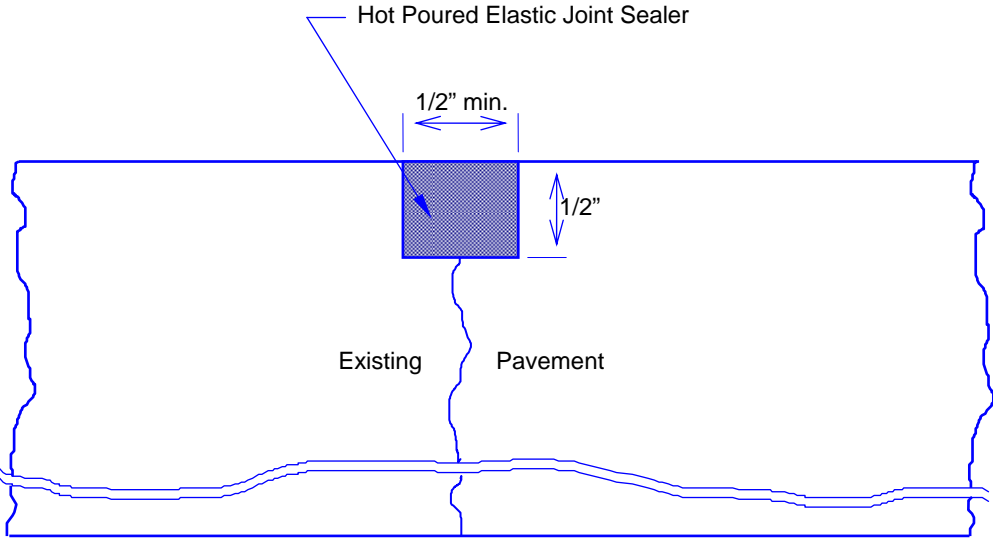
Sealant shall be placed in the routed reservoir with equipment and by methods that insure complete and uniform filling. Sealant shall be placed level with the driving surface of the concrete. Any excess or overrun of sealant shall be removed by the Contractor at no additional cost to the state.

Seal Random Cracks in PCC Pavement will be measured by the foot to the nearest 0.1 foot of random cracks sealed and accepted on the project.

Seal Random Cracks in PCC Pavement will be paid for at the contract unit price per foot measured for payment. Payment shall be full compensation for all labor, equipment, material and incidentals required for crack routing, cleaning, furnishing and installing backer rod when necessary, furnishing and placing sealant and removing routed and foreign material from the roadway.

STATE OF SOUTH DAKOTA	PROJECT	SHEET	TOTAL SHEETS
	016-491, 385-491, 016-491 & 079S-492	4	19

SEALING RANDOM CRACKS



SURFACING THICKNESS DIMENSIONS

Plans quantities will be applied even though the thickness may vary from that shown on the plans.

At those locations where material must be placed to achieve a required elevation, plans quantities may be varied to achieve the required elevation.

TABLE OF NONREINFORCED PCC PAVEMENT REPAIR

STATE OF SOUTH DAKOTA	PROJECT	SHEET	TOTAL SHEETS
	016-491, 385-491, 016-491 & 079S-492	5	19

PCN I1MH US 16/385

MRM	W x L	Area (sqyd)	1 1/4" Bar (each)	# 5 Bar (each)	DB Assembly (each)
33.0	2-14'x20'	70.0	28	18	2
	1-14'x5'				
33.15	5-14'x20'	155.6	84	32	2
	Total	225.6	112	50	4

PCN I1MJ US 385

MRM	W x L	Area (sqyd)	1 1/4" Bar (each)	# 5 Bar (each)	DB Assembly (each)
56.28	7-14'x20'	217.8	112	32	3
58.15	2-14'x20'	62.2	56	8	
	Total	280	168	40	3

PCN I1MK US 16

MRM	W x L	Area (sqyd)	1 1/4" Bar (each)	# 5 Bar (each)	DB Assembly (each)
10.65	1-14'x20'	111.1	76	24	1
	3-12'x20'				
16.67	3-14'x20'	93.3	56	16	1
16.89	2-14'x20'	62.2	56	8	
	Total	266.6	188	48	2

PCN I1ML SD 79

MRM	W x L	Area (sqyd)	1 1/4" Bar (each)	# 5 Bar (each)	DB Assembly (each)
34.94	3-14'x20'	173.3	52	24	4
	3-12'x20'				
42.0	1-14'x20'	31.1	28	8	
44.75	2-14'x15'	86.7	52	12	2
	2-12'x15'				
50.9	1-14'x10'	28.9	52	4	
	1-12'x10'				
54.95	3-14'x20'	173.3	52	24	4
	3-12'x20'				
56.76	1-14'x20'	57.8	52	8	
	1-12'x20'				
	Total	551.1	288	80	10

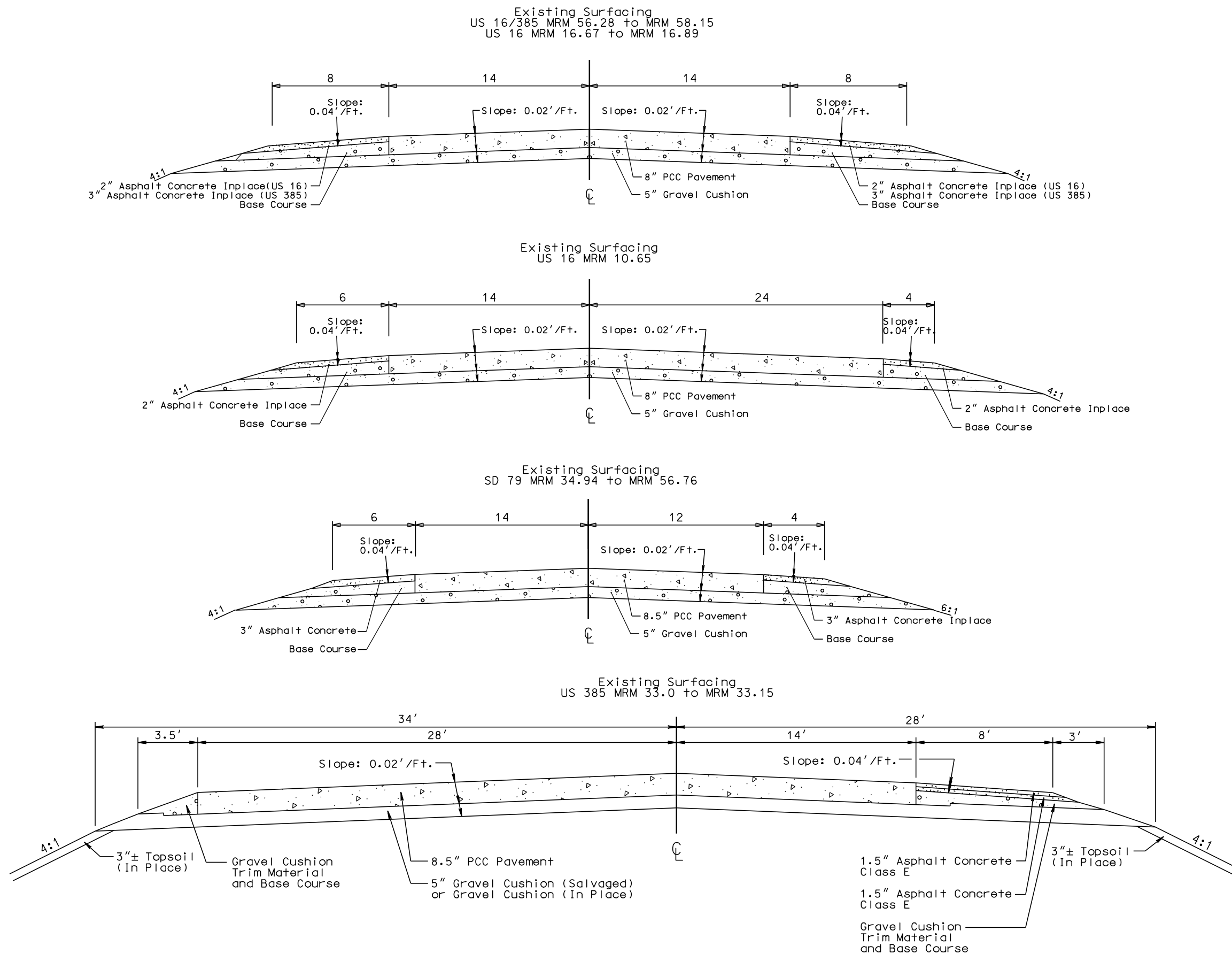
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PLOTTED FROM - TRRC11610

STATE OF SOUTH DAKOTA	PROJECT	SHEET NO.	TOTAL SHEETS
	016-491, 385-491 016-491 079S-492	6	19

Plotting Date: 05-OCT-2009

# TYPICAL SURFACING SECTION





GENERAL MAINTENANCE OF TRAFFIC

Removing, relocating, covering, salvaging and resetting of permanent traffic control devices, including delineation, shall be the responsibility of the Contractor. Cost for this work shall be incidental to the contract unit prices for the various items unless otherwise specified in the plans. Any delineators and signs damaged or lost shall be replaced by the Contractor at no cost to the State.

Storage of vehicles and equipment shall be outside the clear zone and as near as possible to the right-of-way line. 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 to 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.

All vehicles entering and exiting closed lanes of traffic shall display a flashing amber light visible from all directions at a minimum distance of ¼ mile.

No work during hours of darkness.

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

Sufficient traffic control devices have been included in these plans to sign one workspace on US 16/385 and US 385 two workspaces on US 16 & SD 79. If the Contractor elects to work on additional sites simultaneously, the cost for additional traffic control devices shall be incidental to the contract unit price per unit for Traffic Control.

MAINTENANCE OF TRAFFIC – PCC PAVEMENT REPAIR

A Type III Barricade shall be installed at the end of a lane closure taper as detailed in these plans. Additional Type III Barricades shall be installed facing traffic within the closed lane at a spacing of 1/4 mile. Each mainline concrete repair location from which the in place concrete has been removed shall be marked with a minimum of two reflectorized drums. In areas containing numerous concrete repair locations, two reflectorized drums should be installed at a spacing of 660' alternating with the Type III Barricades.

Signs may be mounted on portable supports meeting minimum heights in MUTCD.

Construction workspaces on divided roadways shall be limited to 3 miles in length. Construction workspaces on undivided roadways shall be limited to 300 feet in length. The distance between the closest points of any two construction workspaces, including channeling devices, shall not be less than 3 miles. Drivers in two-way traffic workspaces must be able to see approaching traffic through and beyond the work zone.

Holes adjacent to centerline in the lane open to traffic created during removal and replacement of PCC Pavement repair areas shall be filled with cold asphalt mix during the cure of concrete placed in a repair area, and until the lane open to traffic is closed. Cost for furnishing asphalt concrete, hauling and placing asphalt shall be incidental to the contract unit price per square yard for Nonreinforced PCC Pavement Repair

MAINTENANCE OF TRAFFIC – PCC PAVEMENT REPAIR(CONTINUED)

Holes in the asphalt or gravel shoulders created during removal and replacement of PCC Pavement repair areas shall be filled with gravel or hot-mix asphalt concrete (to match the shoulder surfacing) prior to opening the lane to traffic. Cost for furnishing asphalt concrete, hauling and placing asphalt and gravel shall be incidental to the contract unit price per square yard for Nonreinforced PCC Pavement Repair.

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

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

Extra care shall be taken to protect the in place asphalt shoulders. In all work zones in these areas, the same channelizing devices and spacing used on centerline, will also be required on the shoulders. These channelizing devices shall be placed in locations to adequately keep traffic completely off these shoulders. Continuous maintenance of the shoulder devices will be required to keep them in place. Cost for these extra channelizing devices shall be incidental to the contract lump sum price for Traffic Control, Miscellaneous.

If the Contractor elects not to work in an area for more than 3 days, for reasons within the control of the Contractor, the Contractor shall remove applicable traffic control devices and replace them when work resumes. There will be no payment for this work.

Work activities shall not be conducted simultaneously on the median and outside shoulders of the same directional set of lanes.

I1MH

SIGN CODE	SIGN SIZE	DESCRIPTION	NUMBER REQUIRED	UNITS PER SIGN	UNITS
G20-2	36" x 18"	END ROAD WORK	2	17	34
W1-4	48" x 48"	REVERSE CURVE SIGN (LEFT OR RIGHT)	2	34	68
W4-2	48" x 48"	LEFT OR RIGHT LANE ENDS (SYMBOL)	1	34	34
W13-1	24" x 24"	ADVISORY SPEED PLATE	1	16	16
W20-1	48" x 48"	ROAD WORK ##### FT. OR AHEAD	2	34	68
W20-5	48" x 48"	LT. OR RT. LANE CLOSED ##### FT. OR AHEAD	1	34	34
W20-7a	48" x 48"	FLAGGER	2	34	68
*****	*****	TYPE III BARRICADE - 8 FT. DOUBLE SIDED	4	56	224
TOTAL UNITS					546

I1MJ

SIGN CODE	SIGN SIZE	DESCRIPTION	NUMBER REQUIRED	UNITS PER SIGN	UNITS
G20-2	36" x 18"	END ROAD WORK	2	17	34
R1-1	48" x 48"	STOP	2	34	68
W1-4	48" x 48"	REVERSE CURVE SIGN (LEFT OR RIGHT)	1	34	34
W3-1	48" x 48"	STOP AHEAD (SYMBOL)	2	34	68
W3-4	48" x 48"	BE PREPARED TO STOP (also shown as W20-7b)	2	34	68
W13-1	24" x 24"	ADVISORY SPEED PLATE	2	16	32
W20-1	48" x 48"	ROAD WORK ##### FT. OR AHEAD	2	34	68
W20-4	48" x 48"	SINGLE LANE ROAD ##### FT. OR AHEAD	2	34	68
W20-7a	48" x 48"	FLAGGER	2	34	68
*****	*****	TYPE III BARRICADE - 8 FT. DOUBLE SIDED	4	56	224
TOTAL UNITS					732

I1MK

SIGN CODE	SIGN SIZE	DESCRIPTION	NUMBER REQUIRED	UNITS PER SIGN	UNITS
G20-2	36" x 18"	END ROAD WORK	4	17	68
R1-1	48" x 48"	STOP	2	34	68
W1-4	48" x 48"	REVERSE CURVE SIGN (LEFT OR RIGHT)	3	34	102
W3-1	48" x 48"	STOP AHEAD (SYMBOL)	2	34	68
W3-4	48" x 48"	BE PREPARED TO STOP (also shown as W20-7b)	2	34	68
W4-2	48" x 48"	LEFT OR RIGHT LANE ENDS (SYMBOL)	1	34	34
W13-1	24" x 24"	ADVISORY SPEED PLATE	3	16	48
W20-1	48" x 48"	ROAD WORK ##### FT. OR AHEAD	4	34	136
W20-4	48" x 48"	SINGLE LANE ROAD ##### FT. OR AHEAD	2	34	68
W20-5	48" x 48"	LT. OR RT. LANE CLOSED ##### FT. OR AHEAD	1	34	34
W20-7a	48" x 48"	FLAGGER	4	34	136
W20-7b	48" x 48"	BE PREPARED TO STOP (also shown as W3-4)	2	34	68
*****	*****	TYPE III BARRICADE - 8 FT. DOUBLE SIDED	4	56	224
TOTAL UNITS					1122

I1ML

SIGN CODE	SIGN SIZE	DESCRIPTION	NUMBER REQUIRED	UNITS PER SIGN	UNITS
G20-2	36" x 18"	END ROAD WORK	2	17	34
R2-1	30" x 36"	SPEED LIMIT ##	8	23	184
W3-5	48" x 48"	SPEED REDUCTION	4	34	136
W4-2	48" x 48"	LEFT OR RIGHT LANE ENDS (SYMBOL)	4	34	136
W20-1	48" x 48"	ROAD WORK ##### FT. OR AHEAD	4	34	136
W20-5	48" x 48"	LT. OR RT. LANE CLOSED ##### FT. OR AHEAD	4	34	136
W20-7a	48" x 48"	FLAGGER	2	34	68
SPECIAL	30" x 24"	FINES DOUBLED	4	18	72
*****	*****	TYPE III BARRICADE - 8 FT. DOUBLE SIDED	8	56	448
TOTAL UNITS					1350

PERMANENT PAVEMENT MARKING

The Contractor shall advise the Engineer a minimum of 2 weeks prior to the application of the permanent pavement marking to allow the State to check and mark the location of no passing zones.

Application of permanent pavement marking paint shall be completed within 14 days following completion of final surfacing.

The Contractor will be required to repaint all existing pavement marking including centerline, edge line, lane lines, etc.

The pavement marking paint and glass beads shall be furnished and applied by the Contractor and shall meet the requirements for materials and application as per the Standard Specifications for Roads and Bridges, 2004 Edition.

All areas to be painted shall be thoroughly broomed prior to placement of any permanent paint to the satisfaction of the Engineer.

RATES OF APPLICATION

Centerline striping (yellow) – 16.9 gallons per mile. \*  
Edgeline striping (white) – 33.80 gallons per mile. \*\*

\* Rate is above the Region average. The actual gallons used will vary depending upon the number of no passing zones.  
\*\* Rate is for both edgelines.

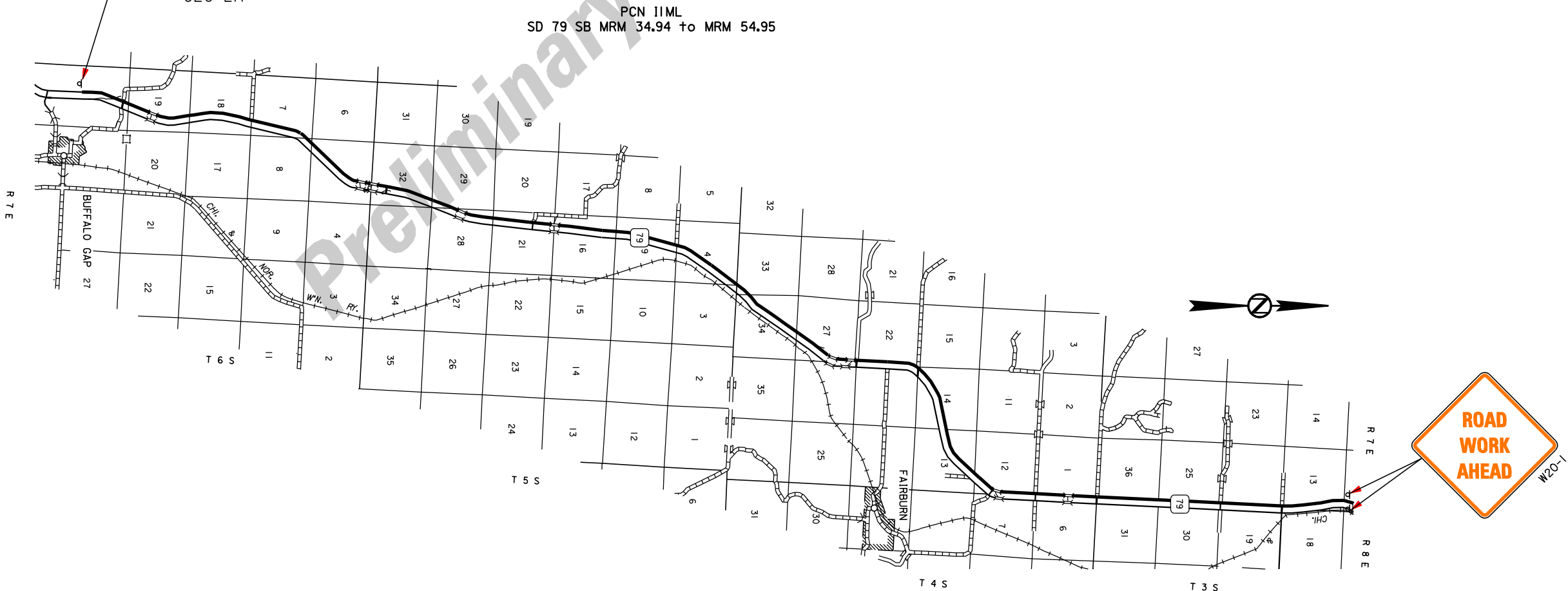
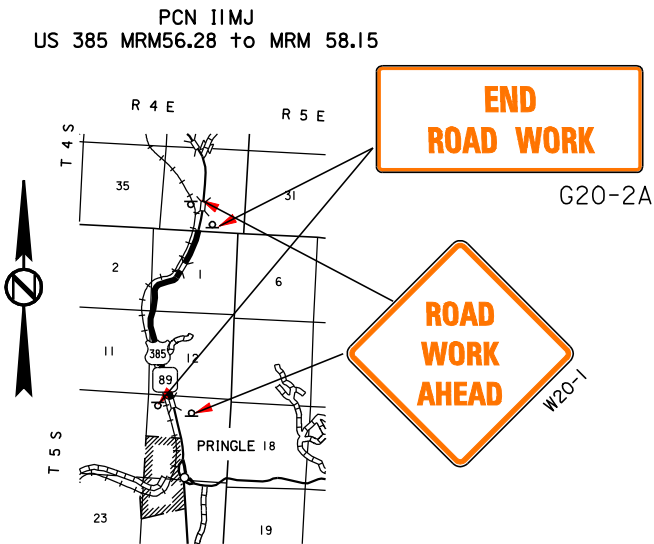
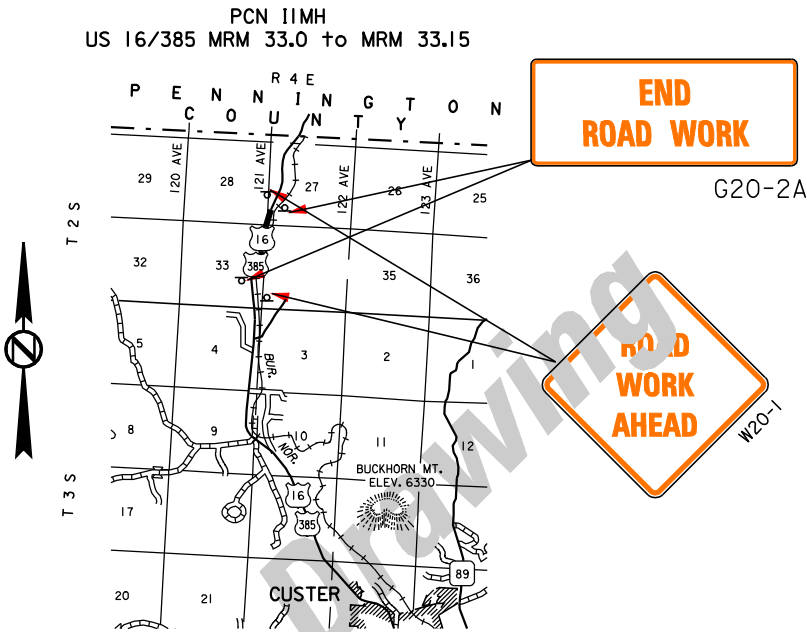
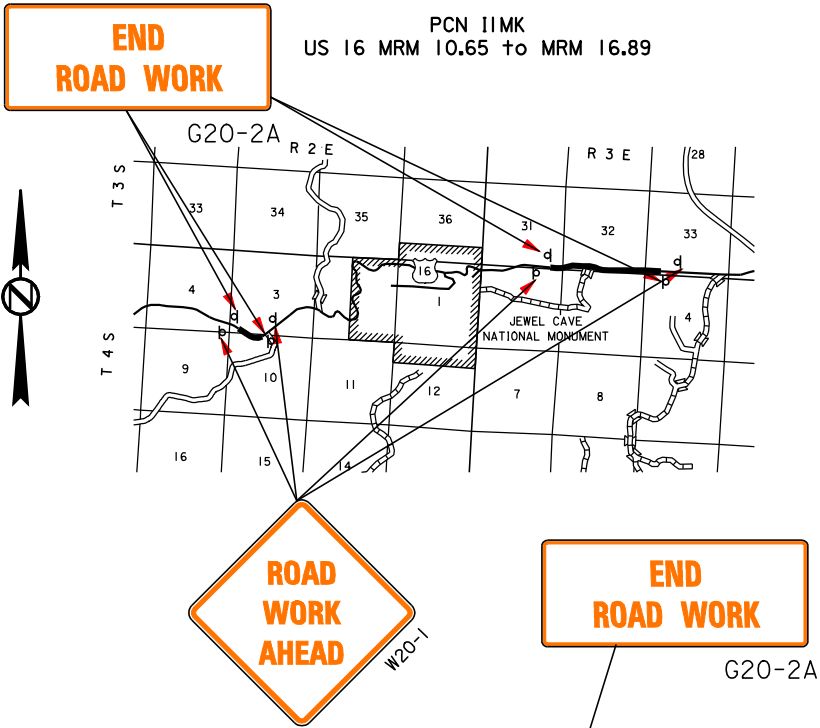
Plot Scale - 200,000,000:1,000,000

Plotted From - TRRC11610

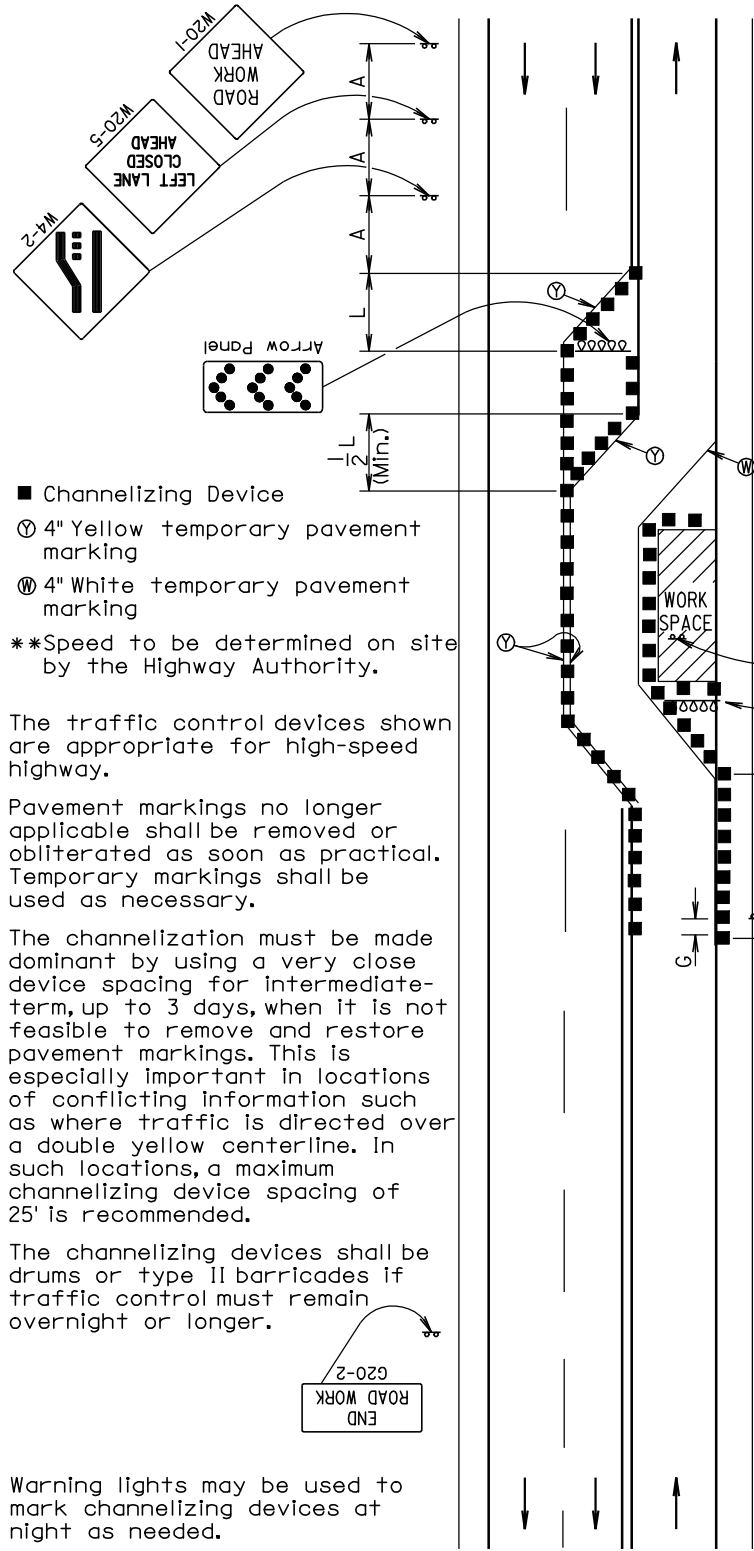
STATE OF SOUTH DAKOTA	PROJECT	SHEET NO.	TOTAL SHEETS
	016-491, 385-491		
	016-491 079S-492		

Plotting Date: 05-OCT-2009

# FIXED LOCATION SIGNS

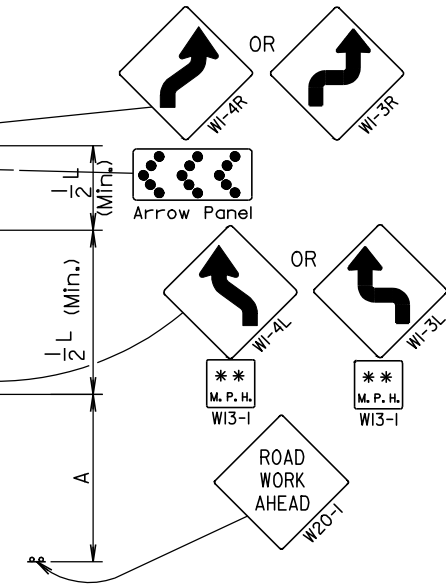






Posted Speed Prior to Work (M.P.H.)	Spacing of Advance Warning Signs (Feet) (A)	Taper Length (Feet) (L)
0 - 30	200	180
35 - 40	350	320
45 - 50	500	600
55	750	660
60 - 65	1000	780

Posted Speed Prior to Work (M.P.H.)	Spacing of Channelizing Devices (Feet) (G)
0 - 30	25
35 - 40	25
45 - 50	50
55	50
60 - 65	50



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

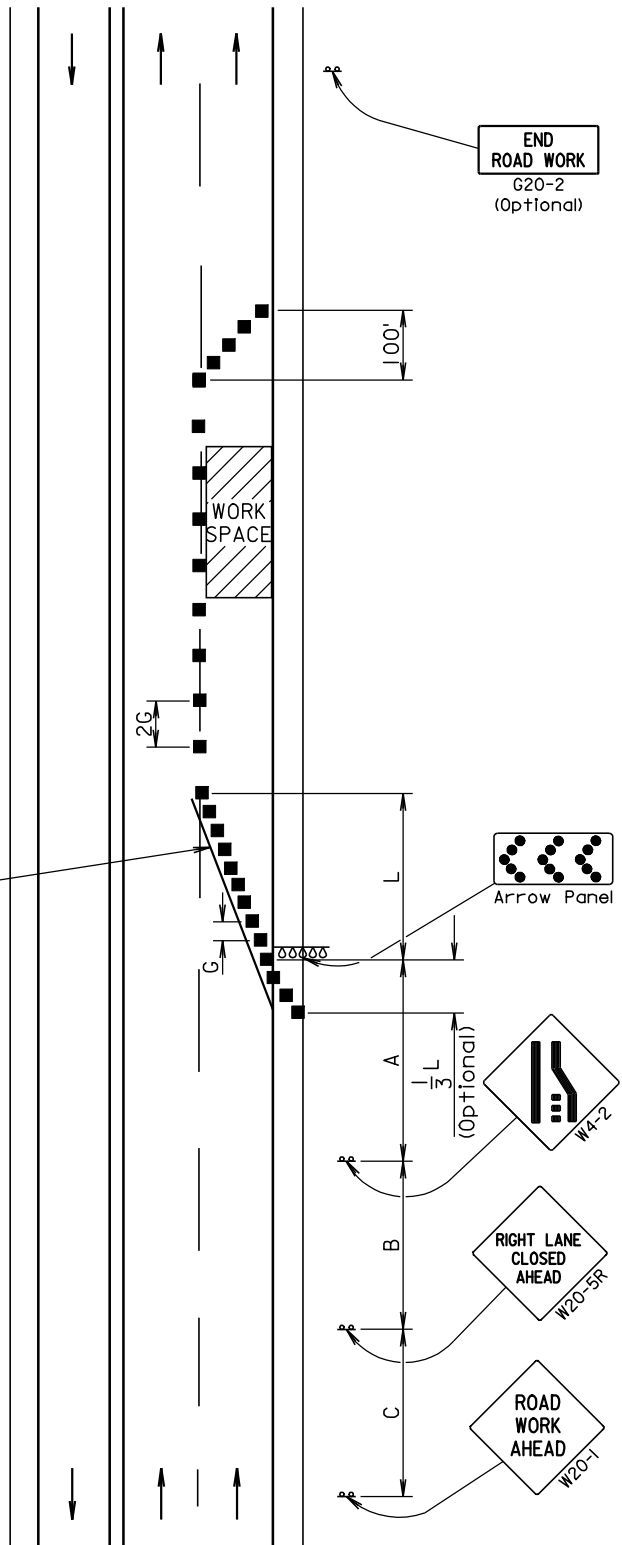
**Channelizing Device**

Drums or Type II Barricades shall be used if required overnight.

42" cones may be used along centerline

Longitudinal dimensions may be adjusted to fit project conditions such as horizontal curves, vertical curves, and other site restrictions.

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



STATE OF SOUTH DAKOTA	PROJECT	SHEET NO.	TOTAL SHEETS
	016-491, 385-491 016-491 079S-492	10	19

Plotting Date: 05-OCT-2009

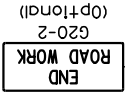
Posted Speed Prior to Work (M.P.H.)	Spacing of Advance Warning Signs (Feet)			Taper Length (Feet) (L)	Spacing of Channelizing Devices (Feet) (G)
	(A)	(B)	(C)		
0 - 30	200			180	25
35 - 40	350			320	25
45 - 50	500			600	50
55	750			660	50
60 - 65	1000			780	50

Use opposing left lane closure only when work may encroach in that lane. If closure is not required use only the ROAD WORK AHEAD sign for opposing traffic and centerline channelizing markers.

The channelizing devices shall be drums or type II barricades if traffic control must remain overnight or longer. During daylight hours, 42" cones may be used in lieu of drums or type II barricades along the centerline.



A

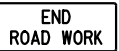


(Optional)  
G20-2

2G

2G

Channelizing Device



G20-2  
(Optional)

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



Arrow Panel

A

B

C



Plotting Date: 05-OCT-2009

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.

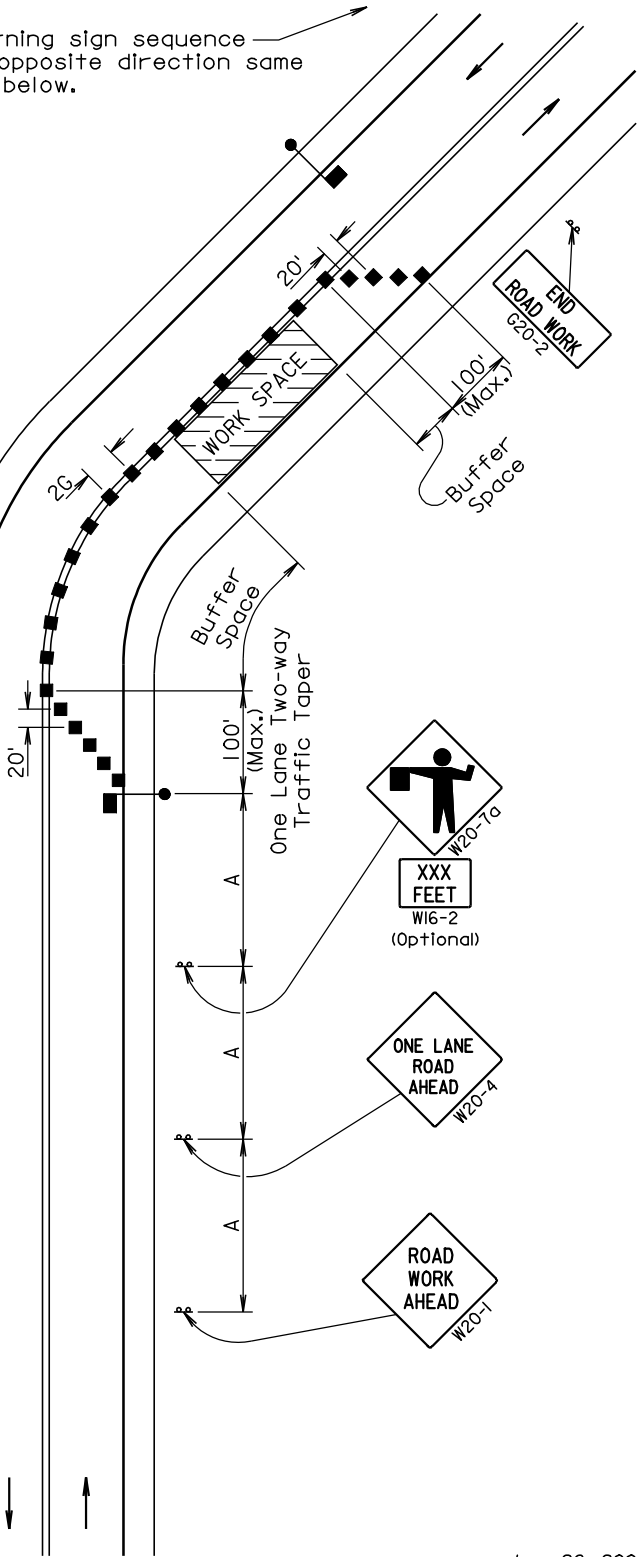
The channelizing devices shall be drums or type II barricades if traffic control must remain overnight or longer. During daylight hours, 42" cones may be used in lieu of drums or type II barricades along the centerline.

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 shall be a sufficient length so that the channelizing devices are visible to approaching traffic.

Warning sign sequence in opposite direction same as below.



June 26, 2006

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

END  
ROAD WORK  
G20-2  
(Optional)

Posted Speed Prior to Work (M.P.H.)	Length of Longitudinal Buffer Space (Feet)
20	35
25	55
30	85
35	120
40	170
45	220
50	280
55	335
60	415
65	485

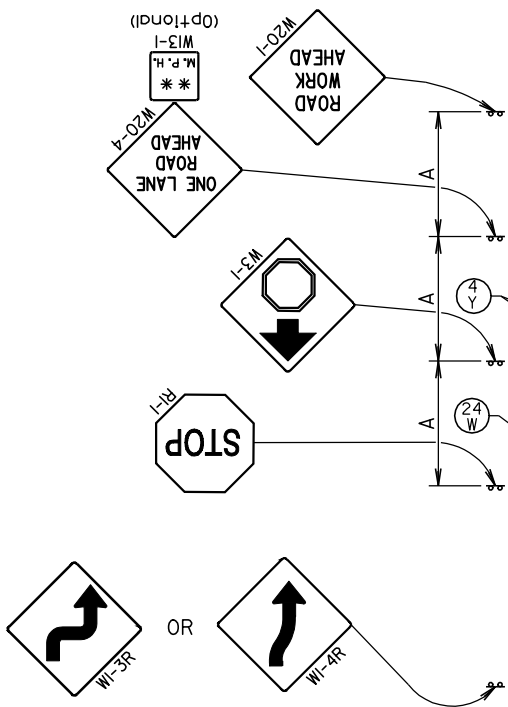
- 24 W

 24" White Temporary Pavement Marking
- 4 Y

 4" Yellow Temporary Pavement Marking

Channelizing Device

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

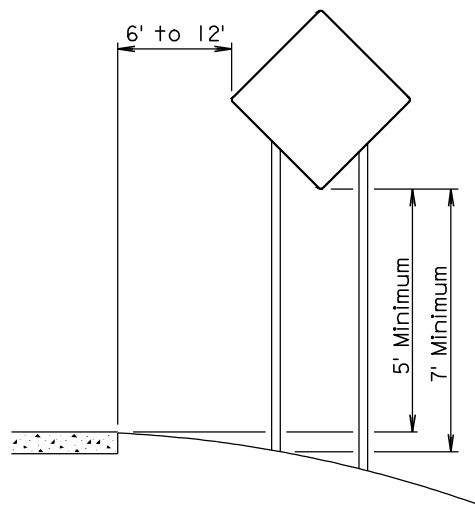


The buffer space length may be adjusted due to sight distance limitations and other work site limitations.

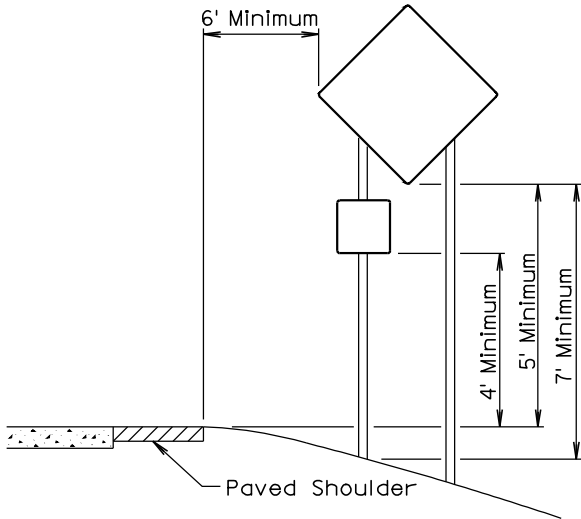
The channelizing devices shall be drums or type II barricades if traffic control must remain overnight or longer. During daylight hours, 42" cones may be used in lieu of drums or type II barricades along the centerline.

Type III Barricade

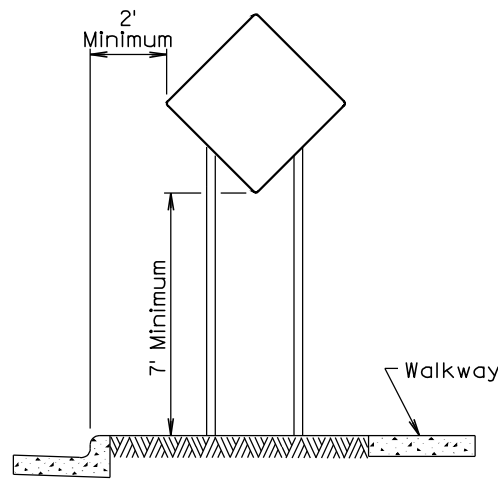




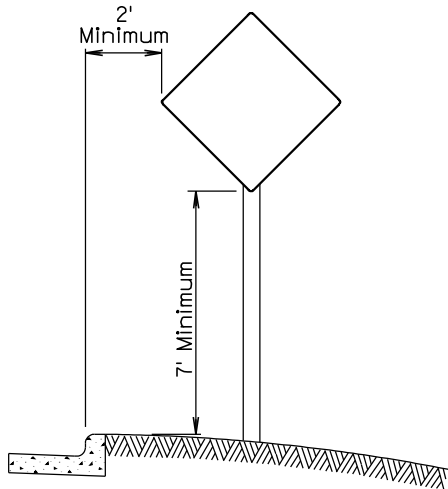
RURAL DISTRICT



RURAL DISTRICT WITH  
SUPPLEMENTAL PLATE



URBAN DISTRICT



URBAN DISTRICT

December 23, 2003

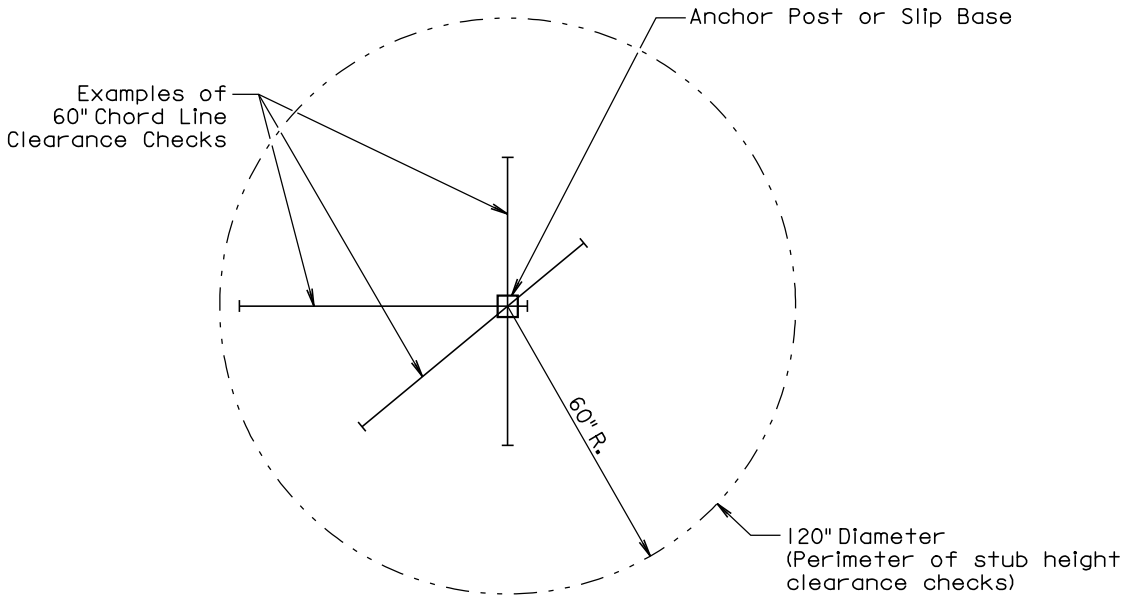
Published Date: 3rd Qtr. 2009

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**BREAKAWAY SIGN SUPPORTS**  
(Typical Construction Signing)

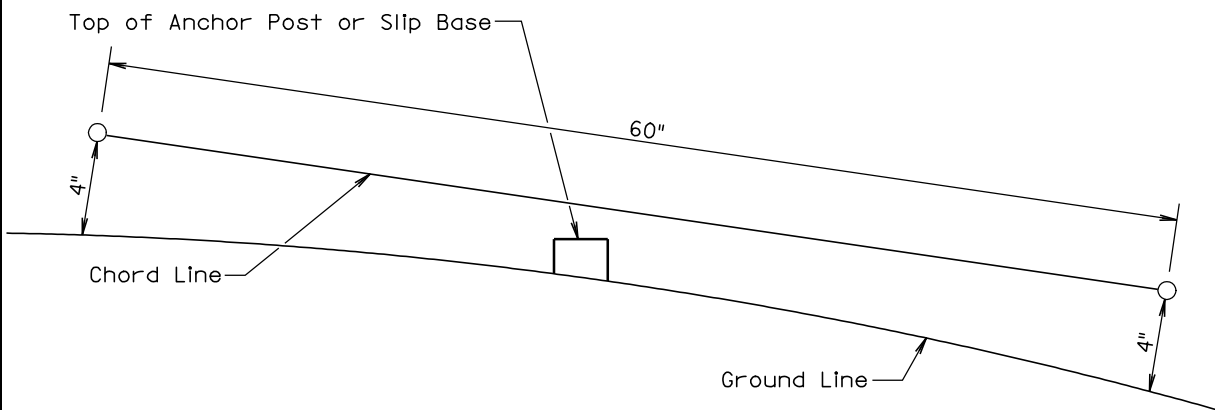
PLATE NUMBER  
634.85

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: 3rd Qtr. 2009

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**BREAKAWAY SUPPORT STUB CLEARANCE**

PLATE NUMBER  
634.99

Sheet 1 of 1



PLOT SCALE - 25.600000:1.000000

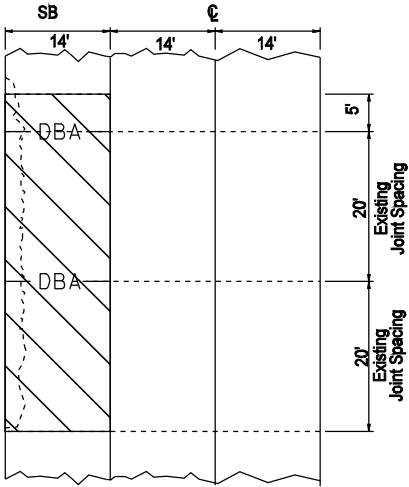
PLOTTED FROM - TRRC11610

# NONREINFORCED PCC PAVEMENT REPAIR LOCATIONS

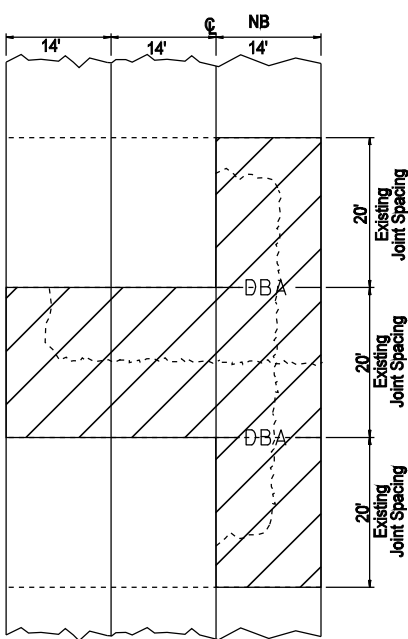
STATE OF SOUTH DAKOTA	PROJECT	SHEET NO.	TOTAL SHEETS
	016-491, 385-491	14	19
	016-491 079S-492		

Plotting Date: 05-OCT-2009

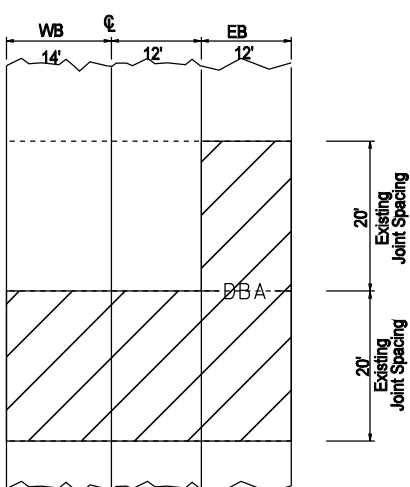
US 16/385 - MRM 33.00



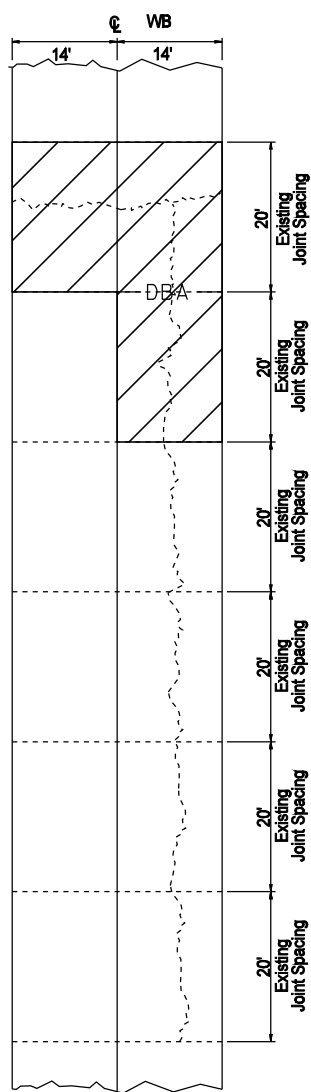
US 16/385 - MRM 33.15



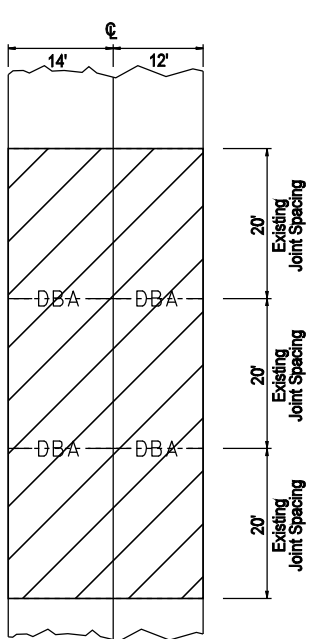
US 16 - MRM 10.65



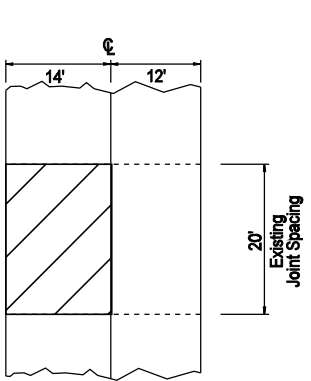
US 16 - MRM 16.67



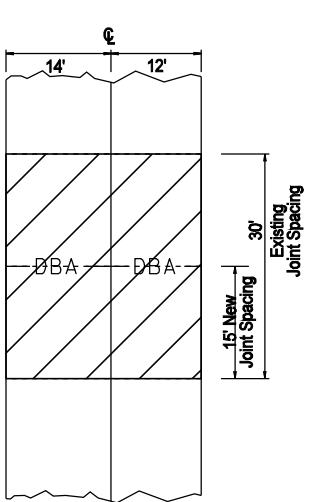
SD 79 SB - MRM 34.94



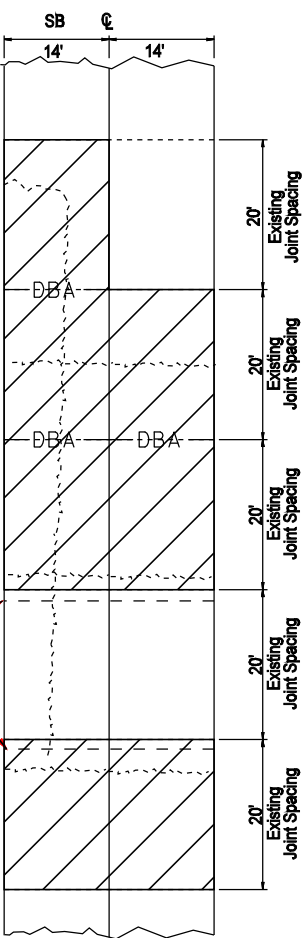
SD 79 SB - MRM 42.00



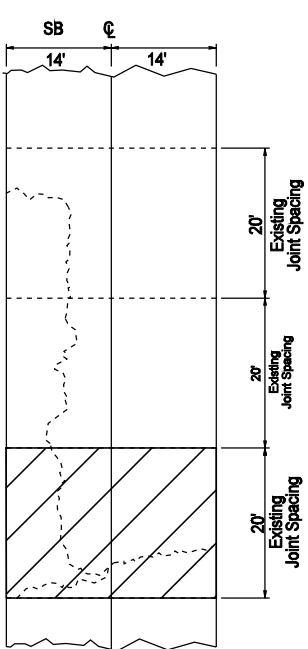
SD 79 SB - MRM 44.75



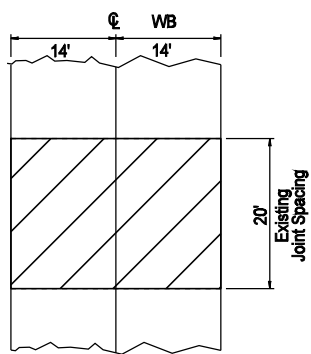
US 385 - MRM 56.28



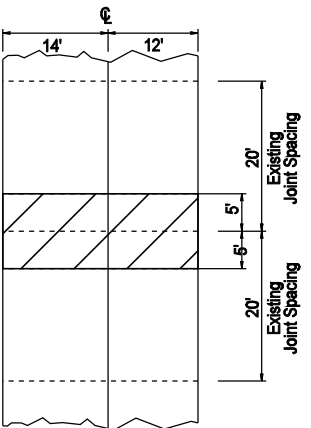
US 385 - MRM 58.15



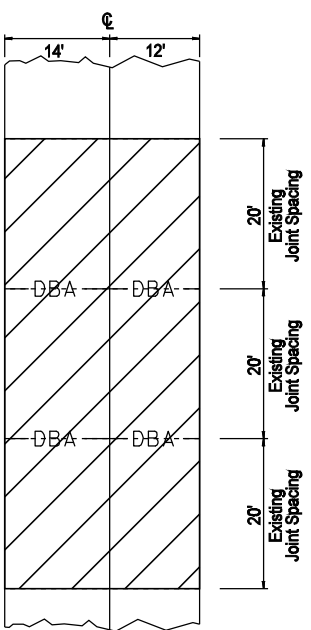
US 16 - MRM 16.89



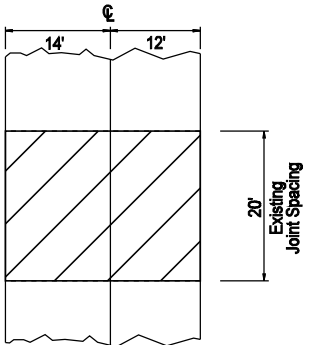
SD 79 SB - MRM 50.90



SD 79 SB - MRM 54.95



SD 79 SB - MRM 56.76



Box Culvert

PLOT SCALE - 200,000,000:1,000,000

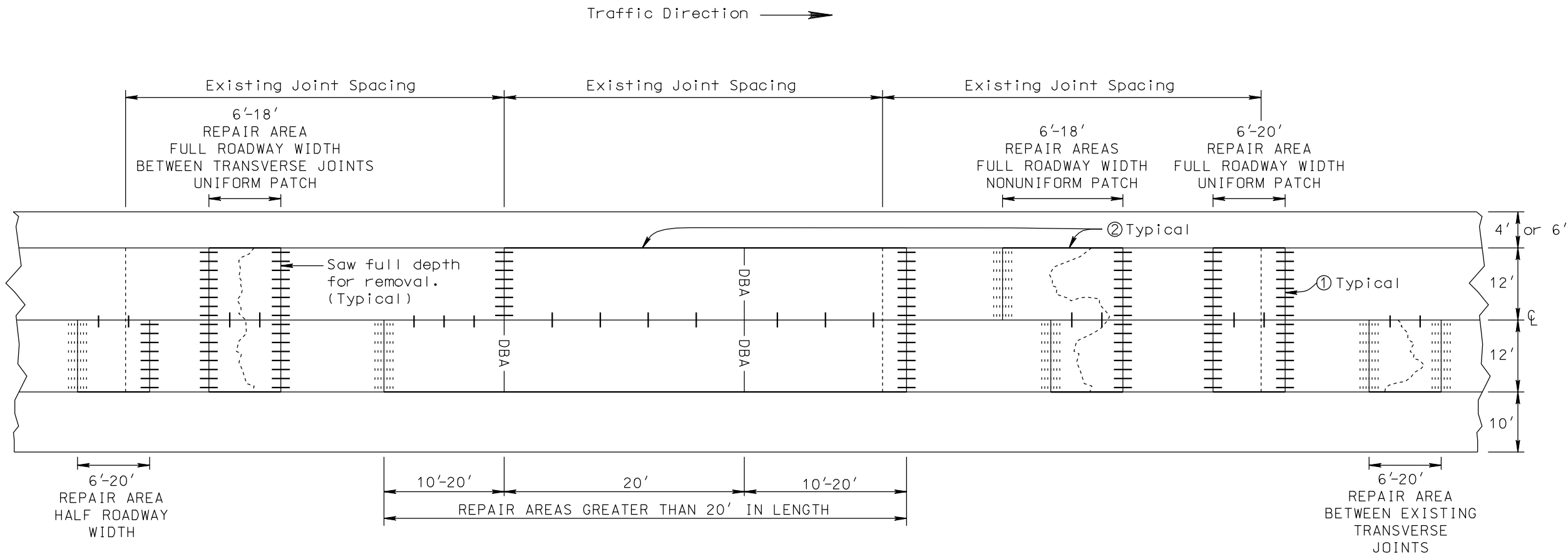
PLOTTED FROM - TRRC11610

# NONREINFORCED PCC PAVEMENT REPAIR

## FOUR LANE DIVIDED - TYPICAL REPAIR AREAS

STATE OF SOUTH DAKOTA	PROJECT	SHEET NO.	TOTAL SHEETS
	016-491, 385-491 016-491 079S-492	15	19

Plotting Date: 05-OCT-2009



### NOTES:

- ① Where possible, transverse joints shall be constructed full roadway width.
- ② All edges of repair areas that are adjacent to asphalt concrete shall be formed to match the width of the existing concrete pavement.

### KEY:

#### Steel Bars for Longitudinal Joints

- | No. 5 x 30" epoxy coated deformed tie bars.
  - Sawed Joint - spaced 30" center to center.
  - Construction Joint - spaced 48" center to center.

- | No. 5 x 24" epoxy coated deformed tie bars.
  - Drilled In - spaced 30" center to center.

#### Steel Bars for Transverse Joints

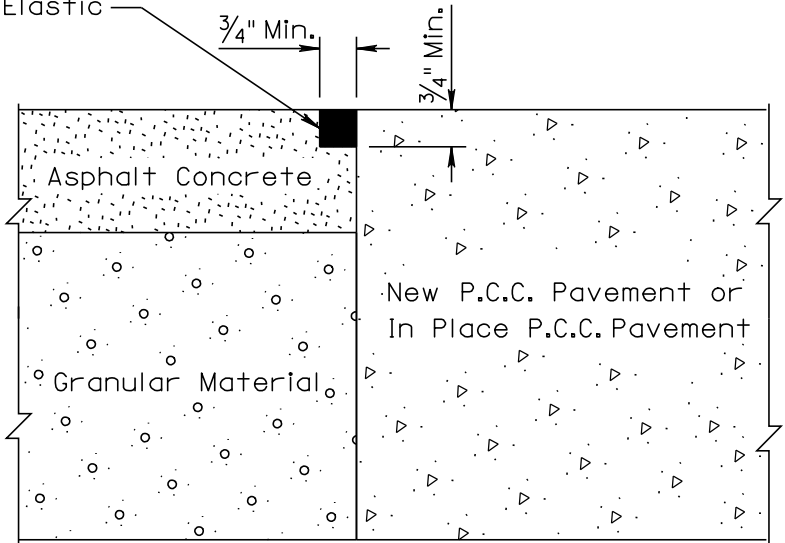
- Drilled in 1 1/4" x 18" epoxy coated plain round dowel bars spaced 12" center to center.
- ..... Drilled in No. 9 x 18" epoxy coated deformed tie bars spaced 18" center to center.

DBA Dowel Bar Assembly (for repair areas greater than 20' in length)

FILE - U:\REGIONRC\PR\2010\RCMAINT\PLANS\CUSTER CONCRETE REPAIR\PCCPREP\1010WME - 15

Plotting Date: 05-OCT-2009

Hot Poured Elastic  
Joint Sealer



March 31, 2000

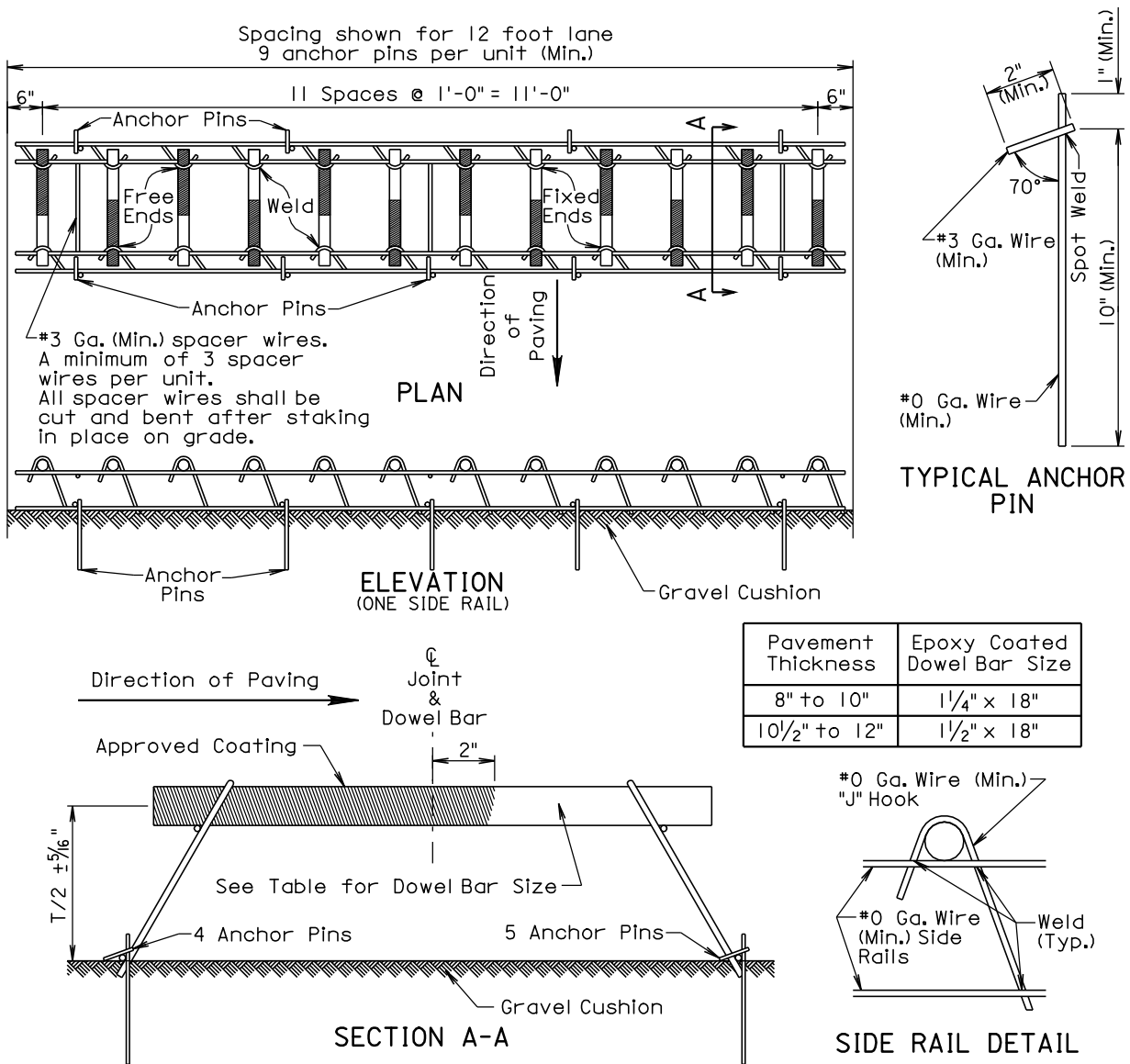
S  
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ASPHALT CONCRETE SHOULDER JOINT  
ADJACENT TO PCC PAVEMENT

PLATE NUMBER  
320.15

Sheet 1 of 1

Published Date: 3rd Qtr. 2009



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

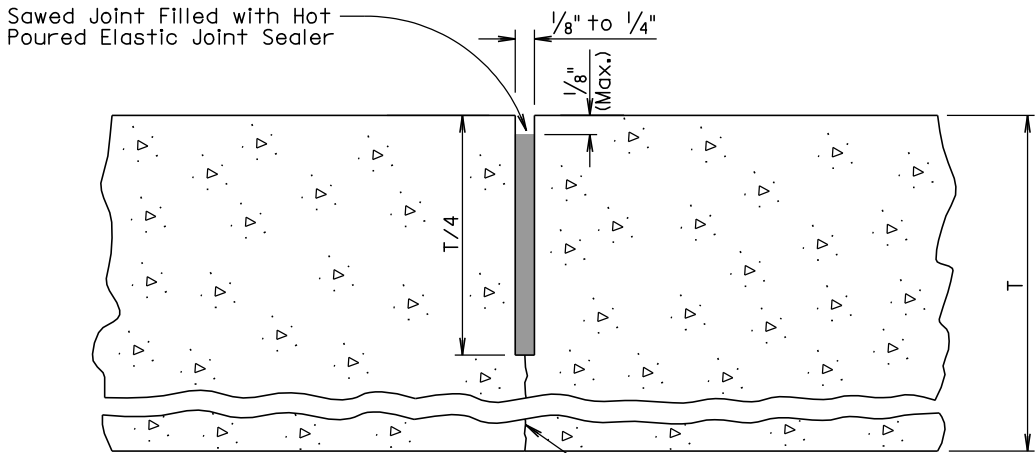
S  
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PCC PAVEMENT DOWEL BAR ASSEMBLY  
FOR TRANSVERSE CONTRACTION JOINTS

PLATE NUMBER  
380.01

Sheet 1 of 1

Published Date: 3rd Qtr. 2009



T = Pavement Thickness

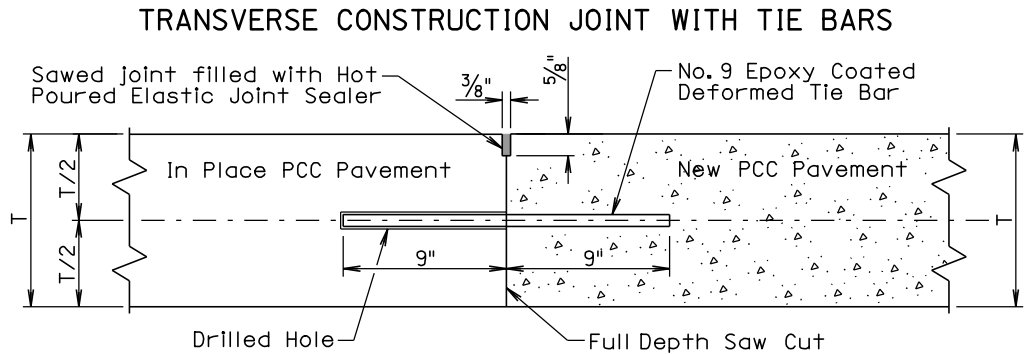
GENERAL NOTES:

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

<b>Published Date: 3rd Qtr. 2009</b>	<b>SD DOT</b>	<b>PCC PAVEMENT TRANSVERSE CONTRACTION JOINT WITH OR WITHOUT DOWEL BAR ASSEMBLY</b>	PLATE NUMBER 380.03
			Sheet 1 of 1



T = In Place PCC Pavement and New PCC Pavement Thickness

GENERAL NOTES:

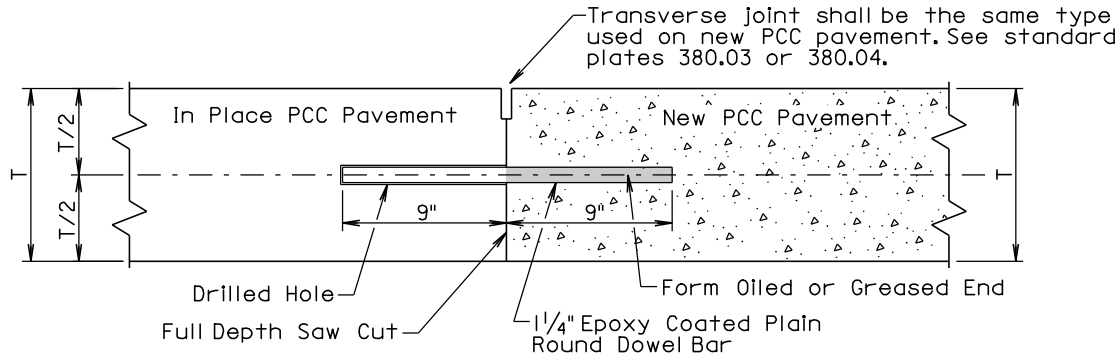
This detail shall be used when the transverse joint is less than 15 feet from the existing transverse contraction joint.

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



T = In Place PCC Pavement and New PCC Pavement Thickness

GENERAL NOTES:

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

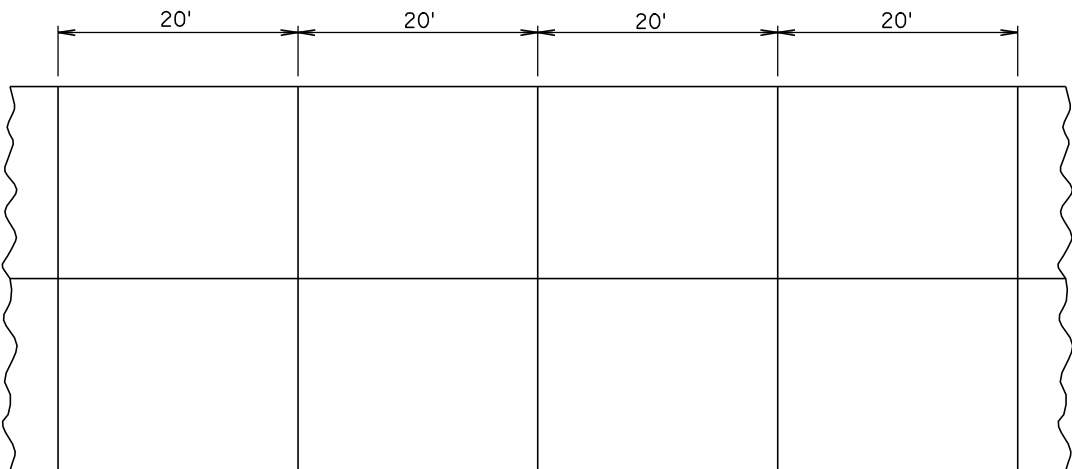
The plain round dowel bars shall be embedded a minimum depth of 9 inches into the in place PCC pavement and anchored with an epoxy resin adhesive.

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

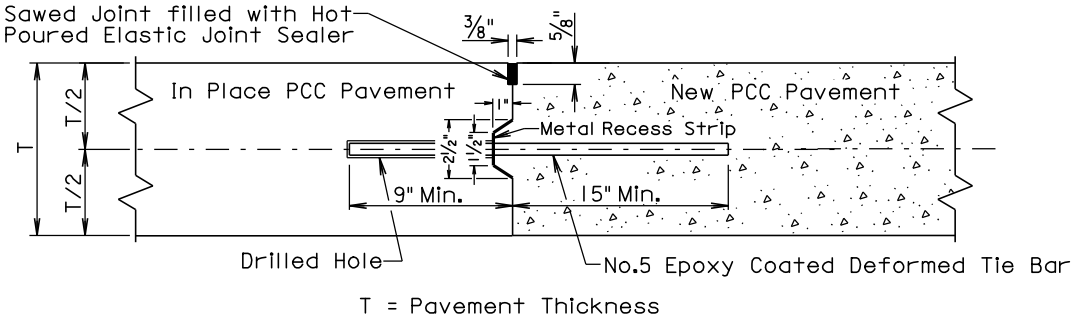
<b>Published Date: 3rd Qtr. 2009</b>	<b>SD DOT</b>	<b>PCC PAVEMENT TRANSVERSE CONSTRUCTION JOINTS WITH TIE BARS OR DOWEL BARS</b>	PLATE NUMBER 380.06
			Sheet 1 of 1



September 14, 2001

<i>Published Date: 3rd Qtr. 2009</i>	<b>S D D O T</b>	<b>PCC PAVEMENT TYPICAL CONTRACTION JOINT SPACING</b>	PLATE NUMBER 380.08
			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.

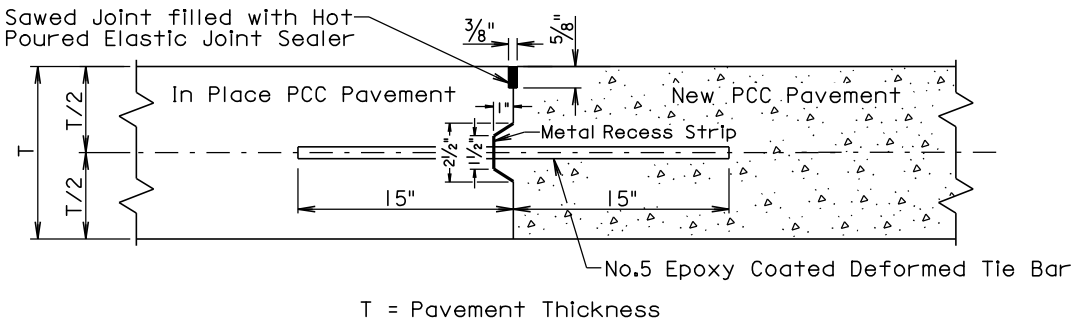
No.5 epoxy coated deformed tie bars shall be spaced 48" center to center for a female keyway or 30" center to center for a vertical face and male keyway. The keyway shown above is a female keyway.

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

<i>Published Date: 3rd Qtr. 2009</i>	<b>S D D O T</b>	<b>PCC PAVEMENT LONGITUDINAL JOINTS WITH TIE BARS</b>	PLATE NUMBER 380.10
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