

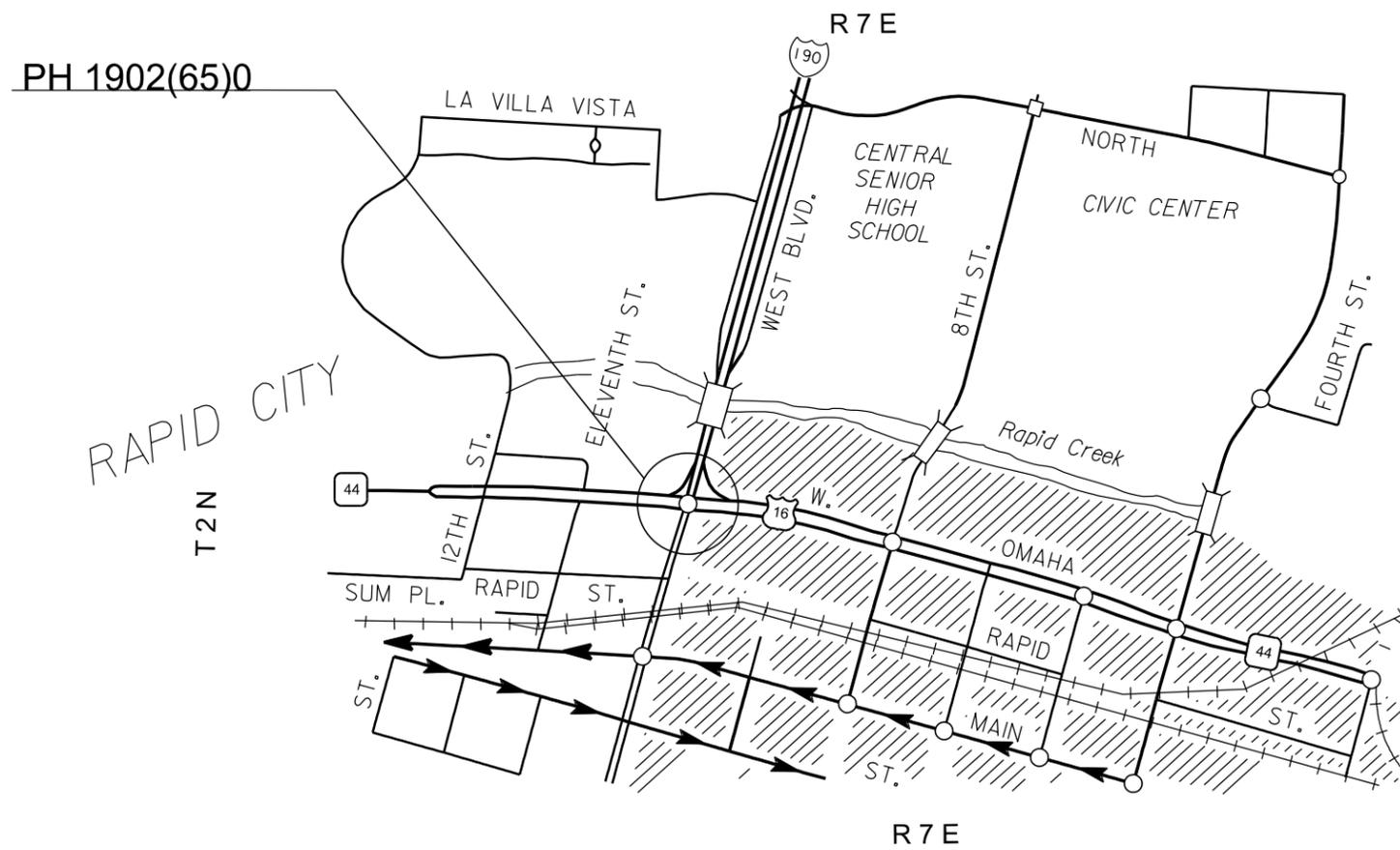
Section F: Surfacing Plans

STATE OF SOUTH DAKOTA	PROJECT PH 1902(65)0	SHEET F1	TOTAL SHEETS F9
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Plotting Date: 12/03/2013

INDEX OF SHEETS

- F1 General Layout W/Index
- F2-F3 Estimate With General Notes & Tables
- F4 Typical Surfacing Section
- F5 PCC Pavement Layout
- F6 Special Details
- F7-F9 Standard Plates



PLOT SCALE - 1:200

PLOTTED FROM - ITRP15123

PLOT NAME - 1

FILE - U:\MS\PR\PEN\03AZ\TITLEF.DGN

SECTION F – ESTIMATE OF QUANTITIES

Bid Item Number	Item	Quantity	Unit
120E6200	Water for Granular Material	6.7	MGal
210E3020	Ordinary Roadway Shaping	1,711.3	SqYd
260E2010	Gravel Cushion	561.0	Ton
320E1200	Asphalt Concrete Composite	9.4	Ton
380E0090	10" Nonreinforced PCC Pavement	1,183.3	SqYd
380E3040	8" PCC Driveway Pavement	19.6	SqYd
380E6000	Dowel Bar	379	Each
380E6110	Insert Steel Bar in PCC Pavement	644	Each

SURFACING THICKNESS DIMENSIONS

Plans quantity will be applied 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 quantity may be varied to achieve the required elevation.

SAWING IN 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. No separate payment shall be made for sawing.

ORDINARY ROADWAY SHAPING

Ordinary Roadway Shaping shall be performed on new paving areas within the intersection of US 16, I 190 and West Boulevard. The existing granular material shall be removed. All other work shall be in accordance with the Standard Specifications.

An estimated 1,711.3 sq. yds. of Ordinary Roadway Shaping will be required for the intersection. Water for Embankment shall be incidental to the contract unit price for Ordinary Roadway Shaping.

10" NONREINFORCED CONCRETE PAVEMENT

The fine aggregate may require screening as determined by the Engineer.

Fine aggregate shall conform to Section 800.2.D, Alkali Silica Reactivity (ASR) Requirements, of the Standard Specifications.

Concrete used in Portland cement concrete pavement shall conform to the Special Provision for Contractor Furnished Mix Design for PCC Pavement.

In Lieu of an automatic subgrader operating from a preset line, a motor grader or other suitable equipment may be used to bring the gravel cushion to final grade prior to placement of concrete.

There will be no direct payment for trimming of the Gravel Cushion. The trimming will be considered incidental to the related items required for PCC Pavement. Trimming shall be performed as required by Section 380.3 C. of the Standard Specifications.

10" NONREINFORCED CONCRETE PAVEMENT (continued)

Automatic dowel bar inserters will not be allowed on this project.

A construction joint will be sawed whenever new concrete pavement is placed adjacent to existing concrete pavement.

All transverse contraction joints are to match existing joints as approved by the Engineer.

In addition to traditional field inspection of reinforcement, a Ground Penetrating Radar (GPR) unit may be used to verify reinforcement locations in the hardened concrete. The GPR may be used any time prior to the Acceptance of Field Work being issued. All costs related to corrective measures, including but not limited to concrete removal or cutting of reinforcement, price deducts, and delays to the project schedule shall be the responsibility of the Contractor.

The surface of the mainline paving shall be longitudinally tined. All non string line machine tined areas shall be transverse tined.

LOCATION	10" NON-REINFORCED PCC PAVEMENT SQ.YDS.	WATER FOR GRANULAR MATERIAL MGAL	6" GRAVEL CUSHION TONS
Intersection of US 16, I 190, and West Blvd			
NW Corner of Intersection	266.6	1.4	117.3
NE Corner of Intersection	463.7	2.3	194.6
SE Corner of Intersection	296.6	1.6	135.8
SW Corner of Intersection	156.3	1.1	91.3
TOTAL	1,183.3	6.4	539.1

ALKALI SILICA REACTIVITY

Fine aggregate with a 14 day expansion value of 0.400 and greater shall not be used.

The Department will use the running average of the last three known expansion test results or less for determining acceptability of source and the required type of cement. These expansion results are reported in the preceding table. Additional testing, when requested by the Contractor, will be performed by the Department at the Contractor's expense.

Below is a list of known fine aggregate sources and the average corresponding 14 day expansion values:

The values listed in the table are intended for use in bidding. If a previously tested pit by SDDOT with acceptable test values (less than 0.250) is discovered after letting to require Type V cement (greater than 0.250) the Department will accept financial responsibility for the change from Type II to Type V cement.

Type II or Type V cement will not change the requirement for the fly ash. The cost for either type of cement shall be subsidiary to the contract item.

STATE OF SOUTH DAKOTA	PROJECT	SHEET NO.	TOTAL SHEETS
	PH 1902(65)0	F2	F9

TABLE OF KNOWN FINE AGGREGATE SOURCES

Source	Location	Expansion Value
Bachman	Winner, SD	0.335*
Birdsall S&G	Creston, SD	0.158
Birdsall S&G	Oral, SD	0.131
Birdsall S&G	Wasta, SD	0.170
Bitterman	Delmont, SD	0.314*
Concrete Materials	Corson, SD	0.170
Croell	Quinn, SD	0.089
Emme Sand & Gravel	Oneil, NE	0.217
Fischer S&G	Rapid City, SD	0.092
Fischer S&G	Spearfish, SD	0.053
Fuchs	Pickstown, SD	0.275*
Higman	Akron, IA	0.198
Higman	Hudson, SD	0.187
Hilde	Madison, SD	0.116
Jensen	Herried, SD	0.276*
L.G. Everist	Brookings, SD	0.186
L.G. Everist	Hawarden, IA	0.166
L.G. Everist	Summit, SD	0.141
Morris	Blunt, SD	0.192
Morris – Richards pit	Onida, SD	0.188
Myrl & Roys Paving-Nelson Pit	Sioux Falls, SD	0.156
Northern Concrete Agg.	Rauville, SD	0.113
Northern Concrete Agg.	Luverne, MN	0.124
Opperman - Guvordahl Pit	Burke, SD	0.337*
Opperman - Cahoy Pit	Herrick, SD	0.307*
Opperman - Jones Pit	Burke, SD	0.321*
Opperman – Randall Pit	Pickstown, SD	0.239
Thorpe Pit	Britton, SD	0.098
Wagner Building Supplies	Wagner, SD	0.241
Wasta Sand & Gravel	Wasta, SD	0.159

* These sources will require Type V cement in the concrete mix design and Class F (Modified) fly ash as specified.

STATE OF SOUTH DAKOTA	PROJECT	SHEET NO.	TOTAL SHEETS
	PH 1902(65)0	F3	F9

STEEL BAR INSTALLATION

The Contractor shall install the Steel Bars (1¼ inch x 18 inch epoxy coated plain round dowel bar and No. 5 x 24 inch epoxy coated deformed tie bar) 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 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.

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.

Epoxy coated plain round steel bars shall be installed on 12 inch centers in the transverse joint. The first steel bar shall be placed a minimum of 3 inches and a maximum of 6 inches from the outside edge of the slab.

Epoxy coated deformed steel bars shall be inserted on 30 inch centers in the longitudinal joint and shall be placed a minimum of 15 inches from the existing transverse contraction joint.

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).

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 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 installation to eliminate voids and ensure complete bonding of the bar. Insertion of the bars by the dipping method will not be allowed.

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

TABLE OF STEEL BAR INSTALLATION

LOCATION	1 ¼" x 18" Round Dowel Bar	No. 5 x 24" Deformed Tie Bar
	Each	Each
Intersection of US 16, I 190, and West Blvd		
NW Corner of Intersection	12	116
NE Corner of Intersection	24	184
SE Corner of Intersection	10	142
SW Corner of Intersection	10	146
TOTAL	56	588

TIE BARS AND LONGITUDINAL JOINTS

The use of automatic tie bar inserters will only be allowed on the vertical edge of longitudinal construction joints. The use of automatic tie bar inserters will not be allowed on sawed longitudinal joints.

Tie bars shall be held in the specified position parallel to the slab surface and perpendicular to the centerline by a supporting device. Tie bars or tie bar baskets shall be securely staked to the roadbed and shall hold the bar at the correct spacing, alignment, and elevation. Tie bars shall be tied to at least one stake.

Tie bars will not require supports if inserted into the side of the pavement during slip form paving of the longitudinal construction joint operation. Failure to acquire the correct tie bar locations or position in the construction joint shall require the bars to be corrected and a change made to the operation which may include drilling and epoxy bars or other methods as approved by the Engineer.

The final position of each tie bar shall be within the following tolerances:

-- Vertical Placement: ± T/6 for any part of the tie bar (T = slab thickness)

-- Transverse Placement (side shift): ± 3 inches when measured perpendicular to the longitudinal joint line

If the tie bar does not meet the requirements and tolerances specified, corrective action shall be performed at the Contractor's expense to the satisfaction of the Engineer.

LOCATION OF CONCRETE PAVEMENT JOINTS

The location of joints, as shown on the "PCC Pavement Layout" sheets, are only approximate locations to be used as a guide in the final location of joints and to afford bidders a basis for estimating the construction costs of the joints. The final locations of the joints are to be designated by the Engineer during construction.

TABLE OF DOWEL BARS

LOCATION	1 ¼" Bars Each
Intersection of US 16, I 190, and West Blvd	
NW Corner of Intersection	95
NE Corner of Intersection	112
SE Corner of Intersection	110
SW Corner of Intersection	62
TOTAL	379

8" PCC DRIVEWAY PAVEMENT

The PCC Pavement at Sta. 15+26.17-180.53' R, estimated at 19.6 square yards, shall comply with the requirements of the Standard Specifications for Class M6 concrete. See Pavement Layouts in this Section. All costs including reinforcing steel and other materials, equipment, labor, and incidentals necessary shall be incidental to the contract unit price per square yard for 8"PCC Driveway Pavement.

ASPHALT CONCRETE, COMPOSITE

Mineral aggregate for the Asphalt Concrete, Composite shall conform to the requirements for Class E, Type 1.

All other requirements in the Standard Specifications for Asphalt Concrete, Composite shall apply.

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

TABLE OF ADDITIONAL QUANTITIES

Location	Water for Granular Material MGal	Gravel Cushion Tons	Asphalt Concrete, Composite (1 st / 2 nd Lifts) Tons
Pkg lot in SE quadrant	0.2	17.8	4.7 / 4.7
Entrance at Sta. 15+26.17-180.53' Rt	--	4.1	
TOTAL	0.2	21.9	9.4

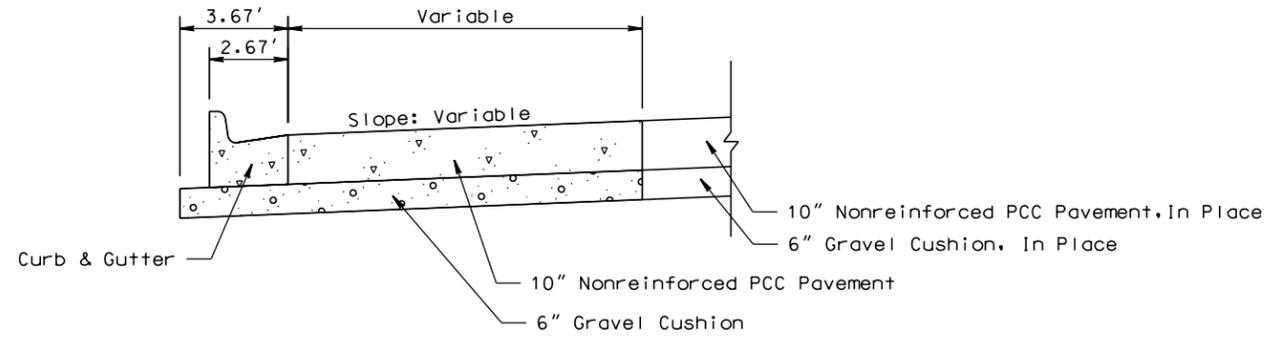
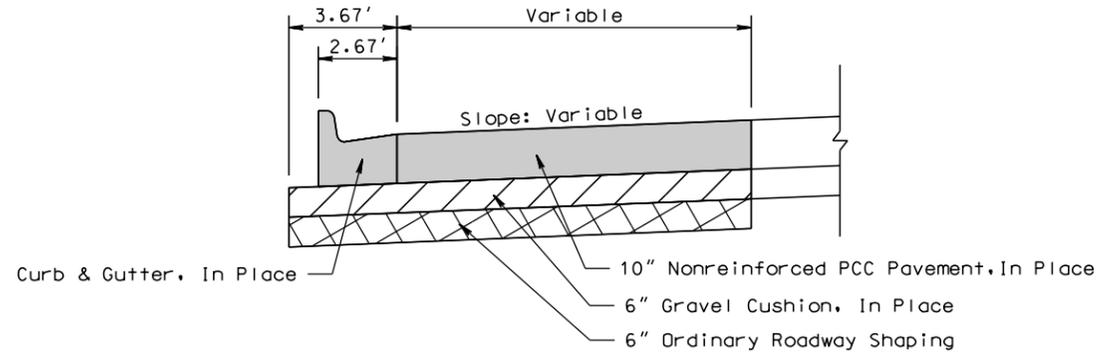
TYPICAL SURFACING SECTIONS

STATE OF SOUTH DAKOTA	PROJECT	SHEET NO.	TOTAL SHEETS
	PH 1902(65)0	F4	F9

Plotting Date: 12/03/2013

PLOT SCALE - 1+6.19298

-  Remove Concrete Pavement
-  Remove Granular Material
-  6" Ordinary Roadway Shaping



PLOTTED FROM - TRPR15123

PLOT NAME - 2

FILE - ... \PENND036Z \TYPICAL SECTION.DGN

PCC PAVEMENT JOINT LAYOUT

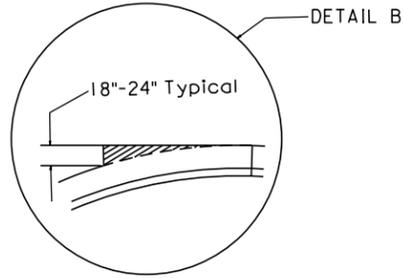
STATE OF SOUTH DAKOTA	PROJECT	SHEET	TOTAL SHEETS
	PH 1902(65)0	F5	F9

Plotting Date: 12/03/2013

Scale 1 Inch = 60 Feet
Sheet 1 of 1 Sheets

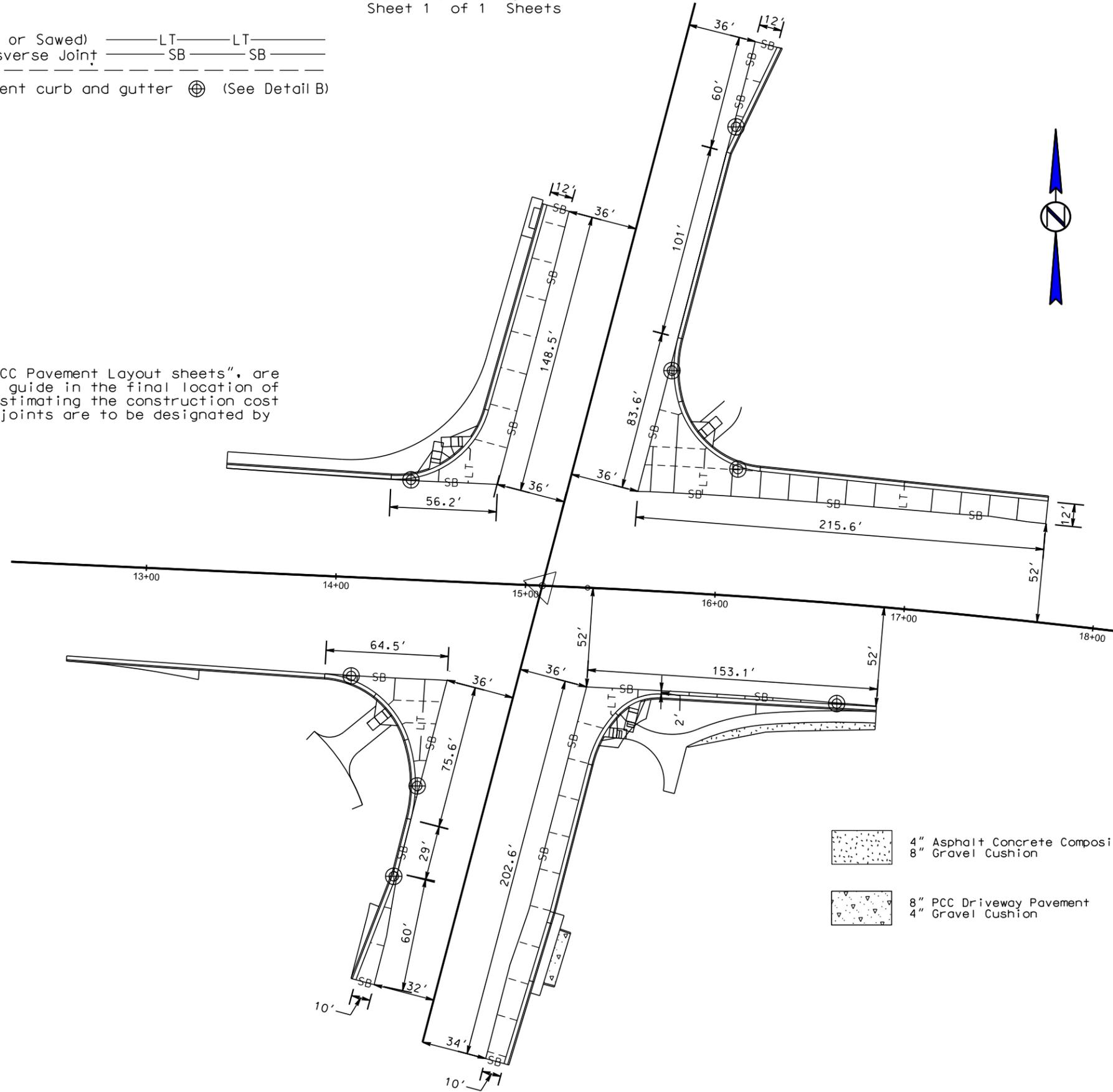
LEGEND:

- Longitudinal Joint With Tie Bars (Construction or Sawed) ———— LT ———— LT ————
- Steel Bar Installation in Longitudinal or Transverse Joint ———— SB ———— SB ————
- Transverse Contraction Joint - - - - -
- Areas to be poured monolithically with adjacent curb and gutter ⊕ (See Detail B)



LOCATION OF CONCRETE PAVEMENT JOINTS

The location of joints, as shown on the "PCC Pavement Layout sheets", are only approximate locations to be used as a guide in the final location of joints and to afford bidders a basis for estimating the construction cost of the joints. The final location of the joints are to be designated by the Engineer during construction.



- 4" Asphalt Concrete Composite
8" Gravel Cushion
- 8" PCC Driveway Pavement
4" Gravel Cushion



PLOT SCALE - 1:60

PLOTTED FROM - TRPR15123

PLOT NAME - 3

FILE - ... \PCC PAVEMENT LAYOUT.DGN

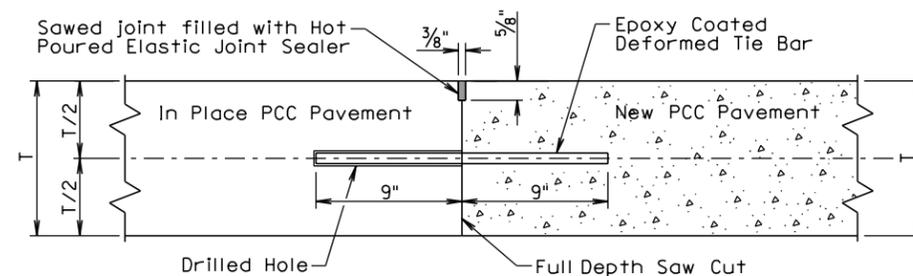
SPECIAL DETAILS

STATE OF SOUTH DAKOTA	PROJECT PH 1902(65)0	SHEET F6	TOTAL SHEETS F9
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Plotting Date: 12/03/2013

PCC PAVEMENT TRANSVERSE CONSTRUCTION JOINTS WITH TIE BARS OR DOWEL BARS

TRANSVERSE CONSTRUCTION JOINT WITH TIE BARS



T = In Place PCC Pavement and New PCC Pavement Thickness

GENERAL NOTES:

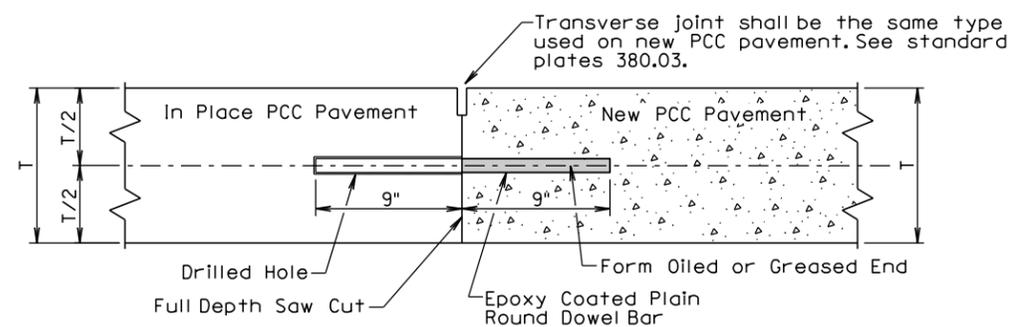
This detail shall be used when the transverse joint is less than 14' on 20' joint spacing and less than 9' on 15' joint spacing from the existing transverse contraction joint.

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 used on 10 inch and less PCC Pavement and No. 11 epoxy coated deformed tie bars shall be used on 10.5 inch and greater PCC Pavement. The tie bar spacing shall be 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

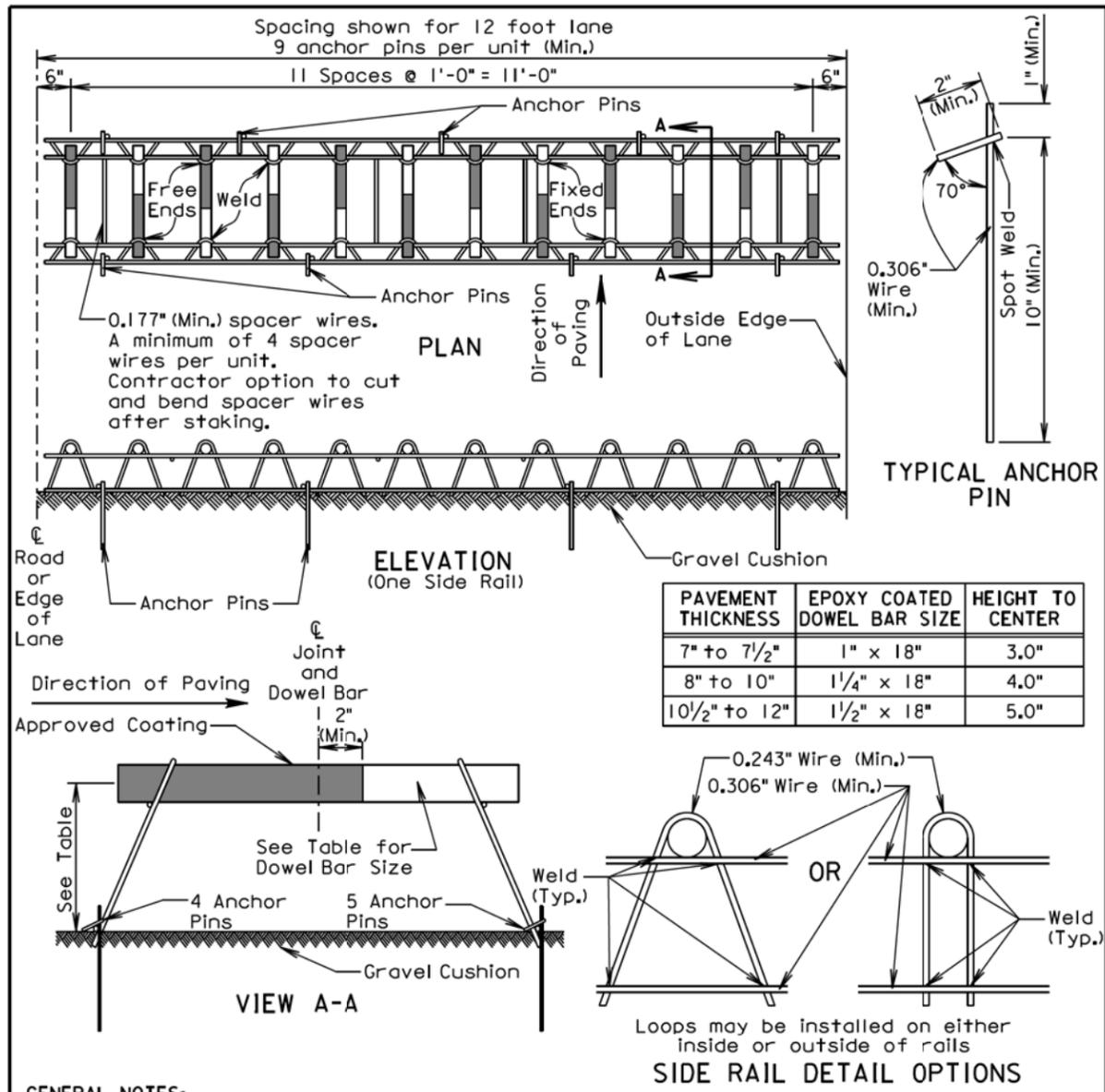
GENERAL NOTES:

This detail shall be used when the transverse joint is 15 feet or greater on 20' joint spacing and 10' or greater on 15' joint spacing from the existing transverse contraction joint.

The epoxy coated 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.

1 1/4" epoxy coated plain round dowel bars shall be used on 10 inch and less PCC Pavement and 1 1/2" epoxy coated plain round dowel bars shall be used on 10.5 inch and greater PCC Pavement. The number and spacing of the epoxy coated plain round dowel bars shall be as detailed on the standard plate for dowel bars. The epoxy coated plain round dowel bars 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.



GENERAL NOTES:

Longitudinal joint tie bars shall be placed a minimum of 15 inches from the transverse contraction joint.

Centerline of individual dowel bars shall be parallel to top of subgrade $\pm 1/8$ inch in 18 inches and to all other dowel bars in the assembly $\pm 1/16$ inch in 18 inches.

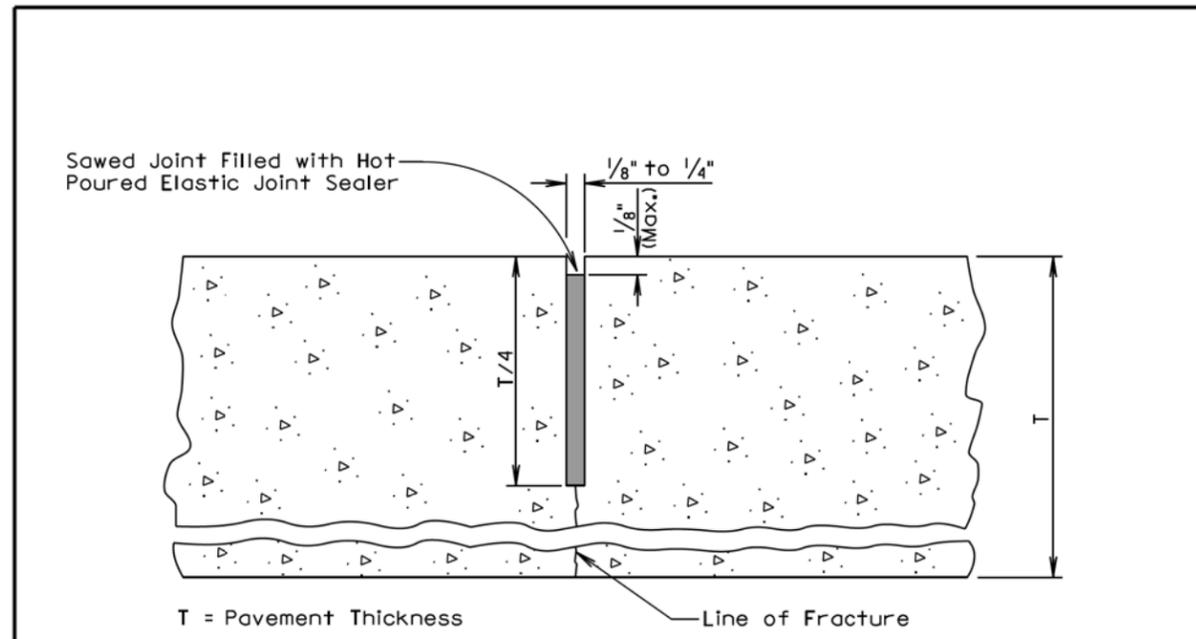
Centerline of individual dowel bars shall be parallel to the centerline of the roadway $\pm 1/2$ inch in 18 inches.

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

Supporting devices as shown on this sheet, or equivalent as approved by the Engineer, shall be used to maintain proper horizontal and vertical alignment of the dowel bars.

August 30, 2013

Published Date: 4th Qtr. 2013	S D D O T	PCC PAVEMENT DOWEL BAR ASSEMBLY FOR TRANSVERSE CONTRACTION JOINTS 12 Bar Assembly on Granular Base Material	PLATE NUMBER 380.01
			Sheet 1 of 1



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.

June 26, 2013

Published Date: 4th Qtr. 2013	S D D O T	PCC PAVEMENT TRANSVERSE CONTRACTION JOINT WITH OR WITHOUT DOWEL BAR ASSEMBLY	PLATE NUMBER 380.05
			Sheet 1 of 1

PLOT SCALE - 1:200

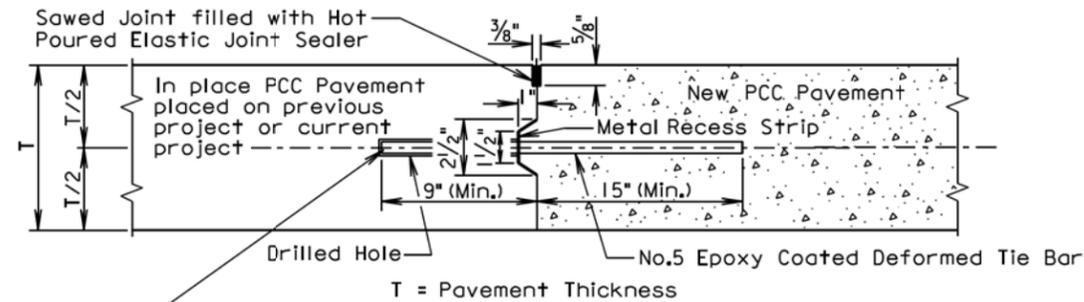
PLOTTED FROM - TRPR15123

PLOT NAME - 5

FILE - ... \380.01 380.05.DGN

LONGITUDINAL CONSTRUCTION JOINT WITH TIE BARS

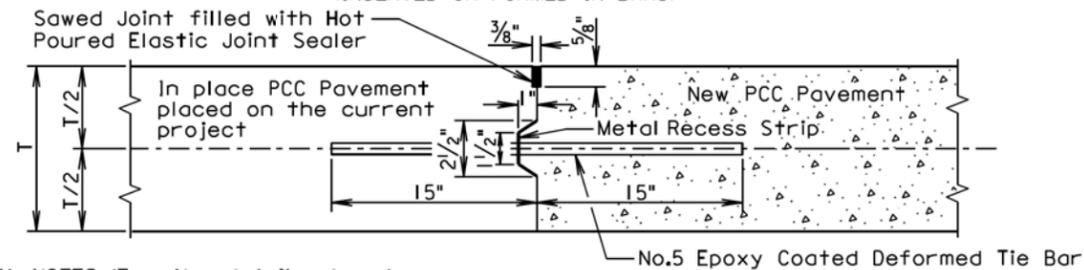
(DRILLED IN BARS)



T = Pavement Thickness
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.

LONGITUDINAL CONSTRUCTION JOINT WITH TIE BARS

(INSERTED OR FORMED IN BARS)



GENERAL NOTES (For the details above):

The epoxy coated deformed tie bars shall be spaced in accordance with the following tables:

Tie Bar Spacing 48" Maximum	
Transverse Contraction Joint Spacing	Number of Tie Bars
6.5' to 10'	2
10.5' to 14'	3
14.5' to 18'	4
18.5' to 22'	5

Tie Bar Spacing 30" Maximum	
Transverse Contraction Joint Spacing	Number of Tie Bars
5' to 7'	2
7.5' to 9.5'	3
10' to 12'	4
12.5' to 14.5'	5
15' to 17'	6
17.5' to 19.5'	7
20' to 22'	8

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

The required number of tie bars as shown in the table shall be uniformly spaced within each panel. The uniformly spaced tie bars shall be spaced a maximum of 48 inches center to center for a female keyway and shall be spaced a maximum of 30 inches center to center for a vertical face and male keyway. The maximum tie bar spacing shall apply to tie bars within each panel.

The keyway illustrated in the above details depict a female keyway.

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.

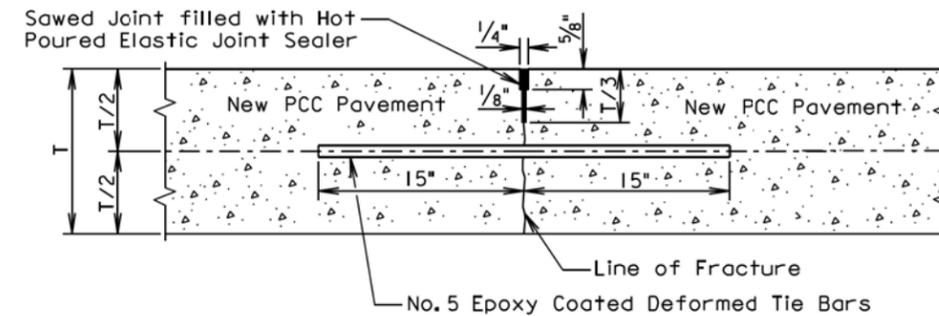
August 31, 2013

S D D O T	PCC PAVEMENT LONGITUDINAL JOINTS WITH TIE BARS	PLATE NUMBER 380.10
		Sheet 1 of 2

Published Date: 4th Qtr. 2013

SAWED LONGITUDINAL JOINT WITH TIE BARS

(POURED MONOLITHICALLY)



T = Pavement Thickness

GENERAL NOTES (For the detail above):

The epoxy coated deformed tie bars shall be spaced in accordance with the following table:

Tie Bar Spacing 48" Maximum	
Transverse Contraction Joint Spacing	Number of Tie Bars
6.5' to 10'	2
10.5' to 14'	3
14.5' to 18'	4
18.5' to 22'	5

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

The required number of tie bars as shown in the table shall be uniformly spaced within each panel with a maximum space of 48 inches center to center. The maximum tie bar spacing shall apply to tie bars within each panel.

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 is necessary.

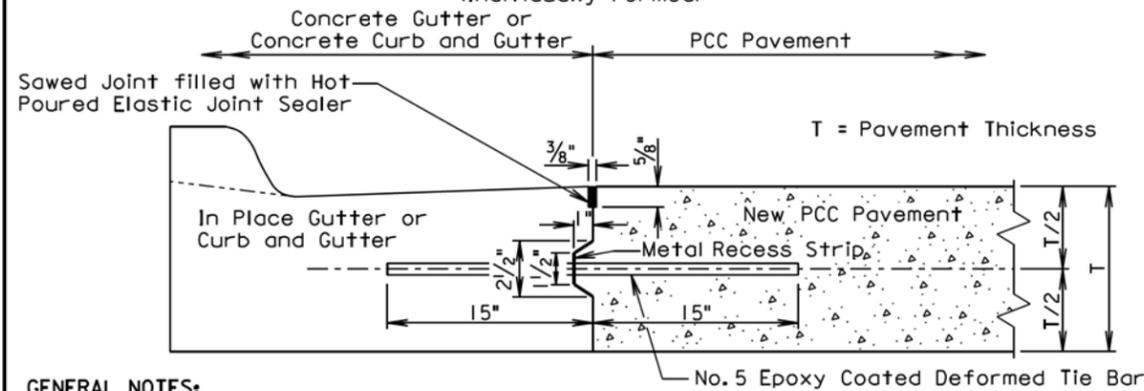
August 31, 2013

S D D O T	PCC PAVEMENT LONGITUDINAL JOINTS WITH TIE BARS	PLATE NUMBER 380.10
		Sheet 2 of 2

Published Date: 4th Qtr. 2013

LONGITUDINAL CONSTRUCTION JOINT WITH TIE BARS

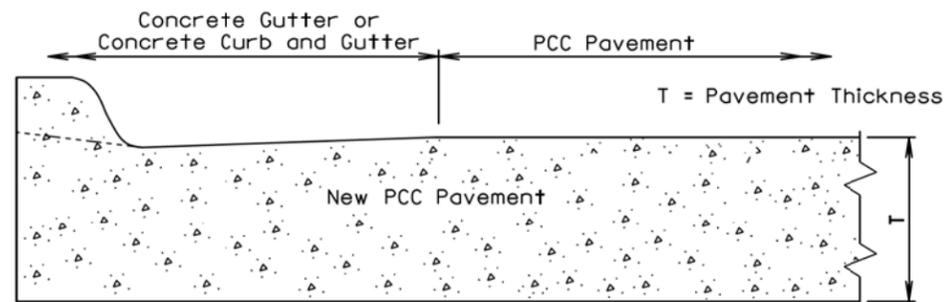
(Individually Formed)



GENERAL NOTES:

- No. 5 epoxy coated deformed tie bars shall be spaced 48 inches center to center. 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 transverse contraction joints in the concrete gutter or concrete curb and gutter shall be placed at each mainline PCC pavement transverse contraction joint. The transverse contraction joints in the concrete gutter or the concrete curb and gutter shall be 1/2 inches deep if formed in fresh concrete using a suitable grooving tool. If a saw is used to cut the transverse contraction joints, then the depth of the joint shall be at least 1/4 the thickness of the concrete gutter or concrete curb and gutter.
- The term "In Place Gutter or Curb and Gutter" in the above drawing indicates that the in place concrete gutter and concrete curb and gutter was placed on the current project.

POURED MONOLITHICALLY



GENERAL NOTES:

- The mainline curb and gutter may be placed monolithically with the PCC pavement if the mainline lane width is less than or equal to 12 feet. If this method of construction is used, the tie bars and the sawed joint between the curb and gutter and the PCC pavement shall be eliminated.
- The gutter or curb and gutter shall be sawed transversely at each mainline transverse contraction joint. The transverse contraction joints in the gutter or curb and gutter shall be sawed and sealed same as the transverse contraction joints in the PCC pavement.
- The slope of the gutter shall be the slope designated for the type of gutter or curb and gutter to be constructed. The bottom slope of the gutter or curb and gutter shall be constructed at the same slope as the mainline concrete pavement.

June 26, 2013

S D D O T	PCC PAVEMENT LONGITUDINAL CONSTRUCTION JOINTS WITH CONCRETE GUTTER OR CONCRETE CURB AND GUTTER	PLATE NUMBER 380.11
	Published Date: 4th Qtr. 2013	Sheet 1 of 1