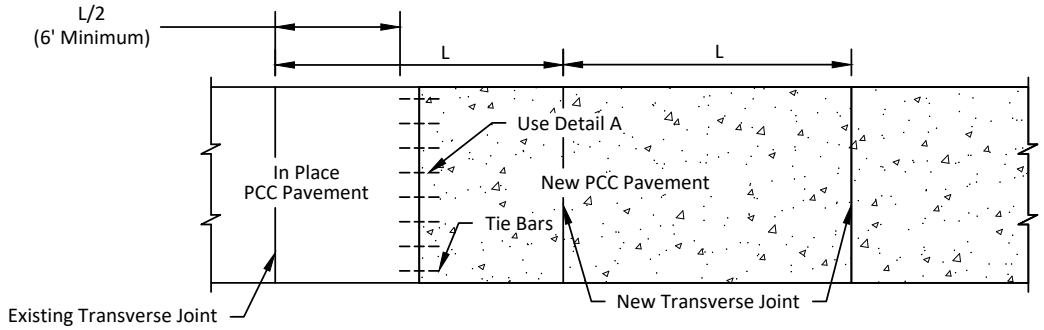
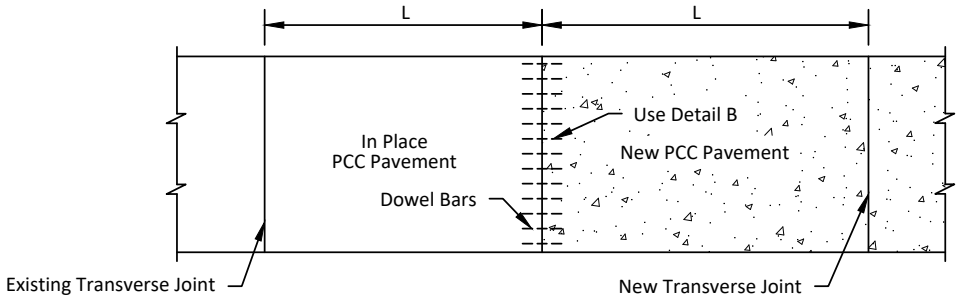


PLAN VIEW

L=Distance Between Transverse Joints



PLAN VIEW

Note:
Transverse joints shall match existing joints in adjacent lanes of paving.

N.T.S.

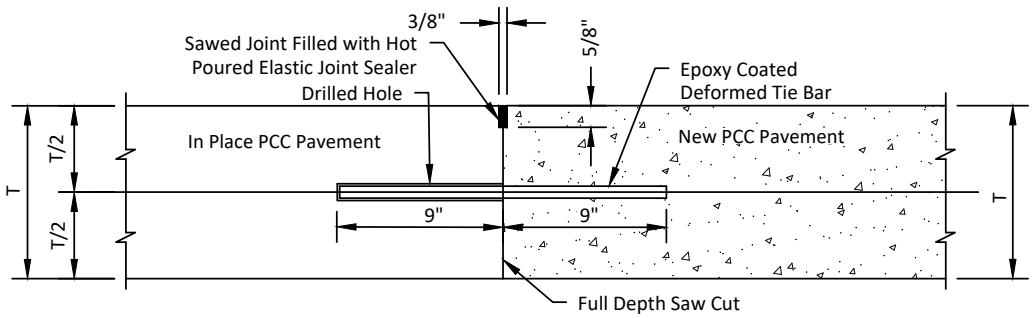
CITY OF RAPID CITY | PUBLIC WORKS DEPARTMENT

PCC PAVEMENT TRANSVERSE CONSTRUCTION JOINTS WITH TIE BARS OR DOWEL BARS

DATE: 8-19-22

Sec. - Sht.
40-1a

DETAIL A
TRANSVERSE CONSTRUCTION JOINT WITH TIE BARS

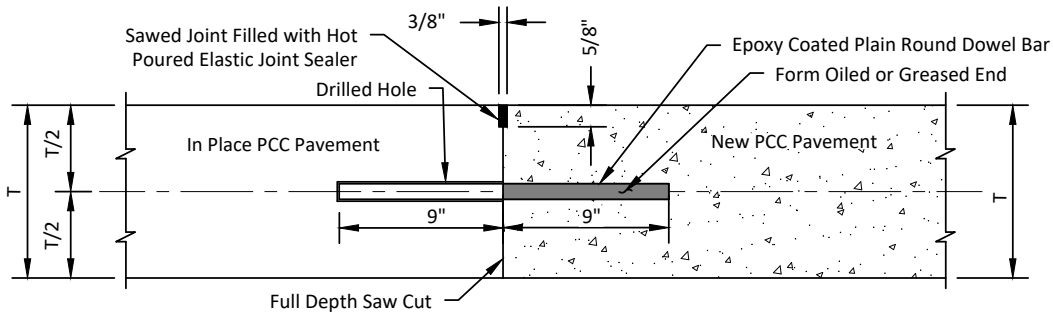


T=In Place PCC Pavement and New PCC Pavement Thickness

Notes:

1. The term "In Place PCC Pavement" in the above drawing indicates that the in place PCC pavement was placed on a previous project.
2. The tie bars will be embedded a minimum depth of 9" into the in place PCC pavement and anchored with an epoxy resin adhesive.
3. No. 8 epoxy coated deformed tie bars shall be used in 7" to 7 $\frac{1}{2}$" thick PCC pavement, No. 9 epoxy coated deformed tie bars will be used in 8" to 10" thick PCC pavement and No. 10 epoxy coated deformed tie bars will be used in 10 $\frac{1}{2}$" thick and greater PCC pavement. The tie bar spacing will be 18" center to center and will be a minimum of 3" and a maximum of 9" from the pavement edges.

DETAIL B
TRANSVERSE CONSTRUCTION JOINT WITH DOWEL BARS



T=In Place PCC Pavement and New PCC Pavement Thickness

Notes:

1. 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.
2. The plain round dowel bars will be embedded a minimum depth of 9" into the in place PCC pavement and anchored with an epoxy resin adhesive.
3. The epoxy coated plain round dowel bar size, number, and spacing will be the same as detailed on the corresponding dowel bar assembly, see Detail 40-6. The epoxy coated plain round dowel bars will be a minimum of 3" and a maximum of 6" from the pavement edges.

N.T.S.

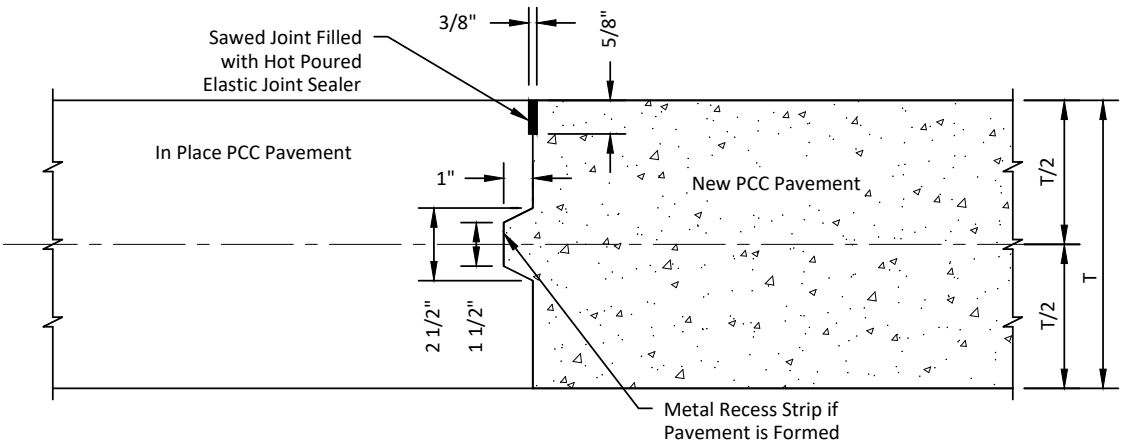
CITY OF RAPID CITY | PUBLIC WORKS DEPARTMENT

PCC PAVEMENT TRANSVERSE CONSTRUCTION JOINTS WITH TIE BARS OR DOWEL BARS

DATE: 8-19-22

Sec. - Sht.
40-1b

KEYWAY JOINT



T=Pavement Thickness

Notes:

1. When concrete pavement is formed and a keyway is provided, a metal recess strip will be used. When concrete pavement is slip formed, a metal recess strip is not required.
2. The term "In Place PCC Pavement" in the above drawing indicates that the in place PCC pavement was placed on the current project.

N.T.S.

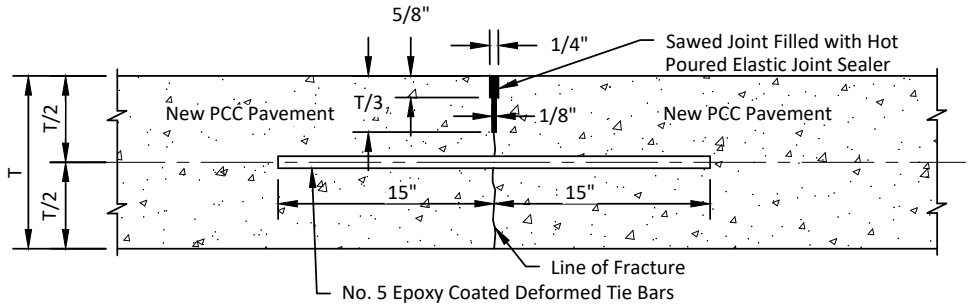
CITY OF RAPID CITY | PUBLIC WORKS DEPARTMENT

PCC PAVEMENT LONGITUDINAL JOINT WITH KEYWAY

DATE: 8-19-22

Sec. - Sht.
40-2

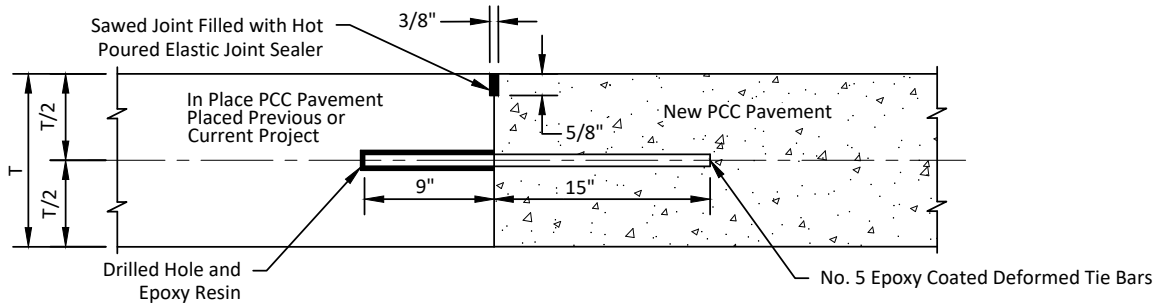
SAWED LONGITUDINAL JOINT WITH TIE BARS
(Poured Monolithically)



Notes:
1. Tie bar spacing shall be 48" center to center and shall be supported so the tie bar remains in place as detailed during paving operations.
2. The first saw cut to control cracking will 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.

T=Pavement Thickness

LONGITUDINAL CONSTRUCTION JOINT WITH TIE BARS



Note:
The No. 5 epoxy coated tie bars shall be embedded a minimum of 9" into the in place PCC pavement and anchored with an epoxy resin adhesive. Tie bar spacing shall be 30" center to center when no keyway is present.

N.T.S.

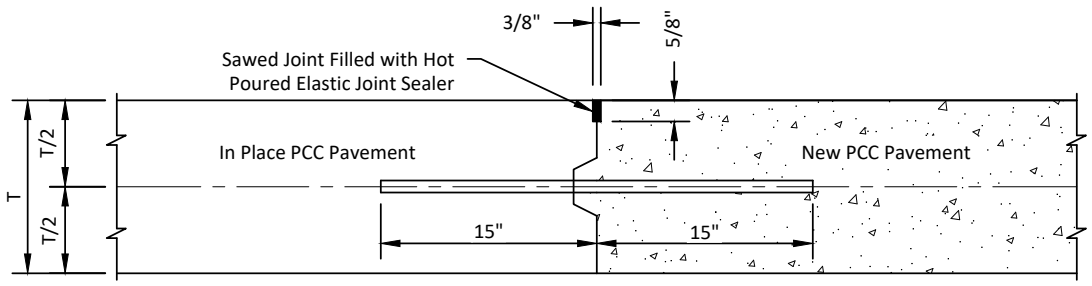
CITY OF RAPID CITY | PUBLIC WORKS DEPARTMENT

PCC PAVEMENT LONGITUDINAL JOINTS WITH TIE BARS

DATE: 8-19-22

Sec. - Sht.
40-3a

LONGITUDINAL CONSTRUCTION JOINT WITH KEYWAY AND TIE BARS



T=Pavement Thickness

Notes:

1. When concrete pavement is formed and a keyway is provided, a metal recess strip will be used. When concrete pavement is slip formed, a metal recess strip is not required.
2. The term "In Place PCC Pavement" in the above drawing indicates that the in place PCC pavement was placed on the current project.
3. The epoxy coated deformed tie bars will be spaced in accordance with the following table:

   a. The tie bars will be placed a minimum of 15" from the transverse contraction joints.

   b. The required number of tie bars as shown in the tables will be uniformly spaced. Bar spacing for monolithically poured pavement shall be a maximum space of 48" center to center as shown in table above. Bar spacing adjacent to existing PCC pavement shall be a maximum space of 30" center to center as shown in table above. The maximum tie bar spacing will apply to tie bars within each panel.

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

N.T.S.

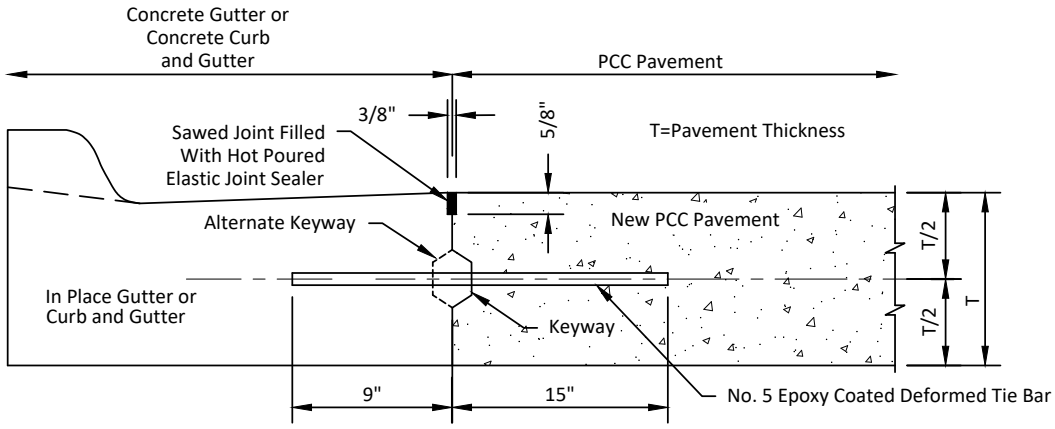
CITY OF RAPID CITY | PUBLIC WORKS DEPARTMENT

PCC PAVEMENT LONGITUDINAL JOINTS WITH TIE BARS

DATE: 8-19-22

Sec. - Sht.
40-3b

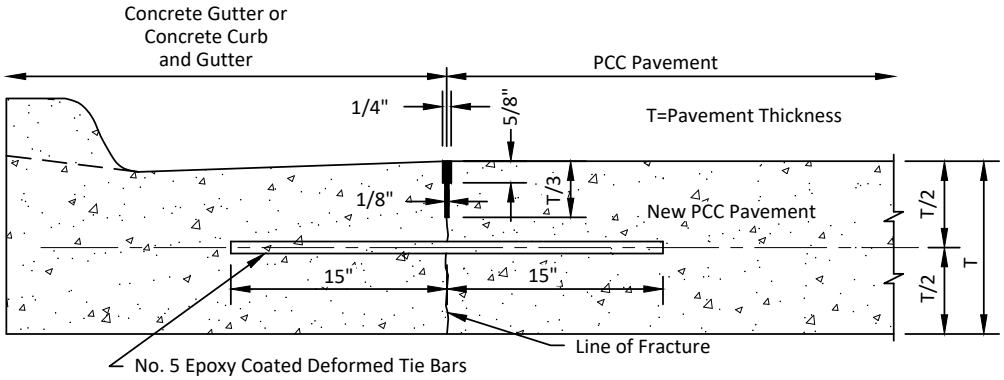
LONGITUDINAL CONSTRUCTION JOINT WITH TIE BARS
(Individually Formed)



Notes:

1. No. 5 epoxy coated deformed tie bars will be spaced 48" center to center. The keyway may be formed in either the curb and gutter (alternate keyway shown above) or the PCC pavement. No. 5 epoxy coated deformed tie bars will be placed 30" center to center if a keyway is not installed.
2. The tie bars will be placed a minimum of 15" from existing transverse contraction joints.
3. The keyway is optional and is not required. When concrete pavement is formed and a keyway is provided, a metal recess strip will be used. When concrete pavement is slip formed, a metal recess strip is not required.
4. The transverse contraction joints in the concrete gutter or concrete curb and gutter will match each mainline PCC pavement transverse contraction joint.
5. The term "In Place Gutter or Curb and Gutter" in the above drawing indicates that the in place concrete gutter or concrete curb and gutter was placed on the current project.

POURED MONOLITHICALLY



Notes:

1. The mainline curb and gutter may be placed monolithically with the PCC pavement or as required by plan note if the mainline lane width is less than or equal to 12'.
2. No. 5 epoxy coated deformed tie bars will be spaced 48" center to center.
3. The tie bars will be placed a minimum of 15" from existing transverse contraction joints.
4. The gutter or curb and gutter will be sawed transversely at each mainline transverse contraction joint. The transverse contraction joints in the gutter or curb and gutter will be sawed and sealed same as the transverse contraction joints in the PCC pavement.
5. The slope of the gutter will 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 will be constructed at the same slope as the mainline concrete pavement.

N.T.S.

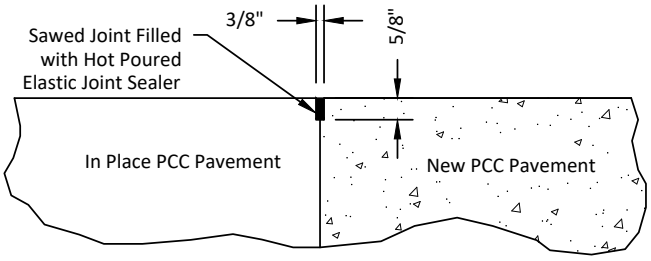
CITY OF RAPID CITY | PUBLIC WORKS DEPARTMENT

PCC PAVEMENT LONGITUDINAL CONSTRUCTION JOINTS WITH CONCRETE GUTTER OR CONCRETE CURB AND GUTTER

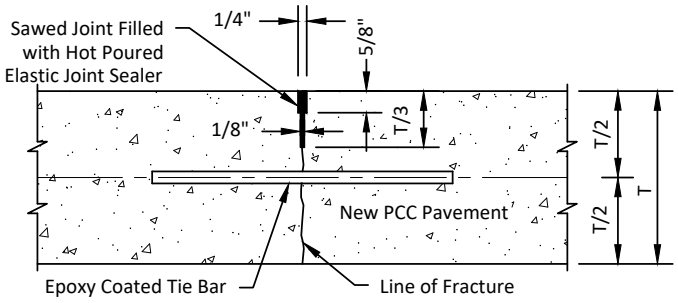
DATE: 8-19-22

Sec. - Sht.
40-4

LONGITUDINAL CONSTRUCTION JOINT

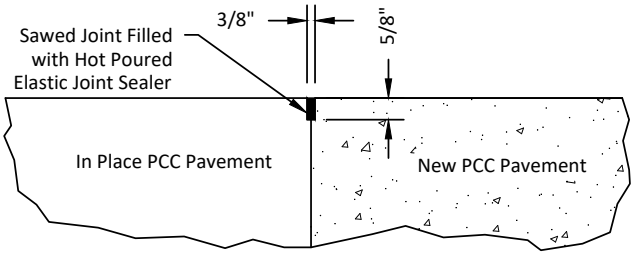


SAWED LONGITUDINAL JOINT

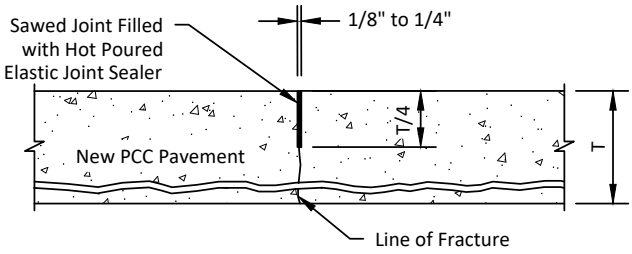


T=Pavement Thickness

TRANSVERSE CONSTRUCTION JOINT



SAWED TRANSVERSE CONTRACTION JOINT



Notes:

1. The term "In Place PCC Pavement" in the above drawing indicates that the pavement was placed on the current project or was placed on a previous project and is being tied to on the current project.
2. The first cut to control cracking for a sawed longitudinal joint shall be a minimum of 1/3 the thickness of the pavement. Additional sawing for widening the saw cut to provide for the installation of the hot poured elastic joint sealer is necessary.
3. The first cut to control cracking for a sawed transverse joint shall be a minimum of 1/4 the thickness of the pavement.
4. Transverse construction joints shall only be made at planned joint locations. Mid panel transverse construction joints shall not be constructed.
5. All hot pour 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 the removal shall be to the satisfaction of the Engineer. All costs for removal of spilled joint sealer shall be borne by the Contractor.

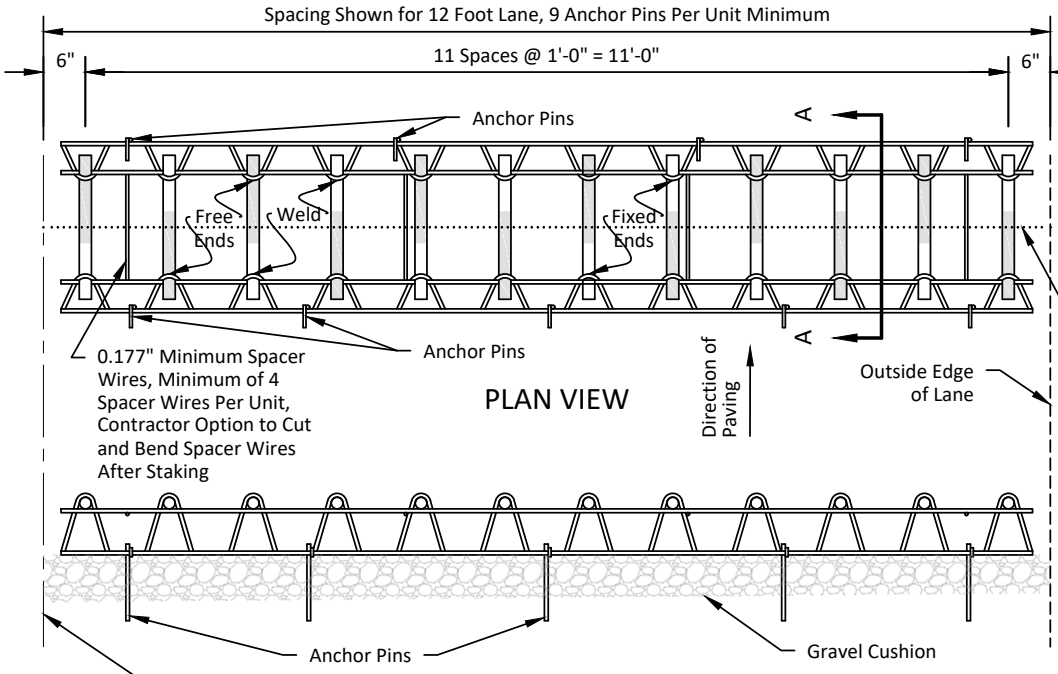
N.T.S.

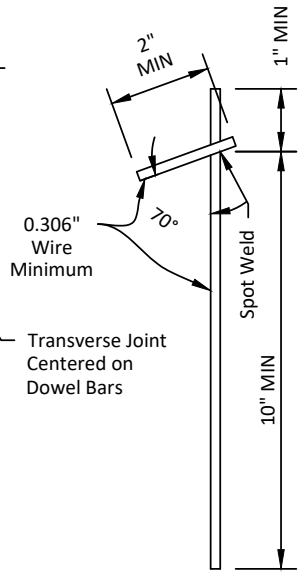
CITY OF RAPID CITY | PUBLIC WORKS DEPARTMENT

PCC PAVEMENT JOINT DETAILS

DATE: 8-19-22

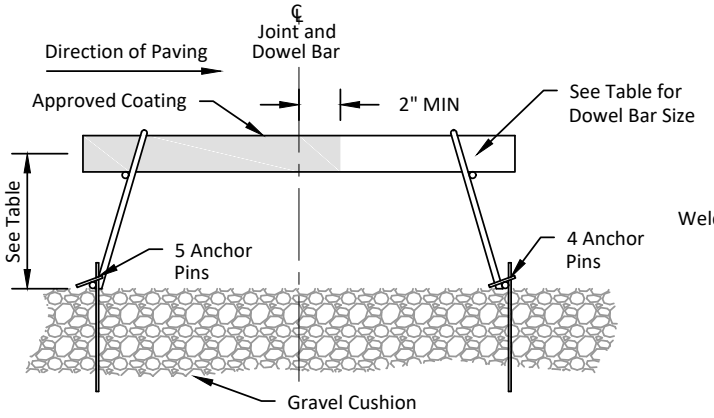
Sec. - Sht.
40-5



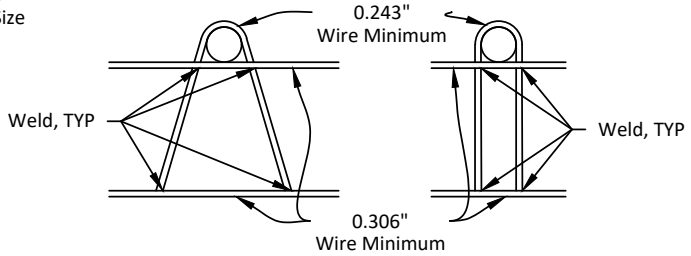


ANCHOR PIN

PAVEMENT THICKNESS	EPOXY COATED DOWEL BAR SIZE	HEIGHT TO CENTER
7" to 7 $\frac{1}{2}$"	1" x 18"	3.0"
8" to 10"	1 $\frac{1}{4}$ " x 18"	4.0"
10 $\frac{1}{2}$" to 13"	1 $\frac{1}{2}$ " x 18"	5.0"



SECTION A-A



Loops may be installed on either inside or outside of rails.

SIDE RAIL OPTIONS

Notes:

1. Longitudinal joint tie bars will be placed a minimum of 15" from the transverse contraction joints.
2. Centerline of individual dowel bars will be parallel to top of subgrade +/- 1/8" in 18" and to all other dowel bars in the assembly by +/- 1/16" in 18 ".
3. Centerline of individual dowel bars will be parallel to the centerline of the roadway to +/- 1/2" in 18".
4. 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".
5. Supporting devices as shown on this sheet, or equivalent as approved by the Engineer, will be used to maintain proper horizontal and vertical alignment of the dowel bars.

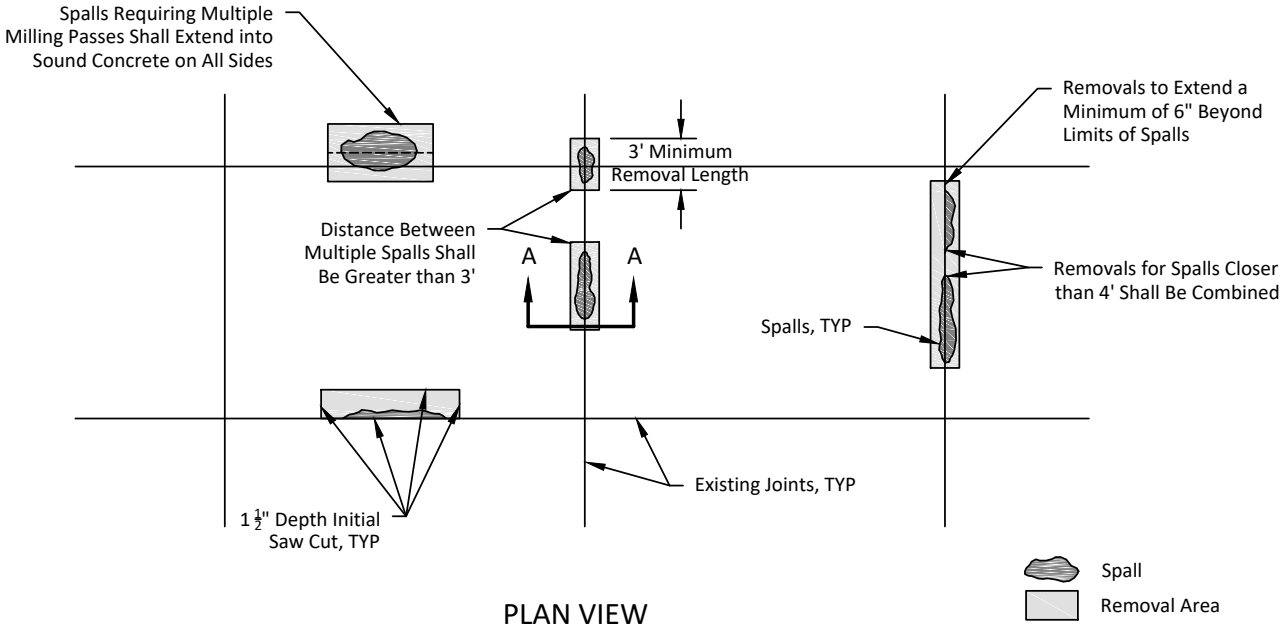
N.T.S.

CITY OF RAPID CITY | PUBLIC WORKS DEPARTMENT

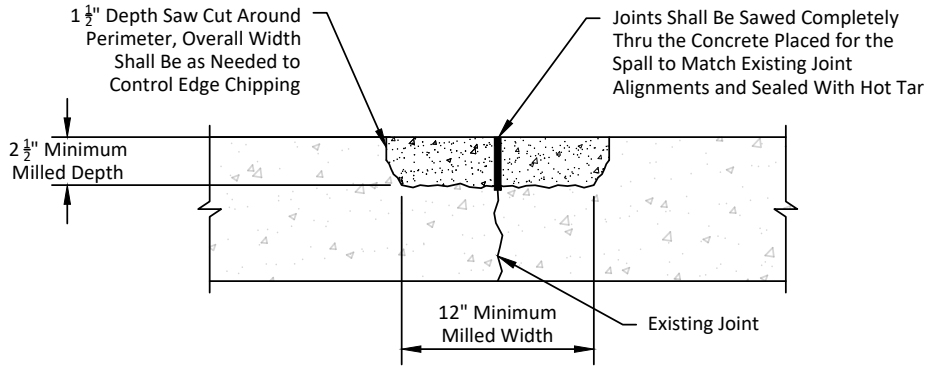
PCC PAVEMENT DOWEL BARS

DATE: 8-19-22

Sec. - Sht.
40-6



PLAN VIEW



SECTION A-A

N.T.S.

CITY OF RAPID CITY | PUBLIC WORKS DEPARTMENT

SPALL REPAIR

DATE: 8-19-22

Sec. - Sht.
40-7a

Notes:

1. Spall quantities shown in the plans are approximate and are based on field measurements at the time of plans preparation. Spall repairs shall be marked in the field by the engineer and may vary from the plans based on field conditions.
2. Spalls will be marked out to the nearest whole foot. Removal is to extend 6 inches beyond the spall on transverse joints. Minimum length of removal shall be 3'. Joints containing spalls closer than 4' shall have the removal limits combined. Multiple milling passes may be required in areas where existing spalls are too wide to remove in one pass.
3. Spall repair areas shall be removed thru the use of a vertical edge milling machine. The milled width shall be a minimum of 12" and shall have a uniform depth of 2.5" over the area to be removed. An initial saw cut will be required around the perimeter of the removal area. The saw cut shall be a minimum of 1.5" depth to control edge chipping beyond the area to be repaired.
4. Prior to the placement of concrete the surface of the milled area shall be sand blasted to remove any additional unsound concrete and free latances. Compressed air shall then be used for the final cleaning of the surface. After final cleaning of the spall a bonding mortar shall be mixed and applied to all existing concrete surfaces (horizontal and vertical) to receive the spall fill material. The bonding mortar shall consist of the following proportions: 2 parts portland cement to 1 part sand. The portland cement and sand shall be mixed with enough water to form a thick creamy consistency. The Contractor may propose to utilize other commercially available bonding agents thru the submittal process.
5. The surface temperature shall be 40 degrees and rising prior to the placement of the bonding agent and concrete fill material. The concrete fill material shall be consolidated by the use of a small spud vibrator.
6. The final finishing procedure is to paint a sand-cement grout, the same grout used for the bonding mortar, at the edges of the repair to impede delamination of the patch. This ensures that a high percentage of cementitious material is available to glue the edges of the patch material to the existing concrete, helping to prevent the infiltration of moisture that can lead to delamination if water at the interface freezes in cold weather. The final surface shall be a broomed finish.
7. Joints shall be sawed to match existing joints and shall be sawed to the depth of the spall material plus 0.25". The sawed joint shall be sealed using hot tar.
8. Linseed oil cure shall be applied at a rate of 1 gallon per 75 SF. The repair areas shall be covered for 48 hours following the application of cure. Cold weather concreting procedures shall be followed during the 48 hour covering period, as needed.
9. Fill material for the spall areas shall be a commercially supplied redi-mix concrete conforming to the following proportions:

Cement	750 lbs
Course agg	1330 lbs
Fine agg	1330 lbs
Air	4.5% to 7.5%
Slump	1" to 4"
Max w/c ratio	0.42
Water reducer	As Needed

10. Course aggregate shall be 3/8 chip rock. Fly ash will not be allowed. A concrete mix design shall be submitted for acceptance prior to use on the project.
11. Payment for the spall repair will be by the square foot (SF) of repair. Payment shall include all work required to mill and remove existing, saw cutting to control edge chipping, final saw cutting, sealing, concrete placement and all associated items.
12. Processes and procedures for spall repair within this detail are from the National Concrete Pavement Technology Centers guide for partial depth repair of concrete pavements dated April 2012.

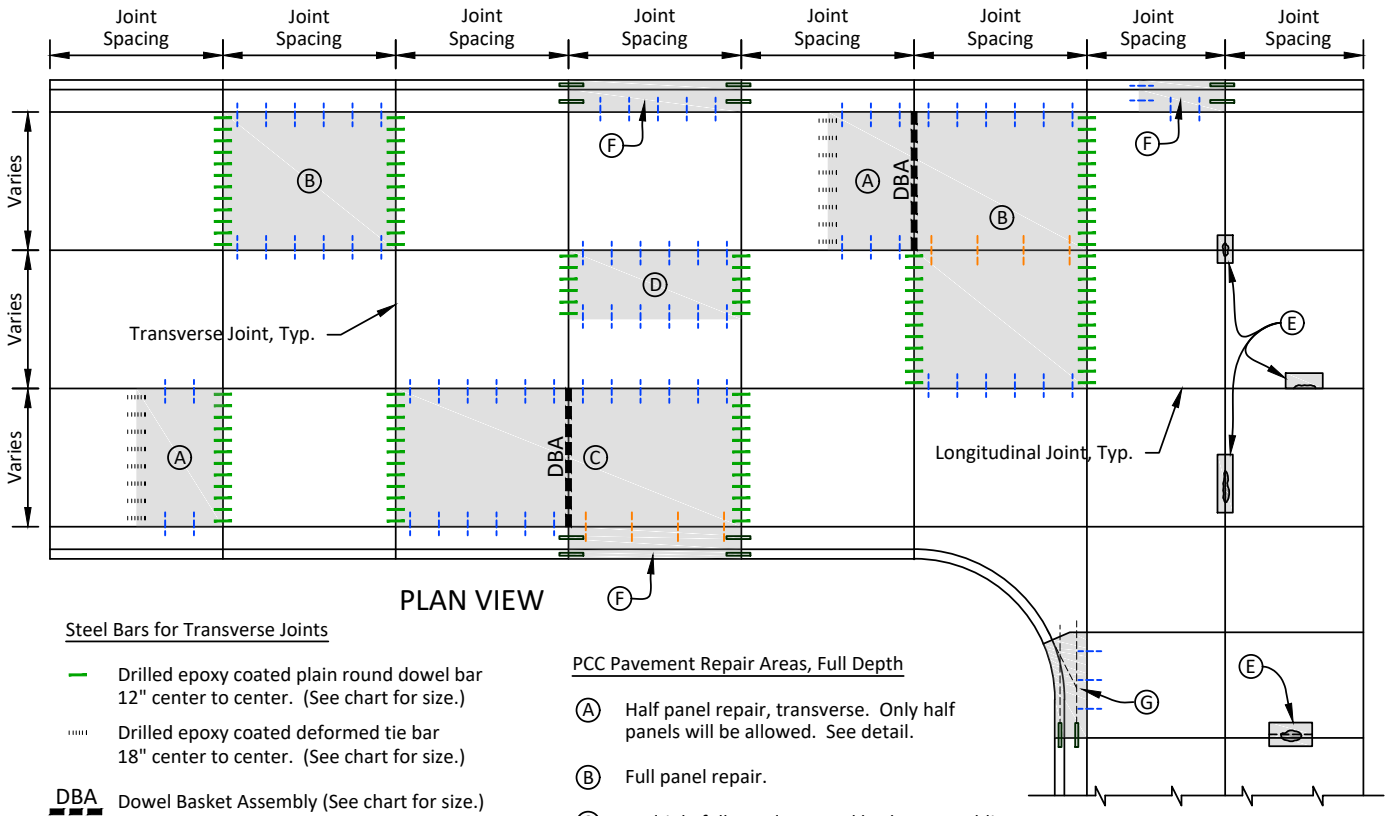
N.T.S.

CITY OF RAPID CITY | PUBLIC WORKS DEPARTMENT

SPALL REPAIR

DATE: 8-19-22

Sec. - Sht.
40-7b



PLAN VIEW

Steel Bars for Transverse Joints

- Drilled epoxy coated plain round dowel bar 12" center to center. (See chart for size.)
- Drilled epoxy coated deformed tie bar 18" center to center. (See chart for size.)
- DBA — Dowel Basket Assembly (See chart for size.)

Steel Bars for Longitudinal Joints

- No. 5 x 30" epoxy coated deformed tie bars. Placed in monolithic pavement centered on joint - spaced 48" center to center.
- No. 5 x 24" epoxy coated deformed tie bars. Drilled and epoxied 9" minimum depth into existing concrete - spaced 30" center to center.

Steel Bars for Curb and Gutter and Concrete Fillets

- No. 5 x 24" epoxy coated deformed tie bars. Drilled and epoxied 9" minimum depth into existing curb and gutter.
- No. 5 x 24" epoxy coated smooth dowel bars. Drilled and epoxied 9" minimum depth into existing curb and gutter.
- No. 5 x 30" epoxy coated deformed tie bars. Placed in monolithic pavement centered on joint - spaced 48" center to center.
- No. 5 x 24" epoxy coated deformed tie bars. Drilled and epoxied 9" minimum depth into existing concrete - spaced 30" center to center.
- No. 4 x 24" epoxy rebar. Drilled and epoxy 9" minimum depth into existing concrete. See Section 60 details for spacing.

PCC Pavement Repair Areas, Full Depth

- (A) Half panel repair, transverse. Only half panels will be allowed. See detail.
- (B) Full panel repair.
- (C) Multiple full panels. Dowel basket assemblies shall be used for new transverse joints.
- (D) Half panel repair, longitudinal. Only half panels will be allowed.

PCC Pavement Spall Repair Areas, Partial Depth

- (E) Spall repair areas. See detail.

Curb and Gutter and Concrete Fillet

- (F)(G) See Section 60 details.

PAVEMENT THICKNESS	EPOXY COATED BAR SIZE
7" to 7 $\frac{1}{2}$"	1" x 18" Smooth Bar or No. 8 Deformed Bar
8" to 10"	1 $\frac{1}{4}$" x 18" Smooth Bar or No. 9 Deformed Bar
10 $\frac{1}{2}$" to 13"	1 $\frac{1}{2}$" x 18" Smooth Bar or No. 10 Deformed Bar

Notes:

1. Concrete shall be sawed full depth. Final removal limits are shown. A second saw cut is required for all concrete removals.
2. Joints, both transverse and longitudinal, shall be constructed to match existing joints unless directed by the Engineer.
3. Joints shall be sawed and sealed as per details.

N.T.S.

CITY OF RAPID CITY | PUBLIC WORKS DEPARTMENT

CONCRETE PAVING REPAIR

DATE: 8-19-22

Sec. - Sht.
40-8