Jointing
- Concrete Flatwork and Jointing Thumbrules
- Sample Joint Layout for Integral Curb Pavement
- Concrete Walk and Curb Returns at Entrances – Standard Plate 7035N
- Reinforcement Around Manholes
- Construction Joints

Staking Details
- Staking Information Sheet– Standard Plan 5-297.115 (Sheet 1 of 2)

Concrete Paving Details
- Expansion Joints – Standard Plan 5-297.221
- Contraction Joints – Standard Plan 5-297.221
- Longitudinal Joints – Standard Plan 5-297.221

Joint Sealing Information
- Joint Sealing
- Typical Dowel Bar Assembly – Standard Plate 1103K (Sheets 1 & 2)
- Construction of Header Joints – Std. Plate 1150R (Sheets 1 & 2)
- Reinforced Panel over Culverts – Std. Plate 1070M
- MnDOT Policy on Sealing Joints
CONCRETE FLATWORK AND JOINTING THUMBRULES

1. Forms
   a. Keep forms in-place for a minimum of 12 hours
   b. When removed, additional curing must be provided for a minimum of 72 hours total
   c. Must be mortar tight in bridge work

2. Joint depths
   a. Pavement – 25% (t/4) of the pavement thickness
   b. Sidewalk – 30% of sidewalk thickness
   c. Curb joints – 2” deep
   d. Removable inserts are not allowed, joints shall be established by grooving or green sawing

3. Joint Spacing
   a. Rule of thumb for all panels – depth in inches x 1.5 feet equals largest panel size
   b. Keep all panels as square as possible
   c. Pavement example – 8” thick pavement x 1.5’ = 12 foot joint spacing (MnDOT maximum joint spacing for concrete pavements is 15’ – regardless of pavement thickness)
   d. Sidewalk example – 4” thick sidewalk x 1.5’ = 6 feet joint spacing
      i. Maximum sidewalk panel size is 6’ x 6’ = 36 square feet
   e. Driveway pavement example – 6” thick driveway x 1.5’ = 9 foot joint spacing

4. Isolation Joints
   a. For longitudinal joints – Use 1/2” bit felt
   b. For transverse joints
      i. For concrete 4” – 8” thick - Use ½” bit felt
      ii. For concrete 8” – 12” thick – Use 1” bit felt

5. Size of reinforcing bars for possible re-enterent cracking
   a. All bars should be 30” long and spaced 4” from transverse joint, 3” from longitudinal joint and 6” from each other
   b. Use 2 - No.13 Metric for concrete 10” thick or less
   c. Use 2 - No.16 Metric for concrete greater than 10” thick

6. Tapers
   a. Concrete shall taper down to no less than a minimum of 1 foot in the transverse direction
b. Eliminate or minimize acute angle panels (especially less than 60 degrees) - provide reinforcing steel if this not possible

c. Reinforcing steel - In concrete pavement areas, 6 feet wide or less, place No. 13 reinforcement bars 4 inches from and along each edge of a taper.

d. All concrete shall meet another joint as close to a 90 degree angle as possible. See drawing below. This joint shall be a minimum of 1 foot in length, although experience indicates 3 feet minimum may be better.

e. Radian joints – 3’ minimum to provide lateral support. For wheel loads provide taper steel in these areas also.

7. Driveway Entrances (7035M)
   a. Based on the instructor’s field experience, some of the following changes are recommended but not required
   b. Delete note 2 – expansion joints are not recommended in sidewalks (the Concrete Engineering Unit would make the same recommendation)
   c. Note 3 should also be applied to paved alleys and commercial driveways (it is currently only shown on private driveways – the Concrete Engineering Unit concurs)
   d. Note 9 – in the case of 6” driveway pavement the maximum joint width should be 9’
   e. Whether poured separately or monolithically, the sidewalk thickness through the driveway should be the same thickness as the driveway
   f. Thickened edge design where driveway meets sidewalk at isolation joint – see detail below.
Isolation joint if this is a concrete roadway.
NOTES:
SEE ROAD DESIGN MANUAL, CHAPTER 5, FOR
GEOMETRIC DESIGN OF ENTRANCES.

WHERE THE MAX. ALLOWABLE ENTRANCE GRADIENT
WOULD BE EXCEEDED, DUE TO THE POSITION OF
EXISTING MALL, THE WALK SHALL BE REMOVED AND
REPLACED, OR THE PAVEMENT RAMPS TO PROVIDE
THE REQUIRED ENTRANCE SLOPE.

SEE PLANS FOR PLACEMENT OF WALK AND
DIMENSIONS FOR CONSTRUCTION OF DRIVEWAYS.
NO DEDUCTION SHALL BE MADE IN CURB & GUTTER
FOR ENTRANCES.

1. 1/2 IN EXPANSION JOINT, 1/2 IN PEDESTRIAN JOINT
FILLER MATERIAL, AASHTO M 213 REQUIRED WHEN
2 CONCRETE AREAS ARE POURED SEPARATELY.
2. 1/2 IN EXPANSION JOINTS AT 60 FT. APPROX.
MAXIMUM INTERVALS.
3. MATCH INPLACE DRIVEWAY THICKNESS (5 IN. MIN.)
4. WITHOUT SIDEWALK, PAVE ONLY TO THE END OF
CURB RETURN WHEN ENTRANCE IS UNSURFACED OR
CONSTRUCTION IS NOT NEEDED BEYOND THIS POINT.
5. WITH SIDEWALK, PAVE TO THE BACK OF SIDEWALK,
PAVED FOR AS CONCRETE DRIVEWAY PAVEMENT.
6. CONTINUATION JOINT (FORMED OR SAWED).
7. EXPANSION JOINT NOT REQUIRED IF ADJACENT
SECTIONS ARE POURED MONOLITHICALLY, SEE
SECTION A-A.
8. SEE PLANS FOR PLACEMENT OF CURB RAMP.
9. FORM DRIVEWAY JOINT AS NECESSARY TO PRODUCE
APPROXIMATELY SQUARE PANELS MAXIMUM WIDTH
15 FT. BETWEEN JOINTS.
10. THE MINIMUM CONTINUOUS AND UNRESTRICTED CLEAR
WIDTH OF A PEDESTRIAN ACCESS ROUTE SHALL BE
4.5 FT.
11. SEE PLANS FOR PROPOSED CROSS SLOPE OF THE
PEDESTRIAN ACCESS ROUTE, WHICH MAY NOT EXCEED
0.02 FT./FT., AS CONSTRUCTED.
Place reinforcing at mid-depth of pavement thickness.

PLAN VIEW

SECTION A-A

REINFORCING FOR CONCRETE PAVEMENT AROUND MANHOLES
Note to Students: Some pages are excerpts taken from the September 1, 2003 MnDOT Concrete Manual. The references shown relate to that manual not this textbook.

5-694.660 JOINTS

Since concrete is a material of low tensile strength and since concrete construction may require staging in operations, the construction of joints is necessary to alleviate problems due to random cracking. See Standard Plan 5-297.221 for joint details.

5-694.661 CONSTRUCTION JOINTS

A construction joint is needed wherever the concrete placement operation is terminated prior to completion of the structure and concrete placement is resumed later. The locations of these joints are generally known in advance and are indicated on the plans for reinforced structures. These joints are substituted for either a contraction or expansion joint since there is no problem of stress on curb and sidewalk work.

A construction joint, normally called a “header joint” or “header”, is placed at the beginning and completion of each day of paving operations. The header joint is formed by using a “board” shaped to the desired cross-section of the pavement. See Figure A 5-694.661 for an example of a completed header joint.

Headers are considered a perpetual problem to concrete foremen, finishers, and are a continuing challenge. Headers are placed at mid-panel. Install side forms, approximately 3 m (10 ft.) in length, to provide proper edge alignment and confine the area for consolidation. Set the side forms to match the width of the pavement.

Figure A 5-694.661
Tie bars, 1.5 m (5 ft.) long, are inserted 0.75 m (2.5 ft.) into the fresh concrete. Concrete around the header joint is thoroughly consolidated by vibration to give strong, dense concrete. A point of weakness may develop at the joint if poor construction practices are followed. The "cream" carried along in the paver is not allowed in the header. Take care not to damage the in-place pavement when paving resumes.

Provide fresh concrete for the final few meters. Do not use the slurry that may have collected in the spreader rolls. Provide thorough but not excessive patterned hand consolidation.

Use a straightedge of sufficient length that laps back onto the existing concrete that has the proper shape. String lining is also recommended.

Near the end of large placements, carefully measure the remaining volume to adjust the amount in the last two or three trucks to provide the required concrete. Aim high, this can prevent waiting for a short load after the plant has closed or the concrete truck is scheduled for other jobs. Do not use concrete spilled or disposed of on the ground to make up any deficiency in material. The material placed at the end of the day's placement should have the same quality consistent with the other material used.

Edge tool the side form edges and the header itself. Use an edging tool with only a minimal radius.
Texture and apply cure in a timely manner. Many times this operation at the header is performed by hand. When starting operations the next day, repeat the process of straight edging and string lining across the joint.

5-694.662 EXPANSION JOINTS

Concrete is subject to expansion and contraction due to temperature and moisture changes. In some instances, it is necessary to construct expansion joints in the structure to provide for relief of the stresses that occur. Expansion joints are always used at bridges.

In curb, gutter, and sidewalk work, expansion joints are required as explained in Specification 2531.3C. The joint used is a plain butt joint with non-extruding preformed joint filler. The Contractor must place the joint filler absolutely vertical; otherwise (since it is a plain butt joint), one section will tend to slide up on the other when the concrete expansion becomes large enough. Follow good consolidation methods at these joints.

Expansion joints are rarely used in concrete pavements. If used, the size and spacing of dowel bars are indicated in the plans. Place non-extruding pre-molded joint filler vertically and straight across the pavement. Check to make sure the dowel bars are parallel. Obtain good consolidation around the dowels, joint filler, and protection angles to obtain a strong joint. The use of preformed expansion baskets tends to cause problems when they are used in pavements. The preformed expansion material acts as a dam, catching the progressing concrete during normal
operation, and can either tip the basket or prevent consolidation. Either situation can cause early deterioration of the joint.

If the joint filler is tipped during the construction, remove the concrete around the joint, straighten or replace the filler, and then replace the concrete. If a tipped joint is discovered after the concrete has hardened, a standard full-depth concrete repair is necessary. In this case, remove approximately 1.5 m (5 ft.) of concrete on each side of the joint (excluding bridges) to properly repair the defect. Use the newest concrete pavement rehabilitation standards available to replace the joint.

5-694.663 CONTRACTION JOINTS

There are several types of contraction joints used in concrete construction. The purpose of a contraction joint is to induce a crack to occur at a predetermined location rather than allow the inevitable random cracks.

In some types of construction, divider plates are used to help hold the forms during concrete placement. This is a practice used in curb, gutter, and sidewalk construction. When the divider plate is removed, there is a small opening, which then acts as a contraction joint. It will open up slightly when the concrete contracts, but provides little if any space for expansion. Obtain good consolidation around the divider plates. More commonly, hand tooling forms the joints.

The contraction joints for concrete paving are divided into two main classes; doweled and undoweled joints. Standard practice in Minnesota, in almost every case, is using doweled joints since undoweled joints will fault over time. Dowel bars provide for load of the vehicles to transfer across the joint from one pavement slab to the next. The minimum dowel bar size is 32 mm (1 1/4 in.) in diameter by 380 mm (15 in.) long. Joints without dowel bars provide for only partial load transfer through aggregate interlock.

The joints are normally constructed by sawing a groove in the concrete after it has hardened. Contraction joints in pavement usually have a depth of t/4 (thickness of the pavement divided by 4). The exception is on unbonded concrete overlays that have a joint depth of t/3.

Only pre-approved dowel bar assemblies are permitted. Saw the joint directly over the center of the dowel bars. It is very probable that a secondary crack will occur near the joint if the plane of weakness is 50 mm (2 in.) or more off center. The section of concrete between the crack and groove will soon spall out. The crack may occur outside the limits of the dowel bars resulting in no load transfer if the joint is 100 to 125 mm (4 to 5 in.) off center of the dowel assembly.

Flush all debris left on the pavement surface and in the joints after the saw cut is completed. Check to assure saw cut depth meets Specifications.

Joints that are over 13 mm (1/2 in.) in an uncracked condition will require oversized sealers. Contact the MnDOT Concrete Engineering Unit for specific recommendations.
The Contractor must assure that the construction sequence is performed in a timely manner so that no random cracks occur. Usually sawing is done about 8 to 12 hours after placement, but each situation is unique due to mix design, temperature, thickness, etc.

5-694.664 LONGITUDINAL JOINTS

Three types of longitudinal joints are predominately used.

- **L1T or L1 joint** - This is a sawed joint down the center of a roadway or section, either tied or untied.
- **L3 joint** - This is a construction joint between two concreting operations, which are not tied to one another, essentially a butt joint.
- **L2KT joint** - This is similar to the L3 joint except the two operations are tied together. This joint calls for placing the first pavement with an indented keyway and bent tie steel installed and tucked into the keyway. The tie steel is straightened before the second operation is begun allowing the tying of the two together.

The sawed longitudinal joint is often used as a traffic marker for two lanes of traffic and is used on double lane pavement construction. Most of these joints contain steel tie bars placed approximately at the mid-depth of the pavement. The size, length, and spacing will vary and this data is obtained from the plans. This steel is inserted into the concrete while it is plastic. A mechanical placing device is used. This is usually located on the front of the paver and automatically spaces and places the steel.

All other longitudinal joints are considered a type of construction joint. These joints may or may not contain tie steel. Check the plans for this feature. Make sure good consolidation is obtained around and under any keyways. Remove the concrete that is spilled on the previously constructed portion the same day the work is performed.
ELEVATION OF MINI BASKET DOWEL ASSEMBLY

NOTES:

1. **DOE**WEL BARS:
   - Dowels are to be 10 steel bars per AASHTO M274 ASTM Gr 40 or Gr 60. See standard plan 5-297.221 for dowel bar diameters.
   - Dowels shall be coated with epoxy coating in accordance with AASHTO M264 and the cut ends are not required to be coated coating thickness shall be 0.035 Mils.
   - Dowels are to be cut with straight surface and deburred.

2. **Dowel Bar Assembly**:
   - Side rails used shall be 1/0 G4 0.306" diameter minimum, loops used shall be 3/8" 0.243" diameter minimum, spacer wires used shall be 3 G4 0.177" diameter.
   - V-leg or U-leg shapes are to be installed on the inside or outside of subframe.
   - All wire intersections are to be welded.

3. **Anchor Pins**:
   - Per lane width, a minimum of (4) anchor pins evenly spaced (4" per side) to prevent movement of basket assembly during construction.
   - Assemblies placed on pavement or PCC base shall be anchored with devices approved by the engineer. For mini baskets, a minimum of (4) anchor pins evenly spaced (4" per side) are required.

4. **Anchoring Requirements**:
   - Per lane width, a minimum of (4) anchor pins evenly spaced (4" per side) to prevent movement of basket assembly during construction.
   - Assemblies placed on pavement or PCC base shall be anchored with devices approved by the engineer. For mini baskets, a minimum of (4) anchor pins evenly spaced (4" per side) are required.

5. **Tolerances**:
   - ±1/4"/linear foot unless otherwise specified.
   - Baskets shall be manufactured so that the dowels are horizontal and parallel from each other and perpendicular to the basket ±1/4"/linear foot.
   - On center should be ±1/2".
   - Dowels should be placed at mid-depth of slab ±1/2" or as otherwise specified.
ELEVATION OF EXPANSION JOINT DOWEL ASSEMBLY

NOTES:

1. DOWEL BARS:
   - DOWELS ARE TO BE BILLET STEEL BARS PER AASHTO M31 (ASTM GR 40 OR GR 60). SEE STANDARD PLAN 5-257.221 FOR DOWEL BAR DIAMETERS.
   - DOWELS SHALL BE COATED WITH EPOXY COATING IN ACCORDANCE WITH AASHTO M254 AND THE CUT ENDS ARE NOT REQUIRED TO BE COATED. COATING THICKNESS SHALL BE T-12 MIL.
   - DOWELS ARE TO BE CUT WITH STRAIGHT SURFACE AND DEBURRED.

2. DOWEL BAR ASSEMBLY:
   - SIDE RAILS USED SHALL BE 1/16 GA (0.306" DIAMETER) MINIMUM.
   - LOOPS USED SHALL BE 3 GA (0.243" DIAMETER) MINIMUM.
   - E-40 OR U-40 SHAPES ARE TO BE INSTALLED ON THE INSIDE OR OUTSIDE OF SUBFRAME.
   - ALL WIRE INTERSECTIONS ARE TO BE WELDED.

8. ANCHOR PIN DETAILS:
   - PEW DOWEL 1/2" MIN.
   - 12" MIN.
   - ANCHOR PIN DIAMETER 0.306" DIAMETER

9. OPTIONAL LEG SHAPES:

10. PERSPECTIVE OF EXPANSION JOINT DOWEL ASSEMBLY

ANCHORING REQUIREMENTS:
   - PER LANE WIDTH A MINIMUM OF 81 ANCHOR PINS EVENLY SPACED 6" PER SIDE TO PREVENT MOVEMENT OF BASKET ASSEMBLY DURING CONSTRUCTION. ASSEMBLIES PLACED ON PAVEMENT OR PCC BASE SHALL BE ANCHORED WITH DEVICES APPROVED BY THE ENGINEER.

TOLERANCES:
   - ±1/4" / LINEAR FOOT UNLESS OTHERWISE SPECIFIED.
   - BASKETS SHALL BE MANUFACTURED SO THAT THE DOWELS ARE HORIZONTAL AND PARALLEL FROM EACH OTHER AND PERPENDICULAR TO THE BASKET ±1/8" / LINEAR FOOT.
   - ON CENTER SHOULD BE ±1/2".
   - DOWELS SHOULD BE PLACED AT MID DEPTH OF SLAB ±1/2" OR AS OTHERWISE SPECIFIED.

PLACE METAL INSTALLATION SHIELDS FOR EXPANSION JOINTS PARALLEL TO THE PAVEMENT SURFACE AND THE PAVEMENT CENTERLINE WITHIN A TOLERANCE OF 1/4" WITHIN THE LENGTH OF THE BAR.

SPACE FROM END OF DOWEL BAR TO END OF SLEEVE TO BE EQUAL TO EXPANSION JOINT WIDTH 0" MINIMUM.

APPROVED APRIL 14, 2010

STATE OF MINNESOTA
DEPARTMENT OF TRANSPORTATION
TYPICAL DOWEL BAR ASSEMBLY
EXPANSION JOINT

SPECIFICATION REFERENCE 2301
STANDARD PLATE NO. 1103K
2 OF 2
CONSTRUCTION HEADER JOINTS

NOTES:

ALL REBARS ARE IN METRIC DESIGNATIONS

ALL REINFORCEMENT BARS SHALL BE EPOXY COATED AND COMPLY WITH SPEC. 3301.

IN AREAS WHERE THE ENGINEER DETERMINES IT IS NOT FEASIBLE TO FURNISH AND INSTALL A DOWEL SPLICER BAR, A BASKET ASSEMBLY, THE TRANSVERSE CONSTRUCTION HEADER JOINTS SHALL BE FORMED BY INSTALLING A HEADER SHAPED TO CONFORM TO THE PAVEMENT CROSS-SECTIONS AND SLOTTED OR DRILLED FOR THE BARS.

1. NO. 22 TIE BARS 5' LONG, SPACED 1' 6" C. TO. C. MAX.

2. SEE DOWEL SPLICER BAR, DOWEL INSERT, AND STAGES OF CONSTRUCTION DETAILS.

3. HEADER SHAPED TO PAVEMENT CROSS-SECTION AND SLOTTED OR DRILLED FOR TIE BARS, REMOVE HEADER AND COMPLETE REMAINDER OF HEADER PANEL WHEN PAVING OPERATIONS ARE RESUMED. SEE DETAIL OF COMPLETED JOINT BELOW.

4. TOLERANCES:

-41/4"/LINEAR FOOT UNLESS OTHERWISE SPECIFIED.
-BASKETS SHALL BE MANUFACTURED SO THAT THE DOWELS ARE HORIZONTAL AND PARALLEL, FROM EACH OTHER AND PERPENDICULAR TO THE BASKET 41/4"/LINEAR FOOT.
-ON CENTER SHOULD BE 41/2".
-DOWELS SHOULD BE PLACED AT MID DEPTH OF SLAB 41/2" OR AS OTHERWISE SPECIFIED.

5. ANCHORING REQUIREMENTS:

-PER LANE WIDTH, A MINIMUM OF 18 ANCHOR PINS EVENLY SPACED (4 PER SIDE) TO PREVENT MOVEMENT OF BASKET ASSEMBLY DURING CONSTRUCTION.
-ASSEMBLIES PLACED ON PAVEMENT OR PCC BASE SHALL BE ANCHORED WITH DEVICES APPROVED BY THE ENGINEER. FOR MINI BASKETS, A MINIMUM OF 6 ANCHOR PINS EVENLY SPACED (2 PER SIDE) ARE REQUIRED.

6. THE JOINT SHALL BE SAWED AND SEALED SIMILAR TO THE OTHER CONSTRUCTION JOINTS.

---

DOWEL SPLICER BAR

DETAIL A

---

STAGES OF CONSTRUCTION

---

APPROVED APRIL 14, 2010

STATE OF MINNESOTA
DEPARTMENT OF TRANSPORTATION
CONCRETE HEADER JOINTS
CONSTRUCTION HEADERS

SPECIFICATION REFERENCE: 2301

STANDARD PLATE NO.: 1150R

1 OF 2
NOTES:

1. All reinforcement bars shall be Epoxy coated and comply with Spec. 3301.
2. No. 22 tie bars 5' long, spaced 1'6" c. to c. max.
3. When terminal header is to remain in place for 3 years or more, the permanent installation should be used. When the terminal header is to remain in place for less than 3 years, the temporary installation should be used.
4. Drill and grout with a Mn/DOT approved Epoxy or non-shrink grout. No. 22 bars 18" long, spaced 12" on center.
5. When future concrete is being constructed adjacent to the permanent header, construct same type of permanent header. Contact the concrete engineering unit if other headers are present.

Approved: April 14, 2010

State Design Engineer
CONCRETE PANELS DO NOT NEED SUPPLEMENTAL REINFORCEMENT OVER EXISTING UNDISTURBED CULVERTS, STORM SEwers AND WATER MAINS. THIS INCLUDES CONCRETE OVERLAYS UNLESS THE INPLACE PAVEMENT EXHIBITS DIFFERENTIAL SETTLEMENT ISSUES, THEN REINFORCE THE NEW CONCRETE PAVEMENT.

DURING CONSTRUCTION, IF THE ENGINEER DETERMINES AN INCREASED POTENTIAL FOR DIFFERENTIAL SETTLEMENT, THEN REINFORCE THE NEW CONCRETE PAVEMENT.

ALL REINFORCEMENT BARS SHALL BE EPOXY COATED AND COMPLY WITH SPEC. 3301.

CONTACT THE MN/DOT CONCRETE ENGINEERING UNIT FOR USE IN ANY OTHER SITUATIONS.

1 TIE BARS (FOR LIT JOINT) NOT REQUIRED IF TRANSVERSE BARS ARE CONTINUOUS THROUGH LONGITUDINAL JOINT.

2 TIE ALL PERIPHERAL INTERSECTIONS AND A SUFFICIENT NUMBER OF INTERMEDIATE INTERSECTIONS TO PREVENT SHIFTING.

ALL REBARS ARE IN METRIC DESIGNATIONS.
The Contractor shall fill the joints with an approved sealing compound prior to allowing any traffic on the roadway. The sealant type is specified in plans. All approved joint sealants are available on the Office of Materials website at www.mrr.dot.state.mn.us/pavements/concrete/products.asp.

Assure that the joints are cleaned of all debris and dust and completely dry just prior to the sealing operation otherwise it is possible the joints could have adhesion failure. The other type of failure that may occur is cohesion failure that is generally contributed to the wrong type of sealant, a poor shape factor, or the joint spacing frequency. See Figure A 5-694.665 for an example of these types of failures.

![Diagram of Cohesion and Adhesion Failure](image)

**Figure A 5-694.665**
A. Hot Pour Sealants
The Contractor shall handle the joint material as prescribed by the Manufacturer and also as required by the Specifications. All material is pre-approved by the MnDOT Office of Materials. Call 651-779-5617 if a material needs verification. Fill longitudinal joints to a slightly under-filled to flush level. An operating tolerance from level to 3 mm (1/8 in.) under the pavement surface is allowed. If any areas of the sealant have settled more than 3 mm (1/8 in.) below the surface of the pavement during the first 24 to 48 hours, the Contractor shall refill to the previously mentioned tolerance.

Rubber asphalt is a material that requires good temperature control during the heating cycle. A slight increase in temperature above the normal operating temperature can change the characteristics of the material and render it unfit for use. For this reason, the Inspector must make sure that the material is heated at the temperature recommended by the Manufacturer. See Specification 3719, 3723, or 3725.

B. Silicone Sealants
Confirm that the joint is completely clean and dry and also free of all incompressibles prior to sealing. An oversized backer rod is placed before silicone is added to the joint. See Figure B 5-694.665 for an example of backer rod installation. Some of the sealants are tooled into the joint with an approved device to ensure the correct shape factor and performance; other silicones are self-leveling. All of the sealants are installed according to Manufacturer's recommendations unless modified by the MnDOT Concrete Engineering Unit. The Contractor shall clean excess sealant from the upper face of the joint and salvage and reuse if in an acceptable condition. See Specification 3722 in the Special Provisions for silicone joint sealant requirements. See Figure C 5-694.665 for an example of sealing contraction joints with silicone.
C. Preformed Joint Sealant
Preformed sealants are commonly used in Minnesota. They are used in areas where there are problems with other sealants bonding to the sawed faces of the pavement joint and in areas where high performance concrete is specified. If
these sealants are specified, they are installed according to the Manufacturer's recommendations unless modified by the MnDOT Concrete Engineering Unit. See Specification 3721. See Figure D 5-694.665 for installation of preformed compression joint sealants.

Figure D 5-694.665
DATE: November 24, 2015

TO: Materials, Construction, Design and State Aid Engineers

FROM: Maria Masten, MnDOT Concrete Engineer

PHONE: 651-366-5572

SUBJECT: MnDOT Concrete Joint Sealing Guidelines

Attached are MnDOT Concrete Engineer’s recommendations for determining whether to seal the concrete pavements joints.

MnDOT’s standard practice is not to seal any contraction or longitudinal joints on concrete pavements, except for the following:

1. All roadways where speed limit is 45 mph or less, excluding ramps and loops
2. Concrete Overlays “Whitetopping” < 6” thick
3. Resealing CPR projects when roadway speed limits are ≤ 45 mph.

All expansion (E) joints require sealing in accordance with Standard Plan 5-297.221 (Sheet 1 of 2). If it is determined that sealing contraction (C) and longitudinal (L) joints is desired, the requirement is a single 1/8” wide saw cut sealed with MnDOT Spec. 3725 hot pour designated as a C2H or C2H-D joint.

Note to Designers:

Until the Standard Plans have been updated to reflect the new standards, please modify the following Standard Plans 5-297.209, 5-297.210, 5-297.217 (Sheets 1 and 2), and 5-291.219 in accordance with the following table:

<table>
<thead>
<tr>
<th>All joints designated as:</th>
<th>Shall now be designated as:</th>
</tr>
</thead>
<tbody>
<tr>
<td>C2H</td>
<td>C1U</td>
</tr>
<tr>
<td>C2H-D</td>
<td>C1U-D</td>
</tr>
<tr>
<td>L1H</td>
<td>L1U</td>
</tr>
<tr>
<td>L1TH</td>
<td>L1TU</td>
</tr>
<tr>
<td>L2TH</td>
<td>L2TU</td>
</tr>
<tr>
<td>L2KTH</td>
<td>L2KTU</td>
</tr>
<tr>
<td>L3H</td>
<td>L3U</td>
</tr>
</tbody>
</table>
MnDOT Concrete Joint Sealing Guidelines

The MnDOT Pavement Design Manual, Chapter 5, Table 530.2 has been updated to reflect the current guidance.

<table>
<thead>
<tr>
<th>Type of Construction *</th>
<th>Speed Limit</th>
<th>Base Material</th>
<th>Joint Reference</th>
</tr>
</thead>
<tbody>
<tr>
<td>All Roadways, excluding ramps and loops</td>
<td>≤ 45 mph</td>
<td>All</td>
<td>C2H C2H-D</td>
</tr>
<tr>
<td>PCC Overlay on Existing HMA (Whitetopping) &lt; 6” thick</td>
<td>&gt; 45 mph</td>
<td>Existing HMA</td>
<td></td>
</tr>
<tr>
<td>New Construction</td>
<td>&gt; 45 mph</td>
<td>All</td>
<td>C1U C1U-D</td>
</tr>
<tr>
<td>Unbonded PCC Overlay of Existing PCC (UBOL)</td>
<td>&gt; 45 mph</td>
<td>All</td>
<td></td>
</tr>
<tr>
<td>PCC Overlay on Existing HMA (Whitetopping) ≥ 6” thick</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Ramps and Loops</td>
<td>All</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

* For future concrete pavement rehabilitation (CPR) projects, follow the same recommended practices as original construction. Contact the MnDOT Concrete Unit with questions.

Feel free to contact me with any questions or concerns regarding the updated guidance, or to discuss suitability of sealing joints on a specific project.