

- 1) Revocation of Plant Certification.
- 2) Revocation of Technician Certification for individual(s) involved.
- 3) Loss of bidding privileges as determined by the State Construction Engineer.
- 4) Criminal prosecution for fraud as determined by the Attorney General.

Decertification actions are determined by the Mn/DOT Concrete Engineer.

**S-45**                    **CONCRETE CURING**

Mn/DOT specifications: 2301.3M2, 2401.3G, 2404.3C3, 2521.3C3b, 2531.3G2 are hereby modified to include the following provision:

The Contractor shall place all types of membrane cure material homogeneously to provide a uniform solid white opaque coverage on all exposed concrete surfaces (equal to a white sheet of typing paper). The membrane cure shall be placed within ½ hour of concrete placement or once the bleed water has disappeared unless otherwise directed by the Engineer. Failure to comply with these provisions will result in a price reduction for the concrete item involved in accordance with Mn/DOT 1503.

**Exception: Specific Mn/DOT approved alpha methyl styrene curing membranes may have a base color (i.e. yellow) that cannot comply with the above requirement. In this case, the color shall be of a uniform solid opaque consistency meeting the intent of the above requirement.**

**S-46**                    **(2301) CONCRETE PAVEMENT**

Concrete Pavement shall be constructed in accordance with the provisions of Mn/DOT 2301 and as modified below:

S-46.1                  Concrete Incentive/Disincentives shall not apply.

S-46.2                  Mix types for the concrete mixtures on this Project as shown in Table 46.1A:

**TABLE 46.1A – Concrete Mix Types**

<b>Concrete Mixtures</b>	<b>Location</b>	<b>Recycled PCC Coarse Aggregate Percent</b>
Low Cost Mix	Lower Concrete Layer Cells 72 & Demonstration Slab 24 foot paving width	0
Recycled Mix	Lower Concrete Layer Cells 70-71 & Demonstration Slab 24 foot paving width	50% RCA
Exposed Aggregate Concrete	Surface Concrete Layer Concrete Overlay Cells 71-72 & Demonstration Slab 24 foot paving width	0

S-46.3                  **CONTRACTOR CONCRETE MIX DESIGN**

The Contractor shall develop the mixture proportions for the Low-Cost Mix, the Recycled Mix, and the Exposed Aggregate Concrete (EAC) mix.

The Contractor shall submit all mix designs using the Mn/DOT Contractor Concrete Paving Mix Design Submittal package available from the Mn/DOT Concrete Engineering Unit's website.

The Contractor shall design the concrete paving mixture based on a volume of 1.000 m<sup>3</sup> [cubic yard] according to industry standard practice. Grade A paving concrete shall be designed and placed at a water cementitious ratio not greater than 0.40.

The concrete pavement demonstration slab shall not commence until 15 days after preliminary approval of the Contractor's concrete pavement mix design and job mix formula (JMF) by the Concrete Engineer. Final approval of the mixture is based on satisfactory field placement.

Prior to the start of paving the Contractor shall submit to an AMRL certified testing laboratory enough cement, supplementary cementitious material (fly ash, GGBFS, silica fume, etc.), fine aggregate, coarse aggregate, chemical admixtures for each trial mixture. Sufficient materials shall be submitted for multiple trial mixes to optimize the mix design proportions.

The Contractor is required to contact the Engineer a minimum of 2 days prior to any mixing so that a Mn/DOT representative can observe the process. This same 2-day notification is required prior to any physical testing on hardened concrete samples. Additionally, any hardened concrete test specimens must be retained for a minimum of 90 days and be made available for Mn/DOT to examine.

The following tests shall be conducted at the AMRL certified laboratory on each of the concrete mix trials:

- Slump and air content (at <5, 15, 30 minutes after the completion of mixing)
- Flexural Strength (3<sup>rd</sup> point) at 1, 3, 7, 28 and 56 days (sets of 2)

#### Job Mix Formula

A Formula (JMF) containing proportions of materials and individual gradations of each material plus a composite gradation according to the requirements of Section S-62.5 (COARSE AGGREGATE FOR PORTLAND CEMENT CONCRETE) of these Special Provisions.

#### Air Content

The air content for all paving grade concrete shall be 7.0 percent plus or minus 1.5 percent. The air content shall be measured after placement on the grade but before consolidation. Mn/DOT 2461.4A4b shall be adjusted accordingly based on the 7.0 percent target value.

#### S-46.4 (PCC/PCC) COMPOSITE PAVEMENT OPERATION

1. Place lower concrete layer
2. Place top concrete layer (15-90 minutes between first and second paver determined by experience from the demo slab). This material can be supplied by pumping or with the use of a conveyer belt from the driving lane or low volume road.
3. Finish smooth
4. Spray on a curing/retarder compound
5. Brush concrete surface with rotating wire brush—2 passes (after 5 to 24 hours determined by experience from the demo slab) to create an Exposed Aggregate Concrete (EAC) surface texture.
6. Spray curing/retarder compound on exposed aggregate surface
7. Saw and seal joints

#### S-46.5 (HMA/PCC) COMPOSITE PAVEMENT OPERATION

1. Place lower concrete layer
2. Finish smooth
3. Texture surface (longitudinal tined)
4. Spray on a curing compound

5. Saw concrete joints
6. Pave HMA surface after 7 days or a concrete compressive strength of 550psi. Tack coat will be placed on the concrete before the HMA paving.
7. Saw and seal HMA over the PCC transverse joints leaving 100 feet unsealed.

S-46.6 DEMONSTRATION SLAB

A 200 foot Demonstration Slab similar to Cell 71 (100 foot) and Cell 72 (100 foot) shall be constructed by the Contractor in MnROAD's stockpile area over a granular base. The purpose of the Demonstration Slab is to replicate the actual construction process, equipment, materials, placement methods, and haul times that will be used on the MnROAD mainline I-94 construction. The demonstration slab shall be installed prior to final concrete placement in cells 70, 71 & 72, at a time determined by the Contractor. The Contractor must also correct any construction related issues learned from the demonstration slab before the mainline test cells are built. The Contractor will only be paid for one mobilization.

S-46.7 LOWER LAYER CONCRETE FOR Cells 70, 71, & 72

The lower layer concrete surface of cell 70 (HMA Overlay Cells) shall require a curing compound and shall be textured with longitudinal tining and sawn according to the Plans. These cells shall cure for 7 days or until the flexural strength of the concrete samples reach 550 psi, before the HMA overlay is placed.

The lower concrete layer of cells 71 & 72 (PCC Overlay Cells) will neither require curing, texturing, or sawing before the second PCC overlay layer is placed.

The tie bars and dowel bars (with the use of dowel baskets) shall be placed in the lower layer of the concrete at the mid-depth of the finished depth of the concrete layer(s). Cell 70 (6 inch PCC) dowels shall be placed at 3 inch height and cells 71-72 (9 inch PCC both layers) dowels shall be placed at 4.5 inch height. The dowel bars shall be sprayed with a Mn/DOT approved form release agent.

S-46.8 UPPER LAYER CONCRETE FOR CELLS 71 & 72

The top concrete layer of cells 71 and 72 shall be finished smooth and sprayed with a retarder/curing compound that Mn/DOT will provide to the Contractor. This retarder/curing compound shall be applied with an airless sprayer to avoid streaking or overlap. Other spray equipment may be demonstrated on the demonstration slab and approved by the Engineer. If this retarder/curing compound is not available at the time of construction, the top layer of the PCC/PCC pavement shall be sprayed with a Mn/DOT Approved retarder and within 20 minutes, covered in accordance with Mn/DOT 2301.3M1. In this case, the retarder can be applied by conventional methods.

Brushing to create the EAC (Exposed Aggregate Concrete) surface will occur at a mutually agreed upon time between the Contractor and Engineer. This will be decided following experience gained from of the Demonstration Slab and considering the environmental conditions at the time of construction. The target uniform texture depth is 1.0 mm but can vary between the depths of 0.8-1.2 mm as determined by ASTM E2157 (texture meter) or ASTM E965 (sand patch). Texture depths shall be achieved by a front-end mounted, rotating wire brush (plastic will not be allowed) to be approved by the Engineer. A minimum of two (2) passes shall be made with the wire brush. The time of brushing shall be between 5 and 24 hours after the concrete overlay is placed

Once the EAC surface has been brushed, a Mn/DOT Approved curing compound shall be immediately applied and sawing shall be completed.

S-46.9 Paragraph 2 of Mn/DOT 2301.3B shall be deleted and replaced with the following:

If the slipform method of construction is used, the base course from out to out of the paver treads shall be accurately fine graded to the required elevation by an approved fine grading machine mounted on crawler treads. Base construction shall be completed and the required subgrade density obtained to a width at least 1.3 m (3 feet) beyond the outside edges of the pavement including any integrant curb before the fine grading is performed. The aggregate base shall have

sufficient stability and firmness to support the fine grading equipment and slipform paver without any distortion of the alignment or grade line.

S-46.10 Paragraph 1 of Mn/DOT 2301.3H1c shall be deleted and replaced with the following:

The frequency of the vibrators shall be established based on the workability of the concrete and experience from the demonstration slab. Electronic, internal, T-shaped, poker vibrators shall be used (either of the surface or internal vibration type) at a recommended operating frequency of 150 to 250 Hz. Other types of vibrating equipment may be approved by the Engineer. The vibrator impulses shall be delivered directly to the concrete and the intensity of vibration shall be sufficient to consolidate the concrete mass thoroughly and uniformly throughout its entire depth and width. The Contractor will be allowed to increase the speed of the vibrators with the permission of the Engineer.

S-46.11 SLIPFORM CONSTRUCTION

Two slipform pavers shall be used in sequence for the PCC/PCC composite pavement construction. The slipform paver shall operate in such a way that the concrete mixture is distributed and consolidated evenly, with the use of two stringlines (one on each side of the two paving lanes). The Contractor may propose and demonstrate other placement methods with the approval of the Engineer.

The second paver shall follow the first paver by approximately 15 to 90 minutes. The actual timing will be made by a mutual decision between the Contractor and the Engineer and shall be determined by environmental conditions and the properties of the bottom concrete layer and experience from the demo slab.

S-46.12 Mn/DOT 2301.3J sentence 1 of paragraph 2 is hereby deleted and the following substituted therefore:

Consolidation of all concrete layers in cells 70, 71, & 72 shall be accomplished with either an electronic internal T-shaped vibrator or a longitudinally crooked poker vibrator, as stated in Section S-46.10 (CONCRETE PAVEMENT) of these Special Provisions. Frequencies of these vibrators shall be adjusted to the workability of the concrete and speed of the paving machines.

S-46.13 CONCRETE PAVEMENT JOINTS

Cell 70 (HMA over PCC) will have unsealed single saw cuts for both transverse and longitudinal joints. Both transverse and longitudinal joints shall be cut at depth of T/3, where T indicates the depth of the concrete layer(s). Joints of Cell 70 (6 inch PCC) shall be cut to 2 inch depth.

Cells 71 & 72 shall contain sealed transverse joints with Preformed Elastomeric Compression Joint Seals meeting Mn/DOT 3721. See Section S-66 (PREFORMED ELASTOMERIC COMPRESSION JOINT SEALS FOR CONCRETE) of these Special Provisions. All longitudinal sawn joints in concrete pavement shall be sealed with hot pour sealant. Both transverse and longitudinal joints shall be cut at depth of T/3, where T indicates the depth of the concrete layer(s). Joints of Cells 71 & 72 (9 inch PCC) shall be cut to 3 inch depth.

Concrete joints in cells 71 & 72 shall be cut following surface texturing at a mutually agreed upon time between the Contractor and the Engineer. This will be decided following construction of the demonstration slab and considering the environmental conditions at the time of construction.

S-46.14 Mn/DOT 2301.3P1 is hereby deleted and the following substituted therefore:

<b>2301.3P1</b>	<b>Workmanship and Quality</b>
2301.3P1a	Surface Requirements
2301.3P1a (1)	Defective Pavement

The Engineer will only accept pavement that meets the specified requirements within permissible tolerances for payment at the Contract bid prices. Pavement that fails to meet the minimum requirements when tested in the prescribed manner is considered defective. Defective pavement is subject to the provisions made herein for correction or adjusted payment. In addition, the concrete incorporated in the work is subject to 2461.

The Engineer will determine the limits of each individual defective pavement area and, when such areas are subject to price adjustment, the area is computed to the nearest whole square meter [square yard], except that areas of less than 1 m<sup>2</sup> [square yard] are considered 1 m<sup>2</sup> [square yard]. The condition of each individual defective area of pavement is assessed based on the greatest deficiency within that area.

2301.3P1a (2) Random or Uncontrolled Cracking

If any random or uncontrolled crack occurs in concrete pavement, the Engineer may require replacement of the pavement or portions thereof or require repairs and/or may require a reduced payment. If the Engineer approves repair of the pavement, the Contractor shall repair the pavement using dowel bar load transfer techniques listed in the latest Department's Concrete Pavement Rehabilitation Standards/Details. The Contractor shall submit to the Engineer for approval, the specific standard technique intended for repair. After approval by the Engineer, the Contractor shall perform replacement or repair work at no expense to the Department. The Contractor shall replace failed repairs at no expense to the Department. Acceptance of the repairs shall comply with the acceptance procedure for the pavement portion of the Project.

S-46.15 Mn/DOT 2301.3P1b and 2301.3P1c is hereby deleted.

S-46.16 Table 2301-3 of Mn/DOT 2301.3P2 is hereby deleted and replaced with the following:

The Contractor shall strive to construct the pavement to the planned thickness. Thickness deficiency up to 0.5 inch will not be penalized. Excessive thickness or thickness deficiency more than 0.5 inch will require removal and replacement by the Contractor at no expense to the Agency.

S-46.17 ADDITIONAL MATERIAL SAMPLES

The Contractor shall supply extra material samples for research testing above and beyond the typical construction contractual testing requirements for all three mixtures used at MnROAD. This includes the low cost, recycled, and EAC concrete mixtures.

1. Fresh concrete sampled from the paver for beams and cylinder samples. (MnROAD will sample from the paver).
2. One (1) 5-gallon bucket of each type of cementitious materials used. (Contractor will sample for MnROAD).
3. 5 cubic yards of each aggregate type (coarse and fine materials) used (MnROAD will pickup from concrete plant during construction).

S-46.18 MEASUREMENT AND PAYMENT

(A) Payment for the concrete pavement construction will be made under Item 2301.502 (Concrete Pavement Standard Width \_\_\_") at the Contract bid price per square yard, which shall be payment in full for all costs incidental thereto.

(B) Measurement of the Structural Concrete for Exposed Aggregate Concrete Pavement (EAC) on Cells 71 and 72 as well as the demonstration slab will be made in accordance with the provisions of Mn/DOT 2301.4B. Payment for the Structural Concrete for constructing Exposed Aggregate Concrete Pavement (EAC) on Cells 71 and 72 as well as the demonstration slab will be made under Item 2301.607 (Structural Concrete (Special)) at the Contract bid price per cubic yard, which shall be payment in full for all costs incidental thereto.

(C) Measurement of the Structural Concrete for the Low Cost Mix Concrete Pavement on Cell 72 as well as the demonstration slab will be made in accordance with the provisions of Mn/DOT 2301.4B. Payment for the Structural Concrete for constructing the Low Cost Mix Concrete Pavement on Cell 72 as well as the demonstration slab will be made under Item 2301.607 (Structural Concrete (Special 1)) at the Contract bid price per cubic yard, which shall be payment in full for all costs incidental thereto.

(D) Measurement of the Structural Concrete for Recycled Mix Concrete Pavement on Cells 70 and 71 as well as the demonstration slab will be made in accordance with the provisions of Mn/DOT 2301.4B. Payment for the Structural Concrete for constructing Recycled Mix Concrete Pavement on Cells 70 and 71 as well as the demonstration slab will be made under Item 2301.607 (Structural Concrete (Special 2)) at the Contract bid price per cubic yard, which shall be payment in full for all costs incidental thereto.

**S-47                    (2301) 1.25" DOWEL BAR**

This work shall consist of furnishing 1.25" epoxy coated dowel bars in accordance with the provisions of Mn/DOT 2301 and the following:

Measurement will be made by the number of epoxy coated dowel bars that are furnished and installed in place as specified. Payment will be made under Item 2301.602 (1.25" Dowel Bars (Epoxy Coated)) at the Contract bid price per each, which shall be payment in full for all costs incidental thereto.

**S-48                    (2301) DRILL AND GROUT REINFORCEMENT BARS (EPOXY COATED)**

This work shall consist of drilling, grouting, and inserting No. 19 epoxy coated reinforcement bars in accordance with the provisions of Mn/DOT 2301 and the following:

Measurement will be made by the weight of epoxy coated reinforcement bars that are furnished, installed, and grouted in place as specified. Payment will be made under Item 2301.608 (Drill and Grout Reinforcement Bars (Epoxy Coated)) at the Contract bid price per kilogram [**pound**], which shall be payment in full for all costs incidental thereto.

**S-49                    (2331) BITUMINOUS JOINT SAWING AND SEALING**

This work shall consist of saw cutting, cleaning, drying and sealing transverse joints in new bituminous surfaces according to the Plans, the applicable Mn/DOT Standard Specifications, and the details in the Plan, as directed by the Engineer, and the following:

S-49.1                Bituminous transverse joints shall be cut with a single saw cut of ½ inch wide by 5/8 inch deep for the 3 inch Superpave Mixture. The sawn bituminous joints shall be located within 0.5 inch of the concrete joints. See Section S-46.13 (CONCRETE PAVEMENT) of these Special Provisions.

**S-49.2                MATERIALS**

(A)                Joint Sealant Material

The Contractor shall provide certification that the sealant meets the requirements of ASTM D-3405 with the following modifications:

Penetration at 25<sup>0</sup> C [77<sup>0</sup> F] .....90 - 150  
Bond at -11<sup>0</sup> C [-20<sup>0</sup> F], Std. Specimen, 3 cycles, 200% extension ..... Passes  
The sealant material shall weigh not less than 1.08 [9.00] nor more than 1.12 kg/liter [9.35 lbs/gallon].

The crack sealant compounds shall be packaged in sealed containers. Each container shall be clearly marked with the name of the manufacturer, the trade name of the sealant, the manufacturer's batch and lot number, the pouring temperature, and the safe heating temperature.

A copy of the manufacturer's recommendations concerning the heating and application of the joint sealant material shall be submitted to the Engineer before the commencement of the work. These recommendations shall be followed by the Contractor. The temperature of the sealer in the field application equipment shall never exceed the safe heating temperature recommended by the manufacturer. Any given quantity of material shall not be heated at the pouring temperature for more than six hours and shall never be reheated. Material shall not be placed if the material's temperature is below the manufacturer's recommended minimum application temperature.

Mixing of different manufacturers' brands or different types of sealants shall be prohibited.

(B) Bond Breaker Tape

Bond breaker tape shall consist of regular masking tape or other suitable bond breaker tape designed for use with hot pour sealants. The width of the tape may be equal to but not more than 3 mm [**1/8 inch**] narrower than the width of the saw cut.

**S-49.3 WEATHER LIMITATIONS**

Sealant materials may be placed during a period of rising temperature after the air temperature in the shade and away from artificial heat sources has reached 4.4° C [**40° F**] and indications are for a continued rise in temperature. During a period of falling temperature, placement of the sealant material shall be suspended until the above conditions are met.

Sealants shall not be placed when, in the opinion of the Engineer, the weather or roadbed conditions are unfavorable. Sawing and sealing shall be permitted only during daylight hours.

**S-49.4 EQUIPMENT REQUIREMENTS**

The melting kettle shall be double jacketed boiler type, equipped with both agitation and recirculation systems capable of melting and applying the sealant through a pressure-fed hose and wand. The melter shall be capable of starting at ambient temperature and bringing the sealing material to application temperature in one hour or less, while continuously agitating and recirculating the sealant. The melter shall be equipped with automatic thermostatic controls and temperature gages to monitor the sealant temperature in the applicator lines and temperature of heat transfer oil in the kettle jacket.

A self-propelled power saw capable of providing a straight cut of uniform depth and width shall be used. Diamond saw blades with either single or gang blade arrangement shall be used. The saw blade or blades shall be of such size and configuration such that the desired joint reservoir shape and deep saw cut are achieved in one pass of the saw. Two pass cutting will not be allowed. No spacers between blades shall be allowed unless the Contractor can show that the desired reservoir and saw cut can be obtained with them. Either wet or dry sawing will be permitted provided the above conditions are met.

The air compressor shall be capable of producing a continuous stream of clean, dry air through the nozzle at 690 kPa [**100 psi**] and 3.5 m<sup>3</sup>/minute [**125 cubic feet per minute (CFM)**] minimum. The compressed air unit shall be equipped with water and oil traps and must produce sufficient air volume and pressure to remove all debris from the sawed joint and all adjacent road surfaces in a safe manner such that the debris will not re-enter the joint prior to the sealing operation.

The heat lance shall operate with propane and compressed air in combination and be capable of achieving a temperature of heated air at the exit orifice of 982° C [**1,800° F**] and a discharge velocity of 914 m/sec. [**3,000 feet per second**].

**S-49.5 CONSTRUCTION DETAILS**

(A) General

The Contractor shall conduct the operation so that saw cutting of transverse joints, cleaning, and sealing are a continuous operation. Traffic shall not be allowed to knead together or damage the sawed joints. Sawed joints not sealed before traffic is allowed on the pavement shall be re-sawed, if necessary, when sawing and sealing operations resume at no additional cost to the State. Saw cutting, cleaning and sealing shall not be done within 48 hours of placement of the wear course.

(B) Saw cutting of Transverse Joints

The transverse saw cut joints shall be cut into mainline pavement directly above existing transverse joints in the mainline pavement, but shall terminate a distance of 300 mm [1 foot] shy of the shoulder pavement unless otherwise detailed on the Plans or directed by the Engineer. Existing joints shall be marked by the Contractor so that the joint can be located after the final bituminous course is completed. The Contractor's procedure for locating these transverse cracks shall be subject to approval of the Engineer.

(C) Cleaning Operation

Dry sawed joints shall be thoroughly cleaned with an air compressor meeting the requirements previously outlined. Cleaning shall continue until the joint is dry and all dirt, dust or deleterious matter is removed from the joint and adjacent pavement to the satisfaction of the Engineer.

Wet sawed joints and adjacent pavement shall be thoroughly cleaned with a water blast (345 kPa [50 psi] minimum) immediately after sawing to remove any sawing slurry, dirt or deleterious matter adhering to the joint walls or remaining in the joint cavity. The joints shall then be dried with an air compressor. Cleaning shall continue until the joint is dry and all dirt, dust or deleterious matter is removed to the satisfaction of the Engineer. If the air compressor produces dirt or other residue from the joint cavity, the Contractor may be required to re-clean the joint with a water blast.

Following cleaning, the sawed joints shall be dried and warmed with a hot air lance. The Contractor shall be careful not to burn the pavement surface. After the hot air lance has been used to warm and dry the joint, the backer tape shall be placed into the bottom of the joint reservoir. Under no circumstances shall more than two (2) minutes elapse between the time the hot air lance is used and the sealant is placed.

The Contractor shall be required to provide protective screening, subject to approval of the Engineer, if his cleaning operations could cause damage to or interference with traffic in adjacent lanes.

(D) Sealing Operation

The joints shall be sealed when the sealant material is at the pouring temperature recommended by the manufacturer. The Contractor shall fill the joint such that after cooling, the sealant is flush with the adjacent pavement along the edges and the center does not sag more than 3 mm [1/8 inch] below the pavement or shoulder surface. Care shall be taken in the sealing of the joints so that the joints are not overfilled and the final appearance shall present a neat fine line. The applicator wand shall be returned to the machine and the joint sealant material recirculated immediately upon completion of each joint sealing. The Engineer may require the Contractor to use a squeegee to force the sealant material into narrow joint shapes if in the opinion of the Engineer the sealant material is not flowing into the joint properly. Sand shall not be spread on the sealed joints to allow for opening to traffic. The sealant shall be tack free before opening to traffic. A given quantity of sealant material shall never be heated at the pouring temperature for more than six (6) hours and shall never be reheated.

(E) Acceptance Sampling

The Contractor shall record the temperature of the kettle and the temperature of the sealant once every hour during the actual working operations. This information is to be recorded on the forms provided by the Engineer. At the end of each days production, the completed forms shall be presented to the Engineer, and they shall be placed in a permanent file by the Engineer. The Engineer shall continuously review the sealant temperatures. Temperatures measured more than  $-12^{\circ}\text{C}$  [ $10^{\circ}\text{F}$ ] above the manufacturer's specified safe heating temperature shall result in the rejection of the material in use and the Contractor shall dispose of the overheated material, at his expense, in an acceptable manner.



Sealed joints shall be rejected if there is evidence of poor workmanship or obvious defects, such as, but not limited to the following:

- (a) Sawed joint not filled completely
- (b) Lack of bond to the sides of the joint
- (c) Excessive debris or moisture in the joint
- (d) Contamination of the sealant
- (e) Sawed joint not filled flush

Rejected sealed joints shall be repaired, the sealant removed and disposed of in an appropriate manner and the joints resealed as necessary, to the Engineer's satisfaction and at no further cost to the State.

**S-49.7 MEASUREMENT AND PAYMENT**

Measurement will be made by the length of joints sawed and sealed as specified. Payment will be made under separate items for each joint type at the Contract bid price per meter [**linear foot**], which shall include the cost of all labor, equipment and materials necessary to complete the work as specified.

<u>Item No.</u>	<u>Item</u>	<u>Unit</u>
2331.603	Sawed/Sealed Joint .....	meter [ <b>linear foot</b> ]

**S-50 (2357) BITUMINOUS TACK COAT**

The provisions of Mn/DOT 2357 are hereby deleted and replaced with the following:

**2357.1 DESCRIPTION**

This work shall consist of the application of bituminous material (emulsion or liquid asphalt) on a bituminous or concrete pavement prior to paving a new lift of Hot Mixed Asphalt.

**2357.2 MATERIALS**

**A Bituminous Material .....3151**

The bituminous material for tack coat will be limited to one of the following kinds of emulsified asphalt. However, the Engineer may authorize the use of medium cure cutback asphalt (MC-250) during the early and late construction season when it is anticipated the air temperature may drop below 32 degrees Fahrenheit.

Allowable grades are as follows:

Emulsified Asphalt

- Anionic..... SS-1, SS-1h
- Cationic..... CSS-1, CSS-1h

Cutback Asphalt

- Medium Cure Liquid Asphalt ..... MC-250

Only Certified Sources are allowed for use. Mn/DOT's Certified Source List is located at the following link: <http://www.dot.state.mn.us/products/index.html>.

**2357.3 CONSTRUCTION REQUIREMENTS**

**A Restrictions**

Tack coat operations shall be conducted in a manner that offers the least inconvenience to traffic, with movement in at least one direction permitted at all times without pickup or tracking of the bituminous material.