



Full Depth Reclamation Reference Guide

Appendix B – Special Provisions Example
(Source: City of Shoreview)

SPECIAL PROVISIONS TO THE MINNESOTA DEPARTMENT OF TRANSPORTATION STANDARD SPECIFICATIONS FOR CONSTRUCTION 2018 EDITION

The performance of the work, the material requirements, the basis of measurement and payment for the various portions of the work, shall be in accordance with the appropriate sections of the Minnesota Department of Transportation, “Standard Specifications for Construction”, 2018 Edition, except as altered by these Special Provisions.

2215 RECLAMATION

2215.2 MATERIALS

C.1 SFDR Design Parameters

The mix design for the project will be provided to the Contractor prior to the start of the project.

C.1.a Design Requirements

Meet the mix design parameters as listed in the provided mix design.

C.3 Bituminous Material

Provide the type and grade of bituminous material for mixture at the rate in the mix design.



2215.3 CONSTRUCTION REQUIREMENTS

A.1 Contractor Quality Control (QC) Testing

Supervisory personnel of the Contractor and crew and the testing laboratory shall meet a representative(s) of the Owner at a mutually agreed time prior to the start of the project to discuss methods of accomplishing all phases of the project. If needed, a representative of the asphalt emulsion supplier shall be present to discuss handling of emulsions and delivery issues.

The Contractor shall be responsible for quality control (QC) of the SFDR process and the completed reclaimed base. Quality control shall include the following activities, and the results of the QC reported daily in writing to the Engineer.

Asphalt Emulsion

A representative from the asphalt emulsion supplier will check the mixing and setting properties as needed and will make adjustments to the asphalt emulsion formulation if necessary. Changes shall comply with Table 2. The sampling frequency shall be in accordance with the Engineer's requirements and be established prior to the start of the project. The testing shall meet the requirements in Table 2.

TABLE 2.

Test		Minimum	Maximum
Residue from distillation, %	ASTM D244 ¹	63	
Oil distillate by distillation, %	ASTM D244 ¹		0.5
Sieve Test, %	ASTM D244 ¹		0.1

¹ Modified ASTM D244 procedure – distillation temperature of 177°C with a 20-minute hold. The ASTM D244 vacuum distillation procedure may be substituted once the maximum oil distillate is satisfied.

Add Rock

The spread rate of the add-rock shall be checked and conform to the quantity required by the mix design. Rates shall be checked by yield at a frequency to be decided by the Engineer.



Maximum Material Size

Samples of the reclaimed material shall be obtained before beginning compaction.

Sample size shall be 40 pounds. Sampling frequency shall be at the Engineer's discretion.

Moisture Content

Prior to emulsion addition, moisture content shall be checked by microwave oven according to ASTM D 4643 or equivalent procedure. Other suitable methods are acceptable, such as a nuclear gauge, direct heating or infrared. Minimum sample size recommended is 700 grams for the microwave procedure after screening through a ¾ inch sieve. Check the moisture content on the same day that emulsion will be added. If rain has occurred after testing and before emulsion addition, re-check the moisture content. The sample shall be to the depth of reclamation by any suitable method; make sure the sides of the sample hole are perpendicular to the road surface. Keep samples sealed until they are ready for testing. The moisture content shall be checked on at least each of three reclaimer passes on the first day of SFDR. Moisture content sampling frequency shall be at the Engineer's discretion after the first day.

Emulsion Content

The percentage of emulsion added shall be checked by determining the amount used by meter readings or truck weight tickets and by estimating the quantity of road reclaimed – depth, width, length, and estimated in-place density by Proctor density (mix design or field check) or nuclear density. On the first day of SFDR, emulsion content shall be determined at a minimum on the first emulsion transport. Thereafter, emulsion content shall be determined at a sampling frequency at the Engineer's discretion.

Depth Control

The reclaiming depth during all operations shall be monitored regularly to determine compliance with the plans.

Compaction

There are two options for reference density – a test strip or Modified Proctor density. It is recommended that moisture and emulsion contents be checked and established before determination of reference density.

Test Strip Option -If the sand cone method is used for test strip reference density, then it shall be used for acceptance testing. If the nuclear density gauge is for test strip reference density, then it shall be used for acceptance testing. The test strip shall be at least 1000 feet long. The final roller pattern shall result in the maximum achievable density with the rollers specified. This roller pattern shall be used throughout the rest of the project. However, any



significant changes with the road, such as materials, moisture content, or emulsion content, shall require a new test strip for roller pattern determination and new reference density determination. A reference density shall be determined on the test strip at a recommended three to five locations after finish rolling and measured by sand cone (ASTM D 1556) or nuclear gauge (ASTM D 2950, direct transmission). If measured, all subsequent material shall be compacted to a minimum of 97 percent reference density of the test strip average reference density at a sampling frequency to be determined by the Engineer. If accurate dry (nuclear) density results cannot be obtained, then wet density shall be the reference. Correction to dry density shall be by direct moisture measurement, as described in Section 5.4.

Modified Proctor Density Option - Refer to ASTM D 1557, Method C or equivalent; the 6-inch diameter mold is required. Only the nuclear gauge shall be used for acceptance testing when Modified Proctor is used as the reference density, and it shall be measured at the same location as the nuclear gauge reading. Samples shall be obtained to the full depth of reclamation before rolling and stored in a sealed container for no longer than one hour before Proctor compaction. Material shall be compacted to a minimum of 97 percent reference density of the Modified Proctor average reference density. Moisture contents on the material shall be obtained in accordance with Section 5.4 for reference. The mold shall be placed on a firm surface during compaction. If accurate dry (nuclear) density results cannot be obtained, then wet density shall be the reference. Correction to dry density shall be by direct moisture measurement, as described in Section 5.4.

C Construction Requirements – Stabilized Full Depth Reclamation (SFDR)

C.1 General SFDR Requirements

The existing road shall be reclaimed to the depth on the plans, and during this first pass, water and add rock shall be added, if needed; pre-shaping can also be accomplished at this time. After completion of the first pass, the road shall be shaped with a motor grader and compacted with a steel roller to provide better depth control. A second pass of a reclaimer shall be completed with the required amount of asphalt emulsion added.

If the Engineer determines a third pass of the reclaimer significantly improves dispersion of the emulsion, the third pass shall be required for the entire project.

C.6 Mixing/Injecting

Moisture content before emulsion mixing/injecting shall be within 1% from the mix design recommendation. Aerate if too wet and add water if too dry.



2215.4 - METHOD OF MEASUREMENT

C Method of Measurement – SFDR

Bituminous Stabilized Full Depth Reclamation (SFDR) shall be a plan quantity item (P).

Bituminous Material for Mixture shall be measured by the gallon.

2215.5 BASIS OF PAYMENT

The payment for SFDR is per the square yard regardless of the depth of reclamation.

If it is determined by the Engineer that a third pass by the reclaimer is required, the cost for the additional pass shall be incidental to the Stabilized Full Depth Reclamation pay item.

The calculated quantity of Bituminous Material for Mixture was based on the emulsion content specified in the mix design.

2331.603 - JOINT ADHESIVE

Apply the joint adhesive to the face of the longitudinal construction joint.

1. Adjacent hot mix asphalt pavements (trafficked lanes and shoulders)
2. Hot mix asphalt pavement and adjacent concrete pavement (or curb & gutter)

MATERIALS

Provide joint adhesive meeting the requirements as specified in Table 1.

TABLE 1. JOINT ADHESIVE SPECIFICATIONS

<i>TEST</i>	<i>SPECIFICATION</i>
Brookfield Viscosity, 204 °C [400 °F] ASTM D 3236	4,000-10,000 cp
Cone Penetration, 25 °C [77 °F] ASTM D 5329	60-100 mm
Flow, 60 °C [140 °F] D 5329	ASTM 5 mm maximum
Resilience, 25 °C [77 °F] ASTM D 5329	30% minimum
Ductility, 25 °C [77 °F] ASTM D 113	30 cm minimum



Ductility, 4 °C [39.2 °F] ASTM D 113	30 cm minimum
Tensile Adhesion, 25 °C [77 °F] ASTM D 5329	500% minimum
Softening Point ASTM D 36	77 °C [170 °F] min.
Asphalt Compatibility ASTM D 5329	Pass

CONSTRUCTION REQUIREMENTS

Equipment Requirements

Use a jacketed double boiler type melting unit, with both agitation and recirculation systems. Provide a pressure feed wand application system.

Material Handling

Submit a copy of the manufacturer's recommendations for heating and re-heating material and applying the joint adhesive material.

Do not remove the joint adhesive from the package until immediately before it is placed in the melter. Joint adhesive boxes must be clearly marked with the name of the manufacturer, the trade name of the adhesive, the manufacturer's batch and lot number, the application/pour temperature, and the safe heating temperature. Feed additional material into the melter at a rate equal to the rate of material used.

Verify the pouring temperature of the joint adhesive at least once per hour at the point of discharge. Stop production if the adhesive falls below the recommended application /pour temperature. When the temperature of the adhesive exceeds the maximum safe heating temperature, stop production, empty the melter, and dispose of that adhesive in an environmentally safe method. No payment will be made for this material or its disposal.

Do not blend or mix different manufacturer's brands or different types of adhesives.

Joint Adhesive Application

The face of the longitudinal joint must be clean and dry before the adhesive is applied. Apply the joint adhesive material over the entire face of HMA pavement where an adjacent HMA pavement will be constructed. The joint adhesive can also be applied to the entire face of concrete pavement where an adjacent HMA shoulder pavement will be constructed. Recommended band thickness is approximately 3 mm [1/8"]. The use of an application shoe



attached to the end of application wand is recommended. Do not overlap the joint by greater than 12.5 mm [$\frac{1}{2}$ "] at the top of the joint or 50 mm [2"] at the bottom of the joint. Apply the joint adhesive immediately in front of the paving operation. If the adhesive is tracked by construction vehicles, repair the damaged areas and restrict traffic for driving on the adhesive.

Quality Control

Acceptance of the joint adhesive material is based on the certification by the manufacturer that the sealant meets the requirements listed in Table 1. Field sampling shall be used to verify that the delivered joint adhesive meets the requirements of the specifications. The Contractor shall take a sample from the application wand during the first 20-minutes of placing sealant from each melter on the Project in the presence of the Engineer.

Each sample shall consist of two (2) aluminum or steel sample containers with the capacity to hold 2.3 kg [5 pounds] of sealant each. The two (2) sampling containers shall be labeled with SP number, date, time, location, manufacturer, and lot number of sealants. Each container shall be numbered one of two, or two of two. The Engineer reserves the right to conduct supplementary sampling and testing of the sealant material.

The Contractor shall document the locations where the material from each lot number of sealant is placed.

METHOD OF MEASUREMENT

Joint adhesive shall be by the linear foot.

BASIS OF PAYMENT

Payment shall include all material, labor and equipment to install the joint adhesive.