

SECTION 02966

RECYCLED SURFACE

PART 1 GENERAL

1.1 SECTION INCLUDES

- A. Materials and procedures for recycling the existing surface by heating, scarifying, screeding, and compacting the existing surface.

1.2 RELATED SECTIONS

- A. Section 02741: Hot Mix Asphalt
- B. Section 02745: Asphalt Material

1.3 REFERENCES

- A. AASHTO T 48: Flash and Fire Points by Cleveland Open Cup
- B. AASHTO T 59: Testing Emulsified Asphalt
- C. AASHTO T 201: Kinematic Viscosity of Asphalts
- D. AASHTO T 240: Effect of Heat and Air on a Moving Film of Asphalt (Rolling Thin Film Oven Test)
- E. ASTM D 244: Emulsified Asphalts
- F. ASTM D 2006-71: Rostler Test Method
- G. ASTM D 2007: Characteristics Groups in Rubber Extender and Processing Oils and Other Petroleum-Derived Oils by the Clay-Gel Absorption Chromatographic Method

PART 2 PRODUCTS

2.1 HEATER/SCARIFYING EQUIPMENT

- A. Heating unit
 - 1. Enclosed combustion area.
 - 2. No open flame to come in direct contact with asphalt surface.
 - 3. Burn only clean burning fuels (propane, butane, etc.).
 - 4. The Utah State Fire Marshal inspects and approves units that use liquified natural gas at least annually.
 - 5. Use equipment meeting the requirements of the Utah State Liquified Petroleum Gas Board.

- B. Safety Shut-off Switch for the Heat Exchanger
 - 1. Clearly marked and easily operated.
 - 2. Controlled from both the ground and the operator's station.
 - 3. Instantaneously turn off the heat exchanger and the fuel supply.

- C. Scarifier Unit
 - 1. Have at least two rows of spring equalized scarifier rakes (hydraulic or pneumatic leveling).
 - 2. Removable teeth in the rakes.
 - 3. Spring release for manhole and valve protection.

- D. Screed
 - 1. Heated to maintain specified surface temperature.
 - 2. Have reversible augers to move material left or right.
 - 3. Vibratory or oscillating screed.

2.2 ASPHALT REJUVENATING AGENT

- A. Petroleum resin oil base emulsified with water and conforming to the requirements in Table 1.

- B. Asphalt Materials: Refer to Section 02745.

Table 1
Asphalt Rejuvenating Agent

Test on Emulsion	ASTM	AASHTO	Min.	Max.
Viscosity at 77 degrees F, SFS		T 59	15	85
Residue, percent		T 59	60	
Cement Mixing Test, percent		T 59		2.0
Sieve Test, percent		T 59 ₂		0.1
Particle Charge Test		T 59	Pos.	Pos.
Test on Residue Oil				
Original				
Viscosity at 140 degrees F, cst		T 201	80	500
Flash point, COC, degrees F		T 48	752	
Saturates, percent	D 2007			3.0
Asphaltenes, percent	D 2007			1.0
PC/S Ratio ₄	D 2007			1.5
Maltenes Distribution ₄	D 2006-71		0.5	
Ratio ₄	D 2006-71		0.2	1.0
(PC + A ₁)(A + A ₂)				
Test on Residue From RTFO				
Oven Test at 325 degrees F		T 240		
Viscosity Ratio ₅		T 201		3.0
RTFO Oven Weight Change		T 240		6.5

¹ASTM D 244 Modified Evaporation Test of percent residue is made by heating a 50 g sample to 284 degrees F until foaming ceases, then cool immediately and calculate results.

²Test procedures identical with ASTM D 244 except that distilled water will be used in place of two percent sodium oleate solution.

³ASTM D 2006-71 can be used for the determination of saturates.

⁴In the Maltenes Distribution Ratio Test by ASTM Method D 2006-71.

PC = Polar Compounds A₁ = First Acidaffins

A₂ = Second Acidaffins S₁ = Saturates

⁵Viscosity Ratio = $\frac{\text{RTF O Viscosity of Residue at 140 degree F, Cst}}{\text{Original Viscosity at 140 degrees F, Cst}}$

PART 3 EXECUTION

3.1 REPARATION

- A. Broom all loose material off the pavement surface before starting heater/scarifying operations.

3.2 HEATER/SCARIFYING OPERATIONS

- A. Temperature Control
 - 1. Regulate burners to produce the required scarification without charring the asphalt surface or breaking aggregate particles.
 - 2. Keep the temperature of the scarified material behind the screed between 230 degrees F and 315 degrees F.
- B. Width and Depth
 - 1. Heat the surface to be recycled 6 inches to 12 inches wider than the width to be processed.
 - 2. Scarify to a sufficient depth to yield at least 84 lb/yd².
 - 3. When a subsequent pass is made adjacent to a previously recycled surface, extend the longitudinal joint at least 2 inches into the previously recycled surface.

3.3 DISTRIBUTION OF MATERIAL

- A. Uniformly distribute materials across the width being processed.
- B. Level to produce a smooth surface and uniform cross section.

3.4 COMPACTION

- A. Use at least two rollers.
 - 1. One double drum steel vibratory for breakdown rolling.
 - 2. One pneumatic (13 Ton or more) for finishing rolling.
- B. Complete rolling before temperature of material drops below 185 degrees F.
- C. Conform to Section 02741 and Measurement and Payment in the Bid Book, except that it will be based on the Marshall Method.

3.5 APPLYING REJUVENATING AGENT

- A. During scarifying:
 - 1. Mount applicator on the scarifier.
 - 2. Synchronize with the scarifier's forward speed so that the application rate is within " 5 percent of the rate specified.

- B. After rolling:
 - 1. Apply before the surface temperature drops below 150 degrees F.
 - 2. Apply with a distributor truck equipped with a metering device.
 - 3. Maintain application rate \pm 5 percent of that specified.

3.6 FIELD QUALITY CONTROL

- A. Sampling and testing: Engineer makes at least one weight and one temperature determination randomly within each 20-minute interval during scarifying operations.

- B. Corrective action:
 - 1. Reprocess the surface from the last acceptable test, when a test yields less than 84 lbs/yd².
 - 2. A failing test will be cause for suspension of work.
 - 3. Corrective action includes one or more of the following:
 - a. Increase the number of heater/scarifiers.
 - b. Reduce the speed of travel.
 - c. Adjust the burner(s).

END OF SECTION