Appendix 'A'

Hot in Place Recycling By The Heater Surface Scarification Method

Description This work shall consist of rehabilitating an asphalt pavement by heating, scarifying, reshaping, rejuvenating and compacting the existing surface with the addition of a new slurry, microsurfacing or bituminous surface conforming to the required thickness as specified on the bid item summary.

Procedure The entire surface to be rehabilitated shall be cleaned of water, earth and foreign material by a street sweeper such as an Elgin or similar machine. All base failures shall be repaired in accordance with local specifications, performed in advance or as part of this contract and paid for separately under change order or as an add on to the unit price summary sheet. Rehabilitation work shall be performed only when the air temperature in the shade is at least 45 degrees F and rising.

The surface of the existing pavement shall be heated with a continuously moving heater to allow the pavement to be scarified to a nominal 1 ½" average depth (Note 1) with the surface temperature of the old pavement not to exceed 375 degrees F. Heat shall be applied sequentially and under an enclosed or shielded hood and shall extend at least four inches beyond the width of scarification on both sides. Scarifying shall be accomplished with pressure scarifiers; at no such time shall milling or grinding equipment be engaged in the heater scarification process. Maximum length of the equipment shall be no longer than 120 LF. The scarifying unit shall be equipped to scarify and move asphaltic material away from the gutter edge for a depth of ½" by up to 4" wide. The heating/scarifying operation shall not exceed 30 feet per minute. When a repaving pass is being made adjacent to a previously placed mat, the longitudinal repaving seam shall extend at least two inches into the previously placed mat.

> Note 1: The depth of scarification shall be determined by scraping out and weighing the heated and scarified material from a one square foot area. This weight shall be 75% of the theoretical weight of one square foot by one inch of compacted bituminous surface.

Immediately after the scarifying operation, an approved asphalt modifier shall be applied at the approximate rate of 0.10 gallons per square yard. The agency engineer may waive or adjust the requirement for the asphalt modifier if the existing pavement condition warrants this action. The surface shall then be leveled, by distributing the heated, scarified and treated (HST) material over the width being processed, so as to produce a uniform cross section. The minimum temperature of the HST material after leveling shall be 175 degrees F. The HST material shall be compacted before the temperature of the mix drops below 150 degrees F. Compaction shall be accomplished with a self-propelled pneumatic roller or single steel drum roller meeting the following requirements.

Self Propelled Pneumatic Roller The roller shall be of the oscillating wheel type consisting of not less than seven pneumatic-tired wheels revolving on 2 axles and capable of being ballasted to the mass

(weight) required (a combination roller of rubber tire and single steel drum may be implemented provided the agency engineer approves such equipment during appropriate test strips).

The tires on the front and rear wheels shall be staggered so that the tire sidewalls will have a minimum overlap of ½". The roller shall provide for a smooth operation when starting, stopping or reversing direction. The tires shall withstand inflation pressures between 60 and 120 PSI.

The roller shall be equipped with an adequate scraping or cleaning device on each tire to prevent the accumulation of material on the tires. When used for the compaction of bituminous mixtures, the roller shall be equipped with a water system, which will keep all tires uniformly wet to prevent material pickup when required.

The contractor shall provide means for determining the mass (weight) of the roller as distributed on each wheel. Ballast shall be included in determining the mass (weight).

Method of Measurement The heater scarifying process will be measured in place and the area computed in square yards. The asphalt modifier will be measured in gallons as a separate pay item if not specifically called out as incidental to the HIR process. If provided as a payment item, the preparation of the base will be measured in square yards and the asphalt base repairs will be measured by the ton of asphalt placed at 4" in depth and inclusive of milling, and hauling unit price per away of insitu distressed asphalt.

Basis of Payment This work will be paid for at the contract unit price per square yard for heater scarifying, and if called out as a separate line item unit price, per the gallon for liquid asphalt modifier. If provided as a pay item, the preparation of the base (exclusive of additional material required) will be paid for at the contract unit price per square yard for preparation of base.

Emulsified Rejuvenating Liquid for Hot In Place Recycling

The polymer modified rejuvenating agent will be tested in accordance with the following ASTM standards:

Specification Designation	Test Method	Requirement Min. – Max.
Test on Emulsion		
Viscosity S.F, at 77 F, Sec.	ASTM D-244	15-40
Residue, % W	ASTM D-244 (Mod A)	60-65
Sieve Test, % Max	ASTM D-244 (Mod B)	0.10
Particle Charge Test	ASTM D-244	Positive
Tests on Residue from Distillation	ASTM D-244 (Mod C)	
Viscosity cst, 60 C	ASTM D-445	100-200
Asphaltenes, % W, MAX	ASTM D-2006-70	1.0
Maltenes Dist. Ratio	ASTM D-2006-70	0.3 – 0.6

$$\frac{PC + A1}{S + A2}$$

(a) ASTM D-244 Modified Evaporation Test for percent of residue is made by heating 50 gram sample to 300 deg F until foaming ceases, then cools immediately and calculate results.

(b) Test procedure identical with ASTM D-244 except that distilled water shall be used in place of 2% sodium oleate solution.

(c) In the Maltenes Distribution Ratio Test by ASTM Method D 2006-70

- PC – Polar Compounds
- A1 – First Acidaffins
- A2 – Second Acidaffins
- S – Saturated Hydrocarbons