

State of Illinois
DEPARTMENT OF TRANSPORTATION
Bureau of Local Roads & Streets

SPECIAL PROVISION
FOR
HOT IN-PLACE RECYCLING (HIR) – SURFACE RECYCLING

Effective: January 1, 2012

All references to Sections and Articles in this Special Provision shall be construed to mean specific Sections and Articles in the Standard Specifications for Road and Bridge Construction adopted by the Department of Transportation.

Description. This work shall consist of in-place rehabilitation of hot-mix asphalt (HMA) pavement by heating, scarifying, rejuvenating, and reshaping the surface followed by the addition of a new HMA surface course according to the thickness specified on the plans.

Materials. Materials shall be according to the following.

<u>Item</u>	<u>Article/Section</u>
(a) Rejuvenating Agent (Note 1)	
(b) Hot-Mix Asphalt	1030

Note 1. The rejuvenating agent shall have a minimum Aged Penetration Retention of 90% when tested according to the following test procedure:

- a. Determine the penetration¹ of an unaged standard PG 58-22 asphalt binder.
- b. Age² the asphalt binder in the Rolling Thin Film Oven (RTFO).
- c. Determine the penetration¹ of the aged binder (A).
- d. Add the rejuvenating agent or rejuvenating agent residue³ at the percentage recommended by the manufacturer (maximum 20% by weight) to the aged binder. Blend uniformly.
- e. Determine the penetration¹ of the rejuvenating agent / aged binder mixture. The penetration of this mixture shall be essentially equivalent to the penetration of the unaged PG 58-22.
- f. Age² the rejuvenating agent / aged binder mixture in the RTFO.
- g. Determine the penetration¹ of the aged rejuvenating agent / aged binder mixture (B).
- h. Determine the Aged Penetration Retention according to the following formula:

$$\text{Aged Penetration Retention, \%} = (B/A) \times 100$$

¹ AASHTO T 49 at 77°F (25°C).

² AASHTO T 240 aged for 5 hours at 325°F (163°C).

³ If the rejuvenating agent is an emulsion, obtain the residue according to the test procedure "Emulsified Asphalt Residue by Evaporation" located in AASHTO T 59.

Equipment. Equipment shall be according to the following.

<u>Item</u>	<u>Article/Section</u>
(a) Rollers.....	1101.01
(b) Pre-heater (Note 1)	
(c) Heater-Scarifier (Note 2)	

Note 1. The pre-heater shall be a separate independently self-propelled heating unit.

Note 2. The heater-scarifier shall be self-contained, power propelled unit capable of heating, scarifying, adding rejuvenating agent, mixing, and screeding the scarified asphalt surface.

The heating system shall use propane, fuel oil, or butane as fuel, capable of being turned on or off instantly and have a range of width to heat 4-inches beyond each side of the lane width. Heating of the asphalt pavement surface shall be accomplished in such a manner that adequate heat penetration is provided without excessive oxidation, or direct flame contact with the asphalt street. The heaters shall have an enclosed or shielded hood and allow for the pavement to be scarified to the specified depth with the surface temperature of the old pavement not exceeding 375°F (190°C). The machine shall be equipped with a minimum of two rows of spring-mounted scarification teeth. Teeth shall be evenly spaced with the rows offset by an amount equal to one-half of the tooth spacing. Teeth shall be capable of vertical movement, such that the rows of the teeth will follow any contours in the street profile to scarify to the required depth regardless of depression or high areas. Self-regulating controls shall be used to exert pressure from the weight of the machine onto the tooth mounting system, and to control the depth of scarification. The aggregate shall be dislodged, but not fractured, to the specified depth.

The machine shall be capable of adding rejuvenating agent uniformly over the area to be scarified at a uniform rate per distance traveled.

The machine shall be capable of lateral movement of the scarified materials as required, by using a reversible auger and/or adjustable blades. This system shall be capable of maintaining a uniform supply of scarified material distributed as required across the face if the spreader screed.

The heater-scarifier shall be equipped with an automatic electronic grade control device. The device shall be effective in leveling depressions. The device shall be capable of controlling the elevation of the screed relative to either a preset grade control string line or a grade reference device traveling on the adjacent pavement surface. The traveling grade reference device shall be not less than 30 ft (9 m) in length.

The screed or strike off assembly shall effectively produce a finished surface of the required evenness and texture without tearing, shoving or gouging the mixture.

CONSTRUCTION REQUIREMENTS

General. The entire surface to be rehabilitated shall be free of water, soil, vegetation, and foreign material. All base failures shall be repaired prior to the heating scarifying process according to Section 358. Rehabilitation work shall be performed only when the air temperature in the shade is at least 45 °F (7 °C) and the forecast is for rising temperatures.

The surface of the existing pavement shall be heated with a continuously moving heater to allow the pavement to be scarified to a 0.75 to 1.5 in (20 to 38 mm) average depth with the surface temperature of the old pavement not to exceed 375 °F (190 °C). Heat shall be applied under an enclosed or shielded hood and shall extend at least 4 in. (100 mm) beyond the width of scarification on both sides. Scarifying shall be accomplished with pressure scarifiers. The scarifying unit shall be equipped to scarify and move material away from the gutter flags for a depth of 1/2 in. (13 mm) by 4 in. (100 mm) wide. The heating-scarifying operation shall not exceed 30 ft (10 m) per minute. When a repaving pass is being made adjacent to a previously placed mat, the longitudinal repaving seam shall extend at least 2 in. (50 mm) into the previously placed mat.

Immediately after the scarifying operation, the rejuvenating agent shall be applied at the maximum rate of 0.20 gal/sq yd (0.5 L/sq m). The actual rate will be determined by the Contractor based on pavement condition, rejuvenating agent, and pavement samples. The Contractor will provide the Engineer with the application rate prior to construction. The application rate should not vary by more than ± 0.03 gal/sq yd (± 0.1 L/sq m) unless existing pavement conditions change. Any modification of the application rate shall be approved by the Engineer. 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 °F (80 °C). The HST material shall be compacted before the temperature of the mix drops below 150 °F (65 °C).

Compaction shall be accomplished by performing a growth curve within the first half mile of production. If an adjustment is made to the rejuvenating agent's application rate, the Engineer reserves the right to request an additional growth curve. The growth curve, consisting of a plot of lb/cu ft (kg/cu m) vs. number of passes with the project breakdown roller, shall be developed. Roller speed during the growth curve testing shall be the same as the normal paving operation. This curve shall be established by use of a nuclear gauge. Tests shall be taken after each pass until the highest lb/cu ft (kg/cu m) is obtained. This value shall be the target density.

A new growth curve is required if the breakdown roller used on the growth curve is replaced with a new roller during production. The target density shall apply only to the specific gauge used. If additional gauges are to be used to determine density specification compliance, the Contractor shall establish a unique minimum allowable target density from the growth curve location for each gauge.

TABLE 1 - MINIMUM ROLLER REQUIREMENTS FOR HIR – SURFACE RECYCLING			
Breakdown Roller (one of the following) ¹	Intermediate Roller	Final Roller (one or more of the following) ¹	Density Requirement
V _D , P	--	V _S , T _B , T _F	95 - 102 percent of the target density obtained on the growth curve

^{1/} Equipment definitions in Table 1 of Article 406.07.

Within 48 hours of the HST operation, a HMA surface course specified in the plans shall be placed according to Section 406.

Method of Measurement.

- (a) **Contract Quantities.** The requirement for use of contract quantities shall be according to Article 202.07(a).
- (b) **Measured Quantities.** The hot in-place recycling – surface recycling will be measured for payment in place and the area computed in square yards (square meters). The rejuvenating agent will be measured for payment in gallons (liters) according to Article 1032.02. The HMA surface will be measured for payment in tons (metric tons) according to Article 406.13.

Basis of Payment. This work will be paid for at the contract unit price per square yard (square meter) for HOT IN-PLACE RECYCLING – SURFACE RECYCLING, and per gallon (liter) for REJUVENATING AGENT.

The HMA surface will be paid for according to Article 406.14

If provided as a pay item, the preparation of the base will be paid for according to Article 358.07. If not provided as a pay item, preparation of the base, including additional material required, shall be considered as included in the contract unit price bid for hot in-place recycling, and no additional compensation will be allowed.