

# SBR Latex Modified Emulsified Asphalt

## Chip Sealing

### DRAFT MAINTENANCE SPECIFICATION

March 22, 2007

**Description:** This work consists of furnishing and applying SBR latex modified emulsified asphalt binder followed by an application of treated cover aggregate to the surface of the existing pavement. It shall be constructed in accordance with these specifications and close conformity with the lines, grades, thickness, and typical cross section shown on the plans or established by the Engineer.

**Material:** The chip sealing shall be composed of emulsified asphalt binder and cover aggregate as specified below:

- (1) **Emulsified Asphalt Binder:** The Emulsified Asphalt Binder shall meet AASHTO Specification M140 for Grade RS-2 or AASHTO Specification M208 for Grade CRS-2.

The binder shall be modified with SBR latex at the emulsion colloid mill at the time of manufacture. The SBR latex shall be BASF Butonal, UltraPave SBR Latex or an approved equal. The SBR latex shall be added to meet a minimum 50% Elastic Recovery of the binder utilizing the following test:

**Elastic Recovery-** Condition the ductilometer and samples to be treated at 50 F. Prepare the brass plate, mold and briquette specimen in accordance with AASHTO T51. The molds shall be of the non-tapered type used for Force Ductility Testing. Keep the specimen at the specified test temperature of 50 F for 85-90 minutes. Immediately after conditioning; place the specimen in the ductilometer and proceed to elongate the sample to 20 cm at a rate of pull of 5 cm/min. After the 20 cm elongation has been reached, stop the ductilometer and hold the sample in its elongated position for 5 minutes. After 5 minutes, clip the sample approximately in half by means of scissors or other suitable cutting devices. Let the sample remain in the ductilometer in an undisturbed condition for one hour. At the end of this time period, retract the half sample specimen until the two broken ends touch. At this point note the elongation (E) in cm. Calculate the percent recovery by the following formula:

$$\% \text{ recovery} = \frac{20 - E}{20} \times 100$$

- (2) **Cover Aggregate:** The cover aggregate shall be crushed quarry stone, free from dust or other contaminants. All stone shall satisfy a 35% maximum for the L.A. Abrasion Test and a 30% maximum for the Flakiness Index Test.

The gradation of the cover aggregate shall meet the following limits:

<u>Sieve Size</u>	<u>% Passing</u>
½ in	100
¾ in	85-100
#4	0-25
#8	0-5
#50	0-2
#200	0-1

The maximum amount of material passing the #200 sieve shall be determined using a washed sieve analysis in accordance with AASHTO T11.

The cover aggregate shall be treated with a liquid asphalt binder providing for a 0.6 % (+/- 0.2%) residual asphalt coating by weight of the aggregate.

**Equipment:** The equipment used by the Contractor shall include, but not be limited to the following:

- (1) **Asphalt Distributor:** The asphalt distributor shall be self-propelled and contain suitable mechanical circulating and heating mechanism to provide a uniform approved temperature of the entire mass of material. The distributor shall be equipped with a radar type sensor used to measure ground speed, and feed a Digital Volumetric Accumulator capable of applying asphalt material in accurately measured quantities at any rate between 0.1 to 2.0 gallons per square yard of roadway surface, at any length of spray bar up to 16 feet. The distributor shall be capable of maintaining a uniform rate of distribution of asphalt material regardless of change in grade, width, or alignment of the road. It shall be equipped with a cab mounted, electronic control for setting asphalt pump discharge rate and on/off switching of spray for nozzles in one-foot increments. The spray nozzles and pressure system shall provide a sufficient and uniform fan-shaped spray of emulsified asphalt binder throughout the entire length of the spray bar at all times while operating. The spray shall completely cover the roadway surface receiving the treatment.
- (2) **Aggregate Spreader:** The aggregate spreader shall be hydrostatically driven and self-propelled. It shall be equipped with a hydraulically controlled variable adjustable head that is capable of spreading cover aggregate in widths from 4 to 18 feet. The spreader shall be mounted on

pneumatic tires and shall apply the cover aggregate to the road surface in a manner that ensures that the tires do not contact the road surface until after the cover aggregate has been applied. The unit shall be equipped with an electronic radar type sensor used to measure ground speed and will automatically adjust the cover aggregate application rate depending on width of application and the speed of chip spreader. It shall have the ability to apply cover aggregate on any grade from 0 to 10%. The spreader shall be equipped with an integral hopper with a minimum capacity for 5 tons of cover aggregate. It shall be filled in a manner which ensures that the truck tires never come in contact with the emulsified asphalt binder treated road surfaces until the cover aggregate has been properly applied. To maintain constant cover aggregate application, the spreader shall have a self-locking truck hitch to permit towing of aggregate trucks without stopping the aggregate spreader. It will be capable of maintaining positive engagement over irregular terrain.

- (3) **Rollers:** All rollers used shall be self-propelled pneumatic tired. Each roller shall have a minimum compacting width of 5 feet and gross weight adjustable within the range of 200 to 300 pounds per inch of compaction width. The tires shall have a minimum pressure of 60 psi and shall be arranged such that full compaction will be obtained over the full width of the roller with each pass.
- (4) **Power Broom/Street Sweeper:** A rotary power broom or street sweeper shall be provided that is capable of cleaning the road surface prior to spraying bituminous material and to remove loose cover aggregate after treatment as directed by the Engineer.

**Construction Methods:** The chip seal operation shall proceed in accordance with the requirements of the “Maintenance and Protection of Traffic” and “Prosecution and Progress” specifications.

- (1) **Weather Requirements:** Work shall not be done unless the pavement is dry. No work shall be done during rain or foggy periods. No work shall be done if the ambient temperature is below 55 degrees F. Work shall be restricted to the calendar year dates of May 1-September 30.
- (2) **Road Surface Preparation:** Immediately prior to the application of emulsified asphalt binder and cover aggregate the roadway surface shall be cleaned by the Contractor using a mechanical sweeper and any other equipment or means necessary to remove all foreign debris and material (leaves, branches, dirt, sand, garbage, etc...) from the pavement surface. The surface shall also be dry. The prepared roadway surface must meet the approval of the Engineer. All foreign debris and material shall be removed and disposed of by the Contractor. Following pavement cleaning, the Contractor shall cover all pavement and utility structures including storm drains, manhole covers, water gates and gas gates. The

Contractor shall remove and dispose of the covers not prior to the completion of rolling operations yet by the close of the work day.

- (3) **Application of Emulsified Asphalt Binder:** The distance or area in which the emulsified asphalt binder is placed shall be governed by the rate at which the cover aggregate is applied and by the requirements of the “Maintenance and Protection of Traffic” and “Prosecution and Progress” specifications. No traffic shall be permitted on uncovered emulsified asphalt binder.

The emulsified asphalt binder shall not be applied until the loaded aggregate spreader is on hand ready to begin application of aggregate immediately, with sufficient truck loads of aggregate at the site to cover the length of the anticipated applications of emulsified asphalt binder.

The emulsified asphalt binder shall be applied at a rate of 0.35 – 0.45 gallons per square yard to achieve satisfactory results. The actual rate of application within this range for a given pavement requires the cover aggregate be embedded at 50% of the stone particle size into the emulsified asphalt binder with minimal stone loss following compaction.

Application of the emulsified asphalt binder shall produce a uniform film without ridges and skips. Adjustments to the spray bar and nozzles shall be made prior to application of the emulsified asphalt binder on the areas to be chip sealed.

The temperature of the emulsified asphalt binder at the time of application (spraying) shall be as approved by the Engineer, within the limits specified below:

RS-2 and CRS-2      135-185 degrees F

- (4) **Application of Cover Aggregate:** The cover aggregate shall be spread immediately following the application of emulsified asphalt binder. Under no circumstances shall operations proceed in such a manner that the emulsified asphalt binder remains uncovered for more than one minute so as to set up or dry out to an extent that will impair retention of the cover aggregate.

The aggregate shall be spread uniformly over the full width of the emulsified asphalt binder application, at a rate of 20-25 pounds per square yard to achieve satisfactory results. Immediately after spreading the cover aggregate, any areas having non-uniform coverage shall be corrected to the satisfaction of the Engineer by removing excess material and spreading additional material over deficient areas.

- (5) **Rolling Operations:** Rolling shall follow immediately behind the spreading of cover aggregate, with the first rolling coverage completed within five minutes after spreading the aggregate. The rolling shall be continued until three complete coverages, over the full width of the application area, have been obtained. All rolling shall be performed with approved pneumatic-tired rollers as specified. A minimum of two rollers shall be used for rolling operations. The rollers shall not be operated at speeds exceeding five miles per hour. Rolling shall begin at the outer edge of the aggregate cover and proceed in a longitudinal direction, working toward the center of the road. Rollers shall avoid driving on exposed emulsified asphalt binder. All stops and turns shall be made gradually.

The completed surface shall present a uniform appearance. Cover aggregate shall be added or removed as necessary during the rolling operations to achieve a uniform appearance.

- (6) **Protection of Surface:** No traffic shall be permitted on the chip sealed road surface until after all rolling has been completed and the emulsified asphalt binder has set to a degree satisfactory to the Engineer. All traffic shall be held to speeds not exceeding 25 miles per hour. "Loose Stone" signs shall be posted at the beginning limit of the chip seal operation and at every one mile interval. Speed limit signing and other required signing shall meet all Connecticut Department of Transportation and contract requirements. They shall remain in place for a minimum of 24 hours after the chip seal was placed. Signing shall not be removed until the loose aggregate is removed from the roadway and all other contract requirements are fulfilled (i.e. line striping) so that the original posted speed limit can be reinstated.

On the morning following each day of chip seal operations and weather permitting, the Contractor shall sweep the surplus aggregate from the previous day's chip seal application. This operation shall be conducted while the road surface is cool, and care shall be exercised that the cover aggregate that has set is not disturbed.

The Contractor shall dispose of the surplus aggregate in a manner satisfactory to the Engineer.

**Method of Measurement:** This work will be measured for payment by the number of square yards of "Chip Seal" placed. The specification is presented as a turn-key operation requiring bidders to include all costs associated with this work.

**Basis of Payment:** The accepted quantity of "Chip Seal" placed shall be paid for at the contract unit price per square yard. The cost of the emulsified asphalt binder used shall be included in the cost per square yard. This unit price shall include all materials, equipment, tools, and labor incidental thereto.

