ASPHALT–RUBBER SURFACE TREATMENT WITH AGGREGATE COVER

**From Waterbury IM 089-2(43)(Re-advertised)

xx. DESCRIPTION. This specification covers requirements for materials, manufacture, and application of asphalt-rubber as a stress absorbing membrane (SAM) or a stress absorbing membrane interlayer (SAMI). This specification shall consist of an application of a combined reacted mixture of hot paving grade asphalt and ground rubber followed immediately with a cover material.

xx. MATERIALS.

(a) Asphalt Cement. Asphalt cement for the asphalt-rubber mixture shall be PG 58-28 or PG 64-28. The grade selected shall be based on laboratory testing by the asphalt-rubber supplier.

(b) Anti-Stripping Agent. If required by the job-mix formula to produce appropriate water resistance, an anti-stripping agent that is heat stable and approved for use by the Agency shall be incorporated into the asphalt-rubber material at the dosage required by the job-mix formula (up to 1.0% by weight of asphalt). It shall be added to the asphalt cement prior to blending with the granulated rubber.

(c) Rubber. The granulated rubber shall be a vulcanized rubber product from the ambient temperature processing of scrap, pneumatic tires. The granulated rubber shall meet the following gradations. No substitutions will be accepted.

Sieve Size	% Passing
2.00 mm (#10)	100
1.18 mm (#16)	90 – 100
0.60 mm (#30)	25 – 100
0.18 mm (#80)	0 - 20

The use of rubber of multiple types from multiple sources is acceptable provided that the overall blend of rubber meets the gradation requirements. The length of the individual rubber particles shall not exceed 3 mm (1/8”).

A Type A Certification shall be furnished in accordance with Subsection 700.02.

(d) Aggregate. Aggregate shall conform to the requirements of Subsection 704.10 for crushed stone. Crushed gravel stone will not be permitted. Percentage of wear, as determined by AASHTO T 96, shall be a maximum of 30. The aggregate shall be pre-heated to a temperature between 93°C and 149°C (200°F and 300°F), and be pre-coated with 0.4% to 0.8% (by weight of aggregate) of PG 52-34, PG 58-28, PG 64-22, or PG 64-28 asphalt cement prior to application. It is

recommended that the gradation of the aggregate meet the following limits:

Sieve Size	% Passing - Nominal Size	
	9.5 mm (3/8″)	12.5 mm (1/2″)
19 mm (3/4″)	100%	100%
12.5 mm (1/2″)	100%	85 – 100%
9.5 mm (3/8″)	90 – 100%	25 – 75%
4.75 mm (#4)	0 – 30%	0 – 15%
2.36 mm (#8)	0 – 5%	0 – 5%
0.075 mm (#200)	0 – 2%	0 – 2%

xx. ASPHALT-RUBBER MIXING AND REACTION.

(a) Mixing and Reaction. The percent of rubber shall be 18% (+/- 3%) by weight of total mixture, that is, by total weight of asphalt cement, plus granulated rubber. The exact granulated rubber content shall be determined by the mix design submitted by the asphalt-rubber supplier based on laboratory testing.

The temperature of the asphalt shall be between 177°C and 218°C (350°F and 425°F) at the time of addition of the granulated reclaimed rubber. The asphalt and rubber shall be combined and mixed together in a blender unit and reacted for a minimum of one hour. The temperature of the asphalt-rubber mixture shall be above 163°C (325°F) during the reaction period.

(b) Delays. When a job delay occurs after full reaction, the asphalt-rubber may be allowed to cool. The asphalt-rubber shall be reheated slowly just prior to application, but not to a temperature exceeding 204°C (400°F). An additional quantity of granulated rubber or additive not exceeding 3% by volume of the hot asphalt-rubber mixture may be added after reheating.

(c) Viscosity. Viscosities shall be run, by the asphalt-rubber supplier, on each blended load of asphalt-rubber using a Haake-type field viscometer. The viscosity of the final product shall be in the range of 1,500 to 5,000 centipoise.

xx. EQUIPMENT.

(a) Mechanical Blender. A mechanical blender for proper proportioning and thorough mixing of the asphalt-cement and granulated rubber is required. This unit shall be equipped with an asphalt totaling meter (liters or gallons); a flow rate meter (liters per minute or gallons per minute); a positive displacement auger to feed the rubber properly to mixing chamber at the specified rate; and a static motionless mixer. Blender will have a separate asphalt cement feed pump and finished product pump to maximize production. Blender shall be capable of providing 100% proportional mix at any given time during the blending cycle. Documentation from the manufacturer supporting this shall be submitted to the Agency authority if requested.

(b) Distributor Truck. On projects exceeding 31.8 metric tons (35 tons) of liquid asphalt rubber, at least two pressure-type bituminous distributor trucks in good condition will be required. The distributor shall be equipped with an internal heating device capable of heating the material evenly up to 218°C (425° F); an internal mixing unit capable of maintaining a proper mixture of asphalt cement and granulated rubber; have adequate pump capacity to maintain a high rate of circulation in the tank and to spray the asphalt-rubber at a viscosity of 1,000 to 3,500 centipoise; and have adequate pressure devices and suitable manifolds to provide constant positive cut-off to prevent dripping from the nozzles. Distributor shall be equipped with an electronically controlled computerized compensation unit for controlling application rates at various width and speed changes. The application unit shall have electronic controls and a digital read out installed and operated from the inside of the cab of the distributor. The distribution bar on the distributor shall be fully circulating. Any distributor that produces a streaked or irregular distribution of the material shall be promptly repaired or removed from the project.

Distributor equipment shall include a tachometer, pressure gauges, volume measuring devices, and a thermometer for reading temperature of tank contents. Controls for spray bar shall be located in cab of truck, for controlling width and rate of spray of product. It shall be so constructed that uniform applications may be made at the specified rate per square meter (square yard) with a tolerance of plus or minus 0.2 liters per square meter (0.05 gal/ square yard).

A “bootman” shall accompany the distributor and ride in a position so that all spray bar nozzles are in full view of the “bootman” and readily accessible for unplugging.

(c) Hauling Equipment. Trucks for hauling cover material shall be rear discharge conveyor-fed or “live bottom” trucks and shall be equipped with a device to lock onto the hitch at the rear of the chip spreader to prevent aggregate spillage.

Sufficient hauling vehicles will be available to ensure continuous operation of the distributor and chip spreader.

(d) Aggregate Spreader. The aggregate spreader shall be hydrostatically driven and self-propelled. It must be equipped with a hydraulically controlled variable adjustable head that is capable of spreading stone in widths from 1.4 to 5.4 meters, (4.5 to 18 feet). The spreader shall be mounted on pneumatic tires, and shall apply the stone on the road surface in a manner that ensures that the tires do not contact the road surface until after the stone has been applied. The unit shall be equipped with an electronic radar-type sensor used to measure ground speed that will automatically adjust the stone application rate, depending on width of application and the speed of chip spreader. It shall have the ability to apply stone on any grade from 0 - 6%. The spreader shall be equipped with an integral hopper with a minimum capacity of 4.5 metric tons (5 tons) of stone, which shall be filled by trucks in a manner which ensures that the truck tires never come in contact with asphalt treated road surfaces until the stone has been properly applied. To maintain constant stone application, a self-locking truck hitch will permit towing of aggregate trucks without stopping the chip spreader. It will be capable of maintaining positive engagement over irregular terrain.

(e) Pneumatic-Tired Rollers. Two (2) self-propelled, multiple-wheel, pneumatic-tired rollers, each weighing between 6.5 and 10.9 metric tons (7 and 12 tons), shall be used. Each roller shall have a total compacting width of at least 1.4 meters (56 inches) and have a minimum tire pressure of 414 kPa (60 psi).

(f) Steel-Wheel Roller. One (1) self-propelled, 2-axle (tandem) steel-wheel roller, weighing between 7.3 and 10.9 metric tons (8 and 12 tons) shall be used. The roller shall be equipped with scrapers. Combination pneumatic and steel drum-type rollers are acceptable, as one unit only.

xx. CONSTRUCTION REQUIREMENTS.

(a) Preparation. Potholes, other areas of pavement failure, and major depressions in the existing pavement surface shall be repaired as indicated in the Plans or as directed by the Engineer.

Immediately prior to application of the asphalt rubber, the surface shall be thoroughly cleaned by sweeping. The Contractor shall be responsible for covering all utility irons just prior to application and uncovering after aggregate is spread.

(b) Seasonal and Weather Limitations. The asphalt rubber shall not be applied when weather conditions are unfavorable to obtaining a uniform spread. Construction shall proceed

only when the atmospheric temperature is at least 10°C (50°F) and rising. No water shall be present on the road surface.

(c) Application. The asphalt-rubber mixture shall be applied at a temperature of 170° to 215°C (338°F to 419°F) at a rate of 2.3 to 2.9 liters per square meter (0.50 to 0.65 gallons per square yard), with the exact rate of application to be determined by the aggregate gradation, traffic volume, and pavement condition.

Longitudinal joints shall be reasonably true to line and parallel to centerline. Where any construction joint occurs, the edges shall be broomed back and blended so there are no gaps and the elevations are the same, and free from ridges and depressions. Longitudinal joints shall be overlapped from 10.2 to 15.2 centimeters (4 to 6 inches).

During application, adequate provision shall be made to prevent marring and discoloration of adjacent pavements, structures, vehicles, foliage, or personal property.

(d) Aggregate Application. The application of aggregate shall follow as close as possible behind the application of the hot asphalt rubber, which shall not be spread further in advance of the aggregate spread that can be immediately covered. Construction equipment or other vehicles shall not drive on the uncovered asphalt rubber. The hot-precoated aggregate shall be spread uniformly by a self-propelled spreader at a rate of spread directed by the Engineer, generally between 16.3 to 21.7 kilograms per square meter, (30 to 40 pounds per square yard). Any deficient areas shall be covered with additional material.

(e) Rolling. A minimum of three (3) rollers shall be used for aggregate compaction into the hot asphalt rubber. Two rollers must be pneumatic-tired and one must be steel-wheel.

Rolling shall commence immediately following spread of aggregate. There shall be at least three coverages by the pneumatic-tired rollers to embed the aggregate particles firmly into the asphalt rubber. Coverage shall be as many passes as are necessary to cover the entire width being spread, with a pass being one movement of a roller in either direction. Additional coverage of the steel-wheel roller will follow. Water shall be applied to the tires or wheels as required to limit sticking of the asphalt rubber and aggregate to the rollers.

(f) Sweeping. When the maximum amount of aggregate has been embedded into the asphalt rubber and the pavement has cooled, all loose material shall be swept or otherwise removed. This shall be done at a time and in a manner that will not displace any embedded aggregate or damage the asphalt rubber.

xx. METHOD OF MEASUREMENT. The quantity of Special Provision (Asphalt-Rubber Surface Treatment with Aggregate Cover) to be measured for payment will be the number of square meters (square yards) placed in the complete and accepted work.

xx. BASIS OF PAYMENT. The measured quantity of Special Provision (Asphalt-Rubber Surface Treatment with Aggregate Cover) will be paid for at the Contract unit price per square meter (square yard). Payment shall be full compensation for furnishing, mixing, hauling, and placing the material specified and for furnishing all labor, tools, equipment, and incidentals necessary to complete the work.

Payment will be made under:

Pay Item		Pay Unit
900.675	Special Provision (Asphalt-Rubber Surface Treatment with Aggregate Cover)	Square Meter (Square Yard)