Item 402.0670 02 - Rubberized Paver-Placed Surface Treatment, Type A, F2

DESCRIPTION

The Rubber Modified Paver Placed Surface Treatment consists of a warm polymer modified asphalt emulsion coat followed immediately with a rubber modified ultra thin hot mix asphalt-wearing course. Initial pavement cleaning and all necessary pavement repairs, crack sealing, joint sealing, pavement marking removal, utility adjustments and milling of rebates will be paid for under the appropriate items. This specification is for use on highways of all traffic volumes. Refer to Chapter 6 of the NYSDOT Comprehensive Pavement Design Manual for selection of appropriate friction requirements: F1, F2 or F3. Quality Adjustment Factors do not apply for this item.

MATERIALS The requirements of §401-2 Materials apply, except as modified herein.

A. ***Mix Designs.*** Formulate a job mix formula that satisfies the design limits listed in Table 1- Mixture Requirements and submit it to the Regional Materials Engineer for approval. The requirements of § 401-2.01, Hot Mix Asphalt Designs, do not apply.

TABLE 1 - MIXTURE REQUIREMENTS(1)

Sieve Sizes	Type A		Type B		Type C	
	Design Limits % Passing	Production Tolerance %	Design Limits % Passing	Production Tolerance %	Design Limits % Passing	Production Tolerance %
3/4					100	
½			100		85 - 100	± 4
3/8	100		85 - 100	± 4	60 - 90	± 4
¼	85 - 100	± 4	30 - 55	± 4	30 – 55	± 4
#4	40 - 60	± 3	24 - 45	± 3	24 – 45	± 3
#8	21 - 37	± 3	21 - 37	± 3	21 - 37	± 3
#16	16 - 26	± 3	16 - 26	± 3	16 - 26	± 3
#30	12 - 20	± 2	12 - 20	± 2	12 - 20	± 2
#50	8 - 16	± 2	8 - 16	± 2	8 - 16	± 2
#100	5 - 10	± 2	5 - 10	± 2	5 - 10	± 2
#200	5 - 7	± 2	5 - 7	± 2	5 - 7	± 2
% PG Binder	5.8 – 6.4		5.8 – 6.4		5.8 – 6.4	

(1) All aggregate percentages are based on total mass of aggregate.
(2) Gradation data for Design / Monitoring shall be determined by AASHTO T 27 and AASHTO T 11

B. ***Aggregate.*** §401-2.02 except as modified herein. Use coarse aggregate with a minimum coarse-aggregate angularity (CAA) of 90% one fractured face and 85% two fractured faces.

1. Coarse Aggregate Type F1 Conditions.

a. Limestone, dolomite or a blend of the two, having an acid-insoluble residue content of not less than 20.0%.

b. Sandstone, granite, chert, traprock, ore tailings, slag or other similar non-carbonate materials.

c. Gravel, or a natural or manufactured blend of the following types of materials: limestone, dolomite, gravel, sandstone, granite, chert, traprock, ore tailings, slag, or other similar materials meeting the following requirements:

MATERIALS (Cont'd.)

Type A Mixes – Noncarbonate plus #8 inches particles must comprise a minimum of 30.0% of the total aggregate (by weight with adjustments to equivalent volumes for materials of different specific gravities). Additionally, a minimum of 95.0% of plus #4 inches particles must be noncarbonate.

Type B Mixes – Noncarbonate plus #60 inches particles must comprise a minimum of 30.0% of the total aggregate (by weight with adjustments to equivalent volumes for materials of different specific gravities). Additionally, a minimum of 95.0% of plus #4 inches particles must be noncarbonate.

Type C Mixes – Noncarbonate plus #60 inches particles must comprise a minimum of 30.0% of the total aggregate (by weight with adjustments to equivalent volumes for materials of different specific gravities). Additionally, a minimum of 95.0% of plus 3/8 inches particles must be noncarbonate.

2. Coarse Aggregate Type F2 Conditions.

a. Limestone, dolomite or a blend of the two having an acid insoluble residue content of not less than 20.0%.

b. Sandstone, granite, chert, traprock, ore tailings, slag or other similar non-carbonate materials.

c. Gravel, or a natural or manufactured blend of the following types of materials: limestone, dolomite, gravel, sandstone, granite, chert, traprock, ore tailings, slag, or other similar materials, meeting the following requirements:

Type A Mixes – Noncarbonate plus #8 inches particles must comprise a minimum of 10.0% of the total aggregate (by weight with adjustments to equivalent volumes for materials of different specific gravities). Additionally, a minimum of 20.0% of plus #4 inches particles must be noncarbonate.

Type B Mixes – Noncarbonate plus #60 inches particles must comprise a minimum of 10.0% of the total aggregate (by weight with adjustments to equivalent volumes for materials of different specific gravities). Additionally, a minimum of 20.0% of plus #4 inches particles must be noncarbonate.

Type C Mixes – Noncarbonate plus #60 inches particles must comprise a minimum of 10.0% of the total aggregate (by weight with adjustments to equivalent volumes for materials of different specific gravities). Additionally, a minimum of 20.0% of plus 3/8 inches particles must be noncarbonate.

3. Coarse Aggregate Type F3 Conditions.

a. Limestone, or a blend of limestone and dolomite having an acid insoluble residue content of not less than 20.0%.

b. Dolomite.

c. Sandstone, granite, chert, traprock, ore tailings, slag or other similar non-carbonate materials.

d. Gravel, or a natural or manufactured blend of the following types of materials: limestone, dolomite, gravel, sandstone, granite, chert, traprock, ore tailings, slag, or other similar materials, meeting the following requirements:

Type A Mixes – Noncarbonate plus #8 inches particles must comprise a minimum of 10.0% of the total aggregate (by weight with adjustments to equivalent volumes for materials of different specific gravities). Additionally, a minimum of 20.0% of plus #4 inches particles must be noncarbonate.

Type B Mixes – Noncarbonate plus #60 inches particles must comprise a minimum of 10.0% of the total aggregate (by weight with adjustments to equivalent volumes for materials of different specific gravities). Additionally, a minimum of 20.0% of plus #4 inches particles must be noncarbonate.

Type C Mixes – Noncarbonate plus #60 inches particles must comprise a minimum of 10.0% of the total aggregate (by weight with adjustments to equivalent volumes for materials of different specific gravities). Additionally, a minimum of 20.0% of plus 3/8 inches particles must be noncarbonate.

4. Additional Coarse Aggregate Requirements. Coarse aggregate must also meet the requirements listed in Table 2 - Coarse Aggregate Properties.

MATERIALS (Cont'd.)

TABLE 2 - COARSE AGGREGATE PROPERTIES

Property	Method	Requirement
LA Abrasion Coefficient, maximum % loss	AASHTO T 96	25
Maximum Flakiness Index	NFP 18-561	20
Maximum Flakiness Coefficient (G/E)[(1)]	NFP 18-561	1.58
Maximum percent passing 600 µm, %	AASHTO T 11, T 27	2

[(1)] Where G is the smallest square opening the particle can pass through and E is the smallest slot the particle can pass through.

C. ***Mineral Filler.*** § 703-08, Mineral Filler.

D. ***Asphalt Binder.*** The rubber-modified binder shall consist of a blend of Performance-Graded Binder and crumb rubber meeting the following specification for Terminal Blend Crumb Rubber (TBR) or the specification for ASTM D-6114 for Asphalt Rubber Binder (ARB) Table I, Type II. The Performance Graded Binder (PGB) shall conform to 702-5828, 702-6422 or 702-6428.

1. Terminal Blend Crumb Rubber (TRB). The percent of crumb rubber shall be 12% (+/-3%) by total weight of reacted PGB and ground rubber. The rubber shall conform to ASTM D6114, section 3.2, Ground Recycled Tire Rubber, with the following additions:

The ground rubber shall be vulcanized rubber produced from the ambient temperature processing of scrap, pneumatic tires. The ground rubber shall meet the following gradations:

Sieve Size	% Passing
#30	100
#40	45-100

The use of rubber of multiple types from multiple sources is acceptable provided that the overall blend of rubber meets the gradation requirements. The rubber shall be accepted by certification from the rubber supplier.

Physical Requirements for TBR Binder

	min	max
Penetration @ 77° 100g, 5s:	30	75
Softening Point °F (Test Method D 36)	130	-
Elastic Recovery @ 50°F (ASTM D6084)	65	-

2. Asphalt Rubber Binder (ARB). The ARB shall be blended and interacted to conform to ASTM D6114 Table 1, Type II.

Anti-stripping Agent. If required, an anti-stripping agent that is heat stable and approved for use by the Agency shall be incorporated into the rubber-modified binder at the dosage required by the job-mix formula (up to 1.0% by weight of PGB). It shall be added to the PGB prior to blending with the ground rubber.

E. ***Polymer Modified Asphalt Emulsion.*** § 702 - Bituminous Materials, CRS-1p, Item 702-4701.

F. ***Equipment.***

1. **Paving.** Use a self-priming paver appearing on the Department's Approved List. The self-priming paver must be capable of spraying the polymer modified asphalt emulsion, applying the hot mix asphalt overlay and smoothing the surface of the mat in one pass at a rate of at least 10 m/minute. The self-priming paver must be equipped with a receiving hopper, feed conveyor, emulsion storage tank, metered high-pressure emulsion spray bar, and a variable width, heated, ironing-type screed. The screed must have the ability to be crowned at the center both positively and negatively and have vertically adjustable extensions to accommodate the desired pavement profile. Make equipment approval requests to the Director, Materials Bureau, at least 30 days before the start of work.
2. **Compaction.** Use steel wheeled double drum rollers weighing at least 10 tons, equipped with functioning water systems and scrapers to prevent material from adhering to the roller drums.
3. **Hauling.** Use vehicles that meet § 402-3.03, Hauling Equipment, to transport the hot mix asphalt-wearing course.

CONSTRUCTION DETAILS

A. ***Hot Mix Production.*** The requirements of §401-3, Construction Details apply with the following modifications. If a test value for the 0.075 inches sieve, or any sieve larger than 1.18 inches varies from the target value by more than 1.5 times the production tolerance given in Table 1 - Mixture Requirements, the Regional Materials Engineer will evaluate the material represented by that test to determine acceptability. If for any sieve, the average absolute difference of [Test Value - Target Value] for a lot exceeds the production tolerance, the Regional Materials Engineer will evaluate the material to determine acceptability.

A delivery ticket must accompany each vehicle supplying HMA. Make one legible copy of the delivery ticket available to the State's paving inspector prior to placement of the mixture. Each delivery ticket shall show all of the following information and identify the type of mix used as outlined in Table 1 - Mixture Requirements.

A. Ticket number.
B. Plant identification.
C. Contract number.
D. Mix type (A, B, or C), friction requirement (F1 or F2), and performance-graded binder (PG Binder).
E. Quantity of material in delivery vehicle.
F. Date and time.

B. ***Surface Preparation.*** Perform all surface preparation prior to applying the wearing course.

1. Thoroughly clean the entire area to be overlaid. The surface of the area to be overlaid must be free of dirt, oil, and other foreign materials. Remove all debris and standing water. A damp surface is acceptable if favorable weather conditions are expected during paving operations.
2. Cover all manhole covers, water boxes, catch basins, and other such utility structures within the area to be paved with plastic, building felt, or other material approved by the Engineer. Reference each for location and adjustment after paving. Remove the covers each day.

C. ***Application.*** The requirements of § 402-3.01, Weather and Seasonal Limitations apply, except as modified herein. Placement may begin if the surface temperature is at least 45ºF and rising.

1. Apply the polymer modified asphalt emulsion at a temperature of 140 - 176ºF. Provide a uniform application across the entire width to be overlaid, at a rate of 0.15 - .24 Gals/y^2. Continuously monitor the spray rate.
2. No equipment shall come in contact with the polymer modified asphalt emulsion before the hot mix asphalt-wearing course is applied.
3. Immediately after applying the polymer modified asphalt emulsion, apply the hot mix asphalt overlay across the full width of the emulsion at a temperature of 293 - 338ºF.
4. Apply the hot mix asphalt at a rate within the appropriate application range, listed in Table 5. The finished treatment has a minimum thickness of 1/2 inch for Type A, and 5/8 inches for Types B and C.

Table 5 - Wearing Course Application Ranges

Type	Minimum (lb/y^2)	Maximum (lb/y^2)
A	55	75
B	60	80
C	65	85

D. ***Compaction.*** Begin compaction immediately after application of the wearing course. Use a minimum of two static passes. Avoid using vibratory compaction. The roller(s) will not be allowed to stop on the freshly placed wearing course. Use an adequate number of rollers to complete compaction before the pavement temperature falls below 185°F. Protect the wearing course from traffic until the rolling operation is complete and the material has cooled sufficiently to resist damage.

E. ***Paver and Equipment Cleaning***. The requirement of § 402-3.12, Paver and Equipment Cleaning apply.

F. ***Coring.*** The Engineer will require four cores from each section of compacted paver placed surface treatment applied below the appropriate minimum application rate listed in Table 5. The Engineer will randomly locate the four core locations. Core the pavement. The Engineer will determine the thickness of the paver placed surface treatment and reject sections not meeting the required minimum thickness.

The Engineer may require four cores from each section of compacted paver placed surface treatment exceeding the appropriate maximum application rate, listed in Table 5, to determine the thickness of the paver placed surface treatment. The Engineer may stop paving operations immediately if the over application of the paver placed surface treatment will create problems, such as, but not limited to, reducing overhead clearance, curb reveal or guide rail height. The Engineer and Vendor will agree upon and document a maximum application rate and maximum thickness to prevent problems created by over applying the paver placed surface treatment. Resume paving. The Engineer will reject any additional paver placed surface treatment sections determined to exceed the maximum agreed upon application rate and thickness.

Coring is not required for sections paved within the appropriate application range, listed in Table 5 - Wearing Course Application Ranges.

All labor, materials and equipment associated with required pavement coring, including maintenance and protection of traffic and filling core holes, will be done at the Vendor's expense.

METHOD OF MEASUREMENT. Payment will be measured as the number of square meters of pavement surface. Section 401-4, Method of Measurement does not apply.

BASIS OF PAYMENT. The unit price bid per square meter shall include all labor, materials and equipment necessary to complete the work. All necessary pavement repairs, crack sealing, joint sealing, pavement marking removal, utility adjustment and milling rebates will be paid for under the appropriate items.