ITEM 18402.918102 M - PAVER-PLACED SURFACE TREATMENT, TYPE A, F1
ITEM 18402.928102 M - PAVER-PLACED SURFACE TREATMENT, TYPE B, F1
ITEM 18402.938102 M - PAVER-PLACED SURFACE TREATMENT, TYPE C, F1

ITEM 18402.918202 M - PAVER-PLACED SURFACE TREATMENT, TYPE A, F2
ITEM 18402.928202 M - PAVER-PLACED SURFACE TREATMENT, TYPE B, F2
ITEM 18402.938202 M - PAVER-PLACED SURFACE TREATMENT, TYPE C, F2

DESCRIPTION.

The paver-placed surface treatment consists of a warm polymer modified asphalt emulsion coat followed immediately with an ultra thin hot mix asphalt wearing course.

MATERIALS.

A. Hot Mix Asphalt Wearing Course. The requirements of Section 401- Plant Production apply, except as modified herein. 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.

If a test value for the 0.075 mm sieve, or any sieve larger than 1.18 mm 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.

TABLE 1 - MIXTURE REQUIREMENTS[1]

Sieve Sizes (mm)	Type A		Type B		Type C	
	Design Limits % Passing	Production Tolerance %	Design Limits % Passing	Production Tolerance %	Design Limits % Passing	Production Tolerance %
19.0					100	
12.5			100		85 - 100	± 4
9.5	100		85 - 100	± 4	60 - 90	± 4
6.3	85 - 100	± 4	30 - 50	± 4	30 - 50	± 4
4.75	40 - 60	± 3	24 - 40	± 3	24 - 40	± 3
2.36	21 - 32	± 3	21 - 32	± 3	21 - 32	± 3
1.18	16 - 26	± 3	16 - 26	± 3	16 - 26	± 3
0.600	12 - 20	± 2	12 - 20	± 2	12 - 20	± 2
0.300	8 - 16	± 2	8 - 16	± 2	8 - 16	± 2
0.150	5 - 10	± 2	5 - 10	± 2	5 - 10	± 2
0.075	5 - 7	± 2	5 - 7	± 2	5 - 7	± 2
% PG Binder	4.9 - 5.3		4.8 - 5.2		4.8 - 5.2[2]	

[1] All aggregate percentages are based on total mass of aggregate.
[2] The Director, Materials Bureau, will evaluate Type C designs with asphalt binder percentages between 5.2% and 5.4% at the Contractors request.

1. Asphalt Binder. § 702 - Bituminous Materials, use the appropriate performance graded binder for the project's location.

ITEM 18402.918102 M - PAVER-PLACED SURFACE TREATMENT, TYPE A, F1
ITEM 18402.928102 M - PAVER-PLACED SURFACE TREATMENT, TYPE B, F1
ITEM 18402.938102 M - PAVER-PLACED SURFACE TREATMENT, TYPE C, F1

ITEM 18402.918202 M - PAVER-PLACED SURFACE TREATMENT, TYPE A, F2
ITEM 18402.928202 M - PAVER-PLACED SURFACE TREATMENT, TYPE B, F2
ITEM 18402.938202 M - PAVER-PLACED SURFACE TREATMENT, TYPE C, F2

2. ***Coarse Aggregate.*** § 703-02 - Coarse Aggregate, with the following additions. If the coarse aggregates are from more than one source or of more than one type of material, proportion and blend all constituents to provide a uniform mixture. Use 100% crushed stone from an approved source that will meet one of the following conditions when sampled and tested in accordance with Materials Method 28, Friction Aggregate Control and Test Procedures

   Coarse Aggregate Type F1 Conditions.

   a. Limestone having an acid insoluble residue content of not less than 20.0%, excluding particles of chert and similar siliceous rocks.

   b. Dolomite having an acid insoluble residue content of not less than 17.0%, excluding particles of chert and similar siliceous rocks.

   c. Sandstone, granite, chert, traprock, ore tailings, slag or other similar non-carbonate materials. Non-carbonate particles are defined as having a minimum acid insoluble residue content of 80.0%.

   d. Gravel, or a natural or manufactured blend of the following types of materials: limestone, dolomite (excluding Wappinger dolomite, as defined by the Department), gravel, sandstone, granite, chert, traprock, ore tailings, slag, or other similar materials meeting the following requirements:

      Type C Mixes - Non-carbonate plus 3.2 mm 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 9.5 mm particles must be non-carbonate.

      Type B Mixes - Non-carbonate plus 3.2 mm 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 6.3 mm particles must be non-carbonate.

      Type A Mixes - Non-carbonate plus 3.2 mm 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 4.75 mm particles must be non-carbonate.

Non-carbonate particles are defined as having a minimum acid insoluble residue content of 80.0%.

Coarse Aggregate Type F2 Conditions.

a. Limestone having an acid insoluble residue content of not less than 20.0%, excluding particles of chert and similar siliceous rocks.

b. Dolomite having an acid insoluble residue content of not less than 17.0%, excluding particles of chert and similar siliceous rocks.

c. Sandstone, granite, chert, traprock, ore tailings, slag or other similar non-carbonate materials. Non-carbonate particles are defined as having a minimum acid insoluble residue content of 80.0%.

d. Gravel, or a natural or manufactured blend of the following types of materials: limestone, dolomite (excluding Wappinger dolomite, as defined by the Department), gravel, sandstone, granite, chert, traprock, ore tailings, slag, or other similar materials, meeting the following requirements:

   Type C Mixes - Non-carbonate plus 3.2 mm 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 9.5 mm particles must be non-carbonate.

   Type B Mixes - Non-carbonate plus 3.2 mm 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 6.3 mm particles must be non-carbonate.

   Type A Mixes - Non-carbonate plus 3.2 mm 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 4.75 mm particles must be non-carbonate.

   Non-carbonate particles are defined as having a minimum acid insoluble residue content of 80.0%.

e. Manufactured blend of Wappinger dolomite (as defined by the Department) and the following types of materials: gravel, sandstone, granite, chert, traprock, ore tailings, slag, or other similar materials meeting the following requirements:

Type C Mixes - Non-carbonate plus 3.2 mm 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 9.5 mm particles must be non-carbonate.

Type B Mixes - Non-carbonate plus 3.2 mm 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 6.3 mm particles must be non-carbonate.

Type A Mixes - Non-carbonate plus 3.2 mm 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 4.75 mm particles must be non-carbonate.

Non-carbonate particles are defined as having a minimum acid insoluble residue content of 80.0%.

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

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.

It is recommended that the coarse aggregate portion (plus 2.36 mm material) meet the gradation requirements given in Table 3 - Recommended Coarse Aggregate Gradation.

ITEM 18402.918102 M - PAVER-PLACED SURFACE TREATMENT, TYPE A, F1
ITEM 18402.928102 M - PAVER-PLACED SURFACE TREATMENT, TYPE B, F1
ITEM 18402.938102 M - PAVER-PLACED SURFACE TREATMENT, TYPE C, F1

ITEM 18402.918202 M - PAVER-PLACED SURFACE TREATMENT, TYPE A, F2
ITEM 18402.928202 M - PAVER-PLACED SURFACE TREATMENT, TYPE B, F2
ITEM 18402.938202 M - PAVER-PLACED SURFACE TREATMENT, TYPE C, F2

TABLE 3 - RECOMMENDED COARSE AGGREGATE GRADATION			
Screen Size (mm)	**Type A (% Passing)**	**Type B (% Passing)**	**Type C (% Passing)**
19.0	–	–	100
12.5	–	100	85 - 100
9.5	100	85 - 100	25 - 50
6.3	85 - 100	0 - 15	0 - 15
4.75	25 - 50	0 - 3	0 - 3
2.36	0 - 3	0	0

3. Fine Aggregate. § 703-01, Fine Aggregate, with the following additions. Use 100% crushed stone having a minimum sand equivalent of 60%, as determined by AASHTO T 176, "Plastic Fines in Graded Aggregates and Soils by Use of the Sand Equivalent Test." It is recommended that the fine aggregate portion (minus 4.75 mm material) meet the gradation requirements given in Table 4 - Recommended Fine Aggregate Gradation.

TABLE 4 - RECOMMENDED FINE AGGREGATE GRADATION	
Sieve Size	**Percent Passing**
4.75 mm	100
2.36 mm	90 - 100
1.18 mm	60 - 80
600 µm	45 - 60
300 µm	30 - 40
150 µm	20 - 30
75 µm	15 - 25

4. Mineral Filler. § 703-08, Mineral Filler.

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

CONSTRUCTION DETAILS

A. 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 9 metric 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.

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 7ºC and rising. The finished treatment has a minimum thickness of 12.5 mm for Type A and 16 mm for Types B and C.

1. Apply the polymer modified asphalt emulsion at a temperature of 60 - 80ºC. Provide a uniform application across the entire width to be overlaid, at a rate of 0.68 - 1.13 L/m^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 145 - 170ºC.

ITEM 18402.918102 M - PAVER-PLACED SURFACE TREATMENT, TYPE A, F1
ITEM 18402.928102 M - PAVER-PLACED SURFACE TREATMENT, TYPE B, F1
ITEM 18402.938102 M - PAVER-PLACED SURFACE TREATMENT, TYPE C, F1

ITEM 18402.918202 M - PAVER-PLACED SURFACE TREATMENT, TYPE A, F2
ITEM 18402.928202 M - PAVER-PLACED SURFACE TREATMENT, TYPE B, F2
ITEM 18402.938202 M - PAVER-PLACED SURFACE TREATMENT, TYPE C, F2

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.

C. 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 85°C. Protect the wearing course from traffic until the rolling operation is complete and the material has cooled sufficiently to resist damage.

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

METHOD OF MEASUREMENT.

The paver-placed surface treatment will be measured as the number of square meters of pavement surfaced. § 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 adjustments, and milling of rebates will be paid for under the appropriate items.

Payment will be made under:

Item No.	Item	Pay Unit
18402.918102 M	Paver-Placed Surface Treatment, Type A, F1	Square Meter
18402.928102 M	Paver-Placed Surface Treatment, Type B, F1	Square Meter

ITEM 18402.918102 M - PAVER-PLACED SURFACE TREATMENT, TYPE A, F1
ITEM 18402.928102 M - PAVER-PLACED SURFACE TREATMENT, TYPE B, F1
ITEM 18402.938102 M - PAVER-PLACED SURFACE TREATMENT, TYPE C, F1

ITEM 18402.918202 M - PAVER-PLACED SURFACE TREATMENT, TYPE A, F2
ITEM 18402.928202 M - PAVER-PLACED SURFACE TREATMENT, TYPE B, F2
ITEM 18402.938202 M - PAVER-PLACED SURFACE TREATMENT, TYPE C, F2

18402.938102 M	Paver-Placed Surface Treatment, Type C, F1	Square Meter

18402.918202 M	Paver-Placed Surface Treatment, Type A, F2	Square Meter
18402.928202 M	Paver-Placed Surface Treatment, Type B, F2	Square Meter
18402.938202 M	Paver-Placed Surface Treatment, Type C, F2	Square Meter