## ITEM P-636 HIGH FLOAT SURFACE TREATMENT

DESCRIPTION

636-1.1 Construct a single course asphalt surface treatment (HFST).

MATERIALS

636-2.1 EMULSIFIED ASPHALT. Use HFMS-2s high float asphalt emulsion material that conforms to AASHTO M 140.

636-2.2 AGGREGATES. Use crushed stone or crushed gravel for cover coat material (cover aggregate) consisting of sound, tough, durable pebbles or rock fragments of uniform quality. Use material free from clay balls, vegetable matter, adherent films or coatings of dirt, clay, dust, or other deleterious matter that could impede adherence of the asphalt material. Wash the aggregate if necessary. Meet the following requirements:

|  |  |  |
| --- | --- | --- |
| L.A. Wear,% | AASHTO T 96 | 50, max. |
| Micro-Deval, % | AASHTO T 327 | 15, max. |
| Sodium Sulfate Loss,% | AASHTO T 104 | 9, max.(5 cycles) |
| Fracture,% | ATM 305 | 50, min. (single face) |
| Thin-Elongated Pieces | ATM 306 | 8, max. |
| Plasticity Index\* | AASHTO T 90 | 3 max. |

\*Prepare material for AASHTO T 90 according to the wet preparation method, AASHTO T 146.

The test sampling locations(s) will be determined by the Engineer, before crushing operations begin. Cover stockpiles of cover coat material to exclude precipitation.

**a. Gradation testing:**

1. **Acceptance Testing:** Determine the gradation by AASHTO T 27. Testing will be done upon notification by the Contractor that the crusher is ready for production.
2. **Assurance Testing:** Determine the gradation by AASHTO T 27 and AASHTO T 88 except dry the material for the T 88 test within a temperature range of 90° to 100° F.

At least 15 days before beginning work, submit a representative 30-pound sample of the aggregate and 1-quart sample of the asphalt material proposed for use in the work. The Department will test the materials using ATM 414 as submitted (that is, without addition of anti-stripping additives). The Department will reject materials failing to meet or exceed 70% retention of the asphalt, unless you provide approved anti-stripping additives or employ other approved measures which correct this deficiency.

TABLE 636-1

REQUIREMENTS FOR GRADING OF COVER AGGREGATE

FOR HIGH FLOAT SURFACE TREATMENT

| **Sieve** | **Percent Passing by Weight** |
| --- | --- |
| 1 in. | 100 |
| 3/4 in. | 75-95 |
| 3/8 in. | 50-80 |
| No. 4 | 35-65 |
| No. 8 | 20-50 |
| No. 40 | 8-30 |
| No. 200 | 0-5 |
| 0.005 mm | 0-3\* |

\* Special Note on Gradation Testing: For acceptance testing, verify compliance with the minus 0.005 mm size fraction at least once for each source used. For assurance testing, use the entire gradation with each test.

636-2.3 SURFACE TREATMENT BLOTTER MATERIAL. Use suitable, clean sand. Unless otherwise required by the Engineer, use sand passing the 8 mesh sieve, and having no more than 0.5% material passing the 200 mesh sieve. The material may be accepted in stockpile at the source. Gradation will be determined by AASHTO T-27.

636-2.4 DETERMINE HFST DESIGN COMPOSITION.Within two days after the start of cover aggregate crushing, submit a representative 70 Ib sample of the cover aggregate and a 1 gallon sample of the high float asphalt emulsion proposed for use on the project. Fill the asphalt container to the brim so that it contains no air.

Submit changes in application rates warranted by changes in aggregate gradation, source of cover aggregate, or high float emulsion supplier in the same manner as the-original submittal.

636-2.5 COMPOSITION OF SURFACE TREATMENT. The initial application rates of asphalt and cover aggregate materials will be as determined by the Engineer per subsection 636-2.4. The Engineer may adjust application rates as required by field conditions.

The following table provides the pre HFST Design estimating factors, and specifies the tolerance allowed the Contractor for applying surface treatment material above or below the application rates determined by the Engineer.

|  |  |  |
| --- | --- | --- |
| **Material** | **Pre-HFST Design Estimating Factor** | **Specified Tolerance** |
| HFMS-2S Asphalt | 0.75 gallon per sq. yard | ±0.04 gallon per sq. yard |
| Cover Aggregate | 75 Ib per sq. yard | ±3 Ib per sq. yard |

CONSTRUCTION REQUIREMENTS

636-3.1 GENERAL. Longitudinal joints are allowed only at the centerline. Accomplish work in a manner such that asphalt and cover aggregate applications are completed full width by the end of each shift.

636-3.2 WEATHER LIMITATIONS. Proceed only if ambient air temperature is 60ºF or above. Measure temperatures in the shade away from any heat source.

Do not apply HFST during periods of rain, fog, mist or imminent rain or when weather conditions prevent the proper penetration of the asphalt material and/or adhesion of the cover aggregate.

Ensure that weather conditions allow for proper construction of the HFST and adequate curing time prior to inclement weather or freeze-up. Do not apply HFST before May 15 or after August 15.

636-3.3 EQUIPMENT.

1. **Distributor.** Use a distributor that is designed, equipped, maintained and operated so that asphalt material at even heat is applied uniformly on variable widths of surface up to half the roadway, runway, or taxiway width plus 6 inches, at the specified rate, from 0.38 to 0.75 gallons per square yard, with uniform pressure and within specified tolerances.

Provide distributor equipment that meets the following:

**(1)** Computerized control of liquid asphalt spread rates to automatically deliver specified delivery rates and capable of changing rates when so directed. Computer monitoring of spread rate, truck speed and distance traveled.

**(2)** A thermometer for measuring temperatures of the tank's contents, readily visible from outside the truck cab.

**(3)** Each nozzle in the spray bar is turned to make the constant angle with the longitudinal axis of the spray bar that is recommended by the manufacturer of the distributor. All nozzles in the spray bar are of the same manufacture, type and size. The spray bar height provides triple overlap of the asphalt emulsion being applied by the spray nozzles.

Before the application of asphalt, ensure that the distributor meets the following requirements:

**(1)** The spray bar can be maintained at a constant height throughout the entire operation.

**(2)** Spray bar nozzles are clean and in good working condition.

**(3)** The spray bar is provided with a positive shutoff to prevent dribbling.

**(4)** The distributor is capable of maintaining a uniform speed.

Calibration and adjustment requirements include:

**(1)** The distributor will be inspected by the Engineer prior to the commencement of the operation. Perform any adjustments, maintenance and other requirements prior to use.

**(2)** Calibrate the distributor in accordance with the manufacturer's recommendations. The Engineer may require the Contractor to prove the accuracy of the distributor prior to commencing the asphalt application and any time thereafter if deemed necessary by the Engineer. Any change in settings on the distributor after calibrating will require that the distributor be recalibrated.

**(3)** Should any of the nozzles on the spray bar fail to provide a constant, uniform flow during the application of asphalt material, immediately cease application of the asphalt material. Do not allow the distributor to resume application of the asphalt material until all of the nozzles are in good working order. Nozzle adjustments and/or repairs must be approved by the Engineer.

**b. Aggregate Spreader.** Provide an aggregate spreader that is capable of evenly applying cover aggregate material to the specified roadway, runway, or taxiway width in a maximum of two passes. Provide an aggregate spreader that is computer controlled to automatically maintain the specified delivery rate of cover aggregate regardless of variations in machine speed. Provide a spreader with sufficient size feed system to maintain cover aggregate in the spread hopper at all times. Provide a spread hopper that is equipped with augers or other approved equipment to prevent segregation of the cover aggregate materials.

Stopping the aggregate spreader to refill the receiving hopper will be permitted provided that the spreader is backed up at least 20 feet from the last cover aggregate application. The aggregate spreader will be permitted to slow down to allow trucks to backup and discharge loads into the receiving hopper. Provide an aggregate spreader that is constructed to eliminate material segregation in the various hoppers.

Immediately before using the aggregate spreader on the project, calibrate the aggregate spreader for the cover aggregate to be applied. Control the forward speed of the aggregate spreader during calibration to approximate the speed required to apply the cover aggregate over the asphalt material and maintain a continuous operation with the distributor. Calibrate the aggregate spreader in accordance with the manufacturer's recommendations. The Engineer may require the Contractor to prove the accuracy of the aggregate spreader.

Calibrate the aggregate spreader whenever directed by the Engineer and allow the Engineer to observe the procedure.

**c. Rollers.** Utilize a minimum of three self-propelled pneumatic rollers weighing not less than 20,000 Ibs, equipped with not less than nine tires staggered back and front, inflated to 60 psi. Inflate all tires to equal pressure, and equip each roller with a suitable tire pressure gauge for checking tire inflation pressure.

636-3.4 PREPARATION OF SURFACE. Apply HFST on sections of fully shaped and compacted grade. Allow the Engineer to approve grade prior to application of HFST. Apply HFST within 72 hours of approval of the grade. Areas of grade not surfaced within the 72 hour period are subject to reapproval by the Engineer. Roll the surface with a steel wheeled soil compactor immediately prior to application of asphalt materials. Do not leave windrows of materials that may impede drainage on or adjacent to the surface treatment area.

Apply HFST when the prepared surface is damp. Prior to the asphalt application, the Engineer may require dampening the surface by applying a fine spray of water to the prepared surface. Do not apply HFST to a wet surface or when rain or fog is present or imminent.

636-3.5 APPLYING HIGH FLOAT ASPHALT EMULSION MATERIAL. Ensure that the length of spread of high float asphalt emulsion (hereafter referred to as asphalt) material does not exceed that which trucks loaded with cover aggregate can immediately cover.

For the first pass over the segment of roadway, runway, or taxiway being surfaced, follow a string line, set either on the shoulder or on the centerline, whichever is on the driver's side of the distributor. Accomplish the second pass with the centerline joint on the driver's side of the distributor.

Do not allow any equipment or vehicles on sprayed asphalt at any time prior to cover aggregate application.

Do not spread asphalt material more than 6 inches wider than the width covered by the cover aggregate from the spreader. Do not allow operations to proceed in a manner that allows asphalt material to chill, set up, dry, or otherwise impair retention of the cover aggregate.

Park the distributor, when not spreading, so that the spray bar or mechanism will not drip asphalt material on the surface of the roadway, runway, or taxiway.

Apply asphalt material at temperatures between 150ºF and 180ºF.

Correct any skipped areas or deficiencies. Prevent an excess of asphalt material at junctions of spreads.

636-3.6 APPLICATION OF COVER AGGREGATE MATERIAL. Provide cover aggregate that has a temperature of no less than 40°F and a 3%-5% moisture content (by dry weight) at the time of application. If necessary, the cover aggregate shall be moistened or dried to achieve the specified moisture content.

Apply cover aggregate within 1.5 minutes after application of the asphalt material or as directed by the Engineer. Keep the increment as constant as possible, and adjust as needed to meet changing conditions. Whenever it is apparent that the time limit above will be exceeded, make a transverse joint by placing construction paper (roofing felt or similar product) on the prepared surface and ending the HFST operations on the paper. Remove the paper and dispose of properly. Touch up the edges of the applied HFST prior to restarting HFST operations.

Immediately after cover aggregate is spread, cover deficient areas with additional material. Begin pneumatic tire rolling for the full width of the aggregate immediately after placement of cover aggregate and continue until at least six complete coverages are obtained or until cover aggregate is bound tightly, to the satisfaction of the Engineer. Accomplish the rolling operation within 500 feet of the cover aggregate application. Slow the high float application operation if the rolling cannot be completed within this distance. Do not exceed 5 miles per hour with the pneumatic tire roller. Maintain a spare pneumatic tired roller on the project during high float application, in addition to those rollers necessary to accomplish this specification.

Accomplish spreading in such a manner that the tires of the trucks or aggregate spreader do not contact the uncovered and newly applied asphalt material.

Sweeping to remove excess cover aggregate is required. Sweep between two and three weeks following the application of cover coat material as directed by the Engineer. Remove ridges of loose aggregate created by traffic prior to sweeping, or uniformly spread ridges over the surface as they develop as directed by the Engineer.

636-3.7 APPLICATION OF BLOTTER MATERIAL. Due to weather, construction and/or materials problems, it is possible that the finished surface treatment may become unstable. To minimize development of damage to the surface, blotter material may be required. Apply blotter material as directed by the Engineer and immediately roll with a pneumatic-tired roller (as described above) with tire pressures adjusted to 90-100 psi.

636-3.8 TRAFFIC CONTROL. Do not operate construction equipment at speeds exceeding 15 miles per hour on a freshly applied surface treatment, for a period of up to 24 hours, as directed by the Engineer. Unless otherwise specified, keep public corridors open to traffic at all times. Do not allow traffic on freshly sprayed asphalt or cover aggregate material that is not fully compacted. As soon as final rolling of the HFST layer is accomplished, controlled traffic may be permitted to operate on the HFST surface. Control public traffic on the HFST so that speeds do not exceeding 15 miles per hour for a period of 12 hours or as directed by the Engineer.

METHOD OF MEASUREMENT

636-4.1 See Section 90.

Surface Treatment Blotter Material and water used for aggregate and surface preparation are not measured for payment; these items are considered subsidiary obligations.

If sweeping and/or blading of excess cover aggregate is required, this work is not measured or paid for directly, but is considered a subsidiary obligation.

BASIS OF PAYMENT

636-5.1 Water for emulsified asphalt is subsidiary.

Payment will be made under:

Item P636.010.0000 Asphalt for High Float Surface Treatment, Type HFMS-2s – per ton

Item P636.020.0000 Aggregate for High Float Surface Treatment, Grading B – per ton

Item P636.030.0000 High Float Surface Treatment – per square yard

Item P636.040.0000 Aggregate for High Float Surface Treatment – per cubic yard

REFERENCES

AASHTO M 140 Emulsified Asphalt

AASHTO T 27 Sieve Analysis of Fine and Coarse Aggregates

AASHTO T 88 Particle Size Analysis of Soils

AASHTO T 90 Plastic Limit and Plasticity Index of Soils

AASHTO T 96 Resistance to Degradation of Small-size Coarse Aggregate by Abrasion and Impact in the Los Angeles Machine

AASHTO T 104 Soundness of Aggregate by Use of Sodium Sulfate or Magnesium Sulfate

AASHTO T 146 Wet Preparation of Disturbed Soil Samples for Test

AASHTO T 327 Resistance of Coarse Aggregate to Degradation by Abrasion in the Micro-Deval Apparatus

ATM 305 Percentage of Fracture in Coarse Aggregate

ATM 306 Determining the Percentage of Flat and Elongated Particles in Coarse Aggregate (Alaska FOP for ASTM D 4791)

ATM 414 Anti-Strip Requirements of Hot Mix Asphalt