

## SECTION 32 12 00

### HOT-MIX ASPHALT PAVING

#### PART 1 GENERAL

##### 1.1 RELATED DOCUMENTS

- A. Requirements of the General Provisions apply to all work under this section.
- C. Maryland Department of Transportation State Highway Administration Standard Specifications for Construction Materials, July 2018 and as amended.
- D. Throughout the specifications, types of materials may be specified by manufacturer's name and catalogue number in order to establish standards of quality and performance and not for the purpose of limiting competition. Alternate methods and/or materials may be submitted to the Architect for consideration. Those judged to be equal to that specified will receive written approval.

##### 1.2 SUMMARY

- A. This Section includes the following:
  - 1. Hot-mix asphalt paving.
  - 2. Hot-mix asphalt patching
  - 3. Hot-mix asphalt overlays.
  - 4. Asphalt surface treatments:
    - a. Fog seals
    - b. Slurries
  - 5. Pavement-marking paint.
- B. Related Sections:
  - 1. Section 31 20 00: Excavating, Filling & Grading

##### 1.3 SYSTEM DESCRIPTION

- A. Provide hot-mix asphalt pavement according to the materials, workmanship, and other applicable requirements of the Maryland Department of Transportation State Highway Administration Standard Specifications for Construction Materials, July 2008, are hereby by reference made a part of these specifications where applicable.
- B. Bituminous concrete pavement shall consist of aggregate asphalt mixed and constructed in accordance with these specifications and placed to the depth, grade, and cross section shown on the Construction Details.

##### 1.4 SUBMITTALS

- A. Product Data: For each product specified. Include technical data and tested physical and performance properties.
- B. Shop Drawings: Indicate pavement markings, lane separations, and defined parking spaces. Indicate dedicated handicapped spaces with international graphics symbol.

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- C. Qualification Data: For firms and persons specified in the "Quality Assurance" Article to demonstrate their capabilities and experience. Include lists of completed projects with project names and addresses, names and addresses of architects and owners, and other information specified.
- D. Material Test Reports: Indicate and interpret test results for compliance of materials with requirements indicated.
- E. Material Certificates: Certificates signed by manufacturers certifying that each material complies with requirements.
- F. Final project "as-built" record documents.

## **1.5 QUALITY ASSURANCE**

- A. Installer Qualifications: Engage an experienced installer who has completed hot-mix asphalt paving similar in material, design, and extent to that indicated for this Project and with a record of successful in-service performance.
- B. Manufacture Qualifications: Engage a firm experienced in manufacturing hot-mix asphalt similar to that indicated for this Project and with a record of successful in-services performance.
  - 1. Firm shall be a registered and approved paving mix manufacturer with the Maryland State Highway Administration.
- B. Testing Agency Qualifications: The Owner will engage a qualified independent testing agency has the experience and capability to satisfactorily conduct the testing indicated without delaying the Work.
  - 1. The contractor shall provide the Testing Agency a minimum of 24 hours notice prior to the performance of such testing required.
- D. Regulatory Requirements: Conform to applicable standards of authorities having jurisdiction for asphalt paving work on public property.
- E. Asphalt-Paving Publication: Comply with AI's "The Asphalt Handbook", except where more stringent requirements are indicated.
- F. In the event of a discrepancy between the Project Specifications, Construction Documents, Maryland Department of Transportation State Highway Administration Standard Specifications for Construction Materials, July 2008 or other guidelines set forth by the authorities having jurisdiction the more stringent will apply.

## **1.6 DELIVERY, STORAGE, AND HANDLING**

- A. Deliver pavement-marking materials to Project site in original packages with seals unbroken and bearing manufacturer's labels containing brand name and type of material, date of manufacture, and directions for storage.
- B. Store pavement-marking materials in a clean, dry, protected location and within temperature range required by manufacturer. Protect stored materials from direct sunlight.

## **1.7 PROJECT CONDITIONS**

- A. Environmental Limitations: Do not apply asphalt materials if substrate is wet or excessively damp or if the following conditions are not met:

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1. Tack Coat: Minimum surface temperature of 40 deg F.
  2. Slurry Coat: Comply with weather limitations of ASTM D 3910.
  3. Asphalt Base Course: Minimum surface temperature of 32 deg F and rising at time of placement.
  4. Asphalt Surface Course: Minimum surface temperature of 40 deg F at time of placement.
- B. Pavement-marking Paint: Apply pavement marking on clean, dry surfaces as specified at the manufacturer's recommended ambient, surface and material temperatures.

## **PART 2 PRODUCTS**

### **2.1 AGGREGATES**

- A. General: Use locally available materials and gradation that exhibit a satisfactory record of previous installations. Bituminous concrete shall meet the requirements of the MDSHA Specifications, Division 400, as later specified herein or as indicated on the drawings.
- B. Coarse Aggregate: Sound, angular crushed stone; crushed gravel; or properly cured, crushed blast-furnace slag, complying with ASTM D 692-88.
- C. Fine Aggregate: Sharp-edged natural sand or sand prepared from stone; gravel, properly cured blast-furnace slag; or combination thereof, complying with ASTM D 1073.
1. For hot-mix asphalt, limit natural sand to a maximum of 20 percent by weight of the total aggregate mass.

### **2.2 ASPHALT MATERIALS**

- A. Asphalt Cement: ASTM D 3381 for viscosity-graded material, ASTM D 946 for penetration-graded material.
- B. Undersealing Asphalt: ASTM D 3141, pumping consistency.
- C. Tack Coat: ASTM D 977, emulsified asphalt.
- C. Water: Portable.

### **2.3 AUXILIARY MATERIALS**

- A. Herbicide: Commercial chemical for weed control, registered by Environmental Protection Agency (EPA). Provide granular, liquid, or wettable powder form.
1. Roundup manufactured by Monsanto Company is not acceptable.
- B. Sand : ASTM D 1073, Grade Nos. 2 or 3.
- C. Paving Geotextile: Nonwoven polypropylene, specifically designed for paving applications, resistant to chemical attack, rot, and mildew.
- D. Pavement-Marking Paint: Latex, water based emulsion, ready mix complying with FS-TT-P-1952 F, Type 1.

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1. Color: White.
  2. Color: Yellow.
- E. Glass Beads: Per section 951.09 of 2018 SHA Standards and Specifications.

## **2.4 MIXES**

- A. Hot-Mix Asphalt: Provide dense, hot-laid, hot-mix asphalt plant mixes approved by authorities having jurisdiction and complying with the following requirements:
1. Base Course: Hot mix Asphalt Superpave 19 mm – PG 64-22 Level 2 Low ESALS
  2. Surface Course: Hot mix Asphalt Superpave 9.5 mm – PG 64-22 Level 2 Low ESALS.

## **PART 3 EXECUTION**

### **3.1 EXAMINATION**

- A. Verify that sub grade is dry and in suitable condition to support paving and imposed loads.
- B. Proof-roll sub base using heavy, pneumatic-tired rollers to locate areas that are unstable or that require further compaction.
- C. Notify Architect in writing of any unsatisfactory conditions. Do not begin paving installation until these conditions have been satisfactorily corrected.

### **3.2 COLD MILLING**

- A. Clean existing paving surface of loose and deleterious material immediately before cold milling. Remove existing asphalt pavement, including hot-mix asphalt and as necessary, unbound-aggregate base course, by cold milling to grades and cross sections indicated.
1. Repair or replace curbs, manholes, and other construction damaged during cold milling.

### **3.3 PATCHING AND REPAIRS**

- A. Patching: Saw cut perimeter of patch and excavate existing pavement section to sound base. Recompact new sub grade. Excavate rectangular or trapezoidal patches, extending 12 inches into adjacent sound pavement, unless otherwise indicated. Cut excavation faces vertically.
1. Tack coat faces of excavation and allow to cure before paving.
  2. Fill excavation with dense-graded, hot-mix asphalt base mix and, while still hot, compact flush with adjacent surface.
  3. Partially fill excavation with dense-graded, hot-mix asphalt base mix and compact while still hot. Cover asphalt base course with compacted, hot-mix surface layer finished flush with adjacent surfaces.
- B. Portland Cement Concrete Pavement: Break cracked slabs and roll as required to reseat concrete pieces firmly.

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1. Pump hot undersealing asphalt under rocking slabs until slab is stabilized or, if necessary, crack slab into pieces and roll to reseat pieces firmly.
  2. Remove disintegrated or badly broken pavement. Prepare and patch with hot-mix asphalt.
- C. Leveling Course: Install and compact leveling course consisting of dense-graded, hot-mix asphalt surface course to level sags and fill depressions deeper than 1 inch in existing pavements.
1. Install leveling wedges in compacted lifts not exceeding 3 inches thick.
- D. Crack and Joint Filling: Remove existing filler material from cracks or joints to a depth of ¼ inch. Refill with asphalt joint-filling material to restore watertight condition. Remove excess filler that has accumulated near cracks or joints.
- E. Tack Coat: Apply uniformly to existing surface of previously constructed asphalt or Portland cement concrete paving to surfaces abutting or projecting into new, hot-mix asphalt pavement. Apply at a uniform rate of 0.01 to 0.05 gal./sq. ft. of surface.
1. Allow tack coat to cure undisturbed before paving.
  2. Avoid smearing or staining adjoining surfaces, appurtenances, and surroundings. Remove spillages and clean affected surfaces.

### **3.4 SURFACE PREPARATION**

- A. General: Immediately before placing asphalt materials, remove loose and deleterious material from substrate surfaces. Ensure that prepared subgrade is ready to receive paving.
1. Sweep loose granular particles from surface of unbound-aggregate base course. Do not dislodge or disturb aggregate embedded in compacted surface of base course.
- B. Herbicide Treatment: Apply herbicide according to manufacturer's recommended rates and written application instructions. Apply to dry, prepared subgrade or surface or compacted-aggregate base before applying paving materials.

### **3.5 HOT-MIX ASPHALT PLACING**

- A. Bituminous concrete shall not be placed when the ambient air and surface temperature is below 40° F. When the surface temperature falls below these limits, material enroute may be placed at the risk of the Contractor.
- B. Apply tack coat when ambient temperature is above 40° F and when temperature has not been below 32° F for 12 hours immediately prior to applications. Do not apply when base is wet or contains an excess of moisture.
- C. Machine place hot-mix asphalt mix on prepared surface, spread uniformly, and strike off. Place asphalt mix by hand to areas inaccessible to equipment in a manner that prevents segregation of mix. Place each course to required grade, cross section, and thickness, when compacted. Place each course to required grade, cross section, and thickness, when compacted.
1. Place hot-mix asphalt base course in number of lifts and thickness indicated.
  2. Place hot-mix asphalt surface course in single lift.

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3. Spread mix at minimum temperature of 225 degrees F.
  4. Begin applying mix on high side of one-way slopes, unless otherwise indicated.
  5. Regulate paver machine speed to obtain smooth, continuous surface free of pulls and tears in asphalt-paving mat.
- D. Place paving in consecutive strips no less than 10 feet wide, except where infill edge strips of a lesser width are required.
1. After first strip has been placed and rolled, place succeeding strips and extend rolling to overlap previous strips. Complete asphalt base course for a section before placing asphalt surface course.
- E. Promptly correct surface irregularities in paving course behind paver. Use suitable hand tools to remove excess material forming high spots. File depressions with hot-mix asphalt to prevent segregation of mix; use suitable hand tools to smooth surface.

### **3.6 JOINTS**

- A. Construct joints to ensure continuous bond between adjoining paving sections. Construct joints free of depressions with same texture and smoothness as other sections of hot-mix asphalt course.
1. Clean contact surfaces and apply tack coat.
  2. Offset longitudinal joints in successive course a minimum of 6 inches.
  3. Offset transverse joints in successive course by the length of the paver.
  4. Construct transverse joints by bulkhead method or sawed vertical face method as described in AI's "The Asphalt Handbook".
  5. Compact joints as soon as hot-mix asphalt will bear roller weight without excessive displacement.
  6. Compact asphalt at joints to a density within 2 percent of specified course density.
- B. Longitudinal and transverse joints shall be made in a careful manner.
1. Well bonded and sealed joints are required. If necessary, in order to obtain this result, joints shall be painted with asphalt.
  2. Both longitudinal and transverse joints in successive courses shall be staggered so as not to be one above the other.
  3. Longitudinal joints shall be staggered a minimum of 6 inches and shall be arranged so that the longitudinal joint in the top course being constructed shall be at the location of the lane dividing the traffic lanes.
- C. Joints between old and new pavements, or between successive days work, shall be carefully made in such a manner as to ensure a thorough and continuous bond between old and new surfaces.
1. In the case of surface courses, the edge of the old and new surface course shall be cut back for its full depth so as to expose a fresh surface.

2. To obtain a well bonded joint, the surface shall be painted with hot asphalt, after which the hot surface mixture shall be placed in contact with it and raked to a proper depth and grade.
3. Before placing the mixture against them, all contact surfaces, of curbs, gutters, headers, manholes, etc., shall be painted with a thin uniform coating of hot asphalt cement or asphalt cement dissolved in Naphtha.

### **3.7 COMPACTION**

- A. General: Begin compaction as soon as placed hot-mix paving will bear roller weight without excessive displacement. Compact hot-mix paving with hot, hand tampers or vibratory-plate compactors in areas inaccessible to rollers.
  1. Complete compaction before mix temperature cools below 185 deg F (85 deg C).
- B. Breakdown Rolling: Accomplish breakdown or initial rolling immediately after rolling joint and outside edge. Examine surface immediately after breakdown rolling for indicated grade, and smoothness, Repair surface by loosening displaced material, filling with hot-mix asphalt, and rerolling to required elevations.
- C. Intermediate Rolling: Begin intermediate rolling immediately after breakdown rolling, while hot-mix asphalt is still hot enough to achieve specified density. Continue rolling until hot-mix asphalt course has been uniformly compacted to an in-place density of 92.0 to 97.0 percent of the maximum density.
- D. Finish Rolling: Finish roll paved surfaces to remove roller marks while hot-mix asphalt is still warm.
- E. Edge Shaping: While surface is being compacted and finished, trim edges of pavement to proper alignment. Bevel edges while still hot, with back of rake or smooth iron. Compact thoroughly using tamper or other satisfactory method.
- F. Repairs: Remove paved areas that are defective or contaminated with foreign materials. Remove paving course over area affected and replace with fresh, hot-mix asphalt. Compact by rolling to specified density and surface smoothness.
- G. Protection: After final rolling, do not permit vehicular traffic on pavement until it has cooled to less than 140° F or as directed by the Engineer.

### **3.8 INSTALLATION TOLERANCES**

- A. Thickness: Compact each course to produce the thickness indicated within the following tolerances:
  1. Base Course: Plus or minus 1/2 inch.
  2. Surface Course: Plus 1/4 inch, no minus.
- B. Surface Smoothness: Compact each course to produce a surface smoothness within the following tolerances as determined by using a 10-foot straightedge applied transversely or longitudinally to paved areas:
  1. Base Course: 1/4 inch
  2. Surface Course: 1/8 inch
  3. Crowned Surfaces: Test with crowned template centered and at right angle to crown. Maximum allowable variance from template is 1/4 inch.

### **3.9 SURFACE TREATMENTS**

- A. Slurry Seals: Apply slurry coat in a uniform thickness according to ASTM D 3910 and allow to cure.
  - 1. Roll slurry to smooth ridges and provide a uniform, smooth surface.

### **3.10 PAVEMENT MARKING**

- A. Do not apply pavement-marking paint until layout, colors, and placement have been verified with Architect.
- B. Allow paving to cure for time period required per pavement marking manufacturer's recommendation.
- C. Pavement surfaces shall be dried free of oil, dirt, grease, and other contaminants prior to application of pavement markings surfaces not in conformance shall be cleaned by the Contractor to a width of 4 to 6 inches wider than the markings to be applied.
- D. Existing pavement markings that conflict with new or altered traffic pattern shall be completely removed by the Contractor. The method used by the Contractor for removal shall not damage the pavement surface and shall be approved by the Engineer. Any pavement damaged shall be repaired or replaced as determined by the Engineer at no additional cost to the Owner.
- E. Apply paint with mechanical equipment to produce pavement marking of dimensions indicated with uniform, straight edges. Apply at manufacturer's recommended rates to provide a minimum wet film thickness of 15 mils.

### **3.11 FIELD QUALITY CONTROL**

- A. Testing Agency: Owner will engage a qualified independent testing agency to perform field inspections and tests and to prepare test reports.
  - 1. Testing agency will conduct and interpret tests and state in each report whether tested Work complies with or deviates from specified requirements.
- B. Additional testing, at Contractor's expense, will be performed to determine compliance of corrected Work with specified requirements.
- C. Thickness: In-place compacted thickness of hot-mix asphalt courses will be determined according to ASTM D 3549.
- D. Surface Smoothness: Finished surface of each hot-mix asphalt course will be tested for compliance with smoothness tolerances.
- E. In-Place Density: Samples of uncompacted paving mixtures and compacted pavement will be secured by testing agency according to ASTM D 979.
  - 1. Reference laboratory density will be determined by averaging results from 4 samples of hot-mix asphalt-paving mixture delivered daily to site, prepared according to ASTM D1559, and compacted according to job-mix specifications.
    - a. One core sample will be taken for every 100 sq. yd. or less of installed pavement, but in no case will fewer than 3 cores be taken.
    - b. Field density of in-place compacted pavement may also be determined by nuclear method according to ASTM D 2950 and correlated with ASTM

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D 1188 or ASTM D 2726.

- F. Remove and replace or install additional hot-mix asphalt where test results or measurements indicate that it does not comply with specified requirements.

**END OF SECTION 32 12 00**