

SECTION 321216 – ASPHALT PAVING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to this Section.

1.2 SUMMARY

- A. This Section includes the following:
 - 1. Hot-mix asphalt paving.
 - 2. Hot-mix asphalt patching.
 - 3. Pavement-marking paint.
 - 4. Cold milling of existing hot-mix asphalt pavement.
- B. Related Sections include the following:
 - 1. Division 01 Section Submittal Procedures” for review methods and procedures.
 - 2. Division 31 Section “Earth Moving” for aggregate subbase and base courses and for aggregate pavement shoulders.
 - 3. Division 32 Section “Pavement Joint Sealants” for joint sealants and fillers at paving terminations.

1.3 DEFINITIONS

- A. Hot-Mix Asphalt Paving Terminology: Refer to ASTM D 8 for definitions of terms.
- B. DOT: Department of Transportation.

1.4 SYSTEM DESCRIPTION

- A. Provide hot-mix asphalt paving according to materials, workmanship, and other applicable requirements of Maryland State Highway standard specifications.
 - 1. Standard Specification: Maryland State Highway Administration Standard Specification for Construction and Materials.

2. Measurement and payment provisions and safety program submittals included in standard specifications do not apply to this Section.

1.5 SUBMITTALS

- A. Product Data: For each type of product indicated. Include technical data and tested physical and performance properties.
- B. Job-Mix Designs: Certification, by authorities having jurisdiction, of approval of each job mix proposed for the Work.
- C. Material Test Reports: For each paving material.
- D. Material Certificates: For each paving material, signed by manufacturers.

1.6 QUALITY ASSURANCE

- A. Manufacturer Qualifications: manufacturer shall be registered with and approved by Maryland State Highway Administration.
- B. Testing Agency Qualifications: Qualified according to ASTM D 3666 for testing indicated, as documented according to ASTM E 548.
- C. Regulatory Requirements: Comply with Maryland State Highway standard specifications for asphalt paving work.
- D. Asphalt-Paving Publication: Comply with AI MS-22, "Construction of Hot Mix Asphalt Pavements," unless more stringent requirements are indicated.

1.7 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 within temperature range required by manufacturer. Protect stored materials from direct sunlight.

1.8 PROJECT CONDITIONS

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

1. Prime and Tack Coats: Minimum surface temperature of **60 deg F**.
 2. Slurry Coat: Comply with weather limitations of ASTM D 3910.
 3. Asphalt Base Course: Minimum surface temperature of **40 deg F** and rising at time of placement.
 4. Asphalt Surface Course: Minimum surface temperature of **60 deg F** at time of placement.
- B. Pavement-Marking Paint: Proceed with pavement marking only on clean, dry surfaces and at a minimum ambient or surface temperature of **50 deg F** and not exceeding **100 deg F in a 24 hour period**.

PART 2 - PRODUCTS

2.1 AGGREGATES

- A. General: Use materials and gradations that have performed satisfactorily in previous installations.
- B. Recycled Content: Provide maximum reclaimed asphalt pavement (RAP) as feasible.
- C. Regional Content: Provide RAP manufactured and of recycled raw materials recovered within 100 mile radius of Project Site.
- D. Coarse Aggregate: In accordance with Maryland State Highway standards and specifications.
- E. Fine Aggregate: In accordance with Maryland State Highway standards and specifications.
- F. Mineral Filler: In accordance with Maryland State Highway standards and specifications.

2.2 ASPHALT MATERIALS

- A. Asphalt Binder: AASHTO MP 1, PG 64-22.
- B. Asphalt Cement: ASTM D 3381 for viscosity-graded material; ASTM D 946 for penetration-graded material.
- C. Prime Coat: Asphalt emulsion prime complying with Maryland State Highway Administration requirements.

- D. Tack Coat: ASTM D 977 or AASHTO M 140, emulsified asphalt or ASTM D 2397 or AASHTO M 208, cationic emulsified asphalt, slow setting, diluted in water, of suitable grade and consistency for application.
- E. Undersealing Asphalt: ASTM D 3141 or AASHTO M 238, pumping consistency.

2.3 AUXILIARY MATERIALS

- A. Herbicide: Commercial chemical for weed control, registered by the EPA. Provide in granular, liquid, or wettable powder form.
- B. Paving Geotextile: AASHTO M 288, nonwoven polypropylene; resistant to chemical attack, rot, and mildew; and specifically designed for paving applications.
- C. Pavement-Marking Paint: See Section 321723 "Pavement Markings"

2.4 MIXES

- A. Hot-Mix Asphalt: Dense, hot-laid, hot-mix asphalt plant mixes approved by Maryland State Highway Administration; and complying with the following requirements:
 - 1. Provide mixes with a history of satisfactory performance in geographical area where Project is located.
 - 2. Base Course: Superpave 19.0 mm.
 - 3. Surface Course: Superpave 9.5 mm.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Verify that subgrade is dry and in suitable condition to support paving and imposed loads.
- B. Proceed with paving only after unsatisfactory conditions have been corrected.

3.2 COLD MILLING

- A. Clean existing pavement surface of loose and deleterious material immediately before cold milling. Remove existing asphalt pavement by cold milling to grades and cross sections indicated.
 - 1. Mill to a depth of as indicated on plans.
 - 2. Mill to a uniform finished surface free of gouges, grooves, and ridges.

3. Control rate of milling to prevent tearing of existing asphalt course.
4. Repair or replace curbs, manholes, and other construction damaged during cold milling.
5. Excavate and trim unbound-aggregate base course, if encountered, and keep material separate from milled hot-mix asphalt.
6. Transport milled hot-mix asphalt to asphalt recycling facility.
7. Keep milled pavement surface free of loose material and dust.

3.3 PATCHING

- A. Hot-Mix Asphalt Pavement: Saw cut perimeter of patch and excavate existing pavement section to sound base. Excavate rectangular or trapezoidal patches, extending **12 inches** into adjacent sound pavement, unless otherwise indicated. Cut excavation faces vertically. Remove excavated material. Recompact existing unbound-aggregate base course to form new subgrade.
- B. Tack Coat: Apply uniformly to vertical surfaces abutting or projecting into new, hot-mix asphalt paving at a rate of **0.05 to 0.15 gal./sq. yd.**.
 1. Allow tack coat to cure undisturbed before applying hot-mix asphalt paving.
 2. Avoid smearing or staining adjoining surfaces, appurtenances, and surroundings. Remove spillages and clean affected surfaces.
- C. Patching: Fill excavated pavements with hot-mix asphalt base mix and, while still hot, compact flush with adjacent surfaces.

3.4 REPAIRS

- A. Leveling Course: Install and compact leveling course consisting of 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.
- B. Crack and Joint Filling: Remove existing joint filler material from cracks or joints to a depth of **1/4 inch**.
 1. Clean cracks and joints in existing hot-mix asphalt pavement.
 2. Use hot-applied joint sealant to seal cracks and joints more than **1/4 inch** wide. Fill flush with surface of existing pavement and remove excess.

3.5 SURFACE PREPARATION

- A. Proof-roll subbase using heavy, pneumatic-tired rollers to locate areas that are unstable or that require further compaction.
- B. 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.
- C. Herbicide Treatment: Apply herbicide according to manufacturer's recommended rates and written application instructions. Apply to dry, prepared subgrade or surface of compacted-aggregate base before applying paving materials.
 - 1. Mix herbicide with prime coat if formulated by manufacturer for that purpose.
- D. Prime Coat: Apply uniformly over surface of compacted unbound-aggregate base course at a rate of **0.15 to 0.50 gal./sq. yd.** Apply enough material to penetrate and seal but not flood surface. Allow prime coat to cure for 72 hours minimum.
 - 1. If prime coat is not entirely absorbed within 24 hours after application, spread sand over surface to blot excess asphalt. Use enough sand to prevent pickup under traffic. Remove loose sand by sweeping before pavement is placed and after volatiles have evaporated.
 - 2. Protect primed substrate from damage until ready to receive paving.
- E. Tack Coat: Apply uniformly to surfaces of existing pavement at a rate of **0.05 to 0.15 gal./sq. yd.**
 - 1. Allow tack coat to cure undisturbed before applying hot-mix asphalt paving.
 - 2. Avoid smearing or staining adjoining surfaces, appurtenances, and surroundings. Remove spillages and clean affected surfaces.

3.6 PAVING GEOTEXTILE INSTALLATION

- A. Apply tack coat uniformly to existing pavement surfaces at a rate of **0.20 to 0.30 gal./sq. yd.**
- B. Place paving geotextile promptly according to manufacturer's written instructions. Broom or roll geotextile smooth and free of wrinkles and folds. Overlap longitudinal joints **4 inches** and transverse joints **6 inches**.

1. Protect paving geotextile from traffic and other damage and place hot-mix asphalt paving overlay the same day.

3.7 HOT-MIX ASPHALT PLACING

- A. Machine place hot-mix asphalt 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.
 1. Spread mix at minimum temperature of **250 deg F**.
 2. Regulate paver machine speed to obtain smooth, continuous surface free of pulls and tears in asphalt-paving mat.
- B. Place paving in consecutive strips not less than **8 feet** wide unless infill edge strips of a lesser width are required.
- C. Promptly correct surface irregularities in paving course behind paver. Use suitable hand tools to remove excess material forming high spots. Fill depressions with hot-mix asphalt to prevent segregation of mix; use suitable hand tools to smooth surface.

3.8 JOINTS

- A. Construct joints to ensure a 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 to joints.
 2. Offset longitudinal joints, in successive courses, a minimum of **6 inches**.
 3. Offset transverse joints, in successive courses, a minimum of **24 inches**.
 4. Construct transverse joints as described in AI MS-22, "Construction of Hot Mix Asphalt Pavements."
 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.

3.9 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 to **185 deg F**.

- B. Breakdown Rolling: Complete breakdown or initial rolling immediately after rolling joints and outside edge. Examine surface immediately after breakdown rolling for indicated crown, grade, and smoothness. Correct laydown and rolling operations to comply with requirements.
- 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 the following density:
 - 1. Average Density: 92 percent of reference maximum theoretical density according to ASTM D 2041, but not less than 90 percent nor greater than 96 percent.
- D. Finish Rolling: Finish roll paved surfaces to remove roller marks while hot-mix asphalt is still warm.
- E. Protection: After final rolling, do not permit vehicular traffic on pavement until it has cooled and hardened.
- F. Erect barricades to protect paving from traffic until mixture has cooled enough not to become marked.

3.10 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: **1/8 inch**.
 - 2. Surface Course: **1/8 inch**.

3.11 PAVEMENT MARKING

- A. Do not apply pavement-marking paint until layout, colors, and placement have been verified with Engineer.
- B. Allow paving to age for 30 days before starting pavement marking.
- C. Sweep and clean surface to eliminate loose material and dust.

- D. Prime asphalt surfaces with sealer, as recommended by thermoplastic material manufacturer based on surface conditions. Include adhesive or adhesion promoter when asphaltic surfaces exhibit polished aggregate.
- E. Apply paint with mechanical equipment to produce pavement markings, of dimensions indicated, with uniform, straight edges. Apply at manufacturer's recommended rates to provide a minimum wet film thickness of **15 mils**.
 - 1. Broadcast glass beads uniformly into wet markings at a rate of 6 lb / gal.

3.12 FIELD QUALITY CONTROL

- A. Testing Agency: Owner will engage a qualified independent testing and inspecting agency to perform field tests and inspections and to prepare test reports.
- B. Additional testing and inspecting, at Contractor's expense, will be performed to determine compliance of replaced or additional 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: Testing agency will take samples of uncompacted paving mixtures and compacted pavement according to ASTM D 979 or AASHTO T 168.
 - 1. Reference maximum theoretical density will be determined by averaging results from four samples of hot-mix asphalt-paving mixture delivered daily to site, prepared according to ASTM D 2041, and compacted according to job-mix specifications.
 - 2. In-place density of compacted pavement will be determined by testing core samples according to ASTM D 1188 or ASTM D 2726.
 - a. One core sample will be taken for every **1000 sq. yd.** or less of installed pavement, with no fewer than 3 cores 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 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.

3.13 DISPOSAL

- A. All excavated and demolished material shall be removed from Project site and legally dispose of them in an EPA-approved landfill.

END OF SECTION 321216