SECTION 321216

ASPHALT PAVING

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***NOTE TO SPECIFIER***

*Use this Specification Section for Mail Processing Facilities.*

***This is a Type 2 Specification with primarily editable text; therefore, most of the text can be edited, but there is some required text which is noted within the Section with a “Note to Specifier.” Do not revise these paragraphs without an approved Deviation from USPS Headquarters, Facilities Program Management, through the USPS Project Manager.***

*For Design/Build projects, do not delete the Notes to Specifier in this Section so that they may be available to Design/Build entity when preparing the Construction Documents.*

*For the Design/Build entity, this specification is intended as a guide for the Architect/Engineer preparing the Construction Documents.*

*The MPF specifications may also be used for Design/Bid/Build projects. In either case, it is the responsibility of the design professional to edit the Specifications Sections as appropriate for the project.*

*Text shown in brackets must be modified as needed for project specific requirements.* *See the “Using the USPS Guide Specifications” document in Folder C for more information.*

*The last date that USPS revised this standard specification section occurs in two places, at the end of this section and in the Table of Contents. If the date in this section matches the date in the Table of Contents, then you are using the latest version. Do not delete or revise the “last revised” date at the end of the section during the development of the Project Manual.*

*The footer in this section should be edited to replace the text, “USPS MPF SPECIFICATION” with the project name, and the blank date in the center should be replaced with the submission date, for interim design reviews, or the issue date of the completed Project Manual.*

***Before editing this Section, obtain the "Report of Subsurface Investigation" prepared by the Geotechnical Engineer. Read the report and incorporate the recommendations included in the report into this Section.***

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1. GENERAL
	1. SUMMARY

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**NOTE TO SPECIFIER**

The decision to use asphalt pavement (this section) or concrete pavement (Section 321313) for the paving of vehicular areas should be made by the Site A/E in consultation with the USPS Project Manager. This decision should be based on local climate and construction practices and must consider not only initial costs but also life cycle costs.

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* + 1. Section Includes:
			1. Bituminous concrete paving.
			2. Surface course.
			3. Binder course.
			4. Paving base course.
		2. Related Documents: The Contract Documents, as defined in Section 011000 - Summary of Work, apply to the Work of this Section. Additional requirements and information necessary to complete the Work of this Section may be found in other Documents.
		3. Related Sections:
			1. Section 312000 ‑ Earth Moving: Earthwork for Pavement.
			2. Section 321313 ‑ Concrete Paving: Concrete paving, curbs and sidewalks.
			3. Section 321723 ‑ Pavement Markings: Painted pavement markings.
	1. REFERENCES
		1. Asphalt Institute (AI):
			1. AI MS-2 - Mix Design Methods for Asphalt Concrete and Other Hot Mix Types.
			2. AI MS-3 - Asphalt Plant Manual.
			3. AI MS-8 - Asphalt Paving Manual.
			4. AI MS-19 - Basic Asphalt Emulsion Manual.
		2. American Society for Testing and Materials (ASTM):
			1. ASTM D 242 - Specification for Mineral Fiber for Bituminous Paving Mixtures.
			2. ASTM D 698 - Test Methods for Moisture-Density Relations of Soils and Soil-Aggregate Mixtures, Using 5.5 Pound Rammer and 12 inch Drop.
			3. ASTM D 1188 - Method for Bulk Specific Gravity and Density of Compacted Bituminous Mixtures Using Paraffin-Coated Specimens.
			4. ASTM D 1557 - Test Methods for Moisture-Density Relations of Soils and Soil-Aggregate Mixtures Using 10 Pound Rammer and 18 inch Drop.
			5. ASTM D 1560 - Test Method for Resistance to Deformation and Cohesion of Bituminous Mixtures by Means of Hveem Apparatus.
			6. ASTM D 2397 - Specification for Cationic Emulsified Asphalt.
			7. ASTM D 2399 - Practice for Selection of Cutback Asphalt.
			8. ASTM D 2726 - Test Method for Bulk Specific Gravity and Density of Nonabsorbative Compacted Bituminous Mixtures.
			9. ASTM D 3381 - Specification for Viscosity-Graded Asphalt Cement for Use in Pavement Construction.
			10. ASTM D 3549 - Test Method for Thickness or Height of Compacted Bituminous Paving Mixture Specimens.
			11. ASTM D 4318 - Test Method for Liquid Limit, Plastic Limit, and Plasticity Index of Soils.
		3. American Association of State Highway and Transportation Officials (AASHTO):
			1. AASHTO T 88 - Particle Size Analysis of Soils.
	2. SYSTEM DESCRIPTION
		1. Design Requirements: Provide asphalt‑aggregate mixture as recommended by local or state paving authorities to suit project conditions. Use locally available materials and gradations which meet standard state highway specifications and exhibit satisfactory records of previous installations.
	3. SUBMITTALS
		1. Section 013300 - Submittal Procedures: Procedures for submittals.
			1. Assurance/Control Submittals:
				1. Design Data:

Submit design mix following format indicated Asphalt Institute Manual MS‑2, Marshall Stability Method; including type/name of mix, gradation analysis, grade of asphalt cement used, Marshall Stability (pounds), flow, effective asphalt content (percent), and direct references to applicable state highway department specification sections for each material.

Provide design mixture listed in current edition of applicable state highway department specifications.

Use mix designs prepared within 3 years maximum.

Provide documentation of state highway limitations, if any, on use of recycled content materials.

* + - * 1. Certificates: Submit materials certificate to Testing Laboratory signed by material supplier and Contractor, certifying that materials comply with, or exceed, the requirements specified herein.
				2. Qualification Documentation: Paving installer documentation of experience indicating compliance with specified qualification requirements.
	1. QUALITY ASSURANCE
		1. Perform Work in accordance with AI MS-8
		2. Installer Qualifications: Company specializing in performing the Work of this Section with minimum 5 years documented experience.
		3. Regulatory Requirements:
			1. Conform to applicable requirements for paving work on public property.
			2. Maintain access for vehicular and pedestrian traffic as required for other construction activities. Use temporary striping, flagmen, barricades, warning signs, and warning lights as required.
	2. PROJECT CONDITIONS OR SITE CONDITIONS
		1. Jobsite Requirements:
			1. Apply prime and tack coats when ambient temperature is above 40 degrees F, and when temperature has been above 35 degrees F for 12 hours immediately prior to application. Do not apply when base is wet, contains excess moisture, or during rain.
			2. Construct bituminous concrete paving when atmospheric temperature is above 40 degrees F.

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**NOTE TO SPECIFIER**

**REQUIRED**: Do not revise ENVIRONMENTAL REQUIREMENTS without an approved Deviation from USPS Headquarters, Facilities Program Management, through the USPS Project Manager.

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* 1. ENVIRONMENTAL REQUIREMENTS
		1. Resource Management:
			1. Recycled Content: Provide aggregate fabricated from a minimum of 30% recycled rubble or concrete. Provide asphalt cement fabricated from recycled content asphalt.
1. PRODUCTS
	1. MATERIALS

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**NOTE TO SPECIFIER**

**REQUIRED**: Do not revise BASE COURSE and ASPHALT CEMENT without an approved Deviation from USPS Headquarters, Facilities Program Management, through the USPS Project Manager.

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* + 1. Base Course: As indicated on Drawings, complying with applicable state highway specifications regarding source, quality, gradation, liquid limit, plasticity index and mix proportioning.
			1. Unless otherwise specified in applicable state highway specifications, provide base course aggregate fabricated from minimum 30 percent recycled rubble or concrete.
		2. Asphalt Cement: Fabricated from minimum 15 percent recycled asphalt and complying with ASTM D 3381; Table 2 AC‑10, AC‑20, or AC‑30, viscosity grade, depending on local mean annual air temperature as indicated below:

TEMPERATURE CONDITION ASPHALT GRADES

Cold, mean annual air temperature at 45 degrees F or lower AC‑10, 85/100 pen.

Warm, mean annual air temperature between 45 degrees F and 75 degrees F AC‑20, 60/70 pen.

Hot, mean annual air temperature at 75 degrees F or higher AC‑30

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**NOTE TO SPECIFIER**

Delete paragraph below when prime coat is not to be included.

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* + 1. Prime Coat: A medium curing cut‑back asphalt or an asphalt penetrating prime coat consisting of either ASTM D 2397 or ASTM D 2399, MC‑ 30 or SS‑1h.
		2. Tack Coat: Emulsified asphalt; ASTM D 2397 or ASTM D 2399, SS‑1h, CSS‑1, or CSS‑1h, diluted with one part water to one part emulsified asphalt.
		3. Mineral Filler: Rock or slag dust, hydraulic cement, or other inert material complying with AASHTO M‑17/ASTM D 242, if recommended by applicable state highway department standards.
		4. Asphalt‑Aggregate Mixture: Unless otherwise indicated on Drawings, the Design Mix shall have a minimum stability based on a 50‑blow Marshall complying with ASTM D 1559 of 1000 pounds with a flow between 8 and 16. The Design Mix shall be within sieve analysis and bitumen ranges below:

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**NOTE TO SPECIFIER**

Use paragraph below and delete paragraph above where CALTRANS standard is used in place of Marshall test.

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* + 1. Asphalt‑Aggregate Mixture: Unless otherwise indicated on Drawings, the Design Mix shall have a minimum stability based on CALTRANS AR4000. The Design Mix shall be within sieve analysis and bitumen ranges below:

SIEVE ANALYSIS OF MIX

Square Sieve Total Percent Passing Percent Tolerance

1/2 inch 80 ‑ 100 5

3/8 inch 65 ‑ 93 4

No. 8 0 ‑ 55 4

No. 50 2 ‑ 27 2

No. 200 0 ‑ 10 2

Percent Bitumen by Weight of Total Mix: 5.0 ‑ 8.5.

Percent Air Voids: 3‑6.

Percent Aggregate Voids Filled with Asphalt Cement: 70 ‑ 82.

Allowable Variance of Percent Bitumen by Weight of Total Mix: 0.4.

* 1. EQUIPMENT
		1. Maintain equipment in satisfactory operating condition and correct breakdowns in a manner that will not delay or be detrimental to progress of paving operations.
1. EXECUTION
	1. EXAMINATION
		1. Section 017300 - Execution: Verification of existing conditions before starting work.
		2. Verification of Conditions: Verify that field measurements, surfaces, substrates and conditions are as required, and ready to for earthwork operations to begin.
			1. Verify gradients and elevations of base are correct, and base is dry.
		3. Report in writing to Contracting Officer prevailing conditions that will adversely affect satisfactory execution of the Work of this Section. Do not proceed with Work until unsatisfactory conditions have been corrected.
		4. By beginning Work, Contractor accepts conditions and assumes responsibility for correcting unsuitable conditions encountered at no additional cost to the United States Postal Service.
	2. BASE COURSE PLACEMENT

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**NOTE TO SPECIFIER**

Minimum thickness as per project site requirements. Coordinate with geotechnical engineer.

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* + 1. Perform base course construction in a manner that will drain surface properly at all times and at the same time prevent runoff from adjacent areas from draining onto base course construction.
		2. Compact base material to not less than 98 percent of optimum density as determined by ASTM D 698 or 95 percent of optimum density, as determined by ASTM D 1557, unless otherwise indicated on the Drawings.
		3. Granular Base: Construct to thickness indicated on Drawings. Apply in lifts or layers not exceeding 8 inches, measured loose.
		4. Sand/Shell Base: Construct to thickness indicated on Drawings. Apply in lifts or layers not exceeding 4 inches, measured loose.
		5. Asphalt Institute Type IV Mix for Full Depth Asphalt Base: Construct to thickness indicated on Drawings in lifts or layers not exceeding 3 inches, measured loose.
		6. Asphalt Institute Type VI, VII, or VIII Mixes for Hot‑Mix Sand Asphalt Bases: Construct to thickness indicated on Drawings. Apply in lifts or layers not exceeding 3 inches, measured loose.
		7. Soil Cement Stabilized Base: Construct to thickness and strength as indicated on Drawings and in accordance with applicable state highway specifications. If not indicated on the Drawings, the minimum compressive strength shall be 500 pounds per square inch, tested at 28 days.
	1. APPLICATIONS
		1. Prime Coat:
			1. Apply bituminous prime coat to all base material surfaces where bituminous concrete paving will be constructed.
			2. Apply bituminous prime coat in accordance with applicable state highway specifications.
			3. Apply at minimum rate of 0.25 gallon per square yard over compacted base material. Apply to penetrate and seal, but not flood surface.
			4. Make necessary precautions to protect adjacent areas from overspray.
			5. Cure and dry as long as necessary to attain penetration of compacted base and evaporation of volatile substances.
		2. Tack Coat:
			1. Apply to contact surfaces of previously constructed bituminous concrete base courses or portland cement concrete and surfaces abutting or projecting into bituminous concrete or into bituminous concrete pavement.
			2. Apply tack coat to bituminous concrete base course or sand asphalt base course. Apply emulsified asphalt tack coat between each lift or layer of full depth bituminous concrete and sand asphalt bases and on surface of all such bases where bituminous concrete paving will be constructed.
			3. Apply emulsified asphalt tack coat in accordance with applicable state highway specifications.
			4. Apply at minimum rate of 0.05 gallon per square yard of surface.
			5. Allow to dry until at proper condition to receive paving.
	2. BITUMINOUS CONCRETE PLACEMENT
		1. Place bituminous concrete mixture on completed compacted subgrade surface, spread, and strike off. Spread mixture at following minimum temperatures:
			1. When ambient temperature is between 40 degrees F and 50 degrees F, mixture temperature equal to 285 degrees F.
			2. When ambient temperature is between 50 degrees F and 60 degrees F, mixture temperature equal to 280 degrees F.
			3. When ambient temperature is higher than 60 degrees F, mixture temperature equal to 275 degrees F.
		2. Whenever possible, all pavement shall be spread by a finishing machine; however, inaccessible or irregular areas may be placed by hand methods. The hot mixture shall be spread uniformly to the required depth with hot shovels and rakes. After spreading, the hot mixture shall be carefully smoothed to remove all segregated course aggregate and rake marks. Rakes and lutes used for hand spreading shall be of the type designed for use on asphalt mixtures. Loads shall not be dumped faster that they can be properly spread. Workers shall not stand on the loose mixture while spreading.
		3. Paving Machine Placement: Apply successive lifts of bituminous concrete in transverse directions with the surface course placed in the direction of surface‑water flow. Place in typical strips not less than 10 feet wide.
		4. Joints: Make joints between old and new pavements, or between successive days and work in a manner that will provide a continuous bond between adjoining work. Construction joints shall have same texture, density, and smoothness as other sections of bituminous concrete course. Clean contact surfaces of all joints and apply tack coat.
	3. ROLLING AND COMPACTION
		1. The mixture, after being spread, shall be thoroughly compacted by rolling as soon as it will bear the weight of the rollers without undue displacement. The number, weight, and types of rollers and sequences of rolling operations shall be such that the required density and surface are consistently attained while the mixture is in a workable condition.
		2. Compact mixture with hot hand tampers or vibrating plate compactors in areas inaccessible to rollers.
		3. Breakdown Rolling: Accomplish breakdown or initial rolling immediately following rolling of joints and outside edge. Check surface after breakdown rolling, and repair displaced areas by loosening and filling with hot material.
		4. Second Rolling: Follow breakdown rolling as soon as possible, while mixture is hot. Continue second rolling until mixture has been thoroughly compacted.
		5. Finish Rolling: Perform finish rolling while mixture is still warm enough for removal of roller marks. Continue rolling until roller marks are eliminated and course has attained maximum density.
		6. Patching: Remove and replace paving areas mixed with foreign materials and defective areas. Cut out such areas and fill with fresh, hot bituminous concrete. Compact by rolling to maximum surface density and smoothness.
		7. Protection: After final rolling, do not permit vehicular traffic on pavement until it has cooled and hardened. Erect barricades to protect paving from traffic until mixture has cooled enough not to become marked.
	4. CONSTRUCTION
		1. Site Tolerances:
			1. Paving Surface Smoothness: Maximum allowable 10 foot straightedge tolerance for smoothness.
				1. Base Course Surface: 1/4 inch.
				2. Wearing Surface Course: 3/16 inch.
	5. FIELD QUALITY CONTROL
		1. Section 014000 - Quality Requirements: Field inspection and testing procedures
		2. Site Tests:
			1. Paving Base Course: Perform testing of in-place base courses for compliance with requirements for thickness, compaction, density, and tolerance.
				1. Moisture/Density Test: ASTM D 698 or ASTM D 1557.
				2. Mechanical Analysis Test: AASHTO T-88.
				3. Plasticity Index Test: ASTM D 4318.
				4. Base Material Thickness Test: Minimum one test for every 20,000 square feet.
				5. Base Material Compaction Test: Minimum one test for every 20,000 square feet.
				6. Field Density Tests: Perform testing of in-place base courses for compliance with requirements for density using one of the following methods:

Sand-cone Method: ASTM D 1556.

Balloon Method: ASTM D 2167.

Nuclear Method: ASTM D 2922, Method B (Direct Transmission).

* + - * 1. Test each source of base material for compliance with applicable state highway specifications.
			1. Asphalt Concrete Paving: Perform testing of in-place asphalt concrete paving courses for compliance with requirements for thickness, compaction, and surface smoothness.
				1. Thickness: ASTM D 3549; Thickness shall not be less than thickness specified on Drawings.
				2. Surface Smoothness: Testing shall be performed on the finished surface of each asphalt paving course using 10 foot straightedge applied parallel with, and at right angles to centerline of paved areas. Smoothness shall not be less than tolerances specified herein.
			2. Compaction: Field density test for in place materials shall be performed by examination of field cores in accordance with one of the following standards:
				1. Bulk Specific Gravity of Paraffin‑Coated Specimens: ASTM D 1188, minimum one core per 20,000 square feet.

Standard Duty Areas: Minimum 3 cores.

Heavy Duty Areas: Minimum 3 cores.

* + - * 1. Bulk Specific Gravity Using Saturated Surface‑Dry Specimens: ASTM D 2726, minimum one core per 20,000 square feet.

Standard Duty Areas: Minimum 3 cores.

Heavy Duty Areas: Minimum 3 cores.

END OF SECTION

USPS MPF Specification Last Revised: 10/1/2022