SECTION 321313

CONCRETE PAVING

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***NOTE TO SPECIFIER***

*Use this Specification Section for Mail Processing Facilities.*

***This is a Type 1 Specification with completely editable text; therefore, any portion of the text can be modified by the A/E preparing the Solicitation Package to suit the project.***

*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 concrete pavement (this section) or asphalt pavement (Section 321216) 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. Concrete Pavement
       2. Concrete walks and terraces.
       3. Concrete curbs, and curb and gutters.
    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 321216 - Asphalt Paving.
       3. Section 033000 - Cast-In-Place Concrete: Concrete requirements for pavement.
  1. REFERENCES
     1. American Concrete Institute (ACI):
        1. ACI 301 ‑ Specifications for Structural Concrete.
        2. ACI 308 ‑ Standard Practice for Curing Concrete.
     2. American society for Testing and Materials (ASTM):
        1. ASTM A 185 ‑ Specification for Steel Welded Wire, Fabric, Plain, for Concrete Reinforcement.
        2. ASTM A 615 ‑ Specification for Deformed and Plain Billet‑Steel Bars for Concrete Reinforcement.
        3. ASTM C 494 - Standard Specification for Chemical Admixtures for Concrete.
        4. ASTM C 618 - Standard Specification for Coal Fly Ash and Raw or Calcined Natural Pozzolan for Use as a Mineral Admixture in Concrete.
        5. ASTM D 1751 ‑ Specification for Preformed Expansion Joint Fillers for Concrete Paving and Structural Construction (Nonextruding and Resilient Bituminous Types).
  2. SUBMITTALS
     1. Section 013300 - Submittal Procedures: Procedures for submittals.
        1. Product Data: Submit product data for the following:
           1. Joint filler.
           2. Joint sealant.
           3. Concrete admixtures.
           4. Concrete curing compounds.
        2. Assurance/Control Submittals:
           1. Concrete Mix Design: Submit three copies of each proposed mix design for each class of concrete in accordance with ACI 301, Sections 3.9 "Proportioning on the basis of previous field experience or trial mixture", or 3.10 "Proportioning based on empirical data". Submit separate mix design for concrete to be placed by pumping, in addition to the mix design for concrete to be placed directly from the truck chute.
           2. Include the following information in concrete mix design:

Proportions of cement, fine and coarse aggregate, and water.

Water‑cement ratio, 28-day compressive design strength, slump, and air content.

Type of cement and aggregate.

Aggregate gradation.

Type and dosage of admixtures.

Special requirements for pumping.

Range of ambient temperature and humidity for which design is valid.

Special characteristics of mix which require precautions in mixing, placing, or finishing techniques to achieve finished product specified.

* 1. QUALITY ASSURANCE
     1. Perform work in accordance with ACI 301.
     2. Conform to ACI 305R when mixing and placing concrete during hot weather.
     3. Conform to ACI 306R when mixing and placing concrete during cold weather.
     4. Regulatory Requirements:
        1. Conform to applicable requirements for paving work on public property.
        2. Contractor shall maintain access for vehicular and pedestrian traffic as required for other construction activities. Utilize temporary striping, flagmen, barricades, warning signs, and warning lights as required.

1. PRODUCTS
   1. FORM AND REINFORCING MATERIAL
      1. Forms: Steel, wood, or other suitable material of size and strength to resist movement during concrete placement and to retain horizontal and vertical alignment until removal. Use straight forms, free of distortion and defects. Use flexible spring steel forms or laminated boards to form radius bends as required.
         1. APA Exterior Plyform BB with a medium density, smooth, hard, fused resin fiber overlay, or metal forms.
         2. Form Oil: Coat forms with non-staining type coating that will not discolor or deface surface of concrete. Subject to compliance with requirements, manufacturers offering specified items which may be incorporated in the work include the following.
            1. "Eucoslip" - Euclid Chemical Co., Cleveland, OH (800) 321-7628.
            2. "Form Coating" - Nox-Crete Chemicals, Omaha, NE (800) 669-2738.
            3. Substitutions: Under provisions of Section 016000.
      2. Curb, Curb and Gutter Forms: Use flexible spring-steel forms or laminated boards to form radius bends. Tolerance: Not to deviate more than 1/4 inch in 10 feet in grade and alignment.
      3. Reinforcing:
         1. Welded Wire Mesh: Welded plain cold‑drawn steel wire fabric, ASTM A 185. Furnish in flat sheets, not rolls, unless otherwise acceptable to Owner.
         2. Reinforcing Bars: Deformed steel bars, ASTM A 615, Grade 60.
         3. Fiber reinforced concrete mixtures having the same strength or exceeding as specified for concrete mixes, as verified by Manufacturer’s testing laboratory procedures, shall be considered as an alternate for welded wire mesh in exterior flat work, curbs and sidewalks.
      4. Reinforcing Accessories:
         1. Reinforcing Accessories: Subject to compliance with requirements, manufacturers offering specified items which may be incorporated in the work include the following.
            1. Dayton Superior Corp., Miamisburg, OH (800) 745-3700.
            2. Heckmann Building Products, Inc., Chicago, IL (800) 621-4140.
            3. Hohmann & Barnard, Inc., Hauppauge, NY (800) 645-0616.
            4. Richmond Screw Anchor Co., Inc., Ft. Worth, TX (817) 284-4981.
         2. Conform to Concrete Reinforcing Steel Institute Manual of Standard Practice. Include spacers and chairs with plastic tipped legs, ties and other devices necessary for properly assembling, placing, spacing and supporting forms and reinforcement in place.
         3. Section 016000 - Product Requirements: Product options and substitutions. Substitutions: Permitted.
   2. CONCRETE MATERIALS
      1. Comply with requirements of applicable Section 033000 for concrete materials, admixtures, bonding materials, curing materials, surface sealers and others as required.
      2. Cement:
         1. Portland Cement: ASTM C150 Type 1.
         2. High-early Strength Portland Cement: ASTM C150, Type III.
      3. Aggregates: ASTM C33.
         1. Fine aggregate shall be natural sand, or sand prepared from stone or gravel. Grains shall; be clean, hard, durable, uncoated and free from silt, loam and clay.
         2. Coarse Aggregates: Crushed stone, gravel, or other approved inert materials of similar characteristics, or combinations thereof, having hard, strong, durable pieces free from adherent coatings. Maximum size of pieces shall be 3/4" to #4 except for footings, which may be 1-1/2". The maximum size of aggregate may also be not larger than one fifth of the narrowest dimension between forms, nor larger than three fourths of the minimum clear spacing between reinforcing bars.
      4. Water: Clean and free from injurious amounts of oil, acids, salts, organic or other deleterious matter.
      5. Air Entrainment: ASTM C260.
         1. Use air-entrained concrete for exterior exposed concrete including walls, walks, paving, etc. where minimum daily temperatures are expected below 38 degrees F during pouring or subsequent 38 day curing period.
         2. Proportion air-entraining concrete to attain minimum 28-day compressive strength specified.
         3. Total Air Entrainment in Concrete: Not less than four percent nor more than six percent volume of concrete.
      6. Admixtures:
         1. May be used at Contractor’s option to provide workability at low slumps, increased compressive strength, retardation or acceleration of the concrete.
         2. Chemical Admixtures: ASTM C494. Mineral Admixtures: ASTM C618.
         3. The cement factor shall not be reduced and changes shall be made in the other mix proportions to ensure the minimum strength requirements.
         4. Use of admixtures approved in writing by Architect. No additional expense to the Owner will be allowed.
         5. No calcium chloride shall be used.
         6. Before any admixture is accepted for use, the Contractor shall submit certified laboratory reports on each additive material to the architectural consultant. The report shall show the following:
            1. Confirmation of compliance with the applicable ASTM Standard.
            2. Evaluation of the effects of the admixture on the properties of the concrete to be made on the job, including consideration of the anticipated ambient conditions on the job, and proposed construction procedures.
            3. Determination of within-lot uniformity of product proposed for use.
   3. CONCRETE MIXES
      1. Concrete Proportions:
         1. Concrete shall be homogenous, and when hardened, shall have the required strength, resistance to deterioration, durability, water tightness and the properties as specified.
         2. Minimum concrete strength at 28 days shall be;
            1. 3,000 psi for walks, terraces, curbs and gutters.
            2. 4,000 psi for concrete pavement and pads.
         3. Slump of concrete:
            1. Pavement: 2-1/2 inch minimum to 4 inch maximum.
            2. Ramps and sloping surfaces: Not more than 3 inches.
      2. Ready-Mix Concrete:
         1. Ready-mix concrete shall conform to ASTM C94. The mixing agitation shall begin within 30 minutes, and the concrete shall be discharged from the truck within one hour after the water has been added to the concrete mix.
         2. Delivery tickets are to accompany each concrete truck and shall be kept in the job superintendent's file. Delivery tickets must indicate the following information or be subject to rejection:
            1. Name of project.
            2. Supplier of concrete.
            3. Truck identity and ticket serial number.
            4. Date of delivery.
            5. Brand of cement.
            6. Cement content.
            7. Strength classification.
            8. Batching time.
            9. Point of deposit.
            10. Total amount of water.
            11. Weight of aggregate.
            12. Daily temperature.
            13. Number of cubic yards in load.
            14. Admixture content.
            15. Name of Contractor.
            16. Name of driver.
            17. Time loaded and first mixing of concrete.
            18. Reading of revolution counter.
         3. Quantity of water used for each batch shall be accurately measured.
   4. JOINT MATERIALS
      1. Sealed expansion and contraction joints: Filler of nonbituminous rubber or cork conforming to ASTM D1752.
      2. Non-sealed joints:
         1. Non-sealed Joints: Subject to compliance with requirements, manufacturers offering specified items which may be incorporated in the work include the following.
            1. "Flexcell" - Celotex Corp., Tampa, FL (813) 873-1700.
            2. "Seal Tight Fiber Expansion Joint" - W.R. Meadows, Inc., Hampshire, IL (800) 342-5976.
         2. Filler premolded bituminous type conforming to ASTM D1751.
         3. Section 016000 - Product Requirements: Product options and substitutions. Substitutions: Permitted.
      3. Noncompressive Filler:
         1. Noncompressive Filler: Subject to compliance with requirements, manufacturers offering specified items which may be incorporated in the work include the following.
            1. "Styrofoam SM" - Dow Chemical Co., Midland, MI (517) 636-0754.
            2. "Foamular" - Owens Corning, Toledo, OH (800) 828-7155.
         2. 2 inch or 1 inch thick sheets.
         3. Section 016000 - Product Requirements: Product options and substitutions. Substitutions: Permitted.
      4. Compressive Filler:
         1. Compressive Filler: Subject to compliance with requirements, manufacturers offering specified items which may be incorporated in the work include the following.
            1. "Ethafoam" - Dow Chemical Co., Midland, MI (800) 322-8723.
            2. "Rodofoam No. 423" - Sternson Group, Brampton, ON (800) 265-8417.
         2. 2 inch or 1 inch thick sheets, compression modulus within the range of 15 to 25 pounds per square inch per inch.
         3. Section 016000 - Product Requirements: Product options and substitutions. Substitutions: Permitted.
      5. Filler Adhesive for Noncompressive Filler and Compressive Filler:
         1. Filler Adhesive: Subject to compliance with requirements, manufacturers offering specified items which may be incorporated in the work include the following.
            1. "General Purpose Mastic No. 11" - Dow Chemical Co., Midland, MI (800) 322-8723.
            2. "Rodofast" - Sternson Group, Brampton, ON (800) 265-8417.
         2. Section 016000 - Product Requirements: Product options and substitutions. Substitutions: Permitted.
      6. Slab-on-grade Construction Joints: Provide a full slab depth 24 gauge metal preshaped key, approximate depth of key to be 1/4 slab thickness and a key width of about 1/10 slab thickness.
      7. Joint Sealants: ASTM C920. Non‑priming, pourable, self‑leveling polyurethane. Subject to compliance with project requirements manufacturers offering joint sealants which may be incorporated in the Work include, but are not limited to the following:
         1. Sonolastic Paving Joint Sealant, by Sonneborn, Shakopee, MN (800) 433-9517.
         2. Sonomeric CT 1 Sealant, by Sonneborn, Shakopee, MN (800) 433-9517.
         3. Sonomeric CT 2 Sealant, by Sonneborn, Shakopee, MN (800) 433-9517.
         4. Vulkem 45, by Mameco, Cleveland, OH (800) 321-6412.
         5. Chem-Caulk, by Bostik, Middleton, MA (800) 726-7845.
         6. "THC-900" - Tremco, Beachwood, OH (800) 562-2728.
         7. Section 016000 - Product Requirements: Product options and substitutions. Substitutions: Permitted.
   5. CURING MATERIALS
      1. Sealers:
         1. Sealers: Subject to compliance with requirements, manufacturers offering specified items which may be incorporated in the work include the following.
            1. "Polyseal" - W.R. Meadows, Inc., Hampshire, IL (800) 342-5976.
            2. "Kure-N-Seal" - Sonneborn, Shakopee, MN (800) 433-9517.
            3. "Cure-Hard" - W.R. Meadows, Inc., Elgin, IL (312) 683-4500.
         2. ASTM C156 and ASTM C309, Type I. Material shall become integral part of concrete and leave slab free of residue or film.
         3. Section 016000 - Product Requirements: Product options and substitutions. Substitutions: Permitted.
      2. Membrane: Opaque-white polyethylene sheet, 0.006 inch thick, meeting requirements of ASTM C171.
2. EXECUTION
   1. EXAMINATION
      1. Section 017300 - Execution Requirements: 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. SUBGRADE PREPARATION
      1. Conform with the requirements specified in Section 312000 .
      2. Thoroughly wet subgrade and then compact with two passes of a 500 pound roller.
      3. Pumping: Where concrete paving or sidewalks, and curbs are to be placed, yielding material deflecting more than 1/2 inch under a 500 lb. roller shall be removed to a depth of not less than 4 inches below subgrade elevation and replaced with an approved granular material which shall then be compacted as described above.
      4. The subgrade shall be in a moist condition when the concrete is placed. In cold weather the subgrade shall be prepared and protected so as to provide a subgrade free from frost when the concrete is deposited.
   3. FORM CONSTRUCTION
      1. Comply with the requirements of Section 033000. Install sufficient quantity of forms to allow continuous progress of the work and so that forms can remain in place at least 24 hours after concrete placement.
      2. Check complete formwork for grade and alignment to the following tolerances:
         1. Top of form: Not more than 1/8 inch in 10 feet.
         2. Vertical face: Longitudinal axis not more than 1/4 inch in 10 feet.
   4. PLACING REINFORCEMENT
      1. Support reinforcing and wire securely together to prevent displacement by construction loads and traffic, or the placing of concrete. For slabs on grade, supporting pieces of concrete blocks or bricks may be used.
      2. Place wire mesh reinforcing two inches above bottom of slab unless otherwise indicated.
      3. Reinforcement shall be kept clean from oil, dirt and loose mill scale or other coatings which might destroy the concrete bond. Remove tags and markings prior to concrete placement.
      4. Do not place concrete until reinforcement has been inspected and approved by local authorities, if required.
   5. CONCRETE PLACEMENT AND FINISHING
      1. Tamp and consolidate concrete with a suitable wood or metal tamping bar and the surface shall be finished to grade with a wood float.
      2. Finished surfaces shall not vary more than 3/16 inch from the testing edge of a 10 foot straightedge.
      3. Curb Expansion Joints: Fill joints with 1/2 inch thick joint filler strips conforming to ASTM D1751 or ASTM D1752.
      4. Contraction Joints: Divide the surface of paving, walks and terraces into rectangular areas not to exceed 5 feet 0 inches each way.
         1. Cut a groove in the top portion of the slab to a depth of at least one-fourth of the slab thickness using a jointer or by sawing a groove in the hardened concrete with a power-driven saw.
         2. Membrane-cured surface damaged during the sawing operations shall be resprayed as soon as the surface becomes dry.
      5. Slab Finishes: ACI 301, paragraph 11.7 and as follows:
         1. Broom Finish: On stair treads with abrasive nosings and on walks, unless other finishes have been indicated or specified.
         2. Broom or Belt Finish: On level walks. Broom in direction perpendicular to travel and approved sample panel. Submit joint pattern layout prior to starting work.
   6. TOLERANCES
      1. Horizontal slabs: Finished surfaces true with no deviation in excess of 1/8 inch when tested with a 10 foot straightedge, non-accumulative. No coarse aggregate showing.
      2. Steps:
         1. Variation in steps within a flight of stairs:
            1. Rise: 1/8 inch.
            2. Tread: 1/4 inch.
         2. Variation in consecutive steps:
            1. Rise: 1/16 inch.
            2. Tread: 1/8 inch.
   7. EXPANSION JOINTS
      1. Install transverse expansion joints at returns and 15 feet on center.
      2. Install longitudinal expansion joints where curbs and paved areas abut each other, buildings, other concrete slabs and pads or vertical restraints.
      3. Place joint filler with top edge 1/4 inch below the surface and shall be held in place with steel pins or other devices to prevent warping of the filler during floating and finishing.
      4. Immediately after finishing operations are completed, round joint edges with edging tool having a radius of 1/8 inch. Remove concrete over the joint filler.
      5. At the end of the curing period, clean and fill expansion joints with joint sealer. Fill joints flush with concrete surface. Dummy groove joints shall not be sealed.
   8. CURING
      1. Immediately after the finishing operations, the exposed concrete surface shall be cured for 7 days by the mat, impervious sheet, or membrane-curing method.
   9. BACKFILLING
      1. After curing, remove debris and backfill the adjoining areas, grade and compact to conform to the surrounding area in accordance with the lines and grades indicated.
   10. PROTECTION
       1. Protect the completed work from damage. Repair damaged concrete and clean concrete discolored during construction. Remove work that is damaged and reconstruct to entire length between regularly scheduled joints. Refinishing damaged portion is not acceptable.
       2. Prevent cars and trucks from driving on new pavement for a minimum of 14 days.

END OF SECTION

USPS MPF Specification Last Revised: 10/1/2022