

SECTION 32 13 13
CONCRETE PAVING

PART 1 GENERAL

1.1 SUMMARY

- A. Section Includes:
1. Concrete sidewalks.
 2. Concrete integral curbs and gutters.
 3. Concrete median barriers.
 4. Concrete base and surface for parking areas and roads.
 5. Small miscellaneous slabs.
- B. Related Sections:
1. Section 31 23 23 - Excavation and Fill: Compacted subgrade for paving.
 2. Section 32 11 23 - Aggregate Base Courses: Compacted base for paving.
 3. [Section 32 12 16 - Asphalt Paving: Asphalt wearing course.]
 4. [Section 32 17 23 - Pavement Markings.]
 5. Section 33 05 13 - Manholes and Structures: Frames and lids in paving.

1.2 REFERENCES

- A. American Association of State Highway Transportation Officials (AASHTO)
1. AASHTO M 31 - Deformed and Plain Carbon Steel Bars for Concrete Reinforcement.
 2. AASHTO M 32 - Steel Wire, Plain for Concrete Reinforcement.
 3. AASHTO M 282 - Joint Sealants, Hot Poured, Elastomeric-Type, for Portland Cement Concrete Pavements.
- B. American Concrete Institute:
1. ACI 301 - Specifications for Structural Concrete.
 2. ACI 304 - Guide for Measuring, Mixing, Transporting, and Placing Concrete.
- C. ASTM International:
1. ASTM C309 - Standard Specification for Liquid Membrane-Forming Compounds for Curing Concrete.
 2. ASTM A 497 - Standard Specification for Steel Welded Wire Fabric, Deformed, for Concrete Reinforcement.
 3. ASTM A 615 - Standard Specification for Deformed and Plain Billet-Steel Bars for Concrete Reinforcement.
 4. ASTM C1315 - Standard Specification for Liquid Membrane-Forming Compounds Having Special Properties for Curing and Sealing Concrete.
 5. ASTM D1751 - Standard Specification for Preformed Expansion Joint Filler for Concrete Paving and Structural Construction (Nonextruding and Resilient Bituminous Types).
 6. ASTM D1752 - Standard Specification for Preformed Sponge Rubber and Cork Expansion Joint Fillers for Concrete Paving and Structural Construction.
- D. SCDOT Standard Specifications:
1. Standard Specifications for Highway Construction, 2007, published by the South Carolina Department of Transportation.

1.3 SUBMITTALS

- A. Section 01 33 00 - Submittal Procedures: Requirements for submittals.
- B. Concrete Mix Design: Submit concrete mix design 30 days prior to use of concrete.
- C. Product Data: Submit data on joint materials, admixtures, and curing compounds.
- D. Manufacturer's Certification: Certify products are produced at a plant approved by SCDOT and that products meet or exceed specified requirements.
- E. Installer Certification: Certify installer is on list of SCDOT prequalified contractors with an approved Quality Control Plan.
- F. Process Control Plan: Submit process control plan for delivering and placing concrete.
- G. Samples: Submit two sample panels, 2 inch x 12 inch in size, illustrating exposed aggregate finish.

1.4 QUALITY ASSURANCE

- A. Perform Work in accordance with section 501 of SCDOT Standard Specifications, except as modified herein.
- B. Maintain one copy of document on site.
- C. Obtain cementitious materials from same source throughout.

1.5 QUALIFICATIONS

- A. Manufacturer: Company specializing in manufacturing products specified in this Section and prequalified by SCDOT.
- B. Installer: Company specializing in performing Work of this Section and prequalified by SCDOT.

1.6 ENVIRONMENTAL REQUIREMENTS

- A. Section 01 60 00 - Product Requirements: Environmental conditions affecting products on site.
- B. Do not place concrete when base surface temperature or air temperature in the shade is 40 degrees F and falling or surface is wet or frozen.
- C. Do not place concrete when air temperature in the shade is 95 degrees F and rising or when concrete temperature is greater than 95 degrees F.

PART 2 PRODUCTS

2.1 FORM MATERIALS

- A. Slip Form Methods: Use slip form methods wherever possible.
- B. Fixed Form Materials: Metal conforming to Section 501 of SCDOT Standard Specifications.

2.2 JOINT MATERIALS

- A. General: Conform to Section 501 of SCDOT Standard Specifications.
- B. Joint Filler: Sponge rubber or cork type conforming to ASTM D1751 (AASHTO M213) or bituminous, non-extruding, resilient type conforming to ASTM D1752 (AASHTO M153), Type 1; thickness as indicated on Drawings.
- C. Silicone Sealant: Low modulus, cold applied, single component, chemically curing silicone material.
 - 1. Type NS: Non-sag silicone, toolable.
 - 2. Type SL: Self-leveling silicone, tooling not required.
- D. Rubber Asphalt Sealant: Hot poured rubber asphalt joint sealer conforming to AASHTO M282 (ASTM D3406).
- E. Bond Breaker:
 - 1. General: Product that does not stain or adhere to the sealant and is chemically inert and resistant to oils, gasoline, solvents, and primer.
 - 2. For On-Grade Pavements: Circular backer rod, diameter 25 percent larger than joint width.
 - a. Type L, For Cold Pour Sealants Only: Closed cell expanded polyethylene foam. Use with Type NS silicone only.
 - b. Type M, For Cold or Hot Pour Sealants: Closed cell polyolefin with closed skin over an open cell core.
 - 3. For Bridge Decks Only: Bond breaking tape, extruded polyethylene with pressure sensitive adhesive on one side, minimum 0.005 inches thick.

2.3 REINFORCEMENT

- A. General: Conform to Section 501 of SCDOT Standard Specifications.
- B. Reinforcing Steel: ASTM A615 (AASHTO M 31); 60 ksi yield grade; deformed billet steel bars; epoxy coated finish.
- C. Dowels and Tie Bars: ASTM A615 (AASHTO M 31); 60 ksi yield grade, plain steel, epoxy coated finish.
- D. Welded Wire Fabric Steel: Deformed type, ASTM A497; unfinished.

2.4 CONCRETE MATERIALS

- A. Concrete Materials: Provide fine aggregate, coarse aggregate, Portland Cement, fly ash, ground granulated blast furnace slag, water, air entraining agent, and chemical admixtures in accordance with Section 501 of SCDOT Standard Specifications.

2.5 ACCESSORIES

- A. Curing Compound: ASTM C309 (AASHTO M-148), Type 1 clear or translucent or Type 2 white pigmented.

2.6 CONCRETE MIX

- A. Mix and deliver concrete in accordance with Section 501 of SCDOT Standard Specifications.

- B. Roadway and Area Pavement concrete: Air entrained conforming to the following criteria:
 - 1. Flexural Strength: 650 psi at 28 days.
 - 2. Slump: 1.5 inch maximum for slip form method, 3 inches maximum for fixed form hand methods.
 - 3. Minimum Cement Content: 526 pounds/cubic yard.
 - 4. Maximum Water/Cement Ratio: 0.559.
 - 5. Air Entrainment: Between 4.5 and 5.5 percent.

- C. Class A Concrete for sidewalk, curb, curb and gutter, and other incidental site concrete: Air entrained, vibrated conforming to the following criteria:
 - 1. Compressive Strength: 3,000 psi at 28 days.
 - 2. Maximum Slump Vibrated: 3.5 inches.
 - 3. Minimum Cement Content: 564 pounds/cubic yard.
 - 4. Maximum Water/Cement Ratio for Angular Aggregate: 0.532.
 - 5. Maximum Water/Cement Ratio for Rounded Aggregate: 0.488.
 - 6. Air Entrainment: 6.0 percent plus or minus 1.5 percent.

- D. Use accelerating admixtures in cold weather only when approved by the Engineer in writing. Use of admixtures will not relax cold weather placement requirements.

- E. Use calcium chloride only when approved by the Engineer in writing.

- F. Use set retarding admixtures during hot weather only when approved by the Engineer in writing.

2.7 SOURCE QUALITY CONTROL AND TESTS

- A. Section 01 40 00 - Quality Requirements: Testing and Inspection Services.

- B. Submit proposed mix design of each class of concrete to independent firm for review prior to commencement of Work.

- C. Tests on cement, aggregates, and mixes will be performed to ensure conformance with specified requirements.

- D. Test samples in accordance with ACI 301 for compressive strength (cylinders) and flexural strength (beams.)

PART 3 EXECUTION

3.1 EXAMINATION

- A. Section 01 30 00 - Administrative Requirements: Verification of existing conditions before starting work.

- B. Verify compacted base course is acceptable and ready to support paving and imposed loads.

- C. Verify gradients and elevations of base are correct.

- D. Verify utility structure frames and lids are installed in correct position and elevation.

3.2 PREPARATION

- A. Moisten base to minimize absorption of water from fresh concrete.
- B. Coat surfaces of manhole, catch basin, and other utility structure frames with oil to prevent bond with concrete pavement.
- C. Notify Engineer minimum 24 hours prior to commencement of concreting operations.

3.3 FORMING

- A. Place and secure forms to correct location, dimension, profile, and gradient.
- B. Assemble formwork to permit easy stripping and dismantling without damaging concrete.
- C. Place joint filler vertical in position, in straight lines. Secure to formwork during concrete placement.

3.4 REINFORCEMENT

- A. Place reinforcement as indicated on Drawings.
- B. Interrupt reinforcement at contraction and expansion joints.
- C. Place dowels to achieve pavement and curb alignment as detailed.
- D. Provide doweled joints 18 inches on center at transverse joints with one end of dowel set in capped sleeve to allow longitudinal movement.

3.5 PLACING CONCRETE

- A. Place concrete in accordance with Section 501 of SCDOT Standard Specifications.
- B. Place concrete using the slip form technique wherever possible.
- C. Ensure reinforcement, inserts, embedded parts, and formed joints are not disturbed during concrete placement.
- D. Place concrete continuously over the full width of the panel and between predetermined construction joints. Do not break or interrupt successive pours such that cold joints occur.
- E. Place concrete to pattern indicated on Drawings.

3.6 PAVEMENT JOINTS

- A. Provide expansion, contraction, and construction joints as indicated on Drawings.
- B. Place expansion joints at 60 foot maximum intervals. Place contraction joints at 20-foot maximum intervals. Align pavement joints with curb, gutter, and sidewalk joints.
- C. Place joint filler between paving components and building or other appurtenances. Recess top of filler 1/2 inch for backer rod and sealant placement.

- D. Saw cut contraction joints 3/16 inch wide or as indicated at an optimum time after finishing. Cut 1/3 into depth of slab.

3.7 SIDEWALK, CURB, AND CURB AND GUTTER JOINTS

- A. Provide sawn joints at 5-foot intervals. Provide 3/4 inch expansion joint at 30 feet maximum and between sidewalks and curbs and structures.
- B. Align sidewalk, curb and gutter joints with pavement joints.

3.8 FINISHING

- A. Area Paving: Heavy broom.
- B. Sidewalk Paving: Light broom. [Brush to 6 inch radius with smooth trowel joint edges.]
- C. Median Barrier: Light broom and trowel joint edges.
- D. Curbs and Gutters: Light broom.
- E. Inclined Vehicular Ramps: V-grooves with mechanical equipment and spring tines, perpendicular to slope.

3.9 EXPOSED AGGREGATE

- A. Apply surface retarder where exposed aggregate finish is indicated.
- B. Wash exposed aggregate surface with clean water and scrub with stiff bristle brush exposing aggregate to match sample panel.
- C. Sand blast concrete surfaces to achieve aggregate exposure surface to match sample panel.

3.10 CURING

- A. Place curing compound on concrete surfaces immediately after finishing.
- B. Cover with burlap or polyethylene film to protect from cold weather and rain.

3.11 JOINT SEALING

- A. Separate pavement from vertical surfaces with 1/2 inch thick joint filler.
- B. Place joint filler in pavement pattern placement sequence. Set top to required elevations. Secure to resist movement by wet concrete.
- C. Extend joint filler from bottom of pavement to within 1/2 inch of finished surface.

3.12 TOLERANCES

- A. Maximum Variation of Surface Flatness: 1/4 inch in 10 feet.
- B. Maximum Variation From True Position: 1/2 inch.
- C. Maximum Variation in thickness: 1/2 inch.

3.13 FIELD QUALITY CONTROL

- A. Section 01 40 00 - Quality Requirements: Field inspecting, testing, adjusting, and balancing.
- B. Prepare three concrete test beams for every 1,333 or less square yards of pavement for each class of concrete placed each day.
- C. Prepare one additional test beam during cold weather and cured on site under same conditions as concrete it represents.
- D. One slump test will be taken for each set of test cylinders taken.
- E. Maintain records of placed concrete items. Record date, location of pour, quantity, air temperature, and test samples taken.
- F. Take one 4-inch diameter core for every 1,333 square yards or less of pavement for each class of concrete placed each day.

3.14 PROTECTION

- A. Immediately after placement, protect pavement from premature drying, excessive hot or cold temperatures, and mechanical injury.
- B. Do not permit pedestrian or vehicular traffic over pavement for 7 days minimum after finishing.

3.15 SCHEDULES

- A. Concrete Sidewalks: Class A Concrete, compressive strength of 3,000 psi at 28 days, 4 inches thick, buff color Portland cement, light broom finish.
- B. Roadway Pavement Concrete: Non-reinforced, flexural strength of 650 psi at 28 days, 8 inches thick, wood float finish.
- C. Propane Tank Slab: Class AA Concrete, 4,500 psi 28 day concrete, 6 inches thick, 6/6-6 x 6 inch mesh reinforcement, light broom finish.

END OF SECTION