

PART 1 GENERAL

1.1 SUMMARY

- A. Section Includes:
 - 1. Aggregate subbase.
 - 2. Concrete paving for:
 - a. Concrete sidewalks.
 - b. Concrete stair steps.
 - c. Concrete integral curbs and gutters.
 - d. Concrete parking areas and roads.

- B. Related Sections:
 - 1. Section 07 90 00 - Joint Protection: Sealant for joints.
 - 2. Section 31 22 13 - Rough Grading: Preparation of site for paving and base.
 - 3. Section 31 23 23 - Fill: Compacted subbase for paving.
 - 4. Section 32 11 23 - Aggregate Base Courses: base course.
 - 5. Section 32 12 16 - Asphalt Paving: Asphalt wearing course curbs.
 - 6. Section 32 91 19 - Landscape Grading: Preparation of subsoil at pavement perimeter.

1.2 REFERENCES

- A. American Association of State Highway and Transportation Officials:
 - 1. AASHTO M324 - Standard Specification for Joint and Crack Sealants, Hot Applied, for Concrete and Asphalt 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 A184/A184M - Standard Specification for Fabricated Deformed Steel Bar Mats for Concrete Reinforcement.
 - 2. ASTM A185/A185M - Standard Specification for Steel Welded Wire Fabric, Plain, for Concrete Reinforcement.
 - 3. ASTM A497/A497M - Standard Specification for Steel Welded Wire Fabric, Deformed, for Concrete Reinforcement.
 - 4. ASTM A615/A615M - Standard Specification for Deformed and Plain Billet-Steel Bars for Concrete Reinforcement.
 - 5. ASTM A706/A706M - Standard Specification for Low-Alloy Steel Deformed and Plain Bars for Concrete Reinforcement.
 - 6. ASTM A767/A767M - Standard Specification for Zinc-Coated (Galvanized) Steel Bars for Concrete Reinforcement.

7. ASTM A775/A775M - S Standard Specification for Epoxy-Coated Steel Reinforcing Bars.
8. ASTM A884/A884M - Standard Specification for Epoxy-Coated Steel Wire and Welded Wire Reinforcement.
9. ASTM A934/A934M - Standard Specification for Epoxy-Coated Prefabricated Steel Reinforcing Bars.
10. ASTM C31/C31M - Standard Practice for Making and Curing Concrete Test Specimens in the Field.
11. ASTM C33 - Standard Specification for Concrete Aggregates.
12. ASTM C39/C39M - Standard Test Method for Compressive Strength of Cylindrical Concrete Specimens.
13. ASTM C94/C94M - Standard Specification for Ready-Mixed Concrete.
14. ASTM C143/C143M - Standard Test Method for Slump of Hydraulic Cement Concrete.
15. ASTM C150 - Standard Specification for Portland Cement.
16. ASTM C172 - Standard Practice for Sampling Freshly Mixed Concrete.
17. ASTM C173/C173M - Standard Test Method for Air Content of Freshly Mixed Concrete by the Volumetric Method.
18. ASTM C231 - Standard Test Method for Air Content of Freshly Mixed Concrete by the Pressure Method.
19. ASTM C260 - Standard Specification for Air-Entraining Admixtures for Concrete.
20. ASTM C309 - Standard Specification for Liquid Membrane-Forming Compounds for Curing Concrete.
21. ASTM C494/C494M - Standard Specification for Chemical Admixtures for Concrete.
22. ASTM C595 - Standard Specification for Blended Hydraulic Cements.
23. ASTM C618 - Standard Specification for Coal Fly Ash and Raw or Calcined Natural Pozzolan for Use as a Mineral Admixture in Concrete.
24. ASTM C979 - Standard Specification for Pigments for Integrally Colored Concrete.
25. ASTM C989 - Standard Specification for Ground Granulated Blast-Furnace Slag for Use in Concrete and Mortars.
26. ASTM C1017/C1017M - Standard Specification for Chemical Admixtures for Use in Producing Flowing Concrete.
27. ASTM C1064/C1064M - Standard Test Method for Temperature of Freshly Mixed Hydraulic-Cement Concrete.
28. ASTM C1116 - Standard Specification for Fiber-Reinforced Concrete and Shotcrete.
29. ASTM C1315 - Standard Specification for Liquid Membrane-Forming Compounds Having Special Properties for Curing and Sealing Concrete.
30. ASTM D1751 - Standard Specification for Preformed Expansion Joint Filler for Concrete Paving and Structural Construction (Nonextruding and Resilient Bituminous Types).
31. ASTM D1752 - Standard Specification for Preformed Sponge Rubber and Cork Expansion Joint Fillers for Concrete Paving and Structural Construction.
32. ASTM D6690 - Standard Specification for Joint and Crack Sealants, Hot Applied, for Concrete and Asphalt Pavements.

1.3 PERFORMANCE REQUIREMENTS

- A. Paving: Designed for parking and light duty commercial vehicles.

1.4 SUBMITTALS

- A. Section 01 33 00 - Submittal Procedures: Requirements for submittals.

- B. Product Data:
 - 1. Submit data on concrete materials, joint filler admixtures curing compounds.
- C. Design Data:
 - 1. Submit concrete mix design for each concrete strength. Submit separate mix designs when admixtures are required for the following:
 - a. Hot and cold weather concrete work.
 - 2. Identify mix ingredients and proportions, including admixtures.
 - 3. Identify chloride content of admixtures and whether or not chloride was added during manufacture.

1.5 QUALITY ASSURANCE

- A. Perform Work in accordance with ACI 301. Requirements of Section 03 10 00, Section 03 20 00, and Section 03 30 00.
- B. Obtain cementitious materials from same source throughout.

1.6 QUALIFICATIONS

- A. Manufacturer: Company specializing in manufacturing Products specified in this section with minimum three years documented experience.
- B. Installer: Company specializing in performing work of this section with minimum three years documented experience.

1.7 PRE-INSTALLATION MEETINGS

- A. Section 01 30 00 - Administrative Requirements: Pre-installation meeting.
- B. Convene minimum one week prior to commencing work of this section.

1.8 ENVIRONMENTAL REQUIREMENTS

- A. Section 01 60 00 - Product Requirements: Environmental conditions affecting products on site.
- B. Do not place concrete when base surface temperature is less than 40 degrees F, or surface is wet or frozen.

PART 2 PRODUCTS

2.1 FORM MATERIALS

- A. Wood Steel form material, profiled to suit conditions.
- B. Joint Filler: ASTM D1751; Asphalt impregnated fiberboard or felt, 1/4 inch thick.

2.2 REINFORCING

- A. Deformed Reinforcing: Steel: ASTM A615/A615M, 60 ksi yield grade, plain deformed billet bars, galvanized uncoated epoxy coated finish.
- B. Deformed Bar Mats: ASTM A184/A184M; fabricated from ASTM A615/A615M or ASTM A706/A706M; 60 ksi yield strength, steel bars, unfinished galvanized finish epoxy coated finish.
- C. Welded Deformed Wire Fabric: ASTM A497/A497M; in flat sheets coiled rolls; unfinished epoxy coated finish.
- D. Dowels: ASTM A615/A615M; 60 ksi yield strength, plain steel bars; cut to length indicated on Drawings, square ends with burrs removed; unfinished galvanized finish epoxy coated finish.
- E. Tie Wire: Minimum 16 gage annealed type, epoxy coated.
- F. Fibrous Concrete Reinforcement:
Concrete reinforcing fibers shall be 100% virgin polypropylene, collated, fibrillated fibers as supplied by Fibermesh Company, or similar. Reinforcement fibers shall be used in all concrete on this project, using the amount and type in strict accordance with the manufacturer's recommendations. The fibers shall have a tensile strength of 70 to 100 ksi.

2.3 CONCRETE MATERIALS

- A. Concrete Materials: As specified in Section 03 30 00.

2.4 ACCESSORIES

- A. Curing Compound: ASTM C309, Type 1 1D 2, Class A B.
- B. Liquid Surface Sealer: manufactured by.
- C. Surface Retarder: type, color as selected from manufacturer's standard range; manufactured by.
- D. Joint Sealers: Specified in Section 07 90 00.

2.5 CONCRETE MIX - BY PERFORMANCE CRITERIA

- A. Mix concrete in accordance with ACI 304. Deliver concrete in accordance with ASTM C94/C94M.
- B. Select proportions for normal weight concrete in accordance with ACI 301 Method 1.
- C. Provide concrete to the following criteria:
 - 1. Compressive Strength: 2400 psi at 7 days.
 - 2. Compressive Strength: 4000 psi at 28 days.
 - 3. Slump: 2"- 5" to inches.
 - 4. Minimum Cement Content: 564 pounds/cu yd.

- 5. Maximum Water/Cement Ratio: 0.48
- 6. Air Entrainment: 6 percent +/- 1%.

- D. Use accelerating admixtures in cold weather only when approved by the Architect/Engineer in writing. Use of admixtures will not relax cold weather placement requirements.
- E. Use calcium chloride only when approved by the Architect/Engineer in writing.
- F. Use set retarding admixtures during hot weather only when approved by the Architect/Engineer in writing.

2.6 SOURCE QUALITY CONTROL AND TESTS

- A. Section 01 40 00 - Quality Requirements: Testing and Inspection Services: Provide mix design for.
- B. Submit proposed mix design of each class of concrete to appointed 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 ASTM C94/C94M ACI 301.

PART 3 EXECUTION

3.1 EXAMINATION

- A. Section 01 30 00 - Administrative Requirements: Verification of existing conditions before starting work.
- B. Verify compacted subgrade granular stabilized soil subbase is dry and ready to support paving and imposed loads.
 - 1. Proof roll subbase with in minimum two perpendicular passes to identify soft spots.
 - 2. Remove soft subbase and replace with compacted fill as specified in Section 31 23 23.
- C. Verify gradients and elevations of base are correct.

3.2 SUBBASE BASE COURSE

- A. Aggregate Subbase Base Course: Install as specified in Section 32 11 23.

3.3 PREPARATION

- A. Moisten substrate to minimize absorption of water from fresh concrete.
- B. Coat surfaces of manhole catch basin frames with oil to prevent bond with concrete paving.

- C. Notify Architect/Engineer minimum 24 hours prior to commencement of concreting operations.

3.4 FORMING

- A. Place and secure forms and screeds to correct location, dimension, profile, and gradient.
- B. Assemble formwork to permit easy stripping and dismantling without damaging concrete.

3.5 REINFORCING

- A. Place reinforcing at top bottom mid-height top and bottom of paving.
- B. Interrupt reinforcing at contraction expansion joints.
- C. Place dowels reinforcing to achieve paving and curb alignment as detailed.
- D. Provide doweled joints at inch spacing at transverse joints interruptions of concrete with one end of dowel set in capped sleeve to allow longitudinal movement.
- E. Repair damaged galvanizing epoxy coating to match shop finish.

3.6 PLACING CONCRETE

- A. Coordinate installation of snow melting components.
- B. Place concrete in accordance with ACI 301. as specified in Section 03 30 00.
- C. Ensure reinforcing, inserts, embedded parts, formed joints and 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.

3.7 JOINTS

- A. Place expansion contraction joints at 20 foot intervals. Align curb, gutter, and sidewalk joints.
- B. Place joint filler between paving components and building or other appurtenances. Recess top of filler 1/4 inch for sealant installation.
- C. Provide scored sawn joints at 3 feet intervals between sidewalks and curbs, between curbs and paving, and.
- D. Saw cut contraction joints 3/16 inch wide at an optimum time after finishing. Cut 1/3 into depth of slab.
- E. Seal joints as indicated on Drawings in accordance with Section 07 90 00.

3.8 FINISHING

- A. Area Paving: Light broom.
- B. Sidewalk Paving: Light broom, radius edges, and trowel joint edges.
- C. Curbs and Gutters: Light broom.
- D. Direction of Texturing: Transverse to paving direction.
- E. Inclined Vehicular Ramps: V-jointed perpendicular to slope.
- F. Place curing compound sealer on exposed concrete surfaces immediately after finishing.

3.9 CURING AND PROTECTION

- A. Immediately after placement, protect concrete from premature drying, excessively hot or cold temperatures, and mechanical injury.
- B. Maintain concrete with minimal moisture loss at relatively constant temperature for period necessary for hydration of cement and hardening of concrete.
- C. Cure concrete floor surfaces as specified in Section 03 39 00.

3.10 ERECTION TOLERANCES

- A. Section 01 40 00 - Quality Requirements: Tolerances.
- B. Maximum Variation of Surface Flatness: 1/4 inch in 10 ft.
- C. Maximum Variation From True Position: 1/4 inch.

3.11 FIELD QUALITY CONTROL

- A. Section 01 40 00 - Quality Requirements 01 70 00 - Execution and Closeout Requirements: Field inspecting, testing, adjusting, and balancing.
- B. Perform field inspection and testing in accordance with ASTM C94/C94M ACI 301 State Municipality of Highways Public Work's standards.
- C. Inspect reinforcing placement for size, spacing, location, support.
- D. Testing firm will take cylinders and perform slump and air entrainment tests in accordance with ACI 301.
- E. Strength Test Samples:
 - 1. Sampling Procedures: ASTM C172.
 - 2. Cylinder Molding and Curing Procedures: ASTM C31/C31M, cylinder specimens, standard cured field cured.

3. Sample concrete and make one set of three cylinders for every 75 150 cu yds. or less of each class of concrete placed each day and for every 5,000 sf of surface area paving.
4. Make one additional cylinder during cold weather concreting, and field cure.

F. Field Testing:

1. Slump Test Method: ASTM C143/C143M.
2. Air Content Test Method: ASTM C173/C173M ASTM C231.
3. Temperature Test Method: ASTM C1064/C1064M.
4. Measure slump and temperature for each compressive strength concrete sample.
5. Measure air content in air entrained concrete for each compressive strength concrete sample.

G. Cylinder Compressive Strength Testing:

1. Test Method: ASTM C39/C39M.
2. Test Acceptance: Average compressive strength of three consecutive test maximum 500 psi less than specified compressive strength In accordance with State Municipality of Highways Public Work's standards.
3. Test one cylinder at 7 days.
4. Test two cylinders at 28 days.
5. Retain one cylinder for days for testing when requested by Architect/Engineer.
6. Dispose remaining cylinders when testing is not required.

H. Maintain records of placed concrete items. Record date, location of pour, quantity, air temperature, and test samples taken.

3.12 PROTECTION

- A. Immediately after placement, protect paving from premature drying, excessive hot or cold temperatures, and mechanical injury.
- B. Do not permit pedestrian vehicular traffic over paving for 7 days minimum after finishing, until 75 percent design strength of concrete has been achieved.

END OF SECTION