



SECTION 02770
CONCRETE FOR UTILITIES AND CONCRETE PAVEMENT
CONSTRUCTION

PART 1 GENERAL

1.01 SCOPE

- A. The Work covered by this section consists of furnishing all plant, labor, equipment, appliances, and materials and of performing all operations in connection with the construction of concrete utility structures, concrete pavements, curbs and gutters, sidewalks, concrete steps, and driveway ramps on previously prepared subgrades in accordance with the Drawings, Specifications, or as directed by the OWNER.
- B. Concrete repair must be conducted to the satisfaction of the agency having primary jurisdiction of the facility, and the more stringent regulations shall apply.

1.02 SUBMITTALS

- A. Action Submittals:
 - 1. Curb Form Material: Information on metal forms, if used, including type, condition, surface finish, and intended function.
 - 2. Concrete mix design.
- B. Informational Submittals: Concrete delivery tickets for each batch of concrete before unloading at Site.

PART 2 PRODUCTS

2.01 CONCRETE FOR UTILITY STRUCTURES

- A. Strength:
 - 1. Minimum 28-day Strength: 4,000 psi.
 - 2. Maximum Water/Cementitious Materials Ratio: 0.44.
 - 3. Fly ash shall be substituted for cement 25 percent by weight.
- B. Durability: Concrete shall be air entrained 4 percent to 7 percent.

- C. Slump Superplasticizer can be added to the mix to increase slump to 8 inches.
- D. Concrete shall be in accordance with the applicable provisions of ACI 301, Specifications for Structural Concrete for Buildings.

2.02 CONCRETE FOR CONCRETE PAVEMENT

- A. Strength:
 - 1. Minimum 28-day Strength: 4,000 psi.
 - 2. Maximum Water/Cementitious Materials Ratio: 0.44.
 - 3. Fly ash shall be substituted for cement 25 percent by weight.
- B. Durability: Concrete shall be air entrained 4 percent to 7 percent.
- C. Slump: 3 inches, plus or minus 1 inch.
- D. Concrete shall be in accordance with the applicable provisions of ACI 301, Specifications for Structural Concrete for Buildings.

2.03 REINFORCING STEEL

- A. Meet requirements of ASTM A615 with a yield strength of 60,000 psi.

PART 3 EXECUTION

3.01 WEATHER LIMITATIONS

- A. Concrete shall not be placed:
 - 1. Until the air temperature in the shade is 35 degrees F and rising and is forecast to remain 35 degrees F.
 - 2. On frozen ground.
 - 3. During periods of rain or snow.
- B. Concrete placement shall not continue when air temperature drops below 40 degrees F.
- C. Protect concrete pavement from inclement weather for 7 days after it has been placed, when rain is imminent, and when air temperature drops or is forecast to drop below 35 degrees F.

3.02 SUBGRADE AND FORMS

- A. Provide and operate a template for checking the contour of the subgrade. The template shall rest on the side forms and shall be provided with adjustable rods that project downward to the subgrade at 1-foot intervals. Adjust these rods to the required cross sections of the bottom of the slab when the template is supported at its sides.
- B. Forms shall be of metal or wood and subject to approval by the OWNER.
- C. Extruded machine curb or curb and gutter may be used. The OWNER reserves the right to approve the machine used, the contour and finish of the curb and gutter, and the design mix and the right to designate the spacing for expansion and contraction joints.
- D. Test the subgrade with respect to elevation and density prior to setting forms. Complete the subgrade to the plane of the typical sections shown on the Drawings and to the lines and grades established by the Drawings. Compact subgrades as specified in Section 02321, Excavation, Bedding, and Backfill for Utilities.
- E. After preparing the subgrade as described above, set the forms. The subgrade under the forms shall be firm and cut true to grade so that each form section will, when placed, be firmly in contact for its entire length and base width. Stake the form into position so that the top, when tested by a 10 feet straightedge, conforms to the requirements specified for the surface of the concrete and so that the longitudinal axis of the upstanding leg does not vary more than 1/4 inch. Tightly lock form sections together.
- F. Finish the subgrade to the exact section of the bottom of the pavement shown on the Drawings. Wet the subgrade down far enough in advance of the placing of the concrete to ensure that it is firm and moist. In cold weather, the subgrade shall be entirely free from frost when the concrete is deposited.
- G. Leave forms in place at least 24 hours after the concrete has been placed against them. Do not use crowbars or heavy tools against "green" concrete when removing the forms. Clean the forms well before reoiling and reuse.

3.03 PLACING

- A. Concrete shall be in place within 45 minutes from the time all ingredients are charged in the mixing drum and before the concrete has obtained its

initial set. Deposit concrete so that minimum handling will be necessary, and distribute it so that, when consolidated and finished, the slab thickness and surface grade required by the Drawings will be obtained at all points. Place concrete rapidly and continuously between expansion joints and use shovels for any necessary hand spreading. Consolidate the concrete adjacent to forms and joints with forks and spades.

- B. Do not place concrete when the ambient temperature is below 35 degrees F, or when the concrete is, without special protections, likely to be subject to freezing temperatures before final setting has occurred. The temperature of the concrete when placed shall be not less than 50 degrees F, or more than 90 degrees F. Heating of the mixing water or aggregates will not be permitted until the temperature of the concrete has decreased to 55 degrees F. Heated materials shall be free from ice, snow, and frozen lumps before entering the mixer. Methods and equipment for heating shall be subject to the OWNER'S approval. Provide suitable means for maintaining the concrete at a temperature of at least 40 degrees F for not less than 72 hours after placement. Any concrete damaged by freezing shall be removed and replaced at the expense of the CONTRACTOR.

3.04 FINISHING

- A. Immediately after placement, properly finish the concrete. The sequence of operations shall be as follows: hand finishing, longitudinal floating, straightedge finishing, and edging the joints.
- B. Provide an approved hand strike template, approved tamping template, and a longitudinal float for the hand finishing of pavement. The templates shall be at least 1 foot longer than the pavement width and at least 4 inches wide. The longitudinal float shall be 6 feet to 8 feet long. The float shall be rigid and substantially braced and provided with suitable handles to ensure smooth and effective manipulation. The bottom edges of the base of the float shall be rounded. Floats made of metal or a combination of wood and metal may be used.
- C. As soon as concrete is placed, strike off and screed to the appropriate cross section and to an elevation above grade which, when the concrete is consolidated and finished, will ensure that the surface of the pavement is at the exact elevation indicated on the drawings.
- D. Tamp the entire surface, and continue tamping until the required compaction and reduction of internal and surface voids are secured. Immediately after the final tamping of the surfaces, float the pavement longitudinally by hand. If contact with the pavement is not made at all points by the float, additional

- concrete shall be required and screened, and the float operated until a satisfactory surface is obtained.
- E. After the longitudinal floating is complete, eliminate minor irregularities and score marks remaining in the pavement surface by removing surplus material or, if necessary, by adding and working in freshly mixed concrete with long handled floats and filling in open textured areas in the pavement surfaces. Make the final finish with straightedges 8 feet in length. A straightedge operated from the side of the pavement shall be equipped with a handle 3 feet longer than length of the pavement. Immediately fill depressions with freshly mixed concrete, strike off, consolidate, and refinish. Remove projections above the required elevation while the concrete is still plastic and workable, doing so in a time sequence that will ensure the removal of all water and laitance from the surface. Continue the straightedge testing and refloating until the entire surface is free from observable departures from the straightedge, conforms to the required grade and contour, and will, when the concrete has hardened, conform to the surface requirements specified herein.
- F. After hand finishing has been completed but before the concrete has attained initial set, carefully finish the edges of slabs along forms and at points with an edging tool of a 2-inch radius to form a smooth, rounded surface. Clean corners or edges of slabs that have crumbled and any areas that lack enough mortar for proper finishing by removing loose fragments and soupy mortar, and then fill solidly and finish with a mixture of the correct proportions and appropriate consistency. Eliminate unnecessary tool marks, and leave edges smooth and true to line. After removing the forms, fill any damaged or honeycombed areas with mortar composed of one part cement and two parts sand.
- G. Form transverse and contraction joints in the finished pavement prior to initial set, spacing them as shown on the Drawings. Contraction joints shall be 1/4 inch wide and 3/4 inch deep and shall be finished with an edging tool of 1/4-inch radius.
- H. Place transverse and premolded expansion joints 4 inches thick in such a way that the joint will be filled to within 1/2 inch of the surface of the walk. Place them to full depth and normal to the grade. Wherever concrete walks abut against transverse steps, other walks, or adjacent structures, provide expansion joints. Clean concrete from top of premolded joints and edge of concrete as specified above.



3.05 PROTECTION AND CURING

- A. Protect and cure concrete with an approved curing compound applied according to the manufacturer's directions.

3.06 SURFACE TEST

- A. Remove any portion of the pavement that shows a variation or departure greater than 1/4 inch from the testing edge of a 10-foot straightedge, and replace or correct as directed by the OWNER.

END OF SECTION