

**SECTION 02528
CONCRETE PAVEMENT, CURBS AND GUTTERS**

PART 1 - GENERAL

1.1 SUMMARY

- 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 construction of concrete plaza, pavement, curbs and gutters, sidewalks, concrete steps, and driveway ramps on previously prepared subgrades in accordance with the drawings and these specifications.

1.2 RELATED DOCUMENTS

- A. Drawings and general provisions of the contract, including General and Supplementary Conditions apply to this Section.
- B. Section 03300 – Cast-in-Place Concrete

1.3 SUBMITTALS

- A. Submit shop drawings for all products specified in this section in accordance with the requirements of General and Supplementary Conditions.

PART 2 - PRODUCTS

2.1 MATERIALS

- A. All material shall meet the requirements provided in Section 03300 - Cast-in-Place Concrete.
- B. All concrete shall be $f' = 4,000$ psi, as defined by ACI standards, air entrained. The applicable provision of ACI 301, Specifications for Structural Concrete for Buildings, form a part of this specification.
- C. Aggregate type, size and mix ratio for the exterior exposed pavement of the Central Lab Office Building shall match the aggregate of the of the approved sample panels.

PART 3 - EXECUTION

3.1 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 one 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 Construction Manager (CM).
- C. 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 for all slabs of earth to at least 95% of maximum dry density as determined by ASTM D698 (Standard Proctor).

- D. 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 ten 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 $\frac{1}{4}$ inch. Tightly lock form sections together. Form layout shall conform with layout shown on drawing to within $\frac{1}{4}$ inch.
- E. 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.
- F. 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.

3.2 PLACING

- A. Prior to placing exterior plaza slabs the area shall be proof rolled and four (4) inches of ASTM 448 No. 57 stone shall be placed under the slab area. All exterior slabs shall be reinforced as shown on drawings with a minimum of WWF 6X6-W2.9xW2.9.
- B. Concrete shall be in place within 45 minutes (or as approved by the CM) from the time all ingredients are charged in the mixing drum. 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. Use shovels for any necessary hand spreading. Consolidate the concrete adjacent to forms and joints with forks and spades.
- C. Do not place concrete when the ambient temperature is below 35 degrees F, nor 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, nor more than 90 degrees F. Heating of the mixing water and/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 CM'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.

3.3 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 one foot longer than the pavement width and at least four inches wide. The longitudinal float shall be six feet to eight 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. 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 screeded, and the float operated until a satisfactory surface is obtained.
- D. 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 the long handled floats and filling in open textured areas in the pavement surfaces. Make the final finish with straightedges eight feet in length. A straightedge operated from the side of the pavement shall be equipped with a handle three feet longer than $\frac{1}{2}$ of the pavement width. Place the straightedge at the centerline and pull uniformly to the edge. Do not advance the straightedge along the pavement in successive stages more than $\frac{1}{2}$ its length. 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 with the surface requirements specified herein.
- E. After hand finishing has been completed but before the concrete has attained initial set, carefully finish the edges of slabs along forms and at joints with an edging tool of $\frac{1}{4}$ 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.
- F. Form transverse and contraction joints in the finished pavement prior to initial set, spacing them as shown on the drawings. Contraction joints shall be $\frac{3}{8}$ inch wide and one inch deep minimum (the greater of one inch or $\frac{1}{5}$ the thickness of the slab) and shall be finished with an edging tool of $\frac{1}{4}$ inch radius.
- G. Place transverse and premolded expansion joints $\frac{1}{2}$ inch thick in such a way that the joint will be filled to within $\frac{1}{2}$ 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 all concrete from the top of the premolded joints and edge the concrete as specified above.
- H. Concrete slab finishes in the plaza area shall be as described in Section 03300 and as shown on the drawings. The following two finishes are added to those shown in Section 03300 3.12:
1. Medium Abrasive Blast Finish: Where shown or specified to receive an abrasive blast finish, produce finish on fresh hardened concrete. Use abrasive grit, equipment, application techniques, and cleaning procedures to expose aggregate and surrounding matrix surfaces and to achieve a medium degree of exposure.
 2. Heavy Abrasive Blast Finish: Where shown or specified to receive an abrasive blast finish, produce finish on fresh hardened concrete. Use abrasive grit, equipment, application techniques, and cleaning procedures to expose aggregate and surrounding matrix surfaces and to achieve a heavy degree of exposure.

3. Six foot square test panels shall be prepared by the subcontractor for each finish used in the plaza area. The equipment and procedures used by the subcontractor shall be approved by the CM prior to placing any plaza concrete slabs.
- 3.4 PROTECTION AND CURING
- A. Protect and cure concrete with an approved curing compound applied according to the manufacturer's directions and as outlined in Section 03300.
- 3.5 SURFACE TEST
- A. Remove any portion of the pavement that shows a variation or departure greater than $\frac{1}{4}$ inch from the testing edge of a ten foot straightedge, and replace or correct as directed by the CM.

END OF SECTION 02528