

ITEM 6 CONCRETE CURBS, GUTTERS, AND SIDEWALKS

6.1 DESCRIPTION

This work shall consist of constructing curbs, gutters, sidewalks, ramps, local depressions and driveways of the form and dimensions shown on the plans.

6.2 MATERIALS

Materials shall conform to the applicable requirements of Item 11, Portland Cement Concrete Pavement (PCCP).

6.3 EQUIPMENT

6.3.1 General

Equipment and tools necessary for handling materials and performing all parts of the work must have adequate capacity and be in good mechanical condition. This equipment shall be on the site, available for inspection and testing, before paving operations are started. All equipment, tools, and machinery shall be maintained in a satisfactory working condition.

Equipment shall be approved by the **AGENCY**. All equipment and machinery shall be kept in good working order, free of leaks and properly muffled. All taxes, licenses and fees shall have been paid and proper licenses and permits shall be posted as required by law.

6.3.1 Forms

The depth of forms for curbs shall be equal to the full depth of the curb. The depth of outside forms for concrete gutter shall be equal to the full thickness of the gutter. Timber forms, if used, shall be surfaced on the side placed next to the concrete, shall have a true smooth upper edge, and shall not be less than 14/2 inches thick after being surfaced. Warped forms and forms not having a smooth, straight upper edge shall not be used. Benders or thin plank forms, rigidly placed,

shall be used on curves, grade changes or for curb returns. Steel forms shall not be used on curved sections with radii less than 200 feet. Back forms for curb returns shall be made of a minimum of 1/2-inch benders, for the full height of the curb, cleated together. Forms shall be carefully set to alignment and grade and to conform to the dimensions required. Forms shall be held rigidly in place by the use of pairs of steel stakes placed at intervals not to exceed 4 feet. If metal forms are used, steel stakes shall not be spaced more than 6 feet apart. Clamps, spreaders and braces shall be used where required to ensure rigidity in the forms.

6.3.2 Slip Forms

Slip-form paving equipment shall be equipped with traveling side forms of sufficient dimensions, shape, and strength to support the PCCP laterally for a sufficient length of time during placement to produce pavement of the required cross section.

No abrupt changes in longitudinal alignment of the pavement will be permitted. The horizontal deviation shall not exceed 0.04 foot from the alignment established by the **AGENCY**. All forms shall be cleaned thoroughly each time they are used and coated with a light oil as often as necessary to prevent the PCCP from adhering to them.

6.4 **CONSTRUCTION**

Curbs, gutters and sidewalks shall be placed in sections of 90 feet maximum length. Moisture treatment and stabilization of the subgrade will be required where specified on the plans in

6.4.1 Earthwork

The subgrade shall be constructed true to the grade and cross section as shown on the plans or established by the **AGENCY**. It shall be thoroughly moisture conditioned and rolled or hand tamped until the subgrade from front of curb to back of sidewalk reaches the compaction required for the adjacent roadway. All soft and yielding material shall be removed to a depth of not less than 12 inches and the resulting space filled with compacted earth, sand or gravel.

The completed subgrade shall be tested for grade and cross section by means of a template extending the full depth and supported on the side forms. The subgrade and forms shall be watered in advance of placing portland cement concrete.

6.4.2 Existing Curbs, Gutters and Sidewalks

The **CONTRACTOR** shall remove existing curbs, gutters and sidewalks to the limits shown on the plans. Removal and replacement beyond the plan limits shall be at the **CONTRACTOR's** expense and no additional compensation will be allowed.

6.4.3 Curb and Gutter Expansion Joints

Expansion joints 1/2 inch wide shall be constructed in curbs and gutters at 90-foot intervals, at each side of structures and at the ends of all curb returns; except that expansion joints shall not be installed within 20 feet of an island nose. Expansion joints shall be filled with joint filler strips 1/2 inch thick conforming to ASTM D 1751, Fiber Type. The filler for the joint shall be furnished in a single piece for the full depth and width required for the joint. Expansion joint filler shall be shaped to the cross section of the curb and gutter. Expansion joints shall be constructed at right angles to the line of curb and gutter.

6.4.4 Sidewalk Expansion Joints

Transverse expansion joints 1/2 inch wide shall be constructed at all sidewalk returns and in line with expansion joints in adjacent curb. Where curb is not adjacent, expansion joints shall be constructed at intervals of 100 feet. Expansion joints shall coincide where curb and gutter are adjacent, even if not integral. Expansion joints shall be filled with joint filler strips 1/2 inch thick conforming to ASTM D 1751, Fiber Type. The filler for the joint shall be furnished in a single piece for the full depth and width required for the joint unless otherwise authorized by the **AGENCY**.

The joint filler shall be placed with the top edge 1/4 inch below the concrete surface and shall be held in place by means of steel pins driven into the subgrade and spaced sufficiently close to prevent warping of the filler during

floating. Upon completion of floating, the pins shall be removed and when finishing operations have been completed, the joint shall be edged with an edging tool having a radius of, 1/8 inch.

6.4.5 Curb and Gutter Construction

In constructing curbs, entrances for driveways shall be constructed according to the dimensions shown on the plans. With approval of the **AGENCY**, the curb may be constructed by the use of a curb forming machine.

Where hot mix asphalt pavement (HMAP) or portland cement concrete pavement (PCCP) is to be placed around or adjacent to manholes, drop inlets or catch basins in gutter, local depressions or driveways, such structures shall not be constructed to final grade until after the curbs and gutters have been constructed on each side of the structure in order to maintain a true grade.

The forms shall be filled to the top and the concrete shall be consolidated so that there will be no rock pockets. Concrete shall be consolidated by means of mechanical vibrators approved, by the **AGENCY**. No concrete over 90° F shall be used. Immediately after removing the front curb forms, the face of the curb shall be troweled smooth to a depth of not less than 2 inches below the flow line or to the flow line of integral curb and gutter, and then finished with a steel trowel. The stop shall be finished and the front and back edges rounded as shown on the plans.

After the face of the curb has been troweled smooth, it shall be given a final fine brush finish with brush strokes parallel to the line of curb. In no case shall the minimum time between placing concrete and removal of forms be less than 12 hours. No dusting or topping of the surface, or sprinkling with water, to facilitate finishing shall be permitted.

The top and face of the finished curb shall be true and straight, and the top surface of curbs and gutters shall be of uniform width, free from humps, sags or other irregularities. When a straightedge 10 feet long is laid on the top or face of the curb or on the surface of the gutters, the surface shall not vary more than 1/8 inch from the edge of the straightedge, except at grade changes or curves. The

exposed surface shall be cured for a period of not less than 72 hours in accordance with the requirements in Item 11.

6.4.6 Sidewalk Construction

The structures shall be finished to smooth, NOT troweled, and uniform texture by floating with wooden or magnesium floats, and, if so directed by the **AGENCY**, by cross brooming or burlap-finishing. No concrete over 90° F shall be used. The surface shall be lightly grooved or marked into squares or other shapes to match other such markings on similar existing structures in the vicinity, or as designated by the **AGENCY**.

No dusting or topping of the surface, or sprinkling with water, to facilitate finishing shall be permitted. The minimum time between placing concrete and removal of forms is at least 12 hours. When a 10-foot straightedge is placed on the sidewalk, the surface shall not vary more than 1/8 inch from the edge of the straightedge, except at grade changes, and the finished surface shall be free from blemishes.

Immediately after the surface of the sidewalk is finished, the concrete shall be cured for a period of not less than 72 hours in accordance with the requirements of Item 11.

Contraction joints in sidewalks must be placed at a spacing equivalent to width up to 12 feet. All joints in curb and gutter must be continuous through adjacent sidewalk.

6.4.7 Cold Weather Protection

When concrete is placed with ambient temperatures below 40° F, the **CONTRACTOR** shall provide satisfactory methods and means to protect the mix from injury by freezing. The aggregates, or water, or both, shall be heated in order to place the concrete at temperatures between 50° and 90° F. Placing of concrete may be started in the morning if the **CONTRACTOR** desires, but shall be discontinued at 3:00 p.m. of the same day if freezing weather threatens.

The concrete or aggregates shall be protected before and after placing, as directed by the **AGENCY**, to retain all heat possible in the concrete mix. After the concrete has been placed, the **CONTRACTOR** shall provide sufficient protection such as blankets, canvas, framework, heating apparatus, etc., to enclose and protect the structure and maintain the temperature of the concrete at not less than 50° F until at least 60 percent of the 28-day field strength has been attained. Temperatures shall be measured and recorded using a recording thermometer. Except as provided above, cold weather concreting shall be in accordance with ACI 306. If in the opinion of the **AGENCY**, the protection provided is inadequate, concrete placement shall cease until conditions or procedures are satisfactory to the **AGENCY**.

6.4.8 Hot Weather Concreting

Except by written authorization, concrete shall not be placed if its temperature exceeds 90° F. The placement of concrete in hot weather shall comply with ACI 305.

6.4.9 Opening

Walks shall not be opened to pedestrian traffic for at least 24 hours after placement. Curb cuts, curb and gutter and crosspans shall not be opened to vehicular traffic for at least 7 days after placement or until concrete has attained two-thirds of the required 28-day strength. The **CONTRACTOR** shall maintain suitable barricades to comply with these requirements.

6.5 TOLERANCES

Surface irregularities (measured with a 10-foot long straightedge) exceeding 3/16 inch, but less than 1/2 inch, shall be ground by the **CONTRACTOR** at his expense. When surface irregularities exceed the foregoing limits, the **CONTRACTOR** shall remove and replace that portion of work at his expense.

If, after stripping of forms, any concrete is found to be not formed as shown on the Plans, or is out of alignment or level, or shows a defective surface, it shall be considered as not conforming to these specifications. The defective area shall be removed and replaced by the **CONTRACTOR** at his expense.

6.6 MEASUREMENT

The quantity of curb and gutter measured for payment will be the number of linear feet along the base of the curb face or along the flow line of the gutter, and such measurement shall be continuous along such line extended across driveway and alley entrance returns. The quantity of sidewalk, ramps and driveway shall be measured for payment by area in square yards. All quantities herein will be complete and in place. These are plan quantities and no separate measurement is required.

6.7 TESTING AND INSPECTION

Testing of portland cement concrete pavement shall be performed in accordance with Table 6.7.

TABLE 6.7
SCHEDULE FOR MINIMUM MATERIALS SAMPLING AND TESTING

Compressive Strength	ASTM C 39	One set. per 100 cubic yards
Air Content	ASTM C 231	One test per each first three trucks, then one for every five trucks thereafter
Slump	ASTM C 143	One test per each first three trucks, then one for every five trucks thereafter
Temperature	ASTM C 1064	One test per 300 cubic yard
Thickness	ASTM C 174	One test per 500 linear feet. One set consists of at least 4 cylinders

6.8 PAYMENT

All quantities of concrete measured will be paid for at the contract unit price. All excavation or backfill work required other than roadway quantities will be considered subsidiary and no further payment will be made. Saw cutting of existing installations prior to removal will not be paid for directly but the cost shall be considered as included in the contract unit price. The price shall be full compensation for furnishing all materials required and for all manipulations, labor, tools, equipment and incidentals necessary to complete the work.

Item	Description	Payment
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6.1	Concrete Curb and Gutter	\$/linear foot
6.2	Concrete Sidewalk, Ramps, Drives	\$/yd ²
6.3	Removal	\$/yd ²