

Concrete Curbing - 2531

2531.1 DESCRIPTION

This work shall consist of constructing cast-in-place concrete curbs, curb and gutter, medians, driveway pavement, and other similar traffic delineation or service items.

2531.2 MATERIALS

A Concrete.....	2461
Mix designations shall be as given below for the method of placement:	
A1 Manual Placement.....	Mix No. 3A32
A2 Slip-form Placement.....	Mix No. 3A22
B Reinforcement Bars.....	3301
C Steel Fabric.....	3303
D Preformed Joint Filler.....	3702
E Blank	
F Concrete Treating Oil.....	3917
G Curing Materials	
G1 Curing Paper.....	3752
G2 Plastic Sheeting.....	3756
G3 Membrane Curing Compound.....	3754
G4 Extreme Service Membrane Cure.....	3755
H Granular Materials.....	3149

2531.3 CONSTRUCTION REQUIREMENTS

A Foundation Preparations

The foundation shall be excavated, shaped, and compacted to a firm, uniform bearing surface, conforming to the planned section and established grade. Unsuitable subgrade soils shall be removed and replaced as directed. Granular material, as specified and where required by the Plans, shall be furnished, placed and compacted thoroughly to the required depth.

B Forms

Forms shall be of metal, wood, or other suitable material, and shall be capable of sustaining the concrete in its proper position until set. Face forms for curbing shall conform to the required shape and design. Side forms shall have a depth at least equal to the edge thickness of the concrete being formed. The forms shall be fully supported on the foundation and be adequately restrained at the proper line and grade.

Approved flexible or curved forms of proper radius shall be used on curves having a radius of 45 m (150 feet) or less.

The contact surfaces of all forms shall be coated with form treating material conforming to 3902, prior to placing the concrete.

C Joint Construction

Transverse expansion joints, filled with 13 mm (1/2 inch) preformed joint filler material, shall be placed at the ends of all curved sections; and at the ends of the curved portions of entrance and street returns. Longitudinal expansion joints shall be placed as shown in the Plans. Expansion joints with filler material shall also be placed at locations where the concrete surrounds or adjoins any existing fixed objects such as fire hydrants, building foundations, and other rigid structures.

Contraction joints shall be provided at 3 m (10 foot) intervals in curb or curb and gutter construction and at 6 m (20 foot) intervals in solid median construction, except as otherwise provided in the Plans. The contraction joints shall generally be formed to the full depth of the concrete, using 3 mm (1/8 inch) thick removable inserts conforming to the cross sectional shape of the concrete. Where practicable, such as in driveway pavement or where a curb machine is used, the contraction joints may be formed or sawed as approved by the Engineer to a depth of at least 50 mm (2 inch) from all exposed surfaces.

Joints shall be constructed perpendicular to the subgrade and shall align with similar joints in adjoining work when practicable. Transverse joints shall be placed at right angles to the longitudinal axis of the work unless otherwise indicated in the Contract.

Longitudinal construction joints between a concrete median or gutter section and a concrete pavement shall have a surface groove, either formed or sawed, that is approximately 10 mm (3/8 inch) wide and at least 13 mm (1/2 inch) in depth.

D Metal Reinforcement

Metal reinforcement shall be provided and placed as required by the Plans and in conformance with the applicable provisions of 2472.

E Placing and Finishing Concrete

Immediately before placing the concrete, the inside faces of the forms shall be wetted and the foundation moistened with water.

The concrete shall be placed in a manner that will prevent segregation; consolidated by hand tamping or internal vibrating to fill all voids; struck off to the required grade; and floated smooth. Curb face forms and contraction joint inserts shall be removed as soon as the concrete has set sufficiently to retain its molded shape.

The top surface and face of curbs shall be hand-floated with a suitable trowel as soon after the face forms have been removed as the condition of the concrete will permit.

After the water sheen has disappeared, joints and edges shall be rounded to the radii shown in the Plans or as directed by the Engineer, and all concrete surfaces exposed to view shall be lightly brushed to a uniform texture.

Side forms shall remain in place for at least 12 hours after the concrete has been cast. All cavities shall be filled with mortar, upon removal of the side forms.

F Slipform Machine Placement

Instead of using fixed side forms, concrete may be placed and formed to the required shape by using an approved type of extrusion machine that will produce a finished product meeting the standards for dimension, quality, workmanship, and appearance as would be achieved with fixed-form construction provided for herein. Hand finishing will be required only to the extent necessary to obtain the specified surface finish and texture.

G Concrete Curing and Protection

After the finishing operations have been completed and as soon as the set of the concrete permits, the concrete shall be cured for a minimum period of 72 hours. The curing shall be in accordance with one of the methods prescribed herein. Where side forms are used, the edges shall receive the curing media within 30 minutes after removal of the forms. During cold weather, the Contractor shall protect the

concrete from frost damage prior to and throughout the duration of the cure.

After September 15th, in that part of the State that is north of the 46 degree Parallel, and after October 1 in that part of the State that is south of the 46 degree Parallel, or before April 15, only the blanket curing or extreme service membrane methods of curing will be permitted.

With the blanket method, after being cured the prescribed minimum period of 72 hours, the concrete shall be treated with two applications totaling approximately 4 m² per liter (1 gallon per 150 square feet) of concrete treating oil applied over all concrete surfaces that will remain exposed in the completed work. The concrete shall be clean and dry when the treating oil is applied.

G1 Blanket Curing Method

The concrete shall be covered with waterproof paper or plastic sheeting as soon as possible (without marring the concrete) after completion of the finishing operations. The curing blankets shall be in such condition and be utilized in such manner as to envelop the exposed concrete and prevent loss of water vapor.

G2 Membrane and Extreme Service Membrane Curing Method

All surfaces exposed to air at the time of cure shall be coated with membrane curing compound within 1 hour after finishing the concrete surfaces. The compound shall be applied by an approved airless spraying machine at the approximate rate of surface curing area.

As conditions for approval, the spraying machine shall have as essential elements, a recirculating bypass system that provides for continuous agitation of the reservoir material; separate hose and nozzle filters; and a multiple or adjustable nozzle system that will provide for variable spray patterns.

Before application, the curing compound as received in the shipping container shall be agitated until a homogeneous mixture is obtained. Application shall be such that a uniform coating is obtained. Any areas that, by visual inspection, appear to have received too light a coating shall be resprayed immediately. Also, should the membrane film become damaged at any time within the required curing period, the damaged areas shall be repaired immediately by respraying. Wherever the initial or corrective spraying is such as to result in unsatisfactory curing, the Engineer may require use of the blanket curing method at no additional cost to the Department.

H Blank

I Blank

J Backfill Construction

As soon as possible without subjecting the concrete work to damaging stresses, the required backfill or embankment construction shall be completed to the elevations indicated in the Plans, using selected materials from the excavations where no other material is provided by the Contract. Placement and compaction of the material shall be in accordance with the applicable provisions of 2451.

All surplus excavated materials shall be disposed of by the Contractor in a manner satisfactory to the Engineer.

K Workmanship and Finish

The complete concrete work shall give the appearance of uniformity in surface contour and texture, and shall be accurately constructed to line and grade.

Edge and surface alignment on curved construction shall conform closely to the planned curvature, and the flow line surface of gutters shall be finished as necessary to eliminate low spots and avoid entrapment of water.

Concrete edges and surfaces designed to straight lines or grades will be checked with a 3 m (10 foot) straightedge, and any deviations therefrom in excess of 8 mm (5/16 inch) will be considered to be unacceptable work.

Unacceptable work shall be removed and be replaced with acceptable work as ordered by the Engineer. In the absence of an order to remove and replace, the Contractor shall have the option of so doing or may elect to leave the unacceptable work in place and accept the following price reductions:

- (1) For 10 to 14 mm (3/8 to 9/16 inch) deviation, payment at 75 percent of Contract price.
- (2) For deviation over 14 mm (9/16 inch), payment at 50 percent of Contract price.

2531.4 METHOD OF MEASUREMENT

The construction provided for herein will be measured, as indicated in the Proposal, by the length, area, or volume. No deductions will be made for any castings or minor fixtures encompassed in the work.

A Length

Length measurements on curbs and curb and gutter will be made along the face of the curb at the gutter line. In the case of transitions from one size or design to another, the entire transition will be measured for payment under the item bid at the higher unit price of the two involved.

Length measurements on solid medians and other construction having uniform width and symmetrical cross section will be made along the center of the longitudinal axis. Unless a variance from the basic design results in increased cross sectional area, short sections of modified design (such as tapers and depressions) will be included for payment with the basic design if there is no separate item provided therefor.

At entrances and alleys, any curbing constructed beyond the curb returns or driveway pavement will be measured for payment as shown in the Plans.

B Area

When measurement is by area, computations will be based on the length as staked and the extreme width between outside faces as shown in the Plans or otherwise authorized, without regard to variations in concrete thickness caused by integral construction such as curbs, drainage openings, etc. However, driveway pavement of each specified thickness, and other items of different design will be measured separately as provided for in the Contract.

C Volume

When measurement is by volume, computations will be based on the length as staked and the cross sectional dimensions shown in the Plans or otherwise authorized.

All concrete structures not otherwise designated for payment by type or design will be included for payment under the item of structural concrete.

2531.5 BASIS OF PAYMENT

Payment for the concrete construction provided for herein, at the Contract prices per unit of measure, will be compensation in full for all costs of furnishing the materials and constructing the work complete in place as specified, except that any granular materials furnished and placed by order of the Engineer in the absence of specific Plan requirements will be paid for separately under 2451.5.

Payment for concrete curbing, median, and driveway construction will be made on the basis of the following schedule:

<u>Item No.</u>	<u>Item</u>	<u>Unit</u>
2531.501	Concrete Curb and Gutter, Design.....	meter (linear foot)
2531.502	Concrete Curb, Design.....	meter (linear foot)
2531.503	Concrete Median.....	square meter (square yard)
2531.505	Concrete Median.....	meter (linear foot)
2531.507	__mm (inch) Concrete Driveway Pavement	square meter (square yard)
2531.511	Concrete (Type of Structure).....	cubic meter (cubic yard)
2531.521	Structural Concrete.....	cubic meter (cubic yard)