SECTION 02400

CONCRETE SIDEWALK AND CURBING

PART 1 - GENERAL

1.01 SCOPE

This specification covers the material, method and installation required by the Contractor to repair damaged concrete streets, curbs, gutters and sidewalks. The Contractor shall provide all necessary labor materials and equipment to complete the work as hereinafter specified or as directed by the Engineer.

1.02 DEFINITIONS

A. "Apron": Shall mean that portion of a driveway approach between the back side of the curb and the street side of the sidewalk.

B. "Step Block": Shall mean a series of one (1) tread and one (1) riser.

C. "Steps": Shall mean a minimum series of two (2) treads and two (2) risers.

D. "Terrace Blocks": Shall mean a walkway between the main sidewalk and the back side of the curb.

PART 2 - MATERIALS

2.01 CEMENT

A. The cement to be used shall be Portland Cement Type II conforming to the current ASTM C150 Specification.

B. Test Reports: Proposed cement manufacturer and Mill Test Reports must be submitted to the Engineer for approval thirty (30) days prior to anticipated use.

2.02 FINE AGGREGATE

A. Fine aggregate shall consist of hard, strong, durable, uncoated grains, free from organic impurities, and shall conform to the NYSDOT Standard Specifications Item 703-07 “Concrete Sand”.

B. Test Reports: Proposed source of supply of fine aggregate, and report of all tests required by this section made by an independent testing laboratory, current within six (6) months must be submitted to the Engineer for approval thirty (30) days prior to anticipated use.

2.03 COURSE AGGREGATE

A. Coarse aggregates shall consist of hard, durable, crushed gravel or crushed stone free from clay, silt, shale or other soft or laminated stone. The stone shall be clean and uncoated. The standard of quality for the coarse aggregate shall be the New York State Department of Transportation Specification 703-02 "Coarse Aggregate" for crushed stone or crushed gravel.

B. Test Reports: Proposed source of supply of coarse aggregates and reports required for standard of quality made by an independent testing laboratory current within the past six (6) months must be submitted to the Engineer for approval thirty (30) days prior to anticipated use.

2.04 WATER

Water shall be clean and free from oils, acids, alkalis, organic matter or other deleterious substances.

2.05 AIR ENTRAINMENT

Air entrainment admixtures shall comply with current specification for air entraining admixtures for concrete ASTM Standard Specification C-260. Manufacturer is to be approved by the Engineer.

2.06 WATER REDUCING AGENT

Water reducing agent shall comply with current specification for water reducing agents ASTM C-494, Type A. Manufacturer is to be approved by the Engineer.

2.07CONCRETE MIX DESIGN

A. Mix design shall be established by an independent testing laboratory conforming to ACI 211 using approved materials and submitted to the Engineer for approval. The concrete shall consist of a design mixture of Portland Cement, fine and coarse aggregates, water, and admixtures (Air Entrainment and Water Reducing Agent). The concrete mixture shall have a minimum cement content of not less than six (6) bags of cement per cubic yard. The proportions of fine aggregate to coarse aggregate shall be quantities of these materials which will produce a workable and plastic concrete having a compressive strength of not less than four thousand (4000) pounds per square inch at twenty-eight (28) days when tests are made in accordance with ASTM C-31 and ASTM C-39 Specifications. The design shall be made for workability equal to slump of four (4) inches as measured according to ASTM C-143 Specification with the smallest quantity of mixing water. The coarse aggregate shall consist of No. 1 and No. 2 sizes with not more than 50 percent nor less than 30 percent No. 1 aggregate size.

B. Air entrainment is to be in accordance with ASTM C-260 and designed for amounts not less than five (5) percent and not more than seven (7) percent. Water reducing agents

shall be in accordance with ASTM C-494 and shall reduce the total water required by at least ten (10) percent without any loss of workability and produce an increased strength proportional to the water/cement ratio.

PART 3 - GENERAL INSTALLATION

3.01 CONCRETE MIXING

Ready-mixed concrete shall be measured, mixed and delivered in accordance with the requirements set forth in the New York State Department of Transportation Standard Specifications for Ready-mixed Concrete and ASTM Standard Specifications, Designation C94. Discharge of the concrete from the truck mixer shall be complete within one hour after the introduction of mixing water to the cement and aggregates. The retempering of concrete which has partially hardened with or without additional materials or water is prohibited.

3.02 COLD WEATHER CONSTRUCTION

Concrete shall not be placed on frozen subgrade or where the subgrade under adjacent pavement is frozen. Concrete may be placed when the air temperature in the shade, and away from artificial heat, is not less than 40 degrees Fahrenheit and rising. Concrete shall not be placed when the temperature is 40 degrees Fahrenheit or less and falling, and shall conform to ACI 306-66 Specifications, "Recommended Practice for Cold Weather Concreting."

3.03 HOT WEATHER CONSTRUCTION

All concreting operations during hot weather shall conform to the requirements of ACI 605-59 "Recommended Practice for Hot Weather Concreting". Care shall be taken to protect the concrete. The operations shall be scheduled to avoid problems that occur with flash set or too rapid drying conditions. Increasing the water cement ratio is not an acceptable method for retarding the set of concrete. Consideration shall be given to maintaining the temperature of the cement, aggregates, and mixing water. The temperature of the concrete at the time of delivery to the job site shall not exceed 90 degrees Fahrenheit. When the ambient air temperature exceeds 75 degrees Fahrenheit, an approved retarder shall be incorporated into the design mix.

3.04 CURING

A. As soon as the concrete has hardened sufficiently to prevent damage, the finished surface shall be protected by waterproof paper blankets. A standard of quality for paper blankets shall conform to ASTM C-171 "Waterproof Paper for Curing Concrete." The Contractor shall take necessary steps to keep cover material moist and in proper position, firmly anchored down at all times during the curing period of seven (7) days. The concrete surface must not be damaged or pitted by rain.

B. The Contractor may use a liquid membrane if a letter requesting permission is submitted to the Director of Public Works and the following criteria is adhered to:

1. Liquid membrane shall conform to ASTM C-309 or latest revision.

2. Liquid membrane is to be an approved material for curing by the New York State Department of Transportation.

3. The curing compound is to be applied in accordance with the manufacturer's specifications.

4. The concrete is to be covered as soon as the liquid membrane has dried with an approved material such as canvas, white paper, etc. The cover will be maintained for a minimum of seven (7) days

3.05 PROTECTION OF WORK

A. The Contractor shall furnish, erect and maintain suitable safety barriers to protect the finished surface until the concrete is cured. Acceptable forms of protection are traffic cones and/or safety barricades with brightly colored flagging. Wooden or steel stakes with flagging shall not be used under any circumstances.

B. Any concrete section damaged or vandalized prior to final acceptance shall be repaired or replaced by the Contractor at his own expense, to the satisfaction of the Engineer.

PART 4 - CONCRETE SIDEWALK INSTALLATION

4.01 Reference: Drawing No. DPW 11 - DPW 13

4.02 SUBGRADE

Subgrade shall be placed on a compacted subbase and graded to the proper elevation by using washed stone or AOBE.

4.03 FORMS AND FORMING

Forms to contain concrete may be of wood or metal. Forms shall be required to form the full depth of the section required: e.g., four (4) inch forms for four (4) inch slabs, six (6) inch forms for six (6) inch slabs, etc. Forms shall be properly staked and braced to provide straight alignment. Forms are to be set so that finished sidewalk will have a slope equal to 1/4 inch to the foot of width pitched toward the roadway.

4.04 CONCRETE THICKNESS

A. Concrete sidewalks shall be a minimum of four (4) inches thick in all areas, except that sidewalks spanning driveways and downtown areas shall have a minimum depth of six

(6) inches.

B. Drive aprons at drive approaches shall have a minimum thickness of six (6) inches.

4.05 CONSTRUCTION JOINTS

A. The sidewalk shall have straight traverse joints every five (5) feet by one of the following methods:

1. The use of a one-eighth inch thick by four inch wide (1/8"x4") metal plate. All joints and outer edges shall be neatly rounded and finished with edger tools.

2. Saw cut to a depth of 25% of the slab thickness, up to a maximum depth of three (3) inches. All cuts shall be completed within 24 hours from initial placement of concrete.

4.06 EXPANSION JOINT

A. Material - The expansion joint shall be 1/4 inch thick premolded bituminous material the full depth of the section.

B. Expansion joints shall be installed in the new sidewalk at the start of, and every 25 to 30 feet thereafter AOBE, and also in those areas where the sidewalk abuts the curb, pavement, telephone poles, water hydrants, and other structures.

4.07 PRE-FORMED EXPANSION AND ISOLATION JOINT

Expansion joint material, conforming to ASTM D-994; pre-formed expansion joint filler, shall be approved. The material shall be 1/4 inch in thickness and must extend the full depth of the slab. It shall be installed every twenty (20) to twenty-five (25) feet and also, where the sidewalk abuts the curb, pavement, buildings and other structures.

4.08 PLACING OF CONCRETE

Prior to placing of concrete, the subbase and forms shall be wetted. The concrete is to be poured with no more than a three (3) inch slump. If the concrete is supplied from a ready-mix plant, the concrete must be in place within sixty (60) minutes after initial mixing water is added. The total mixing water shall not exceed five (5) gallons per ninety-four (94) pound sack of cement. When the ambient air temperature exceeds 75 degrees Fahrenheit, the concrete must be in place within thirty (30) minutes from the addition of the initial mixing water unless a retarder is used. Retempering of concrete will not be permitted.

4.09 FINISHING

A. Once concrete has been deposited, it shall be immediately screeded to correct elevation and then the dividers shall be put in place. When the concrete has set enough, the surface may be floated with a wood hand float, metal ball float or any other acceptable method.

Final finish shall be done with a fine hair push broom or swirl wood float finish. All edges and joints shall be edged with a rounded tool of 1/4 inch radius and transverse joints shall be the width of the walk every five (5) lineal feet.

B. The procedures for finishing shall include the following operations in the proper sequences to the satisfaction of the Engineer:

1. Screed to proper grade.

2. Float exposed surfaces.

3. Edge.

4. Let set.

5. Cut full depth of joints by removing face forms and/or divider plates (See No. 11).

6. Magnesium float.

7. Edge.

8. Broom.

9. Re-edge.

10. Cure.

11. Saw cut joints - optional

4.10 CURING

See Article 3.04 - CURING of this Section

4.11 BACKFILL

After the forms are removed, exposed sides of the sidewalk shall be backfilled with gravel and rough graded to eliminate potential safety hazards. The backfill material shall compacted gravel or soil and free of large stones. When stated in the Contractor's Agreement or Permit, the top two (2) inches of backfill material shall be feathered and graded with topsoil, meeting the existing ground at a maximum distance of three (3) feet from the sidewalk edge(s).

4.12 DRIVE APRONS

A. Drive aprons shall be constructed as shown on the work order and drawings. Payment shall be the same as six (6) inch sidewalk. There shall not be any dummy joints constructed without prior approval of the Engineer.

B. The Contractor may make an agreement with the property owner to increase the specified quantities provided the property owner agrees in writing, to pay the additional costs. The City will not participate in any work done on private property.

PART 5 - CONCRETE CURB AND GUTTER INSTALLATION

5.01 Reference: Drawing No. DPW 6 - DPW 9

5.02 SUBGRADE

Subgrade shall be placed on a compacted subbase and graded to the proper elevation by using washed stone or AOBE.

5.03FORMS AND FORMING

A. Forms shall be free from warp and of sufficient strength to resist springing out of shape. All wood forms shall be thoroughly wetted and metal forms oiled before depositing any material against them. All mortar and dirt shall be removed from forms that have been previously used. Forms shall be required to form the full depth of the section required. Forms shall be properly staked and braced to provide straight alignments and conform to the shape of the appropriate section. Dividers shall conform to shape of section desired.

B. A front form may be eliminated when the existing street pavement creates a smooth, uniform edge for placing concrete. The vertical pavement edge shall be of matching curb thickness and grade and may only be used with the Engineer's approval.

C. The forms in a sectional curb repair shall be set to match the same grade and dimensions as the existing curb of the same line. The new curb shall not follow the grade of the adjacent pavement surface if the pavement is damaged or uneven. For this case, a small area, less than six (6) inches wide, shall remain between the new curb and pavement. After the forms are removed, the open area shall be filled with concrete or asphalt at the Contractor's expense.

5.04 CONSTRUCTION JOINTS

The curb shall have straight traverse joints every ten (10) feet (or less as dictated by the existing curb sections) by one of the following methods:

1. The use of a one-eighth inch thick by four inch wide (1/8"x4") metal plate. All joints and outer edges shall be neatly rounded and finished with edger tools.

2. Saw cut to a depth of 25% of the slab thickness, up to a maximum depth of three (3) inches. All cuts shall be completed within 24 hours from initial placement of concrete.

5.05 PREMOLDED BITUMINOUS EXPANSION JOINT

A. The expansion joint shall be 1/4 inch thick premolded bituminous material the full depth of the section. Expansion joint shall be installed in the new curb at the start of, and every 40 to 50 feet thereafter. Expansion joint shall be installed at each side of the catch basins.

B. Expansion joints shall be installed in the new curb at the start of, and every 40 to 50 feet thereafter. If the expansion joint is omitted, 20 feet of curbing will be deducted from payment for each expansion joint that is missing. Payment will be made when one block is removed and repoured with the proper expansion material in place for each omission.

5.06 PLACING OF CONCRETE

Prior to placing of concrete, the subways and forms shall be wetted. The concrete is to be poured with no more than a three (3) inch slump. If the concrete is supplied from a ready-mix plant, the concrete must be in place within sixty (60) minutes after initial mixing water is added. The total mixing water shall not exceed five (5) gallons per ninety-four (94) pound sack of cement. When the ambient air temperature exceeds 75 degrees Fahrenheit, the concrete must be in place within thirty (30) minutes from the addition of the initial mixing water unless a retarder is used. Retempering of concrete will not be permitted. After concrete is poured into the forms, it shall be puddled and spaded or vibrated by mechanical means so as to insure a dense and thorough mixture free from honeycombs and excessive pockets.

5.07 FINISHING

A. Before the concrete has thoroughly set and while the concrete is still green but firm enough to stand up, the form covering the exposed face of curb shall be removed and the front and top of the exposed surfaces shall be finished with a float or steel trowel to make a uniform finished surface. Special tools and methods may be used to work the concrete to the shapes conforming to the sections as specified. Joints left by dividers at equal intervals must be left clean and unplugged to the full depth of the section. All edges are to be tooled with a 1/4 inch edger unless specified otherwise.

B. The procedures for finishing shall include the following operations in the proper sequences to the satisfaction of the Engineer:

1. Screed to proper grade.

2. Float exposed surfaces.

3. Edge.

4. Let set.

5. Cut full depth of joints by removing face forms and/or divider plates (See No. 11).

6. Magnesium float.

7. Edge.

8. Broom.

9. Re-edge.

10. Cure.

11. Saw cut joints - optional

5.08 CURING

See Article 3.04 - CURING of this Section

5.09 BACKFILL

After the forms are removed, the back side of the curb shall be backfilled with gravel and rough graded to eliminate potential safety hazards. The backfill material shall compacted gravel or soil and free of large stones. When stated in the Contractor's Agreement or Permit, the top two (2) inches of backfill material shall be feathered and graded with topsoil, meeting the existing ground at a maximum distance of three (3) feet from the sidewalk edge(s).

5.10 CURB CUTS & OPENINGS

Only with prior approval from the Engineer, the Contractor may cut the curb to create an opening (for a driveway or ramp) instead of removing and constructing a new curb. The curb shall be cut using a mechanical saw with a properly designed blade and left with a smooth, uniform finish. The curb shall not be broken or cracked using alternate means. The length and flare of the cut shall be determined by the Engineer with reference to Drawing No. DPW 13.

END OF SECTION