SECTION 03300 – CAST IN PLACE CONCRETE

PART I – GENERAL

1.1 SUMMARY

A. This Section includes:

1. Concrete Curb (6” Wide)
2. Concrete Wall / Seatwall
3. Concrete Steps
4. Foundation for Playground Equipment, Site Furnishings
5. Footings

1.2 QUALITY ASSURANCE

A. Comply with governing codes and regulations. Provide products of acceptable manufacturers which have been in satisfactory use in similar service for three years. Use experienced installers. Deliver, handle, and store materials in accordance with manufacturer's instructions.

B. Manufacturer Qualifications: A firm experienced in manufacturing ready-mixed concrete products and that complies with ASTM C 94/C 94M requirements for production facilities and equipment.

C. Comply with ACI 301, "Specification for Structural Concrete."

D. Comply with ACI 117, "Specifications for Tolerances for Concrete Construction and Materials."

1.3 SUBMITTALS

A. Samples:

1. A sample of Concrete (Natural Grey) 12” x 12” concrete chip indicating pigment number, dosage rate and specified concrete finish to be used in the project.

2. Sealant in color specified.

B. Mock-up: Minimum 2 feet by 2 feet section of sand blasted finished concrete.

C. Concrete mix design and certified test reports provided by The Concrete Plant for the aggregate, admixture, cement, and curing materials to be incorporated in the concrete for the project.

D. Certified mill test reports provided by the steel fabricator for the reinforcing steel and accessories to be incorporated in the work.

E. Delivery tickets for concrete including the date, time, truck identification, concrete plant, plant inspector, ticket and load number, concrete class and design mix, moisture content of aggregates, quantity and location of placement.

PART 2- PRODUCTS

2.1 STEEL REINFORCEMENT

A. Plain-Steel Welded Wire Reinforcement: ASTM A 185, fabricated from as-drawn steel wire into flat sheets.

B. Deformed-Steel Welded Wire Reinforcement: ASTM A 497, flat sheet.

C. Reinforcing Bars: ASTM A 615/A 615M, Grade 60; deformed, sizes as shown on the drawings.

D. Plain Steel Wire: ASTM A 82, as drawn.

E. Deformed-Steel Wire: ASTM A 496.

F. Bar Supports: Bolsters, chairs, spacers, and other devices for spacing, supporting, and fastening reinforcing bars, welded wire reinforcement, and dowels in place. Manufacture bar supports according to CRSI's "Manual of Standard Practice."

2.2 CONCRETE MATERIALS

G. The design of the concrete mix, equipment, workmanship, and materials shall conform to the applicable requirements of Division 3 sections, except as hereinafter specified. Minimum compressive strength after 28 days shall be 3000 psi. Maximum size of aggregate shall be 1-01/2 inches, but not less than 3/4 inch. Air content by volume shall be 4-1/2 per-cent, plus or minus 1-1/2 percent. The same brand of cement, source of sand, and water/cement ratio shall be maintained for each load of concrete.

1. Provide Class A3 General Use (3,000 psi) concrete for sidewalks, curbs and gutters.

H. Portland Cement air-entrained, ASTM C 150, Class A3 General Use (3,000 psi) per VDOT 217.

2.3 CURING MATERIALS (non colored concrete)

A. Absorptive Cover: AASHTO M 182, Class 2, burlap cloth.

B. Moisture-Retaining Cover: ASTM C 171, polyethylene film or white burlap-polyethylene sheet.

C. Water: Potable.

D. Evaporation Retarder: Waterborne, monomolecular film forming; manufactured for application to fresh concrete.

E. Clear Waterborne Membrane-Forming Curing Compound: ASTM C 309, Type 1, Class B, dissipating.

F. White Waterborne Membrane-Forming Curing Compound: ASTM C 309, Type 2, Class B.

2.4 EXPANSION JOINT FILLER

A. Joint filler shall be ½ inch preformed asphalt expansion joint material conforming to ASTM D994 or ASTM D1751.

B. If bituminous fiber material is used, a bond breaker such as one-half (1/2") wide polytheylene tape or five eigths inch (5/8") diameter expanded polyethylene foam backer rod shall be installed as recommended by the manufacturer.

2.5 EXPANSION JOINT SEALANT

A. Expansion Joint Sealant: Sealant shall be one-component polyurethane-base elastomeric sealant. Asphalt cement will not be approved as a substitution. Sealant color shall match color of adjacent pavement. Where joints fall between pavement sections of different colors, color shall be selected by Architect to match one of the pavement colors.

1. Products: Subject to compliance with requirements, provide one of the following or an approved equal:

1. SikaFlex-1a by Sika Corporation.
2. Sonoclastic NP-1 by Sonneborn and Chem Rex Inc.

PART 3 – EXECUTION

3.1 SAMPLING, TESTING AND ENFORCEMENT

A. Sampling and testing shall be performed in accordance with Section 03100- Concrete Formwork Reinforcement and Materials, Arlington County Department of Public Works Construction Standards and Specifications.

3.2 PREPARATION FOR PLACING CONCRETE

A. Formwork:

1. General: Construct forms of sound material, and of the correct shape and dimensions shown on the Drawings, constructed tightly and of sufficient strength. Brace and tie the forms together so that the movement of workers, equipment, materials, or placing and vibrating the concrete will not throw them out of line or position. Forms shall be strong enough to maintain their exact shape under all imposed loads. Construct forms that may be easily removed without damage to the concrete. Before concrete is placed in any form, the horizontal and vertical position of the form shall be carefully verified and all inaccuracies corrected. Complete all wedging and bracing in advance of placing concrete.

2. Chamfered Corners: Unless otherwise indicated, provide chamfered corners on all exposed corners. Provide 3/4 inch moldings in forms for all chamfering required.

3. Form Ties: Use form ties of sufficient strength and in sufficient quantities to prevent spreading of the forms. Place ties at least 1-inch away from the finished surface of the concrete. Do not use ties consisting of twisted wire loops. Leave inner rods in concrete

when forms are stripped. Space all form ties equidistant, and symmetrical, and line up both vertically and horizontally.

4. Cleanouts and Access Panels: Provide removable cleanout sections or access panels at the bottom of all forms to permit inspection and effective cleaning of loose dirt, debris, and waste material. Clean all forms and surfaces to receive concrete of all chips, sawdust, and other debris and thoroughly blow out with compressed air just before concrete is placed.

5. Arrangement: Arrange formwork to allow proper erection sequence and to permit form removal without damage to concrete.

B. Preparing the Subgrade: Thoroughly prepare and compact the subgrade as specified in Section 02300 – Earthwork. Subgrade shall be excavated to the required elevation below the finished surface of the pavement in accordance with grades and lines shown on the Drawings.

C. Layout: Cast in place concrete shall have true curves to the radii indicated on the Drawings. No straight segments or tangents shall be approved. A digital CADD file containing the project layout is available from the Project Officer to aid in the installation of cast in place concrete elements.

D. Dewatering: Remove water from excavations before concrete is deposited. Divert any flow of water through proper side drains and remove water without washing over freshly-deposited concrete. Remove hardened concrete, debris, ice, and other foreign materials from the interior of the forms, and from the inner surfaces of mixing and conveying equipment. Secure reinforcing in position and place vapor barrier and have inspected and approved before the concrete is poured. Do not wheel equipment used to deposit concrete over reinforcement.

E. Inspection: After placement of reinforcing steel in the forms, and prior to placing concrete, notify the Project Officer so that proper inspection may be made. Such notification shall be made at least 48 hours in advance of placing concrete to permit proper arrangements for inspection.

3.3 DELIVERY

A. Submit a delivery ticket indicating the mix and design strength of the concrete, design slump, and time of leaving the truck mixer with each batch at the time of delivery. Record on the back of the delivery ticket: (a) the time of arrival of the truck mixer on the site; (b) the time of deposit of the concrete from the truck; and (c) the place of deposit of the concrete. The completed delivery ticket shall be delivered to the Project Officer. Failure to deliver such completed ticket to the Project Officer will be cause for the Project Officer to reject the deposited concrete at any time and cause it to be removed and replaced at no additional expense to the County.

B. All batching of concrete shall be in accordance with the manufacturer's instructions.

C. Do not use concrete on the job site when it has exceeded the allotted mixing time as specified in Section of the 217.09 of the VDOT Specifications.

3.4 PLACING CONCRETE

A. Before placing concrete, remove all construction debris, water and ice from the places to be occupied by the concrete. Give particular attention to the removal of dirt and debris from all formed construction joints.

B. Concrete, when deposited, shall have a temperature ranging between a minimum of 50 degrees Fahrenheit and a maximum of 90 degrees Fahrenheit. When the temperature of the surrounding air is below 50 degrees or above 90 degrees Fahrenheit, concreting shall be done in accordance with the recommendations noted in ACI-306 and ACI-305 respectively.

C. Depositing of concrete shall be in accordance with the manufacturer's instructions.

D. Mix concrete in such quantities as required for immediate use and place prior to loss of slump. Do not retemper concrete.

E. Spade, work and vibrate concrete as it is being poured, to secure its maximum density, free from voids and completely filling the forms. Thoroughly work concrete to secure the complete envelopment of all parts of the reinforcing steel and completely fill the corners of the forms. Maintain not less than 2 approved vibrators on the work at all times. Use tremies or chutes for drops of more than 5-feet.

3.5 REMOVAL OF FORMS

A. After concrete has been placed, all forms, bracing and supports shall remain undisturbed long enough to allow the concrete to reach the strength necessary to support with safety its own weight plus any live load and earth pressure that might be placed upon it without causing excessive settlement or deflective or any temporary or permanent damage to the structure. Prevent the breaking of edges and corners of concrete in the stripping of forms. Upon removal of formwork, immediately patch honeycombed areas and other voids to the satisfaction of the Project Officer.

B. Thoroughly clean forms and recoat with specified form coating before each reuse. Do not reuse any form for exposed work which cannot be reconditioned to "like new" condition. Discard forms considered unsatisfactory by the Project Officer. Apply form coating to all forms in accordance with the manufacturer's specifications. Apply form coatings before placing reinforcing steel.

3.6 PROTECTION OF NEW WORK

A. Protect all freshly placed concrete from mechanical injury or action of the elements until such time as the concrete is thoroughly set.

B. Protect sleeves, projecting inserts, anchor bolts and other embedded items from disturbances until the concrete has sufficiently set to hold such items.

3.7 CONTROL JOINTS

A. Provide sawn or tooled joints or removeable insert strips; depth equal to 1/4 slab thickness. Spacing as required and approved by the Project Officer.

3.8 EXPANSION JOINTS

A. Furnish and install preformed expansion joint material at locations shown on the drawings or every 20 feet on center, minimum, full depth of concrete at approved locations by Project Officer. Cut preformed expansion joint material slightly less than the full width of the cross section of the concrete to allow for a liquid joint sealant with any backup material.. Provide

smooth dowels across joint which permit 1 inch horizontal movement and no vertical shear movement.

B. Tool the concrete edges at expansion or contraction joints to a one-eighth (1/8)-inch radius.

3.9 FINISHING

A. Finishing and caulking of concrete shall be in accordance with the manufacturer's instructions.

B. Concrete Walls: All areas of exposed concrete walls from the top of the wall to 1 foot below the finished grade of the structure shall be finished in the following manner:

1. After removal of forms, point cavities, stone pockets, and tie holes in exposed surfaces with mortar by thoroughly wetting the repair area. Cut out honeycombs down to dense concrete, and then patch and point as described above. The mortar mix for patching shall be determined by trial to obtain a good color match with the concrete when both patch and concrete are cured and dry. The amount of mixing water shall be as little as consistent with the requirements of handling and placing the mortar.
2. Ground off form joint marks and fins to a smooth surface, dense and free of prominent grain markings and bulges or depressions more than 1/8-inch in 4 feet.
3. When the mortar pointing has set, the entire exposed concrete surface shall be thoroughly covered with water by means of brush and rubbed with carborundum brick to remove all blemishes and leave the entire exposed surface uniform in color and texture.
4. All walls shall receive a light sandblast finish. Prepare mock-up for approval prior to commencing work.

3.10 CURING

A. Curing shall be started as soon as it is possible to apply the curing medium without damaging the surface, preferably immediately upon completion of the finishing operation. Curing shall continue uninterrupted for a minimum period of 14 days. Rapid drying upon completion of the curing period shall be prevented. At no time during the curing period shall the temperature of the concrete be permitted to drop below 40 degrees Fahrenheit.

3.11 DEFECTIVE CONCRETE

A. Defective concrete is defined as concrete in place which does not conform to strength, shapes, alignments, appearance, and/or elevations as shown on the Drawings; areas which contain faulty surface areas and/or concrete surfaces not finished in accordance with these specifications.

B. Remove all defective concrete and replace in a manner meeting with the Project Officer's approval. Should only surface imperfections occur, patch at the discretion of, and in a manner satisfactory to, the Project Officer. Permission to patch the work shall not be considered as a waiver of the County's right to require complete removal and replacement of such defective work should the patching fail to satisfactorily restore the required quality and appearance of the work.

PART 4- MEASUREMENT AND PAYMENT (to be used for calculation of possible change orders).

4.1 The measurement of "Concrete Curb" to be paid for shall be the number of Linear Feet constructed, in accordance with the plans, specifications, to the satisfaction of the Project Officer.

4.2 The price bid shall be a unit price per Linear Feet and shall include the cost of furnishing all labor, materials, equipment, and incidental expenses necessary to complete the work, including expansion material, sealant, steel reinforcement, curing material, concrete, aggregate subbase, all in accordance with the plans and specifications and to the approval of the Project Officer.

4.3 The measurement of "Concrete Wall and Seatwall" to be paid for shall be the number of Cubic Yards constructed, in accordance with the plans, specifications, to the satisfaction of the Project Officer.

4.4 The price bid shall be a unit price per Cubic Yard and shall include the cost of furnishing all labor, materials, equipment, and incidental expenses necessary to complete the work, including expansion material, sealant, steel reinforcement, curing material, concrete, aggregate subbase, all in accordance with the plans and specifications and to the approval of the Project Officer.

4.5 The measurement of "Concrete Steps" to be paid for shall be the number of Linear Feet constructed, in accordance with the plans, specifications, to the satisfaction of the Project Officer.

4.6 The price bid shall be a unit price per Linear Foot and shall include the cost of furnishing all labor, materials, equipment, and incidental expenses necessary to complete the work, including expansion material, sealant, steel reinforcement, curing material, concrete, aggregate subbase, all in accordance with the plans and specifications and to the approval of the Project Officer.

END OF SECTION