SECTION 502

CONCRETE ITEMS

I. GENERAL

1.1 DESCRIPTION OF WORK

The Contractor shall furnish all labor, supervision, material (except as herein provided), tools, equipment, supplies, and services; and shall perform all Work necessary for constructing curbs, gutters, combination curbs and gutters, sidewalks, paved ditches, paved flumes, bridge drainage aprons and chutes, concrete steps and handrails, median strips, sign islands, and directional island curbs, street connection pavement, energy dissipators, curb-cut ramps, concrete driveway replacement (pipe installation), concrete driveway, entrance gutter, and composite detectable warning surface in accordance with these specifications and in conformity to the lines and grades shown in the Contract Documents or as established by the Owner.

1.2 MATERIALS

A. Materials shall be furnished by the Contractor in accordance with Section 200. Concrete shall be Class A3 unless otherwise specified.

B. The Contractor may, as approved by the Owner, substitute a higher class of concrete, or place admixtures in the mix, to achieve early strength to facilitate the removal of forms and/or the use of the structure. Such change shall be at no additional cost to the Owner.

1.3 SUBMITTALS

Submittals shall be made by the Contractor in accordance with the procedures set forth in Section 105 and as described below:

A. The Contractor shall submit reports of material analysis, concrete mix designs, and shall confirm conformance of all materials with the requirements of this section and all applicable VDOT or permit requirements.

B. The “Acceptance Procedures for Aggregates” shall be in accordance with Section 200.

C. Prior to use or placement, the Contractor shall submit certifications in the form of affidavits from the material suppliers, together with supporting data, attesting that the products and materials meet specification requirements.

II. EXECUTION

2.1 GENERAL PROCEDURES

A. The foundation shall be constructed to the required elevation. Unsuitable material shall be removed and replaced as directed by the Owner. The subgrade shall be compacted per Section 303 or 309 as appropriate, and shaped to provide a uniform, smooth surface. The foundation for hydraulic cement concrete items shall conform to the specified density of the course and shall be moist when concrete is placed.

Immediately following finishing operations, hydraulic cement concrete items shall be cured and protected in accordance with VDOT Road and Bridge Specifications Section 316.04

1. A compression test, consisting of six standard cylinders, two tested at an age of seven days and two tested at an age of twenty-eight (28) days, will be required for each 100 yards of concrete, but not less than one such test for any one day's operation at each location which involves the placing of concrete. Tests shall conform to ASTM C31 and ASTM C39. The Contractor shall keep 2 cylinders for potential retesting or fifty-six (56) day testing in the event of a failure at 28 days.

2. Slump tests shall be made as required by the Owner and shall conform to ASTM C143. Allowable range shall be 2" to 4" unless otherwise indicated. A minimum of 3 slump tests are required for every 20 cubic yards of concrete unless otherwise specified.

3. Tests on Hardened Concrete: Where there is question to the quality of concrete that has been poured, the Owner may require tests in accordance with ASTM C42. Swiss hammer is not acceptable.

4. Existing concrete drives and walks to be removed under this Section shall be taken back to the nearest joint. Concrete shall be sawed leaving a clear and neat joint. Patching of broken concrete will not be accepted.

B. Fixed Forms

1. A full set of forms shall be used, including face forms. Forms shall be straight, free from warp and of such construction that there will be no interference or obstruction with the Owner’s inspection of grade and alignment. Forms shall extend the entire depth of the item and shall be braced and secured so that no deflection from alignment or grade will occur during concrete placement. Radial forms shall be sufficiently flexible or otherwise designed to provide a smooth, uniform, curved surface of the required radius. Clean and coat the contact surfaces of forms and vertical forms of existing pavements used as forms, with a suitable bond breaker or form release material prior to placing concrete. Face forms shall be removed as soon as concrete has attained sufficient set for the curb to stand without slumping. The exposed surface shall then be smoothed by the use of a suitable finishing tool.

2. Concrete Removal

   Existing concrete to be removed shall be taken back to the nearest joint, sawed or jack-hammered leaving a clear and neat joint.

3. Defects in finished work

   All broken and/or cracked concrete shall be removed to the nearest joint and replaced prior to final acceptance at no additional cost to the Owner. Patching of broken curbing will not be accepted. Minor chips in curb are acceptable.

4. Transverse joints for crack control

   Transverse joints for crack control shall be provided at the following locations:

a. At approximately 10 foot intervals.

b. At the gutter where the curb and gutter tie to the gutter apron of drop inlets.

c. When time elapsing between consecutive concrete placements exceeds 45 minutes.

d. Minimum length of new or replaced curb shall be 10 feet.

5. Crack control joints may be formed by using one of the following methods

a. Removable 1/8-inch templates.

b. Scoring or sawing for a depth of not less than 3/4 inches when using curb machine.

c. Approved "leave-in" type insert or may be formed or created using other approved methods which will successfully induce and control the location and shape of the transverse cracks.

6. The joint at the gutter where the curb and gutter ties to the apron gutter of the drop inlet shall be formed by scoring or sawing.

7. Expansion joints shall be formed at intervals of approximately 50 feet, all radii points at concrete entrances and curb returns and no less than 6 feet and no more than 10 feet from drop inlets.

8. Hydraulic cement concrete shall be sufficiently consolidated to produce a closed surface. Edges shall be rounded to a 1/4-inch radius.

9. Exposed surfaces immediately adjacent to the roadway, except concrete median barriers, shall be given a light broom finish. Concrete median barriers shall be given a Class 1 finish in accordance with the requirements of *VDOT Road and Bridge Specifications* Section 404.07. Paved ditches and paved flumes shall be given a coarse or roughened texture. Other exposed surfaces shall be given a rough wood float finish. Mortar used in the removal of surface irregularities shall be prepared in accordance with the requirements of Section 200.

10. Local irregularities in the face and top of curbs shall be not more than 3/8-inch in 10 feet. Vertical alignment shall be sufficiently uniform and regular to ensure complete drainage.

11. Immediately following finishing operations, hydraulic cement concrete shall be cured and protected in accordance with the requirements of *VDOT Road and Bridge Specifications* Section 316.04.

C. General Slipform Requirements

1. If permitted in the Contract Documents, the Contractor may slipform incidental concrete items provided the following conditions are met and approved by the Owner. Allowing the Contractor the option of slipforming concrete items in no way relieves the Contractor from his responsibility to comply with the contract requirements and conditions.

2. Equipment used for slip-forming shall conform to the general requirements of *VDOT Road and Bridge Specifications* Section 502.03(b)

3. Slip-form equipment shall produce a product equal to or better than that produced by fixed form construction. Equipment for slipforming operations shall be designed or engineered to form the type of construction design for which its use is intended. Where equipment has been modified to such an extent that its use is questionable, the Contractor will be required at his expense to demonstrate to the Owner's satisfaction that the equipment can consistently produce the desired type of construction. The slipform equipment shall be self-propelled and shall be equipped to place/extrude, form, consolidate, and finish the freshly placed concrete in such a manner that a minimum amount of hand finishing is required to produce a dense, consolidated, homogenous product. Slipform equipment shall be controlled to line and grade by automatic sensing, guidance, and control devices such that the machine automatically senses and follows taut guidelines or other stable reference, performing any necessary corrective action to ensure the correct grade and alignment are achieved.

4. The Contractor shall ensure that the slipform operation is planned to result in the full cross section and grade of the design cross-section along the complete run of concrete placement.

5. Slip-form equipment shall operate with a continuous forward motion. The Contractor shall plan and stage the work to eliminate the need for the slipform machine to be stopped during placement operations. If for any reason the forward progress of the machine must be stopped, operation of the vibrating and tamping elements shall also be stopped immediately.

6. If the results of the slipform operation are not satisfactory to the Owner in accordance with the requirements stated herein, the continued use of the equipment will not be permitted.

7. Concrete for use in slipform operations may be manufactured with a slump as low as zero. The top of the slump range shall conform to the requirements for the class of concrete specified in the Contract Documents or Special Provisions. The concrete shall have properties that consistently maintain workability and the cross section, line, and grade of the proposed product. Concrete shall be finished to a light broom finish. If water is held back to maintain the desired slump, it may be added in increments provided the maximum water per cubic yard has not been exceeded and a minimum of 30 revolutions at mixing speed is used for complete mixing.

8. Where reinforcing steel is incorporated into the proposed design, it shall be uncoated steel conforming to the requirements of Section 200. Reinforcing steel shall be tied at 100 percent of the bar intersections and shall be sufficiently strengthened with braces, additional reinforcement, or chairs to make the reinforcement cage rigid so as to prevent any movement during concrete placement. If the reinforcing steel exhibits any movement during concrete placement using slipforming methods, the Work shall be suspended until the reinforcing steel has been sufficiently tied and stabilized to the satisfaction of the Owner. The reinforcing steel shall be continuous from fixed object to fixed object. All reinforcing steel shall have the appropriate amount of concrete cover for the particular design with a tolerance of +/-1/2 inch. In no case shall the amount of cover be less than 1

½ inches. Placing reinforcing steel in freshly placed concrete is not permitted.

9. Extrusions shall be of the full cross section of the designed item and multiple placements will be allowed based on the permissible construction joints as noted in the plans or standard drawings.

10. Where weep holes are part of the proposed median barrier design, the Contractor shall use 6-inch-diameter underdrain pipe in lieu of weep holes. The Contractor shall install underdrain pipe conforming to Section 501 and *VDOT Road and Bridge Specifications*, Section 232 at the grade at the bottom of the footing and shall terminate the underdrain pipe in catch basins, drop inlets, or at a suitable day-lighted location.

11. Where naturally occurring vertical contraction cracking occurs and where there exists a grade separation on each side of the barrier, the Contractor shall install a waterproofing membrane conforming to the requirements of Section 200, spanning 1 1/2 feet on each side of the contraction crack at the back surface of the higher grade side of the barrier to prevent water from passing through the barrier.

12. Expansion joint material 1/2-inch thick shall be installed adjacent to each fixed object. Expansion material shall be placed against each fixed object prior to placement of the slipformed concrete. Contraction joints will not be required with slipformed operations provided the reinforcing steel is continuous from fixed object to fixed object.

2.2 INDIVIDUAL ITEM REQUIREMENTS

A. Hydraulic Cement Concrete Curbs, Gutters, Combination Curbs and Gutters, Paved Ditches, and Paved Flumes

1. All concrete curb, gutter, combination curb and gutter, paved ditches and paved flumes shall be placed on a base of compacted aggregate as shown in the *VDOT Road and Bridge Standards* or as otherwise specified.

2. Where standard mountable curb or combination curb and gutter with mountable curb is specified, adjacent curbs of standard entrance gutter and standard connection for streets shall be modified to provide a mountable shape corresponding to the standard mountable shape, in accordance with the *VDOT Road and Bridge Standards*.

3. Where integral curb is specified, the curb shall be placed simultaneously with or immediately after placement of the slab. The time period between slab and curb placement shall be not more than 45 minutes except as hereinafter specified. The surface of the slab on which the curb is to be placed shall be roughened, and the concrete shall be placed so as to secure a bond between the slab and curb.

4. When authorized by the Owner, the Contractor may construct the integral curb by providing steel dowels 5/8-inch in diameter, 7 inches in length, to be embedded in the slab at 1-foot intervals. Dowels shall be placed so as to extend at least 2 inches into the curb. While the slab is still plastic, it shall be roughened to a depth of approximately 1/2 inch below the screeded surface for the full width of the curb.

5. Local irregularities in the face and top of curbs shall be not more than 3/8 inch in 10 feet. Vertical alignment shall be sufficiently uniform and regular to ensure complete drainage.

6. Slipform Method

   a. Where concrete curb or combination curb and gutter is placed over existing pavement, it shall be anchored to the existing pavement either by placing steel dowels and reinforcing steel or by using an approved adhesive. Steel dowels shall be firmly mortared with 1:1 Portland cement and sand mortar in holes drilled in the pavement. If an adhesive is used, the surface of the pavement shall be thoroughly cleaned before the adhesive is applied. Adhesive shall be EP-4 epoxy resin, a two-component system conforming to the requirements of *VDOT Road and Bridge Specifications* Section 243. The pavement shall be cleaned by either blast cleaning or wire brushing so that the prepared surface is free of dust, loose material, oil, or any other material that may prove deleterious to bonding.

   b. The grade for the top of the extruded curb shall be indicated by an offset guideline set by the Contractor from survey information supplied by the Owner. The forming tube portion of the extrusion machine shall be readily adjustable vertically to accommodate, when necessary, a variable height of curb conforming to the predetermined curb grade line. A grade line gage or pointer shall be attached to the machine to monitor the elevation of the curb being placed against the established grade line so as to make corrective adjustments as necessary. In lieu of a grade line gage or pointer, the extrusion machine may be operated on rails or forms set to produce the predetermined finished grade line for the curbing.

   c. Concrete shall be continuously fed to the slipforming machine at a uniform rate. The machine shall be operated under sufficient uniform restraint of forward motion so as to produce a well-compacted homogenous mass of concrete free from surface pits larger than 1/4 inch in diameter and requiring no further finishing other than light brushing with a broom. Finishing with a brush application of grout will not be permitted.

7. Expansion joints shall be constructed as specified for fixed formed curbing or shall be constructed by sawing through the curb section to its full depth. The width of the cut shall be such to allow the insertion of the joint filler with a snug fit. If sawing is performed before the concrete has hardened, the adjacent portions of the curb shall be supported firmly with close fitting shields. The operations of sawing and inserting the joint filler shall be completed before curing the concrete.

8. If sawing is performed after the concrete has hardened, the joint filler shall be mortared in place with heavy trowel pressure. After sawing is performed, all exposed portions of the curb in the vicinity of the joint shall be covered with another application of curing compound. At the conclusion of the curing period, the filler in each saw joint shall be checked for tightness of fit. Any loose filler shall be mortared in place again and cured.

9. Within 3 to 7 days, the Contractor shall backfill concrete curb, gutter, and combination curb and gutter to the required elevation with approved material. Backfill material shall be compacted with curbs and gutters remaining plumb.

10. Finished grades for new curb and gutter shall be staked out by the contractor every 25 feet along the curb line prior to installation. The gutter slope and alignment shall be verified with a 10 foot straight edge. The variation of the surface from the testing edge of

the straight edge between any two contact points with the surface shall not exceed 1/4". Humps and depressions exceeding this tolerance shall be removed to the nearest joint, and replaced. Any curb that holds more than 1/4" of water, or is installed at a slope such that water will not flow shall be removed and replaced to the extent necessary to provide positive flow.

11. The contractor shall make all transitions between existing (old) and new curbing at no additional expense to the Owner.

12. In locations where there is existing curb, the contractor shall remove the curb in its entirety from the existing joint nearest the beginning of the proposed transition and replace it.

B. Median Strip Slabs, Directional Island Curbs, and Curbs for Median Strips

The area between curbs of earth medians and directional island curbs shall be filled with suitable material, firmly compacted, and brought to a grade approximately 6 inches below the top of curbs. The final 6 inches shall be backfilled with approved soil media. Sufficient material shall be placed between curbs to compensate for settlement, thus leaving the earth slightly higher than the curbs. Seed and topsoil shall be applied in accordance with the requirements of Section 603 and 602, respectively.

C. Hydraulic Cement Concrete Sign Islands

Sign islands shall be constructed in accordance with the requirements of *VDOT Road and Bridge Specifications* Sections 502 and 504.03 except that joints for crack control and expansion shall be provided at locations that coincide with joints in underlying adjacent, or integral rigid pavement or other structures.

D. Hydraulic Cement Concrete Sidewalk

1. The foundation shall be shaped and compacted to a firm, even surface.

2. Unsuitable material shall be removed and replaced with approved material as directed by the Owner. Large holes shall be filled with sandy, coarse material, and sharp contours and rises shall be leveled.

3. When geotextile fabric is required, the designated area shall be cleared of debris prior to fabric installation. Adjacent strips of geotextile fabric shall be overlapped at least 12 inches. If fabric is torn or punctured, it shall be repaired with the same type of fabric. A patch shall be placed over the damaged area with an overlap of at least 12-inches in all dimensions at the Contractor’s expense.

4. Forms shall be straight, free from warp, and of sufficient strength to resist the pressure of concrete without springing and shall extend for the full depth of concrete. Forms shall be braced and stacked so that they will remain in horizontal and vertical alignment until their removal. Where practicable, forms shall be placed at least 100 feet in advance of concrete placement. Forms shall be cleaned of foreign matter and coated with an approved bond-breaking agent before concrete is placed.

5. The foundation shall be thoroughly moistened immediately prior to concrete placement.

Concrete shall be placed in forms by methods that will prevent segregation. Concrete shall be spread to the full depth and brought to grade by screeding and straightedging. Concrete shall be spaded adjacent to forms to prevent a honeycomb appearance, and the surface shall be floated with a wooden float to produce a surface free from irregularities. The final finish shall be obtained with an approved hand float that will produce a uniform surface texture. Light metal marking rollers or light brooming may be used to hide trowel marks. Outside edges of the sidewalk slab and joints shall be edged with an edging tool having a radius of 1/4-inch.

6. Transverse expansion joints shall be constructed at intervals of approximately 50 feet, except for closures. Slabs shall be at least 3 feet in length. Slabs shall be separated by transverse preformed joint filler, 1/2-inch in thickness that extends from the bottom of the slab to approximately 1/4-inch below the top surface.

7. The slab between expansion joints shall be divided into sections approximately 5 feet in length by transverse control joints formed by a jointing tool, trowel, or other approved means. Transverse control joints shall also be provided when the time period between consecutive concrete placements is more than 45 minutes. Control joints shall extend into concrete for at least 1/4 of the depth and shall be approximately 1/8-inch in width. Where slabs are more than 7 feet in width, control joints shall be formed longitudinally to obtain secure uniform blocks that are approximately square. Transverse control joints shall also be installed where the corners of the drop inlets project into the sidewalk.

8. Construction joints shall be formed around appurtenances extending into and through the sidewalk. Preformed joint filler 1/4-inch thick shall be installed in these joints except that joint filler shall not be used adjacent to drop inlets. An expansion joint shall be formed and filled with 1/4-inch preformed joint filler no less than 6 feet and no more than 10 feet from drop inlets. Preformed joint filler shall also be installed between concrete sidewalk and any adjacent fixed structure that is not tied to the sidewalk with steel dowels.

9. Where the sidewalk is constructed in conjunction with adjacent curb, expansion joints in the curb and sidewalk shall coincide. Where such construction is adjacent to existing curb, the expansion joint shall coincide, where practicable.

10. Where existing or proposed structures are within the limits of the sidewalk area, concrete around them shall be scored in a block, or circle as applicable, approximately 8 inches wider than the maximum dimension of the structure at the sidewalk elevation.

11. Preformed joint filler shall be securely fastened.

12. The Owner may drill cores from the completed slab to make depth measurements. Sections showing a deficiency of more than 3/8-inch shall be removed and replaced to the specified depth at the Contractor's expense.

13. Immediately following finishing operations, concrete shall be cured and protected in accordance with the requirements of *VDOT Road and Bridge Specifications* Section 316.04. Sidewalks shall not be opened to pedestrian traffic for the first 5 days. Vehicular traffic shall be excluded for the first 14 days or until the minimum design compressive strength is attained, whichever is the lesser time.

14. When liquid membrane-forming compound is used, heavy concentrations of curing

compound that will not properly set and that may be tracked into homes or businesses shall not be used.

E. Curb Cut Ramp

1. Curb Ramp with Detectable Warning Surfaces: The installation of the concrete curb ramp and transition slope ramps shall be constructed according to the Contract Documents, Section 521, and this Section, except for the detectable warning device tiles that shall be installed in accordance with the manufacturer's specifications and the Contract Documents.

2. Curb ramp and transition slope ramp floors shall be 7 inch thick Class A3 concrete or, if precast, 7-inch thick Class A4. Transition slope ramps may be poured monolithically with curb ramp floor or by using permissible construction joint with required bars. The required bars shall be 8 inches in length, No. 5 rebar, and shall be placed 12 inches from center to center along both of the curb ramp floors, mid-depth of the ramp floor, with 1 ½ inch minimum concrete cover. If curb ramp floor is precast, holes must be provided for dowel bars so that adjoining flared transition slope ramps can be cast in place after the placement of the precast curb ramp. The finished surface of the curb ramp and transition slope ramps shall be uniformly profiled to match the adjoining surfaces without lips or obstructions and shall drain completely. The location and orientation of the curb ramps shall be constructed as shown in the Contract Documents or directed by the Owner.

3. Curb ramp running slopes at unrestrained sites shall not be steeper than 1:12 (0.0833) and the cross slope shall not be steeper than 1:48 (0.02). Transition slope ramps shall not be steeper than 1:12 (0.0833). When altering existing sidewalk, where existing site development precludes the accommodation of a ramp slope of 1:12 (0.0833), a running slope between 1:12 (0.0833) and 1:10 (0.10) is permitted for a rise of 6 inches maximum and a running slope of between 1:10 (0.10) and 1:8 (0.125) is permitted for a rise of 3-inches maximum. In historic facilities, a 1:6 (0.1667) ramp with a maximum run of 2-inches is permitted if a lesser slope is not feasible and if the historic significance of the facility would be treated or destroyed through the use of complying ramp. Curb ramp running slope shall not exceed 8' in length, except at sites where the Contract Documents specify a greater length.

4. Where a curb ramp is constructed within the existing concrete curb, combination curb and gutter and/or sidewalk, the existing concrete curb or combination curb and gutter shall be removed to the nearest joint beyond the curb transitions or to the extent that no remaining section of curb or curb and gutter is less than 5 foot long. The existing sidewalk shall be removed to the nearest joint beyond the transition slope ramps or walk around or to the extent that no remaining section of sidewalk is less than 5 foot long.

5. When a curb ramp and transition slope ramps are constructed with bricks or concrete pavers, the bricks and concrete pavers shall be installed in accordance with manufacturer's specifications or Contract Documents.

6. Detectable warning surface tile shall extend the full width of the curb ramp or landing and in the direction of travel 24 inches from the back of curb. The detectable warning surface shall not be installed on the transition slope ramps. The detectable warning surface shall be located so that the edge nearest the curb line is between 6 inches and 8 inches from the face of curb unless noted in the Contract Documents. All permanent

installations of detectable warning surfaces shall be "wet set" in freshly placed concrete. Concrete pavers shall be wet set in concrete with a minimum depth of 4 inches of concrete underneath, unless otherwise shown on the plans or recommended by the manufacturer. Surface mounted detectable warning surfaces are permitted only for temporary installations where the detectable warning will be in service 6 months or less.

7. Domes shall be aligned on a square grid, aligned in rows parallel and perpendicular to the predominant direction of travel. The domes must be not skewed diagonally to the direction of travel.

8. After the installation of the detectable warning surface tile, the surface of the tile shall be free of any debris, concrete and sealant and shall be cleaned according to the manufacturer recommendations.

9. The Contractor and manufacturer shall jointly warrant the installed detectable warning surface to last no less than two years without losing more than one percent of the truncated domes due to delaminating as a result of product failure and shall further warrant the surface for a minimum of five years against fading, chipping, peeling, cracking or loss of original shade due to sunlight, salt or exposure to weathering.

F. Hydraulic Cement Concrete Steps

Hydraulic cement concrete steps shall be constructed in accordance with the requirements of Section 406 (Reinforcing Steel) and *VDOT Road and Bridge Specifications* Section 404 (Hydraulic Cement Concrete Operations). The tread portion of steps shall be given a light broom texture. Finished concrete shall be cured and protected in accordance with the requirements of *VDOT Road and Bridge Specifications* Section 316.04.

G. Handrails

1. Handrails shall be constructed using standard or special fittings, or by welding joints. If joints are welded, exposed joints shall be finished by grinding or filing to give a neat appearance. Handrails shall be bonded internally to maintain continuity. Handrails shall be electrically grounded according to *VDOT Road and Bridge Specifications* Section 410.03(b).

2. Metal items, including rails, posts, and fittings, shall be galvanized in accordance with the requirements of *VDOT Road and Bridge Specifications* Section 233 except for metal posts and rails fabricated from pregalvanized material whose ends and other exposed areas are satisfactorily repaired with a material conforming to the requirements of *VDOT Road and Bridge Specifications* Section 233.

III. MEASUREMENT FOR PAYMENT

A. Concrete Curb, Combination Curb and Gutter, and Gutter Complete-in-place

1. Standard concrete curbs, radial curbs, standard combination curb and gutter, radial combination curb and gutter, and asphalt concrete curbs will be measured in linear feet along the face of the curb and will be paid for at the contract unit price per linear foot for the type and standard specified. The price shall include modifying curbs or curb and gutters to transition with standard entrance gutters, standard street connection pavement,

and standard median strips. Where the curb or curb and gutter is adjacent to drop inlets, the contract unit price for the drop inlets shall include that part of the curb or curb and gutter within the limits of the structure.

2. Where there is no other excavation within the limits of the concrete curb, gutter, or combination curb and gutter other than that necessary for its construction, the contract unit price shall include excavating, backfilling, compacting, and disposing of surplus and unsuitable material. Where excavation is necessary for the roadway, the part of excavation within the limits of the concrete curb, gutter, or combination curb and gutter will be paid for as regular excavation in accordance with Section 303.

3. Gutters will be measured in square yards of surface area or linear feet as indicated on the Bid form.

B. Paved Ditch, Paved Flume, Entrance Gutter, and Street Connection Pavement

1. Quantities will be measured and paid for in linear feet or square yards of surface area as indicated on the Bid form.

2. The cost of excavation below the finished grade or below the slope surface of cut or fill sections that is necessary for installing and backfilling paved ditches and flumes shall be included in the unit bid price for the paved ditch or flume in square yards or linear feet, as indicated on the Bid form.

3. Undercut excavation below the neat lines of paved ditches in cut sections, including replacement backfill for undercut excavation and excavation above the upper lateral limits of paved ditches and paved flumes that are outside the normal plan earthwork limits, will be measured and paid for in accordance with the requirements of Section 303.

C. Energy Dissipators

Measurement will be each item. Payment will be made at the contract unit price bid per each energy dissipator.

D. Concrete Driveways and Entrances installed or replaced will be measured and paid for in units of square yards per thickness in inches; cubic yards, or, per each, as indicated on the Bid form.

E. Median Strips (Width)

1. Median strips will be measured in linear feet for the width specified parallel to the surface of the road or square yards.

2. Payment will be made at the contract unit price bid per linear foot or square yards.

F. Sign Island

Sign islands will be measured and paid in units of each or square yards at the contract unit price, complete-in-place, exclusive of posts and signs.

G. Directional Island Curb

Directional island curbs will be measured and paid in linear feet at the contract unit price along

the face of the curb.

H. Hydraulic Cement Concrete Sidewalks

1. Measurement will be in square yards and paid for at the contract unit price bid per square yard of sidewalk thickness

2. If regular excavation is not shown in the sidewalk area, the unit bid price for sidewalks shall include excavating, subgrade preparation, geotextile fabric, forms, removing existing sidewalk, disposing of surplus and unsuitable material, and incidentals.

3. When the sidewalk area is located in the cross-sectional area for roadway excavation, excavation within the sidewalk area will be paid for the unit price bid for regular excavation.

4. Each structure located within the limits of the sidewalk having an area greater than 1 square yard will be excluded in computing the square yards of sidewalk.

I. Curb-cut ramps

1. Payment will be made at the unit price bid per square yard of finished surface, complete-in-place, except for composite detectable warning surface panels. The curb ramp will be paid by the type of combined surface material (concrete, and/or exposed aggregate concrete, and/or concrete pavers or brick pavers).

2. If regular excavation is not shown in the curb-cut ramp area, the unit bid price for curb-cut ramps shall include excavating, subgrade preparation, geotextile fabric, forms, removing existing curb-cut ramp, disposing of surplus and unsuitable material, and incidentals.

3. When the curb-cut ramp area is located in the cross-sectional area for roadway excavation, excavation within the curb-cut ramp area will be paid for at the unit price bid for regular excavation.

J. Composite detectable warning surface panels

1. Composite detectable warning surface panels will be measured in units of square feet, complete-in-place, including all labor, tools and mounting materials necessary for the installation.

2. Payment will be made at the contract unit price bid per square feet.

K. Concrete Steps

1. Concrete steps will be measured in cubic yards of concrete and pounds of reinforcing steel, complete-in-place.

2. Payment will be made at the contract unit price bid per cubic yard of concrete and per pound of reinforcing steel.

L. Handrails

Handrails will be measured in linear feet and paid for at the contract unit price per linear feet along the top rail, complete-in-place.

M. Geotextile Fabric

1. When not included in other pay items, measurement and payment will be in square yards to the limits shown on the Contract Documents.

2. This price shall include preparing the surface, furnishing and installing fabric, overlaps and repair work, and excavating and backfilling toe-ins.

N. Fill material between curb lines will be measured in accordance with the requirements of Section 303.

O. Topsoil shall be measured in accordance with Section 602.

P. Incidental items are identified in Section 109.1.2 and also include the following

1. Bedding stone for sidewalks, steps, paved flumes and paved ditches.

2. Reinforcing steel (when not a separate pay item).

End of Section