PART 1 - GENERAL

1.1 Description of Work

Provide all plant, labor, materials and equipment necessary for the completion of the plain and reinforced concrete called for on the approved plans.

1.2 Related Work Specified Elsewhere

Section 03400 - Precast Concrete

1.3 Applicable Specifications

A. American Concrete Institute (ACI)

B. American Society for Testing and Materials (ASTM)

C. United States Product Standards PS I-66

D. Virginia Department of Transportation, Road and Bridge Specifications (VDOT)

E. Wire Reinforcement Institute (WRI)

1.4 Quality Assurance The following codes and standards are hereby made a part of this specification and concrete work performed shall conform with the applicable references except as specified otherwise in this section.

ACI Standard 318-71 - Building Code Requirements Reinforced Concrete (Working Stress Design) ACI Standard 318 - Building Code Requirements for Reinforced Concrete ACI Standard 315 - Manual of Standard Practice for Detailing Reinforced Concrete Structures ACI Committee Report - Concrete Sanitary Engineering Structures, ACI Committee 350 ACI Standard 301 - Specifications for Structural Concrete for Buildings Wire Reinforcement Institute, Inc., WRI - Manual of Standard Practice Virginia Department of Transportation, Road and Bridge Specifications (VDOT)

1.5 Submittals

A. Shop drawings shall include bar tabulations, placement drawings and details.

B. The Concrete Plant shall provide the concrete mix design and certified test reports on the aggregate, admixture, cement, and curing materials to be incorporated in the concrete for the project.

C. The steel fabricator shall provide certified mill test reports for the reinforcing steel and accessories to be incorporated in the work.

D. The Contractor shall provide delivery tickets for concrete and shall include 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 - MATERIALS

2.1 General

Concrete materials, methods of mixing, conveying, curing, placing, reinforcement, and the making and removal of forms shall conform to the latest requirements of Section 217 of the VDOT Specifications.

2.2 Class of Concrete

Cast-in-place concrete shall be Class A3 General Use (3,000 psi) or Class B2 (2,200 psi) unless stated otherwise on the approved plans.

2.3 Earth Forms

Except for the bearing surface of thrust blocks, concrete cradle, concrete encasements, and the second pours of drop manholes, do not place concrete directly against vertical surfaces of the soil.

2.4 Plywood

Except where noted otherwise on the approved plans, use plywood forms for all concrete which shall be exposed in the finished work, and for all exterior walls below grade which are to receive membrane waterproofing. Plywood shall conform to U.S. Product Standard PS 1-66 and shall be a minimum of 5/8-inch thick. Each panel shall carry the grade trademark of the American Plywood Association along with the DFPA (Douglas Fir Plywood Association) Quality stamp.

2.5 Form Coating

Use non-grain raising and non-staining type that shall not leave residual matter on surface of concrete or adversely affect proper bonding of subsequent application of other material applied to concrete surface, such as “Nox-Crete Form Coating” as manufactured by the Nox-Crete Company, “Arcal-80” as manufactured by Arcal Chemical Corporation, “Synthex” as manufactured by Industrial Synthetics Company, or approved equal. Do not use coatings containing mineral oils or other non-drying ingredients.

PART 3 - EXECUTION

3.1 General

A. Employ a competent and acceptable crew leader for concrete work. This crew leader shall be thoroughly familiar with all phases of concrete construction, including forms.

B. Be responsible for the capacity of all form work, shoring and bracing to carry all superimposed live and dead loads before, during and after concrete is poured.

C. Provide form work with adequate cleanout openings to permit inspection and easy cleaning after reinforcement has been placed. Where possible, place these openings in the side of the unexposed surfaces.

3.2 Construction of Forms

A. General: Construct wood forms of sound material, and of the correct shape and dimensions, constructed tightly and of sufficient strength. Brace and tie the forms together so that the movement of men, equipment, materials, or placing and vibrating the concrete shall not throw them out of line or position. Forms shall be strong enough to maintain their exact shape under all imposed loads. Camber where necessary to assure level finished soffits. 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.

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

C. Embedded Items: Make provision for sleeves, anchors, inserts, water stops, and other features.

D. 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.

E. 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.

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

3.3 Preparation for Placing

A. 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. Do not place on frozen ground. 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.

B. Prior to placing of any concrete, and after placement of reinforcing steel in the forms, notify the Engineer 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.

3.4 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 Engineer. Failure to deliver such completed ticket to the Engineer shall be cause for the Engineer to reject the deposited concrete at any time and cause it to be removed and replaced at no additional expense to the County.

B. 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.

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

D. 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.

E. Fill under Slabs on Grade: Clean sand, or aggregate, evenly spread and compacted to the full depth, unless otherwise shown on the Contract Drawings.

3.6 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 Engineer.

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 Engineer. Apply form coating to all forms in accordance with the manufacturer's specifications. Apply form coatings before placing reinforcing steel.

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

3.8 Preformed Joints

A. Furnish and install preformed expansion joint material at locations shown on the Contract Drawings. 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.

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

3.9 Finishing

A. All areas of exposed concrete walls and appendages from the top of the wall to 1'-6-inch below the finished grade or water level of the structure shall receive a rubbed finish applied 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.

B. All areas of walls not covered above shall have all fins and projections removed. Patch all voids and depressions exceeding 3/8-inch in any dimensions.

C. Unless otherwise noted or specified, all slabs shall be finished monolithically. Exposed concrete slabs shall have a tolerance of 1/8-inch in 10 feet with maximum high and low variance not occurring in less than 20 feet, and with 1/16-inch tolerance in any one running foot with no abrupt variations.

D. After screeding and floating, give concrete steps and slabs a light steel toweling to seal the surface and remove any irregularities left by the float. Just before the concrete becomes non-plastic, the surface of the concrete shall be given a fine broom finish perpendicular to the line of traffic and so executed that the corrugations thus produced shall be uniform in character and width. The broomed surface shall be free from porous spots, irregularities, depressions, and small pockets or rough spots such as may be caused by accidentally disturbing particles of coarse aggregate embedded near the surface. Use a coarse broom to provide a non-slip surface for ramps.

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 Sampling, Testing and Enforcement

A. The Contractor shall furnish such facilities as the Engineer may require for on site testing and for collecting and forwarding concrete samples for testing to an approved independent laboratory selected by the Engineer. The laboratory shall establish the mix proportions and test the concrete. One test shall be performed

for each 10 cu. yds. of concrete. The laboratory shall maintain records showing brand of cement, brand and quantity of admixtures, time and location of the batch from which the test was made, air content, slump, and compressive strength. The laboratory shall supply the test cylinders, slump cones, field technicians, and all equipment necessary for performance of field and laboratory testing specified herein.

B. One strength test shall consist of four field specimens. One (1) specimen for testing at seven (7) days, one (1) specimen for testing at fourteen (14) days, and two (2) specimens for testing at twenty-eight (28) days. The samples for strength tests shall be taken in accordance with –"Method of Sampling Fresh Concrete" (ASTM C-172). Cylinders for acceptance tests shall be molded and laboratory-cured in accordance with "Method of Making and Curing Concrete Compression and Flexure Test Specimens in the Field" (ASTM C-31) and tested in accordance with "Method of Test for Compressive Strength of Molded Concrete Cylinders" (ASTM C-39). Each strength test result shall be the average of two cylinders from the same sample tested at seven (7), fourteen (14) and twenty-eight (28) days.

C. When the frequency of testing shall provide less than five strength tests for a given class of concrete, make tests from at least five randomly selected batches or from each batch if fewer than five are used. When the total quantity of a given class of concrete is less than 30 cu. yds., the strength tests may be waived by the Engineer if, in his judgment, adequate evidence of satisfactory strength is provided.

D. Should individual tests of laboratory-cured specimens produce results more than 500 psi below specified strength (f'c), or tests of field-cured cylinders indicate deficiencies in protection and curing, take steps to assure that

loadcarrying capacity may have been significantly reduced, tests of cores taken from the area in questions shall be required in accordance with "Standard Method of Obtaining and Testing Drilled Cores and Sawed Beams of Concrete" (ASTM C-42). Three cores shall be taken for each cylinder test more than 500 psi below specified strength (f'c). If the concrete in the structure shall be more than superficially wet under service conditions, the cores shall be immersed in water for at least 48 hours and tested wet.

E. Concrete represented by the above core tests shall be considered structurally adequate if the average of the three cores is equal to at least 85 percent of specified strength (f'c) and if no single core is less than 75 percent of f'c. To check testing accuracy, locations represented by erratic core strengths may be retested. If these strength acceptance criteria are not met by the core tests, and if structural adequacy remains in doubt, the Engineer shall order load tests for the questionable portion of the structure, or declare the section to be defective.

3.12 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 Engineer's approval. Should only surface imperfections occur, patch at the discretion of, and in a manner satisfactory to, the Engineer. 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

4.1 Concrete work associated with cast-in-place structures, curbs, sidewalks shall be paid for under the appropriate unit item called for in the bid proposal.

4.2 Concrete steps shall be measured by step per width category. Payment shall include all labor, materials and equipment necessary for a complete installation.

4.3 Demolition, excavation and restoration shall be considered incidental to the work and therefore, no separate payment shall be made for demolition, excavation or restoration.

PART 1 - GENERAL

1.1 Description of Work

Provide all plant, labor, equipment and material to provide the precast concrete structures including manholes but excluding pipe, as called for on the approved plans, Construction Standards and this section.

1.2 Related Work Specified Elsewhere

Section 02500 - Storm Sewers and Drainage Systems
Section 02510 - Sanitary Sewers and Appurtenances
Section 03100 - Concrete, Formwork, Reinforcement and Materials

1.3 Applicable Specifications

A. American Society for Testing and Materials (ASTM)

B. Virginia Department of Transportation, Road and Bridge Specifications (VDOT)

1.4 Quality Assurance

A. All precast concrete items shall be products of one or more manufacturers having demonstrated competence in the design and production of precast concrete specialties of the types specified herein for a minimum of 3 years.

B. The referenced documents of Section 03100 shall become a part of this section.

1.5 Submittals

A. Prior to delivering any material to the project site, submit to the Engineer for approval shop drawings for fabrication and setting of the precast concrete work, along with manufacturer's detailed descriptive literature.

B. Submit certified concrete mix design for the structures to be furnished to the job site.

C. Submit certified test reports for the aggregate, cement, admixtures, reinforcing and curing materials used in the fabrication of the structures.

1.6 Class of Concrete

Concrete for precast structures shall be VDOT Class A4 General. Use unless stated otherwise on the approved plans.

PART 2 - MATERIALS

2.1 General

Concrete materials, methods of mixing, conveying, curing, placing, reinforcement, and the making and removal of forms shall conform to the latest requirements of the VDOT Section 217.

2.2 Precast Concrete Manholes

Precast concrete manhole bases, risers and cones shall conform to requirements of ASTM C478 with configurations as shown in the drawings. Cones shall be eccentric. Manhole sections for sanitary sewers shall be of male and female end type with a preformed groove provided in the male end for placement of a round rubber gasket ring. Rubber gasket rings shall meet the requirements of ASTM C-361 or C-443. The gasket shall be the sole element utilized in sealing the joint from either external or internal hydrostatic pressure. Use the appropriate lubricant as directed by the manufacturer. Manhole sections for storm sewers may use mortared joints.

Each precast section shall be clearly marked on the inside near the top with the following information where applicable: ASTM designation, Standard detail or drawing number, station location and designation, date of manufacture and name or trademark of manufacturers. Precast concrete manholes shall be manufactured by the Virginia Precast Corp., Valley Blox, Inc., or equal.

2.3 Precast Concrete Catch Basin

Precast concrete catch basins shall conform to the requirements of ASTM A-185 for welded wire fabric construction, or ASTM A-165 for deformed steel billet bars and the applicable provisions specified in Section 03100 except that the design mix (f'c) shall be 4,000 psi concrete.

PART 3 - EXECUTION

Fabrication and testing of the precast concrete structures shall be in accordance with the stipulated execution procedures of Section 03100.

PART 4 - MEASUREMENT AND PAYMENT

No separate measurement and payment shall be made for this work. It is covered under other work to which it relates.

PART 1 - GENERAL

1.1 Description of Work

Provide all labor, materials and equipment necessary to furnish and install mortar required for the masonry and mortared rubble work and miscellaneous grout as called for on the approved plans.

1.2 Related Work Specified Elsewhere

Section 04200 - Masonry Units

1.3 Applicable Specifications

A. American Society for Testing and Materials (ASTM)

B. Virginia Department of Transportation, Road and Bridge Specifications (VDOT)

PART 2 - MATERIALS

2.1 General

Mortar and grout shall conform to the latest requirements of Section 218 of the VDOT Specifications.

2.2 Mortar for Unreinforced Masonry and Brick

The mix for unreinforced masonry shall conform with ASTM C270, Type “M” with the following options:

A. Portland Cement Mortar: 1 part Portland cement; 1/4 part hydrated lime and lime putty; 3-1/2 parts sand.

B. Masonry Cement Mortar: 1 part Portland cement; 1 part masonry cement; 4-1/2 parts sand.

2.3 Mortar and Grout for Reinforced Masonry

The mix for reinforced masonry shall conform with ASTM C476 Type PM or PL.

PART 3 - EXECUTION

3.1 Storage of Materials

Protect materials from moisture, foreign material and deterioration.

3.2 Weather Requirements

Hot Weather: Add water as needed to supplement evaporation losses. Cold Weather: When air temperatures range between 32°F and 40°F, heat mixing water or aggregate to between 70°F and 160°F maximum. When air temperature is below 32°F, and only with the approval of the Engineer, heat both the mixing water and aggregate to between 70°F and 160°F maximum.

3.3 Quality Control

A. Prepare sample batches of mortars and grouts prior to beginning masonry work.

B. Test in accordance with ASTM C270 (Unit Masonry) or ASTM C476 (Reinforced Masonry), whichever applies. Send copies of test results to the Engineer for approval.

3.4 Mixing Mortar and Grout

Mix mortar in accordance with ASTM C270 (Unity Masonry) and mortar and grout in accordance with ASTM C476 (Reinforced Masonry). Mortar or grout not within 2-1/2 hours after mixing shall not be used in masonry work.

PART 4 - MEASUREMENT AND PAYMENT

No separate measurement and payment shall be made for this work. It shall be considered a subsidiary obligation of the Contract under other work to which it relates.

PART 1 - GENERAL

1.1 Description of Work

Provide all labor, materials and equipment necessary to furnish and install masonry as called for on the approved plans and as specified herein.

1.2 Related Work Specified Elsewhere

Section 04100 - Mortar and Grout
Section 09900 - Protective Coatings

1.3 Applicable Specifications

A. American Society for Testing and Materials (ASTM)

B. Virginia Department of Transportation, Road and Bridge Specifications (VDOT)

1.4 Submittals

Submit to the Engineer, two representative samples of each kind and type of masonry specified for the project and sample of anchors and ties. Do not purchase masonry until samples are approved by the Engineer.

PART 2 - MATERIALS

2.1 Masonry Units

Masonry block and brick units shall conform to Section 222 of the VDOT Specifications.

2.2 Welded Wire Fabric

Welded wire fabric shall conform to Section 228 of the VDOT Specifications.

2.3 Steel Reinforcement

Steel reinforcement called for on the approved plans shall be deformed bars, grade 40, in conformance with Section 223 of the VDOT Specifications.

2.4 Reinforcement, Anchors and Ties

A. Masonry joint reinforcement shall be factory fabricated from zinc coated colddrawn steel wire, ASTM A82. Reinforcement shall consist of two or more deformed longitudinal wires minimum size No. W1.5, weld connected with minimum size No. 21.5 cross wires, forming a truss or ladder design. Zinc

coating, ASTM A116, Class 1, except that cross wires used for cavity wall ties shall be Class 3. Out-to-out spacing of longitudinal wires shall be approximately 2-inches less than the nominal width of the block or with in which it is placed. Distance between welded contacts of cross wires with each longitudinal wire shall not exceed 16-inches. Joint reinforcement shall be furnished in flat sections 10 to 20 feet in length, except that factory-formed corner reinforcements and other special shapes may be less in length.

B. Anchors and ties shall be zinc-coated, ferrous metal of the types specified. Zinc coating ASTM A153, Class B-1, B-2, or B-3 as applicable. Cooper cladding of steel wire shall conform to the requirements as specified for Grade 30 HS wire in ASTM Specification B227.

PART 3 - EXECUTION

3.2 General

A. Build into masonry, bolts, anchors, nailing blocks, inserts, expansion joints and other items necessary and incidental to the completion of the project.

B. Masonry shall be laid with plumb, true to line, with level courses accurately spaced with a story pole, and unless otherwise shown, with each course breaking joints with the course next below. Each unit shall be adjusted to its final position in the wall while mortar is still soft and plastic. Any unit that is disturbed after mortar has stiffened shall be kept plumb throughout. Corners and reveals shall be plumb and true. Courses shall be so spaced that backing masonry shall level off flush with the face work at all joints where metal ties are used. Anchors, accessories, and other items required to be built in with masonry shall be built in as the masonry work progresses. Cutting and fitting of masonry shall be done by masonry mechanics with power-driven masonry saws.

C. Weather Requirements: Precondition and protect masonry units in cold weather as follows:

1. Avg. daily air temperature between 32^{o}F and 40^{o}F -- protect newly laid masonry from rain and snow 24 hours.

2. Avg. daily air temperature between 25°F and 32°F -- provide heat on both sides of construction masonry; use wind breaks for winds above 15 mph; cover masonry with insulating blankets for 24 hours.

3. Avg. daily temperature below 20°F -- provide enclosure and heat to maintain air at 32°F for 24 hours. Do not lay masonry units at temperatures colder than 30°F.

D. Before resuming work, top surface of masonry in place shall be cleaned of loose mortar and foreign material.

3.2 Storage

A. Store cementitious materials on pallets under a tarpaulin cover in a dry place. Covers shall overhang 2 feet down each side and be held securely in place.

B. Reinforcing, metal ties, and anchors shall be protected from contact with soil and before being placed shall be free from loose rust and other coatings that shall destroy or reduce the bond.

3.3 Laying Concrete Masonry Units

A. All sections herein shall apply to both ordinary masonry units and concrete catch basin units.

B. All concrete masonry units shall be running bond with units in the courses above regularly breaking joints with the units below, unless otherwise indicated on drawings.

C. Layout all openings before construction. The final location of openings shall be adjusted so that partial size units may be kept to a minimum.

D. Reinforcing mesh shall be installed in the three courses above all openings and shall extend 3 ft. 9 in. beyond each side of opening. Mesh shall be installed in every third course of all masonry unit walls.

E. Do not set patched, chipped, cracked, broken or otherwise defective units. Cut out defective joints and repoint.

F. All intersecting walls shall be keyed together with masonry units.

G. Cut block with a carborundum saw. Do not cut with hammer chisel.

H. Use solid load-bearing block where required for structural purposes. Use hollow load-bearing block at all other locations.

I. Leave all necessary openings for the passage of pipes and drains. At completion of the work of other trades, return and close all openings.

J. Keep the open space at control joints and expansion joints free of mortar by using a continuous wood or metal strip temporarily set in the wall. Caulk control and expansion joints.

K. Standard width of mortar joints for both horizontal and vertical joints shall be 3/8 inch. Joints shall have full mortar coverage on vertical and horizontal face shells, but mortar shall not extend through unit on the web edges. Compact mortar joints on the weather side of exterior walls and press tight against the edges of the units with a proper tool.

3.4 Brick

A. Lay all face brickwork in straight running bond, level, with joints struck flush, then tooled with a concave pointing tool. Courses shall equal 3 to 8 inches in height. Mortar beds shall be full. Fill voids solid with mortar. Fill all vertical joints with mortar except weep holes.

B. Carry facing and backing of exterior walls simultaneously and bond as required.

C. Set reinforcement flashing and ties every 2 sq. ft. of wall surface.

D. Provide rope wick weep holes, spaced approximately 32 in. on center, in vertical joints of first course, over all counter flashing and through wall flashing on all exterior walls.

E. Project bolts from the face of the masonry a sufficient distance to allow for the proper attachment intended. Oil all threads and protect by waterproof caps.

F. All joints shall be uniform and 3/8 inch thick unless otherwise indicated.

G. Joints in exposed or painted surfaces shall be tooled when thumbprint hard with a round jointer. Joints shall be flush on the vertical and concave on the horizontal.

H. Joints in unparged masonry below grade shall be pointed tight with a trowel.

I. Mortar joints in surfaces to be plastered, stuccoed, or covered with other masonry shall be cut flush.

J. Mortar protrusions extending into cells or cavities to be reinforced and filled shall be removed.

K. Fill horizontal joints between top of masonry partitions and underside of concrete slabs or beams with mortar.

3.5 Bonding with Masonry Bonders

A. Where two or more masonry units are used to make up a thickness of a wall, inner and outer wythes shall be bonded at vertical intervals not exceeding 34 inches by transverse lapping of stretcher units at least 3 inches over units below, or by lapping with units at least 50 percent greater in width than unit below at vertical intervals not exceeding 17 inches.

B. Bond intersecting bearing walls with metal ties at vertical intervals not to exceed 16 inches.

C. When intersecting bearing walls are carried up separately, regularly block (tooth) vertical joint with 8-inch maximum offsets. Provide joints with rigid steel anchors at vertical intervals not to exceed 48 inches. When approved, blocking may be eliminated and rigid steel anchors provided at vertical intervals not to exceed 24 inches.

D. Anchor abutting or intersecting interior non-load bearing walls with metal ties at vertical intervals not to exceed 24 inches and extending at least 4 inches into the masonry.

E. Construct all concrete masonry in accordance with the National Concrete Masonry Associations.

3.6 Angles and Beams

A. Adjust as required to keep masonry level and at proper elevation.

B. Embed beams firmly in mortar of same quality as used in laying masonry wall.

3.7 Jointing and Cleaning

A. At the completion of the work, all holes in joints of masonry surfaces, except weep holes, shall be filled with mortar and suitably tooled.

B. Dry brush masonry surface at the end of each day's work and after final pointing using wire brushes if necessary to remove mortar but exercise care not to scratch or damage work.

PART 4 - MEASUREMENT AND PAYMENT

Manholes, catch basins, and yard inlets constructed of masonry block and concrete block shall be measured as each. Payment shall include all masonry/block work, mortar, manhole steps, manhole frame and cover, inlet frame and cover, concrete slab, grout, demolition, excavation, backfill, restoration and all necessary appurtenant items. Other use of the masonry block and concrete block is covered under the work to which it relates.

PART 1 - GENERAL

1.1 Description of Work

Provide all plant, labor, materials and equipment for the construction of mortar rubble retaining walls as called for on the approved plans and as detailed in the Construction Standards and specified herein.

1.2 Related Work Specified Elsewhere
Section 04100 - Mortar and Grout

1.3 Applicable Specifications

Virginia Department of Transportation, Road and Bridge Specifications (VDOT)

PART 2 - MATERIALS

2.1 Mortar

Mortar shall conform to Section 222 of the VDOT specifications.

2.2 Stone

Stone shall conform to Section 204 and 508.03(a) of the VDOT specifications.

2.3 Concrete Rubble

Concrete rubble shall be approved by the Engineer. Concrete rubble available from the County shall be so noted on the approved plans.

2.4 Concrete Rubble Backing

Class A3 concrete conforming to Section 217 of the VDOT Specifications.

2.5 Filter Material

Filter material shall be Miraf 140, Typar 3401 or approved equal.

2.6 Backfill

Porous backfill shall be clean crushed stone or gravel aggregate size no. 57 or 68, in conformance with Section 204 of the VDOT Specifications.

PART 3 - EXECUTION

Construct mortar rubble masonry walls in conformance with the approved plans and the standard details. Shaping, dressing, cleaning, wetting, laying and other construction procedures
for the walls shall be performed in accordance with Section 508.03(b) of the VDOT Specifications.

PART 4 - MEASUREMENT AND PAYMENT

Mortar rubble masonry walls shall be measured in cubic feet based on the approved plans and sections. Payment shall include demolition, concrete rubble backing, excavation, backfill, restoration, testing of materials, labor, material and equipment necessary for a complete and structurally sound retaining wall in place.

PART 1 - GENERAL

1.1 Description of Work

A. Provide all plant labor, supervision, material and equipment to furnish and install all structural steel and miscellaneous metal items, with accessories, fasteners, anchors, etc., complete in place as shown on the approved plans.

1.2 Related Work Specified Elsewhere

Section 09900 - Protective Coatings

1.3 Applicable Specifications

A. American Institute of Steel Construction (AISC)

B. American Society for Testing and Materials (ASTM)

C. American Welding Society (AWS)

D. Virginia Department of Transportation, Road and Bridges Specifications (VDOT)

1.4 Submittals

A. Before any fabrication is begun, submit detailed shop drawings of all miscellaneous metal items showing sizes of metal components, method of assembly, hardware, and anchorage or connection to other work.

B. Submittals shall include detailed descriptive literature of manufactured items specified herein.

1.5 Quality Assurance

A. Fabrication and installation procedures shall conform to the specifications and practices of the American Institute of Steel Construction.

PART 2 - MATERIALS

3.1 General

A. Standard Structural Steel Shapes and Plates shall be in conformance with ASTM A-36.

B. Steel Pipe shall be in conformance with ASTM A-53, Type E or S, Grade A or B.C.Cast Iron shall be in conformance with ASTM A-48, Class 30, unless otherwise indicated. D. Fastenings shall be in conformance with Section 232(d), (e) and (f) of the VDOT specifications.

C. Welding Electrodes shall be as permitted by AWS Code D1.0.

D. The primers shall be as specified in Section 09900: Protective Coatings.

2.2 Pipe Handrails

A. General

Pipe handrails shall be galvanized steel pipe in conformance with Sections 233 of the VDOT Specifications. The rails shall be standard weight and the post shall be extra strong steel pipe. Standard or special fittings shall be used or the joints may be welded. Painting of railings shall meet the requirements of Section 09900.

B. Rail and Post Spacing

Post spacing shall not exceed 7' on center. Unless shown otherwise on the drawings, the top rail shall be located at a height of 3' 6-inch, (4'6-inch for bike trails), except stair runs shall have top rail at a height of 3' 6-inch and enclosed stair landings shall have top rail at a height of 3' 0-inch. Intermediate rails shall be located as shown on the Construction Standard R-3.1.

2.3 Gratings

All gratings shall be as indicated on the standard drawings.

2.4 Expansion Bolts

A. Bolts shall be “Wej-It” concrete anchors as manufactured by “Wej-It” Expansion Products, Inc., Broomfield, Col., ”Taper Bolt” as manufactured by U.S. Expansion Bolt Co., York, Pa., or approved equal.

Self-drilling expansion anchors where called for on the plans shall be “Red Heads” as manufactured by the Phillips Drill Co., Michigan City, Indiana, or approved equal.

Contractor shall submit certified test reports establishing shear and tensile pull out for the anchors used.

B. Bolts shall be of the same type as the members which they support, that is Type 2024-T6 alloy for aluminum shapes and hot dipped galvanized steel for structural steel shapes. Stainless steel bolts shall be used in all process units.

PART 3 - EXECUTION

3.1 General

A. Furnish all bolts, nuts, screws, clips, washers, and any other fasteners necessary for proper installation of items specified or called for on the approved plans. For ferrous metal, use stainless steel or galvanized on exterior. On interior, match adjacent material.

B. Metal for shop-fabricated items shall be well formed to shape and size, with crisp lines or angles. Shearing and punching shall leave clean, true lines and surfaces. Weld permanent connections and grind smooth where exposed to view. Dress all sharp edges.

C. Verify all measurements at job.

D. Field drilled or punched holes; do not use cutting torch. Shearing and punching shall leave true lines and surfaces.

E. Construct to sizes indicated using rolled shapes and/or plates as detailed. Include wall and sill anchors for construction indicated.

F. Set all work plumb, true, rigid, and neatly trimmed out.

G. Grout plates, bolts, and similar items with non-shrink grout.

H. Ship railings with factory-preassembled posts and fittings. Assemble on location in accordance with manufacturer's instructions, keeping posts plumb and posts parallel to either horizontal or rake.

I. Castings subject to foot or street traffic shall have bearing surfaces machined to prevent rocking and rattling.

J. Protect all dissimilar metals from galvanized corrosion by pressure tapes, coatings or isolators.

3.2 Welding

A. Perform all ferrous metal welding in accordance with AWS Code D1.0. Use only pre-qualified welding procedures in accordance with AWS paragraph 103(a) and only by operators experienced in performing the type of work indicated.

B. Weld pipe handrail in accordance with Section 407 of VDOT Specifications.

3.3 Bolted Connections

A. In general, use bolts for field connections only and then only as detailed. Provide washers under all heads and nuts bearing on wood. Draw all nuts tight and nick threads of permanent connections to prevent loosening. Use beveled washers where bearing is on sloped surfaces.

B. Provide grating with necessary minimum clearances and fit so as to lie flat and not rock in any fashion. Provide U-clips in each corner of the grating sections.

3.4 Protection of Surfaces

A. Provide protection by strippable coating, protective sleeves, polyethylene sheets, boarding, or other suitable means during fabrication, shipment, site storage, and erection to prevent damage to the finished work due to stains, discolorations, scratches, or any other cause. Replace damaged elements at no expense to the County.

B. After installation, and after danger of subsequent damage has passed, remove all protective coverings from all exposed surfaces, and clean those surfaces of all soil and discoloration, ready for acceptance.

PART 4 - MEASUREMENT AND PAYMENT

4.1 Handrails shall be measured in linear feet installed. Payment shall include all labor, equipment and materials necessary for a complete installation.

4.2 Structural steel, including beams, girders, and miscellaneous steel, shall be paid for at the contract lump sum price or when specified in pounds of metal in the fabricated structure.

4.3 No separate measurement and payment shall be made for other work under this section. It shall be considered a subsidiary obligation of the Contract under other work to which it relates.

SECTION 06100 STRUCTURAL TIMBER AND LUMBER

PART 1 - GENERAL

1.1 Description of Work

Provide all labor, material and equipment to furnish and construct with structural timber and lumber as called for on the approved plans and specified herein. The work includes timber and lumber construction and all other incidental construction.

1.2 Related Work Specified Elsewhere

Section 02100 - Clearing and Grubbing
Section 02110 - Demolition
Section 09800 - Wood Preservatives

1.3 Applicable Specifications

A. American Lumber Standards

B. Virginia Department of Transportation, Road and Bridge Specifications (VDOT)

1.4 Applicable References

A. American Association of State Highway and Transportation Officials (AASHTO)

B. National Forest Products Association (NFPA)

1.5 Product Handling

All structural timber and lumber shall be delivered, stored, handled and installed in a manner to prevent twisting, warping or other damage that would preclude satisfactory installation.

PART 2 - MATERIALS

2.1 Structural timber and lumber shall conform to Section 236 of the VDOT Specifications.

2.2 Where treated timber or lumber is required, the preservative and treatment shall be as specified in Section 09800 of these specifications titled: Wood Preservatives.

PART 3 - EXECUTION

3.1 Inspection

Timber and lumber shall be grade marked in accordance with grading rules and basic provisions of the ”American Lumber Standards” by a lumber grading or inspection bureau of agency approved by the Engineer.

3.2 Installation

The structural timber of lumber shall be installed properly in the sizes and grades and to the alignment with fastenings as shown on the approved plans.

PART 4 - MEASUREMENT AND PAYMENT

All timber and lumber shall be measured in units of 1,000 feet-board-measure (MFBM) based on nominal sizing for the materials actually placed in the finished structure according to the approved plans or as directed by the Engineer. Payment shall include all labor, materials and equipment, including preservatives and coatings, necessary for a complete installation.

PART 1 - GENERAL

1.1 Description of Work

Provide all plant, labor, equipment and materials to waterproof all sanitary manholes and other structures subject to hydrostatic head when called for on the approved plans.

1.2 Related Work Specified Elsewhere

Section 07150 - Damp proofing

1.3 Applicable Specifications

Virginia Department of Transportation, Road and Bridge Specifications (VDOT)

1.4 Applicable References

A. American Association of State Highway and Transportation Officials (AASHTO)

B. American Society of Testing and Materials (ASTM)

1.5 Quality Assurance

Provide certified test reports of testing required by referenced specifications.

PART 2 - MATERIALS

2.1 Primer, asphalt, fabric and joint sealers shall conform to Section 213 of the VDOT Specifications.

2.2 Membrane: System A, B, C or D as specified in Section 214.04 of VDOT Specifications or preformed elastomeric waterproofing as manufactured by Polyguard (No. 650), B.F. Goodrich (20 mil vinyl water barrier) or Grace (Bithuthene 3000).

PART 3 - EXECUTION

3.1 Waterproof exterior, below grade structures when called for on the approved plans.

3.2 Conform to Section 416 of VDOT Specifications when applying System A, B, C, or D expect that structures shall be treated as that specified for decks.

3.3 Conform to the manufacturer's printed instructions when applying preformed elastomeric waterproofing.

PART 4 - MEASUREMENT AND PAYMENT

No separate measurement and payment shall be made for this work. It shall be considered a subsidiary obligation of the Contract under other work to which it relates.

PART 1 - GENERAL

1.1 Description of Work

Provide all plant, labor, equipment and materials to damp proof structures not subject to hydrostatic head when called for on the approved plans.

1.2 Related Work Specified Elsewhere

Section 07100 - Waterproofing

1.3 Applicable Specifications

Virginia Department of Transportation, Road and Bridge Specifications (VDOT)

1.4 Applicable References

A. American Association of State Highway Transportation Officials (AASHTO)

B. American Society for Testing and Materials (ASTM)

1.5 Quality Assurance

Provide certified test reports of testing required by referenced Specifications.

PART 2 - MATERIALS

Primer and asphalt shall conform to Section 213 of the VDOT Specifications.

PART 3 - EXECUTION

Conform to Section 417 of VDOT Specifications.

PART 4 - MEASUREMENT AND PAYMENT

No separate measurement and payment shall be made for this work. It shall be considered a subsidiary obligation of the Contract under other work to which it relates.

PART 1 - GENERAL

1.1 Description of Work

Provide all labor, materials and equipment for the complete application of paint to new and or existing ferrous metal structures in the conformance with the requirements of the various sections of these specifications.

Painting shall conform to the requirements specified in the specifications and where called for on the approved plans or special provisions.

For safety precautions, the Contractor shall wear protective goggles and masks for the cleaning and painting of metal structures.

1.2 Related Work

Section 09900 - Protective Coatings

1.3 Applicable Specifications

A. American Society for Testing and Materials (ASTM)

B. American Association of State Highway and Transportation Officials (AASHTO)

C. Steel Structures Painting Council (SSPC)

D. Virginia Department of Transportation (VDOT)

E. Occupational Safety and Health Administration (OSHA)

F. Toxic Substance Control Act (TSCA)

G. Hazardous Material Transportation Act (HMTA)

H. United States Environmental Protection Agency (USEPA)

I. Virginia Department of Health, Solid & Hazardous Waste Management Division (VDH)

1.4 Surfaces not to be Painted

Refer to Section 09900, Paragraph 1.4

1.5 Submittals

Refer to Section 09900, Paragraph 1.5

1.6 Quality Assurance

A. Refer to Section 09900, Paragraph 1.6

B. Steel Structures Painting Council (SSPC):

SSPC-SP1-82	Solvent Cleaning
SSPC-SP2-82	Hand Tool Cleaning
SSPC-SP3-82	Power Tool Cleaning
SSPC-SP6-85	Commercial Blast Cleaning
SSPC-Visual	Pictorial Surface Preparation Standards For Painting Steel Surfaces

C. To assure quality control and the quality of the paint a representative of the paint manufacturer shall be present during the initial stages of mixing and application of the paint system.

1.7 Product Delivery, Storage and Safety Data

Product delivery, storage and safety data shall conform to the manufacturer's specification and Section 09900, Paragraph 1.7. All containers shall be labeled with:

A. Manufacturer's Name
B. Product Name & Number
C. Batch Number
D. Date of Manufacturer

1.8 Guarantee

Refer to Section 09900, Paragraph 1.8.

1.9 Weather Conditions

Paint shall be applied only on thoroughly dry surfaces and during periods of favorable weather conditions. Blasting and/or painting shall not be permitted when the atmospheric temperature is at or below 40^{o}F. in the shade; when the relative humidity exceeds 85% at the site of work or when weather conditions would prevent obtaining a satisfactory job, such as anticipating rain, fog or any type of condensation, dust or when it can be anticipated that atmosphere temperature shall drop below 40^{o}F. Painting shall not be permitted on surfaces that are sufficiently hot to cause blistering or when the surface is damp. The surface should be dry and at least 5^{o}F above the dew point. Or as specified by the manufacturer.

1.10 Protection Against Damages

The Contractor shall provide protection devices such as tarps, screens, covers, as necessary to prevent damage to the work, other property, persons, or environment from all cleaning and painting operations.

A water trap acceptable to the Engineer, shall be furnished and installed on all equipment used in spray painting.

Paint or paint stains which result in an unsightly appearance on a surface not designated to be painted shall be removed by the Contractor at his expense and to the satisfaction of the Engineer.

All painted surfaces that are marred or damaged as a result of the Contractor's operation shall be repaired by the Contractor, at his expense, with materials and to a condition equal to the coating specified herein. Upon the completion of all painting operations and any other work that would cause dust, grease, or any other foreign materials to be deposited upon the painted surfaces, shall be thoroughly cleaned off to the satisfaction of the Engineer. If traffic conditions start to cause dust, the Contractor, when directed by the Engineer, shall sprinkle water or a dust palliative on area of the traveled way to control the problem. No additional payment shall be made for this work.

1.11 Special Stenciling

The date (month and year) of painting shall be stenciled by the Contractor in two locations on the structure, as directed by the Engineer. The block letters shall be 2 1/2-inch high, and the paint used shall be in distinct contrast with the background.

PART 2 - MATERIALS

2.1. Acceptable Manufacturers

The protective coating system specified under this specification is in reference to the Tnemec Company. Other systems are acceptable provided that they are equal or better than the system referenced to:

TNEMEC Company Incorporated, Richmond, VA.
Ditsler Company (Manufacturer's representative)
302 West Cary Street
Richmond, VA 23220DC Metro (804)780-3077

2.2 Paint Materials

The paint for new or existing structural steel or other metal surfaces shall conform to the requirements of this section, unless otherwise specified on the plans or in the special provisions. The following descriptions apply to the TNEMEC system for primers, and top

coat coating profile. Other systems shall be accepted if proven to be equal or better than the system specified in this section.

Coating	Description
90-97 Tneme-Zinc:	
Zinc-Rich organic moisture cured	A two-component moisture cured urethane primer zinc-rich primer, used in conjunction with chemical and corrosion resistant top coats. When used as a shop primer, may be recoated the same day. Conforms to SSPC-PS 12.01.
Endura-Shield III Series 73:	
High build acrylic polyurethane	A high-solids, high-build, fast-drying coating that is highly resistant to abrasion, corrosive fumes and chemical contact. Can be applied in a single coat directly to properly applied organic zinc-rich primers and other compatible coatings without the use of an intermediate or tie coat. Provides long-term color and gloss retention.

2.3 Material Preparation

A. Do not use any material older than the manufacturer's recommended shelf life.

B. Mix and thin materials according to manufacturer's latest printed instructions.

C. Do not use mixed materials beyond manufacturer's recommended pot life.

2.4 Paint System

Unless specified in the plans or special provisions, it is understood that the coating application for primers, intermediate coats and top coats received shall be as recommended by the manufacturer. The minimum acceptable thickness is that enclosed in the parenthesis.

A. System – 1 Produced by TNEMEC

Primer- 9097 Tneme-Zinc

SURFACE PREPARATION (SSPC-SP6)	Commercial Blast Cleaning
COLOR	Reddish-Gray

METALLIC ZINC CONTENT	83% by weight in dry applied film
SOLID BY VOLUME	63.0% ±2.0% (Mixed)
THEORETICAL COVERAGE	1003 mil sq. ft. per gallon
DRY FILM THICKNESS	2.5 to 3.5 mils per coat
CURING TIME	At 75°F To handle: 1 hour To recoat: 4 hours
TEMPERATURE RESISTANCE	(Dry) Continuous 250°F Intermittent 300°F
SPECIAL QUALIFICATIONS	This product meets the requirements of the United States Department of Agriculture for use in federally inspected meat and poultry processing plants

Intermediate Coat – (None applicable with this system)

Top Coat - Series 73 Endura Shield III

SURFACE PREPARATION	Prepare surfaces by method suitable for exposure and surface (see prime coat data). All surfaces must be dry and clean.
COLORS	Refer to Tnemec CHROMACOLORS
FINISHES	Semi-gloss
SOLIDS BY VOLUME*	58.0 + 2.0% (Mixed)
THEORETICAL COVERAGE*	930 mil. sq. ft. per gallon
DRY FILM THICKNESS	3.0 to 5.0 mils per coat
CURING TIME - AT 75oF	To touch: 1 hour To handle: 5 hours To recoat: 12 hours To resist moisture condensation: 3 to 6 hours
TEMPERATURE RESISTANCE	(Dry) Continuous 170oF. Intermittent 200°F
MIXING RATIO	By volume-Four (Part A) to One (Part B)

CHEMICAL RESISTANCE	Organic Acids Mineral Acids Oxidizing Agents Alkali Solutions	
FREQUENT CONTACT	Alcohols Aliphatic Hydrocarbons Aromatic Hydrocarbons Salt Solutions Ketones	Fresh Water Waste Water Mineral Oils Vegetable Oils

*Values may vary with color.

2.5 Performance Criteria

This product shall meet or exceed the following test requirements
90-97 Tneme-Zinc
Type: Zinc-rich Urethane Primer

Adhesion

Method:	Elcometer Adhesion Tester (0 to 1,000 psi). Coating applied to sandblasted steel panels and cured 7 days at 77°F./50% R.H.
System:	90-8 One-Coat 90-97 Tneme-Zinc.
Requirement:	Not less than 800 psi pull, average of three trials.
Method:	ASTM D 3359 (Method B). Substrate: 4-inch x 12-inch x 1/8inch steel panels.
Surface Preparation:	SSPC-SP10.
System:	90-8 One-Coat 90-97 Tneme-Zinc cured 7 days at 77oF./50% R.H.
Requirement:	No less than a rating of 5, average of three trials.

Salt Spray (Fog)

Method:	ASTM B117-73. System: 90-8 One-Coat 90-97 Tneme-Zinc.
Requirement:	No blistering, cracking, softening or delamination of film. No rust creepage at scribe and no rusting at edges after 3,000 hours of exposure.
Method:	ASTM B 117-73.

System: 90-97 Tneme-Zinc/Series 73

Endura-Shield III.

Requirement : No blistering, cracking, softening or delamination of film. No more than 1/16-inch rust creepage at scribe and no rusting at edges after 3,000 hours of exposure.

Series 73 Endura-Shield III

Type: High-Build Acrylic Polyurethane Enamel

Abrasion Resistance: Federal Test Method Std. No. 141, Method 6192, CS-17 Wheel, 1,000 gram load. No more than 95 mg. loss after 1,000 cycles.

Adhesion: ASTM D 3359 Method B (Crosshatch Adhesion). Coating systems applied to sandblasted steel panels and cured 30 days @ 77°F. Not less than a rating of 5, average of three tests.

Humidity: ASTM D 2247-68. No blistering, cracking, softening or delamination of film after 600 hours exposure.

Salt Spray: ASTM B 117-73. No blistering, cracking, softening or delamination of film. No rust creep age at scribe and no more than one percent rusting at edges after 1,000 hours exposure.

PART 3 - EXECUTION

3.1 Inspection

Refer to Section 09900 - PART 3.1

A. Make visual comparison of cleanliness or prepared surfaces with pictorial standards in accordance with SSPC-VIS-1.

B. Measure dry film thickness using a magnetic film thickness gage in accordance with SSPC-PA2.

3.2 Surface Preparation

All surfaces of new or existing structural steel or other metals to be painted shall be blast cleaned unless otherwise specified in the special provisions, or approved in writing by the Engineer.

In repainting existing steel structures the method of cleaning shall be specified in the special provisions. Any damage to sound paint on areas not designated for treatment, resulting from the Contractor's operations shall be repaired by him at his expense to the satisfaction of the Engineer.

3.3 Blast Cleaning

Surfaces prepared by Commercial Blast Cleaning shall be in accordance with SSPC-SP6. The blast cleaning shall remove all rust, mill scale and other substances down to bright metal. Special attention shall be given to cleaning of corners and reentrant angles. Before painting, sand adhering to the metal in the corners and elsewhere shall be removed. The cleaning shall be approved by the Engineer prior to any painting. Bare metal shall be prime painted as soon as practicable after it is cleaned. All surface shall be primed the same day they are blast cleaned. Any reblasted that is required shall be done by the Contractor at his expense.

Abrasive used for blast cleaning shall meet all local state and federal specifications, regulations and laws to produce satisfactory results. The Anchor Pattern on the blast surface shall not exceed 1 1/2 to 2 mils.

3.4 Disposal and Removal of Lead Primer

All lead base primer shall be blasted off the structure, in accordance with OSHA (Occupational Safety and Health Administration) health and safety regulations. The regulations are outlined in the code of federal regulations section 1910.1025 “Lead”.

The Contractor shall have all testing required by regulations or by the selected waste hauler or landfill, such as Toxicity Characteristic Leaching Procedure Testing (TCLP Testing), or subsequent testing required by the Resource Conservation and Recovery Act (RCRA) or local or state regulations, to determine proper treatment and/or disposal requirements, including any follow-up testing, shall be done at the Contractor's expense. The Cost of all disposal on shall be paid for by the Contractor. Copies of all manifests, testing results and treatment procedure documents as shall be sent to the County.

The citizen and environmental protection shall conform to all Local, State and Federal specifications, regulations, and laws governing the removal of lead paint. Each site shall be reviewed for compliance with environmental and industrial containment standards and safe guards.

List of Agencies to contact:

Occupational Safety and Health Administration (OSHA)	(202) 523-9655
Environmental Protection Agency (E.P.A.)	(202) 260-4134

Water Pollution (Arlington County)	(703) 228-6820
Environmental Health (Arlington County)	(703) 228-4826
Hazardous Waste Violation, Health Dept. (VA)	(804) 225-2667
VA. State Air Pollution Control Board	(703) 644-0311

3.5 Notification

The Contractor shall notify the Engineer in writing, at least one week in advance of the date that cleaning and painting operations are to begin.

3.6 Coating Schedule

First coat: Series 90-97 Tneme-Zinc at 2.5 - 3.5 dry mils. (Note: two coats of primer applied to severely rusted areas, bolts, bearing areas, pitted areas at a minimum of 2 feet from beam end as determined by the Engineer. Brush apply first full coat forcing material into these areas).

Second coat: Series 73 Endura-Shield III at 3 - 5 dry mils.

3.7 Method

Painting shall be done in a neat and workmanlike manner. Unless otherwise specified, paint shall be applied by conventional air spray, airless spray brush or any combination thereof. Refer to the manufacturer's recommendation on the application of their painting system.

A. Apply a smooth, uniform coat, free of any skips, holidays, runs, sags, dry spray or any other film defects. Correct the deficiencies before the succeeding application.

B. On all surfaces that are inaccessible for painting by regular means, the paint shall be applied by sheep skin daubers, bottle brushes or any means approved by the Engineer.

C. Do not apply successive coats until the Engineer has completed inspection. Succeeding coats shall be applied within the following 24 hours. A minimum of
30 minutes shall elapse between applications or as specified by the manufacturer. Refer to the manufacturer's specification on application of succeeding coats.

3.8 Curing

Allow the prime coat to cure a minimum of 12 hours, or as specified by the manufacturer, before top coating.

The top coat shall be applied within 24 hours, or as specified by the manufacturer, to minimize contamination.

Refer to the manufacturer's recommendations or curing time for their brands of paints.

3.9 Field Painting

Surfaces which shall be inaccessible after erection shall be cleaned free from any foreign material and painted prior to erection with such field coats as are called for on the plans or specified in the special provisions or authorized by the Engineer. Field painting, except for retouching, shall be performed only after all form work, such as concrete, is completed and the forms removed. When the paint applied for retouching has thoroughly dried, such field coats as called for on the plans or authorized shall be applied. However, no coat of paint shall be applied until the preceding coat has dried. Paint shall be considered dry when another coat can be applied without the development of any film irregularities.

To secure a minimum coating on edges of plates or shapes, bolt heads and nuts and other parts subjected to special wear and attack, the edges, shall first be stripped with a longitudinal motion and the bolt heads and nuts with a rotary motion, followed immediately by the general painting of the whole surface, including the edges and bolt heads nuts.

If traffic produces an objectionable amount of dust, the Contractor shall allay the dust for the necessary distance on each side of the structure and take any other precautions necessary to prevent dust and dirt from coming in contact with freshly painted surfaces or with surfaces before the paint is applied.

The second field coat shall not be applied in less than 2 days after the first field coat. The application of the final field coat shall be deferred until after all construction operations which might mar the finished coat are complete.

The Contractor shall protect adjacent property and pedestrian, vehicular and other traffic upon or underneath the structure and also all portions of the superstructure and substructure against damage or disfigurement by the painting operation.

PART 4 - MEASUREMENT AND PAYMENT

Preparing and painting of structural steel shall be measured by the square foot or as noted. Measurement shall be determined along the surface of the actual area painted. Payment shall be per square foot for preparing and painting structural steel and shall include full compensation for furnishing all labor, materials, tools, equipment, disposing and incidentals, and for doing all the work involved in preparing the steel and applying the paint to the surfaces as shown on the plans, specified in these specifications and the special provisions, and as directed by the Project Officer.

PART 1 - GENERAL

1.1 Description of Work

Provide all plant, labor, material and equipment to treat piles, structural and miscellaneous timber called for on the approved plans.

1.2 Related Work Specified Elsewhere

Section 06100 - Structural Timber & Lumber
Section 09900 - Protective Coatings

1.3 Applicable Specifications

A. American Association of State Highway Transportation Officials (AASHTO)

B. Virginia Department of Transportation, Road and Bridge Specifications(VDOT)

1.4 Applicable Reference

American Wood Preserver's Association (AWPA)

1.5 Quality Assurance

Provide certified test reports as required by AASHTO M-133.

PART 2 - MATERIALS

2.1 Materials shall conform to Section 236 of the VDOT Specifications.

PART 3 - EXECUTION

3.1 Preparation, treatment and penetration shall conform to Section 236 of the VDOT Specifications.

PART 4 - MEASUREMENT AND PAYMENT

No separate measurement and payment shall be made for this work. It shall be considered a subsidiary obligation of the Contract under other work to which it relates.

PART 1 - GENERAL

1.1 Description of the Work

Provide all labor, materials and equipment for the complete application of protective coatings for interior and exterior surfaces as required in accordance with these specifications and where called for on the approved plans.

1.2 Related Work Specified Elsewhere

Section 09800 - Wood Preservatives

1.3 Applicable Specifications

A. American Society for Testing and Materials (ASTM)

B. Steel Structures Painting Council (SSPC0)

1.4 Surfaces Not to be Painted

The following surfaces are not to be painted. (If surfaces referenced below are to be coated, specific instructions shall be given on the approved plans.)

A. Non-ferrous metals; for example - Aluminum Copper Monel Brass
B. Stainless Steel
C. Chain link fencing
D. Concrete walks, curbs
E. Exterior concrete foundations
F. Plastic
G. Brick
H. Galvanized steel

1.5 Submittals

In accordance with Section 03100, submit a complete list of materials and color charts. The Engineer shall select colors.

1.6 Quality Assurance

A. Primers, intermediate and top coats for each surface shall be supplied by one manufacturer.

B. Thinner, solvents, cleaning compounds shall comply fully with the recommendations of the coatings manufacturer.

C. The protective coating systems shall be tested and inspected for acceptance in accordance with Part 3.

1.7 Product Delivery, Storage and Handling

Deliver painting materials to the site in the original manufacturer's containers with labels intact and seals unbroken. Store materials in an area specifically assigned for storage. Storage area shall be well ventilated and kept locked. Keep storage area clean. Remove oily rags daily and dispose same properly. Take all necessary precautions to avoid fires.

1.8 Guarantee

Protective coatings shall be guaranteed for a period of one year after acceptance of the project by the County. Approximately one month prior to the expiration of this guarantee period, the Engineer shall notify the Contractor to coordinate inspection of the coatings. All coatings for the project shall be inspected and failures repaired at no cost to the County. Normal wear, abrasion, or physical damage as determined by the Engineer shall not be considered as failures.

PART 2 - MATERIALS

2.1 Acceptable Manufacturers

The protective coating systems specified under this section are generic in form. The systems are manufactured by a number of acceptable manufacturers, no one of which can provide all of the systems for this contract. Manufactures are required to meet the requirements herein.

2.2 Paint Materials

The following descriptions apply to the short form identifications of the primers, intermediate and top coats specified under the various systems of paragraph 2.3 following. Other acceptable coatings of the above named manufacturers exist, but have not been defined herein.

Coating	Description
Coal Tar - Black	High build coal tar solution containing 65% solids by volume.
Coal Tar Epoxy-White	High build 2-component white coal tar epoxy coating having a minimum epoxide resin content of 34% by weight in the weight
Epoxy - Polyamide	Two component Polyamide epoxy containing 55% solids by volume. With exposure at 45o facing ocean exhibit no blistering, cracking delamination after 36 months' exposure. Exhibits no more than 130 mg. loss after 100 grams load of Federal Test Method Std. No. 141 Method 6192.
Eproxy-Primer - Red	Two component polyamide epoxy containing a minimum of 53% solids by volume having performance equal to the epoxy-polyamide above.
Modified Epoxy	High build decorative sand texture finish suitable for use on new and previously painted concrete and masonry and having 50% minimum solids by volume. When subject to ASTM D-2247 test for humidity shall exhibit no blistering, softening, or loss of film integrity, or change in color after 1,000 hours.
Polyurethane Enamel	Two component aliphatic polyurethane highly-resistant to abrasion; corrosive fumes, moisture and chemical contact and containing a minimum of 50% solids by volume. Shall show no blistering, cracking, softening or delamination of film after 5,000 hours' exposure (ASTM D-2247 humidity) and shall meet the abrasion and gloss test of the polyurethane aliphatic-1.

2.3 Paint Systems

Unless specified otherwise, it is understood that each stage of coating (primer, intermediate and top) receives only 1 coat. Note that the dry film thicknesses specified denotes the average. The minimum acceptable for the thickness tests are noted in parenthesis ().

A. Concrete and Masonry

1. System “A-1”

Interior – Immersion

Primer	
Epoxy-Polyamide	5.0 mils d.f.t.
	(4.0 mils minimum)
FINAL COAT	
Polyurethane Enamel	2.0 mils d.f.t.
Semi-gloss (color)	(1.5 mils minimum)

2. Systems "A-4"

Interior - Immersion or Non-immersion - Storm or Sewer Structures when specifically called for on the approved drawings.

1 COAT

Coal Tar Epoxy – White	22.0 mils d.f.t.
	(20.0 mils minimum)

3. System "A-3"

Interior Walls or Exterior Walls Above Grade

FINISH COAT

Modified Epoxy	10.0 mils d.f.t. (8.0 mils minimum)

4. System "A-5"

Exterior Walls to be Backfilled

PRIMER

Coal Tar - black	15.0 mils d.f.t.

FINAL COATS

Coal Tar - black	15.0 mils d.f.t.
Total:	30.0 mils d.f.t.
	(27.0 mils minimum)

B. Steel and Iron

1. System "B-1"

Non-Immersion - Severe Corrosive Condition

PRIMER

Epoxy - Polyamide	5.0 mils d.f.t.
(semi-gloss)	(4.0 mils minimum)

TOP COAT

Polyurethane Enamel	2.0 mils d.f.t.
(semi-gloss - color)	(1.5 mils minimum)

2. System "B-2"

Non-Immersion - Mild Corrosive Condition	
PRIMER	
Epoxy Primer - Red	4.0 mils d.f.t. (3.0 mils minimum)
TOP COAT	
Epoxy - Polyamide	5.0 mils d.f.t. (4.0 mils minimum)

C. Wood

1. System "C-1"

All Exposures	
PRIMER AND TOP COAT	
Epoxy - Polyamide - 2 coats	2.5 mils d.f.t.(2.0 mils min.) each coat

2.4 Galvanizing

A. All exterior and/or interior steel work, where indicated on the Contract Documents, shall be galvanized by the hot-dip process, conforming to ASTM A-386 for assembled steel products. All required hot-dip galvanizing shall be done after fabrication, in the largest sections possible. Items too large for available dip tanks shall be sprayed, by approved methods, with molten zinc to coating thickness of .003 inch to .004 inch.

B. Weight of zinc coating per square foot of actual surface shall average not less than 2.0 ounces and no individual specimen shall show less than 1.8 ounces.

C. All bolts and screws for attachment of galvanized items shall be galvanized or non-corrodible material.

PART 3 - EXECUTION

3.1 Inspection

A. Complete records shall be kept by the Contractor and furnished to the Engineer. These records shall identify the particular paints that were applied to a surface, the date of application, area coated, climatic conditions, and the following post application quality control data:

1. Wet film thickness: 3 readings per 100 sq. ft.
2. Dry film thickness: 1 reading per 250 sq. ft.

B. Repair all damaged coated areas, holidays and thickness test areas in accordance with the coating manufacturer's recommendations so that the repaired area is equal to the undamaged coated areas in all respects.

3.2 Surface Preparation

All surfaces to be coated shall be cleaned, free of harmful scale, rust, dirt, oil, grease, moisture, concrete mortar, loose and damaged coatings and all foreign matter.

A. Concrete:

Concrete shall be fully cured prior to coating. Fully cured shall be defined as 28 days at75^{o}F or 49 days at 50^{o}F or 53 days at 50^{o}F. Rebuild rough, chemically attacked and/or abraded surfaces. Rebuild concrete surfaces containing air, water pits, splatter, fins, protrusions, bulges, or other surface irregularities while the concrete is still ”green”.

B. Steel and Iron:

1. Remove all weld splatter. Grind all edges, projections, sharp corners and welds to a smooth, rounded contour.

2. Remove oil and grease from surfaces by solvent cleaning in accordance with the Steel Structures Painting Council Specifications (SSPC).

3. Abrasive blast steel and iron surfaces in accordance with SSPC-SP-20 (Near-White Blast).

4. In areas where blasting is not feasible, obtain the approval of the Engineer to use power tool cleaning in accordance with SSPC-SP-3.

5. Remove dust and spent sand from the surfaces after sand blasting by brushing and vacuum cleaning.

6. Apply the prime coat as soon as possible after the preparation is complete and before the dew point is reached. All surfaces blasted and power-tooled in one day shall be coated on the same day. Leave whipblast or power tool areas exposed overnight.

C. Galvanized Steel Surfaces:

Conform to ASTM A-384 and A-385 (Recommend Practices) pertaining to galvanizing assembled steel products. Unless otherwise permitted, do all galvanizing after fabrication, in largest sections practicable. Where galvanizing is removed by welding or other assembly procedure, touch up abraded areas with molten zinc or zinc-rich paint.

D. Concrete or Cinder Block:

Concrete or cinder block substrates shall be clean, dry and free of oils and release agent contaminants. If necessary, spot clean with solvent and wash with strong detergent and warm water. Flush with high pressure water and allow to dry for approximately one hour before application.

E. Brick:

Clean off all mortar, uneven loose or detrimental foreign matter. Apply a cleaning compound approved by the coating manufacturer. Allow to stand on the brick for at least 15 minutes. Thoroughly remove the cleaning compound by high pressure spray delivering 1 to 3 gpm at 1,000 psig. Allow to dry for at least one hour and paint as soon as possible after drying.

F. Wood:

Maintain the surface in a clean and dry manner. Fill cracks and nail holes with putty after the first coat has been applied. Seal knots and sap streaks with material approved by the manufacturer. Sand surfaces to a fine smooth finish.

3.3 Application

A. Mix all paint and tinting colors in strict accordance with the specifications of the paint manufacturer. Except for epoxies, mix paints at storage area and deliver to the site ready-mixed.

B. Apply coatings uniformly and in a continuous film by brush or spray, leaving no sags, holidays, pinholes, bubbles or other defects. Coatings judged unsatisfactory by the Engineer's representative shall be corrected at no additional cost to the County.

C. Do not apply paint when the surrounding air temperature, as measured in the shade, is below 50^{o}F or less than 5^{o}F above the dew point. Do not apply paint to wet or damp surfaces or when the humidity exceeds 85%.

D. Vary the colors of successive coats.

E. Do not apply successive coats until the Engineer has completed inspection.

F. All shop galvanized steel work necessitating field welding which in any manner removes original galvanizing shall be restored by field cold galvanizing with “Ferraloy”, “Tin Easy Fluid”, “'galvaloy”, or approved equal.

PART 4 - MEASUREMENT AND PAYMENT

No separate measurement and payment shall be made for this work. It shall be considered a subsidiary obligation of the Contract under other work to which it relates.

PART 1 - GENERAL

1.1 Description of the Work

Provide all labor, material and equipment to furnish and install, complete in place, the bus shelter in accordance with these specifications and to the lines, grades and dimensions shown on the approved plans.

1.2 Related Work Specified Elsewhere

Section 02611 - Concrete Walks and Concrete Driveway Entrance
Section 02612 - Interlocking Concrete and Brick Pavers
Section 03100 - Concrete Formwork, Reinforcement and Materials
Section 09900 - Protective Coatings

PART 2 - MATERIALS

2.1 Bus Shelter Unit

The bus shelter shall be either an Arlington County type or a Metro type bus passenger shelter as specified on the plans. The Metro type bus shelter shall be provided by Washington Metro Area Transit Authority (WMATA). The Arlington County bus shelter shall be furnished by the Contractor, unless otherwise specified on the approved plans.

2.2 Paint

Paint for the Metro shelter shall be custom blend, Metro Brown, available from MAB Paint Co., 3312 Wisconsin Ave. NW, Washington, DC, Phone: (202) 966-5445.

2.3 Concrete Pad

The concrete pad and aggregate base shall be in conformance with Section 02611 of these specifications.

2.4 Pavers

Pavers when specified on the approved plans, shall match the adjacent sidewalk and be as specified in Section 02612 and on the plans.

PART 3 – EXECUTION

3.1 The Contractor is responsible for the pick-up and delivery of the Metro passenger shelter unit from the Washington Metropolitan Area Transit Authority. Three weeks prior to installation, contact the Arlington County, Department of Environmental Services, Planning Division at 228-3681 to arrange for pick-up and directions.

3.2 The unit is to be mounted on a 4-inch thick concrete pad on a 3-inch compacted aggregate base. Construct concrete pad in accordance with Section 02611. When pavers are specified on approved plans, lay pavers in accordance with Section 02612. Match elevation of pavers or concrete pad with adjacent sidewalk and provide 1/4-inch/ft positive drainage to street. Extend anchor bolts from concrete base pad through pavers to mount on shelter brackets.

3.3 Install bus shelter in accordance with the approved plans and the details provided in these specifications.

3.4 Paint the Metro bus shelter in accordance with Section 09900 and manufacturer's application instructions.

PART 4 - MEASUREMENT AND PAYMENT

Bus shelters shall be measured as each. Payment shall be at the unit price stated in the bid proposal and shall include all materials, labor and incidentals necessary for a complete installation of the bus shelter unit and the supporting concrete pad.

PART 1 – GENERAL

This work shall consist of maintaining and protecting workers, vehicular and pedestrian traffic through areas of construction within the limits of the project and over the approved traffic detours. All work shall be in accordance with the latest Arlington County Construction Standards and Specifications, Virginia Department of Transportation (VDOT) Road and Bridge Specifications, the Manual on Uniform Traffic Control Devices (MUTCD), and the Virginia Work Area Protection Manual (WAPM), the standard drawings, and the Contract, as directed by the Project Officer.

1.1 Description of Work

Provide all plant, labor, supervision, materials, and equipment to install, maintain, relocate, and remove all temporary traffic control devices.

1.2 Related Work Specified Elsewhere

1.3 Applicable Specifications

A. Virginia Department of Transportation (VDOT)
B. VDOT Road and Bridge Specifications
C. Manual on Uniform Traffic Control Devices (MUTCD)
D. Virginia Work Area Protection Manual (WAPM)
E. Occupational Safety and Health Act, State & Federal (OSHA)

1.4 Quality Assurance

Work Zone Traffic Control Certification

The Contractor shall have at least one (1) employee who is certified by VDOT in Basic Work Zone Traffic Control; and who shall be responsible for the placement, maintenance and removal of work zone traffic control devices within the project limits in compliance with the permit requirements and conditions, the approved plan, specifications, the Virginia Work Protection Manual and the Manual of Uniform Traffic Control Devices. An Employee certified by VDOT in the Intermediate Work Zone Traffic control shall be on-site to provide supervision during work zone adjustments or changes to traffic control due to field conditions. This employee shall provide evidence of this certification upon request from Arlington County personnel.

PART 2- MATERIALS

2.1 General

Material shall conform to the requirements of the applicable VDOT specification.

2.2 Signalization, Barricades, Channelizing Devices, Safety Devices, and Pavement Markings

Signalization, barricades, channelizing devices, safety devices, and pavement markings shall

conform to the requirements of Division VII of the latest VDOT specifications and the MUTCD.

2.3 Temporary Pavement Markers

Temporary pavement markers shall conform to the requirements of VDOT Section 235, Retroreflectors.

2.4 Construction Pavement Markings

Construction pavement markings shall conform to the requirements of VDOT Section 231 (Paint), and Section 246 (Pavement Marking).

2.5 Portable Changeable Message Signs

Portable changeable message signs shall meet the requirements of Section 512.03 subsection q of the VDOT Road and Bridge Specifications.

PART 3- EXECUTION

This section shall conform to the VDOT Specification Section 512.03.

PART 4- MEASUREMENT AND PAYMENT

Payment for MOT shall be based on the bid form. Payment for maintenance of traffic is full compensation for providing the proper pedestrian and vehicular traffic controls during all stages of construction and includes furnishing, preparing, fabricating, installing, maintaining, removing, relocating, repairing, or replacing pedestrian and vehicular traffic control devices and signs as necessary, and all other materials, labor, hardware, equipment, tools, supplies, and incidentals. Contractor shall be responsible for acquiring VDOT permit for any revision during construction and/or as required by the project contract to the approved traffic control plan.

Payment for maintenance of traffic for each site shall be made as partial payments. The first installment of 50 per cent of the total cost for maintenance of traffic shall be made on the first progress estimate following partial mobilization and initiation of construction work for the particular site. The remaining 50% of the cost shall be paid on each subsequent estimate based on the percent of work completed at the site all the way through Final Acceptance of work. The Project Officer shall have the authority to decide on the appropriate payment for each subsequent estimate.

PART 1 - GENERAL

1.01 SUMMARY

A. This Section includes the following:

a. Protection of existing trees to remain:

i. Pruning of existing trees roots that are affected by execution of the Work, whether temporary or permanent construction.
ii. Aeration and Root Protection Matting
iii. Tree Protection Fencing

PRODUCT DATA SHEET 1 - Provide all labor, materials, tool and equipment as required to have tree protection applied on all areas called for on plans.

PRODUCT DATA SHEET 2 - In addition to the specifications contained herein, Work shall be performed in accordance with the Arlington County Department of Parks & Recreation Design Standards for Tree Protection and Trimming as shown on plans and available online on the Arlington County Website

PRODUCT DATA SHEET 3 - Related Sections:

a. 02200 Earthwork

b. 02100 Clearing and Grubbing

c. 01500 Erosion and Sediment Control and Pollution Prevention

d. 329000 Exterior Plants

e. 329200 Seeding and Sodding

1.02 DEFINITIONS

A. Finish Grade: Elevation of finished surface of planting soil.

B. Imported Topsoil: Soil obtained off-site that meets the specifications herein for topsoil and is suitable for use in planting soil/backfill soil mixture when existing soil quantities are insufficient. Refer to Section 329100 “Planting Preparation.”

C. Planting Soil/Backfill Soil Mixture: Existing soil modified as specified to be suitable for planting. Refer to Section 329100 “Planting Preparation.”

D. Subgrade: Surface or elevation of subsoil remaining after completing excavation, or top surface of a fill or backfill, before placing planting soil.

E. ISA: International Society of Arboriculture

F. CBAY: Chesapeake Bay, typically referring to CBAY watershed.

G. Urban Forester/County Urban Forester: Refers to the Arlington County Urban Forester

H. Landscape Architect: Refers to an Arlington County Landscape Architect or their designee.

1.03 SUBMITTALS

A. Product Data: For each type of product indicated in Section 2.0

B. Certification: From Contractor's arborist, certifying that trees indicated to remain have been protected during construction according to recognized standards and that trees were promptly and properly treated and repaired when damaged.

C. Maintenance Requirements: From Contractor's arborist, for care and protection of trees affected by construction during and after completing the Work.

D. Contract arborist Qualifications: Contractor shall submit a copy of valid ISA certification to the Project Officer for approval with confirmation by Urban Forester.

E. List products to be used and firms, including qualifications to perform work.

F. Provide schedules for performance of work.

1.04 QUALITY ASSURANCE

A. Contractor shall ensure that tree and plant protection methods are implemented by an arborist Certified by the International Society of Arboriculture (ISA) to provide for the care of the trees and plants impacted by construction activities. Provide ISA certification verification to Project Officer per section 1.03 "Submittals" prior to beginning work.

B. The Contractor shall identify to the Project Officer at least one authorized on-site Point of Contact(POC) who is, by training or experience, familiar with the policies, regulations and standards applicable to the work being performed. The POC and the certified arborist may be the same individual.

C. Crews shall be directly supervised by an ISA certified arborist.

D. All workers, through related training and on the job experience, shall be familiar with the technical aspects of arboricultural work and equipment used in such operations.

E. Trucks and mechanized equipment shall not enter tree protection areas.

F. Stump grinding shall be with small machines specifically designed for that purposes. No stumps shall be excavated except as described herein. Stumps shall be ground not more than 8" below grade and care must be taken to minimize damage to root of the trees to remain.

G. No stump grinding within tree protection areas.

H. All work in or near tree protection areas shall be carefully performed by Contractor in order to avoid damage to tree trunks, branches, root system, and other existing plant materials and soils that are to remain.

I. Silt shall not be allowed to collect in preservation or reforestation areas. Silt accumulating in preservation areas shall constitute damage and shall require remedial activity. All silt shall be removed from preservation areas within 24 hours of siltation. The methods and procedures for silt removal within tree preservation and reforested areas shall be approved by the Project Officer with confirmation by the Urban Forester.

J. Tree Pruning Standard: Comply with ANSI A300 (Part 1), "Tree, Shrub, and Other Woody Plant Maintenance--Standard Practices (Pruning)."

   a. Pruning shall remove only dead, dying, damaged or broken limbs greater than 1" – 1.5" in diameter.

   b. Pruning for clearance shall be reviewed and approved by Project Officer with confirmation by the Urban Forester.

K. Urban Forester Notification: The Contractor shall notify the Project Officer 72 hours prior to the following events, so that the County's Urban Forester can be notified and present at a pre-construction site meeting (refer to Section 3) and to observe work:

   a. Tree protection fencing installation
   b. Tree or root-pruning operations.

   c. Work within tree protection zones.

   d. Tree planting.

PART 2 - PRODUCTS

2.01MATERIALS

A. Temporary Tree Protection Fence: Unless otherwise indicated in approved plans, tree protection fence shall be two-inch wire mesh fabric measuring 72 inches in height mounted on 1.9" O.D. steel pipes driven 24 inches into the ground, placed 120 inches on-center maximum. Refer to Arlington County DPR standard detail on approved plans.

B. Tree Protection Signs: Shall be of heavy-duty sheet aluminum or weatherproof plastic material measuring 12 inches by 18 inches. Signs shall state "NO ENTRY, TREE PROTECTION AREA, CALL 703-228-6557 TO REPORT VIOLATIONS" in both English and Spanish. Signs shall be mounted on fence every 50 feet maximum.

C. Topsoil: Refer to Section 329100 – Plant Preparation.

D. Bark Mulch: Refer to Section 329100 –Plant Preparation

E. Temporary Root Protection Matting: If required in approved plans, temporary root protection matting shall be a double-sided geocomposite, geonet core, non-wove covering such as Tendrain 770-2, as manufactured by Tenax Corporation, Baltimore, MD or approved equal. Six (6) inches of wood chip mulch shall be applied to area to receive root protection matting prior to installation. Matting shall be installed in a single layer.

F. Landscape nails: When required, spikes shall be 12" as indicated on the drawings.

PART 3 - EXECUTION

3.01 PREPARATION

A. Prior to the construction activities, the Contractor shall meet on-site with the Project Officer and Urban Forester to review trees to remain and protective measures required.

B. Temporary Tree Protection Fencing: Install temporary tree protection fencing and signs around tree protection zones to protect remaining trees and vegetation from construction damage. Maintain temporary fence and remove when construction is complete after approval by Project Officer with confirmation by the County Urban Forester.

C. Protect tree root systems from damage caused by runoff or spillage of noxious materials while mixing, placing, or storing construction materials. Protect root systems from ponding, eroding, or excessive wetting caused by dewatering operations.

D. No personnel, vehicles, equipment, construction materials, or construction debris shall be allowed inside the tree protection areas at any time during construction without the written

E. consent of the Project Officer with confirmation by the Urban Forester. If a violation is observed, the Contractor shall be notified by the Project Officer and shall

immediately rectify the situation. Continued and subsequent violations shall result in a fine of $500 per day of violation.

F. Special Demolition Procedures:

a. Demolition of walks and hardscape within tree protection areas shall be directly supervised by an ISA certified arborist.

b. Mechanized equipment shall not enter tree protection areas (TPAs) or reforestation areas.

c. Backfill of voids created by demolition within the TPAs and reforestation areas shall be loosely placed topsoil. Only the amount of topsoil necessary to fill the void without spreading over existing grades shall be allowed.

3.02 EXCAVATION

A. Install shoring or other protective support systems to minimize sloping or benching of excavations if indicated in the approved plans.

B. Do not excavate within tree protection zones, unless otherwise indicated.

C. Where utility trenches are required within tree protection zones, Contractor shall perform root pruning prior to trenching.

D. Where excavation is proposed within the critical root zone of trees to remain, Contractor shall perform root pruning as indicated in approved plans prior to excavation.

E. Where new finish grade is indicated below existing grade around trees, Contractor shall slope grade outside of tree protection zones. Maintain existing grades within tree protection zones.

3.03 ROOT PRUNING:

A. When required, root pruning locations shall be indicated on the approved plans. Exact location and depth shall be determined on site with Project Officer and Urban Forester during the pre-construction meeting.

B. Do not cut main lateral roots or taproots; cut only smaller roots that interfere with installation of utilities. Cut roots with clean, sharp pruning instruments; do not break or chop. All root pruning shall be performed by an ISA certified arborist. Refer to Arlington County Department of Parks & Recreation Design Standards “Tree Protection and Trimming” as shown on plans and available online at:

http://parks.arlingtonva.us/design-standards/

3.04 TREE REPAIR AND REPLACEMENT

A. Promptly repair trees damaged by construction operations within 24 hours. Treat damaged trunks, limbs, and roots according to Arlington County Urban Forester or contract arborist's written instructions.

B. The Contractor shall be responsible for any damage to trees within the Tree Protection Area caused by the Contractor's personnel, vehicles, or equipment at the site. Any damage to a tree to remain shall result in a payment by the Contractor to the Project Officer for the amount of damage based on the latest edition of the Council of Tree and Landscape Appraisers Guide for Plant Appraisal published by the International Society of Arboriculture (ISA). All trees are to be valued as landscape trees.

3.05 DISPOSAL OF WASTE MATERIALS

A. Burning is not permitted.

B. Disposal: Remove excess excavated material and displaced trees from Owner's property and legally dispose.

PART 4 – MEASUREMENT AND PAYMENT

4.1 The measurement of TREE PROTECTION FENCE shall be for LINEAR FOOT of fence including all appurtenances as delivered to the site, furnished, installed, maintained and removed at project completion in accordance with the plans and specifications.

4.2 The unit price for Tree Protection Fence shall include the cost of all labor, materials, equipment and incidental expenses necessary to complete the work.

4.3 The measurement of ROOT PRUNING shall be for LINEAR FOOT of root pruning performed on the project in accordance with the plans and specifications.

4.4 The unit price for ROOT PRUNING shall include the cost of all labor, materials, equipment and incidental expenses necessary to complete the work.

4.5 The measurement of ROOT PROTECTION MATTING shall be for SQUARE FOOT of matting as delivered to the site, furnished, installed, maintained and removed at project completion in accordance with the plans and specifications.

4.6 The unit price for ROOT PROTECTION MATTING shall include the cost of all labor, materials, equipment and incidental expenses necessary to complete the work including anchor/landscaping nails, in accordance with the approved plans and specifications. Unless otherwise specified on the approved plan, excavation for ROOT Protection Matting installation is considered incidental to the work and shall not be paid separately.

PART 1 - GENERAL

1.01 SUMMARY

A. This Section includes erosion control materials, soil amendments, mulching and topsoil.

B. Provide all labor, materials, tools and equipment as required to have topsoil, planting soil mix, soil stabilization, amendments, and mulch applied per the specifications on all areas disturbed by construction to receive plant materials as indicated in the approved plans.

C. Related Sections:

a. Section 02200 Earthwork

b. Section 02100 Clearing and Grubbing

c. Section 311300 Tree Protection and Root Pruning

d. Section 01500 Erosion and Sediment Control and Pollution Prevention

e. Section 329200 Seeding and Sodding

f. Section 329300 Exterior Plants

D. In addition to the specifications contained herein, Work shall be performed in accordance with the:

a. Drawings and general provisions of the contract, including general and supplementary conditions

b. Arlington County Department of Parks & Recreation Design Standards as shown on the plans and available online at:

http://parks.arlingtonva.us/design-standards/

1.02 DEFINITIONS

A. Finish Grade: Elevation of finished surface of planting soil.

B. Imported Topsoil: Soil obtained off-site that meets the specifications herein for topsoil and is suitable for use in planting soil/backfill soil mixture when existing soil quantities are insufficient.

C. Planting Soil/Backfill Soil Mixture: Existing soil modified as specified to be suitable for planting.

E. Subgrade: Surface or elevation of subsoil remaining after completing excavation, or top surface of a fill or backfill, before placing planting soil.

F. ISA: International Society of Arboriculture

G. CBAY: Chesapeake Bay, typically referring to CBAY watershed.

H. Urban Forester/County Urban Forester: Refers to the Arlington County Urban Forester

I. Landscape Architect: Refers to an Arlington County Landscape Architect or their designee.

1.03 SUBMITTALS

A. Samples of all materials specified shall be submitted to the Project Officer for approval with coordination of the Landscape Architect. All approvals shall be in writing.

B. Samples:

a. Existing Topsoil: Provide 1-pound sample of existing topsoil with the following soil test reports.

i. Fertility: pH, nitrate nitrogen, ammonia nitrogen, phosphate phosphorous, potassium, calcium, magnesium, zinc, iron, manganese.

ii. Suitability: total salinity, boron, sodium, potassium, calcium, magnesium, chloride, sulfate.

iii. Physical properties including organic content and particle size distribution.

b. Imported Topsoil: If imported topsoil is required, Contractor shall provide a 1-pound sample of the imported topsoil with the soil test reports as noted above for "Existing Topsoil."

c. Imported Topsoil for Bioretention Areas: If bioretention areas are indicated in the approved plans, the Contractor shall submit soil sample per specifications.

d. Mulches and Organic Matter/Compost: Sample of mulch and organic matter/compost may be requested in lieu of inspection.

e. Product certificates: Contractor shall submit for each type of manufactured product, to be approved by the Project Officer in coordination with Landscape Architect or Urban Forester and complying with the following:

a. Manufacturer's certified analysis for standard products.

f. Geotextile/Soil Stabilization/Erosion Control Fabric: Sample

1.04 QUALITY ASSURANCE

A. Contractor shall have all existing and furnished topsoil to be used for seeding and sodding, and for planting areas tested by a state laboratory or recognized commercial soil-testing laboratory in order to determine recommendations for the types and quantities of soil amendments. The results of this test shall determine the rates and types of fertilizers, lime, soil conditioners, and other amendments, if necessary.

a. Soil tests shall use a representative sample of on-site soils. If existing soil has been undisturbed and is suitable as determined by the soil test, no additional amendments are required.

b. Adjustments should be made based on soil test results.

PART 2 - PRODUCTS

2.01 MATERIALS

A. All materials shall conform to those stipulated below, unless otherwise approved in writing by the Project Officer with confirmation by the Landscape Architect or County Urban Forester.

B. Specified materials to be applied in amounts and methods herein stipulated.

C. Delivery tickets indicating date, weight, analysis and vendor's name, to be submitted to Project Officer.

2.02 SOIL AMENDMENTS

A. Lime: Application rates for liming materials and lime material type chosen shall be determined by required soil tests and approved by the Project Officer in coordination with the Landscape Architect or Urban Forester.

a. When required and unless test results indicate otherwise, lime material shall be dry and free flowing pulverized limestone, hydrate lime or burnt

lime that contains at least 50% total oxides (calcium oxide plus magnesium oxide). Ground limestone shall be ground to such fineness that at a minimum of 50% shall pass through a 100 mesh sieve and 98% - 100% shall pass through a 20 mesh sieve. Lime material shall meet the Virginia Agricultural Liming Materials Act, Code of Virginia Section 3.1-126.1.

B. Fertilizer: Fertilizer type and application rate shall be determined by results of required soil tests and approved by the Project Officer in coordination with the Landscape Architect or Urban Forester:

a. When required and unless test results indicate otherwise, commercial-grade complete fertilizer shall be of neutral character, consisting of fast- and slow-release nitrogen, 50 percent derived from natural organic sources of urea formaldehyde, phosphorous, and potassium in the following composition:

i. Composition: 10 percent nitrogen, 20 percent phosphorous, and 10 percent potassium, by weight.

b. All fertilizers shall be uniform in composition, free flowing, and suitable for application with approved equipment.

c. Fertilizers shall be delivered to the site fully labeled according to applicable state fertilizer laws and shall bear the name, trade name, or trademark and warranty of the product.

C. Delay mixing fertilizer with planting soil if planting shall not proceed within 2 days.

D. Spread fertilizer and lime with approved equipment.

2.03 EXISTING TOPSOIL

A. Existing, native surface topsoil formed under natural conditions with the duff layer retained during excavation period and stockpiled.

a. Contractor shall verify suitability of stockpiled soil to produce or to be amended to produce viable planting soil for lawns and planting beds as described herein.

B. Existing topsoil is to be used to extent possible for lawn areas and is to be amended per the specifications to become the Planting Soil/Backfill Soil Mixture for use in planting pits and bed areas.

C. Prior to use for lawn areas or in planting soil mix, Contractor shall remove all stones, roots, plants, sod, clods, and clay lumps larger than 1/2 –inch in any direction, pockets of coarse

D. sand, concrete slurry, concrete layers or chunks, cement, plaster, building debris and other extraneous materials that are harmful to plant growth.

E. After removal of debris and extraneous materials noted above, the Contractor shall obtain soil tests for the existing soil per the requirements in section 1.04 "Quality Assurance."

F. Contractor shall submit soil test results to the Project Officer for approval with confirmation by the Landscape Architect or Urban Forester.

G. Contractor shall supplement the existing soil as recommended in soil test results to achieve a viable planting soil for lawns and/or planting beds. Contractor shall supplement with imported topsoil per the specifications from off-site sources when quantities of approved, existing topsoil are insufficient for lawns and planting beds.

H. Contractor shall submit a sample of the topsoil that has been amended based on soil test results for approval by the Project Officer with confirmation by Landscape Architect or Urban Forester prior to use in lawn areas or planting beds or pits.

I. Topsoil installed on grade shall attempt to match existing soil texture, except for situations where clay subsoil exists. In the event that clay subsoil exists, use loam or silt loam topsoil.

J. Imported topsoil rather than existing topsoil is to be used for planting in bioretention areas, unless otherwise indicated on the approved plans.

2.04 PLANTING SOIL MIX/BACKFILL SOIL MIXTURE

A. The planting soil mix (also known as backfill soil mixture) shall consist of existing topsoil that has been approved for planting per the specifications above and approved organic matter.

B. The planting soil mix/backfill soil mixture shall be composed of ¾ approved existing topsoil and ¼ approved organic matter as described in the Arlington County DPR Standard planting details, unless otherwise indicated by the Project Officer with confirmation by the Landscape Architect or Urban Forester.

2.05 IMPORTED TOPSOIL

A. Contractor shall add imported topsoil when required on the drawings, when quantity of existing topsoil is insufficient or when determined to be necessary due to soil testing results.

B. Topsoil shall be the natural, original surface soil, a sandy loam uniform in composition and shall be in a friable condition and shall contain less than 3 percent subsoil, hardpan material, stones and clods larger than 1/2 inch in diameter in any direction. It shall also be free of sticks, tree or shrub roots, debris and other material undesirable for plant growth. The area and the topsoil shall be free of undesirable plant such as, but not limited to, Bermuda grass, nut sedge, mugwort or noxious weeds as set forth in the Federal Seed Act.

C. The topsoil shall contain at least 5 percent organic matter. It shall be a sandy loam consisting of at least 5 but not more than 20% clay, at least 10 but not more than 80% sand. It shall have a pH between 5.5 to 6.5. Soluble salts (salinity) shall not exceed 500 ppm. Soil fertility shall be "High" in natural nutrients based on the coordinated ratings in pounds per acre as established by the National Soil and Fertilizer Research Committee.

D. Topsoil which has been manufactured by blending materials which individually do not meet the requirements of this specification shall not be accepted even though the resulting blend meets the organic matter, mechanical analysis, pH and soluble salts requirements. Agricultural limestone at not more than 5 pounds per cubic yard of topsoil any be used to adjust the pH provided it is well mixed in a manner which does not destroy the structure of the soil.

2.06 IMPORTED TOPSOIL FOR BIO-RETENTION AREAS

A. If bioretention is specified in the approved plans, soil for bioretention areas shall comply with the Filter Media and Surface Cover section of the Virginia Department of Environmental Quality's(DEQ) Design Specification No. 9 for Bioretention, Version 2.0, January 1, 2013.

2.07 MULCHES AND ORGANIC MATTER

A. Straw Mulch for Seeded Areas: Provide air-dry, clean, mildew and seed-free, salt hay or threshed straw of wheat, rye, oats or barley.

B. Wood Chip Bark Mulch for Planted Areas: Wood Chip Bark Mulch shall be double-shredded hardwood bark mulch, uniform in size and free of stones, clods, non-organic debris or other foreign material and aged for at least 6 months from an approved source. Insufficiently or improperly aged mulch containing high bacterial counts or high levels of bark or other materials resistant to decomposition shall not be used. Mulch shall not contain the trunk of trees.

C. Organic Matter/Compost Mulch: Well-composted, trash-free, stable, and weed-free organic matter such as composted bark, leaf mold or other plant debris material that has been composted to a point of decay and is mature.

a. pH ranges of 5.5 to 8; moisture content 35 to 55 percent by weight

b. 100 percent passing through 1-inch sieve
c. Peat moss shall not be used.
d. Organic amendments shall be commercially prepared and shall comply with the U.S. Compost Council Seal of Testing Assurance Program's Test Methods for the Examination of Composting and Compost (STA/TMECC) criteria, or as modified in approved plan documents.

2.08 SOIL STABILIZATION/EROSION CONTROL FABRIC

A. ECS-2B Double New Straw Biodegradable Rolled Erosion Control Product, or an approved equal shall be used in all planting beds/reforestation areas.

a. Shall meet Type 2.D specifications for ECTC and HFWA FP-03 Section 713.17

b. Shall have two (2) layers of organic jute netting sewn together with biodegradable thread.

c. Overlap sections 12" and secure with manufacturer's recommended steel wire staples, 6 inches long.

B. Erosion-Control Blankets: Biodegradable wood excelsior, straw, or coconut-fiber mat enclosed in a photodegradable plastic mesh. Include manufacturer's recommended steel wire staples, 6 inches long.

C. Erosion-Control Fiber Mesh: Biodegradable burlap or spun-coir mesh, a minimum of 0.92 lb/sq. yd with 50 to 65 percent open area. Include manufacturer's recommended steel wire staples, 6 inches.

D. Erosion-Control Mats: Cellular, non-biodegradable slope-stabilization mats designed to isolate and contain small areas of soil over steeply sloped grades, of 3 inch nominal mat thickness. Include manufacturer's recommended anchorage system for slope conditions.

a. Products: Subject to compliance with requirements and plan documents, the products below, or an approved equivalent, be used:

i. Invisible Structures, Inc.; Slopetame 2

ii. Tenax Corporation – USA; Tenweb.

PART 3 - EXECUTION

3.01 PREPARATION

A. All identified areas within the project limits shall have approved topsoil mix spread on them and be prepared for seeding and sodding by bringing ground surfaces to grades shown on the drawings. Planting pits and bed areas identified on the approved plans shall be prepared in accordance with the applicable DPR Landscape Standard details.
a. No seeding shall be done on frozen ground or when the temperature is

32F or lower. Refer to specification 329200, "Seeding and Sodding." Install erosion-control measures to prevent erosion or displacement of soils and discharge of soil-bearing water runoff or airborne dust to adjacent properties, sidewalks and areas.

b. Rototilling shall not be performed within the critical root zone of trees to be preserved.

c. The soil shall not be tilled or amended when the soil's moisture capacity is above field capacity or when the soil is frozen.

d. Contractor shall identify utilities, existing irrigation and underground utilities. All areas on either side of the utility marking shall be amended by hand.

e. Contractor shall verify that no foreign or deleterious material or liquid has been deposited in soil within a planting area.

f. Contractor shall proceed with installation only after both unsatisfactory conditions have been corrected and rough grading has been completed and approved by the Project Officer in coordination with the Landscape Architect or Urban Forester.

g. Contractor shall protect structures, utilities, sidewalks, pavements and other facilities, trees, shrubs and plantings from damage caused by planting operations.

    a. Protect adjacent and adjoining areas from hydro-seeding and hydro-mulching overspray.

    b. Protect grade stakes set by others until directed to move them.

h. Surfaces shall conform to finish grade, free of water retaining depressions, soil friable, free of clay and of uniformly firm texture.

B. Newly Graded Subgrades: Loosen subgrade to a minimum depth of 6 inches. Remove stones larger than 1/2 inch in any direction and sticks, roots, rubbish, and other extraneous matter including grass vegetation and turf and legally dispose of them off of Arlington County property. Do not mix into surface soil.

a. Thoroughly blend planting soil mix off-site before spreading or spread topsoil, apply soil amendments and fertilizer on surface, and thoroughly blend planting soil mix. Delay mixing amendments with soil if planting shall not proceed within 2 days.

b. Loosen surface soil to a depth of at least of 6 inches. Apply soil amendments and fertilizers according to planting soil mix proportions and mix thoroughly into top 4 inches of soil. Till soil to a homogeneous mixture of fine texture.

c. Spread planting soil mix to a depth of 4 inches but not less than required to meet finish grades after light rolling and natural settlement. Do not spread if planting soil or subgrade is frozen, muddy, or excessively wet.

C. Unchanged Subgrades: If lawns are to be planted in areas unaltered or undisturbed by excavating, grading, or surface soil stripping operations, prepare surface soil as follows:

a. Remove stones larger than 1/2 inch in any dimension and sticks, roots, trash, and other extraneous matter. Legally dispose them off of Arlington County property. Do not mix into surface soil

b. Loosen surface soil to a depth of at least 6 inches, apply soil amendments and fertilizers according to the planting soil mix proportion and mix thoroughly into the top 4 inches of soil.

D. Finish Grading: Grade landscape areas to a smooth, uniform surface plane with loose, uniformly fine texture. Grade to within plus or minus 1/2 inch of finish elevation. Adjust for the thickness of sod, where applicable. Roll and rake, remove ridges, and fill depressions to meet finish grades. Limit fine grading to areas that can be planted in the immediate future.

E. If bioretention areas are specified in the approved plans, the Contractor shall construct these areas in accordance with the Virginia DEQ Stormwater Design Specification No. 9, Version 2.0, January 1, 2013.

F. Contractor shall avoid unnecessary compaction of the soil during grading.

G. Contractor shall ensure appropriate slopes of the swales, berms and final grades.

H. Immediately following each day's work, contractor shall clean all dirt, excess soil, debris and trash from the site. Contractor shall protect and store additional soils in stockpiles protected from saturation, erosion, weed growth and contamination with plastic sheeting or tarps.

I. Amendments for seeding and sodding areas shall be applied after determining by soils test as follows:

a. Lime as specified shall be spread uniformly over designated area. Rate depends on soil tests. Soil tests shall be made before lime application at 8 to 10 plugs per acre taken by the method prescribed the United States Department of Agriculture.

b. Fertilizer shall be spread after the lime has been applied. Rate shall be as recommended per the soil tests.

c. Fertilizer shall be spread with approved equipment and at an even rate over the area to be seeded or sodded.

d. Work lime and fertilizer into top 4 inches of topsoil and grade to smooth surface ready for seeding.

J. Restore areas if eroded or otherwise disturbed after finish grading and before planting.

K. Prepared lawns and planting areas shall be inspected and approved by Project Officer in coordination with Landscape Architect prior to seeding, sodding or planting.

L. If the graded areas develop volunteer weed growth, the growth shall be eliminated at the expense of the Contractor.

3.02 SOIL STABILIZATION MATERIALS

A. Prepare planting area as specified.

B. Moisten prepared planting area before planting if surface is dry. Water thoroughly and allow surface to dry before planting. Do not create muddy soil.

C. Install Soil Stabilization from top of slope, overlapping joints by 12 inches, working downward, and as recommended by material manufacturer for site conditions. Fasten as recommended by material manufacturer.

D. Plant shrubs, trees and perennials through Soil Stabilization fabric by carefully separating fabric layers to allow space for planting.

E. Remove non-biodegradable stabilization materials after plant establishment.

PART 4 - MEASUREMENT AND PAYMENT

4.01 The measurement of PLANTING MIX to be paid for shall be per CUBIC YARD of planting mix in accordance with the plans, specifications and to the satisfaction of the Project Officer.

4.02 The unit price for PLANTING MIX shall include the cost of furnishing all labor, materials, equipment and incidental expenses, including but not limited to soil amendments, organic matter, and soil stabilization materials, necessary to complete the work, all in accordance with the plans, specifications and approval of the Project Officer.

4.03 The measurement of BIORETENTION SOIL MEDIA to be paid for shall be per CUBIC YARD of planting mix in accordance with the plans, specifications and to the satisfaction of the Project Officer.

4.04 If bioretention is explicitly called for in the approved plans, the unit price for BIORETENTION SOIL MEDIA shall include the cost of furnishing all labor, materials, equipment and incidental expenses, including but not limited to soil amendments, organic matter, and soil stabilization materials, necessary to complete the work, all in accordance with the plans, specifications and approval of the Project Officer.

4.05 The measurement of WOOD MULCH to be paid for shall be per CUBIC YARD of Mulch in accordance with the plans, specifications and to the satisfaction of the Project Officer.

4.06 The unit price for WOOD MULCH shall include the cost of furnishing all labor, materials, equipment and incidental expenses necessary to complete the work, all in accordance with the plans, specifications and approval of the Project Officer..

4.07 Unless otherwise specified on the project drawings, supplemental specifications or special conditions, excavation is considered incidental to the work and therefore no separate payments shall be made for excavation.

PART 1 - GENERAL

1.01 SUMMARY

A. The work includes, but is not limited to the provision of all material, services, labor, and equipment necessary to perform the following as required per the plans for the establishment of turf, meadow grasses and/or wildflowers:
   a. Seeding
   b. Sodding
   c. Hydro-seeding
   d. Plugging

B. Related Sections:
   a. Section 02200 – Earthwork
   b. Section 329100 – Planting Preparation
   c. Section 311300 – Tree Protection and Root Pruning
   d. Section 329300 – Exterior Plants
   e. Section 01500 – Erosion and Sediment Control and Pollution Prevention

C. In addition to the specifications contained herein, Work shall be performed in accordance with the:
   a. Drawings and general provisions of the contract, including general and supplementary conditions.
   b. Arlington County Department of Parks & Recreation (DPR) Design Standards as shown on the plans and available online on the Arlington County Website

1.02 DEFINITIONS

A. Finish Grade: Elevation of finished surface of planting soil.

B. Imported Topsoil: Soil obtained off-site that meets the specifications herein for topsoil and is suitable for use in planting soil/backfill soil mixture when existing soil quantities are insufficient. Refer to Section 329100 “Planting Preparation.”

C. Planting Soil/Backfill Soil Mixture: Existing soil modified as specified to be suitable for planting. Refer to Section 329100 “Planting Preparation.”

D. Subgrade: Surface or elevation of subsoil remaining after completing excavation, or top surface of a fill or backfill, before placing planting soil.

E. ISA: International Society of Arboriculture

F. CBAY: Chesapeake Bay, typically referring to CBAY watershed.

G. Urban Forester/County Urban Forester: Refers to the Arlington County Urban Forester

H. Landscape Architect: Refers to an Arlington County Landscape Architect or their designee.

1.03 SUBMITTALS

A. Samples of all materials shall be submitted to the Project Officer for approval with confirmation by the County Landscape Architect prior to delivery to site.

B. Contractor shall submit qualifications per section 1.04 “Quality Assurance” to Project Officer for approval.

C. Samples:

a. Seed Mix: Certification of grass seed including the botanical and common name, percentage by weight of each species and variety, and percentage of purity, germination, and weed seed. Include the year of production and the date of packaging.

b. Sod: Sod grower's name, together with substantiating information as to field location from which sod is to be cut and species, percent purity and mixture of grass sod to be applied. Samples or photos of sod mix may be requested in lieu of inspection.

c. Special Seed Mixes: Contractor shall submit product data per section 2.03.

1.04 QUALITY ASSURANCE

A. Contractor qualifications:

a. Evidence of completion of at least three (3) projects of similar nature and scope to this project completed within the last five (5) years that have resulted in successful turf and meadow establishment

b. Contractor shall be a member in good standing of either the Professional Landcare Network or the American Nursery and Landscape Association.

c. Experience: Three to Five years’ experience in turf installation.

B. Contractor shall maintain an experienced full-time supervisor on Project site when work is in progress.

PART 2 - PRODUCTS

2.01 MATERIALS

A. All materials shall conform to those stipulated below, unless otherwise approved in writing by the Project Officer with confirmation by the Landscape Architect.

B. Specified materials to be applied in amounts and methods herein stipulated.

C. Delivery tickets indicating date, weight, product data including all analyses for purity and other information as required herein, and vendor's name, to be submitted to Project Officer for approval.

2.02 SEED

A. Grass seed shall be fresh, clean, dry new crop seed complying with purity and germination requirements stipulated herein. All cultivars must be on the current "Virginia Turfgrass Variety Recommendations" or in the top 25 for transitional zone sites-overall of the latest National Turfgrass Evaluation Program (NTEP) as approved by Project Officer with confirmation by the Landscape Architect. The Turf-type Tall Fescue component shall be comprised of a minimum of two cultivars with each cultivar comprising neither less than 30 percent nor more than 70 percent of the blend. The use of K-31 Tall Fescue or Common Kentucky Bluegrass in the mix is prohibited. The mix shall have 2.5 percent maximum inert matter, 0.5 percent maximum crop seed, and 0.1 percent maximum weed seed and 0.0 percent noxious weed. The mix shall comply with the current Virginia Seed Law and Virginia Seed Regulations and approximate the following:

Kind of Seed	% by Weight	% Purity	% Germination
Turf-type Tall Fescue	80	97	85
Bluegrass	10	97	80
Perennial Ryegrass	10	97	90

B. Substitution of seed type or percent only on approval of Project Officer in coordination with Landscape Architect. Seed to be free of noxious weed seed.

2.03 SOD

Cultivated Grass Sod shall be certified and obtained from State Certified nurseries and have been grown on natural native mineral soils comparable to those afforded at the job site. Sod containing netting is not acceptable. Sod grower's information and sod information to be submitted for approval by Project Officer per section 1.03 "Submittals." Failure to obtain advance approval shall constitute grounds for rejection of all sod delivered to the site. Invoices for all sod to clearly state point of origin and have attached to them a facsimile of the Grower's Nursery Certificate issued by the U.S. Department of Agriculture or Certified Delivery Ticket per truckload. All grass sod shall meet the following basic requirements.

a. Sod shall be free of disease and soil borne insects.

b. Sod shall be free of clover, broadleaf weeds and noxious weeds. Sod considered free of such weeds if less than 2 such plants are found per 100 square feet of area.

c. Sod shall be of uniform color and density and contain:

Kind of Seed	% by Weight
Turf Type Tall Fescue	90
Kentucky Bluegrass	10

d. All cultivars must be on the current approved list of the Virginia Turfgrass Variety Recommendations and the sod shall be certified by the Virginia Sod Certification Program. Provide appropriate certifications at the time of installation.

e. Sod sample shall be submitted to and approved by Project Officer in coordination with the Landscape Architect before cutting. Sod placed on the job shall conform to the approved sample or shall be removed and replaced at the Contractor's expense.

f. Sod shall have been mowed prior to stripping and shall have been maintained for a minimum of three months.

g. Sod shall be relatively free of thatch. Thatch build up that significantly detracts from the appearance of the sod may be sufficient cause for rejection.

h. Sod shall be machine stripped at a uniform soil thickness of approximately ¾-inch. Measurement for thickness to exclude tip growth and thatch.

i. Individual pieces of sod shall be cut to supplier's standard width and length. Maximum allowable deviation from standard widths and lengths shall be 5%. Broken pads, torn or uneven ends shall not be permitted.

j. Root development shall be such that standard size pieces shall support their own weight and retain their size and shape when suspended vertically from a firm grasp on uppermost 10% of the area.

k. Under moderate moisture conditions, weight shall not exceed 7 pounds per square foot. Minimum weight shall not be less than 4 lbs. per square foot.

2.04 SPECIALTY SEED (WILFLOWERS, BIORETENTION, and/or REFORESTATION)

A. When specialty seed is explicitly specified in approved plans, and unless otherwise indicated, the specialty seed mix shall be as follows:

a. Virginia Northern Piedmont Riparian Mix variation. Fresh, clean and dry new weed, of mixed species as follows:

i. 22% River Oats, PA/VA Ecotype (Chasmanthium latifolium)

ii. 15% Indiangrass, PA Ecotype (Sorghastrum nutans)

iii. 15% Virginia Wildrye, PA Ecotype (Elymus virginicus)

iv. 10% Beaked Panicgrass, VA Ecotype (Panicum anceps)

v. 10% Big Bluestem, 'Niagara' (Andropogon gerardii)

vi. 10% Switchgrass (Panicum virgatum 'Shelter')

vii. 10% Autumn Bentgrass, PA ecotype (Agrostis perannans)

viii. 8% Mistflower, VA Ecotype (Eupatorium coelestinum)

b. Seed carrier: Inert material, sharp clean sand mixed with seed at a ratio of not less than two parts seed carrier to one part seed.

B. Contractor shall supply the germination test results and the percent purity of the seeds upon delivery to the site to the Project Officer. All seed shall be cleaned, processed, analyzed for purity, stored, and germination tested before being used. Every seed variety contains different germination rates and requirements.

C. Execution:

a. Sow seed with spreader or seeding machine. Do not broadcast or drop seed when wind velocity exceeds 5 mph. Evenly distribute seed by sowing equal quantities in two directions at right angles to each other.

b. Brush seed into top 1/8 inch of soil, roll lightly and water with light spray.

c. Protect seeded areas by applying compost mulch within 24 hours after completing seeding operations. Soak areas, scatter mulch uniformly to a thickness of 3/16 inch and roll surface smooth.

d. Water newly planted areas and keep moist until established.

2.05 SOILS & SOIL AMENDMENTS

A. Refer to Section 329100 "Plant Preparation" soils and soil amendment specifications.

2.06 MULCHES/ ORGANIC MATTER

A. Refer to Section 329100 "Plant Preparation" for mulch specifications.

2.07 SOIL STABILIZATION/EROSION CONTROL FABRIC

A. Refer to Section 329100 "Plant Preparation" for specifications.

PART 3 - EXECUTION

3.01 PREPARATION

A. Refer to Section 329100 "Plant Preparation" for specifications.

3.02 SEEDING - GRASS

A. All areas within the project limits that are not shown for paving, sodding, or special treatment shall be seeded with the specified seed mix.

B. Seeding shall take place between August 15th and October 15th or between March 15th to May 15th. Approval from Project Officer/Landscape Architect shall be required before seeding is to begin.

C. Use 4" of prepared topsoil as base for areas to be seeded.

D. No seeding shall be done during windy weather (winds over 5 mph) or when ground is wet or otherwise non-tillable. No seed shall be done on frozen ground or when the temperature is 32 or lower.

E. Seed shall be uniformly distributed by hydro-seeding methods as specified:

a. Slurry

i. Seed as specified at a rate of 350 lbs./acre.
ii. Mulch: virgin wood fiber type applied at a rate of 1200 lbs./acre.
iii. Tackifier: Guar type or approved equal applied at a rate of 40 lbs./acre.
iv. Fertilizer: 19-19-19 granular applied at a rate of 500 lbs./acre.
v. Lime: Flowable liquid lime at a rate of 5 gallons per acre.
vi. Dye: Slurry must be green with dye added if not included with the mulch.
vii. Application rate: 3000 gallons per acre. Agitation must be maintained throughout mixing and application.
viii. Slurry shall be applied within 8 hours of the start of mixing.
ix. In lieu of hydro-seeding, seed may be drilled or an alternate method may be used. If an alternate method is used, seeding shall have to be run in two directions. The second direction

being at right angles to the first direction. Requests for using alternate methods shall be approved by the Project Officer prior to application of seed.

x. Sow seed at the rate of 5 to 8 lb/1000 sq. ft.

xi. Rake seed lightly into top 1/8 inch of topsoil, roll lightly, and water with fine spray.

xii. Protect seeded areas with slopes not exceeding 6:1 by spreading straw mulch. Spread uniformly at a minimum rate of 2 tons/acre to form a continuous blanket 1-1/2 inches in loose depth over seeded areas. Spread by hand, blower, or other suitable equipment.

xiii. Areas indicated on plan or exceeding 6:1 slope shall be protected with erosion control fabric, jute mat, or similar slope protection, installed according to manufacturer's written instruction, and/or as approved by the Project Officer.

3.03 SODDING

A. All sod shall be transplanted within 24 hours from the time it is harvested unless stacked at its destination in a manner satisfactory to the Project Officer. Do not lay down if dormant or if the ground is frozen or muddy.

B. All sod in stacks shall be kept moist and protected from exposure to air and sun and from freezing. Any sod permitted to dry out may be rejected whenever, in judgment of Project Officer, its survival after placing is doubtful. No payment shall be made for rejected sod. In any event, no more than forty-eight hours shall lapse between cutting and planting of sod is permitted.

C. Before placing or depositing sod upon any surfaces, all shaping and redressing of such surfaces as described under Seeding Soil Preparation shall be completed. The bed area for sod shall be dug out so that when the sod is installed the adjacent soil shall be flush with the top of the sod root mat. Areas shall be watered lightly before the placing of sod; sod shall not be placed on dry surfaces. Completed areas to be sodded shall be a smooth, uniform, well-tilled surface true to line and cross section. Any raking required shall be done immediately prior to placement of the sod at no additional cost to Owner.

D. No sod shall be placed at any time temperature is below 32 degrees Fahrenheit. No frozen sod shall be used and no sod shall be placed upon frozen, powder dry or excessively wet soil.

E. Use 4" of prepared topsoil as base for areas to be sodded.

F. Sod shall be lifted from trucks or storage piles by hand and placed with closed joints and no overlapping. All cracks, seams and voids shall be closed with small pieces of sod. After laying sod shall be sprinkled thoroughly and then tamped. "Tamping" consists of firmly closing seams between strips by use of hand tampers

or approved rollers. All sod shall be thoroughly rolled after closing all seams. Correct any slipping of sod.

G. Adequate water and watering equipment must be on hand before sodding begins and sod shall be kept moist until root system adheres to original seed bed and becomes established and accepted by Project Officer.

H. Sod shall be laid with long edges parallel to contours, except in swales or ditches where it shall be placed perpendicular to the flow line. Only sod placed in swales or ditches shall be staked using 2 stakes per roll of sod. Stakes shall be wood wedges ½" x 1" x 12". Successive strips to be neatly matched and all joints staggered. Sod shall be laid in all areas indicated on landscape plans.

3.04 REFORESTATION

A. Prepare planting area per the specifications.

B. Reforestation process:

a. Reforestation seed mix shall be applied prior to installation of Erosion Control Fabric. Rake seed lightly into the top 1/8 inch of soil, roll lightly and water with fine spray.

i. Do not use wet seed or seed that is moldy or otherwise damaged.

ii. Do not seed against existing trees or vegetation to remain within reforested area limits.

iii. Top dress seed by applying composted mulch within 24 hours after seeding operation. Soak areas, scatter mulch uniformly to a thickness of 1/2 inch and roll surface smooth.

b. Install erosion control fabric from top of slope, overlapping joints by 12 inches, working downward, and as recommended by material manufacturer for site conditions. Fasten as recommended by material manufacturer.

c. Moisten prepared planting area before planting if surface is dry. Water thoroughly and allow surface to dry before planting. Do not create muddy soil.

d. Plant shrubs, trees and perennials through erosion control fabric by carefully separating fabric layers to allow space for planting.

C. Remove non-degradable erosion-control measures after grass establishment period.

3.05 PROTECTION

A. Install post and rope barriers around seeded areas. Tie cloth or ribbon to rope at 10' intervals.

B. Install "KEEP OFF LAWN" signs at appropriate locations.

C. Remove non-biodegradable erosion control measures after plant establishment period.

3.06 MAINTENANCE

A. Maintain surfaces and supply additional topsoil where necessary, including areas affected by erosion.

B. Water to ensure uniform seed germination and to keep surface of soil damp:

a. Each watering shall consist of 1 gallon per 3 sq. yd. of seed or sod

b. Apply water slowly so that surface of soil shall not puddle and crust

C. Cut lawn areas when grass reached height of 3". Maintain minimum height of 2". Do not cut more than 1/3 of blade at any one mowing.

D. After first mowing of lawn, water grass sufficiently to moisten soil from 3" to 5" deep.

E. Reseed damaged grass areas showing root growth failure, deterioration, bare or thin spots and erosion.

3.07 GUARANTEE

A. The Contractor shall be responsible for maintaining all sodded and seeded areas in a healthy, vigorous condition in accordance with Section 3.05 "Maintenance" at his/her own expense until all contracted work is completed and accepted by Project Officer with confirmation by the Landscape Architect or Urban Forester.

B. The Contractor shall, at his own expense, replace any seed or sod which has died or been damaged during the establishment period.

C. Cost of seed and sod shall be withheld from final payment until final approval is given by Project Officer.

3.08 ACCEPTANCE

A. Seeded areas shall be accepted when an even, healthy, close and uniform stand of turf, 3" tall, free of weeds and surface irregularities, with coverage exceeding 90 percent over any 10sq. ft. and bare spots not exceeding 4 by 4 inches is properly established. Bare spots in excess of 4" shall be re-seeded at a rate per section 3.02 of this specification.

B. Sodded areas shall be accepted provided all requirements, including maintenance, have been complied with and sod is well established in a healthy, vigorous growing condition. Reestablish lawns that do not comply with requirements and continue maintenance until lawns are satisfactory.

C. Upon completion, all debris and waste material resulting from seeding/sodding/mulching activities shall be removed from the project area and legally disposed of. Any damaged areas shall be restored to their original condition.

D. Upon acceptance by Project Officer at Final Completion, Arlington County shall assume all lawn maintenance responsibilities.

PART 4 - MEASUREMENT AND PAYMENT

4.01 The measurement of SEEDING to be paid for shall be per SQUARE YARD of seeded grass in accordance with the approved plans and specifications.

4.02 The unit price for SEEDING shall include the cost of furnishing all labor, materials, equipment and incidental expenses necessary to complete the work, including but not limited to erosion control, topsoil, mulch, protection and maintenance, all in accordance with the approved plans and specifications.

4.03 The measurement of SPECIALTY SEEDING to be paid for shall be per SQUARE YARD of reforestation seed mix in accordance with the approved plans and specifications.

4.04 The unit price for SPECIALTY SEEDING shall include the cost of furnishing all labor, materials, equipment and incidental expenses necessary to complete the work, including but not limited to erosion control, topsoil, mulch, protection and maintenance, all in accordance with the approved plans and specifications.

4.05 The measurement of SOD to be paid for shall be per SQUARE YARD of sod installed in accordance with the approved plans and specifications.

4.06 The unit price for SOD shall include the cost of furnishing all labor, materials, equipment and incidental expenses necessary to complete the work, including but not limited to erosion control, protection and maintenance, all in accordance with the approved plans and specifications.

4.07 Unless otherwise specified on the project drawings, supplemental specifications or special conditions, excavation is considered incidental to the work and therefore no separate payments shall be made for excavation.

1.01 SUMMARY

PRODUCT DATA SHEET 4 - This Section includes trees, shrubs, groundcover, bulbs, and perennial plants.

PRODUCT DATA SHEET 5 - Provide all labor, materials, tools and equipment as required to have plants, topsoil, amendments, mulch and seed and/or sod applied on all areas called for on the approved plans.

PRODUCT DATA SHEET 6 - Related Sections:

a. 02200 Earthwork

b. 329100 Planting Preparation

c. 311300 Tree Protection and Root Pruning

d. 01500 Erosion and Sediment Control and Pollution Prevention

e. 329200 Seeding and Sodding

PRODUCT DATA SHEET 7 - In addition to the specifications contained herein, Work shall be performed in accordance with the:

a. Drawings and general provisions of the contract, including general and supplementary conditions

b. Arlington County Department of Parks & Recreation Design Standards as shown on the plans and available online at:

http://parks.arlingtonva.us/design-standards/

1.02 DEFINITIONS

A. Finish Grade: Elevation of finished surface of planting soil.

B. Imported Topsoil: Soil obtained off-site that meets the specifications herein for topsoil and is suitable for use in planting soil/backfill soil mixture when existing soil quantities are insufficient. Refer to Section 329100 “Planting Preparation.”

C. Planting Soil/Backfill Soil Mixture: Existing soil modified as specified to be suitable for planting. Refer to Section 329100 “Planting Preparation.”

D. Subgrade: Surface or elevation of subsoil remaining after completing excavation, or top surface of a fill or backfill, before placing planting soil.

E. ISA: International Society of Arboriculture

F. CBAY: Chesapeake Bay, typically referring to CBAY watershed.

G. Urban Forester/County Urban Forester: Refers to the Arlington County Urban Forester

H. Landscape Architect: Refers to an Arlington County Landscape Architect or their designee.

1.03 SUBMITTALS

A. All submittals specified in Section 329100 "Planting Preparation" shall be provided to Project Officer for approval with confirmation by Landscape Architect or Urban Forester. All approvals shall be in writing.

B. Product Certificates: Contractor shall submit for each type of manufactured product, to be approved by the Project Officer and complying with the following:

a. Manufacturer's certified analysis for standard products.

C. Refer to Section 329100, "Planting Preparation" for soil test requirements.

D. Contractor shall submit State Nursery inspection certificates to the Project Officer.

E. Contractor shall submit to Project Officer the verification of Landscape Industry Certified Technician and Landscape Industry Certified Officer certificates for those responsible for plant installation.

F. Planting Schedule: Contractor shall submit the planting schedule to the Project Officer for approval with confirmation by the Landscape Architect or Urban Forester. The plant schedule shall indicate anticipated planting dates for exterior plants. Contractor shall be responsible for furnishing and installing all plant material shown on the drawings and plant list, as submitted with the contract. Contractor shall have investigated the sources of supply and satisfied himself/herself that he/she can supply all of the plants specified on the drawings in the size, variety, quantity and quality noted before submitting the bid. Failure to take this precaution shall not relieve the successful bidder from the responsibility of furnishing and installing all of the plant material in strict accordance with the contract documents.

G. Substitutions:

a. The Contractor shall submit a written request for a substitute plant a minimum of forty-five (45) calendar days prior to planting date if specific plants shall not be available in time for the scheduled planting. Contractor shall submit the request to the Project Officer for approval with confirmation by the Landscape Architect or Urban Forester.

b. Contractor shall be responsible for documenting any plant suitability or availability problems.

c. If a substitute plant is offered to the County, it shall be of the same size, value and quality as the plant originally specified on the plan, as determined by the Project Officer in coordination with the Landscape Architect or Urban Forester. If the County does not accept the substitute plant, the Contractor shall provide the type

and size of plant material specified on the plans, or a substitute requested by the Project Officer in coordination with the Landscape Architect or Urban Forester.

H. Maintenance Instructions: Contractor shall submit to the Project Officer recommended procedures for maintenance of exterior plants during a calendar year. Submit before end of required maintenance periods.

1.04 QUALITY ASSURANCE

A. Installer Qualifications:

a. Contractor shall designate a project crew leader who possesses one or more of the following certifications:

i. Certified by the Professional Landcare Network (PLANET) as a "Landscape Industry Certified Technician"

ii. Certified by the Professional Landcare Network (PLANET) as a "Landscape Industry Certified Officer"

b. The Contractor shall identify to the Project Officer at least one full-time on-site supervisor who is the Contractor's competent, qualified, and authorized person on the worksite and who is, by training or experience, familiar with the policies, regulations and standards applicable to the work being performed, and capable of sufficiently communicating with the Project Officer.

c. Crew leader and supervisor may be the same individual.

B. Installer Qualifications for Reforestation Projects (required only if approved plans specify reforestation, afforestation or streambank restoration):

a. ISA Certified Arborist shall be on the worksite during planting of reforested areas.

b. Demonstrate experience in Reforestation/Afforestation and Stream-Bank Stabilization projects through:

i. Project portfolio detailing a minimum of three (3) successfully completed reforestation/afforestation/streambank restoration projects in the CBAY watershed area over the past three years.

c. The County shall, throughout the contract term, have the right of reasonable rejection and approval of staff or subcontractors assigned to the project by the Contractor. If the County reasonably rejects staff or subcontractors, the Contractor shall provide replacement staff or subcontractors satisfactory to the County in a timely manner and at no additional cost to the County. The day-to-day supervision and control of the Contractor's employees, and any employees of any of it subcontractors, shall be solely the responsibility of the Contractor.

C. Topsoil Analysis: Furnish soil analysis by a qualified soil-testing laboratory. Comply with requirements in Section 329100, “Planting Preparation.”

D. Provide quality, size, genus, species, and variety of exterior plants indicated, complying with applicable requirements in the most current version of ANSI Z60.1, "American Standard for Nursery Stock." Plants shall be nursery grown stock and conform to the requirements described in the most current issue of the American Standard for Nursery Stock (ANSI) published by the American Nursery and Landscape Association. The Project Officer with confirmation by the Landscape Architect or Urban Forester may reject any non-conforming stock and has the option to field-select plant materials prior to purchasing.

E. Collected material may be used only when approved by Project Officer with confirmation by Arlington County Urban Forester and/or DPR PNR Natural Resource Manager

F. Nomenclature shall be in accordance with *Hortus III*, by L.H. Bailey. All trees and shrubs shall be labeled with a securely attached, waterproof tag bearing legible designation of botanical and common name. Perennials and groundcovers shall be clearly identified with a waterproof tag bearing legible designation of botanical and common name within the container.

G. Pre-installation Conference: Conduct conference at Project site with Project Officer, Arlington County Urban Forester and/or Department of Parks and Recreation (DPR) representative or County Landscape Architect.

H. Urban Forester Notification: Notify the Project Officer at least 72 hours prior to commencement of tree planting operations, so that the County’s Urban Forester can be present on-site to observe the work.

I. The Contractor shall provide a minimum of seven (7) business days’ notice to the Project Officer prior to installing the plant material (this is not the same as inspection notification).

J. At the request of the Project Officer in coordination with the Urban Forester or Landscape Architect, the Contractor shall supply information specifying the provenance of the plant material. Provenance is the geographical origin of the seed or cutting used in propagation and can have a direct effect on plant vigor and survivability.

K. Inspections:

a. Urban Forester may perform periodic inspections to check on tree plantings.

b. Contractor shall arrange a meeting on site with the Project Officer in coordination with the Urban Forester and/or Landscape Architect to perform final inspection of plantings. Refer to section 1.07 “Final Inspection.”

1.05 WORKMANSHIP

B. Any tree pruning shall conform to the most current version of ANSI A-300 Standard Practices for Trees, Shrubs, and Other Woody Plant Maintenance. Do not prune trees and shrubs before delivery.

C. Protect bark, branches, and root systems from sun-scald, drying, sweating, whipping, and other handling and tying damage. Do not bend or bind-tie trees or shrubs in such a manner as to destroy their natural shape. Provide protective covering of exterior plants during

delivery. Do not drop exterior plants during delivery. Plants shall not be bound with wire or rope at any time so as to damage the bark or break branches. Plants shall be handled from the bottom of the root ball only.

D. All plants in transit shall be tarped or covered and shall be kept from drying out. Desiccation damage shall be cause for rejection. Plants damaged in handling or transportation may be rejected by the Project Officer with confirmation by the Urban Forester/Landscape Architect. Any tree or shrub found to have wounds over 12.5% of the circumference of any limb or trunk, or over 1 inch in any direction, whichever is smaller, shall be rejected.

E. Deliver exterior plants after preparations for planting have been completed and install immediately. If planting is delayed more than six hours after delivery, set exterior plants trees in shade, protect from weather and mechanical damage, and keep roots moist. Plants shall not remain unplanted for longer than a three-day period after delivery. Any plants not installed during this time period shall be rejected, unless Project Officer and contractor provide otherwise by written agreement. All plants kept on site for any period of time shall be watered and cared for using ANSI A300 standards.

F. Plants shall be installed immediately following excavation of the hole. No holes shall remain open overnight. The Contractor shall cover and barricade any open holes to effectively prevent any danger of injury to pedestrians.

G. During delivery and installation, the landscape contractor shall perform in a professional manner, coordinating his/her activities so as not to interfere with the work of other trades, and leaving his/her work area(s) clean of litter and debris at the close of each workday.

H. During planting, all areas shall be kept neat and clean, and precautions shall be taken to avoid damage to existing plants, trees, turf and structures. Where existing trees are to be preserved, additional precautions shall be taken to avoid unnecessary accumulation of excavated materials, soil compaction, or root damage. The Contractor shall cover sidewalks or pavers with plywood, and cover turf with plywood, burlap or tarp during excavation.

I. Any damaged areas caused by the Contractor shall be restored to their original condition at no cost to the County. All debris and waste material, including small stones and clumps of clay or dirt exceeding 1” by 1” in any direction, resulting from planting operations shall be removed from the project, legally disposed, and the area cleaned up by the Contractor.

J. Plants with soil covering the root flare, if not removed by Contractor, shall be rejected by Project Officer with confirmation by Landscape Architect or Urban Forester.

K. Contractor shall take full responsibility for any cost incurred due to damage of utilities by their operations.

L. The Contractor shall not be held responsible for uncommon concealed conditions such as concrete/asphalt/stone spoils encountered in excavation work which are not apparent at the time of bidding. Rocks, tree roots and hard clay are common elements of “urban” soils and shall frequently be encountered in the execution of the contract.

M. No plants shall be planted in locations where drainage may, in the opinion of the Contractor, be unacceptable. Such situations shall be brought to the attention of the Project Officer before work continues and, if deemed necessary by the Project Officer with confirmation by the Landscape Architect/Urban Forester, the plants shall be relocated or the contract shall be modified to allow for drainage correction at a negotiated cost. Any such modification shall be in writing and signed by both parties.

N. The Contractor shall layout plants according to the project's landscape plan. The Project Officer shall approve the layout with confirmation by the Landscape Architect prior to plant installation. Plants installed without layout approval from the Project Officer with confirmation by Landscape Architect are subject to removal and replanting by the Contractor at no additional cost to Arlington County.

1.06 WATER REQUIREMENTS

A. Initial Waterings: The Contractor shall supply water for all plantings and shall water all plants at time of installation and 48 hours after installation, even if it is raining. Contractor shall then water plantings at least twice per week at amounts specified below until final acceptance of work.

B. Each watering shall consist of:

a. 20 gallons per individual tree

b. 4 gallons per individual shrub

c. 1 gallon per 1 sq. yd. of shrub or perennial bed

d. 1 gallon per 3 sq. yd. of seed or sod

C. Once final acceptance is completed, Contractor shall have no obligation to water all plantings and the one (1) year planting warranty

1.07 FINAL INSPECTION

A. Contractor shall schedule the final inspection with the Project Officer in coordination with the Urban Forester and/or Landscape Architect.

a. Contractor shall notify Project Officer at least one week in advance to arrange final inspection meeting with the Urban Forester and/or Landscape Architect.

b. Contractor shall conduct the final inspection of the landscape materials no less than three months after the installation of the plants or substantial completion of construction work, whichever comes last, and in the presence of the Project Officer, the Urban Forester and/or Landscape Architect.

c. The landscaping inspection shall review all landscape work under the contract.

d. All plants shall be alive and in good health at the time of final inspection.

e. Any plant material that is 25% dead or more shall be considered dead and shall be replaced at no charge to the County. A tree shall be considered dead when the main leader has died back, or 25% of the crown is dead.

f. It shall be the Contractor's responsibility to provide in writing the results of this inspection.

g. The Contractor shall make replacements during the next planting period unless the County specifies an earlier date.

h. The replacement plants shall be reviewed for final acceptance no less than three months after installation. Contractor is responsible for maintenance and watering of replacement material per Section 1.06 and Section 1.08 after planting and until the replacement plantings are finally accepted by Project Officer.

i. A replacement plant shall be of the same size as the original plant with no additional soil additives to be used.

j. The Contractor shall not be responsible for plants that have been damaged by vandalism, fire, removal or other activities beyond the control of the Contractor.

1.08 MAINTENANCE

A. Trees, Shrubs, Perennials, Bulbs & Groundcovers: Contractor shall maintain plantings at his/her own expense until final acceptance of the plantings as specified herein section 1.07.

B. Maintenance shall include pruning, mulching, cultivating, watering, weeding, fertilizing, tightening and repairing stakes and guy supports, and resetting to proper grades or vertical position, as required to establish healthy, viable plantings.

C. Pruning: Remove all sucker growth, dead or broken branches at initial planting and as needed during the warranty period. Pruning shall conform to ANSI-300 Tree Pruning Standards.

D. Fertilizing: No plants shall be fertilized without prior approval of Project Officer with confirmation by the Urban Forester or Landscape Architect.

E. Mulching: Contractor shall re-mulch areas to a depth of two to three inches prior to final acceptance if the time between planting and final acceptance extends beyond six months. Mulch shall be of the same quality as mulch provided at the time of planting. Keep mulch six-inches away from trunks of trees and shrubs.

F. Weeding: Contractor shall perform weeding until final acceptance to keep the planting area as free of weeds as possible. A minimum of one weeding per month from April through October is required if time between planting and final acceptance extends through any months of the growing season.

G. Stakes and Guy Supports: If installed, Contractor shall monitor and adjust all stakes and guy supports until final acceptance.

PART 2 - PRODUCTS

2.01 EXTERIOR PLANTS

PRODUCT DATA SHEET 0 - Contractor shall select plants only from nurseries that have been inspected by state or federal agencies and shall have been grown in USDA Plant Hardiness Zones 4, 5, 6, or 7, and in one of the following states: Maryland, Virginia, Delaware, New Jersey, North Carolina or Pennsylvania.

PRODUCT DATA SHEET 1 - Tree and Shrub Material: Furnish nursery-grown trees and shrubs complying with ANSI Z60.1, with healthy root systems developed by transplanting or root pruning. Provide well-shaped, fully branched, healthy, vigorous stock free of disease, insects, eggs, larvae, and defects such as knots, sun-scald, injuries, abrasions, and disfigurement.

a. Provide balled and burlapped, bare root or container-grown trees and shrubs, as indicated on the Drawings.

b. Balled and Burlapped (B&B) plants shall be dug with firm root balls of earth and free of noxious weeds. There shall be no extra soil on top of the root ball or around the trunk. Balled and burlapped trees shall be securely held in place by untreated burlap and stout rope. Nylon rope is NOT acceptable. Loose, broken or manufactured balls are unacceptable.

c. Ball sizes shall be in accordance with current ANSI standards.

d. In size-grading B&B single stem trees, caliper shall take precedence over height. For multiple-trunk trees, height measurement shall take precedence over caliper.

e. Trees over 1” in caliper shall have a strong central leader (free and clear of branches or splits in the trunk) from the top of the root ball to a height of at least 6’-6”. Only minimal bends in the trunk shall be acceptable. Co-dominant stems and V-crotches shall be cause for rejection.

f. The root system of container-grown plants shall be well developed and well distributed throughout the container.

g. All container-grown trees and shrubs that have circling and matted roots shall be rejected.

PRODUCT DATA SHEET 2 - Perennials: Provide healthy, container-grown plants with well-developed, fibrous root systems from a commercial nursery, of species and variety shown in the Drawings. All container grown plants shall be healthy, vigorous, well rooted and established in the container in which they are growing. A container grown plant shall have a well-established root system reaching the sides of the container to maintain a firm root ball, but shall not have excessive root growth outside the container.

PRODUCT DATA SHEET 3 - Bulbs: Provide top size bulbs as indicated on plan in accordance with most current version of ANSI A60 specification.

PRODUCT DATA SHEET 4 - Field grown trees and shrubs shall be grown in soils of the Piedmont region, or west of that region in the above approved states and zones.

F. All plant materials shall be labeled by grower to identify genus, species, and cultivar, if applicable, in accordance with Section 1.04 "Quality Assurance," above.

G. Bare root plant materials: Bare root plants shall be dug with adequate fibrous roots. Do not root prune. Roots shall be protected during handling and planting to guard against drying out and damage.

H. Plant Materials for ecologically sensitive areas: Plant materials identified on planting plan as being located within an Arlington County Natural Resource Conservation Area (NCRA) shall be native species of local provenance.

a. Plant stock shall originate from a location within 150 miles of Arlington County.

2.02 OTHER MATERIALS

A. Refer to Section 329200 "Seeding and Sodding" for specifications for seeding, specialty seeding, sodding, and soil stabilization/erosion control fabric.

B. Refer to Section 329100 "Planting Preparation" for specifications for soils, mulch, soil amendments and other items related to planting preparation.

PART 3 - EXECUTION

3.01 EXTERIOR PLANTING

A. Contractor shall install plant materials in accordance with the current Arlington County Standard Planting Details as published on the Arlington County website and as specified below.

B. Refer to Section 329100 "Planting Preparation" for specifications on soil amendments.

a. Remove existing sod, turf, weeds or other plant material.

b. Rototill subgrade of planting beds to a minimum depth of 8 inches with the addition of 3 inches organic material. Edge and rake the entire planting bed.

c. Remove stones, clods, debris, sticks, roots and other foreign or extraneous matter larger than 1/2 inch in any dimension. Contractor shall legally dispose of them off Arlington County property.

d. Thoroughly blend planting soil mix off-site before spreading or spread topsoil, apply soil amendments and fertilizer on surface, and thoroughly blend planting soil mix.

e. Spread planting soil mix to a depth of 8 inches but not less than required to meet finish grades after natural settlement. Do not spread if planting soil or subgrade is frozen, muddy, or excessively wet.

f. Finish Grading: Grade planting beds to a smooth, uniform surface plane with loose, uniformly fine texture. Roll and rake, remove ridges, and fill depressions to meet finish grades.

g. Planting operations shall be performed during periods within the planting season when weather and soil conditions are suitable and in accordance with accepted local practice. Plants shall not be installed in top soil that is in muddy or frozen condition. **Lawns, trees and shrubs shall be installed between 03/15 and 06/15**

h. **or between 09/15 and 12/01.** If a project completion is outside of this planting period, contact the Arlington County Urban Forester to obtain a deferral or approval for planting out of season.

C. Plant Layout

a. The Contractor shall layout and space plants according to the project landscape plan.

b. When the layout is complete, the Contractor shall notify the Project Officer for approval with confirmation by the Landscape Architect prior to installation of the plants.

D. Landscape Plantings (Trees, Shrubs, Ground Covers and Perennials)

a. Contractor shall install plantings in accordance with Arlington County DPR standard details available online on the Arlington County Website. Refer to plans for appropriate planting details.

b. Handling: Prepare pit and/or planting bed per standards. Place plant in pit by carrying by the root ball (not by branches or trunk) and plant per the DPR Standards. Make sure the plant remains plumb during the backfilling procedure.

E. Tree and Shrub Pruning: **Contractor shall conform to the most current version of ANSI A-300 Tree Pruning Standards. Do not cut tree leaders; remove only injured or dead branches from trees and shrubs, or those that pose a hazard to pedestrians.** Make all cuts back to a lateral branch or bud. Cuts should be perpendicular above branch collar. Final pruning shall be done after the tree is in place. Do not prune into old wood on evergreens.

F. Plant Protection: Contractor shall protect exterior plants from damage due to landscape operations, operations by other contractors and trades, and others. Maintain protection during installation and maintenance periods. Treat, repair, or replace damaged exterior planting. Injured roots shall be pruned to clean ends before planting with clean, sharp tools per most current ANSI 300 specifications.

a. Protect shrubs, groundcovers and perennials from hot sun and wind; remove protection if plants show evidence of recovery from transplanting shock.

G. Contractor shall remove all tags, labels, strings and wire from the plants, unless otherwise directed.

H. Contractor shall remove surplus soil and waste material, including excess subsoil, unsuitable soil, trash, and debris, and legally dispose of them off of Arlington County property.

I. Refer to Section 1.06 'Water Requirements.'

3.02 STAKING & GUYING TREES

A. Contractor shall stake and guy trees only if required by Urban Forester.

B. If staking and guying is required, the Contractor shall provide and install stakes and guying in accordance with DPR standard staking details for deciduous and evergreen trees.

PART 4 – MEASUREMENT AND PAYMENT

4.01 The measurement of PLANT to be paid for under this item shall be the number of EACH type of furnished and installed plant in accordance with the approved plans and specifications.

4.02 The unit price for each PLANT shall include the cost of all labor, materials, and other expenses necessary to complete the work, including but not limited to required waterings (at time of planting and second watering for each plant 48 hours after installation), and maintenance and watering necessary to keep plants healthy until final acceptance as described herein, in accordance with the approved plans and specifications.

4.03 When explicitly specified in plans, the measurement of STAKING AND GUYING to be paid for under this item shall be the number of EACH to furnished and installed at individual trees in accordance with the approved plans and specifications.

4.04 The unit price for STAKING AND GUYING shall include the cost of all labor, materials, and other expenses necessary to complete the work in accordance with the approved plans and specifications.

4.05 Unless otherwise specified on the project drawings, supplemental specifications or special conditions, excavation is considered incidental to the work and therefore no separate payments shall be made for excavation.