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ITEM 1010

PROJECT REQUIREMENTS

PART 1 - GENERAL

2.01 WORK COVERED BY CONTRACT DOCUMENTS:

A. The Work of Project is defined by the Contract Documents and generally consist of the following:

1. Stabilize the stormwater outfall and stream by placing riprap downstream and behind the endwall for the 72-inch reinforced concrete pipe (RCP), as well as placing a stone façade on the endwall.

2. Stabilize the stormwater outfall and stream by replacing the 36-inch RCP with a new cast-in-place endwall, following Virginia Department of Transportation (VDOT) Standards.

3. Stabilize approximately 265 linear feet (LF) of the riverbank with a combination of stabilization measures including boulder cascades and streambank grading.

4. Install concrete encasements for two sanitary sewer pipe crossings and install boulder cascade downstream to tie into existing stream elevation.

5. Protect sanitary sewer manhole by demolishing existing concrete apron and installing Class III riprap.

6. Place riprap and coir fiber matting slope stabilization where required to stabilize streambank slope.

7. Provide all erosion and sediment control measures and sediment controls as indicated or specified and as required by the Virginia Department of Environmental Quality (DEQ).

8. Install all associated work as required.

B. Project will be constructed under a single prime contract.

2.02 WORK RESTRICTIONS:

A. Normal construction activity shall take place only between the hours of 7 a.m. to 6 p.m., excluding Saturdays, Sundays, and legal holidays. Work outside the above time periods will be permitted only on an emergency basis and only with the written approval of the City.

2.03 CARE AND PROTECTION OF PROPERTY:

A. The Contractor shall be responsible for the preservation of all public and private property, and shall use every precaution necessary to prevent damage thereto. If any direct or indirect damage is done to public or private property by or on account of any act, omission, neglect, or misconduct in the execution of the work on the part of the Contractor, such property shall be restored by the Contractor, at his expense, to a condition similar or equal to that existing before the damage was done, or he shall make good the damage in other manner acceptable to the City.

2.04 PROTECTION AND RELOCATION OF EXISTING STRUCTURES AND UTILITIES:

A. The Contractor shall assume full responsibility for the protection of all structures and utilities, public or private, including headwalls, vaults, piping, and video cables, whether or not they are shown on the Drawings. The Contractor shall carefully support and protect all such structures and utilities from injury of any kind. Any damage resulting from the Contractor's operations shall be repaired by him at his expense.

2.05 TEMPORARY UTILITIES:

A. Provide temporary utilities needed for the work including, but not necessarily limited to, sanitary facilities.

2.06 CLEANUP AND DISPOSAL OF EXCESS MATERIAL:

A. During the course of the work, the Contractor shall keep the site of his operations in as clean and as neat a condition as is possible. He shall dispose of all residue resulting from the construction work and, at the conclusion of the work, he shall remove and haul away any surplus materials, lumber, equipment, temporary structures, and any other refuse remaining from the construction operations, and shall leave the entire site of the work in a neat and orderly condition.

B. In order to prevent environmental pollution arising from the construction activities related to the performance of this Contract, the Contractor and his subcontractors shall comply with all applicable Federal, State, and local laws, and regulations concerning waste material disposal, as well as the specific requirements stated in this Section and elsewhere in the Specifications.

C. The Contractor is advised that the disposal of excess excavated material in wetlands, stream corridors, and plains is strictly prohibited even if the permission of the property owner is obtained. Any violation of this restriction by the Contractor or any person employed by him, will be brought to the immediate attention of the responsible regulatory agencies, with a request that appropriate action be taken against the offending parties.

Therefore, the Contractor will be required to remove the fill at his own expense and restore the area impacted.

PART 2 - PRODUCTS

2.07 TEMPORARY FACILITIES AND UTILITIES

A. Provide mobile telephone for the person in charge of the project at the project site for use in connection with the work.

B. Provide temporary sanitary facilities in the quantity required for use by all personnel. Maintain in a sanitary condition at all times.

END OF SECTION

ITEM 1020

MOBILIZATION

PART 1 - GENERAL

1.01 DESCRIPTION:

A. This work shall consist of the construction preparatory operations, including the movement of personnel and equipment to the project site necessary to begin work. All work to be performed under this item shall be in accordance with the requirements of Section 513 of the Virginia Department of Transportation, Road and Bridge Specifications.

1.02 MEASUREMENT AND PAYMENT

A. Mobilization will not be measured but will be paid for at the Contract lump sum price. Payment of 50% of Mobilization will be made in the first monthly invoice after the Contractor has established the necessary facilities. The remaining 50% of Mobilization will be prorated and paid in equal amounts on each of the next five monthly invoices. The payment will be full compensation for all labor, materials, equipment, tools, and incidentals necessary to complete the work.

B. Payment of the Mobilization item will not be made more than once and no additional payment will be made for demobilization and remobilization, regardless of the reason, including stream closure periods.

END OF SECTION

ITEM 1030

CONSTRUCTION STAKEOUT

PART 1 - GENERAL

1.01 DESCRIPTION:

A. This work shall consist of furnishing, placing, and maintaining construction layout stakes as specified in the Contract Documents or as directed by the Engineer, and shall otherwise be in accordance with Section 517 Virginia Department of Transportation, Road and Bridge Specifications, except as noted below:

1. The Contractor shall retain a professional Engineer or Land Surveyor registered in the state of Virginia to establish all lines and grades needed to construct the infrastructure stabilization.

2. It is the Contractor's responsibility to confirm existing grades, prior to construction activities, at no additional cost to The Owner and adjust quantities, earthwork, and work efforts as necessary with approval from The Owner.

3. The Contractor shall make all field measurements necessary to stakeout the baseline of construction and lay out the lines and grades called for in the Contract Documents or as directed by the Engineer. The Contractor shall use the horizontal and vertical survey controls as shown in the Contract Documents to lay out the lines of work, limits of grading, planting, fill placement and to stake out the location of all proposed structures.

4. Only those benchmarks shown on the drawings shall be used for construction. The Contractor shall be held responsible for their preservation.

5. The Contractor shall, as a part of his construction stakeout operation and before any clearing operation commences, demarcate any wetlands and the Limit of Disturbance throughout the entire project as shown on the Contract Documents and labeled as Limit of Disturbance and/or Wetlands, to the satisfaction of the Engineer. Where Limits of Disturbance are not shown on the Contract Documents, the Limit of Disturbance will be the top of cut, toe of slope or limit of ditch excavation.

6. Trees to be protected during construction are shown on the Contract Documents in the Forest Conservation Plans. Any necessary modifications to the Contract Documents for tree protection will be identified by The Owner and the Contractor prior to clearing and grubbing. All tree protection devices shall be installed before clearing and grubbing commences. Trees to be protected during construction shall

be identified by flagging and/or fencing. No paint or other permanent markings shall be used to indicate saved trees.

7. The Contractor shall notify The Owner once the stakeout or a phase of the stakeout is completed. The Owner will inspect the construction stakeout prior to the Contractor beginning clearing and grubbing activities. The purpose of the inspection is not to verify the stakeout, but to allow The Owner an opportunity to assess the lines established by the Contractor prior to the start of construction. If there are obvious errors with or questions concerning the stakeout, the visible errors and questions will be discussed with the Contractor, prior to the Contractor proceeding with construction. **This inspection will in no way relieve the Contractor of his responsibility to construct the site as specified in the Contract Documents.**

PART 2 - MATERIALS

2.01 Flagging Tape

A. The material for flagging the limits of disturbance shall be a 3-in. international orange vinyl material. The material for flagging wetlands shall be standard pink vinyl flagging. The material for flagging specimen trees shall standard white vinyl flagging.

PART 3 - CONSTRUCTION METHODS

3.01 LINE AND GRADE

The Contractor will provide the following:

3.02 STREAM CHANNEL STAKEOUT

A. The Contractor shall stake the base line and proposed center line as indicated in the Contract Documents. The stakes shall be clearly labeled with appropriate stations and offset distances. The stream channel base line of construction shall be staked with 3-ft long wooden stakes. The maximum spacing of stations (stakes, nails, crosses, etc.) will be 25 ft, and the elevations on the top of each marked point will be furnished. The Contractor shall establish appropriately spaced benchmarks and the necessary references including all points of curvature (P.C.), and points of tangency (P.T.) for the preservation and control of the base line. Upon completion of grading, the Contractor will provide a staked base line or working line. An elevation for the top of each marked point will also be furnished, as well as two sets of prints of the cross sections.

3.03 IN-STREAM STRUCTURE STAKEOUT

A. For in-stream structures, and bank protection, the Contractor shall stake out the boundaries, all breaks in slope, and the tops and toes of structures with a maximum

spacing of 25 ft. Stakes will be used to mark structure start and stop points, elevations, and offsets for the structures from the base line.

3.04 LINE AND GRADEEQUIPMENT AND PERSONNEL

A. The Contractor shall use competent personnel and state of the art equipment with current calibration for all engineering work required to set and maintain the elevations and dimensions as specified in the Contract Documents.

3.05 CONTROL MARKERS

A. The Contractor shall be responsible for preserving the base line of construction, working lines, and benchmarks set at the beginning of the project. The Contractor shall replace the baseline of construction, working lines, and benchmarks if they are disturbed or destroyed, at no additional cost to The Owner.

3.06 CONTROL STAKES

A. For the base line of construction, as specified in the Contract Documents, the Contractor shall furnish, set and preserve stakes at each station along each side of the proposed channel. On each of these stakes shall be marked its offset distance from the baseline of construction and its top elevation or the cut or fill to the profile grade line. Additional stakes, as needed for horizontal and vertical controls necessary for correct layout of the work, shall be set by the Contractor.

3.07 LAYOUT

A. For structures specified in the Contract Documents, the Contractor shall proceed with the layout work. From the field layouts, the Contractor shall check the proposed structure lengths by electronic distance measurement or chaining. When chaining is used, the measurements shall be compensated for horizontal alignment. The Contractor shall also check the location of the structure to affirm its correct location with relation to existing on-site features and conditions that are to remain in their original positions. If any discrepancies are found, the Contractor shall notify the Engineer at once in writing, otherwise, it will be assumed that all planned dimensions, grades and field measurements are correct.

3.08 UTILITES

A. The Contractor shall furnish to the utility companies or agencies working within the limits of the project, promptly upon request, reference to control points, alignment, and grade data, so that they may properly locate and coordinate their work and improvements in relation to the project.

1. UTILITY STAKEOUT

a. The Contractor shall notify the appropriate agencies a minimum of 48 hours (excluding weekends and holidays) prior to the Contractor's anticipated beginning of any underground work.

(1) Request a MISS UTILITY stakeout and possess a valid MISS UTILITY clearance ticket number for any underground work. 1-800-257-7777

(2) Contact all utilities within the limits of the project that are not a member of MISS UTILITY and obtain a stakeout of their respective facilities.

3.09 RIGHT-OF-WAY, EASEMENT LINES AND PROPERTY CORNERS

A. The Contractor shall define right-of-way and easement lines of the project for adjacent property owners, promptly upon request.

B. The Contractor shall retain a Land Surveyor registered in the State of Virginia who shall reference all existing property corners that are within the construction area or the area to be disturbed. Upon completion of the project, any corners that have been disturbed or destroyed shall be replaced by the registered land surveyor at the expense of the Contractor. Cost of this shall be included in the lump sum price bid for Construction Stakeout.

3.010 SUBGRADE, SUBBASE AND BASE CONTROLS

A. The Contractor shall furnish for subgrade, subbase and base courses, a string line and grade with fixed controls having a maximum longitudinal and transverse spacing of 25 feet.

3.011 FLAGGING

A. The flagging shall be placed continuously throughout wetland areas and buffers. In areas where trees are not to be disturbed, the Contractor shall individually flag those trees in a line along the clearing limits, which are not to be moved or destroyed. If the flagging has been destroyed and the Engineer determines that its use is still required, the Contractor shall re-flag the area at no cost to The Owner.

B. If the Contractor, after notification by the Engineer that replacement flagging is needed, does not replace the destroyed flagging within 48 hours, the Engineer may proceed to have the area re-flagged. The cost of the re-flagging by the Engineer will be charged to the Contractor and deducted from any monies due under the Contract.

3.012 MEASUREMENT AND PAYMENT

A. Construction Stakeout will not be measured but will be paid for at the Contract lump sum

price. Payment will be full compensation for furnishing, placing, and maintaining construction layout stakes, flagging of disturbance and wetland limits, removal of flagging and stakes following project completion, and for all material, labor, equipment, tools, and incidentals necessary to complete the work. Payment of the Contract lump sum price will be prorated and paid in equal amounts on each monthly estimate. The number of months used for prorating will be the number estimated to complete the work.

END OF SECTION

ITEM 1040

CLEARING AND GRUBBING

PART 1 - GENERAL

1.01 DESCRIPTION:

A. This work shall consist of clearing and grubbing within the limits specified in the Contract Documents. All work to be performed under this item shall be in accordance with the requirements of Section 301 of the Virginia Department of Transportation, Road and Bridge Specifications, with the following additions and/or modifications.

B. Clearing within the construction area includes removing and disposing of trees, shrubs and other vegetation within the limits of disturbance as is required for construction or as directed by The Owner. **The Limit of Disturbance (LOD) shown on the plans is not the limit of clearing and grubbing.** *Only trees designated in the Contract Documents and those trees approved by The Owner and the Engineer may be removed.*

C. No open burning will be permitted within the construction limits for this project.

D. The removal, stockpiling and placing of any materials labeled for re–use shall be incidental to the pay item for Clearing and Grubbing.

E. Grubbing within the construction area includes removing from the ground and disposing of all stumps, roots, stubs, brush, trash, rubble, and debris at locations off the project site.

PART 2 - CONSTRUCTION METHODS

2.01 PROJECT STAGING

A. To minimize the potential for erosion, sedimentation, and the degradation of water quality, clearing and grubbing will be conducted in stages. The area cleared and grubbed at any one time shall be limited to the area of active construction work.

B. Unless noted in the Sequence of Construction, no areas will be cleared and grubbed until the areas disturbed during the previous construction stage have been stabilized (i.e. covered by fabric and/or seeded and mulched). The Engineer shall have ultimate authority in this determination.

2.02 DAMAGING OR DETROYING VEGETATION BEYOND THE LIMIT OF DISTURBANCE

A. The Contractor shall not damage or destroy any trees, shrubs or turf, which exist beyond

the limits of disturbance as illustrated on the Contract Documents and specified.

B. The Contractor shall be responsible for any and all damages to trees, shrubs, or turf located beyond the limits of disturbance that occurs from his operations during the life of the Contract. The Contractor shall fully restore, at his own expense, and to the satisfaction of the Engineer, any trees, shrubs, or turf that have been damaged or destroyed.

2.03 SALVAGING AND STOCKPILING

A. The Contractor and Engineer shall meet onsite to determine availability of boulders for use in bank protection. Boulders and riprap determined to meet the specifications shall be salvaged and stockpiled for later use on-site, at no additional cost to The Owner.

B. Salvaged boulders which are deemed suitable for re-use as identified in the Contract Documents should be stored and elevated off the ground until use in construction.

2.04 CHIPPING

A. Describes chipping of cut trees within the limit of disturbance and spreading or placing on the site as directed by the Engineer. Chipping shall be accomplished by use of a chipping machine to a size acceptable to the Engineer. Material deemed by the Engineer unsuitable for chipping (too large, invasive species, etc.) shall be hauled offsite to an approved disposal location at no additional cost to The Owner.

2.05 FLUSH CUTTING

A. Describes cutting trees flush with the ground. The stump is left in place to leave the surrounding soil and infrastructure undisturbed. Flush cutting shall be accomplished by removing the whole tree that is above ground and leaving the root system in place. The stump shall be treated with a systemic herbicide applied directly to the stump to prevent the stump from resprouting from the remaining plant material. The Contractor shall use a 25% herbicide solution in water that uses glyphosate (such as Round Up) or triclopyr (such as Remedy Ultra) for cut stump applications.

2.06 MEASUREMENT AND PAYMENT

A. Clearing and Grubbing will not be measured but will be paid for at the Contract lump sum price. The payment will be full compensation for the removal and disposal of all materials cleared and grubbed, and for all material, labor, equipment, tools, and incidentals necessary to complete the work. The chipping and spreading of chipped materials, removal of unsuitable material, vine removal, stump treatment and the salvaging and stockpiling of logs shall be incidental to this item.

END OF SECTION

ITEM 1050

MAINTENANCE OF TRAFFIC

PART 1 - GENERAL

1.01 DESCRIPTION

A. This item shall consist of maintenance of traffic for project access from all access points onto public or private roads, and for information signage related to ingress and egress from the work site. All work to be performed under this item shall be in accordance with the requirements of Section 512 of the Virginia Department of Transportation, Road and Bridge Specifications.

B. All temporary sign work to be performed under this item shall be in accordance with Section 512 Virginia Department of Transportation, Road and Bridge Specifications.

C. The Contractor shall submit, if required, a traffic control plan in writing to the City of Alexandria, Department of Transportation for approval prior to the preconstruction meeting. If the Contractor does not follow the traffic control plan; the Owner will stop all activity and charge working days until the Contractor complies with the traffic control plan.

D. If the Contractor needs to close a lane of traffic on a state-maintained roadway to complete any work on the County roadway at its intersection with the state roadway, a Land Use Permit from the Virginia Department of Transportation will be required. The Contractor shall notify the Engineer at least fourteen (14) days prior to the anticipated lane closure for The Owner to coordinate with the Department of transportation to obtain the Land Use Permit. Any Lane Closure on a state-maintained roadway shall be in accordance with the standard details of the Virginia Department of Transportation requirements.

1.02 MEASUREMENT AND PAYMENT

A. Maintenance of Traffic will not be measured but will be paid for at the Contract lump sum price. Payment of the Contract lump sum price will be prorated and paid in equal amounts on each monthly invoice. The number of months used for prorating will be the number estimated to complete the work as determined by the Contract documents. Payment will be full compensation for furnishing, placing, maintaining and removing traffic control measures, and for all material, labor, equipment, tools, and incidentals necessary to complete the work.

END OF SECTION

ITEM 1060

EROSION AND SEDIMENT CONTROL

PART 1 - GENERAL

2.08 DESCRIPTION:

A. Provide all work and take all measures necessary to control soil erosion resulting from construction operations, prevent flow of sediment from construction site, and contain construction materials within protected working area as to prevent damage to any stream or wetlands.

B. The Contractor is responsible for obtaining a Virginia Erosion and Sediment Control General Permit (9VAC25-880-70) prior to commencement of work.

2.09 REFERENCES:

A. United Stated Environmental Protection Agency (USEPA):

1. Guidelines for Erosion and Sediment Control, Planning and Implementation.

2. Processes, Procedures and Methods to Control Pollution Resulting from all Construction Activity.

B. Virginia Erosion and Sediment Control Handbook, latest available edition.

2.10 SUBMITTALS:

A. Submit product data for each type of product indicated and shop drawings for review and approval.

B. Prior to the start of the work, submit to Engineer, a copy of the acquired E&SC General Permit.

2.11 QUALITY ASSURANCE:

A. Use acceptable procedures, including use of water diversion structures, diversion ditches, settling basins, and sediment traps.

B. Operations restricted to areas of work indicated on drawings and area which must be entered for construction of temporary or permanent facilities.

C. If construction materials are washed away during construction, remove materials from fouled areas.

D. Stabilize diversion outlets by means acceptable to Engineer.

E. City has authority to limit surface area of erodible earth material exposed by Contractor operations and to direct immediate permanent or temporary pollution control measures to prevent contamination of any stream or wetlands, including construction of temporary berms, dikes, dams, sediment basins, sediment traps, slope drains, and use of temporary mulches, mats, or other control devices or methods to control erosion.

PART 2 - PRODUCTS

1.01 COIR MATTING:

A. CM-700 or engineer approved equal as described in Item 7010: Soil Stabilization Matting.

1.02 WOOD STAKES:

A. 2 inches by 2 inches by 3 feet or approved COIR Matting biodegradable stake equivalent,

1.03 GEOTEXTILE FABRIC:

A. Geotextile/filter fabric shall be non-woven polypropylene geoxtextile, such as Mirafi 700x, Mirafi 70/20, Filterweave 500, or approved equal as described in Item 9060: Geotextile – Non-Woven for In-Stream Structures.

1.04 SUPER SILT FENCE:

A. Super Silt Fence shall be as described in Item 3050: Super Silt Fence.

1.05 OTHER MATERIALS:

A. As indicated on Drawings.

B. Materials specified in the Virginia Erosion and Sediment Control Handbook, and as approved by Engineer. Applicable sections of the DEQ E&S handbook include but are not limited to the following:

1. Chapter 3.01 – Safety Fence

2. Chapter 3.02 – Construction Entrance

3. Chapter 3.19 – Riprap

4. Chapter 3.36 – Soil Stabilization Blankets and Matting

PART 3 – EXECUTION

1.06 GENERAL:

A. Do not discharge chemicals, fuels, lubricants, bitumen, raw sewage and other harmful waste into or alongside any body of water or into natural or man-made channels.

3.02 INSTALLATION:

A. Install all Erosion and Sediment Control devices per the Virginia Erosion and Sediment Control Handbook, latest available edition.

END OF SECTION

ITEM 1070

DEMOLITION AND DISPOSAL OF EXISTING STRUCTURES

PART 1 - GENERAL

1.01 DESCRIPTION

A. The Contractor shall furnish all labor, materials, and equipment necessary for the demolition and disposal of existing structures. The work consists of removing and properly disposing of all debris, including but not limited to fallen trees, drainage structures, existing retaining wall, concrete, and miscellaneous litter. Additionally, this item includes removal of existing riprap, where shown on the Contract Documents.

1.02 CONSTRUCTION METHODS

A. All demolition, removal, and disposal shall be performed according to the Contract Drawings and all applicable Federal, State and local laws, regulations and guidelines. Demolition shall generally be limited to removal of fallen trees, drainage structures, concrete, the sheet pile retaining wall, and miscellaneous litter as delineated and/or directed by the Engineer or County Inspector. These materials are to be disposed of legally by the Contractor.

B. The Contractor shall cut all existing asphalt and/or concrete surfaces with a power saw in such a manner as to create a tight, neat, straight water sealed joint. No “jack-hammering” or tearing of the existing surfaces will be allowed. The Contractor shall protect all adjacent surfaces as necessary.

C. Perform work so adjacent structures, equipment, paving and materials, which are to remain, shall not be damaged. If damage occurs, the Contractor shall repair or replace the adjacent structures, equipment, paving and materials as directed by the Engineer or County Inspector at no additional cost to Public Works. Existing utilities damaged by demolition shall be replaced with the same material and quality as the existing utilities. Before construction begins, the Contractor shall inspect existing structures, equipment and paving that will remain in-place within and adjacent to the work area for existing defects and damage found during this inspection. All damage repairs shall be at the Contractor’s expense.

D. The Contractor shall perform the work in a manner that will not damage parts of the structure or facility not intended for removal. If, in the opinion of the Engineer or County Inspector, the method of construction used may endanger or damage parts of the structure or affect the satisfactory operation of the facilities, the Contractor shall promptly change the method when so notified. Perform all cutting required regardless of whether such

cutting is specifically indicated. Examine the existing structures and make an estimate of cutting required and other conditions to be encountered in order to accomplish the work. No blasting will be permitted.

E. All equipment, materials, and piping within the project limits, designated for removal, shall become the property of the Contractor.

F. The Contractor is responsible for the removal and proper disposal of all debris and structures within the limits of disturbance as shown on the Contract Drawings. Debris shall be removed from areas of proposed grading and all other areas within the limits of disturbance. Large debris may be removed using excavator buckets, cable winch, towing strap, laborers with bags or buckets, or other methods identified by the Contractor and approved by the Engineer.

G. The Contractor shall provide warning signs as required, for personnel and the public.

1.03 MEASUREMENT AND PAYMENT

A. Demolition and Disposal of Existing Structures will not be measured and will be paid for at the Contract lump sum price. The payment will be full compensation for the removal and disposal of all materials, saw cutting, and for all material, labor, equipment, tools and incidentals necessary to complete the work.

END OF SECTION

ITEM 1080

HIGH VISIBILITY SAFETY FENCE

PART 1 - GENERAL

1.01 DESCRIPTION

A. High Visibility Safety fence shall be installed as specified on the contract documents for use along and within areas of the Limits of Disturbance as directed by the Engineer.

1.02 MATERIALS

A. Steel Mesh – Shall be 9-gauge zinc-coated steel

B. Posts - Shall be zinc-coated steel pipe.

C. Top Nails - Shall be zinc-coated steel pipe.

D. Braces – Shall be zinc-coated steel.

E. Gates - Shall be single- or double-swing, zinc-coated steel. Gates should be a minimum of 12 feet wide

1.03 CONSTRUCTION METHODS

A. The Contractor shall erect the High Visibility Safety fence as designated on the Contract Documents and as directed by the Engineer prior to beginning construction.

B. Posts shall be spaced a maximum of ten (10) feet. Posts will be set in concrete and backfilled or anchored by other acceptable means. All corner posts, end posts, gate posts, and pull posts should be embedded, braced, and trussed as shown in the "Standard Fence – Chain Link" detail found in the latest version of the Virginia Department of Transportation Road and Bridge Standards.

C. Applicable warning signs noting hazardous conditions must be installed immediately upon installation of safety fence. The safety fence and posts shall be removed at the end of the contract and with the approval of the Engineer. The fence and posts shall become the property of the Contractor at the completion of the project.

1.04 MEASUREMENT AND PAYMENT

A. High Visibility Safety Fence will be measured and paid for at the contract unit price per linear foot installed. The payment will be full compensation for furnishing, installation,

maintenance, and removal of the fence as shown on the Contract Documents, including all materials, labor, equipment, tree protection area signage, tools and incidentals necessary to complete the work.

END OF SECTION

ITEM 1090

TRAIL MANAGEMENT

1.01 DESCRIPTION

A. Furnish, transport, and replace in kind existing on-site Recreation Area as specified in the Contract Documents or as directed by the Engineer.

1.02 MEASUREMENT AND PAYMENT

A. Trail Management will not be measured and paid for at the contract unit price but paid per lump sum (LS). Price and payment will be full compensation for all material, labor, equipment, tools and incidentals necessary to complete the work.

END OF SECTION

ITEM 2010

STREAM CHANNEL EXCAVATION (CLASS 5)

PART 1 - GENERAL

1.01 Description

A. All work to be performed under this item shall be in accordance with the requirements of Section 303 of the Virginia Department of Transportation, Virginia Department of Transportation, Road and Bridge Specifications.

B. All excavation specified on the plans and in the Contract Documents, unless otherwise specified, shall be classified as Class 5 Excavation. The Contractor shall use all suitable materials, including topsoil, subsoil, and channel bed material, as specified in the Contract Documents, from excavation in the construction throughout the Contract.

C. This item includes excavation, separation, removal and disposal of debris and unsuitable materials from the stream channel, floodplain, or wetland areas and salvaging, transporting, placing, and stockpiling of suitable materials in areas designated on the plans and as outlined below. All concrete, rubble, asphalt or other unsuitable material, such as clay or wet material, removed from the channel is considered unsuitable material.

1.02 Layout

A. The layout of the grading shall be as shown on Contract Drawings (plans and cross-sections). Grading shall transition smoothly between cross-sections, with no abrupt changes in channel geometry.

1.03 Excavation

A. Excavation shall include the following:

1. Cut areas within the boundary faces of the cross-sections specified in the Contract Documents, including excavation within the channel, banks or floodplain for stabilization activities. This shall include excavation for the installation of rock grade control structures and bank treatment techniques, as specified on the plans and in these specifications.

2. Demolition and/or removal of debris from the stream channel, including trees and debris jams, tires, concrete lining, broken up concrete and other materials as designated by the Engineer.

3. Additional rock encountered within the stream channel that may be handled by

the same tools and equipment used for channel or stream excavation under this Contract.

4. When excavating for infrastructure stabilization or other facilities indicated on the plans, the Contractor may encounter wet or saturated soils. The Contractor shall be prepared to dewater and transport unsuitable soil off-site in a manner that prevents discharge or spillage of soils or water onto adjacent properties or roads. Should any discharge occur, the Contractor shall be responsible for immediate and complete clean-up.

5. There shall be no overnight stockpiling of erodible material in the 100-year floodplain.

PART 2 - CONSTRUCTION

2.01 Excavation and Fill

A. Excavation and fill for the construction of the new channel shall be as shown on the Contract Documents. Construction shall be as shown in the plan view, cross sections, and the stream profile drawings. All work to be performed under this item shall be in accordance with the requirements of Section 303 of the Virginia Department of Transportation, Virginia Department of Transportation, Road and Bridge Specifications.

B. Due to the requirement to dewater the stream channel, all excavation and fill to construct the new channel, as well as all in-stream structures, must be done in an expeditious manner. Dewatering periods must be limited, and the stream flow returned to the new channel as soon as is reasonably possible. The Contractor is responsible to provide adequate equipment and manpower, as well as to establish a work schedule that will meet this requirement.

C. In areas where fill is required to establish the design channel, the Contractor shall place the required fill and compact the soil by tamping it with the excavator bucket. Fill shall be placed in 8 to 12 inch lifts. Each lift shall be compacted by tamping with the excavator bucket or by tracking in by the excavator. Reasonable compaction as determined by the site engineer/city inspector shall be achieved before placement of succeeding lifts.

D. Immediately upon completion of streambank grading and the installation of in-stream structures along a given segment, the Contractor will provide permanent stabilization of all disturbed areas. Permanent stabilization will be completed as set forth in the Standard Specifications for Permanent Seed and Mulch, and Soil Stabilization Matting

2.02 Site Clean-up

A. Prior to undercutting any stream invert, cutting into any stream bank, or excavating the

site, the reach that is being constructed shall be cleaned of all non-desirable items such as waste concrete, metal, vegetation debris, and rubbish prior to stockpiling. The Contractor shall be responsible for removing as much unnatural or undesirable material as possible prior to salvaging and stockpiling of the suitable on-site materials. Disposal of non-desirable material shall be the responsibility of the Contractor.

2.03 Use of Salvaged Streambed Materials

A. Material shall be salvaged from the existing channel to provide natural streambed material. The use of salvaged streambed material is defined in each treatment specification. Salvaged streambed material meeting the specifications of materials referenced in the following specifications shall be used prior to the furnished materials: Item 9020: Salvaged Streambed Material

B. Topsoil and subsoil shall be salvaged from within the grading limits for use as specified in the Contract Documents or as directed by the Engineer. Placement of salvaged or furnished topsoil meeting the specifications of materials referenced in the following specifications shall be used prior to the furnished materials: Item 7030: Placing Salvaged Topsoil – 4" Depth and Item 7040: Placing Furnished Topsoil – 4" Depth.

C. In addition to the specifications described for furnished material, salvaged topsoil and salvaged subsoil shall be free of any plant parts (seeds, rhizomes, stolon, roots, etc.) of noxious weeds (Johnsongrass, Canada Thistle, Phragmities, etc. as defined by the Virginia Department of Conservation and Recreation) as well as non-native, invasive plants (Multiflora rose, garlic mustard, etc.) as determined by the Engineer. Salvaged topsoil and subsoil shall be stockpiled on site and kept separate from other materials.

2.04 Disposal of Unsuitable Materials

A. Existing debris, concrete, waste, and other unsuitable materials, as determined by these specifications or by the Engineer, shall be removed from the site and shall be disposed of in a site with an approved erosion and sediment control permit.

2.05 Rock Excavation

A. Boulders and rock from the excavation may not be broken and used for any of the proposed in-stream or bank structures unless authorized by the Engineer or provided for in the Contract Documents.

B. Blasting. The Contractor shall obtain prior approval from the Engineer before performing any rock blasting necessary to complete the excavation to the grades and lines indicated on the plans. All blasting shall conform to SHA standards.

C. Pre-splitting. The Contractor shall obtain prior approval from the Engineer before

performing any pre-splitting activities, necessary to complete the excavation to the grades and lines indicated on the plans. All pre-splitting shall conform to VDOT standards.

2.06 Excavation Beyond Specified Limits.

A. The widening of cut or excavation sections beyond the limits of the cross-sections, as specified in the Contract Documents, is prohibited in all instances except by written order from the Engineer. When ordered by the Engineer, the procurement of additional suitable materials for fill shall conform to the following provisions.

1. Finished Excavation. Refer to Section 303 of the Standard Specifications.

2. Excavation Limits.

a. If the Engineer directs the Contractor to excavate beyond the limits of the cross-sections originally proposed, and within the limits of disturbance, then all material within the limits will be classified as Class 5 Excavation.

b. If the Contractor, with approval of the Engineer, elects to obtain material by widening cuts beyond the limits of the cross-sections originally proposed and within the limits of disturbance, the excavation of the materials will be classified as Class 5 Excavation.

2.07 Unsuitable Material and Undercuts.

A. Unstable or other unsuitable material encountered at or below the lowest normal excavation limit, as specified in the Contract Documents, shall be undercut and removed to the extent directed by the Engineer. The undercutting and removal of unsuitable material shall be incidental to Class 5 Excavation. In rock areas, the limit of measurement for excavation will be at the bottom of the normal plan section. All voids created by the removal of unsuitable material and undercuts, except when rock is encountered at subgrade, shall be backfilled to the lines and grades specified in the Contract Documents. Backfill material for undercuts shall conform to materials specified and shall be incidental to the Class 5 Excavation.

2.08 Placement of Salvaged Streambed Materials

A. Salvaged streambed materials meeting the specifications described in the Contract Documents shall be placed as described in the Contract Documents.

2.09 Stabilization

A. The Contractor shall be responsible for temporary and permanent stabilization of all streambanks and graded or traversed floodplain areas, immediately upon completion of grading, as specified in the Contract Documents. The Contractor shall perform all care

and remediation work required to maintain stable streambanks, including erosion and sediment control.

B. In cases where additional material is required, The Contractor is responsible for furnishing and transporting suitable fill material to the project site. The suitability of fill material is dependent on the area to be filled. If unsuitable streambed materials are available on site the use of Item 9030: 2-3" Stone for Stream Mixes will be used as described in the specifications.

PART 3 - MEASUREMENT AND PAYMENT

3.01 Stream Channel Excavation (Class 5) will be measured and paid for at the Contract unit price per cubic yard. The payment will be full compensation for all excavation, hauling, salvaging, separating, stockpiling, and placing of suitable materials, formation and compaction of embankments and backfill, backfilling of stream beds or otherwise disposing of excess and unsuitable materials, undercutting and backfilling of undercuts, and for all material, labor, equipment, tools, and incidentals necessary to complete the work. The cost of handling and re-handling wet soils, reuse of salvaged fill material, salvaged streambed material, salvaged topsoil, and over-excavation to construct a temporary access bridge, if necessary, shall be considered incidental to the cost of Stream Channel Excavation (Class 5), as appropriate. The cost of over excavating for the installation of structures shall be incidental to the materials necessary for construction of the structure.

3.02 Material will be measured in its original position and the volume computed by the Method of Average End Area. The cross-sectional area measured will not include water or other liquids. Measurement for Stream Channel Excavation (Class 5) will not include any material removed outside the limits of disturbance as specified in the Contract Documents.

3.03 Earthwork bid item quantities are based on existing elevations/contours and proposed grading, as shown on the Contract Document's cross-sections and profiles. Existing elevations and grades may have changed since the original survey was completed, due to erosion and sediment accumulation. Prior to the start of excavation, the Contractor may conduct surveys to confirm existing grades and verify and adjust earthwork quantities and work efforts, at no additional cost to The Owner. Because of the possibility of changes to grades following completion of an area of work due to extremes in stream flow, the Contractor may conduct surveys incrementally as a particular work area is completed for quantity verification. The survey shall be submitted to the Engineer for review to confirm incremental as-built conditions and quantities. The Contractor is solely responsible for restoring un-surveyed sections to design conditions at no additional cost to The Owner.

END OF SECTION

ITEM 2020

DISPOSAL OF EXCAVATED MATERIALS (STOCKPILE)

PART 1 - GENERAL

1.01 DESCRIPTION

A. The Contractor shall perform disposal of unsuitable, unsatisfactory, and excess excavated material offsite at an approved stockpile location or approved disposal facility. Disposal of Excavated Unsuitable Materials shall be performed as described in Item 2010: Stream Channel Excavation (Class 5). Stockpile Construction shall be performed as described in the Contract Documents.

1.02 Suitable Material

A. Excess suitable soil material shall be transported and disposed of as specified in the contract documents at the location of the stockpile. Disposal of unsuitable material including, but not limited to, rock, concrete, asphalt, sidewalk, curb and gutter, vegetation debris, soft soil, trash, and other miscellaneous debris shall be performed as described in Item 2010: Stream Channel Excavation (Class 5).

PART 2 - CONSTRUCTION

2.01 Excavation and fill for the permanent stockpile construction shall be as shown on the Contract Documents. Construction shall be as shown in the plan view.

2.02 In areas where fill is required to establish the design permanent stockpile, the Contractor shall place the required fill and compact the soil by tamping it with the excavator bucket. Fill shall be placed in 8 to 12 inch lifts. Each lift shall be compacted by tamping with the excavator bucket or by tracking in by the excavator before placement of succeeding lifts. The final lift placed shall not be compacted. The stockpile construction and incremental stabilization shall occur in two phases. Phase One shall not exceed 15 feet in vertical height. Once 15-foot maximum vertical height is achieved the stockpile shall be seeded and stabilized. Phase Two can then be constructed to bring the stockpile to final grade.

2.03 Immediately upon completion of permanent stockpile grading, the Contractor will provide permanent stabilization of all disturbed areas. Permanent stabilization will be completed as set forth in the Standard Specifications for Permanent Seed and Mulch, and Soil Stabilization Matting.

PART 3 - MEASUREMENT AND PAYMENT

3.01 Disposal of Excavated Material (Stockpile) will be measured and paid for at the Contract

unit price per cubic yard. The payment will be full compensation for all hauling, grading, and disposing of excess and unsuitable materials and for all material, labor, equipment, tools, and incidentals necessary to complete the work. The cost of handling, re-handling soils, and grading shall be considered incidental to the cost of Disposal of Excavated Materials (Stockpile), as appropriate.

3.02 Material volume for Disposal of Excavated Materials (Stockpile) will be estimated by 80% of estimated truck load volume and documented by the on-site Construction Services Manager prior to leaving the site. Measurement for Disposal of Excavated Materials will not include any material removed outside the limits of disturbance as specified in the Contract Documents.

END OF SECTION

ITEM 3010

STABILIZED CONSTRUCTION ENTRANCE

PART 1 - GENERAL

1.01 DESCRIPTION

A. All work to be performed under this item shall be in accordance with the detail on the Contract Documents and the requirements of Section 512 of the Virginia Department of Transportation, Virginia Department of Transportation, Road and Bridge Specifications.

1.02 MATERIALS

A. Stone shall be VDOT No. 2 aggregate.

B. Geotextile - Nonwoven Geotextile as specified in Section 245 Virginia Department of Transportation, Road and Bridge Specifications.

1.03 CONSTRUCTION METHODS

A. The entrance(s) shall be constructed and maintained in a condition, which will prevent tracking or flowing of sediment onto private or public right-of-way or roads. The location of entrances shall be determined in the field by the Contractor with the approval of the Engineer and the Sediment Control Inspector.

B. Rehabilitate Stabilized Construction Entrance shall consist of periodic top dressing with additional aggregate, replacement of pipe or other repairs to the entrance.

1.04 MEASUREMENT AND PAYMENT

A. Stabilized Construction Entrance will be measured and paid for at the Contract unit price per each. When pipe is required, it will not be measured but the cost will be incidental to the Contract unit price for Stabilized Construction Entrance. The payment will be full compensation for excavation, geotextile, aggregate, pipe, rehabilitation, relocation and removal and for all material, labor, equipment, tools, and incidentals necessary to complete the work.

END OF SECTION

ITEM 3020

TEMPORARY ACCESS ROAD

PART 1 - GENERAL

1.01 DESCRIPTION

A. This work shall consist of establishing and maintaining a temporary access road as shown on the Contract Documents and the requirements of C-SCM-02 of the Virginia Department of Transportation, Virginia Department of Environmental Quality, Stormwater Management Handbook.

1.02 MATERIALS

A. Wood Chips or Mulch - Standard Specification 605 of the Virginia Department of Transportation, Virginia Department of Transportation, Road and Bridge Specifications.

B. Timber Matting - Timber mats shall be made from all natural select hardwood (no preservatives), 100% bolted - no nails, overlapping and designed for heavy duty construction equipment.

C. Temporary Pipe – A temporary conduit placed to convey drainage beneath a Temporary Access Road. Temporary Pipe must be sufficiently protected from vehicle traffic by timber or bridge matting to prevent pipe collapse.

1.03 CONSTRUCTION METHODS

A. A Temporary Access Road with a maximum width of 12’ shall be installed and maintained as shown on the Contract Documents in the manner selected by the Contractor and as approved by the Engineer. The contractor shall maintain the minimum access road depth as outlined in C-SCM-02 of the Virginia Department of Transportation, Virginia Department of Environmental Quality, Stormwater Management Handbook.

B. The Contractor may need to use additional Timber Matting or Swamp Mats in areas as directed by the Project Manager to minimize impacts to wetlands, control sediment, or facilitate movement of equipment. Moving and reuse of timber mats as needed shall be at no additional cost to the Owner.

C. Contractor is responsible for any damage and subsequent repairs to asphalt walking paths due to temporary access road.

1.04 MEASUREMENT AND PAYMENT

A. Temporary Access Road will be measured and paid for at the Contract unit price per linear foot installed. The payment shall be full compensation for all wood chips, mulch, stone, temporary pipe, timber matting, and all material, labor, equipment, tools, and incidentals necessary to complete the work.

END OF SECTION

ITEM 3030

TEMPORARY ACCESS BRIDGE

PART 1 - GENERAL

1.05 DESCRIPTION

A. This work shall consist of establishing, maintaining, and removing a temporary access bridge as shown on the Contract Documents. Work shall be executed in accordance with C-ENV-03 of the Virginia Department of Transportation, Virginia Department of Environmental Quality, Stormwater Management Handbook.

1.06 MATERIALS

A. Materials shall conform to C-ENV-03 of the Virginia Department of Transportation, Virginia Department of Environmental Quality, Stormwater Management Handbook.

1.07 CONSTRUCTION METHODS

A. A Temporary Access Bridge shall be installed, maintained, and removed in accordance with C-ENV-03 of the Virginia Department of Transportation, Virginia Department of Environmental Quality, Stormwater Management Handbook..

1.08 MEASUREMENT AND PAYMENT

A. Temporary Access Bridge will not be measured but will be paid for per each (EA) at the contract unit price. The payment shall be full compensation for all material, labor, equipment, tools, and incidentals necessary to complete the work.

END OF SECTION

ITEM 3040

CONTINGENT SILT FENCE

PART 1 - GENERAL

1.01 DESCRIPTION

A. This work shall consist of installing and maintaining silt fence as shown on the Erosion and Sediment Control Contract Documents or as directed by the Engineer. All work to be performed under this item shall be in accordance with the requirements of Sections 242 and 245 of the Virginia Department of Transportation, Virginia Department of Transportation, Road and Bridge Specifications, with the following additions and/or modifications herein:

1.02 MATERIALS

A. Contractor shall furnish all materials necessary to construct and install the Silt Fence as specified in Sections 242 and 245 Virginia Department of Transportation, Road and Bridge Specifications.

1.03 CONSTRUCTION METHODS

A. This work shall include furnishing, installing and maintaining silt fence for sediment control. Silt fence shall be installed in accordance with the specifications as shown on the Erosion and Sediment Control Contract Documents or as directed by the Engineer or the Sediment Control Inspector.

1.04 MEASUREMENT AND PAYMENT

A. Silt Fence will be measured and paid for at the Contract unit price per linear foot. The payment shall be full compensation for furnishing, installation, maintenance, and removal and for all material, labor, equipment, tools, and incidentals necessary to complete the work.

B. Replacement or resetting of the Silt Fence, if deemed necessary by the inspector, will not be measured for payment but will be incidental to the Silt Fence.

END OF SECTION

ITEM 3050

SUPER SILT FENCE

PART 1 - GENERAL

1.05 DESCRIPTION

A. This work shall consist of installing and maintaining silt fence as shown on the Erosion and Sediment Control Contract Documents or as directed by the Engineer. All work to be performed under this item shall be in accordance with the requirements of Section 242 and 245 of the Virginia Department of Transportation, Virginia Department of Transportation, Road and Bridge Specifications, with the following additions and/or modifications herein:

1.06 MATERIALS

A. Contractor shall furnish all materials necessary to construct and install the Super Silt Fence as specified in Sections 242 and 245 of the Virginia Department of Transportation, Road and Bridge Specifications.

1.07 CONSTRUCTION METHODS

A. This work shall include furnishing, installing and maintaining silt fence for sediment control. Silt fence shall be installed in accordance with the specifications as shown on the Erosion and Sediment Control Contract Documents or as directed by the Engineer or the Sediment Control Inspector. Super Silt fence shall be installed prior to the disturbance of stockpiling, staging and construction access areas shown on the Erosion and Sediment Control Contract Documents.

1.08 MEASUREMENT AND PAYMENT

A. Super Silt Fence will be measured and paid for at the Contract unit price per linear foot. The payment shall be full compensation for furnishing, installation, maintenance, and removal and for all material, labor, equipment, tools, and incidentals necessary to complete the work.

B. Replacement or resetting of the Super Silt Fence, if deemed necessary by the inspector, will not be measured for payment but will be incidental to the Silt Fence.

END OF SECTION

ITEM 3060

TREE PRESERVATION SIGNAGE

PART 1 - GENERAL

1.01 DESCRIPTION

A. The Contractor shall furnish all labor, equipment, and materials necessary for the installation and maintenance of appropriate tree preservation signs. Trees that have limited potential to be damaged by construction activities and with sufficient room to avoid during construction shall be protected with Safety Fence and/or Tree Protection Fence with Tree Preservation Signage. Safety Fence with Forest Retention Signage shall be installed as described in Item 1080: High Visibility Safety Fence and modified to include a forest retention signage as described below. Tree Protection Fence shall be installed as described in Item 3090: Tree Protection Fence

1.02 MATERIALS

A. Forest Preservation Signage – Signs shall be constructed using durable materials to withstand all anticipated weather conditions. The signs shall also be mounted to posts capable of withstanding possible inundation and flood conditions. Contractor shall maintain signs throughout the duration of the work, including downtime periods.

1.03 CONSTRUCTION METHODS

A. The Contractor shall erect the High Visibility Safety Fence and/or Tree Protection Fence as designated on the Contract Documents and as directed by the Engineer prior to beginning construction.

B. In addition, Forest Preservation Signage shall not be fastened or nailed to trees. One Forest Preservation Signage, sign or equivalent, shall be posted for every 30 linear feet of High Visibility Safety Fence or Tree Protection Fence. Signs shall be mounted to posts.

1.04 MEASUREMENT AND PAYMENT

A. Forest Preservation Signage will be measured and paid for at the contract unit price per each installed. The payment will be full compensation for furnishing, installation, maintenance, and removal of the fence as shown on the Contract Documents, including all materials, labor, equipment, signage, tools and incidentals necessary to complete the work.

END OF SECTION

ITEM 3070

MAINTENANCE OF STREAM FLOW

PART 1 - GENERAL

1.01 DESCRIPTION

A. This work shall consist of maintaining and diverting stream flow and installing flow diversion devices for the purpose of isolating work areas when construction activities take place within the stream channel, as specified in the Erosion and Sediment Control Contract Documents or as directed by the Engineer.

1.02 MATERIALS

A. Sandbags - Sandbags shall consist of materials, which are resistant to ultraviolet radiation, tearing and puncture, and woven tightly enough to prevent leakage of fill material (i.e., sand, fine gravel, etc.).

B. Sheeting - Sheeting shall consist of polyethylene or other material, which is impervious and resistant to puncture and tearing.

C. Pump(s) - Pump(s) shall be large enough to maintain un-interrupted base flow to the channel downstream of the work area. The pump-around shall include a hose suitable to convey water over land to the downstream section. The minimum length of hose required (measured in linear feet) is equivalent to the maximum estimate for three workdays provided by the Contractor.

D. Sediment Filter Bag(s) - Filter bags shall be in accordance with the plan and construction specifications per VDEQ Virginia Stormwater Management Handbook

1. The filter bag will be removed and replaced at the discretion of the Engineer when the filtering rate is inadequate for the pumping rate. The bags and sediment will be disposed of off-site.

2. Sediment Filter Bags should be made of nonwoven, needle-punched, polypropylene Geotextile designed to meet or exceed the mechanical properties:

a. Tensile Strength (ASTM D4632) - 250 lbs

b. Elongation @ Break (ASTM D4632) - 50%

c. Mullen Burst (ASTM D3786) - 350 psi

d. Puncture Strength (ASTM D4833) - 150 lbs

e. Trapezoidal Tear (ASTM D4533) - 80 lbs

f. Apparent Opening Size (ASTM D4751) - 40-80 US Sieve

g. Permittivity (ASTM D4491) - 1.30 Sec-1

h. UV Resistance, % Retained (ASTM D4355) - 70%

i. Flow Rate (ASTM D4491) - 70 gal/min/sf

3. The Engineer may specify any size up to 15’ x 15’.

1.03 CONSTRUCTION METHODS

A. During all operations, the Contractor shall maintain continuous flow and operation of all waterways, channels and storm drains while minimizing the discharge of sediment to any watercourse. The Contractor shall conduct their operations in a manner that reduces the amount of sedimentation introduced into the stream to an absolute minimum. Dewatering of excavation areas directly into the stream is prohibited.

B. The Contract Documents include details and suggested sequences for maintaining channel flow during construction. The Contractor may develop his/her own plan to maintain flow and control erosion with the approval of the Engineer. The Contractor shall obtain approval from the City of Alexandria for any significant modifications to the Contract Documents.

C. The Contractor shall utilize sandbags, pumps, sump pits, hoses, energy dissipaters, diversion pipes, dewatering methods, and other means to divert flow around the work area, dewater work areas, and control discharges of sediment to receiving waters.

D. Maintenance of Stream Flow measures shall be maintained throughout the duration of the work to the Engineer’s satisfaction. Any discharge of sediment resulting from the Contractor’s construction shall be remedied to the satisfaction of the Engineer at the Contractor’s expense.

E. Maintenance of Stream Flow shall be inspected daily to monitor for fish and wildlife that may be trapped, pinned, disoriented, injured, or deceased. If any impacts to fish or wildlife are observed immediately contact City of Alexandria Natural Resource Managers katrina.napora@alexandriava.gov and raychel.frye@alexandriava.gov for further guidance and direction.

F. Upon completion of the work, after the drainage devices have served their purposes, and with the inspector’s approval, the devices shall be removed and disposed of away from

the project by the Contractor at their own expense. Removal and disposal shall be done in compliance with erosion and sediment control and waste disposal requirements of the City of Alexandria Code.

1.04 MEASUREMENT AND PAYMENT

A. Maintenance of Stream Flow will not be measured but will be paid for at the Contract lump sum price. The payment will include designing and providing diversion structures regardless of the type required to satisfactorily divert the stream flow, excavation, backfill, pump-around and dewater the site and excavated areas within the stream diversion area, maintenance of the diversion system, sandbags, polyethylene sheeting, dikes, sediment filter bags, excavation and cleanout of dewatering basins, diversion pipes, pumps, sump pits, hoses, connections, Geotextile, energy dissipaters for hose outfalls, resetting of the diversion system, removal of the diversion system, and all other materials, labor, equipment, tools and incidentals necessary to complete the work. This price will not be adjusted when consideration is given to an alternative stream diversion system regardless of any changes in quantities from that shown in the Contract Documents. The Contractor may make requests for partial payment of dewatering expenses monthly. Payment request shall be prorated based on the percentage of the dewatering completed to date.

B. If the total payments made for dewatering are less than the Contract Lump Sum Price for this item, the unpaid balance will be included in the final contract payment.

C. Payment of the Contract Lump Sum Price shall constitute full compensation for completion of the work.

END OF SECTION

ITEM 3080

TREE PROTECTION PLANKING

PART 1 - GENERAL

1.01 DESCRIPTION

A. The Contractor shall protect all trees within the limit of disturbance not designated for removal. Trees that have limited potential to be damaged by construction activities and with sufficient room to avoid during construction shall be protected with Tree Protection Fencing. Tree Protection Fencing shall be installed as described in Item 3090: Tree Protection Fence, and as detailed on the Construction Documents. Trees that are directly adjacent to or have the potential to be damaged by machinery that is in close operation shall be protected with Tree Protection Planking. The Contractor shall provide wooden planks as impact protection on individual trees or as directed by the Engineer.

1.02 MATERIALS

A. Wooden planks - Wooden planks shall be hardwood and shall be a minimum of 2 inch thick.

B. 10 Gauge Wire

C. Burlap

1.03 CONSTRUCTION METHODS

A. Place wooden planks around trees to a height of 8 foot or as directed by the Engineer. During installation of the wood planks, caution shall be used to avoid damaging any bark or branches. Tree bark must be protected from damage due to direct contact with wire or other anchoring materials by use of burlap.

1.04 MEASUREMENT AND PAYMENT

A. Tree protection planking will be measured and paid for at the Contract price per each item. The payment will be full compensation for all material, labor, equipment, tools, and incidentals (including watering during the construction period) necessary to complete the work. The price must include removal from site of all related materials upon project completion. Reuse of tree protection planking shall be incidental to this item.

END OF SECTION

ITEM 3090

TREE PROTECTION FENCE

PART 1 - GENERAL

1.05 DESCRIPTION

A. Tree Protection Fence shall be installed as specified on the contract documents for use along and within areas of the Limits of Disturbance where trees and shrubs are to be protected and as directed by the Engineer.

1.06 MATERIALS

A. Tree Protection Fence - Fence shall be 2” chain link fabric or wire fence.
B. Posts - Posts shall be 2” outer diameter galvanized steel or 2x4 pressure treated posts.
C. Tree Preservation Area Signage – As outlined in Item 3060.

1.07 CONSTRUCTION METHODS

A. The Contractor shall erect the tree protection fence as designated on the Contract Documents and as directed by the Engineer prior to beginning construction.
B. Posts shall be spaced a maximum of ten (10) feet. Tension wire or rope may be used as a top stringer woven through the top row of strands to prevent potential sagging. Tension bars are required at the end of each fence run. Should construction sequencing allow, and with the approval of the Engineer, fencing from a completed section of the project site can be removed and reused on the site. The Tree Protection Fence and posts shall be removed at the end of the contract and with the approval of the Engineer. The fence and posts shall become the property of the Contractor at the completion of the project.

1.08 MEASUREMENT AND PAYMENT

A. Tree Protection Fence will be measured and paid for at the contract unit price per linear foot installed. The payment will be full compensation for furnishing, installation, maintenance, and removal of the fence as shown on the Contract Documents, including all materials, labor, equipment, tree protection area signage, tools and incidentals necessary to complete the work.

END OF SECTION

ITEM 3100

ROOT PRUNING

PART 1 - GENERAL

1.01 DESCRIPTION

A. All work to be performed under this item shall be in accordance with the detail on the Contract Documents.

1.02 CONSTRUCTION METHODS

A. Root pruning shall be done with a trencher or vibratory plow to a depth of 12”.

B. Root pruning shall take place prior to any clearing or grading. Exact pruning location shall be determined by a certified arborist.

C. Avoid damage to existing structures, plants, and turfgrass. Keep turfgrass areas, paved surfaces and sidewalks clean.

D. Promptly remove, disperse, or dispose of wood debris and other waste materials as directed.

E. Do not injure vegetation to be preserved. Repair injuries to bark, trunks, or limbs by cutting, smoothing, and tracing the bark in accordance with ANSI A300 Standards for Tree Care Operations.

1.03 MEASUREMENT AND PAYMENT

A. Root Pruning will be measured and paid for at the Contract unit price per linear foot. The payment will be full compensation for all labor, materials, equipment, tools, cleanup and restoration, damage repair, disposal fees, and incidentals necessary to complete the work.

END OF SECTION

ITEM 4010

BOULDER CASCADE

PART 1 - GENERAL

1.01 DESCRIPTION:

A. This work shall consist of furnishing, transporting, stockpiling, installing, and maintaining boulder cascade structures along the stream channel, as specified in the Contract Documents.

PART 2 - Materials

A. ROCK

a. Rock shall consist of imbricated rock of appropriate color (e.g. green/gray, brown/gray, dark gray, and/or dark brown in color) obtained from an approved source. Any rock shall be free from laminations, weak cleavages, and shall not disintegrate from the action of air, water, and in handling and placing. Granular sedimentary rock shall generally not be acceptable.

b. The rock shall have a minimum unit weight of 165 lbs per cubic foot.

c. Rocks shall have a minimum width (Y-Axis) and length (X-Axis) between 2.75 feet and 3.25 feet.

d. Rocks shall have a Minimum height (Z-Axis) between 1.5 feet and 2.5 feet.

e. Weight of rock must be 2 tons or greater.

f. The Contractor shall obtain from the quarry and submit to the City of Alexandria a certificate verifying the follow – 1) Rock, 2) Classification, 3) Weight per cubic foot, 4) Weight of rock being supplied, and 5) Rock Size

g. Samples shall be delivered to the project site for approval by the City of Alexandria prior to its use in the project. Any unsuitable material shall be removed at the Contractor's expense.

h. The Contractor shall not be granted an extension of time or extra compensation due to delay caused by sampling, testing, approval, or disapproval of rock material under the requirements of these Specifications.

i. Rock sizes shall be as specified below:

Structure	X-Axis (Length)	Y-Axis (Width)	Z-Axis (Height)
Boulders (Footer Rock and Top Rocks)	2.75 – 3.25 feet	2.75 – 3.25 feet	1.5 – 2.5 feet

B. FOOTER ROCK

a. Footer rock shall meet the specifications for Rock contained in the Contract Documents. Footer rock consists of rock placed below the invert of the proposed channel or underneath top rocks to provide support for the top rock and prevent toe scour.

C. TOP ROCKS (HEADER)

a. Top rock (header rock) shall meet the specifications for Rock contained in the Contract Documents. Top rock consists of the row(s) of rock place upon and above footer rocks.

D. GEOTEXTILE FABRIC

a. Geotextile/filter fabric shall be non-woven polypropylene geoxtextile, such as Mirafi 700x, Mirafi 70/20, Filterweave 500, or approved equal as described in Item 9060: Geotextile – Non-Woven for In-Stream Structures.

E. STREAMBED MATERIAL

a. Streambed material shall meet the specifications as described in Item 9020: Salvaged Streambed Material.

PART 3 -Construction

3.01 GENERAL

A. Construction and construction tolerances shall be in accordance with the Drawings and Specifications. Grades shall be within 0.25’ of the grades shown on the plans.

B. Before beginning installation, verify site conditions are as indicated on the Drawings. Notify the Engineer if site conditions are not acceptable. Do not begin preparation or installation until unacceptable conditions have been corrected.

3.02 CONSTRUCTION OBSERVATION

A. The City or Project Engineer should verify the materials supplied by the contractor meet all the requirements of the specification. This includes all submittals and proper installation of the system.

B. The Contractor's field construction supervisor shall have demonstrated experience and be qualified to direct all work at the site as approved the City or Engineer.

3.03 INSTALLATION INSTRUCTIONS

A. The contractor shall ensure that the erosion and sediment control devices specified in the contract documents are in place before any work begins on the rock cascades.

B. Contractor shall excavate to the extents required to construct the structure. The subgrade should be smooth, firm, and free from protruding objects or voids that would affect the proper positioning of the first layer of rock and filter fabric. Contractor shall take precautions to minimize over-excavation. Over-excavation shall be filled with compacted infill material, or as directed by the Engineer, at the Contractor's expense.

C. The Contractor shall place filter fabric under all layers of boulders. Place filter fabric loosely and evenly on the prepared slope and secure per manufacturer requirements. Adjacent strips should overlap 12 inches. The upslope filter fabric should always be placed over the downslope filter fabric. If the filter fabric is torn or damaged, it should be repaired or replaced.

D. The contractor shall place footer rocks on the downstream end of cascade. A second or third row (as necessary) of footer boulders shall anchor the cascade boulders such that footers extend a minimum of 2 feet below the receiving pool bottom elevation. Adjacent boulders shall be placed in direct physical contact with one another. Gaps shall not exceed 2 inches unless otherwise shown on the plans or approved by the Engineer.

E. Lay footer boulders as a gently curved rack to spread water laterally (ends of curve point downstream). Form a gentle parabolic shape to keep flow within the thalweg and shoulders. Embed boulders, a minimum of 2 feet into adjacent banks. When boulders are unable to be placed into the stream bank due to their proximity to segmental gravity block retaining walls, the contractor shall work with the selected segmental block retaining wall supplier to determine an appropriate method to ensure cascade stability with the approval of the City and Project Engineer, whether by pocket keying, grout, or similar.

F. Secure footer boulders into soil over pinned geotextile.

G. Stack the first layer of rock ensuring that the rocks are stacked so the placed rock rests on two rocks in the tier below it. Place in irregular offset pattern.

H. Use smaller stones in voids between the tiers to ensure that stacked rocks rest solidly on the tier below with minimal opportunity for movement.

I. Place filter fabric at the completion of each tier of stacked rock.

J. Continue placing tiers of rock until the design height is achieved.

K. Wash in smaller particles into the structure at the end of construction Start at top of cascade and use a 2-inch pump and hose to seal structures and promote surface flow. Repeat multiple times and supply more sand and gravel at the top weirs to continue supplying materials to fill voids in subsequent storms and washes.

L. Chink larger voids between boulders.

M. Liberally cast streambed material over each finished tier to fill in voids and to supply material for the wash-in stage.

N. Trim any excess geotextile fabric such that it is not visible.

O. Upon completion of work, remove unsuitable and surplus rocks and excavated materials to fill areas or approved off-site locations.

3.04 MEASUREMENT AND PAYMENT

A. Imbricated Rock will be measured and paid for at the Contract unit price per Ton installed as described in Item 9010: Imbricated Rock.

B. Geotextile will be measured based on square yards installed. The payment will be full compensation for the preparation of surfaces, loading, hauling, supplying and placement for all material, labor, equipment, tools, and incidentals necessary to complete the work as described in Item 9060: Geotextile – Non-Woven for In-Stream Structures.

C. Salvaged Streambed Material shall be incidental to Item 2010: Stream Channel Excavation (Class 5).

D. Excavating, sorting, stockpiling, and placing fill material shall be incidental to Item 2010: Stream Channel Excavation (Class 5).

END OF SECTION

ITEM 4020

METAL RAILING

1.01 DESCRIPTION

A. This work shall consist of furnishing and installing metal railing true to the line, grade, and dimensions shown on the plans or as established by the City or Engineer.

1.02 MATERIALS

A. Concrete shall conform to Section 217 of the Virginia Department of Transportation, Road and Bridge Specifications. If the Engineer approves the Contractor placing concrete by the extrusion method, the slump of the concrete may be less than 2 inches, the air content shall be no less than 4 percent, and the size of the coarse aggregate shall be no less than No. 7.
B. Steel reinforcement shall conform to Section 223 of the Virginia Department of Transportation, Road and Bridge Specifications.
C. Hydraulic cement mortar and grout shall be nonshrinking and shall conform to Section 218 of the Virginia Department of Transportation, Road and Bridge Specifications.
D. Aluminum railings and materials shall conform to Section 229 of the Virginia Department of Transportation, Road and Bridge Specifications.
E. Anchor bolts shall conform to Section 226.02(c) of the Virginia Department of Transportation, Road and Bridge Specifications.
F. Grounding materials shall conform to Section 238 of the Virginia Department of Transportation, Road and Bridge Specifications.

1.03 CONSTRUCTION

A. Fabrication and erection shall be performed in accordance with Section 407 and Section 410 of the Virginia Department of Transportation, Road and Bridge Specifications. The Contractor shall submit working drawings in accordance with Section 407, including anticipated finish, to be approved by the City and Engineer.

1.04 MEASUREMENT AND PAYMENT

A. Metal railing will be paid for at the contract unit price per linear foot installed. This price shall include constructing, fabricating, and furnishing rails, rail posts, post bearing pads, anchor assemblies, and sleeves; furnishing and installing grounding materials; painting; galvanizing; reinforcing steel necessary; and concrete where applicable.

ITEM 4030

PRE-CAST ENDWALL FOR PIPE CULVERTS

1.01 DESCRIPTION:

A. This item covers the furnishing and installation of Precast Endwalls for Pipe Culverts and Precast Endwalls for Multiple Pipe Culverts.

1.02 MATERIALS

A. 36” Precast Endwall for Pipe Culverts

1.03 CONSTRUCTION METHODS

A. Precast Endwalls for Pipe Culverts shall be installed in accordance with the contract documents. Precast Endwalls for Pipe Culverts shall be installed in accordance with Detail 101.18 and Detail 101.06 of the Virginia Department of Transportation, Road and Bridge Specifications

1.04 MEASUREMENT AND PAYMENT

A. Precast Endwalls for Pipe Culverts will be measured and paid for each Precast Endwalls for Pipe Culverts installed. The payment will be full compensation for all material, labor, equipment, tools and incidentals necessary to complete the work.

END OF SECTION

ITEM 4040

ARMORED UTILITY CROSSING

PART 1 - GENERAL

1.01 DESCRIPTION

A. Armored Utility Crossings structures are used to protect existing sanitary sewer lines and provide protection from storm flows. The work includes placement of a stone structure within the proposed stream channel overtop of utilities as well as a cast-in-place concrete pipe encasement. This work shall consist of transporting material, installing and maintaining Armored Utility Cross within the stream channel and stream bank, as specified on the Contract Documents or as directed by the Engineer.

1.02 MATERIALS

A. Class II Riprap for Armored Utility Crossing shall consist of stone of appropriate color (e.g., green/gray, brown/gray, and tan/brown in color) obtained from an approved source. All rock shall be free from laminations, weak cleavages and will not disintegrate from the action of air, salt water and in handling and placing. Granular sedimentary rock will generally be unacceptable. Concrete will not be considered as an alternative for rock. White rock is not acceptable.

B. Concrete (3,000 P.S.I or greater) shall be used for the encasement.

1.03 CONSTRUCTION METHODS

A. Armored Utility Crossing shall be installed per the Contract Documents and details, and the following Construction Specifications. The Contractor shall arrange and construct Armored Utility Crossings under the direction and approval of the Engineer.

B. Contractor shall review the Armored Utility Crossing Contract documents and details with Engineer prior to construction. Any questions or concerns regarding structure placement or structure construction should be brought to the attention of the Engineer for clarification prior to proceeding with structure installation.

C. Concrete Placement

1. Do not place concrete until free water has been removed or has been diverted by pipes or other means and carried out of the forms, clear of the work. Do not deposit concrete underwater, and do not allow free water to rise on any concrete until the concrete has attained its initial set. Do not permit free or storm water to flow over surfaces of concrete so as to injure the quality or surface finish.

2. Do not place concrete during inclement weather. Protect concrete placed from inclement weather. Keep sufficient protective covering ready at all times for this purpose.

3. Deposit concrete at or near its final position to avoid segregation caused by rehandling or flowing. Do not deposit concrete in large quantities in one place to be worked along the forms with a vibrator.

4. Do not deposit partially hardened concrete in forms. Retempering of partially hardened concrete is not permitted. Remove partially hardened concrete from site at no additional compensation.

5. Do not allow concrete to fall freely in forms to cause segregation (separation of coarse aggregate from mortar). Limit maximum free fall of concrete to 4 feet. Do not move concrete horizontally more than four feet from point of discharge. Space points of deposit not more than eight feet apart.

6. Conduct vibration to produce concrete of uniform texture and appearance, free of honeycombing, streaking, cold joints or visible lift lines.

D. Encasements

1. All concrete encasements shown on the plans shall be constructed per the details on the Drawings. The earth may be used for side and bottom forms provided such sides can be excavated uniformly smooth and to the size and shape specified.

2. Care must be taken during the pouring operation to ensure that the pipe does not float or move from the buoyant effects of the concrete. Misalignments of the crossings shall be cause for total removal and replacement of the encasement and pipe at the Contractor's expense.

3. Once the concrete is set, measures shall be taken to cure the concrete by covering it with plastic. Water shall not be allowed to run over the concrete for at least 48 hours. Forms will be required if the subgrade and sides are not firm or will not hold shape.

4. Concrete encasement shall extend into existing ground 6" on either side and beneath the pipe and 6" above the pipe.

5. Placed material not conforming to the specified limits shall be removed and replaced as directed by Engineer at no additional cost to The Owner.

1.04 MEASUREMENT AND PAYMENT

A. Armored Utility Crossing will not be measured but will be paid for at the Contract lump

sum price. Price and payment will be full compensation for all grading, excavation, stone, backfill, concrete placement, disposal of excess material, prewashing when required, and for all material, labor, equipment, tools and incidentals necessary to complete the work.

B. Excavating, sorting, stockpiling, and placing fill material shall be incidental to Item 2010: Stream Channel Excavation (Class 5).

END OF SECTION

ITEM 4050

MANUFACTURED STONE VENEER FOR CONCRETE ENDWALLS

1.01 DESCRIPTION:

A. This item covers the furnishing and installation for adhered manufactured stone veneer. Manufactured Stone Veneer (MSV) units consist of a mixture of cement, lightweight aggregates, concrete additives and coloring pigments to replicate appearance of natural stone and designed to be applied with a cementitious mortar to a backing surface. All work to be performed under this item shall be in accordance with ASTM Specifications C1670, C1670M, and C1780.

1.02 ADMINISTRATIVE REQUIREMENTS

A. Pre-Installation Meeting – Contractor shall set pre-installation meeting at least two weeks prior to starting work from this section. Mock-up panel shall be complete and reviewed at this meeting.

1.03 SUBMITTALS

A. Product data - Provide data for MSV units, lath and scratch coat/cement board, water resistive-barrier (WRB), and weep-screed/flashing materials.
   1. Test Report for each MSV profile showing Compliance with ASTM C1670.
   2. Color Charts (Stone, Trims, Pointing Mortar)

B. Contractor shall submit proposed detail drawings depicting proper installation and flashing techniques. Reference these details locations with those found on drawings.

C. Verification Samples - For each finish product specified, submit a sample board representing actual product, color, pattern and texture.

D. Construct mock-up panel minimum 4 feet long by 4 feet high which includes MSV, lath installation, mortars, weep-screed/flashings, WRB and related materials. Demonstrate proper installation technique to be used on project.
   1. Leave section exposed showing proper layering of WRB and Weep Screeds and Flashings.
   2. Mock-up shall remain on site until the work has been accepted.

1.04 MATERIALS

A. Setting Bed Mortar - Setting Bed used to adhere MSV units to scratch coat mortar or to bondable concrete or concrete masonry.

1. Prepackaged /Preblended Modified shall be in accordance with ANSI A118.4 or A118.15. Follow industry standards and manufacturers installation requirements for setting veneer.

B. Setting bed Mortar - Setting Bed used to adhere MSV units to cement board.
   a. Prepackaged/Preblended thin-set Modified mortar shall be in accordance with ANSI A118.4 or ANSI A118.15. Follow industry standards and manufacturers installation requirements for setting veneer.

C. Pointing Mortars - Pointing or Grouting mortars used to fill the joints between individual MSV units once the setting bed mortar has sufficiently cured.
   1. Site-Mixed shall be in accordance with ASTM C270 / ASTM C1714 Type N or S.
   2. Approved pre-packaged pointing mortar that meets or exceeds standard.
   3. When specified, use iron oxide pigments to match color selected by the City of Alexandria.

D. Accessories
   1. Lath - Self-furring metal lath (galvanized) shall be 2.5 lb/yd2 or heavier and in accordance with ASTM C847.
      a. Welded wire lath shall be in accordance with ASTM C933.
      b. 18 Gauge (or heavier) woven wire lath shall be in accordance with ASTM C1032.
      c. A lath product consistent with MSV Manufacturer's installation instructions and evaluated by an accredited evaluation service shall be in accordance with ICC-ES Acceptance Criteria 275 (AC275) or equivalent and ASTM C1788.
   2. Water-Resistive Barrier sheet shall be in accordance with ASTM D226/D226M, Type I or ASTM E2556/E2556M Type I or II.
   3. Other acceptable materials include:
      a. Materials evaluated for compliance with ICC-ES AC38.
      b. Liquid-applied materials evaluated for compliance with ICC-ES AC212 (for use as primary WRB only).
      c. Pre-Coated sheathing evaluated for compliance with ICC-ES AC310 (for use as primary WRB only).

1.05 CONSTRUCTION METHODS

A. Cold & Hot Weather Requirements: Comply with requirements set by TMS 402/602.
   1. Protect installation when temperature is 40° F or less prior to, during, and 48 hours after completion of masonry work per requirements set in TMS 602.
   2. Protect installation from rapid drying when air temperature is greater than 100° F (or above 90° with a wind speed greater than 8 mph) prior to, during and 72 hours after completion of masonry work per requirements set in TMS 602.

B. Verify that backup wall system construction complies with MSV manufacturer's instructions, CMHA MSV Installation Guide, CMHA MSV-TEC-001 and ASTM C1780.

C. Verify that substrates to receive mortar scratch coat or setting bed comply with MSV manufacturer's instructions.
   1. Scratch Coat: When scratch coat has dried before installing stone, dampen scratch coat by misting it with water to control suction. Visible water standing on the surface of the scratch coat will inhibit good bond. The scratch coat should be visibly hydrated but free from standing surface water.
   2. Concrete Masonry Surfaces: Verify joints are cut flush and surface is ready to receive mortar setting bed. Verify no bituminous or water-repellent coatings exist on masonry surface.
   3. Concrete Surfaces: Verify surfaces are flat, honeycomb is filled flush, and surface is ready to receive mortar setting bed. Verify no bituminous, water repellent, or form release agents exist on concrete surface that are detrimental to mortar setting bed.
      a. Surface must meet or exceed CSV level 2 or greater as set by International Concrete Repair Institute (ICRI) Technical Guide 310.2. When surface fails to meet level 2, attach metal lath per ASTM Standard.
   4. Framing (Metal or Wood) w/ structural sheathing – Verify sheathing is installed per specifications. Follow manufacturer's instructions when using sheathing that functions as the primary WRB layer.
   5. Verify that related items provided under other sections are properly sized and located. These include roof kick-out flashings, chimney caps, wall copings and railings.
   6. Verify that built-in items are in proper location and ready for installation of MSV units. This includes electrical outlet boxes, plumbing systems and other items shown on plans.

D. Water Resistive Barrier

   1. Integrate water-resistive barrier with all flashing accessories, adjacent water-resistive barriers, doors, windows, penetrations and cladding transitions.
   2. For all sheet WRBs, install per manufacturer's instructions, including proper lapping and transitions.
   3. For all liquid and pre-coated sheathing install per manufacturer's instructions. Ensure flashing tape is properly installed over weep screeds/flashings prior to installation of secondary WRB.
   4. WRB Installation Requirements
      a. Light Frame Applications – install 2 two layers of WRB when using lath and scratch coat. Install one layer of WRB when using cement board.
      b. Concrete/Masonry Substrate – installed WRB when indicated on drawings.

E. Lath

1. Install lath securely to surface with proper fasteners and spacing requirements.
   a. Install fasteners into framing at required depth as outlined in MSV Design & Installation Guide.
   b. Lap lath at vertical seams 1" minimum and at horizontal seams 1/2" minimum.
2. When installing lath over continuous insulation board refer to MSV Design and Installation Guide 5th Edition/5th Printing or later for proper fastener selection and required horizontal and vertical spacing required by International Building Code (IBC) based on insulation board thickness and assembly weight.

F. Scratch Coat and Cement Board

1. Metal Lath Surface:
   a. Apply mortar scratch coat nominal ½" thick to completely cover and engage metal lath in accordance with ASTM C926. Scratch surface horizontally with scarifier when surface is thumb print hard.
   b. When scratch coat has dried before installing stone, dampen scratch coat by misting it with water to control suction. If scratch coat is saturated, wait for surface to dry before installing stone veneer.
2. Cement Board:
   a. Secure cement board to wall using required hi-low screws following manufacturer's instructions. Screws should not exceed 8" vertical spacing.
   b. Tape all seams with alkali-resistant adhesive mesh tape. Mud all seams with polymer thin-set mortar to embed mesh tape. For exterior applications use 4" minimum tape. For interior applications use 2" minimum tape. For all applications, use 4" minimum tape at all corners. Mud all seams with modified mortar meeting ANSI A118.4 or A118.15.

G. Manufactured Stone Veneer

1. Install MSV with a cementitious mortar setting bed assuring complete coverage on back of stone surface in accordance with MSV manufacturer's instructions, CMHA MSV-TEC-001 and ASTM C1780.
   a. Work from multiple pallets / boxes to ensure proper color blending
   b. Laying pattern should resemble approved Mock-up panel.
   c. Mortar joints as approved in sample panel.
2. Sills/Water Table - Install sills where indicated on drawings. When detailed, secure metal support clips under stone sill prior to setting Sills/Water Table shapes.

3. Use accessory shaped stones around electrical boxes and other wall penetrations to ensure weather tight fit. When accessory shaped stones are not available, cut and fit stone around openings in a professional manner.
4. Install control joints/movement joints in stone veneer where indicated on drawings.
5. Remove excess mortar and mortar smears as work progresses.
6. Protect finished work from rain during and for 48 hours following installation.

1.06 MEASUREMENT AND PAYMENT

A. Manufactured Stone Veneer for Concrete Endwalls will not be measured but will be paid for at the Contract lump sum price. Price and payment will be full compensation for all material, labor, equipment, tools and incidentals necessary to complete the work.

ITEM 4060

DEADMAN ANCHOR SYSTEM FOR EXISTING SHEET PILE RETAINING WALL

1.01 DESCRIPTION:

A. All work performed under this item and payment therefore shall be in accordance with VDOT Manual of the Structure and Bridge Division, Chapter 18, Earth Retaining Walls, FHWA Geotechnical Engineering Circular No. 4, Ground Anchors and Anchored Systems, and UFGS 31 41 16.16 Synthetic Sheet Piling.

1.02 CONSTRUCTION METHODS

A. Deadman Anchor System for Existing Sheet Pile Retaining Wall shall be installed per the Contract Documents and details, and the following Construction Specifications. The Contractor shall arrange and construct Deadman Anchor System for Existing Sheet Pile Retaining Wall under the direction and approval of the Engineer.

B. Contractor shall review the Deadman Anchor System for Existing Sheet Pile Retaining Wall Contract documents and details with Engineer prior to construction. Any questions or concerns regarding structure placement or structure construction should be brought to the attention of the Engineer for clarification prior to proceeding with structure installation.

1.03 MEASUREMENT AND PAYMENT

A. Deadman Anchor System for Existing Sheet Pile Retaining Wall will be measured and paid for at the contract unit price per each installed. Price and payment will be full compensation for all grading, excavation, and for all material, labor, equipment, tools and incidentals necessary to complete the work.

ITEM 4070

FLAP GATES FOR PIPE CULVERTS

1.01 DESCRIPTION:

A. This work consists of furnishing and installing Flap Gates for Pipe Culverts as shown on the contract documents and as may be determined to be necessary by the Contractor and Engineer. Flap gates shall automatically permit discharge from the storm drainage system and prevent backflow from downstream water bodies.

1.02 PERFORMANCE

A. Gate shall open automatically under positive discharge head and shall close automatically and prevent backflow under the design backwater elevation.

1.03 SUBMITTALS:

A. The Contractor shall submit product data and shop drawings for review and approval prior to installation.

1.04 CONSTRUCTION METHODS

A. Install flap gate in accordance with the manufacturer's recommendations. Verify unrestricted gate movement after installation.

1.05 MEASUREMENT AND PAYMENT

A. Flap Gates for Pipe Culverts will be measured and paid for at the contract unit price per each installed. Price and payment will be full compensation for all material, labor, equipment, tools and incidentals necessary to complete the work.

ITEM 7010

SOIL STABILIZATION MATTING

PART 1 - GENERAL

1.01 DESCRIPTION

A. This work consists of furnishing and installing Soil Stabilization Matting on graded stream banks and adjacent slopes, as shown on the contract documents and as may be determined to be necessary by the Contractor and Engineer.

1.02 MATERIALS

A. Soil Stabilization Matting - A woven fabric of high strength coir twine made from well-cleaned, fresh water cured coconut fiber (CM-700 or approved equivalent) meeting the following minimum mechanical properties:

1. Thickness (ASTM D5199) - 0.35 in.
2. Mass per unit area (ASTM D5261) - 20.6 oz/sq.yd
3. Width Tensile Strength Dry (ASTM D4595) - 1512 x 1032 lbs/ft
4. Width Tensile Strength Wet (ASTM D4595) - 924 x 684 lbs/ft
5. Maximum Elongation Dry (ASTM D4595) - 40% x 33% lbs/ft
6. Maximum Elongation Wet (ASTM D4595) - 69% x 35% lbs/ft
7. Sheer Stress - 4.5 psf
8. Velocity - 12 fps
9. Open Area - 50%

B. Wooden Stakes - Stakes for securing the matting shall be triangular wooden stakes with a nominal dimension of 2” x 4” at the head and tapering to a point. Stakes must be a minimum of 18” long. Staples are not allowed for use to secure matting.

1.03 CONSTRUCTION

A. If topsoil is determined to be necessary by the Engineer, the topsoil shall be placed prior to installing the Soil Stabilization matting. Soil or seedbed preparation and permanent seeding shall be complete prior to the placement of soil stabilization matting.

1.04 PLACING AND SECURING

A. Soil Stabilization Matting shall be laid smoothly and firmly in the direction of water flow. Stretching shall be avoided. Where more than one width of matting is required, the ends of each strip shall overlap at least 12 inches for vertical and 6 inches for horizontal overlaps. Overlapping shall be done with both the upslope and upstream ends of the matting overlapping the downslope and downstream ends. Soil Stabilization Matting shall be installed as depicted on the typical details. In no case shall matting extend less than 12 inches beyond the top of the slope.

1.05 KEYING-IN

A. The Contractor shall excavate a shallow trench at the top of the slope and key-in the top edge of the matting a minimum of 12-inches x 12-inches x 12-inches as shown on the construction documents. Vertical ends of the matting at both the upstream and downstream ends of the bank treatment areas shall also be keyed-in to a trench excavated into the slope a minimum of 6-inches. Following installation of stakes, the trenches shall be backfilled with topsoil and tamped firmly. The Engineer may require any other edge exposed to more than normal flow of water to be keyed-into the slope in a similar manner.

B. The bottom edge of the matting shall be installed within a toe trench. The matting shall be secured in-place along the bottom edge one foot below the bottom of the bank using stakes.

1.06 SECURING MATTING WITH STAKES

A. Soil Stabilization matting shall be securely fastened in place with stakes driven vertically into the soil. Stakes shall be installed 24-inches apart along the upstream and downstream edges of the matting, within the key-in trench at the top of slope, and on vertical and horizontal overlapping edges. On slopes 2:1 or steeper, wooden stakes shall be installed on 3-foot centers in alternating rows throughout the remainder of the matting. On slopes of 3:1 or gentler, wooden stakes shall be installed on 4-foot centers throughout the remainder of the matting.

1.07 MAINTENANCE

A. Areas of torn or degraded matting shall be repaired or replaced unless such degradation is within the accepted tolerances for temporary blankets. Edges or seams which are loose or frayed shall be secured with additional Stakes. Bare patches of vegetation shall be reseeded as necessary.

1.08 MEASUREMENT AND PAYMENT

A. Soil Stabilization Matting will be measured and paid for at the Contract unit price per square yard of area covered. Should the Soil Stabilization Matting become unsecured or degrade before the disturbed area is fully stabilized, the Contractor shall replace the matting and re-seed the affected area at the Contractor's expense. The payment will be full compensation for all materials, labor, equipment, tools, and incidentals necessary to complete the work.

B. Wooden Stakes will not be measured and paid for separately, but the cost will be considered incidental to the Contract unit price for Soil Stabilization Matting.

C. Seeding will be measured and paid for at the Contract unit price per pound installed for the planting zone seed mix as shown on the Contract Documents for Item 7050, 7060, 7070, and 7080.

END OF SECTION

ITEM 7020

TEMPORARY SEED AND MULCH

PART 1 - GENERAL

1.01 DESCRIPTION

A. This item involves the placement of temporary seed and mulch and for the purposes of temporary stabilization of disturbed areas prior to permanent vegetative establishment.

B. This item shall be in accordance with Section 603 of the Virginia Department of Transportation, Virginia Department of Transportation, Road and Bridge Specifications, and as described in the Planting Schedule of the Contract Documents.

1.02 CONSTRUCTION METHODS

A. Temporary seed and mulch shall be applied to any disturbed area that cannot be permanently stabilized for an extended period of time, as directed by the Engineer.

1.03 MEASUREMENT AMD PAYMENT

A. Temporary Seed and Mulch shall be measured and paid for at the Contract unit price per square yard covered. Payment shall be full compensation for all materials, labor, equipment, tools and incidentals necessary to complete the work as directed by the Engineer.

END OF SECTION

ITEM 7030

PLACING SALVAGED TOPSOIL – 4” DEPTH

PART 1 - GENERAL

1.04 DESCRIPTION

A. The Contractor shall salvage and place topsoil to a depth of 4 inches throughout all areas that have been disturbed and require permanent seeding. The Contractor shall use salvaged topsoil prior to using furnished topsoil.

B. This item shall be in accordance with Section 602 of the Virginia Department of Transportation, Virginia Department of Transportation, Road and Bridge Specifications, and as described in the Planting Schedule of the Contract Documents.

1.05 MATERIALS

A. This item shall be in accordance with Section 602 of the Virginia Department of Transportation, Virginia Department of Transportation, Road and Bridge Specifications, and as described in the Planting Schedule of the Contract Documents

1.06 CONSTRUCTION METHODS

A. The Contractor shall furnish and place topsoil to a depth of 4 inches throughout all areas that have been disturbed and require permanent seeding., as directed by the Engineer.

1.07 MEASUREMENT AMD PAYMENT

A. Placing Salvaged Topsoil - 4” Depth will be measured and paid for at the Contract unit price per square yard placed. The payment will be full compensation for all material, testing, certification, labor, equipment, tools, and incidentals necessary to complete the work.

END OF SECTION

ITEM 7040

PLACING FURNISHED TOPSOIL – 4” DEPTH

PART 1 - GENERAL

1.08 DESCRIPTION

A. The Contractor shall furnish and place topsoil to a depth of 4 inches throughout all areas that have been disturbed and require permanent seeding. The Contractor shall use salvaged topsoil prior to using furnished topsoil.

B. This item shall be in accordance with Section 602 of the Virginia Department of Transportation, Virginia Department of Transportation, Road and Bridge Specifications, and as described in the Planting Schedule of the Contract Documents.

1.09 MATERIALS

A. This item shall be in accordance with Section 602 of the Virginia Department of Transportation, Virginia Department of Transportation, Road and Bridge Specifications, and as described in the Planting Schedule of the Contract Documents

1.10 CONSTRUCTION METHODS

A. The Contractor shall furnish and place topsoil to a depth of 4 inches throughout all areas that have been disturbed and require permanent seeding., as directed by the Engineer.

1.11 MEASUREMENT AMD PAYMENT

A. Placing Furnished Topsoil - 4” Depth will be measured and paid for at the Contract unit price per square yard placed. The payment will be full compensation for all material, testing, certification, labor, equipment, tools, and incidentals necessary to complete the work.

ITEM 7050

RIPARIAN BUFFER SEEDING

ITEM 7060

STREAMSIDE/STREAMBANK SEEDING

PART 1 - GENERAL

1.01 DESCRIPTION

A. This work shall consist of soil preparation, and seeding all areas shown in the Contract Documents.

1.02 MATERIALS

A. Seed shall conform to the seed mixes specified within the Contract documents.

B. Seed tags with the seed origin, purity of the seed, germination percentage and date of germination testing shall be provided for all seed introduced into the project area.

C. No lime, fertilizer, or other amendments are to be used, unless otherwise approved by the Engineer.

1.03 CONSTRUCTION

A. All areas to be seeded shall conform to the finished grades as specified on the plans and be free of all weeds, trash, debris, brush, clods, loose rocks and other foreign materials larger than 3 inches in diameter or length that would interfere with seeding. All gullies, washes or disturbed areas that develop subsequent to final dressing shall be repaired prior to seeding.

B. Seeding shall be performed within the dates specified by the Contract documents, or as directed by The Owner. No seeding shall be performed on frozen ground or when the temperature is 32°F/0°C or lower.

C. Loosen graded soils to a depth of 1 to 2 inches with a hand rake or other approved device. Seed mixes shall be applied at the rate specified in the Contract documents. Apply seed when the soil is friable (soil should break up easily and not form clods when worked) using a broadcast seeder or hydroseeder. If a broadcast seeder is used, mix the seed with

a carrier of similar weight (perlite, vermiculite, sawdust, or similar product) and make two passes over each area. The second pass shall be made at a 90-degree angle to the first pass to ensure even seed distribution. Work seed into the soil with the back of a hand rake. Finally, press the seed into the soil with a hand roller or by simply walking on the seeded areas following raking to ensure soil to seed contact. If using a hydroseeder, no carrier is required and one pass over each area will be sufficient provided that all portions of the site to be seeded are covered.

D. For those areas that are not to be covered by soil stabilization matting, mulch seeded areas with straw at a rate of 100 bales/acre or 16 cubic yards/acre. Immediately after seeding, the site shall be watered lightly but thoroughly, so that the top 4 inches of soil is saturated.

1.04 WARRANTY

A. The Contractor shall maintain a minimum 85% aerial coverage of seeded areas for 1 year after final inspection. This shall include necessary care and replacement to achieve the required coverage.

1.05 MEASUREMENT AND PAYMENT

A. Upland Native Seed Mix, Riparian Buffer Seeding, Wetland Seeding, and Streamside/Streambank seeding shall be measured and paid for at the contract unit price per pound of seed installed. Payment will be full compensation for furnishing and incorporating all seed, including all maintenance and warranty, mulch, materials, labor, equipment, tools, and incidentals necessary to complete the work as specified in Contract Documents, or as directed by The Owner.

END OF SECTION

ITEM 7070

LIVE STAKE PLANTING

PART 1 - GENERAL

2.12 DESCRIPTION

A. This work shall consist of acquiring, transporting, and installing live stakes along the stream banks as specified on the Contract Documents, these Construction Specifications or as directed by The Owner. Acquiring, transporting, and installation shall take place when plants are dormant (December 1 through April 1, inclusive).

2.13 MATERIALS

A. Live cuttings for live stakes shall be 0.5 inches to 1.5 inches in diameter and between 2 feet to 3 feet long. Side branches shall be removed, and the bark left intact prior to installation. Buds on the stakes shall be oriented in an upward position. The basal ends shall be tapered to a point for easy insertion into the soil. The top shall be cut smooth and square. Live stakes shall consist of a mix of three species, as shown on the planting schedule:

Cornus amomum	Silky Dogwood
Cornus sericea	Red Osier Dogwood
Salix sericea	Silky Willow
Salix nigra	Black Willow

B. All plant material shall conform to the current issue of the American Standard for Nursery Stock published by the American Association of Nurserymen.

C. Plant materials must be selected from certified nurseries that have been inspected by state and/or federal agencies. Nursery inspection certificates shall be furnished to The Owner upon request.

D. Plant material collected from the “wild” is prohibited.

E. The Owner may reject plants damaged in handling or transport.

PART 2 - CONSTRUCTION METHODS

2.01 LIVE MATERIAL PREPARATION

F. All cuts shall be smooth, and the cut surface kept small. The use of large pruning shears or power saws may be required.

G. Live materials must be protected against drying out and overheating before/during transport (e.g., they shall be covered transported in unheated vehicles, moistened, kept in soak pits) and on-site prior to installation (e.g., by storing in controlled conditions, storing in shade, covering with evergreen branches or plastic, placing in moist soil, or spraying with anti-transpirant chemicals). Live materials shall receive continuous shade, shall be sheltered from the wind, and shall be continuously protected from drying by being heeled into moist soils. Where water is available, live stakes shall be sprayed or immersed.

H. Live materials shall be installed the same day that the cuttings are harvested. If installation of live materials cannot be accomplished on the same day and storage is required, live materials shall be stored for a period no longer than 3 calendar days.

2.02 LIVE STAKE INSTALLATION PREPARATION

I. Live Stakes shall be installed according to the Sequence of Construction, Contract Documents, and the following specifications.

J. Soil Stabilization matting should be placed on the banks prior to installing the live stakes.

K. Use a rebar stake or other approved method to make a pilot hole at $\pm$ 45-degree angle into firm soil, insert the point of the stake into the pilot hole and tamp it into the ground at $\pm$ 45-angle to the slope using a hammer and wood block, dead blow hammer or with a rubber mallet.

L. The live stakes should be installed in 2 rows that are 3.0 feet apart using triangular spacing.

M. Buds should be oriented up.

N. Approximately three-fourths of the length of the live stake should be installed into the ground, and soil should be firmly packed around it after installation.

O. Do not split the stakes during installation. Stakes that split should be removed and replaced.

2.03 INSTALLATION PHASE ACCEPTANCE

A. Installation Phase acceptance shall be granted when all Live Stakes Construction Method activities have been satisfactorily completed as determined by The Owner or a representative of The Owner.

2.04 PLANT ESTABLISHMENT

P. The Contractor is responsible for maintaining a 50% plant establishment success rate at the end of the one–year establishment period, following Installation Phase acceptance. The Contractor is responsible for replanting all areas not meeting 50% survival.

Q. The Contractor will not be responsible for plant material that has been damaged by vandalism, fire, or other activities beyond the Contractors' control, as determined by The Owner.

2.05 MEASUREMENT AND PAYMENT

R. Live Stakes will be measured and paid for at the Contract price per each Live Stake installed. The payment will be full compensation for furnishing, storing, soaking, watering, and planting, and for all materials, labor, equipment, tools and incidentals necessary to complete the work specified in the Contract Documents, or by The Owner. No separate payment will be made for the replacement of Live Stakes during construction or the one–year establishment period.

S. Live Stakes will be paid according to the Live Stakes Payment Schedule:

Live Stakes Payment Schedule		
Requirements	**Percent of Total Contract Price**	**Payment for Completed Work**
Installation Phase	70%	At Installation Phase Acceptance
Establishment Phase	30%	At Establishment Phase Acceptance
Total Payment	100%	

END OF SECTION

ITEM 7080

UPLAND TREE AND SHRUB

PART 1 - GENERAL

2.14 DESCRIPTION

A. This work shall consist of furnishing and planting trees and shrubs and all plant establishment operations as specified in the Contract Documents and shown on the Planting Contract Documents, or as directed by The Owner. Transporting and installation of plant material shall take place March 1 to June 15, inclusive or September 15 to December 15, inclusive.

B. Prior to the start of work on this item, the Contractor shall submit a proposed planting schedule, including source of plant material to The Owner for review. No work shall be performed until The Owner approves this schedule.

2.15 GENERAL

A. The Contractor shall possess a Virginia Department of Agriculture and Consumer Services Commercial Pesticide Business License and a Pesticide Applicator Certificate for the pertinent pesticide application Category: (2) Forest; (3A) Ornamental Plant Exterior; (3-C) Turf; (5) Aquatic; (6) Right-of-Way and Weed.

B. Apply pesticides in conformance with the Virginia Pesticide Applicator's Law, OSHA and VOSH regulations, and the manufacturer's label and Safety Data Sheets (SDS).

C. Ensure that pesticides are applied by a Virginia Certified Pesticide Applicator, or by a Registered Pesticide Applicator under the supervision of a Certified Pesticide Applicator.

D. Pesticides shall be EPA-approved and registered for use in Virginia to control plants, fungi, insects or other pests. Pesticides shall be approved for use and used at labeled application rates.

1. Herbicide. Herbicide shall control or prevent regrowth of plants or vegetation.

2. Insecticide. Insecticide shall control or protect against insect or other arthropod pests.

3. Fungicide. Fungicide shall control or protect against fungal or bacterial pests.

E. Record the location and details of pesticide applications on Virginia Department of Agriculture and Consumer Services Pesticide Application Records Form. Submit the Form to City of Alexandria within 24 hours after applying pesticides.

PART 2 MATERIALS

2.16 PLANT MATERIAL

A. All plant materials shall meet the standards outlined in Section 605 of the Virginia Department of Transportation, Road and Bridge Specifications . The plant material shall also be inspected in accordance with Section 605.04.

B. Plant materials must be selected from certified nurseries that have been inspected by state and/or federal agencies. Nursery inspection certificates shall be furnished to The Owner upon request.

C. Plant material collected from the "wild" is prohibited.

D. Container grown stock shall have been grown in a container long enough for the root system to have developed sufficiently to hold its soil. Roots shall visibly extend to the inside face of the growing container, but container grown stock shall not be root bound. All container plants shall be grouped and watered daily until they are planted.

E. The Owner may reject plants that do not meet the standards outlined in Section 605.09 or plants that have been damaged in handling or transport.

2.17 SUBSTITUTE PLANT MATERIAL

A. If a substitute is selected, it must be native to the Virginia Coastal Plain Region; of the same size, value, and quality; and have the same habitat requirements as the original plant. All substitution requests shall be submitted to City of Alexandria for review.

2.18 SHELTERS

A. Refer to Items 7090: Deer Protection

PART 3 - CONSTRUCTION METHODS

3.01 Preparation

A. The live plant material shall be transported to the construction site within 3 calendar days of delivery from the nursery. Live plant materials must be protected against drying out and overheating before/during transport (e.g., they shall be covered transported in unheated vehicles, moistened, kept in soak pits) and on–site prior to installation (e.g., by storing in controlled conditions, storing in shade, covering with evergreen branches or

plastic, placing in moist soil, or spraying with anti–transpirant chemicals). Live materials shall receive continuous shade, shall be sheltered from the wind, and shall be continuously protected from drying by being heeled into moist soils.

3.02 Planting

A. The Contractor shall refer to the Plant Schedules and Details on the Contract Documents for specific planting pit and spacing requirements. Perform the following operations when preparing planting pits for individual plants.

1. Undesirable Vegetation. Manually remove undesirable vegetation and apply an aquatic non-selective herbicide in water with wetting agent and dye at least 14 calendar days before plant installation. Cut and remove dead vegetation or debris that interferes with soil preparation, plant installation or future maintenance.

2. Excavation. Excavate planting pits to the depth required to allow for the placement of root collars at the soil surface. Retain the excavated soil for preparation as backfill soil. Remove excess soil from the site or spread as directed. Excavate additional depth and width as shown in the detail, place furnished subsoil to the dimensions shown in the detail, and complete tree or installation using Table 1. Remove excess soil from the site or spread as directed.

3. Planting Pit Diameter. Use Table 1 to determine the diameter of the planting pit based upon the container or root ball diameter.

4. Compost. Use Table 1 to determine the quantity of compost to mix into backfill soil, based upon planting pit diameter. Uniformly mix compost into the backfill soil.

5. Mulch. Spread shredded hardwood bark mulch uniformly over the soil surface to a 3-in. depth. Promptly repair damage caused by washouts or construction activities.

6. Water. Use Table 1 to determine the quantity of water to apply for each installed plant based upon planting pit diameter.

TABLE 1 - PREPARING PLANTING PITS AND BACKFILL SOIL AND WATERING				
Container or Root Ball Diameter, In.	ANSI Z60 Container Size	Planting Pit Diameter, In.	Compost, Ft^3	Water per Event, Gal
<3	Plugs and Tubelings	2 to 4	0.01	0.10
3	#SP3	6	0.02	0.15
5	#SP4	10	0.02	0.20
6	#SP5 or #1	12	0.03	0.30
8	#2	17	0.09	0.50
10	#3	21	0.18	1.00
12	#5	24	0.28	1.50
14	#7	28	0.44	2.30
16	#10	32	0.65	3.50
18	#15	36	0.94	5.00

3.03 Plant Protection

A. The Contractor shall install tree and shrub shelters as indicated in Items 7090: Deer Protection.

3.04 Clean Up

A. During planting all areas shall be kept neat, clean and free of all trash and debris, and all reasonable precautions shall be taken to avoid damage to existing plants, turf, structures and private property.

B. Remove all tags, labels, strings, and wire from the plant materials, unless otherwise directed by The Owner.

C. Final cleanup shall be the responsibility of the Contractor and consist of removing all trash

and materials incidental to the project and disposing of them off–site.

3.05 Installation Phase Acceptance

A. The Contractor shall submit a request for Installation Phase Inspection when operations are completed. The Installation Phase Inspection will be scheduled by The Owner or a representative of The Owner at the project site with the Contractor to verify completion. At least 7 calendar days' notice will be provided before the scheduled Inspection so that it may be completed in the company of the Contractor.

B. The Owner or a representative of The Owner, in consultation with the Contractor, shall develop an Installation Phase punch list and list of plants to be replaced, if necessary. Installation Phase acceptance shall be granted when all the Installation Phase requirements are completed according to the Installation Phase Acceptance Table.

Installation Phase Acceptance Table	
Item	**Requirement**
1	Inspection is completed.
2	Damaging pests are controlled.
3	Layouts are inspected and approved.
4	Compost is mixed in soil, as required.
5	Trees and shrubs are pruned.
6	Trees are installed vertically and straight.
7	Tree and shrub shelters are installed properly.
8	Mulch is uniformly spread to the specified depth.
9	Washouts in planting pits are repaired.
10	Plants receive initial watering and follow up watering.
11	Clean up is completed, plant tags and ribbons are removed.
12	Plants are relocated to approved locations.
13	Abandoned planting pits are filled and seeded.
14	Unacceptable plants are replaced.
15	Damage repairs and Installation Phase Punch List are completed.
16	Pesticide Application Reporting Forms are completed.

3.06 Plant Establishment

A. The Contractor is responsible for maintaining an 85% plant establishment success rate for a one–year establishment period, following Installation Phase acceptance. The Contractor is responsible for replanting all areas not meeting 85% survival during the establishment period. The plant establishment period of all replacement plants shall extend for an

additional one-year period from the date of their acceptance after replacement.

B. A plant is considered unsuccessful if:

1. The plant is dead or missing
2. 25% or more of the leaf area is dead, lost or dropped
3. a bark wound over 2-in. is present
4. 10% or more of the tree height is lost due to leader die-back
5. or 75% of the branches exhibit 6-in. or more of branch die-back.

C. Watering shall conform to Table 1, above.

D. The Contractor will not be responsible for plant material that has been damaged by vandalism, fire, or other activities beyond the Contractors' control, as determined by The Owner.

3.07 Year One Acceptance:

A. The Owner will inspect the tree and shrub plantings one year after the Installation Phase. Year One Acceptance will be granted when the requirements of the Establishment Table are satisfactorily completed.

3.08 Establishment Phase Acceptance:

A. The Owner will inspect the tree and shrub plantings at the end of the establishment periods. Establishment Acceptance will be granted when the requirements of the Establishment Table are satisfactorily completed.

Establishment Phase Table	
Item	**Requirement**
1	Water sprouts are manually pruned and removed.
2	Trees are straightened.
3	Washouts in planting pits are repaired.
4	Plants are relocated to approved locations.
5	Abandoned planting pits are filled and seeded.
6	Plants are successfully established.
7	Damaging pests are controlled.
8	Planting pits are weed free.
9	Unacceptable plants are replaced.
10	Pesticide Application and Nutrient Management Reporting Forms are completed.
11	Damage repairs and Establishment Punch List are completed.

PART 4 – MEASUREMENT AND PAYMENT

A. Planting Trees and Shrubs will be measured and paid for at the Contract price per each item specified in the Contract Documents. The payment will be full compensation for all trees, shrubs, transporting, installing, planting pit excavation, backfill, mulch, clean up, plant establishment, watering, maintenance, replanting and all material, labor, equipment, tools, and incidentals necessary to complete the work.
B. Planting Trees and Shrubs will be paid according to the Planting Trees and Shrubs Payment Schedules.

Planting Trees and Shrubs Payment Schedule – Items 7100 and 7110		
Requirements	**Percent of Total Contract Price**	**Payment for Completed Work**
Installation Phase	70%	At Installation Phase Acceptance
Establishment Phase	30%	At Establishment Phase Acceptance
Total Payment	100%	

END OF SECTION

ITEM 7090

DEER PROTECTION

PART 1 - GENERAL

3.01 DESCRIPTION

A. Provide, install, and maintain tree and shrub deer protection guard for newly installed trees and shrubs as directed by The Owner.

B. Single stem trees shall be protected by sleeves. Multi-stem trees and shrubs shall be protected by wire cages.

3.02 MATERIALS

A. Deer Protection Guard (Sleeves)

1. The 4-ft. protection guard shall consist of 4-in. diameter, high strength / heavy duty, open weave mesh (with grid not to exceed 3/4 in. x 3/4 in.) to prohibit harboring of insects and animals, and to prevent moisture/mildew build-up. Material shall be UV stable rigid plastic, black in color, with an expected useful lifespan of a minimum of 5 years.

B. Deer Protection Guard (Wire Cages)

1. The 4 ft. protection guard shall consist of 14-gauge welded wire fence (with grid not to exceed 2 in. x 2 in.) to prohibit harboring of insects, and animals, and to prevent moisture/mildew build-up. Material shall be, 14-gauge welded wire fence with an expected useful lifespan of a minimum of 5 years.

C. Fastening Ties

1. Ties shall be approximately 3/16 in. x 11 in. in length and made of black UV treated plastic with a releasable, ratchet locking mechanism to fasten to a hardwood stake. Lock shall securely close.

D. White Oak Stakes

1. Stakes shall be a minimum of 1 in. x 1 in. x 47 in. in size, and shall consist of straight, rot-resistant, White Oak with a pencil point ground on one end.

3.03 CONSTRUCTION.

A. Installation of Deer Protection Guard (Sleeves)

B. Install HDPE Deer Protection Guard on single stem trees as directed.

1. Compare guard height to height of first significant scaffold branch tree or shrub to be protected.

2. Prune branch if needed to avoid wrapping branches within guard.

3. Carefully wrap the guard around the installed tree or shrub.

4. Place hardwood stake upright and outside of the guard, so that it rests alongside of the guard.

5. Drive stake vertically into the ground until the top of the stake is approximately 12 inches below the top of the guard.

6. Ensure the guard is always in full contact with the ground surface.

7. Evenly space 3 fastening ties along the guard and tighten ties to secure the guard to the hardwood stake.

C. Installation of Deer Protection Guard (Wire Cages)

D. Install Deer Protection Guard on multi stem trees and shrubs as directed.

1. Compare guard height to height of first significant scaffold branch tree or shrub to be protected. Measure and cut appropriate wire mesh length to wrap fully around the plant and leave 6 inches away from the existing growth.

2. Prune branch if needed to avoid wrapping branches within guard.

3. Carefully wrap the guard around the installed tree or shrub.

4. Install at least 2 hardwood stakes to secure the wire mesh.

5. Drive stake vertically into the ground a minimum of 12 inches and until the top of the stake is approximately 12 inches below the top of the guard to prevent deer uplift

6. Ensure the guard is always in full contact with the ground surface.

7. Evenly space 3 fastening ties along the guard and tighten ties to secure the guard to the hardwood stakes.

E. Maintenance of Guards

1. During the one-year establishment period for trees and shrubs, guards shall be

repaired or replaced if damaged or missing, at no cost to The Owner.

2. Check guards on a semi-annual basis to ensure the following:

   a. Guards are upright, ties are tight, and hardwood stakes are providing

   b. the designed support.

   c. Guards are maintaining contact with the ground surface.

   d. Guards are not girdling the plants.

   e. Sucker growth is not growing through the guards.

3.04 MEASUREMENT AND PAYMENT

A. Deer Protection Guards will be measured and paid for at the Contract unit price per each installed. The payment will be full compensation for installation and maintenance and for all materials, labor, equipment, tools, maintenance, removal, replacement and other incidentals necessary to complete the work.

B. Deer Protection Guards will be paid for according to the Deer Protection Guard Schedule Payment Schedule

Deer Protection Guard Payment Schedule		
Requirements	**Percent of Total Contract Price**	**Payment for Completed Work**
Installation of Deer Protection Guards	70%	At Installation Phase Acceptance
Establishment Phase	30%	At Establishment Phase Acceptance
Total Payment	100%	

END OF SECTION

ITEM 9010

IMBRICATED ROCK

3.05 DESCRIPTION

A. This work shall consist of furnishing and placing stone for instream structures (rock cascade) and other features as shown on the Contract Documents or as directed by the Engineer.

3.06 MATERIALS

A. Rock shall consist of appropriate color (e.g., green/gray, brown/gray, and tan/brown in color) obtained from an approved source. Rock shall not be harvested from offsite streams or rivers outside a commercial quarry operation. All rock shall be free from laminations, weak cleavages and will not disintegrate from the action of air, water and in handling and placing. Granular sedimentary (sandstone) rock will generally be unacceptable. Concrete will not be considered as an alternative for rock. White rock is not acceptable.

Stone for Instream Structures shall meet the following Construction Specifications:

Structure		Minimum Density (lb/cu ft)	Length (ft)	Width (ft)	Height (ft)	Min. # of Flat Sides
Rock Cascade	Headers	150	2.75 - 3.25 feet	2.75 – 3.25 feet	1.5 – 2.5 feet	1
	Footers	150	2.75 – 3.25 feet	2.75 – 3.25 feet	1.5 – 2.5 feet	2

3.07 CONSTRUCTION METHODS

A. Stone Sourcing

a. Stone shall be salvaged from the limits of disturbance of this Contract first. If sufficient material meeting the above requirements is not available from within the limits of disturbance, the Contractor shall obtain material meeting specifications.

2. The Contractor will locate potential sources for the stone. The Contractor will not be granted an extension of time or extra compensation due to delay caused by sampling, testing, approval or disapproval of stone material under the requirements of these specifications. The Contractor shall obtain from the quarry and submit to the Engineer a certificate verifying the following:

    a. Stone Classification

    b. Weight per Cubic Foot

    c. Weight of Stone Being Supplied.

    d. Stone quality shall meet all of the above specifications.

3. It will be the contractor's responsibility to make all necessary arrangements with the source of supply in a timely fashion, so that the contractor shall maintain an adequate supply of stone material and that work shall not be unnecessarily delayed due to insufficient supply.

B. Stone Installation

1. The Contractor shall install the stone in accordance with Contract Documents and these Construction Specifications for Rock Cross Vanes and other features as shown on the Contract Documents or as directed by the Engineer.

3.08 MEASUREMENT AND PAYMENT

A. All Stone for Instream Structures described in this section will be measured and paid for at the Contract unit price per Ton installed. Salvaging and storing stone onsite shall be incidental to Item 2010: Stream Channel Excavation. Payment will be full compensation for all material, labor, equipment, tools, and incidentals necessary to complete the work.

END OF SECTION

ITEM 9020

SALVAGED STREAMBED MATERIAL

PART 1 - GENERAL

1.01 DESCRIPTION

A. Salvage, transport, stockpile, maintain, and place Salvaged Streambed Material associated with pool substrate construction as specified in the Contract Documents or as directed by the Engineer. If salvaged streambed material is no longer available, use of furnished stream bed material must be approved by the Engineer prior to placement.

1.02 MATERIALS

A. Salvaged Streambed Material consisting of native cobble, gravel, and stone shall be salvaged from the project site first. If sufficient streambed material is not available from the project site, the Contractor shall furnish material as described in the Item 9030: 2" – 3" Stone for Stream Mixes to the Engineer for approval prior to placement. Only approved material shall be placed at the site.

1.03 CONSTRUCTION METHODS

A. Salvaged Streambed Material shall be used in accordance with Contract Documents and associated with pool substrate construction as shown on the Contract Documents or as directed by the Engineer.

1.04 MEASUREMENT AND PAYMENT

A. Salvaged Streambed Material shall be incidental to Item 2010: Stream Channel Excavation (Class 5).

END OF SECTION

ITEM 9030

2” – 3” STONE FOR STREAM MIXES

PART 1 - GENERAL

1.01 DESCRIPTION

A. Furnish, transport, stockpile, maintain, and place 2” – 3” Stone for Stream Mixes associated with stream substrate construction as specified in the Contract Documents or as directed by the Engineer. If salvaged streambed material is no longer available, use of furnished stream bed material must be approved by the Engineer prior to placement.

1.02 MATERIALS

A. 2 - 3” Stone for Stream Mixes shall consist of a mixture of gravel, cobble, and stone of appropriate color (e.g., green/gray, brown/gray, and tan/brown in color) obtained from an approved source. Gravel, cobble, and stone shall not be harvested from streams or rivers outside the project limits unless part of a commercial quarry operation. All rock shall be free from laminations, weak cleavages and will not disintegrate from the action of air, water and in handling and placing. Concrete will not be considered as an alternative for rock. White rock is not acceptable.

Material	**Gradation**	**Proportion (%)**
2” – 3” River Stone	2.0 to 3.0 inch; D_{50}= 2.5in	100%

B. The Contractor shall provide a sample of 2” – 3” Stone for Stream Mixes to the Engineer for approval prior to placement. Only approved material shall be placed at the site.

1.03 CONSTRUCTION METHODS

A. 2" - 3” Stone for Stream Mixes shall be used in accordance with Contract Documents and associated with stream substrate construction as shown on the Contract Documents or as directed by the Engineer.

1.04 MEASUREMENT AND PAYMENT

A. Payment will be full compensation for all materials, transport, excavation, mixing, and installation for all material, labor, equipment, tools, and incidentals necessary to complete the work as specified in these specifications and on the Contract Documents.

B. 2” – 3” Stone for Stream Mixes will be measured and paid for at the Contract unit bid price per CY installed.

END OF SECTION

ITEM 9040

CLASS II RIPRAP FOR ARMORED UTILITY CROSSINGS

ITEM 9050

CLASS II RIPRAP FOR OUTFALL PROTECTION

ITEM 9060

GROUTED CLASS III RIPRAP FOR MANHOLE PROTECTION

PART 1 - GENERAL

1.01 DESCRIPTION

A. Furnish, transport, stockpile, and maintain Class II and Grouted Class III as specified in the Contract Documents or as directed by the Engineer.

B. Class II and Grouted Class III Riprap shall meet the specifications as per Section 901.02 of Virginia Department of Transportation, Road and Bridge Specifications.

1.02 MATERIALS

A. Class II and Class III Riprap shall consist of stone of appropriate color (e.g., green/gray, brown/gray, and tan/brown in color) obtained from an approved source. All rock shall be free from laminations, weak cleavages and will not disintegrate from the action of air, salt water and in handling and placing. Granular sedimentary rock will generally be unacceptable. Concrete will not be considered as an alternative for rock. White rock is not acceptable.

B. Grout for use in Grouted Class III Riprap shall meet the specifications as per Section 414.02 of Virginia Department of Transportation, Road and Bridge Specifications.

1.03 CONSTRUCTION METHODS

A. Class II and Grouted Class III riprap shall be furnished and installed in accordance with the requirements of the Virginia Stormwater Management Handbook, Chapter 7.4, Practice C-ECM-13, the Contract Documents, and as directed by the Engineer.

1.04 MEASUREMENT AND PAYMENT

A. Class II and Grouted Class III Riprap will be measured and paid for at the contract unit price per Ton. Price and payment will be full compensation for all grading, excavation, stone, backfill, placement, disposal of excess material, geotextile, prewashing when required, and for all material, labor, equipment, tools and incidentals necessary to complete the work.

B. Salvaged Riprap shall be incidental to Item 2010: Stream Channel Excavation (Class 5).

END OF SECTION

ITEM 9070

GEOTEXTILE– NON-WOVEN FOR IN-STREAM STRUCTURES

1.01 DESCRIPTION

A. This work shall consist of furnishing and placing Geotextile as shown on the Contract Documents for the boulder cascade and placement of riprap or as directed by the Engineer.

1.02 MATERIALS

Class	Type of Geotextile	Grab Strength (lb) D4632	Puncture Strength (lb) D4833	Permittivity sec^{-1} D4491	Apparent Opening Size, max. (mm) D4751	Trapezoid Tear Strength (lb) D4533
8-OZ	Nonwoven	250	90	0.20	0.30	90

1.03 CONSTRUCTION METHODS

A. Geotextile shall be used in the construction of the boulder cascade and placement of riprap or as directed by the Engineer.

1.04 MEASUREMENT AND PAYMENT

Geotextile will be measured based on square yards installed. The payment will be full compensation for the preparation of surfaces, loading, hauling, supplying and placement for all material, labor, equipment, tools, and incidentals necessary to complete the work.

END OF SECTION

ITEM 9080

AS-BUILT DRAWINGS

PART 1 - GENERAL

1.01 DESCRIPTION

A. The contractor shall prepare and submit to The Owner for approval, certified As-built Drawings of the completed infrastructure stabilization activity to fully illustrate all construction within the established limits of disturbance.

B. The Owner shall provide the services of Construction Services Manager to verify elevations, locations, and dimensions of the grading and infrastructure stabilization structures. It is the Contractor's responsibility to coordinate, during all phases of construction, with the Construction Services Manager. The Contractor and the Construction Services Manager will document the installed features as construction is occurring.

1.02 MATERIALS

A. The As-built Drawings shall be reproducible Mylar copies of the approved Contract documents (to be obtained from The Owner). Features to be surveyed shall consist of the following:

1. Plan view

a. Extent of constructed grading

b. Identify and show extent of bioengineering

c. Identify elevations and dimensions of all structures

2. Profile along thalweg

a. Elevations at design stations and at locations of any revisions

b. Instream structures/bioengineering controls should be identified with elevation notes.

3. Cross Sections

a. Offset and elevation identified at inverts and grade breaks

b. Identify and show placement of structures, bioengineering controls and any

bank stabilization with elevations notes

c. Show existing ground and the extent of constructed grading

B. The As-built Drawings shall be certified by a Professional Land Surveyor licensed within the State of Virginia and shall be prepared in accordance with Section 317 of Virginia Department of Transportation, Road and Bridge Specifications. During construction, the Contractor shall adhere to tolerances noted within these Contract Documents. The signed, sealed and certified reproducible mylar As-built Drawings along with 3 print copies shall be forwarded to The Owner for approval.

1.03 CONSTRUCTION METHODS

A. NOTE: It is HIGHLY recommended the Contractor's land surveyor check grades, locations and elevations of structures throughout the construction process.

B. It is the Contractor's responsibility to coordinate with the Construction Services Manager to verify grades, locations and elevations during the course of construction.

C. The Contractor shall notify The Owner a minimum of 14 calendar days prior to completion of construction activities.

D. Upon completion of construction activities, the Contractor shall have no longer than 28 calendar days to furnish The Owner with certified As-built Drawings.

E. The Contractor may choose to submit to The Owner partial survey drawings in order to illustrate the layout of all plan features and grading; however, this submission of a partial drawing does not automatically convey approval of construction or eliminate the requirement for the Contractor to provide final As-built Drawing of the entire completed project certified by a Professional Land Surveyor.

F. Any errors or omissions found during the course of the red-line survey and determined by The Owner, who shall be sole judge, to have occurred during construction shall be repaired by the Contractor to the satisfaction of The Owner at no additional expense. The Contractor shall make any necessary repairs or corrections required by The Owner with a re-survey of the problem area showing the original Red-line information and any modification highlighted and noted. A Professional Land Surveyor, registered in the State of Virginia, shall also certify the resurvey.

G. Final acceptance of the project by The Owner will not occur until the certified As-built Drawings have been completed for the entire project and approved by The Owner.

1.04 Maintenance

A. The Contractor shall be held responsible for maintaining the integrity of the project until

final acceptance of the As-built Drawings and a determination by The Owner that no errors or omissions have been made by the Contractor during the course of construction. The Owner shall make every effort to notify the Contractor within 35 calendar days of receipt of the drawing as to the acceptability or rejection of the project construction; however, lapse of this time frame does not relieve the Contractor of responsibility for maintaining the integrity of the project or for correcting any errors/omissions until final acceptance or the As-built Drawings for the entire project.

1.05 MEASUREMENT AND PAYMENT

A. Preparation of the As-built Drawings will not be measured but will be paid for at the Contract lump sum price. The payment will be full compensation for surveying, processing, preparation of the As-built Drawings, and for the Professional Land Surveyor to certify and seal the drawings. Payment shall include all materials, labor, equipment, tools, maintenance, and incidentals necessary to complete the work.

END OF SECTION

ITEM 9110
SUPPLEMENTAL WATERING

PART 1 - GENERAL

1.01 DESCRIPTION

A. This item refers to supplemental watering during the establishment period for all plants.

B. Apply water to permanent seeding areas and/or to trees, shrubs, sod and herbaceous plant material when weekly rainfall is less than 1 inch from May 1 through September 15, inclusive, or as directed by City of Alexandria.

1.02 MATERIALS

A. Refer to Section 605 of the Virginia Department of Transportation, Road and Bridge Specifications.

1.03 CONSTRUCTION METHODS

A. The Contractor shall notify City of Alexandria 3 business days prior to commencing watering operations for approval.

B. Water using a 1-in. inside diameter hose with breaker or watering probe. Supply a minimum 1000-gallon tank, 300 feet of hose and a power-driven pump adequately powered to efficiently supply water to permanent seeding areas and trees. Provide City of Alexandria with measurements and capacities to provide a complete and accurate record of the quantity of water furnished and applied. Apply water at low pressure directly to seeding area or each planting pit. For permanent seeding areas, apply 1 gallon of water for every 5 SF of seeding. For planting pits, apply water as per Table 1 under Item 7110.

1.04 MEASUREMENT AND PAYMENT

A. Supplemental Watering will be measured and paid for at the Contract Unit Price per gallon of water applied. Water will be measured by means of satisfactorily installed meters, or by measurement of tank capacities, or by acceptable documentation of tanks of predetermined capacity. The payment will be full compensation for all water, material, labor, equipment, tools, and incidentals necessary to complete the work. No compensation will be allowed for water wasted as determined by City of Alexandria.

END OF SECTION