

BEAR BRANCH STREAM RESTORATION

VIENNA, VIRGINIA

TECHNICAL CONSTRUCTION IFB SPECIFICATIONS



TOWN OF VIENNA, VIRGINIA



TOWN OF

VIENNA

since 1890

In Cooperation with



TECHNICAL CONSTRUCTION SPECIFICATIONS

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SECTION-01 MOBILIZATION

1. DESCRIPTION

Mobilization shall consist of furnishing, transporting, and stockpiling of all materials for assembling and setting up for the project operations, including but not limited to, the following:

- A. Initial movement of personnel.
- B. Moving all the construction tools and other related equipment and supplies required to complete the work on site. **Equipment must be cleaned (power washed off-site) prior to entering the project site in order to prevent the inadvertent spread/introduction of non-native species.**
- C. All other initial expenses and operations which must be performed before the beginning of the work.
- D. Demobilization.
 - i Contractor shall replace all trail pavements, in like and kind, located within the LOD as shown to be removed on the existing conditions and demolition plans. Contractor shall be required to replace any damage done to existing curb/gutter/concrete apron at the construction entrance.

2. MEASUREMENT AND PAYMENT

Mobilization shall be measured and paid for as a lump sum (LS) item. This price shall include demobilization. No additional payment will be made for demobilization and remobilization because of shutdowns, suspensions of work, or other mobilization activities.

Fifty percent (50%) of the mobilization will be paid on the initial movement of equipment and personnel. Another 25% will be paid midway through the project. The last 25% will be paid at completion of demobilization.

MOBILIZATION.....LS

-END OF SECTION-

SECTION-02 CONSTRUCTION STAKE-OUT

1. DESCRIPTION

This work shall consist of furnishing, transporting, and stockpiling of all materials, placing, maintaining construction layout stakes, and installing monuments for the purpose of construction and postconstruction monitoring efforts, as specified in the Contract Documents, or as directed by The Town of Vienna.

- A. The Contractor shall provide and have available to the project, experienced staff which is competent and qualified to set all lines and grades needed to construct the stream restoration.
- B. The Contractor shall make all field measurements necessary to stakeout the baseline of construction and layout the lines and grades called for in the Contract Documents or as directed by the on-site Engineer or The Town of Vienna. As described in Contract Documents, the Contractor shall use the horizontal and vertical survey controls provided in the Contract Drawings to lay out the lines of work, limits of grading, planting, fill placement, and to stake out the location of all proposed structures.
- C. Only those benchmarks shown on the drawings shall be used for construction. The Contractor shall furnish the assistance for their preservation after being set. The Contractor shall be held responsible for their preservation. If, in the opinion of The Town of Vienna, the benchmarks are willfully or carelessly disturbed or destroyed by the Contractor or his/her employees, the entire cost of replacing them shall be charged against the Contractor and the cost shall be deducted from the Contractor's final payment.
- D. The Contractor shall, as part of the construction stakeout operation and before the mandatory preconstruction meeting and commencement of any clearing operations, demarcate the Limit of Disturbance (LOD) and/or wetlands and buffers, Waters of the U.S., and tree protection areas, to the satisfaction of The Town of Vienna. These areas will be verified during the pre-construction meeting.
- E. Trees to be protected during construction will be identified by The Town of Vienna and the Contractor during the pre-construction meeting. All tree protection devices shall be installed before clearing and grubbing commences.
- F. The Contractor shall notify The Town of Vienna once the stakeout or any phase of the stakeout is completed. The Town of Vienna 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 Town of Vienna an opportunity to assess the lines established by the Contractor, prior to the start of construction. If there are obvious errors with the stakeout, the Contractor shall remedy all errors prior to the Contractor proceeding with construction. **This inspection shall in no way relieve the Contractor of his/her/its responsibilities to construct the site as specified in the Contract Documents.**
- G. The existing elevations and contours shown on the plans, cross sections, stream bottom profiles, and/or bank alignment shown on the Contract drawings were correct when surveyed prior to plan development. However, because of interim stream erosion, sediment aggradation, and possible fill, existing elevations and grades may have changed since the original survey was completed. **It is the**

Contractor's responsibility to confirm existing grades and adjust quantities, earthwork, and work efforts as necessary at no additional cost to The Town of Vienna.

- H. The Contractor shall establish four (4) permanent monuments for post-construction monitoring of stream channel cross-sections. These locations will be established prior to substantial completion. The Contractor shall stakeout and construct permanent monuments at each selected cross section on both sides of the stream channel.

2. CONSTRUCTION

The Contractor will provide the following:

A. Stream Baseline Stakeout

1. A staked baseline of construction for the proposed location of the stream and tributaries or parallel offset baseline, as depicted on the plans, with the spacing of stations (stakes, nails, crosses, etc.) not to exceed 50 feet in straight sections and 25 feet in curves.
2. 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 baseline of construction.

B. Structure Stakeout

Appropriately spaced benchmarks and the necessary references required to locate all in-stream structures noted in the Contract Documents.

C. Control Markers

The Contractor shall preserve the baseline of construction, working lines, and benchmarks set by the Contractor at the beginning of the project.

D. Control Stakes

For the stream baseline of construction, as specified above, the Contractor shall furnish, set, and preserve stakes at each station along each side of the proposed channel. Additional stakes as needed for horizontal and vertical controls necessary for the correct layout of the work shall be set by the Contractor.

E. Layout

For structures specified in the Contract Documents, the Contractor shall ensure that structures are fully staked at least two (2) days prior to construction to allow review by The Town of Vienna staff. From the field layouts, the Contractor shall check the proposed structure lengths by electronic distance measurement or chaining. The Contractor shall also check the location of the structure to verify its correct location with relation to existing on-site features and conditions that are to remain in the original positions. If any discrepancies are found, the Contractor shall notify The Town of Vienna at once in writing; otherwise, all planned dimensions, grades, and field measures will be deemed correct. All lines established on the ground shall be preserved or referenced, marked, and kept available at all times.

F. Permanent Monuments

Said monuments shall be set perpendicular to the stream channel baseline of construction and a minimum of five (5) feet beyond the top of the bank. The monuments shall be constructed by digging a hole to a depth of at least three (3) feet, installing six (6) inch diameter PVC pipe into the hole as a form, and filling it with concrete. The top of the monument shall be installed no higher than one (1) inch above the surrounding ground surface. Once the concrete has begun to set, the Contractor shall install a six-inch long galvanized bolt, with the top of the bolt set flush with the top of concrete.

3. MEASUREMENT AND PAYMENT

The lump sum (LS) payment for Construction Stakeout will be full compensation for furnishing, transporting and stockpiling, placing, and maintaining construction layout stakes, post-construction monitoring monuments, flagging of clearing limits and wetlands, and for all material, labor, equipment, stockpiling, tools, transportation and incidentals necessary to complete the work.

CONSTRUCTION STAKEOUT.....LS

-END OF SECTION-

SECTION-03 WARRANTY

1. DESCRIPTION

The Contractor shall warranty all materials and workmanship for a period of one (1) year from the date of Final Completion and shall replace any portions that fail because of faulty materials or workmanship, at no additional cost to The Town of Vienna. This warranty period of one year shall not extend to trees, shrubs, and herbaceous permanent seeding (see Specifications 18 – Planting Trees and Shrubs and 19 – Herbaceous Permanent Seeding) which have a two (2) year warranty period.

A six (6) month and eleven (11) month inspection will be performed during the year of the warranty period.

The Contractor shall immediately repair or replace all items determined to be defective by the Town Engineer or Authorized Representative upon notification of deficiencies.

Items repaired or replaced under this provision shall have an additional one (1) year warranty period from the new date of acceptance.

Areas and/or other work disturbed while accessing and/or repairing/replacing warranty covered items shall be stabilized and repaired at no additional cost to The Town of Vienna.

-END OF SECTION-

SECTION-04 EROSION AND SEDIMENT CONTROL

1. DESCRIPTION

The Contractor shall perform all work for erosion and sediment control in accordance with the *Virginia Erosion & Sediment Control Handbook, Third Edition*, dated 1992, the Contract Documents, or as directed by The Town of Vienna. The work covered by this section consists of the installation and maintenance of erosion and sedimentation controls to minimize soil erosion and to control sedimentation from affecting water resources.

-END OF SECTION-

SECTION-05 CONSTRUCTION ENTRANCE

1. DESCRIPTION

The work covered by this section consists of furnishing, installing, maintaining, and removing any and all material required for the construction of a temporary stone construction entrance.

2. MATERIALS

Aggregate size shall be VDOT #1 coarse aggregate (2- to 3-inch stone). The filter cloth utilized shall be a woven or nonwoven fabric consisting only of continuous chain polymeric filaments or yarns of polyester. The fabric shall conform to the physical properties noted in Table 3.02-A of the *Virginia Erosion & Sediment Control Handbook, Third Edition*, dated 1992.

3. CONSTRUCTION

The area of the entrance must be excavated a minimum of 3 inches and must be cleared of all vegetation, roots, and other objectional material. The filter fabric underliner will then be placed the full width and length of the entrance. Following installation of the filter cloth, the stone shall be placed to the specified dimensions. If wash racks are used, they should be installed according to the manufacturer's specifications.

4. MEASUREMENT AND PAYMENT

Measurement for construction entrance shall be per each, satisfactorily installed. Payment for construction entrances shall be full compensation for furnishing, transporting, installing, maintenance and warranty, including all materials, labor, equipment, stockpiling, tools, disposal, and incidentals necessary to complete the work as specified in the Contract Documents, or as directed by The Town of Vienna.

CONSTRUCTION ENTRANCE.....EA

-END OF SECTION-

SECTION-06 SILT FENCE

1. DESCRIPTION

Furnish material, construct, maintain and remove temporary silt fence in locations shown in the Construction Documents and in locations that require surface drainage to be filtered.

2. MATERIALS

- A. Synthetic filter fabric shall be a pervious sheet of propylene, nylon, polyester, or ethylene yarn and shall be certified by the manufacture or supplier as conforming to the requirements noted in Table 3.05-B of the *Virginia Erosion & Sediment Control Handbook, Third Edition*, dated 1992.
- B. Posts: Provide steel posts (standard "U" or "T" section) with at least 5 feet long, and 1.33 lbs. per foot in weight per length. Equip with an anchor plate with an area of at least 14.0 square inches. Ensure a means of retaining fencing material in the desired position without displacement.
- C. Wire fence reinforcement for silt fences using standard-strength filter cloth shall be a minimum of 14 gauge and shall have a maximum mesh spacing of 6 inches.

3. CONSTRUCTION

- A. Install in locations as shown in the Construction Documents or as directed.
- B. Install wire and Filter Fabric as shown in *Virginia Erosion & Sediment Control Handbook, Third Edition*, dated 1992.
- C. Maintain the silt fence until the project is accepted or until the fence is removed. Remove and replace deteriorated or ineffective Filter Fabric. Remove and dispose of silt accumulations when necessary or as directed.
- D. Leave silt fence in place until site stabilization and remove at project completion. Removed silt fence becomes the property of the Contractor. Dress and seed and mulch all areas where silt fence is removed.

4. MEASUREMENT AND PAYMENT

Silt Fence shall be measured and paid for at the contract unit price per linear foot (LF) of silt fence installed. The payment will be full compensation for the installation, maintenance, and removal of the fence as shown on the plans, including all materials, labor, equipment, tools, stockpiling, transporting, disposal, and incidentals necessary to complete the work as specified in the Contract Documents, or as directed by The Town of Vienna.

SILT FENCE.....LF

-END OF SECTION-

SECTION-07 GEOTEXTILE FABRIC

1. DESCRIPTION

This work shall consist of furnishing, transporting, maintaining, stockpiling, and properly installing geotextile fabric in the stream channel as specified in the Contract Documents, or as directed by The Town of Vienna.

2. MATERIALS

Geotextile fabric shall be Non-woven fabric made from 100% polypropylene staple filament with the following properties:

Tensile Strength (lbs.)	Elongation @ Break %	Mullen Burst, (psi)	Puncture Strength (lbs.)	Trapezoidal Tear (lbs.)	AOS – US Std Sieve	Permittivity, (sec -1)	U.V. Resistance (%)	Flow Rate, (GAL/MIN/SF)
ASTM D-4632	ASTMD-4632	ASTMD3786	ASTMD-4833	ASTMD - 4533	ASTM D - 4751	ASTMD-4491	ASTMD-4355 (500 hrs.)	ASTM D-4491
180	50	350	105	75	70	1.5	70	100

Fabrics meeting these criteria include the following:

- 180NW (US Fabrics)
- 170N (Mirafi)
- NO7 (Webtec)
- 4552 (Propex)
- GT 170 (SKAPS)

Filter Fabric rolls shall be a minimum of 10’ wide.

Filter Fabric shall be installed per the Construction Documents, specifications and in accordance with the manufacturer’s specifications.

All fabric seams shall overlap by two (2) feet with the upstream edge of the fabric roll overlapping the downstream fabric edge. The Contractor may use fabric staples to hold the fabric in place prior to the placement of the boulders, rip rap, logs and/or coarse backfill material.

The contractor shall remove and replace fabric torn during installation and/or during placement.

3. SUBMITTALS

- A. Cut sheet for geotextile fabric.

4. MEASUREMENT AND PAYMENT

Payment for geotextile fabric shall be incidental to the installation of all in-stream structures and bank protection measures as specified in the Contract Documents, or as directed by The Town of Vienna. No separate payment shall be made for "Filter Fabric".

-END OF SECTION-

SECTION-08 COIR FIBER MATTING AND BIODEGRADABLE STAKES

1. DESCRIPTION

This work shall consist of furnishing, transporting, maintaining, stockpiling, and properly installing coir fiber matting (secured with biodegradable stakes) on all stream bank slopes which will not receive additional stabilization techniques (e.g., stone) and at other locations designated in the Contract Documents, or as directed by The Town of Vienna.

2. MATERIALS

Coir fiber matting shall consist of 100% coconut fiber matting having a weight of at least 700 g/m². Acceptable products are Ecomesh CM700, CF-700 (Coir Fiber Matting 700) by SKB India Co., BioD-Mat70 by Rolanka International, Coir Fiber Mats 700 by Pinelands Nursery, or The Town of Vienna approved equal. Stakes used to secure coir matting shall be 12" biodegradable-type (wooden or plant-based resin) meeting ASTM D6400. Installation shall be in accordance with the Contract Documents, or as directed by The Town of Vienna. Under no circumstances shall any erosion control matting with polypropylene or any other non-coir netting be used on site.

Coir fiber matting is used to support plant growth while stabilizing earthfill. Material shall be 100% natural woven coir (coconut fiber). Meet or exceed the requirements of Table 1.

Table 1 - Requirements for Coir Geotextile Fabric

Property	Test Method	Parameters
Mass/Unit Area	ASTM D-5261	20.6 oz./SY
Thickness	ASTM D-5199	0.30 inches
Color	Visual	Natural/Earth tone
Wide width tensile – Dry MD x CD	ASTM D-4595	126 x 86 lb./in
Maximum Elongation – Dry MD x	ASTM D-4595	50% x 33%
Wide width tensile – Wet MD x CD	ASTM D-4595	77 x 57 lb./in
Maximum Elongation – Wet MD x	ASTM D-4595	69% x 34%
Flexural Rigidity (Stiffness)	ASTM D-1388	12896 x 8132 mg-cm
Water Absorption	ASTM D-1117	146%
Water Velocity	Flume Test	12 ft./sec
Shear Stress	Flume Test	2.5 psf (minimum)
“C” Factor	Flume Test	0.002
Open Area	Measured	50%

The following sources have products that meet the specifications:

- (a) American Excelsior Company, www.americanexcelsior.com, 800-777-7645
- (b) EcoDepot, www.ecodepotsales.com, 443-304-3317
- (c) Nedia Enterprises, Inc., www.nedia.com, 888-725-6999
- (d) North American Green, www.nagreen.com, 800-772-2040
- (e) Rolanka International, Inc., BioD-Mat 70 or 90, www.rolanka.com, 800-760-3215

- (f) Other sources with products meeting the specifications are acceptable.

3. SUBMITTALS

- A. Cut sheet for coir matting and biodegradable stakes. Source of coir fiber matting and stakes shall be submitted to The Town of Vienna for review and approval prior to beginning construction.

4. CONSTRUCTION

A. Installation

1. All materials and construction techniques shall be inspected and approved by The Town of Vienna prior to installation.
2. Install in-stream structures, grade stream bed and banks, and place riffle substrate material and topsoil to the contours specified in the Contract Documents. After placement of riffle substrate material, topsoil, permanent seed mix (**SEED MUST BE SOWN INTO TOPSOIL UNDER MATTING**), and straw mulch, in accordance with the Contract Documents, the Contractor shall install the coir fiber matting as specified in the Contract Documents or as directed by The Town of Vienna.
3. The Contractor shall place coir fiber matting along the stream edge as shown in the Construction Documents or as directed by The Town of Vienna. The coir fiber matting shall be unrolled and placed according to the construction documents. Coir fiber matting shall be placed in all areas within the limits of disturbance where new vegetation is to be established. Matting shall be placed in full contact with the soil. All exterior edges (those edges not overlapping with an adjacent coir fiber matting roll) shall be “keyed” into the ground a minimum of 12 inches in such a way that a seamless grade is created (no humps or bulges in fabric will be permitted).
4. Coir fiber matting edges (matting installed side by side at any given elevation) shall be overlapped a minimum of 12 inches and staked down using biodegradable stakes spaced at 2 feet on-center.
5. Coir fiber matting ends (where upstream roll abuts downstream roll) shall be placed such that the upstream roll overlaps the downstream roll a minimum of 6 inches and shall be staked down using biodegradable stakes spaced at 2 feet on-center.
6. Coir fiber matting ends (matting installed where ends of matting abut in-stream structures) shall be keyed-in” a minimum of 6 inches in such a way that a seamless grade, or transition, is created. (No humps or bulges will be accepted.) These edge areas shall be staked down using biodegradable stakes spaced at 2 feet on-center.
7. Biodegradable stakes shall be arrayed 2 feet on center in a diamond shaped pattern as shown in the construction documents.

B. Clean-up

1. During installation of coir fiber matting, 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.
2. The Contractor shall be responsible for off-site removal and disposal of all trash, excess backfill and any materials incidental to the project.

5. MEASUREMENT AND PAYMENT

Coir Fiber Matting, including biodegradable stakes, shall be measured, and paid for at the Contract unit price per square yard (SY) of matting installed. Payment for coir fiber matting shall be full compensation for furnishing, transporting, maintaining, stockpiling, and properly installing all materials, labor, equipment, tools, and incidentals necessary to complete the work as specified in the Contract Documents, or as directed by The Town of Vienna.

COIR FIBER MATTING.....SY

-END OF SECTION-

SECTION-09 SAFETY FENCE / TREE PROTECTION FENCE

1. DESCRIPTION

This work shall consist of the installation of orange safety fence (perimeter of LOD) and welded wire fence (tree protection within the LOD) in areas specified in the Contract Documents, or as directed by The Town of Vienna. Contractor shall be responsible for maintaining the safety fence throughout the duration of the project. This shall include, but is not limited to, re-securing fallen fence and replacing damaged fence.

2. MATERIALS

- A. Safety fence (tree protection fence) - Fence shall be international orange, high-density polyethylene mesh with a mesh opening of 1.5 inch. The fence shall be 4 feet in height with a roll weight of 20 pounds per roll and roll size of 4 feet by 50 feet.
- B. Posts - Posts shall be conventional metal "T" or "U" posts.
- C. Ties - Tension wire, zip-ties, or rope.

3. CONSTRUCTION

A. Installation

- 1. Posts shall be spaced every 6 feet and installed to a minimum of 18 inches deep.
- 2. Ties shall be wrapped around a horizontal fence strand and post and are for securing the fence to the post.
- 3. Tension wire or rope shall be used as a top stringer woven through the top row of strands to prevent potential sagging.
- 4. The safety fence and posts shall be removed (off-site) at the end of the contract and with the approval of The Town of Vienna. The fence and posts shall become the property of the contractor at the completion of the project.

B. Clean-up

- 1. 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.
- 2. The Contractor shall be responsible for off-site removal and disposal of all trash, excess backfill and any materials incidental to the project.

4. MEASUREMENT AND PAYMENT

Safety Fence shall be measured and paid for at the contract unit price per linear foot (LF) of safety fence installed. The payment will be full compensation for the installation, maintenance, and removal of the fence as shown on the plans, including all materials, labor, equipment, tools, stockpiling, transporting, disposal, and incidentals necessary to complete the work as specified in the Contract Documents, or as directed by The Town of Vienna.

SAFETY FENCE/TREE PROTECTION FENCE.....LF

-END OF SECTION-

SECTION-10 PUMP AROUND/DIVERSION PIPE/DEWATERING

1. DESCRIPTION

This work shall consist of maintaining and diverting stream flow for the purpose of isolating work areas when construction activities take place within the stream channel.

2. MATERIALS

- A. Sandbags shall consist of materials which are resistant to ultraviolet radiation, tearing, and puncture and woven tightly enough to prevent leakage of fill material (e.g., sand, fine gravel, etc.).
- B. Sheeting shall consist of polyethylene plastic, which is impervious and resistant to puncture and tearing.
- C. The Contractor shall submit a written pump-around operations plan to The Town of Vienna for review and approval.
- D. The Contractor shall develop their own estimate of baseflow at the time of construction and size their pump(s) accordingly. Pump(s) shall be large enough to maintain uninterrupted base flow to the channel downstream of the work area. The pump around shall include a hose suitable to convey water overland to the downstream section. Minimum linear feet of hose required is equivalent to the maximum estimate for one workday provided by the Contractor. The pump shall be shut off at night and base flow shall flow through the completed and stabilized portion of the project into the existing downstream channel unless otherwise noted in the Contract Documents.
- E. Engine driven equipment for bypass pumping equipment shall have “critical grade mufflers.” If equipment is operated between the hours of 8:00 PM and 7:00 AM, this equipment shall also be provided with sound attenuation enclosure consisting of a three-sided enclosure with roof constructed of 2 x 4 frame with ½- inch plywood sheathing and 2-inch Styrofoam panels attached to the inside of the entire enclosure. The enclosure shall be portable in order to allow the enclosure to be moved when bypass pumping equipment is moved.
- F. Filter bags made of non-woven geotextile as specified in the Contract Documents shall be used for dewatering the turbid water within the active work area.

3. SUBMITTALS

- A. Written pump around plan for proposed construction work.

4. CONSTRUCTION

- A. Installation of sandbags, sheeting, and pump around shall be in accordance with the approved erosion and sediment control plan in the Contract Documents, or as directed by The Town of Vienna.
- B. The diversion structure shall be installed from upstream to downstream.
- C. The height of the sandbag diversion structure shall be a minimum of base flow depth plus one foot, and a minimum of 2 feet. Furthermore, the sandbag diversion shall be of sufficient height as to provide a pool deep enough to maintain pumping operations.

- D. Sheeting shall overlap the sandbags such that the upstream portion covers the downstream sandbag face with at least an 18-inch overlap.
- E. When dewatering the work area, the pump shall discharge into a non-woven geotextile filter bag of adequate size to accommodate the incoming flow as specified in the Contract Documents. The filter bag must be placed within the Limits of Disturbance on a flat surface to allow dewatering without creating erosive conditions within the site.

5. MEASUREMENT AND PAYMENT

Pump Around/Diversion Pipe/Dewatering shall be measured and paid for as a lump sum (LS) item. The payment will be full compensation for installing and maintaining stream flow. Payment shall include sandbags, sheeting, filter bags, stream pump around, and any other materials, labor, equipment, tools, transporting, stockpiling, removal of dewatering equipment and materials, and all incidentals necessary to complete the work as specified in the Contract Documents, or as directed by The Town of Vienna.

PUMP AROUND/DIVERSION PIPE/DEWATERING.....LS

-END OF SECTION-

SECTION-11 TEMPORARY ACCESS PATH

1. DESCRIPTION

This work shall consist of furnishing, transporting, installing, maintaining, removing and disposal of temporary access path for the purpose of maintaining a stable temporary access path to active construction areas as specified in the Contract Documents, or as directed by The Town of Vienna.

2. MATERIALS

A. Contractor to use necessary materials (i.e., gravel, woven geotextile filter fabric, mulch, timber access mats) in sensitive areas around critical root zones and in necessary areas to maintain a stable, internal temporary access path without damaging the root system of the existing trees to be saved. Contractor shall obtain approval of the Town of Vienna for location and materials used for the access path in sensitive areas. However, based on existing field conditions and proximity to existing trees and root systems, timber access mats could be required within the entire length of the temporary access path within the site. Timber access matting is required when driving equipment in close proximity to trees that shall remain, as depicted on the construction documents under tree protection matting. Temporary access path depicted on the construction plans is conceptual only.

3. CONSTRUCTION

A. Installation

1. The contractor shall be responsible for determining the most stable temporary access path within the LOD and obtain the approval of the Town of Vienna for this path and the materials used (i.e., gravel, woven geotextile filter fabric, mulch, timber access mats). Contractor shall use necessary materials for the temporary access path as described above in Section 2 - Materials. Temporary access path materials shall be installed concurrently with tree removal and all construction along the temporary access path. Based on existing field conditions and proximity to existing trees and root systems, timber access mats could be required for the entire length of the temporary access path within the site, and contractor shall obtain approval of the Town of Vienna for access routes and materials used.
2. Woven filter fabric must be installed under the temporary access path and extend a minimum of 2 feet on both sides of all mats.
3. Install access path starting at the point along the access path that is closest to the construction entrance and work into the project site.

B. Clean-up

1. Remove temporary access path starting with the point farthest into the project site and work back to the construction entrance.
2. As the temporary access path is removed, grade shall be returned to the pre-construction existing conditions unless otherwise shown in the Contract Documents. The area shall be stabilized and planted according to the planting plan and vegetation schedule provided in the Contract Documents.

3. Upon completion of the construction work the contractor shall properly repair, stabilize and/or abandon project access roads through permanent vegetation cover.

4. MEASUREMENT AND PAYMENT

Installation and removal of the Temporary Access Path shall be paid for as a lump sum item. The payment will be full compensation for furnishing, installing, maintaining, and removing the Temporary Access Path. Payment shall include filter fabric and any other materials, labor, equipment, tools, transportation, stockpiling, removal, disposal, and incidentals necessary to complete the work as specified in the Contract Documents, or as directed by The Town of Vienna.

TEMPORARY ACCESS PATH.....SY

-END OF SECTION-

SECTION-12 STOCKPILE/STAGING AREAS

1. DESCRIPTION

This work shall consist of transporting, installing, maintaining, and removing stockpile/staging areas for the purpose of maintaining stable materials and equipment storage areas as specified in the Contract Documents, or as directed by The Town of Vienna.

2. MATERIALS

- A. Woven filter fabric as specified in the Contract Documents.
- B. Silt fence and/or Super Silt Fence as specified in the Contract Documents.

3. CONSTRUCTION

- A. Installation
 - 1. Super silt fence shall be installed around the downhill end of the stockpile/staging areas as specified in the Erosion and Sediment Control Plan and Details presented in the Contract Documents, or as directed by The Town of Vienna.
 - 2. Any erodible materials left in stockpile areas shall be mulched or covered prior to rain events.
- B. Clean-up
 - 1. As stockpile areas are cleared, grades shall be returned to the pre-construction grade, unless otherwise shown on the Contract Documents, and areas of vegetation shall be replanted according to the planting plan and vegetation schedule presented in the Contract Documents.

4. MEASUREMENT AND PAYMENT

The payment will be full compensation for installing, maintaining, and removing the stockpile/staging areas as part of the Temporary Access Path, Section 11. Payment shall include filter fabric and any other materials, labor, equipment, tools, stockpiling and incidentals necessary to complete the work as specified in the Contract Documents, or as directed by the Town of Vienna.

-END OF SECTION-

SECTION-13 CLEARING, GRUBBING, AND TREE REMOVAL

1. DESCRIPTION

This work shall consist of clearing, grubbing, removing, and disposing of vegetation, miscellaneous concrete and brick, rubble and/or debris and other objects within the construction limits except for vegetation and objects that are designated to be preserved, protected, or removed in accordance with the requirements of other provisions of these specifications.

- A. All clearing and grubbing operations shall be performed prior to the start of grading operations except when the woody material is located on or within an existing stream bank and is providing stabilization to the stream bank. Grubbing of those areas shall be completed concurrently with grading or channel construction operations.
- B. Tree removal by the Contractor and/or subcontractors shall be minimal and limited to conflicts with project access and/or required construction activities. Prior to construction the Contractor shall identify (flag) all trees to be removed. Flagged trees shall be reviewed and approved by The Town of Vienna during the pre-construction site walk. Tree removal for site access shall not be for convenience only. If during the execution of the project work additional trees must be removed, the Contractor shall flag the trees for review and approval by The Town of Vienna. Grubbing shall be performed only in areas specified for "cut" unless otherwise directed by The Town of Vienna.
- C. The Contractor shall be responsible for any and all damage to trees, shrubs, herbaceous plants, and wetlands located beyond the limit of disturbance which occurs from his/her operations during the life of the Contract. The Contractor shall fully restore, at his/her own expense, and to the satisfaction of The Town of Vienna, any trees, shrubs, herbaceous plants, and wetlands located outside of the limits of disturbance that have been damaged or destroyed. Wetland restoration shall be in accordance with regulatory agency conditions. The Contractor shall be required to pay a one-thousand-dollar penalty to The Town of Vienna for each instance of damage caused by the Contractor to trees which are located outside of the limits of disturbance.
- D. Tree removal shall only be done in accordance with Contract Documents or as directed by The Town of Vienna. The Contractor shall only clear and grub as much of the proposed channel and grading areas that the Contractor can complete the construction on and have stabilized in the same day as the clearing and grubbing. The Contractor shall install tree protection fencing and matting, as described in the Contract Documents, prior to any disturbance.
- E. Material disposal shall include the disposal of the material in accordance with Local, State and Federal laws if materials are not necessary for the work at no extra cost to the Owner.
- F. Mulched trees and bushes may be used as materials in conjunction with woven filter fabric for the temporary access path.

1. MEASUREMENT AND PAYMENT

Clearing and grubbing shall be measured and paid for as a per acre (AC) item. The payment will be full compensation for clearing, grubbing and disposal of cleared and grubbed materials. Payment shall include all materials, labor, equipment, tools, stockpiling and incidentals necessary to complete the work as specified in the Contract Documents, or as directed by the Town of Vienna.

CLEARING, GRUBBING, AND TREE REMOVAL.....AC

-END OF SECTION-

SECTION-14 SALVAGING TOPSOIL AND PLACEMENT OF TOPSOIL

1. DESCRIPTION

This work shall consist of furnishing and/or salvaging topsoil and placing furnished and/or salvaged topsoil as specified in the Contract Documents, or as directed and approved by The Town of Vienna.

Related Specifications

1. Section 16 – Regular Excavation, Structural Fill (Or Earthwork)
2. Section 18 – Planting Trees and Shrubs
3. Section 19 – Herbaceous Permanent Seeding
4. Section 20 – Vegetation Watering Allowance

2. MATERIALS

A. Salvaged Topsoil

1. Salvaged Topsoil shall consist of loam, sandy loam, clay loam, sandy clay loam or loamy sand, and shall be removed from well-drained O and A soil horizons within all areas to be graded, as specified in the Contract Documents. **B and C soil horizons shall not be used as salvaged topsoil.**
2. Acceptability for use of onsite topsoil and the depth of topsoil to be salvaged shall be determined by the on-site Engineer and/or The Town of Vienna.
3. Unacceptable and/or excess salvaged topsoil shall become the responsibility of the Contractor and shall be completely removed from the project site prior to final site inspection and approval of the project, at no additional cost to The Town of Vienna. However, excess topsoil may also be used as select earth fill if the material meets the requirements detailed in Specification 16 – Regular Excavation, Structural Fill (or Earthwork).
4. On-site soils may be amended as per soil suitability test recommendations in order to meet topsoil specifications laid out in section B below, with coordination and approval from The Town of Vienna. If amended soils meet the specifications below for topsoil, then they may be used as such.

B. Furnished Topsoil

1. Furnished topsoil shall be of a loamy texture and have components of sand, silt, and clay in percentages that, by definitions from the U.S Department of Agriculture Handbook 18, characterizes a loamy soil. Unacceptable and/or excess furnished topsoil shall become the responsibility of the Contractor and shall be completely removed from the project site prior to final site inspection and approval of the project.
2. Furnished topsoil shall meet acceptable soil test level as specified below. A certificate of soil test analysis (of a representative soil sample from each 5,000 square yards of Furnished Topsoil to be delivered to the site) shall be submitted to The Town of Vienna prior to any furnished topsoil delivered to the site for use on the site. Soil tests shall be conducted in a state laboratory or state recognized commercial laboratory.

3. All Furnished topsoil shall be free of stones, lumps, plants, roots, and other debris over 1.5.” All furnished topsoil shall be free of invasive and/or noxious plants, plant parts and seeds identified by the Virginia Department of Conservation and Recreation Natural Heritage Program, the US Department of Agriculture, and the Mid-Atlantic Exotic Pest Plant Council, to include, but not limited to the following:

Annual bluegrass	Corn cockle	Spurred anoda
Bermuda grass	Dodder	Wild garlic
Bindweed	Giant foxtail	Wild onion
Cocklbur	Horse nettle	Johnson grass
Japanese stilt grass	Japanese knotweed	Mile-a-minute
Wavy basket grass	Multiflora rose	

4. Acceptable furnished topsoil analysis results:

<u>CHARACTERISTIC:</u>	<u>CRITERIA:</u>
pH	From 6.0 to 7.5
Cation-exchange capacity	From 5 to 25 cmol+ /kg (meq/100g)
Organic Matter (OM)	From 5% - 30% by wt. (ODS)
Nutrient content	Normal contents of nitrogen, phosphorus, potassium, calcium, magnesium, sulfur, proper micronutrient levels
Soluble salts	Less than 200 ppm
Contaminants	Shall contain no toxic substances

<u>Sieve Size</u>	<u>Minimum Percent Passing, by Weight</u>
2 inches	100
No. 4	90
No. 10	80

<u>Component</u>	<u>Range</u>	<u>Particle Size</u>
Sand	23%-52%	0.05-2.0 MM

Silt	28%-50%	0.002-0.05 MM
Clay	7%-27%	<0.002 MM

D. Straw Mulch

1. Straw mulch shall be small grain straw free from rot. All mulch shall be free from State and Federal prohibited noxious weed seeds listed as alien invasive species by the Virginia Department of Conservation and Recreation Natural Heritage Program, the US Department of Agriculture, and the Mid-Atlantic Exotic Pest Plant Council.

3. CONSTRUCTION

A. Salvaging Topsoil

1. When soil or weather conditions are unsuitable (frozen or excessively wet and muddy), the Contractor shall cease topsoil salvage operations until approved by The Town of Vienna to resume.
2. Storage areas for salvaged topsoil shall be constructed on well drained land, away from streams, in specified stockpile areas. Prior to stockpiling, the Contractor shall install silt fence around the perimeter of the stockpile area and maintain the silt fence until the stockpile is removed. Salvaged Topsoil shall be kept in neat and separate piles from other excavated material.
3. Salvaged Topsoil stockpiles shall NOT be seeded. Salvaged Topsoil stockpiles shall be immediately and thoroughly covered with wood cellulose or straw mulch, or other approved erosion control measures. The piles shall be occasionally re-mulched in order to maintain a consistent cover until they are removed or re-spread.

B. Placement of Topsoil

1. When topsoiling, maintain needed erosion and sediment control practices.
2. Topsoil shall be uniformly spread and lightly compacted to a minimum required depth of 6 inches. The areas covered with topsoil shall be in a condition suitable for seeding and planting.
3. Topsoil shall not be placed while the topsoil is in a frozen or muddy condition, when the subsoil is excessively wet or in a condition that may otherwise be detrimental to proper grading and seedbed preparation.

5. SUBMITTALS

- A. Certificate of soil test analysis for furnished topsoil.

4. MEASUREMENT AND PAYMENT

Salvaging Topsoil shall not be measured, and the cost shall be incidental to the Contract price for Regular Excavation (or Earthwork). It is assumed that there is sufficient topsoil on-site to salvage and place to the depths indicated on the construction plans. Should the contractor feel that Furnished Topsoil is needed, the Contractor shall include the quantity and price as part of the bid. Placing Furnished Topsoil shall be measured and paid for as a per cubic yard (CY) item. Payment shall be full compensation for stockpiling, subgrade improvement, placement of topsoil, fine grading and for all material, labor, equipment, tools, and incidentals necessary to complete the work as specified in the Contract Documents, or as directed by the Town of Vienna.

PLACING FURNISHED TOPSOIL.....SY

-END OF SECTION-

SECTION-15 SOIL SUITABILITY, TESTING, AND AMENDMENTS

1. DESCRIPTION

The Contractor shall bear the responsibility of determining the suitability of on-site soils for planting applications specified on the Construction Documents.

The Contractor shall test site soils to evaluate the nutrient status of the soil prior to planting. Soils shall be sampled and tested in accordance with Virginia DCR approved methods. The Contractor shall consult with The Town of Vienna prior to the application of soil amendments.

Fertilizer (including root dips) and other soil additives (e.g. - topsoil, compost, mycorrhizal, etc.) shall be applied by the Contractor, as necessary, to ensure the success of the plantings in certain soil types through the two-year warranty period. The Contractor shall determine the type and application rate of fertilizer and/or other soil additives that are best suited for the plant species, planting applications, and existing soil conditions. Care shall be taken to minimize nutrient and pollutant loading to aquatic ecosystems through the addition of fertilizer or other additives.

2. SUBMITTALS

- A. Soils test in accordance with Virginia DCR approved soil testing labs.

3. MEASUREMENT AND PAYMENT

There shall be no measurement of payment for soil testing and/or amendments.

-END OF SECTION-

SECTION-16 REGULAR EXCAVATION, STRUCTURAL FILL (OR EARTHWORK)

1. DESCRIPTION

Earthwork shall consist of performing all operations necessary to excavate and transport all material, furnish, process material as required, stockpile, deposit, place, and compact material in accordance with the grades as shown on the plans. Such earthwork shall include the excavation, loosening, removing, loading, transporting, stockpiling, depositing, furnishing, disposing, and compacting in its final location of all materials wet and dry, as required for the purposes of completing the work.

Related Specifications

1. Section 14 – Salvaging Topsoil and Placement of Topsoil
2. Section 18 – Planting Trees and Shrubs
3. Section 19 – Herbaceous Permanent Seeding
4. Section 20 – Vegetation Watering Allowance

2. MATERIALS

- A. Local borrow shall consist of material excavated within the limits of the project and in accordance with the grading plan.
- B. Select earth fill material shall consist of material obtained within the limits of the project and used to raise the site elevations to those specified in the grading plan. If sufficient satisfactory soil materials for use as earth fill are not available from onsite excavations, it shall be the Contractor's responsibility to provide suitable earth fill material. Soils sufficient for use as earth fill include ASTM D 2487 Soil Classification Groups CL, GC, ML, CH and SC, a combination of these groups, or as approved by The Town of Vienna. Earth fill shall be free of rock greater than 3 inches, debris, waste, frozen materials, vegetation, invasive species, pathogens, and any other deleterious matter
- C. For streambanks in areas of fill, as specified in the grading plan, the Contractor shall place clayey material, composed of cohesive materials classified as ML, CL, or CH (per ASTM D-2487).
- D. Existing concrete debris within in the channel may be used as channel fill. The concrete fill should be buried a minimum of 2.5 feet under the bank or bed.

3. SUBMITTALS

- A. Proctor compaction test ASTM D 698-07 Method C Standard (including soil classification, maximum dry density, optimum moisture) for on-site and off-site fill material.
- B. Soil compaction testing results of fill areas consistent with 16.4.H (this specification).

4. CONSTRUCTION

- A. The existing elevations and contours shown on the plans, cross sections, and profiles were surveyed prior to plan development. Existing elevations and grades may have changed since the original survey was completed due to stream erosion, sediment accretion, or fill. It is the Contractor's responsibility to confirm existing grades and adjust earthwork as necessary at no additional cost to The Town of Vienna.

- B. The Contractor shall, at its own risk and at no additional cost to the Owner, maintain, support-in-place, and protect all pipes, poles, cables, utilities, walls, buildings, and other structures or property in the vicinity of its work, whether above or below ground, or that may appear in the excavation.
- C. All earthwork shall be performed in accordance with permit requirements.
- D. All erosion and sediment control devices shall be in place prior to onset of earthwork activities.
- E. Erosion and sediment control devices and measures shall be maintained in a functional condition at all times. Temporary and permanent erosion and sedimentation control measures shall be inspected after each rainfall and at least daily during periods of prolonged rainfall. Deficiencies shall be immediately corrected prior to resuming any earthwork activities.
- F. Grading operations shall be conducted so that material outside of demarcated Limits of Disturbance will not be disturbed.
- G. Local borrow shall be stockpiled in the stockpile/staging areas depicted in the Contract Documents. All stockpile areas will require appropriate sediment control (silt fence or as is otherwise necessary) in order to prevent erosion and sediment transport throughout the duration of storage. The Town of Vienna reserves the right to require other temporary measures not specifically described herein to correct an erosion or siltation condition.
- H. All floodplain fill and existing channel fill material shall be placed in 12-inch-thick loose lifts and compacted over the entire surface using tracked equipment or an excavator bucket, or other equipment necessary, to a compaction between 80- 85% of the standard Proctor maximum dry density.
- I. Topsoil and riffle substrate material shall be installed as described in the Construction Documents, and SECTION 14 - TOPSOIL, to bring surface to final grades as shown in the Construction Documents. Final grade shall be as specified within the Construction Tolerances section of these specifications.
- J. Material shown on the plans as suitable material but found at time of construction to be unsuitable shall be disposed of as unsuitable material at no additional cost to The Town of Vienna.
- K. Loose rock 3 inches or larger shall be removed from the surface of cut slopes (Subject to Town of Vienna approval).
- L. The Contractor shall be responsible for stabilizing all stream banks with temporary seeding, permanent herbaceous seeding (riparian/wetland seed mix), straw mulch, and coir fiber matting immediately after the completion of grading. The Contractor shall perform all care and remediation work required to maintain stable stream banks during construction, including erosion and sediment control.
- M. All unsuitable, unacceptable, or excess material shall be removed from the site at no additional cost to The Town of Vienna.

5. MEASUREMENT AND PAYMENT

Regular Excavation (which includes Salvaged Stream Bed Material, separate specification) shall be measured and paid for as a per cubic yard (CY) item. Payment shall be full compensation for the excavation, transport, stockpiling, and placement, and for all material, labor, equipment, tools and incidentals necessary to complete the work as specified in the Contract Documents, or as directed by the Town of Vienna.

REGULAR EXCAVATION.....CY

-END OF SECTION-

SECTION-17 ROCK

1. DESCRIPTION

This work shall consist of furnishing, transporting, stockpiling, maintaining, disposing, and placing of rock for plunge pools, constructed riffles, rock vanes, cross vanes, rock toe revetment, outfall channels, and other structures as specified in the Construction Documents.

2. MATERIALS

- A. Rock used for cross vanes, rock vane arms, plunge pools, rock outfall channels, and mini-vanes used within constructed riffles including headers, footers, and splash boulders shall consist of **angular blocky flat rock** of appropriate color (e.g., green/gray, brown/gray, dark gray, and/or dark brown) obtained from a source approved by the on-site Engineer and The Town of Vienna. Rock shall not be harvested from streams or rivers outside of a commercial quarry operation. All rock shall be free from laminations, weak cleavages and shall not disintegrate from handling/placing or the action of air, salt, or water. Granular sedimentary rock shall be unacceptable, and all rock shall be of igneous or metamorphic origin. Concrete shall not be considered as an alternative for rock except in cases where existing concrete is harvested from the existing channel bed and approved by the on-site Engineer and is buried 2.5 ft below the bed and banks. The Contractor shall individually select rock, and special order the rock if necessary to meet the requirements. This rock is typically blasted, not equipment processed. Rock shall be dense, sound, non-porous, erosion-resistant, and free from cracks, seams, flakes, fissures, and other defects conducive to accelerated weathering. Structure rock shall be free from dirt, clay, sand, rock fines, and other material not meeting the required gradation limits.
- B. The Riffle substrate, by volume, shall consist primarily of VDOT Class II riprap, select boulders, and VDOT Class I riprap. The gabion stone and supplemental existing bed material shall be used to fill void spaces and help lock the matrix into place. Approximate percentages of the riffle substrate are as follows: 35% VDOT Class I, 35% VDOT Class II, 15% select boulders, and 15% gabion stone and supplemental existing bed material. Select boulders shall be situated in a way that they are not placed side by side or grouped together but are chinked into and embedded within the Class I and Class II riprap. Final approval of the rock placement for riffles shall be approved by the on-site Engineer and The Town of Vienna.
- C. Standard rock material used for riffle substrate, rock toe revetment, and tributary substrate shall meet VDOT standards and specifications. Rock sizes for these features are provided in the details in the Construction Documents.
- D. Rock shall have a minimum unit weight of 165 lbs. per cubic foot.
- E. Samples shall be delivered to project site for approval by The Town of Vienna, prior to material use in the project. Any unsuitable material shall be removed at the Contractor's expense.
- F. The Contractor shall not be granted an extension of time or extra compensation due to delay caused by sampling, approval, or disapproval of rock protection material under the requirements of these Specifications.

3. SUBMITTALS

- A. Certificate from quarry providing the following information:
 - 1. Rocks provided are in accordance with the dimensions given in the Structure Size Tables and/or requirements in the approved Construction Documents.
 - 2. Weight per cubic foot of rock being supplied.

4. CONSTRUCTION

The Contractor shall install rock in accordance with the Construction Documents.

4. MEASUREMENT AND PAYMENT

Payment for Rock shall be incidental to the installation of plunge pools, constructed riffles, cascades, cross vanes, offset cross vanes, log vanes, rock toe revetment, imbricated rock walls, riprap, storm sewer outfalls, tributary outfalls, and all other structures as specified in the Contract Documents, or as directed by The Town of Vienna.

-END OF SECTION-

SECTION-18 PLANTING TREES AND SHRUBS

1. DESCRIPTION

- A. This work shall consist of furnishing, transporting, storing, and installing trees and shrubs to complete the work for the planting plan as specified in the Contract Documents. Work also includes the placement and removal of deer protection on 552 trees and shrubs.
- B. Prior to start of work, the Contractor shall submit a proposed planting schedule, including species and quantities, anticipated planting dates, and the source of plant material to the on-site Engineer and The Town of Vienna for approval. No planting work shall be performed until this information has been reviewed and approved by the on-site Engineer and The Town of Vienna.
- C. The Town of Vienna may request the Contractor to stake and adjust the location of individual plants within the approved Planting Zones.
- D. Contractor shall provide a three (3) day notice of intended plant delivery date in order for owner representative to be on-site to review plant material prior to planting.
- E. Prior to installation of trees and shrubs, all areas disturbed by construction shall be amended, brought to specified grades shown in the Contract Documents, and the seed bed prepared per the Salvaging and/or Furnishing and Placing Topsoil and Earthwork sections of these specifications.

Related Specifications

- 1. Section 14 – Salvaging Topsoil and Placement of Topsoil
- 2. Section 16 – Regular Excavation, Structural Fill (Or Earthwork)
- 3. Section 19 – Herbaceous Permanent Seeding
- 4. Section 20 – Vegetation Watering Allowance

2. MATERIALS

A. Plant Material

- 1. All plant material shall conform to the current issue of the American Standard for Nursery Stock published by the American Association of Nurserymen.
- 2. 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 Town of Vienna upon request.
- 3. The nursery supply source shall certify that the origin of the seeds from which the trees and shrubs were produced is Hardiness Zone 7, east of the Mississippi River. Stock from colder zones may be accepted, subject to the on-site Engineer and The Town of Vienna approval.
- 4. Plant material collected from the wild is prohibited.
- 5. 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. All container-grown plants shall be grouped and kept moist and cool until they are planted. Plants left to dry in the sun prior to planting may be rejected on-site by the on-site Engineer and/or The Town of Vienna.

6. The Town of Vienna may reject plants damaged in handling or transportation or that do not meet the specifications described in the Contract Documents.
7. No plants shall be installed unless The Town of Vienna approves the plant species, condition of the plantings and the process of installation.
8. Deer cage max or approved equivalent (5' height, 3.5' diameter wire fencing) to be used as herbivore protection for 552 trees and shrubs. Website reference: <http://www.deercage.com>.

B. Substitute Plant Material

1. **Contractor shall provide planting submittals two months (min.) prior to the scheduled planting date.** Substitutions will only be permitted with adequate justification. The on-site Engineer and Town of Vienna must approve all plant substitutions.
2. If a substitute is selected, it must be native to The Town of Vienna and of the same size, value, quantity, and quality as the original plant.

C. Water

1. Water used in the establishment or caring of plants and seed shall be free from any substance that is injurious to plant life.

D. Fertilizer

1. No broadcast fertilization shall be permitted on stream restoration projects unless specifically noted in Contract Documents.
2. Fertilize each bare root, plug, tuber, and pint container plant with a 5-gram tablet of controlled release fertilizer. Fertilize each quart container with a 10-gram tablet of controlled release fertilizer. Fertilize each 1-gallon and 2-gallon container with a 20-gram tablet of controlled release fertilizer. Generally, for each 12 to 18 inches of plant height or for each ½ inch of tree diameter at the base, use 20 grams for slow growing plants or 40 grams for fast growing plants or poor soil conditions. Fertilizer tablets shall be Agriform 20-10-5 or approved equivalent, applied in accordance with manufacturer's recommendations.

E. Mycorrhizal Fungi

All bare root seedlings shall be treated with root dip absorbent polymers and mycorrhizal root dip inoculates in accordance with the manufacturer's recommendations. Root Dip shall be Mycortree™ Root Dip or approved equal.

F. Root Growth Hormone

All live stake plantings shall be treated with Root Growth Hormone prior to installation.

G. Straw Mulch

Straw mulch shall be free of rot, mildew, and noxious weed seed and shall be of a small grain such as wheat, barley, or oat.

3. SUBMITTALS

- A. Planting schedule with list of live stakes, plugs, and trees and shrubs lists with scientific name, common name, quantity, and nursery.
- B. Deer cage protection.

4. CONSTRUCTION

A. Installation

1. All areas disturbed by construction shall be planted in accordance with the composition and planting schedules for each designated planting zone. Areas within designated planting zones not disturbed by construction shall be supplemented with trees and shrubs to meet the acre quantities specified in the composition schedule.
2. The Contractor shall refer to the planting plan, vegetation schedule, planting details and notes in the Construction Documents for specific spacing requirements.
3. The Contractor shall use the overall spacing requirements, spacing diagrams, and the Planting Notes and Details in the Construction Documents to determine the spacing between each species of vegetation and among the same species vegetation.
4. Immediately after site preparation and approval, trees and shrubs shall be planted. Bare Root and any containerized plants shall be installed between September 30 and March 31, or as directed by The Town of Vienna. Live stakes shall only be planted when stock is dormant. Tubelings shall be planted between September 30 and March 31. **No planting shall occur when soil is frozen.**
5. Root stock of the plant material shall be kept moist during transport, from the source to the job site and until planted.
6. The Contractor may be required to flag and label individual planting pits at specific locations. Upon planting a typical area within each planting zone, the Contractor shall have The Town of Vienna inspect and approve plant spacing and planting techniques before proceeding.
7. All planting pits shall be dug by hand with a shovel or auger. Walls of planting pits shall be dug so that they are vertical or sloping outward in heavy soils. Scarify the walls of the pit after digging.
8. Planting holes for bare root trees and shrubs shall be 1-2" deeper than the root collar (i.e., 1-2" deeper than they were growing in the nursery). Bare root trees and shrubs shall be installed such that the roots are not bunched, crowded, or bent upwards. Bare root trees and shrubs shall be installed so that all roots are in contact with topsoil.
9. Remove all non-organic debris from the pit and tamp loose soil in the bottom of the pit by hand.
10. Remove the plant either by cutting or inverting the container.
11. **DO NOT** handle the plant by the branches, leaves, trunk, or stem.
12. Place the plant straight in the center of the planting pit, carrying the plant by the root mass. Never lift or carry a plant by the trunk or branches.

13. Place controlled release fertilizer in the planting hole in accordance with Section 18.2.D of these specifications (above).
14. Treat all bare root seedlings with root dip absorbent polymers and mycorrhizal root dip inoculates in accordance with the manufacturer's recommendations as specified in Section 18.2.E of these specifications (above).
15. Treat all live stake plantings with Root Growth Hormone prior to installation.
16. Backfill planting pit with existing soil and hand tamp as pit is being backfilled to completely fill all voids and air pockets. Do not over-compact soil. Make sure plant remains straight during backfilling/tamping procedure.
17. Do not cover the top of the root mass with soil.
18. An additional 18-inch diameter area of compost shall be placed around each tree and shrub. Compost shall be 2 inches thick.
19. Water plants thoroughly immediately after planting.
20. The Contractor shall leave no open planting pits at the close of each day.
21. Remove all tags, labels, strings, and wire from the plant materials, unless otherwise directed by The Town of Vienna.

B. Clean Up

1. During installation of trees and shrubs, 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.
2. The Contractor shall be responsible for off-site removal and disposal of all trash, excess backfill and any materials incidental to the project and disposing of them off-site.

C. Maintenance During Construction

1. The Contractor shall protect vegetation against equipment and personnel damage of any kind for the duration of construction and until acceptance of the work by The Town of Vienna. Maintenance shall begin immediately after each vegetation installation is completed and shall continue throughout the construction period. Maintenance consists of disease and nuisance animal control, weeding, and inspecting to see that the vegetation is healthy and performing adequately in protecting the project surfaces.

5. WARRANTY

- A. The two-year warranty period of care and replacement shall begin after final inspection and approval of the installation of all trees and shrubs.
- B. The Contractor shall be responsible for maintaining a survival rate of 85% on all permanent plantings for the duration of the two-year monitoring period.

- C. The Contractor shall incur the cost of replacing any permanent plantings that do not survive through the two-year monitoring period, including deer herbivory. The Contractor shall be responsible for maintaining all replacement plantings until the 85% survival threshold is met. Additional two-year warranty periods shall apply to all replacement plantings. The two-year monitoring period begins upon acceptance of the landscape plantings by The Town of Vienna.
- D. Approximately six months, one year, year and a half, and two years after the plantings are complete, an on-site inspection of all plantings will be conducted, and the Contractor will be directed accordingly on the mortality replacement at each inspection.

6. MEASUREMENT AND PAYMENT

Planting trees, shrubs, and plugs shall be measured and paid for at the Contract unit price per each (EA) plant in accordance with the plant schedule and planting plan. Payment for planting trees, shrubs, and plugs shall be full compensation for furnishing, transporting, installing, maintenance and warranty, including all materials, labor, equipment, stockpiling, tools, disposal and incidentals necessary to complete the work as specified in the Contract Documents, or as directed by The Town of Vienna.

TREES AND SHRUBS.....	EA
DEER PROTECTING FENCE.....	EA

-END OF SECTION-

SECTION-19 HERBACEOUS PERMANENT SEEDING

1. DESCRIPTION

- A. This work shall consist of furnishing, transporting, storing, and installing all herbaceous permanent seeding for the Planting Zones as specified in the Contract Documents, or as directed by The Town of Vienna.
- B. Prior to start of work on this item, the Contractor shall submit all herbaceous permanent seeding paperwork, to include shipping invoices, seed bag tickets for the herbaceous permanent seed mixes to be installed and the source of the seed to The Town of Vienna for review. No work shall be performed until the seeding paperwork is approved by The Town of Vienna.
- C. Prior to seeding, all areas disturbed by construction shall conform to the grades specified in the Contract Documents. Soils shall be amended, as needed, and required by the Contract Documents, and the seed bed prepared per the Salvaging and/or Furnishing and Placing Topsoil, and Earthwork sections of these specifications.

Related Specifications

- 1. Section 14 – Salvaging Topsoil and Placement of Topsoil
- 2. Section 16 – Regular Excavation, Structural Fill (Or Earthwork)
- 3. Section 18 – Planting Trees and Shrubs
- 4. Section 20 – Vegetation Watering Allowance

2. MATERIALS

A. Seed Mix

Seed Mix shall consist only of the varieties specified in the vegetation schedule and planting plan sheets of the Contract Documents for all planting zones.

Seed shall be certified that the Pure Live Seed (PLS) percentage is equal to or greater than that which is specified on the Plant Schedules. If the PLS is less than specified, the Contractor shall increase the seeding rate to compensate for the PLS difference at the Contractor’s own expense.

All Seed Mix shall be free of invasive and/or noxious plants, plant parts and seeds identified by the Virginia Department of Conservation and Recreation Natural Heritage Program, the US Department of Agriculture, and the Mid-Atlantic Exotic Pest Plant Council, to include, but not limited to the following:

Annual bluegrass	Corn cockle	Spurred anoda
Bermuda grass	Dodder	Wild garlic
Bindweed	Giant foxtail	Wild onion
Cocklbur	Horse nettle	Johnson grass
Japanese stilt grass	Japanese knotweed	Mile-a-minute
Wavy basket grass	Multiflora rose	

B. Straw Mulch

Straw mulch shall be free of rot, mildew, and noxious weed seed and shall be of a small grain such as wheat, barley, or oats.

C. Water

Water used in the establishment or caring of plants and seed shall be free from any substance that is injurious to plant life.

D. Fertilizer

Herbaceous seeding areas shall not be fertilized.

E. Limestone

Limestone shall not be applied to any areas receiving herbaceous seeding.

3. CONSTRUCTION

A. Installation

1. No work shall begin without having the specified (approved by The Town of Vienna) seed mixes on site. If seed supply runs out, no further work shall be done until approved seed supply is replenished.
2. Seeds other than those specified for use within the Contract Document shall not be delivered to or used on the project site. Seed bags found on site containing seed other than that specified in the Contract Documents shall be immediately removed and are subject to confiscation by The Town of Vienna inspection personnel.
3. All areas disturbed by construction shall be seeded in accordance with the planting plans and schedules. The herbaceous permanent seeding is specified on the composition and planting schedules in the Contract Documents. Areas not disturbed shall not be seeded.
4. The Contractor shall supply the content analysis seed tag from each seed bag to The Town of Vienna for approval prior to seeding.
5. 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.
6. Seeding shall be accomplished by using a broadcast spreader. Any alternative seeding methods must be approved by The Town of Vienna prior to Bid Submittal. All seeding equipment shall be calibrated before application to the satisfaction of The Town of Vienna so that the material is applied accurately and evenly to avoid misses and overlaps. The broadcast spreader used shall be capable of placing seed at the specified rate.
7. The specified herbaceous permanent seed mix shall be thoroughly mixed with temporary seed and seeded using a broadcast seeder at the rates specified in the Contract Documents. Seed shall be applied to the top of the Compost and topsoil mixture in two different directions. Following the placement of the topsoil and herbaceous permanent seed mix, the Contractor shall hand rake the seeded areas to mix herbaceous permanent seed mix into the first one (1) inch of the soil.

- 8. Permanent herbaceous and temporary seed shall be sown immediately following fine grading of an area, as construction progresses, in order to achieve rapid stabilization. After seeding and raking, the Contractor shall cover the seeded areas with straw mulch on overbank areas and shall cover seeded areas with straw mulch and coir matting along the stream banks, as indicated in the Contract documents. **No seed shall be spread on top of straw or coir matting.**
- 9. At the sole discretion of Town of Vienna staff, additional seeding may be required in areas where poor vegetative establishment is observed (less than 85% surface coverage). Additional seeding may be requested at any time prior to substantial completion or in association with planting inspections during the two-year warranty period. Additional seeding shall be considered within the original contract scope and shall not be subject to change order request.

B. Clean-up

The Contractor shall be responsible for the removal of all trash and any other materials incidental to the project and disposal of them off-site.

4. WARRANTY

- A. The two-year warranty period of care and replacement shall begin after final inspection and approval of the installation herbaceous permanent seeding.
- B. At the sole discretion of Town of Vienna staff, additional seeding may be required in areas where poor vegetative establishment is observed (less than 85% surface coverage). Additional seeding may be requested at any time prior to substantial completion or in association with planting inspections during the two-year warranty period.

5. MEASUREMENT AND PAYMENT

Herbaceous permanent seeding shall be measured and paid for at the contract unit price per lb (LB) of area seeded. Payment will be full compensation for furnishing, transporting and incorporating all seed, including all maintenance and warranty, materials, labor, equipment, tools, disposal and incidentals necessary to complete the work as specified in the Contract Documents, or as directed by The Town of Vienna.

HERBACEOUS PERMANENT SEEDING.....LB

-END OF SECTION-

SECTION-20 VEGETATION WATERING

1. BIDDERS SHALL INCLUDE VEGETATION WATERING IN THEIR COST PROPOSAL

- A. The purpose of the Vegetation Watering specification is to provide for watering of the proposed *trees, shrubs, and container plants* during extended unseasonably hot or dry conditions, as directed by The Town of Vienna.
- B. The price shall include watering twice a week for the duration of June 15 through September 15 for the duration of the landscape warranty period (two years), that is, a total of 48 visits.
- C. During June 15 through September 15, The Town of Vienna will notify the Contractor when Vegetation Watering is required.
- D. If, for any reason, the warranty period encompasses more than the specified durations (timing, delayed completion, delayed plant replacement, etc.), The Town of Vienna may, at their sole discretion, require additional watering visits. In this scenario, additional watering costs will be negotiated between the Contractor and The Town of Vienna.
- E. Supplemental watering shall be done using a submersible-style pump to pump water from an adjacent pool whenever possible in order to avoid damage associated with vehicular access. Such watering may be required, for example, in areas where vegetative establishment does not provide 85% min. survival of trees and shrubs and 85% aerial coverage of herbaceous vegetation.

2. SUBMITTALS

- A. The Contractor shall include a Vegetation Watering plan as a submittal for approval by The Town of Vienna.
- B. The Vegetation Watering plan submittal shall be approved by The Town of Vienna prior to planting any *trees, shrubs, or herbaceous permanent seeding*.
- C. With the understanding that the stream may be low or dry during the summer months, the Contractor shall include in the Vegetation Watering plan submittal alternate methods for providing water including pumping water from the stream, adjacent fire hydrants, or water trucks.

3. MEASUREMENT AND PAYMENT

- A. Payment shall be measured and paid on a unit price Per Application (PA). Payment will be on a per unit basis as needed and as directed by The Town of Vienna. Payment shall constitute full compensation for all furnishing and transporting all materials, labor, transportation, stockpiling, equipment, tools, and all incidentals necessary to complete the work as described herein, in the Contract Documents and as directed by The Town of Vienna.

VEGETATION WATERING ALLOWANCE.....PA

-END OF SECTION-

SECTION-21 STREAM RESTORATION CERTIFICATION AS-BUILT SURVEY

1. DESCRIPTION

Survey and preparation of the final certified As-Built documents shall be prepared by others and delivered under a separate contract. The certified As-Built survey of the completed stream restoration construction will fully illustrate all completed construction within the established Limits of Disturbance. This does not relieve the Contractor of daily non-certified As-Built survey obligations/grade check notes and notifications as described in the Construction section below.

The Contractor shall prepare and submit weekly, non-certified, As-Built surveys and field construction notes for all in-stream structures, longitudinal profiles, and channel dimensions at each proposed cross section. The weekly, non-certified, As-Built survey and construction notes shall include the As-Built location (stationing) and elevation compared to the proposed As-Built location and elevation for all instream structures, longitudinal profiles, and channel dimensions at each proposed cross section.

2. MATERIALS

- A. During construction, the Contractor shall adhere to tolerances shown on the Construction Plans (Contract Documents).
- B. The certified As-Built survey shall be a reproducible mylar copy of the approved Contract Documents (existing base files to be obtained electronically from the Engineer). The As-Built survey shall be certified by a Land Surveyor licensed to practice in the Commonwealth of Virginia. The As-Built survey shall include, at a minimum, the following features:
 - 1. Verification of information in geometry plan and notation of any changes.
 - 2. Topographic As-Built survey over the extent of all constructed bank stabilization and grading. Shots shall be sampled and reported at density sufficient to show break lines and grade changes at 1 foot contour intervals.

3. SUBMITTALS

- A. Non-certified, As-Built surveys and field construction notes for all in-stream structures, longitudinal profiles, and channel dimensions at each proposed cross section.

4. CONSTRUCTION

- A. The Contractor shall provide weekly, non-certified, As-Built surveys in the form of "Construction Foreman's GRADE CHECK NOTES" to The Town of Vienna Construction Inspector and/or The Town of Vienna Staff on site. The GRADE CHECK NOTES shall show the As-Built elevations are in conformance (within specified tolerances) with the proposed elevations at all structure points shown in the structure tables, and at all proposed in-channel grading (centerline/thalweg, active channel toe, top of bench, back of bench, top of stream bank) and all proposed topographic features outside of the stream channel extended to the LOD on both sides of the channel, as shown in the grading plans, proposed cross sections and longitudinal profile.

- B. The Contractor shall notify The Town of Vienna a minimum of 2 weeks prior to completion of construction activities.
- C. All As-Built survey shall be reviewed and approved prior to Contractor demobilization, and no longer than six (6) weeks following substantial completion of construction activities.
- D. Any errors or omissions found during the As-Built survey and determined by The Town of Vienna to have occurred during construction shall be repaired by the Contractor to the satisfaction of The Town of Vienna at no additional expense to The Town of Vienna. The Contractor shall make any necessary repairs or corrections required by The Town of Vienna including grading, adjustment of stream restoration structures, etc. Upon completion of corrective action, the Contractor shall resurvey the problem area showing the original As-Built information and any modification highlighted and noted. A Land Surveyor licensed to practice in the Commonwealth of Virginia shall also seal the re-survey.
- E. Final acceptance of the project by The Town of Vienna shall not occur until the certified As-Built has been completed for the entire project and has been approved by The Town of Vienna.

5. MAINTENANCE

- A. The Contractor will be held fully responsible for maintaining the project records during construction including the period of the As-Built certification.
- B. The Contractor shall be held responsible for maintaining the integrity of the project until final acceptance of the As-Built survey and a determination by The Town of Vienna that no errors or omissions have been made by the Contractor during construction. The Town of Vienna shall make every effort to notify the Contractor within three (3) weeks of The Town of Vienna's receipt of the As-Built survey as to the acceptability or rejection of the construction of the stream restoration project; 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 of the certified As-Built for the entire stream restoration project.

6. MEASUREMENT AND PAYMENT

Measurement and payment shall not be made for the Contractor to prepare and submit weekly, noncertified, as-built surveys and field construction notes for all in-stream structures, longitudinal profiles and channel dimensions at each proposed cross section and shall be incidental to installation of all instream structures and earthwork. Certified as-built survey shall be proved by a separate contractor under a separate contract.

-END OF SECTION-

SECTION-22 RESPONSIBLE LAND DISTURBER CERTIFICATION

1. DESCRIPTION

The Contractor shall prepare and submit the Responsible Land Disturber Certification. The contractor shall follow all the requirements of the Responsible Land Disturber Certification, Virginia Erosion and Sediment Control Law and associated amendments to the Virginia Erosion and Sediment Control Law § 10.1-563 and § 10.1-566 of the Code of Virginia, *Virginia Erosion & Sediment Control Handbook, Third Edition*, dated 1992, the Contract Documents.

2. MEASUREMENT AND PAYMENT

Payment for the Responsible Land Disturber Certification shall be incidental to Erosion and Sediment Control Section, and shall be full compensation for furnishing, transporting, installing, maintaining and removing all erosion and sediment control measures shown on the plans, including all materials, labor, equipment, tools, hauling, stockpiling, inspecting and incidental costs necessary to complete the work specified in the Contract Documents, or as directed by The Town of Vienna.

-END OF SECTION-