

Wildwood Park Bridges and Boardwalks East Side ITB

Addendum No. 01



Project Name: Wildwood Park Bridges and Boardwalks East	Project No.: RFP#22-23-06
Prepared By: Mark Nottingham	Date: 8-31-2022

Project Clarifications:

- If a temporary bridge is used for construction no additional fill will be allowed and the bridge should have 5' of vertical clearance under it during normal water height.
- The Tower, Area 1 shall be completed within the 365 contract days.
- If the alternate for the concrete sidewalk connection at Area 2, The Beach, is not selected, no other work associated with the concrete sidewalk will occur in this area.
- If the alternate for the concrete sidewalk connection at Area 2, The Beach, is selected, this work shall be completed within 300 days.
- Additional guidance on slope stabilization for Area 1, The Tower, is shown on the following pages of this addendum.

SL-1 VEGETATED SOIL LIFT

- A. The Work under this Section shall consist of the construction and maintenance of soil stabilization earth feature consisting of matting and live vegetation placed along the embankment at Area 1 to protect the existing and graded banks and interwoven around the tree stumps which are to remain (6" above finished grade) after clearing.
- B. The work covered by this section consists of furnishing, storage, preparation and installation of all materials required for proper installation of each Soil Lift structure. The contractor shall install Soil Lift in areas shown on the plans and/or in areas directed by the Landscape Architect.
- C. The vegetated soil lift structure requires the installation of plantings that are best planted during the specified planting season contained in Section SL-2 Permanent Seeding and Planting of Vegetated Soil Lift. The Contractor shall schedule his work to insure the survival of these plantings within the structure. The Contractor shall warrant the plantings within the Vegetated Soil Lift to the same survivability specified in Section SL-2 Permanent Seeding and Planting of Vegetated Soil Lift.

D. Materials:

- 1) Bare-root seedlings, live cuttings, and/or live stakes shall only be installed in the Vegetated Soil Lift according to the Plan Detail. The Coir Fiber Matting within the Vegetated Soil lift shall not be punctured or torn during the installation of the bare-root seedlings, live cuttings, and/or live stakes. In other words, the void must be spread to install the Bare-root seedling without damaging the fabric. A minimum depth of 3-inches of topsoil shall be placed around the bare-root seedlings roots during installation. The species of bare-root seedlings that are to be installed into the Vegetated Soil Lift shall be the species specified in the shall be submitted to the Landscape Architect for Review and approval. Refer to Section SL-2 Permanent Seeding and Planting of Vegetated Soil Lift. Alternate species may be installed with prior written approval of the Landscape Architect.
- 2) Bare root seeding and live stake installation shall be limited to occurring within the specified dormant planting season between November 15th and April 15th. If construction of the Vegetated Soil Lift is to occur outside the specified dormant planting season, then 3-inch to 5-inch plugs or liners shall be used in place of the bare-root seedlings but only if directed in writing by the Landscape Architect.
- 3) Soil Amendments shall consist of at least 25% of the fill material utilized in the construction of the Soil Lift, and should be uniformly mixed throughout.
- 4) COIR FIBER MATTING: Woven matting of high strength coconut fiber (**900 gram**).

Parameter	Minimum Value	Test Method
Thickness	0.30 in minimum	--
Mass per unit area (min.)	20.6 oz./sq.yd.	--
Wide width tensile-Dry (MD X CD)	1,968 x 1,416 lbs/ft	ASTM D5199
Maximum Elongation-Dry (MD X CD)	46% x 36%	ASTM D5261
Wide with tensile- Wet (MD X CD)	1,260 x 768 lbs/ft	ASTM D4595
Maximum Elongation-Wet (MD X CD)	43% x 36%	ASTM D4595
Flexural Rigidity (Stiffness)	14,019 x 9,329 mg-cm	ASTM D1388
Water Absorption-	132%	ASTM D1117
Water Velocity-	16 ft/sec	Flume Test
Shear Stress-	5.0 lbs/ft ²	Flume Test
“C” Factor-	0.003	Flume Test
Open Area-	39%	Measured

- 5) Anchors: Provide anchors per manufacturers recommendations or as approved in writing by the Landscape Architect.

E. Construction:

- 1) Vegetated Soil Lift structures shall be constructed according to manufacturers directions, or as directed by the Landscape Architect.
- 2) The Vegetated Soil Lift shall run parallel to the stream and be constructed into the existing and graded banks. Soil lifts shall be constructed in a manner to ensure that the proposed stream bank grading is achieved through the construction of the Vegetated Soil Lift structures. The bank slopes indicated within the Drawings shall be utilized to set the horizontal offset between each vertical one foot soil lift wrap.
- 3) Excavate the existing bank as necessary to install the Vegetated Soil Lift into the bank to the dimensions shown in the Drawings. Place soil lift footer by laying non-woven filter fabric in the excavated trench and installing a gradation of backfill material shown in the Drawings, compact, and wrap filter fabric backfill.
- 4) Begin placing soil lifts. Each lift shall consist of compacted soil wrapped in the specified Coir Fiber Matting, and shall be constructed to a lift height shown in the Drawings. Lifts shall be sloped back at a maximum slope shown in the Drawings, but generally each soil lift shall be horizontally offset a necessary distance to achieve the proposed bank slope indicated in the Drawings. The coir fiber matting for each soil lift shall be staked according to the manufacturer's recommendation or as illustrated in the "Coir Fiber Matting" detail shown on the Drawings. Each soil lift shall be topped with live cuttings bundles or bare-root seedlings according to Section SL-2 Permanent Seeding and Planting of Vegetated Soil Lift and the Vegetated Soil Lift detail shown in the Drawings. Fill placed within the Vegetated Soil Lifts shall be compacted in 1-foot lifts in accordance with Section SL-3 Grading and Fill of Vegetated Soil Lift.

SL-2 PERMANENT SEEDING AND PLANTING OF VEGETATED SOIL LIFT

General

- A. It is a specific requirement of this Contract that the Contractor provide, or subcontract with, a Planting Supervisor that has one of the following credentials: Certified Landscape Technician, Certified Plant Professional, Registered Forester, Registered Landscape Contractor, certified nurserymen, and others as approved by the City of Wake Forest (e.g. planter with PhD in ecological sciences).
- B. The Planting Supervisor shall be responsible for managing and being on-site during all activities involving permanent planting, including but not limited to the following: site preparation for planting, seedling handling and storage, planting operations, quality control inspections, and managing plant competition.
- C. Permanent seeding and/or woody plantings (i.e. Bare-Root Seedlings, Live Stakes, and Live Cuttings) shall be used on all disturbed areas of the construction site. The areas to be seeded/planted shall extend from upland areas to the stream bank edge of water as shown on the Drawings or as directed by the Landscape Architect. Permanent seeding will be performed during planting times as described in the Planting Notes on the Drawings. Vegetation zones (including application rates, spacing, and schedule) for seeding and woody plantings are specified in this Section and shown in the Planting Notes of the

Drawings.

- D. The Contractor shall remove any trash and debris resulting from planting operations, and legally dispose of it off-site.
- E. The quantity of Permanent Plantings to be installed will be affected by the actual conditions that occur during the construction of the project. The quantity of Permanent Plantings may be increased or decreased at the direction of the Landscape Architect. Such variations in quantity shall not be considered as alterations in the details of construction or a change in the character of the Work.
- F. Refer to Section SL-3 Grading and Fill of Vegetated Soil Lift. for soil preparation and topsoil requirements. All soils that will receive permanent plantings and/or seeding must meet the requirements of Topsoil or Soil Amendments for at least the first 6-inches of soil depth.

Invasive Species Control

- A. If encountered, or as directed by the Landscape Architect, exotic and invasive vines and grasses shall be treated and removed inside **ALL** the planting zones.
- B. Such species shall include, but not be limited to, Japanese honeysuckle (*Lonicera japonica*), kudzu (*Pueraria montana*), common periwinkle (*Vinca minor*), Chinese wisteria (*Wisteria sinensis*), Japanese wisteria (*Wisteria floribunda*), shrubby lespedeza (*Lespedeza bicolor*), Japanese grass (*Microstegium vimineum*), English Ivy (*Hedera helix*), Chinese Privet (*Ligustrum sinense*), Multiflora Rose (*Rosa multiflora*), and tropical soda apple (*Solanum viarum*).

Warranty Period/Replacement

- A. The Contractor shall warrant an 80% survival rate against defects including mortality and poor growth, except for defects resulting from abuse by other parties and abnormal weather conditions. The Contractor shall replace, without cost to the City, all dead plants in excess of 20%, as determined by the City during and at the end of the Warranty Period. Replacements shall closely match adjacent specimens of the same species and shall be subject to all requirements of the Specifications. Replacement plants shall be inspected and approved by the Landscape Architect or City prior to planting. Replacement plantings shall be placed in areas lacking the proper planting density as specified in this Section, or as shown on the Drawings.
- B. The 80% survival rate as described above shall be warranted for one year (12-months) following the installation of the permanent planting and final acceptance by the City.
- C. If, on regular inspection of the site during the warranty period, the Contractor determines that neglect, vandalism, or other conditions beyond the Contractor's control have resulted in the poor health or death of a plant, the Contractor shall immediately report such conditions to the City, in writing.

- D. The Contractor shall protect plantings from damage due to construction operations, operations by other contractors, trades, and trespassers. Protection shall be maintained through installation and construction closeout. The Contractor shall treat, repair, or replace damaged landscape work as directed by the Landscape Architect.
- E. **It shall be the Contractor's responsibility to notify the City in writing at least one month prior to the end of the one year warranty period. In the event the Contractor does not notify the City prior to the one year date of the warranty, the warranty shall extend beyond the one year period, at the cost of the contractor, until the contractor and the City schedule and complete a walkthrough, and any required plant replacements have been completed by the Contractor, and are acceptable to the City.**

Materials

- A. All plant material shall be harvested locally (within the same physiographic eco-region and plant hardiness zone) or purchased from a local nursery, approved by the Landscape Architect. All Live Stakes shall be dormant at time of acquisition and planting. Live Stakes, Live Cutting Bundles, and Bare-Root Seedlings shall be installed between **November 15th and April 15th** unless a more restrictive time period is specified in the Drawings.
- B. Materials, equipment and products incorporated in the Work shall be approved for use before being purchased by the Contractor. The Contractor shall submit to the Landscape Architect a list of the proposed materials, together with such samples as may be necessary as stipulated in the specifications. No request for payment will be approved until this list been received and approved by the Landscape Architect.
- C. The Contractor may furnish or use a substitute that is equal to the materials specified. If the Contractor proposes to furnish or use a substitute, it shall, promptly after Award of the Contract, make written application to the Landscape Architect for approval of a substitute certifying in writing that the proposed substitute will perform adequately the duties imposed by the general design, be similar and of equal substance to that specified, and be suited to the same use and capable of performing the same functions as that specified.
- D. No substitute shall be ordered or installed without the prior written approval of the Landscape Architect. No substitution will be considered by the City, unless an appropriate cost credit for the proposed substitution is submitted at the time of the substitution request.
- E. Delays caused by obtaining approvals for substitute materials will not be considered justifiable grounds for an extension of Contract Time.

Temporary Storage On Site

- A. The Contractor shall deliver plant materials after preparations for planting have been completed and plant immediately. If planting is delayed more than 6-hours after delivery, the Contractor shall set plant materials in the shade, protect them from weather and mechanical damage, keep the roots moist, prevent freezing of the root ball, and

remove ties from branches. The Contractor shall cool the surface of the storage area by watering before placing plants and providing temporary shading.

- B. If the plants are required to sit for any length of time on pavement or other hard surfaces that become hot and/or reflect light, the Contractor shall cool the surface by watering before placing the plants on it. The Contractor shall keep plants protected from strong, direct or reflected light. Tree trunks are especially in need of this protection. See additional special storage requirements for specific plantings in this section.

Watering

- A. The Contractor shall be responsible for providing water to planted material directly after installation. Rain substitutes for a scheduled watering when at least 1-inch of rainfall has been verified in a one-week period. It shall be the Contractor responsibility to keep the plant root zone moist enough to establish and maintain healthy and attractive plant material. Containerized plants shall be watered prior to planting.
- B. The Contractor shall thoroughly water all plants immediately after planting to “saturation of all backfill in the planting pits” during the same day as the planting. When fully settled, the plants shall be at the proper grades and vertical.
- C. The Contractor shall apply water only by an open-end hose at low pressure. Sufficient watering is achieved by filling the saucer twice per application per plant, or as otherwise recommended by the Planting Supervisor.
- D. The water shall be of satisfactory quality to sustain an adequate growth of plants and shall not contain harmful, natural or man-made elements detrimental to plants. The Contractor shall provide such satisfactory water from sources off-site at no additional cost to the City. The cost associated with obtaining and applying water shall be included in the cost of the plant materials. There shall be no separate payment for this item.

Planting Requirements

- A. Permanent plantings shall be planted using a zone methodology as indicated within the Planting Plans on the Drawings.

Permanent Seeding

- A. Seed shall be delivered in original sealed, labeled, and undamaged containers.
- B. Seeding shall be performed during the planting seasons specified in the Planting Notes of the Drawings or between November 15th and April 15th whichever is more restrictive.
- C. The seed shall be fresh, clean, dry, new-crop seed complying with the Association of Official Seed Analysts' "Rules for Testing Seeds" for purity and germination tolerances.
- D. The seed mixture shall be comprised of seed of specified species, variety proportions by weight, and minimum percentages of purity, germination, and maximum percentage of

weed seed as indicated in the Planting Notes in the Drawings.

- E. The various seed mixtures shall be applied at the rates specified in the Planting Notes of the Drawings. These seed mixtures shall contain no noxious weed seed per pound.
- F. When permanent seeding is not performed concurrently with temporary seeding, the Contractor shall re-mulch seeded areas to meet the mulching requirements in the Planting Notes in the Drawings. Anchor straw by tacking, netting, or other approved method sufficient to hold the straw in place.
- G. The area to be seeded shall be examined prior to seeding to ensure compliance with requirements and conditions for seed establishment, and Soil Amendments per Section SL-3 Grading and Fill of Vegetated Soil Lift. The Contractor shall not proceed until unsatisfactory conditions have been corrected.

H. Preparation:

- 1) The Contractor shall limit subgrade preparation to areas that will be planted in the immediate future. The subgrade shall be loosened to a minimum depth of 4-inches, and the seeded areas shall be graded to a smooth, even surface with loose, uniformly fine texture. The areas to be seeded shall then be rolled and raked to remove ridges and fill depressions to meet finish grades. Fine grading shall be limited to areas that can be planted in the immediate future. Prepared areas shall be moistened before seeding when the soil is dry. Prior to planting, the surface shall be watered thoroughly and allowed to dry before planting with care not to create a muddy soil condition. Prepared areas shall be restored if eroded or otherwise disturbed after fine grading and before planting.
- 2) Areas that are to be seeded that have slopes steeper than (1:1) shall be seeded and then lightly raked to cover seeds. Planting on existing banks shall be done in a manner to prevent erosion on slumping banks.

I. Installation:

- 1) Seed shall be sown with a spreader or a seeding machine. Seed shall not be broadcast or dropped when wind velocity exceeds 5 mph. Seed shall be evenly distributed by sowing in two directions at right angles to each other. Wet seed or seed that is moldy or otherwise damaged in transit or storage shall not be used, and disposed of off-site immediately.
- 2) After being sown, the seed shall be raked/roughened into the top ¼-inch of the topsoil and watered with a fine spray. Seeded areas on stream banks shall be protected with erosion control matting as shown on the Drawings or directed by the Landscape Architect. Other seeded areas shall be protected by spreading straw mulch or straw mat uniformly to form a continuous blanket over seed areas. Straw mulch shall be spread by hand, blower, or other suitable equipment, and anchored by crimping into the topsoil by suitable equipment or netting.

Bare-Root Seedlings

- A. The Contractor shall provide the quality, size, source, species and variety of tree and shrub plantings indicated on the Drawings, complying with applicable requirements of ANSI Z60.1 “American Standard for Nursery Stock”.
- B. The delivered Bare-Root Seedlings are to be freshly dug trees and shrubs. Care shall be taken to protect bark, branches, and root systems from sun scald, drying, sweating, whipping, and other handling and typing damage. The plantings shall not be bent or bind-tied in such a manner as to destroy their natural shape. Protective covering shall be provided during delivery, and care shall be taken not to drop trees and shrubs. Bare-Root Seedlings stock shall be packed in wet straw, hay, or other suitable material to keep the root system moist during delivery.
- C. If planting will be delayed more than 6-hours after delivery, the planting materials shall be set in the shade, protected from weather and mechanical damage, and the roots kept moist. If the roots become dried out, heel-in the stock and water for 2-hours.
- D. Hardwood species planted as Bare-Root Seedlings shall have a minimum of four (4) first order lateral roots (FOLR) that exceed 1-mm in diameter. Bare-Root Seedlings that do not possess the minimum number for FOLR shall be culled from planting.
- E. Hardwood Bare-Root Seedlings that will form the canopy shall have a minimum root collar diameter (RCD) of $\frac{3}{8}$ - inch. Bare-Root Seedlings with lesser RCD's will be culled from planting. For species of Bare-Root Seedlings that do not typically exhibit RCD's of $\frac{3}{8}$ -inch, such as bald cypress or river birch, a minimum RCD of $\frac{1}{4}$ -inch may be allowed, with the written approval of the Landscape Architect.
- F. The planting stock shall be grown by nurseries within the same physiographic province of North Carolina within 200 miles of the project site. The seed sources for the plant material shall also match the physiographic province of the area to be planted. Plant stock or seed mixes may be obtained from nurseries beyond the 200 mile limit with the prior written approval of the Landscape Architect.
- G. Installation:
 - 1) The storage, handling, and planting of Bare-Root Seedlings shall follow the procedures outlined in the NC Division of Forest Resources' (NCFS) *Pocket Guide to Seedling Care and Planting Standards, 4th Edition*, which can be obtained at all NCFS county offices. Planting shall not take place on “Severe Days” as defined by the *Pocket Guide to Seedling Care and Planting Standards*.
 - 2) Bare-Root Seedlings shall be spaced according to the Drawings. Bare-Root Seedlings species and max percent composition of zone are represented in the Planting Notes on the Drawings.
 - 3) Bare-Root Seedlings shall typically be planted in the winter within the timeframe indicated in the Drawings. Soil in the area of the planting shall be prepared in

accordance with Section SL-3 Grading and Fill of Vegetated Soil Lift . Bare-Root Seedlings shall be planted in a vertical position with the root collar approximately 2 ½-inch below the soil surface. The hole shall be sized appropriately to permit the roots to spread out and down without J-Rooting. The plant stem shall remain upright. Soil shall be backfilled around the seedling and tamped to eliminate air pockets. Each planted Bare-Root Seedling shall be mulched with minimum of two flakes from a bale of hay.

- 4) Bare-Root Seedlings planted on slopes shall be installed in a manner to prevent bank erosion, ensure the plant is installed upright, provide a stable non-erosive pad for plant establishment, and provide a water trough around the bare root with the excavated soil.

Live Stakes

- A. The Work covered by this Section shall consist of furnishing, installing and maintaining Live Stakes as shown on the Drawings or in locations as directed by the Landscape Architect. Work includes providing all materials necessary to install Live Stake cuttings.
- B. Live Stakes shall be sized according to the Drawings.
- C. During preparation, the basal ends of the Live Stakes shall be cleanly cut at an angle to facilitate easy insertion into the soil, while the tops shall be cut square or blunt for tamping. All limbs shall be removed from the sides of the live cutting prior to installation.
- D. The Live stakes longer live stakes shall be placed higher on the bank to help with root penetration into the water table.
- E. Installation:
 - 1) Cuttings for Live Stakes shall be harvested in manner such that they are cut, immediately put into water to be soaked for 10-days, then planted immediately after the 10-days are completed. Cuttings shall remain wet until they are planted. Outside storage locations shall be continually shaded and protected from wind and direct sunlight.
 - 2) Live Stakes shall be tamped perpendicularly into the finished bank slope with a dead blow hammer, with buds oriented in an upward direction. Stakes shall be tamped until approximately 4/5 of the stake length is within the ground. The area around each Live Stake shall be compacted by foot after the Live Stake has been installed.
 - 3) Live Stakes shall be spaced as specified in the Drawings. Live Stakes should be installed according to the configuration presented in the details on the Drawings. Like Stake species and max percent composition of zone are represented in the Planting Notes on the Drawings.
 - 4) To remove damage from hammering, 1 to 2-inches shall be cut cleanly off of the top of each Live Stake (with loppers) at an angle of approximately 15-degrees following installation.

- 5) Any stakes that are split or damaged during installation shall be removed and replaced.

Live Cuttings

- A. The Work covered by this Section shall consist of furnishing, installing and maintaining Live Cuttings as shown on the Drawings or in locations as directed by the Landscape Architect. Work includes providing all materials necessary to install Live Cuttings.
- B. Live Cuttings consist of the materials and configuration shown in the Drawings. The cuttings shall also be the length shown in the Drawings. The cuttings shall be bound together by cotton or jute twine.
- C. Installation:
 - 1) Live Cuttings shall be harvested in manner such that they are cut, immediately put into water to be soaked for 10-days, and then planted immediately after the 10-days are completed. Live Cuttings shall remain wet until they are planted. Outside storage locations should be continually shaded and protected from wind and direct sunlight. Live Cuttings species selection shall be the same as that utilized for Live Staking, and as indicated on the Drawings.
 - 2) Live Cuttings shall be planted as bundles of cuttings within the Vegetated Soil Lifts, between individual soil lifts with spacing as shown in Drawings, and with staggered spacing between lifts. Bundles can be tied together with jute or cotton twine or placed between the lifts. The Live Cuttings shall be planted into the soil lift as shown in the Drawings. Live Cuttings shall be installed according to the configuration illustrated in the details on the Drawings.
 - 3) Any cuttings that are split or damaged during installation shall be removed and replaced at no additional expense to the City.

Containerized Plantings

The Contractor shall provide the quality, size, source, species and variety of tree and shrub plantings indicated on the Drawings, complying with applicable requirements of ANSI Z60.1 "American Standard for Nursery Stock". Containerizing Plantings shall be grown in a container for sufficient length of time for the root system to have developed to hold its soil together, firm and whole. No plants shall be loose in the container and container stock shall not be pot bound.

- A. Care shall be taken to protect bark, branches, and root systems from sun scald, drying, sweating, whipping, and other handling and typing damage. The plantings shall not to be bent or bind-tied in such a manner as to destroy their natural shape. Protective covering shall be provided during delivery, and care shall be taken not to drop trees and shrubs.

Unless otherwise specified or shown on the Drawings, Containerized Plantings shall be grown and delivered in a minimum one (1) gallon container or as required in the Drawings (whichever is larger). If indicated on the Drawings, the measurements for height shall be taken from the ground level to the average height of the top branches of the plant, and not the longest branch.

Single stemmed or thin plants shall not be accepted. Side branches shall be generous and well twigged. Plants shall be in a moist, vigorous condition, free from dead wood, bruises, or other root or branch injuries.

- B. The planting stock shall be grown by nurseries within the same physiographic province of North Carolina within 200 miles of the project site. The seed sources for the plant material shall also match the physiographic province of the area to be planted. Plant stock or seed mixes may be obtained from nurseries beyond the 200 mile limit with the prior written approval of the Landscape Architect.
- C. Substitutions: If the planting operation shall occur outside the specified dormant planting season stated in the Planting Plans on the Drawings, or between November 15th and April 15th (unless a more restrictive period is called for in the Drawings) then containerized plantings can be substituted for the use of bare-root seedlings for bank and floodplain plantings.

D. Installation:

- 1) Containerized Plantings shall be spaced according to the Drawings. Containerized Planting species and max percent composition of zone are represented in the Planting Notes on the Drawings.
- 2) Containerized Plantings shall be planted in the winter (**November 15th to April 15th**, unless a more restrictive time period is specified in the Drawings). Soil in the area of the planting shall be prepared in accordance with. Add Soil Amendments per the soil test within the planting pit. Only the planting pit and root transition area shall receive Soil Amendments in accordance with. Remove all rocks over 1-inch in diameter, sticks, or any extraneous matter. Till in 4-inches of composted hardwood mulch (particle size 1-inch max.). Exceptions can be made to the planting season, with prior written approval of the Landscape Architect for Containerized Plantings.
- 3) Removal of the Containerized Planting from the pot shall not damage the trunk of the plant or compromise the root ball. The planting pit dug for the Containerized Planting shall be at least 1½ times the diameter of the Containerized Planting root ball. The roots along the outside perimeter and bottom of the root ball shall be gently scarified with a knife prior to planting to break up any circling or binding roots and allow good root contact with planting soil. The plant stem shall remain upright, and the Container Planting shall be set at an appropriate height above original grade to ensure drainage. Soil shall be backfilled around the root ball and tamped to eliminate air pockets. Each planted Containerized Planting shall be mulched with at least two flakes from a bale of hay. For planting Containerized Plantings on slope, see the Containerized Plantings on Slope Detail and the Supplemental Planting Notes on the Drawings. Containerized Plantings planted on slopes shall be installed in a manner to prevent bank erosion, ensure the plant is installed upright, provide a stable non-erosive pad for plant establishment, and provide a water trough around the bare root with the excavated soil.

Plug Plantings

- A. Conform to accepted horticulture practices as used in the trade. Plants shall be protected upon arrival at the site by being thoroughly watered and properly maintained until planted. Plants shall not remain unprotected for a period exceeding 24-hours. At all times workmanlike methods customary in good horticultural practice shall be exercised.
- B. Perennial plugs should have two to three growth stems per plug. Grass and grass like plants shall have at least one growth clump.
- C. Installation:
 - 1) Start the installation nearest to the stream and work up the bank/floodplain.
 - 2) The plugs shall be planted by hand through the coir fiber matting, unless being installed into a Vegetated Soil Lift. When installing plugs into a Vegetated Soil Lift the plugs shall be placed between soil lift layers and the coir fiber matting shall not be punctured. Utilize a 1½ to 2-inches maximum garden spade during installation. The coir fiber matting shall not be pierced or cut, but spread, and in no way removed from the area. It shall surround each plug at the base of the stem.
 - 3) Plugs should rest straight up and ⅛ to ¼-inch minimum above grade. Soil shall be tamped with fingers to secure plug into soil.

Liner Plantings

- A. Liner plantings shall be held to the same standards as bare-root seedlings in. With the exception that liners shall be seedlings delivered to the site with an established root ball container. All liners shall be container grown material, be healthy, vigorous, well-rooted plants and established in the container is which they are sold. The liners shall have tops which are of good quality and are in a healthy growing condition.
- B. Installation: Installation and spacing of the liner plantings shall be conducted in the same fashion as the bare-root seedlings.
- C. Substitutions: If the planting operation shall occur outside the specified dormant planting season stated in the Planting Plans on the Drawings, then liner plantings can be substituted for the use of live stakes for bank plantings.

Herbicide

- A. When herbicide use is necessary, only approved products for use within streams shall be used by a state licensed professional. The company performing the work must have a commercial license as required by the North Carolina Pesticide Board. Any herbicides with a warning label shall not be used. But the Selected herbicide shall be approved by the Landscape Architect before use.
- B. Suggested Mechanisms And Products:
 - 1) Rodeo may be used as a non-selective herbicide and is primarily used as a foliar spray.

- 2) Renovate is a broad leaf selective herbicide which can be used for selective stump painting or as a foliar spray.
- 3) Renovate is the appropriate herbicide to be used on kudzu.

Snag And Debris Removal

- A. The Contractor shall provide Snag and Debris Removal throughout the entire project stream corridor and where indicated within the Drawings. All such work shall be done by hand unless otherwise agreed to by writing from the Landscape Architect.
- B. Snag and Debris Removal shall include the removal of all debris from the project stream and surrounding floodplain area that is considered to be an impediment to stormwater flow as determined by the City and/or Landscape Architect. Debris shall include, but not be limited to, trash, fallen trees across the floodplain and stream channel, and branch piles within the stream channel.
- C. The Contractor will be responsible for coordinating a field review meeting with the City and/or Landscape Architect to review the project corridor and flag areas of Snag and Debris Removal.
- D. All removed debris and snags shall be properly disposed of offsite, or as determined by the City and/or Landscape Architect during the field review.

Ball and Burlap (B&B) Plantings

- A. The Contractor will be responsible for furnishing Ball and Burlap Plantings of the size, location, and species specified in the approved plant list.
- B. The standard of selection, care, rejection, and placement for Ball and Burlap Plantings shall be considered equal to that specified for Containerized Plantings herein, except that the visible burlap shall be removed prior to backfilling.
- C. The Contractor will plant the Ball and Burlap Plantings according to n the Approved plant list.

Brush Mattress

- A. A mulch or mattress of live brush that meets the requirements specified within Live Cuttings of this special provision applied to a bank slope and fastened down with stakes and wire to protect the soil surface from erosive forces through the generation of a dense stand of woody vegetation.
- B. The work covered by this section consists of collection or furnishing, storage, preparation and installation of all materials required for proper installation of each Brush Mattress.
- C. Construction:

- 1) The mattress shall be located up the bank to the top of slope, or as indicated in the plans. The toe of the mattress should be located in a fascine trench. Prepare the slope surface by grading to a uniform, smooth surface, clear of obstruction. Slopes should be graded before the brush mattress is installed.
- 2) The fascine toe should be installed first. Then lay the brush beginning at the downstream end of the work. The butt end of the brush will be placed upstream and plant materials inclined approximately 30 degrees. The upstream edge of the mattress will be keyed into the slope 2 feet. Stakes will be driven throughout the mattress on 3 foot centers each way beginning on the toe of the mattress. No. 9 wire/Jute Rope will be attached to the stakes and tightened to secure the mattress.
- 3) Slope areas above the mattress will be shaped and seeded.

SL-3 GRADING AND FILL OF VEGETATED SOIL LIFT

General

- A. Contractor shall furnish all labor, equipment and materials required for completing all work associated with the grading, excavation, fill, and hauling of excess materials associated with the site grading and structure installations. The Contractor shall perform grading as shown within the Drawings' proposed contours, design notes, proposed stream alignment, typical sections, profiles, and cross-sections.
- B. Do not waste excavation unless permitted. Use suitable excavated material as backfill; or in the formation of embankments, subgrades, and shoulders; or as otherwise directed. Furnish disposal areas for the unsuitable material. Suitable excess material shall be stockpiled at the onsite permanent stockpile location indicated within the Drawings.
- C. Grading work shall be conducted in accordance with the proposed contours and grading breaklines indicated within the Drawings. Grading breaklines denoted within the Drawings include (but are not limited to) the proposed bankfull line, floodplain line, slough channel line, and cut line. These grading breaklines indicate grade transition points for the proposed stream channel, slough channel, and flood plain features. Grade information for these features is included in the profile, typical cross-sections, and cross-sections within the Drawings. Grade lines may be adjusted at their beginning, ending, and at structures (in-stream structures, culverts, etc.) as directed by the Landscape Architect in order to secure a proper tie-in or to create a more "natural" appearance for streams, floodplains, wetlands, and/or sloughs.
- D. To limit disturbance to soils on the site, the Contractor shall restrict the movement of all construction equipment within sensitive areas, and shall avoid all disturbance to existing buffers, wetlands, streams, and trees outside the project Limits of Disturbance as shown in the Drawings.
- E. The Contractor shall not impact any stream, stream bank, buffer, or wetland beyond the limits indicated in the Drawings. Every effort shall be taken to minimize disturbance in these areas and in gaining access to and from the work area.

- F. Construction equipment access is limited in specific locations of the stream channels where grading is to occur. The contractor shall provide construction equipment that can make use of the limited access while still providing the necessary grading shown within the drawings. If construction equipment cannot be provided that can access these areas, then the proposed grading work shall be hand dug with shovels. All work within these areas shall be conducted utilizing the access location and measures specified within the Drawings, unless otherwise approved by the Landscape Architect.
- G. The Contractor shall only conduct bank floodplain, slough, and stream bed work, including all bank stabilization, and installation of in-stream structures on a section of stream that can be entirely stabilized before the end of the day. Such areas must be stabilized by the end of each day and, a stabilized section of stream shall be considered a section that is at final grade, seeded and mulched, and properly secured with coir fiber matting in accordance with the Contract Documents.
- H. All earth moving equipment shall be serviced prior to work commencing each morning. Equipment shall be properly maintained to prevent fuel, oil, and other hazardous lubricant spills in the vicinity of the project streams and wetlands.
- I. All stream channel work shall be performed from the top of channel bank, unless a stream diversion or by-pass is approved, installed, and in satisfactory operation. No equipment will be allowed to operate in a live flowing stream channel.

Performance And Tolerances

- A. Generally, grades shall meet the lines, typical sections and cross-sections with a **tolerance of ± 0.1 feet**. In-stream structure installation shall be held to a higher tolerance, and meet the tolerances specified in Section SL-1.
- B. Uniformly grade areas to a smooth surface, free from irregular surface changes. Final grades shall comply with compaction requirements and grade to cross-sections, lines, and elevations indicated in the Drawings. Field conditions may dictate necessary adjustments to grading plans within the Drawings. In such cases, the Landscape Architect shall indicate adjustments to the Contractor. Adjustments may include, but are not limited to, spot grading in areas where shrub and trees need to be planted or avoided. Grading in these areas will be on a site-specific basis.
- C. Fill material shall be free of trees, limbs, trash, rocks, and other objectionable materials.
- D. Fill and backfill materials should not contain more than 3% organic matter by weight, trash and construction debris, or other objectionable materials. Fill and backfill material should have a maximum dry density greater than 100 pounds per cubic foot (lbs/cf) and percent fines less than 10% to 15% or as indicated on the drawings. **Prior to conducting fill or backfill work, onsite material that is to be utilized for fill or backfill shall be tested by a qualified independent geotechnical Landscape Architect testing agency licensed to work in the State of North Carolina to ensure that the materials meet the requirements specified herein.**

- E. Areas where fill is being added to modify the existing bank, fill the old channel, or modify the ground surfaces shall be filled with compacted soil. These areas shall be compacted such that they will resist erosion and shall not slough. .
- F. Place backfill and fill materials in lifts not more than 1-foot in loose depth for material compacted by heavy compaction equipment, and not more than 6-inches in loose depth for material compacted by hand-operated tampers.
- G. When placing backfill material around proposed or existing structures, place backfill materials evenly on all sides of structures to the required elevation or as detail in the Drawings, and uniformly along the full length of each structure.
- H. Materials used to fill the old stream channel shall be such that the Plasticity Index (PI) of the fill material shall be equal to or greater than that of the PI in each soil strata that surrounds the stream channel cross-section. If all soil strata that surround the stream channel cross section are clays or silts, and if impervious stream plugs are constructed on the stream channel, then the PI of the compacted stream channel material does not have to meet or exceed that of the surrounding silt of clay strata.

Earthwork Quantities

- A. It is the responsibility of the Contractor to complete their own take-off to estimate the earthwork quantities for the purposes of bidding this project. Additionally, it is the responsibility of the Contractor to make its own assessment of the existing conditions for the purpose of determining earthwork quantities. Undercut needed to meet top soil requirements for planting and stockpiling and replacing top soil shall be incidental to the Vegetated Soil Lift pay item.

Field Quality Control

- A. The Contractor shall engage a qualified independent geotechnical Landscape Architecting testing agency licensed to work in the state of North Carolina to perform field quality-control testing. Testing shall be conducting at no additional cost to the City.
- B. The Contractor shall proceed with subsequent earthwork only after test results for previously completed work comply with requirements. Tests will be performed at the locations and frequencies as requested by the City or Landscape Architect.
- C. Contractor will engage a North Carolina state certified analytical laboratory to perform analytical testing related to contaminated soils, if determined to be present onsite.

Protection Of Completed Work

- A. Contractor shall protect newly graded areas from traffic, freezing, and erosion. Protect newly graded stream banks steeper than 3:1 and steeper from excessive foot traffic. Keep free of trash and debris.

- B. Repair and re-establish grades to the specified tolerances where completed or partially completed surfaces become eroded, rutted, settled, or where they lose compaction due to subsequent construction operations or weather conditions. Scarify or remove and replace soil material to depth as directed by Landscape Architect; reshape and compact.
- C. Where settling occurs before the Project correction period elapses, remove finished surfacing, backfill with additional soil material, compact, and re-construct surfacing. Restore appearance, quality, and condition of finished surfacing to match adjacent work, and eliminate evidence of restoration to the greatest extent possible.

Removal And Disposal Of Water

- A. **All excavation and placement of backfill shall be carried out in the dry except as expressly noted in the Drawings.** The Contractor shall furnish, install and operate all necessary machinery, appliances and equipment to keep excavations free from water during construction, and shall dewater and dispose of the water so as not to cause injury to public or private property, or to cause a nuisance or a menace to the public. The Contractor shall control surface runoff so as to prevent entry or collection of water in excavations.
- B. The dewatering systems shall be installed and operated so that the ground water level outside the excavation is not reduced to the extent that would damage or endanger adjacent structures or property. Before dewatering is started, the Contractor shall obtain acceptance by the Landscape Architect for the method, installation and operation of the dewatering system he proposes to use. The release of groundwater to its static level shall be performed in such a manner as to maintain the undisturbed state of the natural foundation soils, prevent disturbance of compacted fill or backfill and prevent flotation or movement of any structures, pipelines and sewers.
- C. If any subgrade or underlying material is disturbed by movement or groundwater, surface water, or any other reason, it shall be replaced at the Contractor's expense with NCDOT #57 crushed stone to the satisfaction of the Landscape Architect.

Removal Of Surplus And Waste Materials

- A. Materials removed during grading and excavation operations shall be stored and disposed of in such manner that they will not interfere unduly with traffic on streets, sidewalks, and driveways, and will provide free access to any existing utilities adjacent to the construction.
- B. The project site is located within an area that receives frequent flooding during large storm events; no excess material will be permitted for permanent stockpile within the associated flood hazard zone. All suitable excess material shall be hauled to the permanent stockpile area indicated in the Drawings, placed and compacted in accordance with this section.
- C. Permanently stockpiled materials shall be stabilized according to the Drawings.
- D. The contractor is hereby notified that the disposal of objectionable excavation material, such as, but not limited to, tires, trash, timber, concrete, asphalt, stumps, tree limbs, etc. shall be the responsibility of the contractor. The Contractor shall be required to obtain its

own (State approved) disposal site for this material.

Soil Amendments

- A. Soil Amendments shall be applied by the Contractor prior to the planting process to provide a suitable growth medium for vigorous vegetation growth. The final grades indicated within the Drawings shall be met with the addition of all soil amendments to the site. If the Contractor determines that the existing site soils at final grade provide the necessary growth medium without the addition of soil amendments, then the Contractor shall provide a soil analysis performed by experience and qualified individuals, such as the local Cooperative Extension or NRCS office, who will explain in writing the results of the analysis. Existing site soil at final grade not requiring the addition of soil amendments shall meet the minimum requirements of the section for Topsoil in SL-3.
- B. Topsoil meeting the requirements of section for Topsoil in SL-3, here, should be considered the primary soil amendments, and will be used throughout the site to reduce the amount fertilizers needed for vegetation growth. The Contractor may use alternative soil amendments other than topsoil application with the approval of the Landscape Architect; however, these soil amendments shall be suitable for stream bank, wetland, and/or open water application so that amendments are resistant to frequent water inundation and not harmful to the aquatic environments.
- C. Available topsoil found onsite and in the locations of proposed grading shall be collected and stockpiled during the clearing and grubbing process as outlined within these project specifications.
- D. Locations where grading was conducted and that contain unsuitable subsoil for vegetation growth at final grade shall be amended with soil amendments prior to temporary and permanent planting operations. Unsuitable soils shall be considered any soil not meeting the requirements of Section SC-6.17 Topsoil. Soil Amendments shall be mixed into the subsoil to provide a well graded 50/50 mixture of topsoil and subsoil to a depth of 6-inches. This can be achieved by spreading the soil amendment to a depth of 3-inches through the planting area and tilling the top 6-inches of soil. **No tilling shall occur within the drip line of existing/preserved trees. Final grade of the site includes the addition of the necessary soil amendments.**
- E. Areas indicated for supplemental planting, if shown, shall only receive soil amendments in the locations where permanent bare root and/or containerized plantings are to occur. In this case the soil amendments shall be installed to provide a well graded 50/50 mixture into the dug hole that the bare root and/or containerized plantings are to be installed or as indicated on the project Drawings
- F. pH Adjustments: The Contractor shall spread lime or iron sulfate at a rate specified through a soils analysis to adjust the pH according to section for Topsoil in SL-3. pH adjustments must be approved by the Landscape Architect prior to application.

Topsoil

- A. Topsoil shall be natural, friable, fertile, fine loamy soil possessing characteristics of representative topsoil in the vicinity that produces heavy and vigorous growth.
- B. Topsoil shall have a pH range of 5.5 to 7.4, free from subsoil, objectionable weeds, litter, sods, stiff clay, stones larger than 1-inch in diameter, stumps, roots, trash, herbicides, toxic substances, or any other material which may be harmful to plant growth or hinder planting operations.
- C. Top soil shall contain a minimum of 3.0% organic material by volume.

Alternative Amendments

- A. If topsoil is not readily available onsite, or does not provide the necessary volume for planting operations, the Contractor may import topsoil from a pre-approved offsite source or use the following substitute with the Landscape Architect's prior approval. Note that chemical amendments shall generally not be allowed.
- B. MANURE: Well-rotted, un-leached, stable or cattle manure containing not more than 25 percent by volume of straw, sawdust, or other bedding materials; free of toxic substances, stones, sticks, soil, weed seed, and material harmful to plant growth.
- C. COMPOST:
 - 1. Compost material shall only be used within planting areas if topsoil is unavailable and with prior approval by the Landscape Architect.
 - 2. Compost material shall be a blend of composted manure and humus and well-aged pine bark. Compost should be mixed with native soil for backfill per the requirements of this Section. Compost material shall be screened and free from lumps, stones, plant material and debris, free of weed seed and other material harmful to plant life. Compost material shall meet the following organic/chemical analysis:

Organic Matter Content:	50% to 80%
pH Range:	5.5-8.0
Moisture Content	30 – 60%, wet weight basis
Organic Matter Content	30 – 65%, dry weight basis
Particle Size	98% passing through ¾" screen of smaller
Soluble Salt	Maximum 10 dS/m (mmhos/cm)
Ammonia Nitrogen:	Maximum 500 ppm
Carbon/Nitrogen Ration:	15-30

- D. FERTILIZER AND LIME: Can be used when topsoil is not available, if approved in writing by Landscape Architect. Apply 1000 lbs/acre 10-10-10 fertilizer, and 2,000 lbs/acre ground agricultural limestone or as indicated on the Drawings

SL-4 MEASUREMENT AND PAYMENT

This item includes furnishing all labor, materials, equipment, tools and other services required to furnish and install Vegetated Soil Lift structures in accordance with this special provision and the project Drawings. The quantity of Vegetated Soil Lifts to be measured per total linear feet (LF) by stream length of Vegetated Soil Lift- measured at the midpoint elevation between the exposed toe and top of lift - installed in accordance with the Contract Documents, and accepted by the City.

Payment for furnishing and installing Vegetated Soil Lift structures shall be made under the Contractor's unit bid price per linear foot (LF) Vegetated Soil Lift furnished and installed, and measured as provided above. All other work and materials (including live stakes, coir matting, geotextile fabric plantings, and other incidentals) required to furnish and install Vegetated Soil Lift structures shall be considered as incidental to the project and no specific payment will be made.

Pay Item

Pay Unit

Vegetated Soil Lift Linear Foot