SECTION 31 32 19 - BIOENGINEERED LIVING SHORELINE

PART 1 - GENERAL

1.1 SECTION INCLUDES

A. Section Includes:
   1. Modular HDPE knitted technical mesh.

1.2 SUMMARY

A. A modular open containment system made up of 2 layers of virgin pre-recycled (food grade) High Density Polyethylene (HDPE), that is constructed with a knitted pattern. The technical mesh incorporates a built-in, free flowing, structural anchoring system on all sides of the system, which is designed to be tethered into and anchored back to stable ground through a network of anchors set into a stable substrate. The living shoreline system is designed to be filled with earthen materials equal or greater than 150 microns (sand, topsoil, aeration plugs/cores, dredge spoils, and organic compost type mixtures). The light weight flexibility of the technical mesh allows the system to take any desired shape or size while the Rip Stop technology supports and promotes root vegetation. The finished surface or slope is to be shaped per the Architect/Engineers specification, prior to vegetation.

1.2 SUBMITTALS

A. Submit the following:
   1. Manufacturer shop drawings, and installation instructions.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Specification is based on products manufactured by Sox Erosion Solutions; Boca Raton, FL.; (561) 501-0057 or Architect approved equal.

2.2 MATERIALS

A. Modular HDPE knitted technical mesh:
   1. Basis of Design: Shore Sox as manufactured by Sox Erosion Solutions.
   2. Features:
      a. Layers of HDPE.
      b. Rip-Stop technology.
      c. Inert- meaning it does not and cannot maintain a magnetic charge so it will not negatively impact the surrounding environments.
      d. Built-in Structural Anchoring System.
         1) Anchoring Material is made of ¼" Diamond Braided Multifilament polypropylene (MFP) rope with tex core at a minimum per manufacturer's guidance but, can be of higher gauge and strength if suggested by specifying engineer.
      e. Open in nature- so it can take any desired finished shape/size.
      f. Waterproof (Not Biodegradable).

g. Will hold earthen material equal or greater than 150 Microns.
h. Will Support Root Vegetation (Sod, Seed, Plantings).
i. Break Strength Grab Method ASTM-D5034:
    1) Warp = 135lbs
    2) Fill = 207lbs
j. Break Elongation Grab Method ASTM-5034
    1) Warp = 32.33%
    2) Fill = 61.7%
k. Tear Strength Trapezoid ASTM- D5587 #1
    1) Warp = 58.0 lbs
    2) Fill = 70.3 lbs
l. Bursting Strength ASTM- D3786
    1) 284 PSI
j. Size: Refer to Drawings.
k. Color: Architect to select from Manufacturer's full range.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Proceed with application after correcting unsatisfactory conditions.

3.2 INSTALLATION

A. Anchoring: The existing substrate in the stable upland zone behind the deployment area will determine the most appropriate anchors.
    1. Two rows of anchors.
    2. Anchors are set every 3 ft on both the top and bottom rows.
    3. Bottom row of anchors are used to set the intended shoreline
    4. Top row of anchors are for stability prevention of undermining
    5. Top & bottom rows should be staggered.
    6. An estimated 75 anchors per every 100 linear ft of technical mesh.
    7. Anchors are pounded subgrade during the fill process.
    8. Untreated Wooden stakes:
        a) Wood Stake:
            1) 2" x 2" x 24" untreated Southern White pine.
            2) 2 feet in length (may need to be longer depending on soil substrate and site)
            3) 45-degree bevel cut on the bottom of the stake (bevel should be facing away from the water and up the slope)
            4) 1⁄2" diameter hole drilled into the top of stake - 3" from top of the stake
        b) Wood Stakes are not appropriate for: Shale, Granite, Some clay substrates, Gravel, Lateral anchoring.

B. Tethering & Connecting: The systems' built in structural roping channels are designed to be tethered into, cut into, and sewn at any given point.
    1. Bottom structural roping channel- is to be tethered back to every bottom anchor and every other top anchor

2. Top structural roping channel- is to be tethered back to every top anchor
3. Side structural roping channels- can be used in these different ways
   a. Connecting sections (modular)
   b. Sewing Ends Closed using a **Lock Stitch** method
   c. Tethered back to anchors laterally to enhance stability
4. Tethering material: ¼" Diamond Braided Multifilament polypropylene (MFP) rope with tex core.

C. Fill Material:
   1. Site conditions will determine the appropriate fill material needed for the projects newly protected or recaptured land.
   2. The earthen materials (sand, topsoil, aeration plugs/cores, dredging spoils and/or organic compost type mixture) must be greater than 150 microns.
   3. It is recommended that all fill materials be tested for particle size and filtration properties prior to install)
   4. It is recommended that all fill material is compacted and it is strongly recommended that water is introduced during the fill process to eliminate any voids
   5. Topography of the embankment: i.e., elevations, escarpment, undermining issues, and final slope calculations = The Erosion Factor and determine the size of the system needed. i.e., 6', 12', 18', and 24'.
      a. 6ft system- holds an estimate of ¼ cubic yard of fill material per linear ft
      b. 12ft system- holds an estimate of 1/2 cubic yard of fill material per linear ft
      c. 18ft system- holds an estimate of 3/4 cubic yard of fill material per linear ft

3.3 CLEAN UP

A. Clear areas required for access to site and execution of Work.
B. Remove all rubbish and debris existing and resulting from work operations of this Section as soon as possible, do not allow to pile up.

END OF SECTION