**SPSRW-XX: Toe Wood**

Version Date: 06/12/2023 Revision Date: XX/XX/XXXX by XXX

### **DESCRIPTION**

The work covered by this section consists of the installation of toe wood, a stream bank structure made from various woody material (logs, limbs, brush, etc.), vegetation, soil, and rip rap, to stabilize stream banks, prevent erosion, and improve aquatic habitats, as specified in the Contract Documents, or as directed by the Engineer.

The quantity of structures to be constructed will be affected by site conditions during construction. The type and quantity of this structure may be increased or decreased at the direction of the Engineer. Such variations in quantity will not be considered as alterations in the details of construction or a change in the character of the work.

### **MATERIALS**

Tree species for the brush pack material shall be either hardwoods or conifers, or a combination of both, the percentage shall be in accordance with the Contract Documents and may be adjusted based on site availability per the Engineer. Brush pack material shall be wood material including limbs, small logs, treetops, brush, and woody shrubs. Unless specified differently in the Construction Drawings, brush pack when in-place as part of the toe wood, should consist of approximately 65% brush of all diameters up to 6”,25% on-site excavated suitable channel or floodplain material, and 10% 2”-10” rip rap by volume.

Filter fabric for sealing structures shall meet the Type 2 material requirements of NCDOT Section 1056 Geosynthetics.

Coir Matting shall be specified by the engineer.

Earth material (i.e., backfill material) shall be sourced on site from stockpiled materials resulting from bank and/or channel bed excavations from channel construction activities when possible. Wooden Dead Stout Stakes shall be hardwood stakes 24" long with a 2" x 2" nominal square cross section. One end of the stake must be sharpened or beveled to facilitate driving through the coir fiber mat and down into the underlying soil.

### **METHODS**

Structure installation and channel grading sequences may vary based on structure function and design. Toe Wood should be installed in conjunction with channel grading operations, so that flow vectors and channel alignment can be used to adjust the installation.

Prior to construction of the structure, establish elevations at the upstream end of the proposed structure. The Contractor may install additional survey control, as needed, to complete the work in accordance with the Contract Documents.

Toe Wood:

1. Woody material for the first layer for the brush pack shall be a bed of 3”-6” limbs/brush and extend to the back of the bankfull bench or as indicated on the plans and set 18” minimum below the bed. The brush shall be placed and layered with a variety of sizes and shapes to achieve the minimum 65% volume of woody material prior to placing any earthen backfill and 2” – 10” rip rap. For streams/locations where it is permitted that the water cannot be diverted and/or pumped around, the woody material may begin to float once installed. Add a temporary counterweight to the woody material to prevent flotation and material movement prior to completing the toe wood installation.
2. Place backfill in the voids and on top of the woody material to the thickness shown on the plans. Typically soil that is already being excavated from the adjacent stream bed or banks is the best source for backfill. Additional soil may be needed after wetting to reach the design elevation.
3. Install layer(s) of woody material and backfill in (six- to eight-inch) 6” – 8” lifts alternating soil lifts and woody material until the top of toe wood reaches the “height of toe wood” per the plans and/or based on site conditions. Woody material for the brush pack above the first layer used in the Toe Wood Structure shall be a variety of size, ¼-6” diameter, and shape and can be with or without leaves/needles. Place woody material on the surface of the backfill and perpendicular to the proposed bank slope.

Upon reaching the top of the proposed toe wood, the Contractor shall perform the planting and bank stabilization technique outlined below or as shown on the plans or as approved by the Engineer:

Planting and Stabilization:

1. Place Type II fabric along the top of the compacted toe wood/backfill surface prior to the placement of coir fiber matting and backfill material.
2. Place coir fiber matting, overlapping the Type II fabric by a minimum of 12”. Coir fiber matting shall be anchored per the Erosion Control Matting specification.
3. Place backfill on top of the Type II fabric and 12” of coir fiber matting per the typical section and/or grading plan.
4. Secure the coir matting in place by installing wooden dead stout stakes in accordance with the Coir Matting specifications. Live Stakes, if shown on plans, shall be a minimum of 2’ long, but shall otherwise be in accordance with live stakes specifications. Live stakes shall be installed during the appropriate/specified planting season.
5. Finish grading the adjacent streambed, channel banks, and/or floodplain to provide a smooth even grade transition between project structure components (arms, sills, inverts, floodplain sills, etc.) and the existing and/or proposed ground surface.

In locations where exposed bedrock and/or other existing features extend to and/or within the limits of the proposed work, the Toe Wood installation shall be field adjusted to incorporate the bedrock/existing feature into the finished work. The Engineer shall be contacted as soon as the presence of bedrock and/or other existing feature is field identified to determine the appropriate method of incorporation. Site conditions may require slight deviation from the plan and shall be approved by the Engineer.

### **MEASUREMENT**

The quantity of Toe Wood will be measured by the actual linear foot (LF) of structure installed and approved by the City or Engineer. The length of Toe Wood shall be measured along the stream bank of which installed, Measurement will occur along the bank in which installed.

There shall be no separate measurement for furnishing, trees, logs, brush pack, rip rap, transplants, or other plant material meeting the requirements of this specification.

### **PAYMENT**

The quantity of Toe Wood, measured as provided above, will be paid for at the contract unit price per linear feet installed and accepted. Such payment will be full compensation for all work covered in this special provision, including, but not limited to grading, installation, adjusting, excavating, placing backfill, maintaining the feature through acceptance, and for furnishing all materials, labor, equipment, tools and incidentals necessary to complete the work as specified in the Contract Documents, or as directed by the Engineer.

There shall be no separate payment for furnishing, trees, logs, brush pack, rip rap, transplants, or other plant material meeting the requirements of this specification.

All coir matting and planting on the bank will be measured separately.

Payment shall be made under:

**TOE WOOD LF**