## SPSRW-XX: Log Sill

Version Date: 1/28/2022 Revision Date: MM/DD/YYYY by XXX

### **DESCRIPTION**

The work covered by this section consists of furnishing, stockpiling, placing and maintaining approved stone, boulders, logs, and filter fabric to be utilized to construct the log sill, as specified in the Contract Document or as directed by the Engineer. Sills are used to provide grade control and improve aquatic habitat.

Sills extend perpendicularly across the streambed in a relatively straight line. The structure may be used alone or in combination with a constructed or variable riffle. The structure invert may be set slightly lower in the center to provide a thalweg and to match the typical section dimensions.

The quantity of structures may be adjusted during construction due to site conditions and at the direction of the Engineer. 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**

ENGINEER TO UPDATE IF THEY FEEL THAT THIS SPECIFICATION IS INADEQUATE FOR SITE CONDITIONS.

Backfill Material shall consist of a well-mixed gradation of, stone aggregate, rip rap, earth, and wood/mulch. Earth material shall be sourced on site from stockpiled materials resulting from bank and/or channel bed excavations from channel construction activities. Earth material from channel bed excavation is preferable for well-mixed gradation placed in the channel and bank(s). Wood/mulch material shall include small logs (less than 1” in diameter), brush, and woody shrubs and shall be sourced on site from stockpiled materials resulting from other construction activities.

The type, size and gradation of the Backfill Material shall be specified by the Engineer to be mobile or non-mobile as the conditions in the channel warrant, and in accordance with the construction documents.

Stone aggregate and rip rap backfill material shall meet the material requirements of NCDOT section 1005 General Requirements for Aggregate and NCDOT section 1042 Rip Rap Materials.

Stone Backfill Material shall consist of durable field or quarry stone that is sound, hard, dense, slightly rounded, resistant to the action of air and water, and free of seams, cracks, or other structural defects. **The Contractor cannot use limestone or concrete waste for stone.**

Logs must be from a hardwood species, relatively straight, 8 to 12 inches in diameter along their entire length and shall meet the material requirements specified in the Contract Documents. All limbs and branches shall be removed from the log. Sources for logs shall include trees removed due to construction activities as well as off-site timber. All logs shall be relatively solid (hard) and free of visible rot and/or animal damage.

Boulders shall consist of flat-sided, durable field or quarry stone that is sound, hard, dense, angular, and resistant to the action of air and water, and free of seams, cracks, or other structural defects. The Contractor shall use stone pieces with a “shape factor” greater than two (length and width more than twice the thickness). **The Contractor cannot use limestone or concrete waste for boulders**. Boulders shall be approved by the Engineer.

The size (length, width and depth (thickness)) of the boulders shall be as specified by the Engineer in accordance with the construction documents.

If needed, #3 Rebar shall meet NCDOT section 1070 Reinforcing Steel.

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

Galvanized steel roofing nails of durable quality with an umbrella head shall be used to fasten filter fabric to the header/footer logs.

### **METHODS**

ENGINEER TO UPDATE IF THEY FEEL THAT THIS SPECIFICATION IS INADEQUATE FOR SITE CONDITIONS.

Structure installation and channel grading sequences may vary based on structure function and design. Grade control structures, such as log sills, shall be installed as grading operations progress downstream.

* 1. Establish elevations of the proposed structure. The Contractor may install additional survey control, as needed, to complete the work in accordance with the Contract Documents.
  2. Over-excavate/trench the stream bed to a depth equal to the total thickness of the log(s) plus backfill material.
  3. Place log(s) in the trench prepared for the sill. Review, survey (measure), and adjust the alignment and/or height of the sill logs, as needed. The log shall extend the entire design length of the sill plus the length needed to provide anchoring into the stream bank. The log(s) shall be reviewed by the Engineer prior to proceeding with the work.
  4. Install filter fabric per the Contract Documents. Nail filter fabric to the upstream side of the log(s) as shown in the detail. Nails shall be below finished grade and spaced at one-foot (1-ft) intervals horizontally. Drape filter fabric over the upstream side of the log(s), down the back face of the sill and across the area of over-excavation/trenching, extending three to four inches (3” – 4”) below grade. Fabric reaching the excavated soil face may be folded and/or trimmed, in accordance with the Contract Documents. There shall be no visible, loose ends or unsecured filter fabric on the completed work.
  5. Place Backfill Material on top of the filter fabric and between the upstream side of the log(s) and the excavated bank soil face and between the upstream side of the log(s) and the excavated streambed soil face. The Backfill Material shall be level with the top surface of the log. Place Backfill Material downstream of the Log Sill for scour protection as shown in the Construction documents. The Backfill Material shall be reviewed by the Engineer prior to proceeding with the work. After installing all of the Backfill Material, inspect the structure and trim/cut any loose and/or visible fabric.
  6. Finish grade the adjacent streambed and channel banks 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. Drops over log sills must not exceed 0.1’ without prior approval from the Engineer.

Based on the size of the stream and the size (length and diameter) of the log(s), a header/footer log combination meeting all other material requirements may be used in lieu of a single log with the Engineer’s prior approval. For header/footer log combination installations, place the header log on top of and slightly behind the footer log. Connect/pin the header and footer log together using #3 rebar or approved equivalent. The header log shall extend the entire design length of the sill plus the length needed to provided anchoring into the stream bank. The footer and header logs shall be reviewed by the Engineer prior to proceeding with the work.

In locations where exposed bedrock and/or other existing feature extends to and/or within the limits of the proposed work, the log sill 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 log sill to be paid for shall be the actual number of linear feet of “Log Sill” completed and accepted into the final work, as measured along the centerline surface of the sill.

No separate measurement of materials shall be made under this item for footer boulders, backfill material, fabric, and/or other incidental items.

### **PAYMENT**

The work covered by this section shall be paid for at the contract per linear foot price for “Log Sill”. 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 meeting the requirements of this specification.

No separate payment shall be made for subsidiary items.

Payment shall be made under:

**SILL, LOG LF**