## SPSRW-XX: Rock Sill

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

### **DESCRIPTION**

The work covered by this section consists of furnishing, stockpiling, placing and maintaining approved stone and filter fabric to be utilized to construct the rock sill, as specified in the Contract Document or as directed by the Engineer. Rock 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 riffle. The structure invert shall 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.**

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.

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

### **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 rock steps/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.

Footer Installation, if needed

* 1. Over-excavate/trench the stream bed to a depth equal to the total thickness of the header and footer boulders. Bedding for the placement of the footer boulders shall be approved by the Engineer prior to placement.
  2. Place footer boulders in the trench prepared for the sill. Footer boulders shall have direct surface contact with adjacent boulders. Review, survey (measure), and adjust the alignment and/or height of the sill footer boulders, as needed. Selecting boulders with similar thickness for the footers may assist with the ease of construction. The footers shall be reviewed by the Engineer prior to proceeding with the work.
  3. Install filter fabric per the Contract Documents. Typically, the fabric is draped over the top of footers, down the upstream face of the footer boulders and across the area of over-excavation/trenching. Fabric reaching the excavated stream bed / toe of bank 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.
  4. Place Backfill Material on top of the filter fabric, between the upstream side of the footer boulders and the excavated stream bed soil face. Backfill Material shall be level with the top surface of the footer boulders. The Backfill Material shall be reviewed by the Engineer prior to proceeding with the work.

Header Installation

* 1. Place the header boulders on top of and slightly upstream from the edge of the footer boulders (such that the header boulders rest partially on top of the Backfill material). Header boulders shall be placed so that they span the seams of the footer boulders. There shall not be a seam in the center of the stream bed (at the thalweg). Header boulders shall have direct surface contact with adjacent boulders, free of gaps. Review, survey (measure), and adjust the alignment and/or height of the vane arm header boulders, as needed. Selecting boulders with similar thickness for the headers may assist with the ease of construction. Installation of header invert boulder first, may help with construction of boulder sill.
  2. Install filter fabric per the Contract Documents. Typically, the fabric is draped over the top of headers, down the upstream face of the header boulders and across the area of over-excavation/trenching. Fabric reaching the excavated stream bed / toe of bank soil face may be folded and/or trimmed, in accordance with the Contract Documents.
  3. Place Backfill Material between the upstream side of the sill header boulders and the excavated /constructed streambed soil face. Backfill Material shall be level with the top surface of the header boulders and the adjacent upstream streambed. Place Backfill material downstream of the Rock 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.
  4. After installing all the sill boulders, inspect the structure and trim/cut any loose and/or visible fabric.
  5. Finish grade the adjacent streambed and channel banks to provide a smooth even grade transition between project structure components and the existing and/or proposed ground surface.

Based on the size of the stream and the size (length and diameter) of the boulder, a single boulder meeting all other material requirements may be used in lieu of separate footer and header boulders with the Engineer’s prior approval. For single boulder installations combine steps 2) through 10) in compliance with the Contract Documents.

In locations where exposed bedrock and/or other existing feature extends to and/or within the limits of the proposed work, the rock 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 rock sill to be paid for shall be the actual number of linear feet of “Rock 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 “Rock 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.

No separate payment shall be made for subsidiary items.

Payment shall be made under:

**SILL, ROCK LF**