## SPSRW-XX: ROCK J-HOOK VANE

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

### Description

The work covered by this section consists of furnishing, stockpiling, placing, and maintaining approved stone, boulders, earth, wood material, logs, mulch, and filter fabric to be utilized to construct the rock j-hook vane, as specified in the Contract Documents, or as directed by the Engineer. The j-hook vane is used for bank protection by directing flow towards the center of the channel.

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 Geosynthetics.

### 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. Rock j-hook vanes are intended to re-direct flows and should be installed after channel grading operations, so that flow vectors and channel alignment can be used to adjust the installation.

Vane and Cut Off Sill

* 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 header boulders and footer boulders (if needed). The excavation slope should be smooth and gradual, typically matching the designed vane slope. Bedding for the placement of the footer boulders shall be approved by the Engineer prior to placement.
	3. Place boulders in the trench made for the vane. Boulders shall have direct surface contact with adjacent boulders and shall smoothly and gradually transition in accordance with the design vane slope. Review, survey (measure), and adjust the alignment and/or height of the vane boulders, as needed. Selecting boulders with similar thickness may assist with the ease of construction. Boulders shall be reviewed by the Engineer prior to proceeding with the work.
	4. Install the boulders for the cut off sill at the downstream end of the structure arm. Review, survey (measure), and adjust the alignment and/or height of the sill boulders, as needed. Boulders shall be reviewed by the Engineer prior to proceeding with the work.
	5. Install filter fabric per the Contract Documents. Typically the fabric is draped over the top of Boulders, down the upstream face of the boulders and across the area of over-excavation/trenching. Fabric reaching the excavated soil face may be folded and/or trimmed, in accordance with the Contract Documents. The fabric installation shall be reviewed by the Engineer prior to proceeding with the work.
	6. Place Backfill Material on top of the filter fabric and between the upstream side of the footer boulders and the excavated soil face. Backfill Material shall be level with the top surface of the boulders. 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.

Hook

* 1. Over-excavate the stream bed to a depth equal to the total thickness of the hook header boulders and footer boulders (if needed).
	2. Place hook boulders in the over-excavated locations. Minimize gaps between adjacent hook boulders.
	3. Repeat steps 7) and 8) until the boulder hook installation is in compliance with the Contract Documents.
	4. Install filter fabric per the Contract Documents. Drape filter fabric over the upstream side of the hook boulders. Fabric reaching the excavated soil face may be folded and/or trimmed, in accordance with the Contract Documents. The fabric installation shall be reviewed by the Engineer prior to proceeding with the work.
	5. Place Backfill Material on top of the filter fabric and between the upstream side of the hook boulders and the excavated bank soil face. Backfill Material shall be level with the top surface of the hook boulders. The Backfill Material shall be reviewed by the Engineer prior to proceeding with the work.
	6. Finish grade 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.

Based on the size of the stream and the size of the boulders, a header/footer boulder combination meeting all other material requirements may be used in lieu of a single boulder with the Engineer’s prior approval. For header/footer boulder combination installations, place the header boulder on top of and slightly behind the footer boulder. The footer and header boulders 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 Rock J-hook vane 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 j-hook vane to be paid for shall be the actual number of linear feet of “Rock J-Hook Vane” completed and accepted into the final work, The length shall be measured along the centerline surface of the structure (cut off sill, vane, and hook).

No separate measurement of materials shall be made under this item for logs, 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 J-Hook Vane”. Payment will be full compensation for all work covered in this special provision, including, but not limited to grading, installation of materials, adjusting, excavating, excavated design pool, 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:

ROCK J-HOOK VANE LF