## SPSRW-XX: Log Cross Vane

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### Description

The work covered by this section consists of furnishing, stockpiling, placing and maintaining approved stone, earth, logs, and filter fabric to be utilized to construct the log cross vane, as specified in the Contract Document or as directed by the Engineer. Cross vanes are in-stream flow structures primarily used for grade control, reducing near bank shear stresses, and providing habitat.

The quantity of structures to be constructed will be affected by actual conditions that occur during the construction of the project. 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, and earth. 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).

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.

Logs must be relatively straight, 8 inches to 12 inches in diameter along their entire length and shall meet the material requirements specified in the Contract Documents. All limbs, bark, 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.

Anchors shall consist of a bolt, cable (minimum length of four feet) and a “duck bill anchor”. Bolt end shall have a nut and washer connection. Submit anchor specifications to the Engineer for approval. Manufactured home tie-down anchors or other soil anchors may be used pending approval of the Engineer.

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 vane and cross 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 cross vanes shall be installed as grading operations progress downstream.

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

Vane and Cut Off Sills:

* 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. Beginning on one-side of the channel, over-excavate/trench the stream bed to a depth equal to the total thickness of the log vane. The excavation slope should be smooth and gradual, typically matching the designed vane slope. Bedding for the placement of the vane arm shall be approved by the Engineer prior to placement.
1. Install a cut off sill at the downstream bank intercept with the log vane. Review, survey (measure), and adjust the alignment and/or height of the cut off sill, as needed. The cut off sill shall be reviewed by the Engineer prior to proceeding with the work.
	1. 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.
	2. At the upstream end, the log vane shall extend into the stream bed. Review, survey (measure), and adjust the alignment and/or height of the log vane, as needed. The log vane shall extend the entire design length of the vane arm plus the length needed to provide a smooth transition into the streambed and bank/sill. The log vane shall be reviewed by the Engineer prior to proceeding with the work.
	3. Continuing with the other side of the channel, repeat steps 2) through 6) until the footers and headers for the structure vanes and sills are completed.

Based on the size of the stream and the size (length and diameter) of the log, a single log, meeting all other material requirements, may be used in lieu of separate footer and header logs, with the Engineer’s prior approval. For single log installations combine steps 3) and 6) in compliance with the Contract Documents.

Log Vane Intersection:

* 1. Over-excavate the stream bed to a depth equal to the total thickness of the structure cross log. Over excavation of the invert trench shall be in the upstream direction, from the proposed structure face.
	2. Place the cross log and secure with an anchor assembly. The anchor assembly shall be installed in accordance with the manufacturer’s specifications, the Contract Documents and as specified by the Engineer. In lieu of the anchor assembly the Contractor may place flat boulders on the ends of the invert log. The invert log, and restraint method (anchors, boulders, or other) shall be reviewed by the Engineer prior to proceeding with the work.
	3. 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.
	4. Place Backfill on top of the filter fabric and between the upstream face of the vane and cross logs and the excavated bank soil face and between the back of the invert log and the excavated streambed soil face the Backfill shall be level with the top surface of the vane and cross log. The Backfill shall be reviewed by the Engineer prior to proceeding with the work.
	5. After installing all of the Backfill, inspect the structure (log vane, cross log, and cut off sill) and trim/cut any loose and/or visible fabric.
	6. Finish grade the adjacent streambed, channel banks, and/or floodplain to provide a smooth even grade transition between project structure components (log vane, cross log, cut off sill, etc.) and the existing and/or proposed ground surface.

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

### Payment

The work covered by this section shall be paid for at the contract per linear foot price for “Log Cross Vane”. 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.

Payment shall be made under:

LOG CROSS VANE LF