

SEDIMENT TUBES

SCDOT Designation: SC-M-815-1 (03/08)

1.0 Sediment Tubes

This Supplemental Specification replaces sections 815.1.1.2, 815.2.3, 815.4.5, 815.5, and 815.6 for sediment tubes in the *South Carolina Department of Transportation Standard Specifications for Highway Construction*, 2007 Edition.

1.1 Description

Sediment tubes are temporary erosion control devices for use along contours, in drainage conveyance swales, and around inlets to help reduce the effects of soil erosion and to retain sediment. Locations for installation will be designated on the Plans or by the Resident Construction Engineer (RCE).

1.2 Materials

Natural pine needles, leaf mulch, and grass clipping-filled sediment tubes are not permitted under this Specification. Straw bales are also not permitted under this Specification.

Provide sediment tubes for ditch checks and Type A inlet structure filters that exhibit the following properties:

- Machine produced by a manufacturer experienced in sediment tube manufacturing.
- Composed of compacted geotextiles, certified 100% weed free curled excelsior wood with 80% of the fiber materials being at least four (4) inches in length, natural coconut fibers (bristle and mattress form obtained from freshwater cured coconut husk.), certified 100% weed free agricultural straw, certified weed free compost per SCDOT Specifications, certified 100% weed free hardwood mulch, or a mix of these materials enclosed by a flexible netting material.
- Constructed of a tubular, flexible outer netting consisting of one of the following:
 - Seamless, high-density, polyethylene, polyester, and/or ethyl vinyl acetate, photodegradable materials treated with ultraviolet stabilizers.
 - Seamless, high-density, polyethylene, non-degradable materials.
 - Seamless, high-density, polypropylene, non-degradable materials.
 - Coir netting or coir fastening twine.

Straw, curled excelsior wood, or natural coconut rolled erosion control products (RECPs) that are rolled up to create a sediment tube are **not** allowed under this Specification.

Provide sediment tubes for ditch check and Type A inlet structure filter applications that meet the minimum performance requirements of Table 1.

Table 1: Minimum Performance Requirements for Sediment Tubes

Property	Test Method	Value
Diameter	Field Measured	18.0-inch minimum 24.0-inch maximum
Mass per Unit Length	Field Measured	3.0 lbs/ft \pm 10% minimum for 18-in diameter, or 4.0 lbs/ft \pm 10% minimum for 24-in diameter
Length per Tube	Field Measured	10-ft minimum*
Netting Unit Weight	Certified	0.35 oz/ft minimum
*Select a length to minimize the number of sediment tubes needed. If the ditch check or inlet length (perpendicular to the water flow) is 15 feet, then one 15-foot sediment tube is preferred over two overlapped 10-foot sediment tubes.		

1.2.1 Quality Assurance

Before installation of sediment tubes, provide the following information from the manufacturer:

- Written quality control program conforming to the requirements of subsection 1.2.2 *Quality Control*.
- Documentation of field and/or laboratory testing that quantifies the erosion control and sediment retention performance of the product conforming to the requirements of subsection 1.2.2 *Quality Control*.

Ensure that each sediment tube bears complete identification including, but not limited to, the following:

- Manufacturer's name and location.
- Manufacturer's telephone number and fax number.
- Manufacturer's e-mail address and web address.
- Sediment tube name, model, and/or serial number.
- Sediment tube diameter, length, and weight.

Sediment tubes are listed on the most recent edition of *SCDOT Qualified Product List 57* prior to being accepted for use. Prior to inclusion on *SCDOT Qualified Product List 57*, sediment tubes must meet the physical and performance criteria outlined in this Specification.

1.2.2 Quality Control

Before installation of sediment tubes, provide the following information from the manufacturer:

- Written description of the manufacturer's quality control program of field and/or laboratory testing that quantifies the performance of the product. Performance testing must take place at a laboratory accredited to perform tests required for the product tested.
- Instructions on the proper installation and maintenance of the sediment tube.
- Certification of the testing requirements upon request.

Provide verification of conformance with manufacturer's published Specifications (i.e. the certification) which at a minimum identify the following:

- Independent qualified test facility.
- Manufacturer.
- Product ID.
- Test ID.
- Test date.

1.3 Construction Requirements

1.3.1 Site Preparation

Proper site preparation is essential to ensure sediment tubes are in complete contact with the underlying soil or underlying surface. Remove all rocks, clods, vegetation, or other obstructions that would prevent the installed sediment tube from having direct contact with the underlying soil or surface.

1.3.2 Installation

1.3.2.1 Type A Inlet Filters

If requested by the RCE, provide a manufacturer's representative on-site to oversee and approve the initial installation of sediment tubes. Install sediment tubes used as Type A inlet structure filters as required by the current *SCDOT Inlet Structure Filters Specification*.

1.3.2.2 Sediment Tube for Ditch Checks

If requested by the RCE, provide a manufacturer's representative on-site to oversee and approve the initial installation of sediment tubes. Provide a letter from the manufacturer approving the installation if requested by the RCE.

Construct a small U-shaped trench to a depth that is 20% of the sediment tube diameter. Lay the sediment tube flat in the U-shaped trench and compact the upstream sediment tube soil interface. Place and anchor the sediment tube ends so they are positioned upstream of the sediment tube center point.

Sediment tubes weighing more than 18 pounds per foot do not require trenching. Backfill these sediment tubes with coarse filter media on the upstream side of the sediment tube to increase the contact area with soil, increase filter size, slow down flow, capture more sediment, reduce undercutting, and reduce installation time. Place and anchor the sediment tube ends so they are positioned upstream of the sediment tube center point.

Do not completely bury sediment tubes during installation. Review all project Specifications for special installation requirements. Install sediment tubes ensuring no gaps exist between the soil and the bottom of the sediment tube. Lap the ends of adjacent sediment tubes a minimum of six (6) inches to prevent flow and sediment from passing through the field joint. Never stack sediment tubes on top of one another.

Avoid damage to sediment tubes during installation. If a sediment tube becomes damaged during installation, place a stake on both sides of the damaged area terminating the tube segment and install a new tube segment. Perform field monitoring to verify that installation procedures do not damage sediment tubes. Replace sediment tubes damaged during installation as directed by the RCE or manufacturer's representative at no expense to the Department.

Install sediment tubes in swales or drainage ditches perpendicular to the flow of water and extend them up the side slopes a minimum of one (1) foot above the design flow depth. Space sediment tubes according to Table 2.

Table 2: Sediment Tube Spacing

Slope (%)	Maximum Sediment Tube Spacing (feet)
< 2	150
2	100
3	75
4	50
5	40
6	30
> 6	25

Sediment tubes weighing more than 18-pounds per foot do not require staking.

Install sediment tubes using wooden stakes (1 inch x 1 inch) or steel posts (1.25 lbs/ linear foot) a minimum of four (4) feet in length. Space posts or stakes on two (2)-foot centers and drive them into the ground to a minimum depth of two (2) feet leaving less than one (1) foot of stake above the exposed sediment tube.

Intertwine the stakes with the outer mesh on the downstream side of the sediment tube.

An acceptable alternative installation is driving stakes on two (2)-foot centers on each side of the sediment tube and connecting them with natural fiber twine or steel wire to inhibit the non-weighted sediment tube from moving vertically. Sediment tubes can also be secured by installing the stakes on two (2)-foot centers in an X-crossing pattern ensuring direct soil contact at all times.

Select the sediment tube check length to minimize the number of sediment tubes needed to span the width of the drainage conveyance. If the required ditch check length (perpendicular to the water flow) is 15 feet, then one (1) 15-foot sediment tube is preferred compared to two (2) overlapping 10-foot sediment tubes.

Install sediment tubes for ditch checks over bare soil, mulched areas, or erosion control blankets. Keep sediment tubes for ditch checks in place until fully established vegetation and root systems have completely developed and can survive on their own.

1.3.3 Delivery, Storage, and Handling

Follow the manufacturer's written storage and handling procedures for sediment tube labeling, shipment, and storage. Clearly show the manufacturer or supplier name and sediment tube diameter and length on product labels.

Store sediment tubes off the ground and cover them to adequately protect them from the following:

- Construction damage.
- Precipitation.
- Extended exposure to ultraviolet radiation including sunlight.
- On-site chemicals.
- Flames' including welding sparks.
- Excess temperatures.
- Other environmental conditions that can damage the physical properties of sediment tubes.

1.3.4 Inspection and Maintenance of Sediment Tubes

Inspect sediment tubes after installation to ensure that no gaps exist under the sediment tubes or between the joints of adjacent ends of sediment tubes.

Inspect sediment tubes every seven (7) days. Repair rills, gullies, and undercutting near the sediment tubes.

Remove sediment deposits that impair the filtration capability of a sediment tube when the sediment reaches one-third of the height of the exposed sediment tube. Remove and/or replace installed sediment tubes as required to adapt to changing construction site conditions.

When the functional longevity of the sediment tube is exceeded as determined by the RCE or manufacturer's representative, remove them from the site. Gather and dispose sediment tubes in regular means as non-hazardous, inert material. Before final stabilization, backfill all trenches, depressions, or other ground disturbances caused by the removal of sediment tubes.

1.3.5 Acceptance

Obtain RCE acceptance and approval of sediment tube installations. When requested by the RCE, ensure that a manufacturer's representative is on-site to oversee and approve the initial installation of sediment tubes. Obtain a letter from the manufacturer approving the installation when requested by the RCE.

The RCE will measure the diameter of installed sediment tubes. The diameter of the installed sediment tube must be within 10% of the circumference printed on the manufacturers packaging slip for approval.

1.4 Measurement

The quantity of the pay item sediment tube is the length of sediment tube installed, including overlaps and wastage, and is measured by the linear foot (LF) of sediment tube in-place, complete and accepted. Sediment tubes damaged by the Contractor's operations are not included in the measurement. The installation of sediment tubes may require written acceptance by the manufacturer's representative before the quantity is accepted.

1.5 Payment

Payment for sediment tubes is full compensation for installing the sediment tubes as specified or directed and includes furnishing, placing, maintaining, inspecting, removing, and disposing of the sediment tubes, providing wooden stakes, steel posts, proper storage facilities, documentation of quality control and quality assurance programs, and all other materials, labor, equipment, tools, supplies, transportation, and incidentals necessary to fulfill the requirements of the pay item in accordance with the Plans, Specifications, and other terms of the Contract.

Bid item numbers and descriptions are as follows:

Table 4: Bid Item Number

Bid Item Number	Description	Unit
8152007	Sediment Tube	LF