

SEDIMENT TUBES FOR DITCH CHECKS

SCDOT Designation: SC-M-815-12 (04/11)

1.0 Sediment Tubes for Ditch Checks

This Supplemental Specification replaces sections 815.1.1.2, 815.2.3, 815.4.5, 815.5 paragraph 3, and 815.6 paragraph 4, for sediment tubes in the *South Carolina Department of Transportation Standard Specifications for Highway Construction*, 2007 Edition. This supplemental specification replaces Supplemental Technical Specification SC-M-815-1.

1.1 Description

Sediment tubes for ditch checks are temporary erosion control devices for use along contours and in drainage conveyance swales to reduce the erosive forces of stormwater runoff. Locations for installation will be designated on the Plans or by the Resident Construction Engineer (RCE).

1.2 Materials

Do not use straw bales, natural pine needles, leaf mulch, and or grass clippings.

Provide sediment tubes for ditch checks that exhibit the following properties:

- Machine produced by a manufacturer experienced in sediment tube manufacturing.
- Materials are certified 100% weed free.
- When curled excelsior wood fiber is used, 80% of the fiber materials are a minimum of four (4) inches in length.
- When washed shredded recycled rubber particles are used, a minimum of 98% of metal is removed.
- Materials are enclosed by a tubular, flexible outer netting treated with ultraviolet stabilizers.

Do not use straw, curled excelsior wood, or natural coconut rolled erosion control products (RECPs) that are rolled up to create a sediment tube for ditch checks device.

Provide sediment tubes for ditch checks that meet the minimum performance requirements of Table 1.

Table 1: Minimum Performance Requirements for Sediment Tubes for Ditch Checks

| Property | Test Method ¹ | Value |
|---|-----------------------------|---|
| Pre-installed Tube Diameter | Field Measured | 18.0-inch minimum 24.0-inch maximum |
| Mass per Unit Length | Field Measured | 3.0 lbs/ft ±10% minimum for 18-in diameter, 4.0 lbs/ft ±10% minimum for 24-in diameter |
| Length per Tube | Field Measured | 10-ft minimum ² |
| Tube Filtering Efficiency Performance | ASTM D5141 or ASTM D7351 | 80% Total Suspended Solids (TSS) |
| Netting Ultraviolet Stability (Retained strength after 500 hrs) | ASTM D4355 | 70% |

²Select length to minimize number of sediment tubes needed. If the ditch check 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 Sediment Tubes listed on the current QPL will remain listed until January 31, 2012. After this date, all products listed on the QPL must meet the requirements of this Specification.

1.2.1 Quality Assurance

Provide sediment tubes for ditch checks listed on the most recent edition of *SCDOT Qualified Product List 57*.

At the time of delivery, provide the RCE with the sediment tube packing list containing 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.
- Certification that the sediment tube meets the physical and performance criteria of this specification.

1.3 Construction Requirements

1.3.1 Site Preparation

Proper site preparation is essential to ensure sediment tubes for ditch checks 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 tubes for ditch checks from having direct contact with the underlying soil or surface.

1.3.2 Installation

If requested by the RCE, provide a manufacturer's representative on-site to oversee and approve the initial installation of sediment tubes for ditch checks. 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 for ditch checks 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 for ditch checks 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 for ditch checks 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 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 for ditch checks 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 for ditch checks in swales or drainage ditches perpendicular to the flow of water and extend them up the side slopes a minimum of 1 foot above the design flow depth. Space sediment tubes for ditch checks according to Table 2.

Table 2: Sediment Tube for Ditch Checks Spacing

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

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

Install sediment tubes for ditch checks using wooden stakes with a minimum measured dimension of 3/4 inch x 3/4 inch and a maximum measured dimension of 2 inches x 2 inches, or using steel posts (1.25 lbs/linear foot) a minimum of 4 feet in length. Use steel posts without a kick plate and painting is not required. Space posts or stakes on 2-foot centers and drive them into the ground to a depth of 2 feet or to the maximum extent practicable.

Install the stakes on the downstream third of the sediment tube.

An acceptable alternative installation is driving stakes on 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 2-foot centers in an X-crossing pattern ensuring direct soil contact at all times.

Select the sediment tubes for ditch checks 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 15-foot sediment tube is preferred compared to two 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 tubes for ditch checks labeling, shipment, and storage. Clearly show the manufacturer or supplier name and sediment tube diameter and length on product labels.

Store sediment tubes for ditch checks 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 for Ditch Checks

Inspect sediment tubes for ditch checks 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 for ditch checks 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 sediment tubes for ditch checks 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 tubes for ditch checks 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 for ditch checks. Obtain a letter from the manufacturer approving the installation when requested by the RCE.

The RCE will measure the diameter of installed sediment tubes for ditch checks. The diameter of the installed sediment tubes for ditch checks 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 tubes for ditch checks 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 for ditch checks damaged by the Contractor's operations are not included in the measurement. The installation of sediment tubes for ditch checks may require written acceptance by the manufacturer's representative before the quantity is accepted.

1.5 Payment

Payment for sediment tubes for ditch checks 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 Tubes for Ditch Checks | LF |