

## ENHANCED STACKED DITCH CHECKS

SCDOT Designation: SC-M-815-19 (07/17)

---

### 1.0 Enhanced Stacked Ditch Checks

Enhanced Stacked Ditch Checks are approved as an acceptable alternative for Riprap Ditch Checks as shown in *SCDOT Standard Drawing, Ditch Check, 815-105-00*. Use Enhanced Stacked Ditch Checks for Drainage Areas no greater than 2 acres, and ensure the installation is stable for the 10-year 24-hour design storm event. Never use Enhanced Stacked Ditch Checks in live streams.

#### 1.1 Description

Enhanced Stacked Ditch Checks are temporary erosion prevention and sediment control devices used in drainage conveyance swales and ditches to reduce the erosive forces of stormwater runoff and allow for sedimentation of eroded particles. Locations for installation are designated on the Plans or by the Resident Construction Engineer (RCE).

#### 1.2 Materials

Provide material for Enhanced Stacked Ditch Checks complying with the requirements specified herein, on the Plans details, or as approved by the Resident Construction Engineer (RCE).

##### 1.2.1.1 Enhanced Stacked Ditch Checks

Do not use straw bales, pine bales, leaf mulch, and or grass clipping tubes. Do not use straw, curled excelsior wood, or natural coconut rolled erosion control products (RECPs) rolled up to create an Enhanced Stacked Ditch Check device. Provide Enhanced Stacked Ditch Check tube components that exhibit the following properties:

- Machine produced by a manufacturer experienced in sediment tube manufacturing.
- Materials are certified 100% weed free.
- Are manufactured to be re-usable throughout the life of a typical construction project.
- 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.

Provide Enhanced Stacked Ditch Checks that meet the minimum performance requirements of Table 1.

**Table 1: Minimum Performance Requirements for Enhanced Stacked Ditch Checks**

Property	Test Method	Value
Pre-installed Single Tube Diameter	Field Measured	9-inch minimum 24-inch maximum
Length per Tube	Field Measured	10-ft minimum <sup>1</sup>
Installed Stacked Ditch Check Height	Field Measured	15-inch minimum 24-inch maximum
Post Attachment	Observed	Pre-installed external post attachment structures or pre-installed post holes
Tube Filtering Efficiency Performance	ASTM D7351 or Approved Equivalent Independent 3 <sup>rd</sup> party Large Scale Testing Facility	80% Total Suspended Solids (TSS)
Netting Ultraviolet Stability (Retained strength after 500 hrs)	ASTM D4355	70%
<sup>1</sup> Select length to minimize number of sediment tubes needed. If ditch check length (perpendicular to the water flow) is 15 feet, then one 15-foot tube is preferred over two overlapped 10-foot tubes.		

#### 1.2.1.2 Steel Posts

Furnish steel posts meeting the following minimum physical requirements:

- Minimum length of five (5) feet.
- Composed of high strength steel with minimum yield strength of 50,000 psi.
- Standard “T” section with a nominal face width of 1.38 inches and nominal “T” length of 1.48 inches.
- Weighs 1.25 pounds per foot (± 8%).
- Painted with a water based baked enamel paint.
- Has a soil stabilization plate made of 15-gauge steel with a minimum cross section area of 17 square inches.

#### 1.2.2 Quality Assurance

Before installation of Enhanced Stacked Ditch Checks, 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 performance of the product conforming to the requirements of subsection 1.2.2 *Quality Control*.

Ensure that each Enhanced Stacked Ditch Check tube component 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.
- Enhanced Stacked Ditch Check tube(s) name, model, and/or serial number.
- Enhanced Stacked Ditch Check tube(s) diameter(s), length, and weight/density.

Enhanced Stacked Ditch Checks are listed on the most recent edition of *SCDOT Qualified Product List 99* prior to being accepted for use. Prior to inclusion on *SCDOT Qualified Product List 99*, Enhanced Stacked Ditch Checks must meet the physical and performance criteria outlined in this Specification.

### 1.3 Construction Requirements

#### 1.3.1 Site Preparation

Proper site preparation is essential to ensure Enhanced Stacked 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 Enhanced Stacked Ditch Checks from having direct contact with the underlying soil or surface. Ensure all surfaces are uniformly and well-compacted for maximum seating and stability of the installed Enhanced Stacked Ditch Checks.

#### 1.3.2 Installation

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

Install Enhanced Stacked Ditch Checks with a minimum weir height above the ground of 15-inches in swales or drainage ditches perpendicular to the flow of water. Extend Enhanced Stacked Ditch Checks up the side slopes a minimum of 1 foot above the Enhanced Stacked Ditch Check weir height. Space Enhanced Stacked Ditch Checks according to Table 2 (based on 18-inch Enhanced Stacked Ditch Check height).

**Table 2: Enhanced Stacked Ditch Checks Spacing (Based on 18-inch Height)**

<b>Slope (%)</b>	<b>Maximum Sediment Tube Spacing (feet)</b>
< 2	100
2	75
3	50
4	35
5	30
6	25
7	20
8	15
> 8	10

Install Enhanced Stacked Ditch Checks by placing two bottom support tubes and then placing one top tube on top of the supporting tubes, forming a pyramid type structure.

Construct a small U-shaped trench to a depth that is 20% of the diameter of the support tubes used for Enhanced Stacked Ditch Checks. Install a TRM Type 1 in accordance with *SCDOT Supplemental Specification for Rolled Erosion Control Products (RECP) (SC-M-815-9) or latest revision*, or a Geotextile Fabric for Erosion Control Under Riprap (Class 2) in accordance with *Section 804.2.11 of the 2007 Standard Specification for Highway Construction or latest revision*, over the trench, and extend the TRM or Fabric a minimum of 4 feet upstream and downstream of the installed Enhanced Stacked Ditch Checks.

Lay the two Enhanced Stacked Ditch Check support tubes over the installed TRM or Fabric covered trench. Lay the single Enhanced Stacked Ditch Check top tube on top of the support tubes. Place and anchor the Enhanced Stacked Ditch Check tube ends so they are positioned upstream of the Enhanced Stacked Ditch Check center point. Do not completely bury Enhanced Ditch Checks during installation. Review all project Specifications for special installation requirements.

Install Enhanced Stacked Ditch Checks using steel posts (1.25 lbs/ linear foot) a minimum of 5 feet in length. Use weather resistant painted steel posts with a metal kick plate. Space posts on maximum 2-foot centers and drive them into the ground to a minimum depth of 2 feet or to the maximum extent practicable for the site conditions. Only install steel posts through the pre-installed post holes or pre-installed external

post attachment structures on the downstream side of the Enhanced Stacked Ditch Check. Do not install posts through Enhanced Stacked Ditch Check tubes. Install posts at a 60 degree angle with the top of the post pointing upstream.

Install Enhanced Stacked Ditch Check tubes ensuring no gaps exist between the underlying soil, TRM and the bottom of the Enhanced Stacked Ditch Check tube. When more than one tube is required to span the entire ditch width, butt tube ends tightly together and join the junction with a junction wrap, and stake this junction separately.

Avoid damage to Enhanced Stacked Ditch Checks during installation. If tubes become 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 the tubes. Replace Enhanced Stacked Ditch Check tubes damaged during installation as directed by the RCE or manufacturer's representative at no expense to the Department.

Select the Enhanced Stacked Ditch 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 15-foot sediment tube is preferred compared to two overlapping 10 foot sediment tubes.

Keep Enhanced Stacked 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 Enhanced Stacked Ditch Checks labeling, shipment, and storage. Clearly show the manufacturer or supplier name and sediment tube diameter and length on product labels.

Store Enhanced Stacked 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 Enhanced Stacked Ditch Checks

Inspect Enhanced Stacked Ditch Checks after installation to ensure that no gaps exist under the structure or between the joints of adjacent ends of Enhanced Stacked Ditch Check tubes.

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

Remove sediment deposits that impair the filtration capability of Enhanced Stacked Ditch Check when the sediment reaches one-third of the height of the exposed Enhanced Stacked Ditch Check. Remove and/or replace installed Enhanced Stacked Ditch Checks as required to adapt to changing construction site conditions.

When the functional longevity of Enhanced Stacked Ditch Checks is exceeded as determined by the RCE or manufacturer's representative, remove them from the site. Gather and dispose Enhanced Stacked Ditch Checks and all materials in regular means as non-hazardous, inert material. Before final stabilization,

backfill all trenches, depressions, or other ground disturbances caused by the removal of Enhanced Stacked Ditch Checks.

#### 1.3.5 Acceptance

Obtain RCE acceptance and approval of Enhanced Stack 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 Enhanced Stacked Ditch Checks. Obtain a letter from the manufacturer approving the installation when requested by the RCE.

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

#### 1.4 Measurement

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

#### 1.5 Payment

Payment for Enhanced Stacked Ditch Checks is full compensation for installing the Enhanced Stacked Ditch Checks as specified or directed and includes furnishing, placing, maintaining, inspecting, removing, and disposing of the Enhanced Stacked Ditch Check tubes, providing steel posts, butt end junction wrap, Type 1 TRM, 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**

<b>Bid Item Number</b>	<b>Description</b>	<b>Unit</b>
8151050	Enhanced Stacked Ditch Checks	LF
8151101	Turf Reinforcement Matting (TRM) Type 1	SY
8042800	Geotextile Fabric for Erosion Control Under Riprap (Class 2)	SY

