Storm Drain Inlet Protection

Description

Storm drain inlet protection is achieved by placing a temporary filtering device around any inlet to trap sediment. This mechanism prevents sediment from entering inlet structures. Additionally, it serves to prevent the silting-in of inlets, storm drainage systems, or receiving channels.

There are six (6) types of inlet structure filters, including:

- Type A-Low Flow
- Type B-Medium Flow, Low Velocity
- Type C-Medium Flow, Medium Velocity
- Type D-High Flow, High Velocity
- Type E-Surface Course Curb Inlet
- Type F-Inlet Tubes

When and Where to Use It

Inlet protection may be installed prior to the construction of roads however, once the sub base is placed, a different type of inlet protection may be required. Inlet protection is required on all inlets that have outfalls that bypass sediment trapping structures and directly discharge off site. Use inlet protection as a last resort for sediment control when no other means are practical and do not use as the only means of protection.

General Design Requirements

Type A-Low Flow Inlet Filters include filter fabric inlet protection and 18-inch diameter sediment tubes

- Applicable for inlets with peak flow rates **less than 1 cfs** where the inlet drain area has grades less than 5%. The immediate drainage area (5-foot radius around the inlet) has grades less than 1%. Areas receiving concentrated flows **are not** acceptable.

Type B-Medium Flow, Low Velocity Inlet Filters include hardware fabric and stone inlet protection.

- Applicable for inlets with peak flow rates **less than 3 cfs** where the inlet drain area has grades **less than 5%.** Flow velocities to the inlet may **not exceed 3 feet per second**. Applicable where an overflow capacity is **not** required to prevent excessive ponding around the structure.

Type C-Medium Flow, Medium Velocity Inlet Filters include block and gravel inlet protection.

- Applicable for inlets with peak flow rates **less than 3 cfs** where the inlet drain has grades **less than 5%.** Flow velocities to the inlet may **not exceed 5 feet per second**. Applicable where an overflow capacity is required to prevent excessive ponding around the structure. **Not applicable in areas exposed to traffic**, such as median drains

Type D-Rigid Inlet Filters include prefabricated inlet filters composed of a geotextile fabric connected to a rigid structure

- Applicable for drainage areas up to **2 acres** with peak flow rates **greater than 3 cfs** where the inlet drain area has grades **greater than 5%**. Flow velocities to the inlet may **exceed 3 feet per second**.
- These filters are used for median applications (Type D1) and for sump applications (Type D2). Applicable where an overflow capacity **is** required to prevent excessive ponding around the structure. Capable of protecting inlet structures not associated with curb inlets. The inlets may include, but are not limited to yard inlets, DI 24-inches by 24-inches, DI 24-inches by 36-inches and manholes.

Type E-Surface Course Curb Inlet Filters include prefabricated inlet filters composed of a synthetic material that has aggregate compartments for stone, sand, or other weighted mechanisms to hold the unit in place.

- Applicable for roadway catch basins after the road surface course is placed

Type F-Inlet Tubes are classified in two categories: weighted inlet tubes and non-weighted inlet tubes.

- Weighted inlet tubes are applicable for inlets with drainage areas less than 1 acre. Weighted inlet tubes are used for placement on gravel, concrete, asphalt or other hard surfaces around drainage inlets where stakes cannot be driven. Weighted inlet tubes are applicable where construction traffic may occur around the inlet. All weighted Type F Inlet Structure Filters are applicable as Type E Inlet Structure Filters.

- Non-weighted inlet tubes are inlet tubes applicable for Catch Basins with drainage areas less than 1 acre where stakes or posts are driven to hold the tube in place. For non-weighted inlet tube applications, an inlet tube is placed on subgrade and is applicable until the road base course is placed.

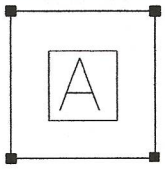
- Both weighted and non-weighted inlet tubes are applicable as weep hole inlet filters, although non-weighted inlet tubes can only be used in situations where stakes is driven into the ground or subgrade to secure the tube.

General Inspection and Maintenance

- Inspect every 7 calendar days and within 24-hours after each storm that produces ½-inches or more of rain. Handle any damage or needed repairs immediately.
- Inspect after installation for gaps that may permit sediment to enter the storm drainage system.
- Remove accumulated sediment and debris from the surface and vicinity of Inlet Filters after each rain event or as directed by the Engineer, Inspector or Manufacturer's Representative.
- Remove sediment when it reaches approximately 1/3 the height of the Inlet Filter. If a sump is used, remove sediment when it fills approximately 1/3 the depth of the hole. Maintain the pool area, always providing adequate sediment storage volume for the next storm event.
- Remove, move, and/or replace as required to adapt to changing construction site conditions.
- Remove Inlet Filters from the site when the functional longevity is exceeded as determined by the Engineer, Inspector or Manufacturer's Representative.
- Dispose of Inlet Filters no longer in use at an appropriate recycling or solid waste facility.
- Prior to final stabilization, backfill and repair all trenches, depressions, and other ground disturbances caused by the removal of Inlet Filters.
- Remove all construction material and sediment and dispose of them properly. Grade the disturbed areas to the elevation of the inlet structure crest. Stabilize all bare areas immediately.

Type A – Filter Fabric Inlet Protection

Plan Symbol



Design filter fabric inlet protection to have an 80 percent design removal efficiency goal of the total suspended solids (TSS) in the inflow. The Design Aids located in the Silt Fence section of this Handbook may be used to properly design filter fabric inlet protection.

Materials

Use filter fabric that conforms to SCDOT standard specifications for highway construction (latest edition). Refer to the silt fence geotextile fabrics SCDOT Approval Sheet #34.

Use 48-inch long wood posts that meet the following requirements.

- 2-inch by 2-inch size.
- Heavy-duty wire staples at least 1½-inch long, spaced a maximum of 6-inches apart to attach the filter fabric to wooden stakes.

Use 48-inch long steel posts that meet the following minimum physical requirements:

- Be composed of high strength steel with minimum yield strength of 50,000 psi.
- Have a standard "T" section with a nominal face width of 1.38-inches and nominal "T" length of 1.48-inches.
- Weigh 1.25 pounds per foot (± 8%).
- Be painted with a water based baked enamel paint.

Installation

Excavate a trench 6-inches wide and 6-inches deep around the outside perimeter of the inlet.

Extend the filter fabric a minimum of 12-inches into the trench. Backfill the trench with soil or crushed stone and compact over the filter fabric unless the fabric is pneumatically installed.

Install the filter fabric to a minimum height of 18-inches and maximum height of 24-inches above grade. Space the posts around the perimeter of the inlet a maximum of 3-feet apart and drive them into the ground a minimum of 24-inches.

Cut the filter fabric from a continuous roll to the length of the protected area to avoid the use of joints. When joints are necessary, wrap filter fabric together only at a support post with both ends securely fastened to the post, with a minimum 6-inch overlap.

Attach fabric to wood posts using heavy-duty wire staples at least 1½-inch long, spaced a maximum of 6-inches apart.

Attach fabric to steel posts with heavy-duty plastic ties. Attach at least four (4) evenly spaced ties in a manner to prevent sagging or tearing of the fabric. In all cases, affix ties in no less than four (4) places.

Inspection and Maintenance

- Inspect every 7 calendar days and within 24-hours after each rainfall event that produces ½-inches or more of precipitation. Replace the fabric if it becomes clogged.
- Remove the sediment when it reaches 1/3 the height of the fabric. Take care not to damage or undercut fabric when removing sediment.
- If a sump is used, remove sediment when it fills 1/3 the depth of the hole.
- Maintain the pool area, always providing adequate sediment storage volume for the next storm.
- Remove storm drain inlet protection only after the disturbed areas are permanently stabilized.
- Remove all construction material and sediment, and dispose of them properly.
- Grade the disturbed area to the elevation of the drop inlet structure crest. Use appropriate permanent stabilization methods to stabilize bare areas around the inlet.

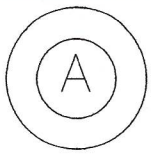
Filter Fabric Inlet Protection

Preventive Measures and Troubleshooting Guide

Field Condition	Common Solutions
Excessive sediment entering inlet.	Ensure that soil stabilization and sediment control devices are installed upstream of inlets. Ensure that the barriers around the inlet are installed correctly. Filter fence needs to be keyed in so that water goes through filter fabric and not under it. Use a different type of inlet protection if concentrated flows are observed.
Filter fabric clogged by sediment or other debris.	Replace filter fabric.
Sediment reaches 1/3 the height of fabric.	Remove sediment.
Ponded water causes a traffic concern.	Use alternate BMPs upstream. Remove inlet protection if necessary.

Type A – Sediment Tube Inlet Protection

Plan Symbol



Materials

Sediment tubes for Type A Inlet Structure Filters exhibit the following properties:

- Produced by a Manufacturer experienced in sediment tube manufacturing.
- Composed of compacted geotextiles, curled excelsior wood, natural coconut fibers, hardwood mulch or a mix of these materials enclosed by a flexible netting material.
- Straw, straw fiber, straw bales, pine needles, and leaf mulch are not allowed under this specification.
- Utilizes outer netting that consists of seamless, high-density polyethylene photodegradable materials treated with ultraviolet stabilizers or a seamless, high-density polyethylene non-degradable materials.
- Diameter ranging from 18-inches to 24-inches.
- 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.
- Select applicable Sediment Tubes from the SCDOT approved products list.

Use 48-inch long wood posts that meet the following requirements.

- 2-inch by 2-inch size.
- Heavy-duty wire staples at least 1½-inch long, spaced a maximum of 6-inches apart to attach the filter fabric to wooden stakes.

Use 48-inch long steel posts that meet the following minimum physical requirements:

- Be composed of high strength steel with minimum yield strength of 50,000 psi.
- Have a standard "T" section with a nominal face width of 1.38-inches and nominal "T" length of 1.48-inches.
- Weigh 1.25 pounds per foot (± 8%).
- Be painted with a water based baked enamel paint.

Installation:

Remove all rocks, clods, vegetation or other obstructions so installed sediment tubes have direct contact with the underlying soil or surface.

Install sediment tubes by laying them flat on the ground. Construct a small trench to a depth that is 20% of the sediment tube diameter. Lay the sediment tube in the trench and compact the upstream sediment tube soil interface. Do not completely bury sediment tubes during installation. 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.

Install sediment tubes using wooden stakes (2-inch x 2-inch) or steel posts (standard "U" or "T" sections with a minimum weight of 1.25 pounds per foot) a minimum of 48-inches in length placed on 2-foot centers. Intertwine the stakes with the outer mesh on the downstream side, and drive the stakes in the ground to a minimum depth of 24-incest leaving less than 12-inches of stake above the exposed sediment tube.

Inspection and Maintenance:

- Inspect every 7 calendar days and within 24-hours after each rainfall event that produces ½-inches or more of precipitation.
- Inspect sediment tubes after installation for gaps under the tubes and for gaps between joints of adjacent ends of sediment tubes. Repair rills, gullies, and all undercutting near sediment tubes.
- Remove and/or replace installed sediment tubes as required to adapt to changing construction site conditions.
- Remove all sediment tubes from the site when the functional longevity is exceeded as determined by the Engineer, Inspector or Manufacturer's Representative.
- Dispose of sediment tubes in regular means as non-hazardous, inert material.

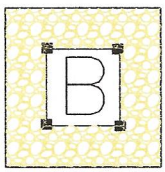
Sediment Tube Inlet Protection

Preventive Measures and Troubleshooting Guide

Field Condition	Common Solutions
Too much sediment has accumulated.	Remove accumulated sediment to recover holding capacity. Remove accumulated sediment from the upstream side of the sediment tube when the sediment has reached a height of approximately one-third the original height of the tube (measured at the center).
Sediment tube washes away.	Use larger sediment tubes. Decrease post spacing, and add more posts. Install posts on both the upstream and downstream sides of the sediment tube.
Other application used instead of sediment tubes	Do not use straw bales as sediment tube alternatives.
Wrong type of materials or wrong type of sediment tube utilized.	Straw, pine needle and leaf mulch-filled sediment tubes are not permitted. Curled excelsior wood, or natural coconut rolled erosion control products (RECPs) that are rolled up to create a sediment tube are **not** permitted. Do not use straw bales.

Type B - Hardware Fabric and Stone Inlet Protection

Plan Symbol



Design hardware fabric and stone inlet protection to have an 80 percent design removal efficiency goal of the total suspended solids (TSS) in the inflow. The Design Aids located in the Rock Check Dam section of this Handbook may be used to properly design hardware fabric inlet protection.

Materials

Use hardware fabric or comparable wire mesh with maximum openings of 0.5-inches x 0.5-inches as the supporting material.

Use48-inch steel posts that meet the following minimum physical requirements:

- Be composed of high strength steel with minimum yield strength of 50,000 psi.
- Have a standard "T" section with a nominal face width of 1.38-inches and nominal "T" length of 1.48-inches.
- Weigh 1.25 pounds per foot (± 8%).
- Be painted with a water based baked enamel paint.

Use heavy-duty wire ties to attach the wire mesh material to the steel posts.

Place Aggregate No. 5 washed stone against the hardware fabric on all sides.

Installation

Excavate a trench 6-inches deep around the outside perimeter of the inlet.

Use hardware fabric or comparable wire mesh with maximum openings of 0.5-inches by 0.5-inches as the supporting material. Extended the fabric a minimum of 6-inches into the ground. Backfill the trench with soil or crushed stone and compact over the fabric.

Use steel posts with a minimum post length of 48-inches consisting of standard "T" sections with a weight of 1.25 pounds per foot (±8%). Install the wire mesh fabric above grade a minimum of 18-inches without exceeding 24-inches.

Space the steel posts a maximum of 3-feet apart around the perimeter of the inlet and drive them into the ground a minimum of 24-inches.

Use heavy-duty wire ties spaced a maximum of 6-inches apart to attach the wire mesh material to the steel posts.

Place Aggregate No. 5 washed stone to a minimum height of 12-inches, and a maximum height of 24-inches against the hardware fabric on all sides.

Inspection and Maintenance

- If the stone becomes clogged with sediment, pull the stones away from the inlet and clean or replace them.
- Since cleaning of gravel at a construction site may be difficult, an alternative approach would be to use the clogged stone as fill and put fresh stone around the inlet.

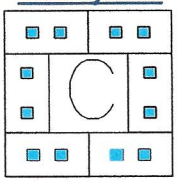
Hardware Fabric and Stone Inlet Protection

Preventive Measures and Troubleshooting Guide

Field Condition	Common Solutions
Excessive sediment is entering the inlet.	Ensure that soil stabilization and sediment control devices are installed upstream of inlets. Ensure that the barriers around the inlet are installed correctly.
Sediment reaches 1/3 the height of the structure.	Remove sediment.
Stone filter material becomes clogged with sediment.	Pull stones away from inlet and clean them, or replace them with new stones.
Ponded water causes a traffic concern.	Use alternate BMPs upstream. Remove drain inlet protection if necessary.

Type C - Block and Gravel Inlet Protection

Plan Symbol



Block and gravel filters are used where heavy flows and higher velocities are expected and where an overflow capacity is necessary to prevent excessive ponding around the structure.

Materials

Use masonry blocks ranging from 8 to 12 inches wide.

Use hardware fabric or comparable wire mesh with maximum openings of ½-inches x ½-inches as the supporting material.

Use 1-inch D_{50} washed stone gravel.

Installation

Place the bottom row of the concrete blocks lengthwise on their side so that the open end faces outward, not upward.

The height of the barrier is varied, depending upon design needs by stacking a combination of blocks that are 8- and 12-inches wide.

Place wire mesh over the outside vertical face of the concrete blocks to prevent stones from being washed through the holes in the blocks. Use hardware cloth or comparable wire mesh with ½-inch x ½-inch openings.

Install 1-inch D_{50} washed stone to a height equal to the elevation of the top of the blocks.

Inspection and Maintenance

- Inspect every 7 calendar days and within 24-hours after each storm that produces ½-inches or more of rain. Any needed repairs should be handled immediately.
- Remove sediment when it reaches 1/3 the height of the blocks. If a sump is used, remove sediment when it fills 1/3 the depth of the hole.
- If the stone filter becomes clogged with sediment, the stones must be pulled away from the inlet and cleaned or replaced. Since cleaning of gravel at a construction site may be difficult, an alternative approach would be to use the clogged stone as fill and put fresh stone around the inlet.
- Remove inlet protection structures after the disturbed areas are permanently stabilized. Remove all construction material and sediment, and dispose of them properly.
- Grade the disturbed area to the elevation of the drop inlet structure crest.
- Stabilize all bare areas immediately.

Block and Gravel Inlet Protection

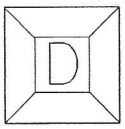
Block and Gravel Inlet Protection

Preventive Measures and Troubleshooting Guide

Field Condition	Common Solutions
Excessive sediment is entering the inlet.	Ensure that soil stabilization and sediment control devices are installed upstream of inlets. Ensure that the block and gravel inlet protection is installed correctly.
Sediment reaches 1/3 the height of the blocks.	Remove sediment.
Stone filter material becomes clogged with sediment.	Pull stones away from inlet and clean them, or replace them with new stones.
Ponded water causes a traffic concern.	Use alternate BMPs upstream. Remove inlet protection if necessary.

Type D – Rigid Inlet Filters

Plan Symbol



There are two uses for rigid inlet filters: median applications (Type D1) and sump applications (Type D2). Type D1 filters have more overflow capacity and less filtration area than Type D2 to prevent ponding in medians. These filters are capable of protecting inlet structures not associated with curb inlets

Materials

Rigid inlet filters exhibit the following properties:

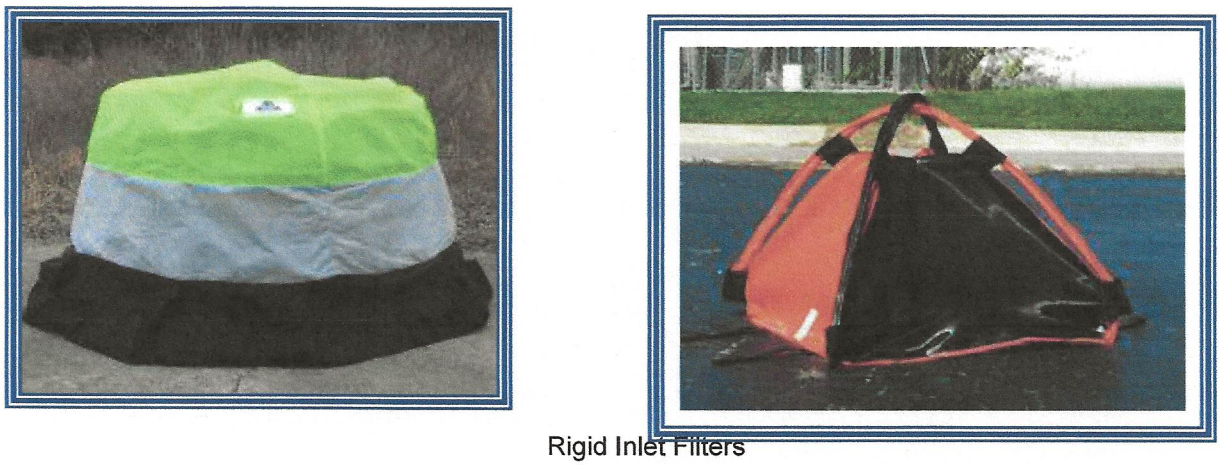
- Composed of a geotextile fabric connected to a rigid structure. The geotextile fabric is non-biodegradable and resistant to degradation by ultraviolet exposure and resistant to contaminants commonly encountered in storm water.
- Use a rigid structure composed of high molecular weight, high-density polyethylene copolymer with a UV inhibitor. Do not use structures that are not reusable and recyclable.
- Use a filter fabric constructed of 100% continuous polyester non-woven engineering fabric. The filter fabric is fabricated to provide a direct fit adjacent to the associated rigid structure.
- Rigid inlet filters have a two-stage design. The first stage conveys normal flows at a minimum clean water flow rate of 100 gallons per minute per square foot. The second stage conveys high flow rates, with a minimum apparent opening of 0.5-inch per square inch (No. 12 standard sieve opening).
- Type D1 inlet filters have a first stage minimum height of 9-inches and a maximum height of 12-inches in order to allow greater overflow capacity and prevent ponding in the median.
- Rigid inlet filters completely surround the inlet.
- Rigid inlet filters have lifting devices or structures to assist in the installation and to allow inspection of the storm water system.
- The filter fabric is capable of reducing effluent sediment concentrations by no less than 80% under typical sediment migration conditions.
- Select applicable Type D inlet filters from the SCDOT approved products list.

Installation

Install rigid inlet filters in accordance with the Manufacturer's written installation instructions. Properly install rigid inlet protection so the inlet is completely enclosed.

Inspection and Maintenance

- Inspect every 7 calendar days and within 24-hours after each storm that produces ½-inches or more of rain. Any needed repairs should be handled immediately.
- Inspect after installation to insure that no gaps exist that may permit sediment to enter the storm drain system.
- Remove and/or replace rigid inlet filters to adapt to changing construction site conditions.
- Clean the rigid inlet protection filter material when it becomes covered or clogged with deposited sediment.
- Replace the rigid inlet protection filter material as directed by the Engineer.



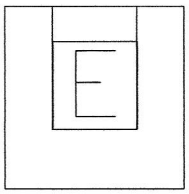
Rigid Inlet Filters

Preventive Measures and Troubleshooting Guide

Field Condition	Common Solutions
Excessive sediment is entering the inlet.	Ensure that soil stabilization and sediment control devices are installed upstream of inlets. Ensure that the rigid inlet filters are installed correctly.
Sediment reaches 1/3 the height of the structure.	Remove sediment.
Rigid inlet filter material becomes clogged with sediment.	Pull rigid inlet filters from inlet and clean them, or replace rigid inlet filters with new filter material.
Ponded water causes a traffic concern.	Use alternate BMPs upstream. Remove rigid inlet filter if necessary.

Type E - Surface Course Curb Inlet Filters

Plan Symbol



Materials

Use surface course inlet filters that have a minimum height or diameter of 9-inches and have a minimum length that is 2-feet longer than the length of the curb opening. Surface course inlet filters are not designed to completely block the inlet opening.

Use surface course inlet filters constructed with a synthetic material that will allow storm water to freely flow through while trapping sediment and debris. Use a material that is non-biodegradable and resistant to degradation by ultraviolet exposure and resistant to contaminants commonly encountered in storm water. Straw, straw fiber, straw bales, pine needles, and leaf mulch are not permissible filter materials.

Surface course inlet filters have aggregate compartments for stone, sand or other weighted materials or mechanisms to hold the unit in place.

Use filter fabric that is capable of reducing effluent sediment concentrations by no less than 80% under typical sediment migration conditions.

Select Type E inlet filters from the SCDOT approved products list.

Installation

Surface course inlet filters are applicable for road Catch Basin after the road surface course is placed. Place surface course inlet filters where sediment may spill over sidewalks and curbs.

Install surface course inlet filters in front of curb inlet openings. The filter has a minimum height or diameter of 9-inches and has a minimum length that is 2-feet longer than the length of the curb opening to allow sufficient length to cover the inlet with at least 1-foot of clearance beyond the inlet on both ends.

Do not completely block the inlet opening with surface course inlet filters. Install surface course inlet filters in a manner to allow overflows to enter the catch basin.

Fill the aggregate compartment to a level (at least ½ full) that will keep the surface course inlet filter in place and create a seal between the surface course inlet filter and the road surface.

Inspection and Maintenance

- Inspect every 7 calendar days and within 24-hours after each storm that produces ½-inches or more of rain. Any needed repairs should be handled immediately.
- Ponding is likely if sediment is not removed regularly.
- Inspect surface course curb inlet filters on a regular basis and immediately after major rain events.
- Clean the surface course curb inlet filter if a visual inspection shows silt and debris build up around the filter.

Surface Course Inlet Filter

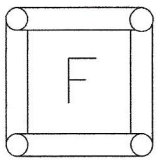
Surface Course Inlet Filter

Preventive Measures and Troubleshooting Guide

Field Condition	Common Solutions
Excessive sediment is entering the inlet.	Ensure that soil stabilization and sediment control devices are installed upstream of inlets. Ensure that the surface course inlet filters are installed correctly.
Sediment reaches 1/3 the height of the structure.	Remove sediment.
Surface course inlet filter material becomes clogged with sediment.	Pull surface course filters from inlet and clean them, or replace surface course inlet filters with new filter material.
Ponded water causes a traffic concern.	Use alternate BMPs upstream. Remove surface course inlet filter if necessary.

Type F - Inlet Tubes

Plan Symbol



Inlet tubes are temporary filtering devices placed around inlet structures to trap sediment and keep silt, sediment and construction debris from entering pipe systems through open inlet structures. Additionally, inlet tubes prevent the silting-in of inlets, storm drainage systems and receiving channels.

Materials

Use inlet tubes that exhibit the following properties:

- Produced by a Manufacturer experienced in sediment tube manufacturing.
- Composed of compacted geotextiles, curled excelsior wood, natural coconut fibers or hardwood mulch or a mix of these materials enclosed by a flexible netting material.
- Do not use straw, straw fiber, straw bales, pine needles or leaf mulch under this specification.
- Utilize an outer netting that consists of seamless, high-density polyethylene photodegradable materials treated with ultraviolet stabilizers or a seamless, high-density polyethylene non-degradable materials.
- Curled wood excelsior fiber, or natural coconut fiber rolled erosion control products (RECP) rolled up to create an inlet tube devices are **not** allowed under this specification.

Weighted Inlet Tubes

Weighted inlet tubes are sediment tubes capable of staying in place without external stabilization measures and may have a weighted inner core or other weighted mechanism to keep them in place.

Materials

Weighted inlet tubes meet the minimum performance requirements shown in the table below.

PROPERTY	TEST METHOD	VALUE
Diameter	Field Measured	6.0 inch to 12.0 inch
Mass per Unit Length	Field Measured	6 inch = 6 lbs/ft minimum 12 inch = 12 lbs/ft minimum
Fiber Length	Field Measured	80% of the fiber materials at least 4-inches in length
Length per Tube	Field Measured	6 foot minimum
Netting Unit Weight	Certified	0.35 oz/ft minimum

Select Type F weighted inlet tubes from the SCDOT approved products list.

Installation

Install weighted inlet tubes lying flat on the ground, with no gaps between the underlying surface and the inlet tube. Never stack weighted inlet tubes on top of one another.

Do not completely block inlets with weighted inlet tubes.

Install weighted inlet tubes in such a manner that all overflow or overtopping water has the ability to enter the inlet unobstructed.

To avoid possible flooding, two or three concrete cinder blocks may be placed between the weighted inlet tubes and the inlet.

Non-Weighted Inlet Tubes

Non-weighted inlet tubes are defined as sediment tubes that require staking or other stabilization methods to keep them safely in place.

Materials

Non-weighted inlet tubes meet the minimum performance requirements shown in the table below.

PROPERTY	TEST METHOD	VALUE
Diameter	Field Measured	6.0 inch to 12.0 inch
Mass per Unit Length	Field Measured	6 inch = 1.0 lbs/ft minimum 12 inch = 2.0 lbs/ft minimum
Fiber Length	Field Measured	80% of the fiber materials at least 4-inches in length
Length per Tube	Field Measured	6 foot minimum
Netting Unit Weight	Certified	0.35 oz/ft minimum

Select Type F non-weighted inlet tubes from the SCDOT approved products list.

Installation

Install non-weighted inlet tubes immediately after grading and construction of catch basin boxes. Maintain non-weighted inlet tubes during subgrade and base preparation until the base course is placed.

For weep hole inlet protection applications, both weighted and non-weighted inlet tubes are applicable. Install non-weighted inlet tubes in situations when stakes can be driven into the ground or subgrade to secure the tube.

Review all project specifications for special installation requirements.

Install non-weighted inlet tubes using 2-inch x 2-inch wooden stakes or steel posts consisting of standard "T" sections weighing 1.25 pounds per foot (±8%), 3-feet in length placed on 2-foot centers. Intertwine the stakes with the outer mesh on the downstream side of the inlet tube.

Drive stakes in the ground to a minimum depth of 1-foot leaving less than 1-foot of stake exposed above the non-weighted inlet tube.

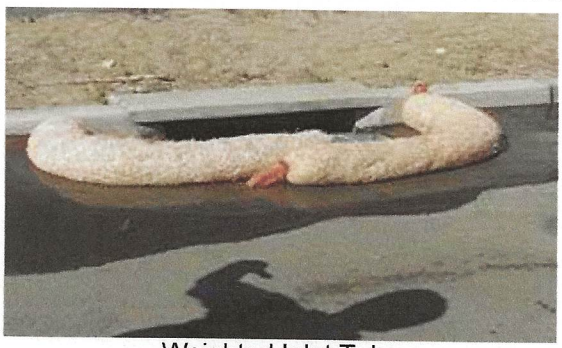
An acceptable alternative installation is driving stakes on 2-foot centers on each side of non-weighted inlet tubes and connecting them with natural fiber twine or steel wire to inhibit the non-weighted sediment tube from moving vertically.

Another acceptable alternative installation for non-weighted inlet tubes is installing stakes on 2-foot centers in a crossing manner maintaining direct soil contact at all times.

Install non-weighted inlet tubes so the top of the tube is below the top of the installed curb line to ensure that all overflow or overtopping water has the ability to enter the inlet unobstructed.

Inspection and Maintenance

- Inspect every 7 calendar days and within 24-hours after each storm that produces ½-inches or more of rain. Any needed repairs should be handled immediately.
- Inlet tubes may be temporarily moved during construction as needed.
- Replace inlet tubes damaged during installation as directed by the Inspector or Manufacturer's Representative at the contractor's expense.



Weighted Inlet Tube

Non-weighted Inlet Tube

Preventive Measures and Troubleshooting Guide

Field Condition	Common Solutions
Excessive sediment is entering the inlet.	Ensure that soil stabilization and sediment control devices are installed upstream of inlets. Ensure that inlet tubes are installed correctly.
Sediment reaches 1/3 the height of the inlet tube.	Remove sediment.
Filter material becomes clogged with sediment.	Pull Inlet from tube and clean them, or replace clogged inlet tubes with inlet tubes
Ponded water causes a traffic concern.	Use alternate BMPs upstream. Remove inlet tubes if necessary.