

# KANSAS DEPARTMENT OF TRANSPORTATION

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## TEMPORARY EROSION CONTROL MANUAL

### SECTION 4 INLET PROTECTIONS

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# SECTION 4 INLET PROTECTIONS

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## BIODEGRADABLE LOG AND FILTER SOCK DROP INLET PROTECTION

### Purpose and Operation

Biodegradable logs and filter socks are devices used for ditch checks, slope interruption, or inlet protection. They provide sediment control by reducing the water velocity allowing the soil particles to drop out of the water column. For inlet protection purposes the primary use is to intercept, pond, and filter the sediment-laden runoff that would enter a drop inlet.

To view KDOTs Standard Drawings for a biodegradable log drop inlet protection, select the following link which shows the detailed drawing with relevant design information: [Landscape Standard LA 852C](#). This file can also be found on KDOTs KART webpage with a free account.

### Design

#### Material Specification

- Use 100% shredded mulch or other non-compost biodegradable material as fill for logs.
- Use log mesh with ¼" openings or larger. It must allow water infiltration.
- Stakes shall be wood or steel according to KDOTs Standard Specifications [Section 2114 – Temporary Sediment Barriers](#).
- For further specifications regarding the biodegradable log and filter sock refer to KDOTs Standard Specifications [Section 902 – Temporary Erosion and Sediment Control](#) and [Section 2114 – Temporary Sediment Barriers](#). See additional Special Provisions for KDOTs Standard Specifications ([Division 900](#) and [Division 2100](#)).
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#### Placement

- Stakes should be placed every 4' along the biodegradable log or filter sock.
- Surround the entire drop inlet with a biodegradable log or filter sock. The ends of the biodegradable log or filter sock should overlap each other tightly to prevent unfiltered water from entering the drop inlet.
- 25% of the height of the biodegradable log or filter sock shall be keyed into ground during installation.

### Installation

#### Proper Installation Method

- Excavate a trench around the perimeter of the drop inlet so that the depth of the trench is 25% of the height of the biodegradable log or filter sock.
- Place the biodegradable log or filter sock in the trench. The ends of the biodegradable log or filter sock should be pressed together tightly and overlap each other by a minimum of 2'.
- Drive stakes into the biodegradable log or filter sock every 4'. The diameter of the biodegradable log or filter sock can range from 1'-6" to 1'-8". The Engineer or Designer is to specify the diameter of biodegradable log or filter sock to be used for drop inlet protection.
- Note: When a biodegradable log or filter sock drop inlet protection is placed in a shallow median ditch, the top of the barrier should not exceed the height of the adjacent paved road.

When the height of the barrier exceeds the height of the adjacent paved road, water may spread onto the roadway causing a hazardous condition.

*List of common placement/installation mistakes to avoid*

- Biodegradable logs and filter socks should be placed directly against the perimeter of the drop inlet. This allows overtopping water to flow directly into the inlet instead of flowing onto nearby soil, causing scour.
- Biodegradable log or filter socks drop inlet protection must be properly trenched in. Biodegradable logs and filter socks at ground level do not work as they can allow water to flow under the barrier.

## **Inspection and Maintenance**

Biodegradable log and filter sock drop inlet protections should be inspected at least once within every 7-day inspection monitoring period. The following is a general list of questions that should be addressed during each inspection:

- Does water flow under the biodegradable log or filter sock?

This is usually caused by not trenching in the biodegradable log or filter sock deep enough. If the problem is an improperly trenched biodegradable log or filter sock, the drop inlet barrier should be removed and a new one installed using the proper trench depth.

- Does water flow through gaps in the biodegradable log or filter sock?

This is usually caused by not tightly overlapping the ends of the biodegradable log or filter sock. If this is the case, then confirm that the biodegradable log or filter sock ends are placed together tightly or inspect the biodegradable logs or filter socks for any other gaps. The ends of the biodegradable log or filter sock should overlap each other by a minimum of 2'.

- Are the biodegradable logs or filter socks decomposing due to age and/or water damage?

This is usually due to the life span of a biodegradable log or filter sock. Inspect the biodegradable logs or filter socks for signs of decomposition and replace as necessary.

- Does sediment need to be removed from the drop inlet protection?

Sediment accumulated in front of the drop inlet barrier should be removed when it reaches one-half of the original exposed height of the biodegradable log or filter sock. Allowing too much sediment to accumulate in front of the drop inlet protection drastically reduces its effectiveness. One high-intensity rainfall can dislodge enough sediment from the drainage basin to completely overtop the drop inlet protection. Therefore, it is extremely important to inspect drop inlet protection within 24 hours of a large rainfall event. When removing sediment from a biodegradable log or filter sock drop inlet protection with a bulldozer or backhoe, take care not to damage or undermine the entrenched biodegradable logs or filter socks.

Please refer to the project specific SWP2, Contract Documents, and detailed drawings for additional inspection and maintenance criteria.

## SILT FENCE INLET SEDIMENT BARRIER

### Purpose and Operation

Silt fence inlet sediment barriers work just like a ditch check or a slope barrier: the silt fence intercepts, ponds, and filters sediment-laden runoff. Ponding the water reduces the velocity of the incoming flow and allows most of the suspended sediment to settle out. As the ponded water percolates through the silt fence fabric, much of the remaining suspended sediment is filtered out.

To view KDOTs Standard Drawings for a silt fence inlet sediment barriers select the following link which shows the detailed drawing with relevant design information: [Landscape Standard LA 852C](#). This file can also be found on KDOTs KART webpage with a free account.

### Design

#### Material Specification

- Silt fence fabric should conform to the AASHTO M288 silt fence specification.
- Stakes or posts shall be 4 ft. (min.) long and of one of the following materials:
  - Hardwood – 1 3/16" x 1 3/16";
  - Southern Pine – 2 5/8" x 2 5/8";
  - Steel U, T, L, or C Section – 0.95 lbs. per 1'-0"; or
  - Synthetic – same strength as wood stakes.
- Silt fence fabric and support backing should be attached to the wooden posts and frame with staples, wire, zip ties, or nails.
- Cross pieces shall be of same material as stakes.
- For further specifications regarding silt fence refer to KDOTs Standard Specifications [Section 902 – Temporary Erosion and Sediment Control](#) and [Section 2114 – Temporary Sediment Barriers](#). See additional Special Provisions for KDOTs Standard Specifications ([Division 900](#) and [Division 2100](#)).

#### Placement

- Place a silt fence inlet sediment barrier in a location where it is unlikely to be overtopped. Water should flow through silt fence and not over it. Silt fence drop inlet barriers often fail when repeatedly overtopped.
- When used as a drop inlet barrier, silt fence fabric and posts must be supported at the top by a frame that is constructed of the same material as the stakes.
- When a silt fence inlet sediment barrier is located near an inlet that has steep approach slopes, the storage capacity behind the barrier is drastically reduced. Timely removal of sediment must occur for a barrier to operate properly in this location.

### Installation

#### Proper Installation Method

- Excavate a trench around the perimeter of the inlet that is at least 6" deep by 4" wide.
- Drive posts to a depth of at least 24" around the perimeter of the drop inlet. The distance between posts should be 4' or less. If the distance between two adjacent corner posts is more than 4', add more posts between them.

- Connect the tops of all the posts with a frame made of 2" by 4" boards of the same material as stakes. Use nails or screws for fastening.
- Attach the wire or polymeric mesh backing to the outside of the post/frame structure with staples, wire, zip ties, or nails.
- Roll out a continuous length of silt fence fabric long enough to wrap around the perimeter of the drop inlet. Add more length for overlapping the fabric joint. Place the edge of the fabric in the trench, starting at the outside edge of the trench. Line all three sides of the trench with the fabric. Backfill over the fabric in the trench with the excavated soil and compact. After filling the trench, approximately 24" to 36" of silt fence fabric should remain exposed.
- Attach the silt fence to the outside of the post/frame structure with staples, wire, zip ties, or nails. The joint should be overlapped to the next post.
- Note: When a silt fence drop inlet sediment barrier is placed in a shallow median ditch, confirm that the top of the barrier is not higher than the paved road. If the top of the barrier exceeds the height of the adjacent paved road, water may spread onto the roadway, causing a hazardous condition.

*List of common placement/installation mistakes to avoid*

- Water should flow through a silt fence drop inlet sediment barrier and not over it. Place a silt fence inlet sediment barrier in a location where it is unlikely to be overtopped. Silt fence inlet sediment barriers often fail when repeatedly overtopped.
- Do not place posts on the outside of the silt fence inlet sediment barrier. In this configuration, the force of the water is not resisted by the posts, but only by the staples (wire, zip-ties, nails, etc.). The silt fence will rip and fail.
- Do not install silt fence inlet sediment barriers without framing the top of the posts. The corner posts around inlets are stressed in two directions whereas a normal silt fence is only stressed in one direction. This added stress requires more support.

## Inspection and Maintenance

Silt fence inlet sediment barriers should be inspected at least once within every 7-day inspection monitoring period. The following is a general list of questions that should be addressed during each inspection:

- Does water flow under the silt fence?

This can be caused by posts that are too far apart, a trench that is too shallow, or an improper burial procedure. Posts should be no more than 4' apart. The trench should be at least 6" wide by 6" deep. The bottom edge of the silt fence should be anchored securely by backfilling over the fabric in the trench with the excavated soil and then compacting. If these guidelines have not been met, the silt fence inlet sediment barrier should be reinstalled, or the deficiencies should be remedied.

- Does the silt fence sag excessively?

Sagging silt fence is caused by excessive post spacing or the lack of a frame connecting the posts. Silt fence posts should be no more than 4' apart. If the post spacing exceeds 4' additional posts should be added to decrease spacing between posts. If no post frame exists, one should be added. A sagging silt fence should be repaired immediately because it has the potential to create a bigger problem: flooding. If a silt fence falls over onto an inlet during a storm, the inlet can become blocked, causing flooding of the roadway.

- Has the silt fence torn or become detached from the posts?

Silt fence can be torn by the force of ponded water, or by winds that rip the silt fence fabric away from the posts. If a silt fence develops tears for any reason, it should be replaced.

- Does sediment need to be removed from the drop inlet barrier?

Sediment accumulated in front of the inlet sediment barrier should be removed when it reaches one-half of the original exposed height of the silt fence. Allowing too much sediment to accumulate in front of an inlet sediment barrier drastically reduces its effectiveness. One high-intensity rainfall can dislodge enough sediment from the drainage basin to completely overtop the inlet sediment barrier. Therefore, it is extremely important to inspect inlet sediment barriers within 24 hours of a large rainfall event. When removing sediment from a silt fence inlet sediment barrier with a bulldozer or backhoe, take care not to damage or undermine the entrenched silt fence.

Please refer to the project specific SWP2, Contract Documents, and detailed drawings for additional inspection and maintenance criteria.



# TRIANGULAR SILT DIKE INLET SEDIMENT BARRIER

## Purpose and Operation

Triangular Silt Dike (TSD) inlet sediment barriers operate by intercepting and ponding sediment-laden runoff. Ponding the water reduces the velocity of the incoming flow and allows most of the suspended sediment to settle out. When the pond height reaches the top of the barrier, water flows over the TSDs and into the inlet.

To view KDOTs Standard Drawings for a Triangular Silt Dike inlet sediment barriers select the following link which shows the detailed drawing with relevant design information: [Landscape Standard LA 852C](#). This file can also be found on KDOTs KART webpage with a free account.

## Design

### Material Specification

- Triangular Silt Dikes™
- Metal landscape staples used to anchor the TSDs should be a minimum of at least 6” long.

### Placement

- TSD inlet sediment barriers should be placed directly around the perimeter of an inlet.
- When a TSD inlet sediment barrier is located near an inlet that has steep approach slopes, the storage capacity behind the barrier is drastically reduced. Timely removal of sediment must occur for a barrier to operate properly in this location.

## Installation

### Proper Installation Method

- For an inlet sediment barrier installation, orient the TSD so that the side bordering the inlet is vertical. Orient the TSD aprons so that the shorter of the two aprons lies beneath the longer one. Neither apron should be under the foam portion of the TSD.
- Place two full sections (approximately 7’ long each) of TSD against opposite sides of the inlet. These sections should extend beyond the edges of the drop sides of the drop-inlet – do not cut these to fit. Excavate trenches that are at least 6” deep by 6” wide near the ends of the TSD apron so that the outer 8” to 10” of the apron can be buried. Lay the outer 8” to 10” of apron into the trench and anchor it with minimum 6” long landscape staples on 18” centers. Backfill the trench with the excavated soil and compact. Anchor the remainder of the apron with a row of minimum 6” long landscape staples on 18” centers along the seam of the TSD.
- In the spaces where the TSDs extend beyond the edges of the inlet, cut new TSDs to fit. There should be a tight fit achieved between the cut TSDs and the existing TSDs. These cut sections should be oriented and anchored in the same manner as the initial sections.
- Note: When a TSD inlet sediment barrier is placed in a shallow median ditch, the top of the barrier should not exceed the height of the paved road. In this configuration, water may spread onto the roadway causing a hazardous condition.

### List of common placement/installation mistakes to avoid

- TSDs should be placed directly against the perimeter of the inlet. This allows overtopping water to flow directly into the inlet instead of onto nearby soil, causing scour.
- Orient the TSD properly. The side in contact with the inlet should be vertical and the shorter apron should lie beneath the longer one.
- If the receiving apron of a TSD is not dug into the ground, water will flow underneath.

## Inspection and Maintenance

TSD inlet sediment barriers should be inspected at least once within every 7-day inspection monitoring period. The following is a general list of questions that should be addressed during each inspection:

- Does water flow under the TSDs?

This is usually caused by not properly anchoring the TSD. Verify that the receiving apron is trenched in and that an adequate number of staples have been used.

- Does water flow through spaces between abutting TSDs?

This is usually caused by incorrect sizing of the cut sections. If the cut sections are too small, re-cut new sections so that they fit properly.

- Does sediment need to be removed from the TSDs?

Sediment accumulated in front of the TSDs should be removed when it reaches one-half of the dike height. Allowing too much sediment to accumulate in front of a TSD barrier drastically reduces its effectiveness. One high-intensity rainfall can dislodge enough sediment from surrounding slopes to completely overtop the inlet sediment barrier. Therefore, it is extremely important to inspect drop-inlet barriers within 24 hours of a large rainfall event. When removing sediment from behind a TSD with a bulldozer or backhoe, take care not to hook the receiving apron with the blade. This will damage the barrier and it will have to be replaced.

Please refer to the project specific SWP2, Contract Documents, and detailed drawings for additional inspection and maintenance criteria.

# CURB INLET PROTECTION

## Purpose and Operation

Curb inlet protection devices operate by intercepting, ponding, and filtering sediment-laden runoff that would enter a curb inlet. Ponding the water reduces the velocity of the incoming flow and allows most of the suspended sediment to settle out. When the pond height reaches the top of the device, water flows over the device and into the curb inlet.

To view KDOTs Standard Drawings for curb inlet protection select the following link which shows the detailed drawing with relevant design information: [Landscape Standard LA 852C](#). This file can also be found on KDOTs KART webpage with a free account.

## Design

### Material Specification

- The bags shall be made of synthetic net (3 mm mesh) or burlap.
- The bags shall be filled with rock that is 1" to 2" diameter.
- A 2"x4" wooden board.
- Alternative products or fill material may be used. These products or materials must be approved by the Engineer or Designer.

## Installation

### Proper Installation Method

- Place a 2"x4" wooden board in a standing position at the opening of the curb inlet.
- Place the bag(s) in front of the wooden board with the ends of the bags against the ends of the board, leaving a gap of 6" to 8" between the curb inlet opening and the bag. The height of the bag(s) (8" minimum diameter) must not be above the top of curb. If multiple bags are required, place them in such a way that no gaps are evident to avoid unfiltered water from leaking into the inlet.

### List of common placement/installation mistakes to avoid

- Do not allow the height of the bag to be above the top of the curb.
- Do not allow water to flow between gaps if multiple bags are being used. Place bags closely together to avoid this.
- Do not allow water to flow around the bags into the curb inlet opening. Place bags close to the wooden board to avoid this.

## Inspection and Maintenance

Curb inlet protection bags should be inspected at least once within every 7-day inspection monitoring period. The following is a general list of questions that should be addressed during each inspection:

- Are the bags damaged and not properly filtering sediment-laden runoff?

This is due to either a rip in the bag or degradation of the material on the outside of the bag. Replace the damaged bag with a new one to avoid sediment-laden runoff from entering the curb inlet.

- Is unfiltered water entering the curb inlet opening?

This is caused by gaps in between bags or between the wood board and the bags. Fix this issue by placing bags closely together with other bags or the wooden board to avoid any gaps in the protection.

- Does sediment need to be removed from the curb inlet protection?

Sediment accumulated in front or behind the curb inlet protection should be removed when it reaches one-half of the original exposed height of the bag(s). Allowing too much sediment to accumulate in front or behind the curb inlet protection drastically reduces its effectiveness. One high-intensity rainfall can dislodge enough sediment from the drainage basin to completely fill the space behind the curb inlet protection. Therefore, it is extremely important to inspect curb inlet protection within 24 hours of a large rainfall event. When removing sediment from the curb inlet protection with a bulldozer or backhoe, take care not to damage or undermine bags.

Please refer to the project specific SWP2, Contract Documents, and detailed drawings for additional inspection and maintenance criteria.