



APPENDIX F

SEDIMENT CONTROL BMPS

SC-1	Sediment Fence
SC-2	Sand Bag Barrier
SC-3	Gravel Bag Berm
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SC-6	Compost Berms and Socks
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SC-10	Entrance/Exit Tracking Controls
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SC-12	Undercut Lots

SEDIMENT FENCE – SC-1

Construction Specifications:

Local municipality requirements should be checked to determine if local requirements differ from this BMP with respect to specific types of sediment fence allowed and methods of installation.

Prefabricated Sediment Fence

Prefabricated fence fabric shall consist of material approved by its manufacturer for use in sediment fence applications and shall include pre-fabricated pockets for stake installation. Select standard duty or heavy duty prefabricated sediment fence based on criteria shown below:

Standard Duty Sediment Fence

- Slope of area draining to fence is 4H:1V or less - Use is generally limited to less than five months
- Area draining to fence produces moderate sediment loads
- Use prefabricated standard duty sediment fence.
- Layout in accordance with typical layout - Install in accordance with attached detail.

Heavy Duty Sediment Fence

- Slope of area draining to fence is 1H:1V or less
- Use generally limited to eight months. Longer periods may require fabric replacement
- Area draining to fence produces moderate sediment loads
- Use prefabricated heavy duty sediment fence. Heavy duty sediment fences typically have the following physical characteristics:
 - Fence fabric has greater tensile strength than other fabric types available from manufacturer
 - Fence fabric has a greater permittivity than other fabric types available from manufacturer
 - Fence fabric may be reinforced with a backing or additional support to increase fabric strength
 - Posts may be spaced closer together than other pre- manufactured sediment fence types available from manufacturer.
- Layout in accordance with attached typical layout.
- Install in accordance with attached standard details.

Installation

- Install sediment fence along a level contour, with the last 6 ft of fence turned up slope. Except for the ends, the difference in elevation between the highest and lowest point along the top of the sediment fence shall not exceed one-third the fence height.
- Generally, should be used in conjunction with erosion source controls up slope to provide effective control.

Minimum BMP standards that apply to Prefabricated Sediment Fence are provided on the attached details.

Common Reasons/Circumstances for Failure

- The most common reasons for sediment fence failure are due to improper installation and poor maintenance. In particular, the toe must be securely trenched into the slope and accumulated sediment should be removed when accumulation reaches 1/3 of the fence height.

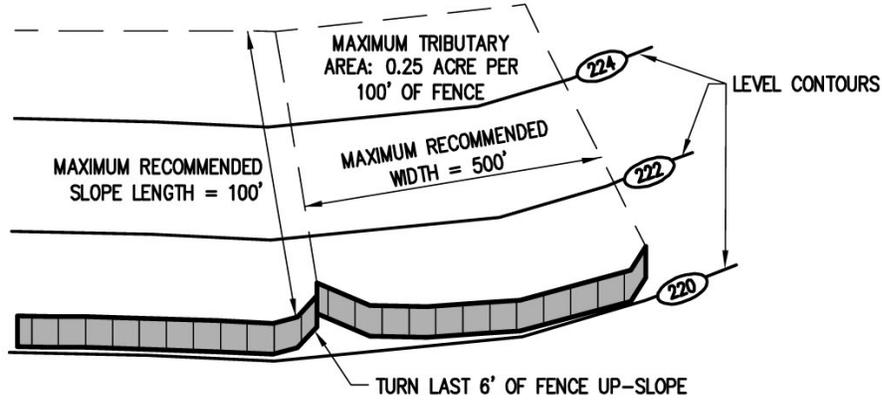
Inspection and Maintenance:

- Repair undercut sediment fences.

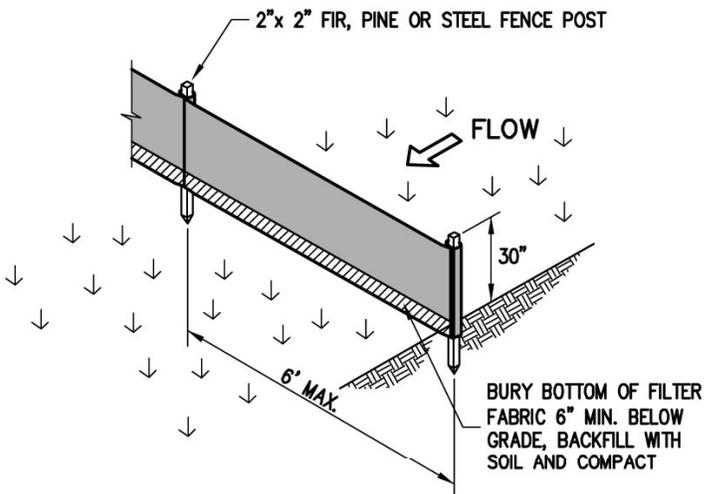
SEDIMENT FENCE – SC-1

- Repair or replace split, torn, slumping, or weathered fabric.
- Inspect sediment fence before, during, and after storm events.
- Any required repairs shall be performed as soon as possible.
- Remove sediment when accumulation reaches $1/3^{\text{rd}}$ the fence height.
- The removed sediment shall be incorporated in the project, disposed of properly, or appropriately stabilized with vegetation.
- Remove sediment fence when no longer needed and upslope area has been stabilized. Fill and compact post holes and anchorage trench, remove sediment accumulation, and grade fence alignment to blend with adjacent ground.

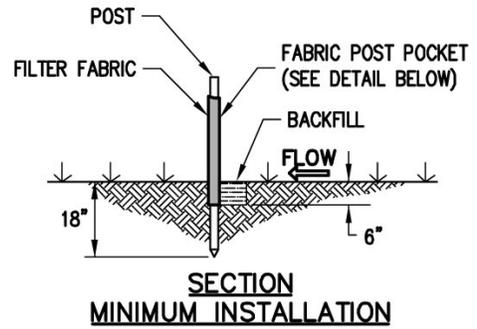
SEDIMENT FENCE – SC-1



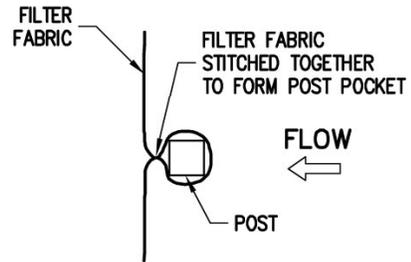
TYPICAL PREFABRICATED SEDIMENT FENCE LAYOUT



TYPICAL PREFABRICATED SEDIMENT FENCE LAYOUT



**SECTION
MINIMUM INSTALLATION**



**DETAIL
FABRIC POST POCKET**

NOTES:

- 1.) INSPECT AND REPAIR FENCE AFTER EACH STORM EVENT AND REMOVE SEDIMENT WHEN NECESSARY.
- 2.) REMOVED SEDIMENT SHALL BE DEPOSITED TO AN AREA THAT WILL NOT CONTRIBUTE SEDIMENT OFF-SITE AND CAN BE PERMANENTLY STABILIZED.
- 3.) SEDIMENT FENCE SHALL BE PLACED ON SLOPE CONTOURS TO MAXIMIZE PONDING EFFICIENCY.
- 4.) STITCHED POCKETS TO BE INSTALLED ON UPHILL SIDE OF SLOPE.

SAND BAG BARRIER – SC-2

Construction Specifications:

Sand bag barriers are intended to block and divert flow. They are not intended to be used as filtration devices.

Materials

- Sand bag Material: Sand bag shall be polypropylene, polyethylene or polyamide woven fabric, minimum unit weight four ounces per square yard (135 g/m²), mullen burst strength exceeding 300 psi (2,070 kPa) in conformance with the requirements in ASTM designation D3786, and ultraviolet stability exceeding 70% in conformance with the requirements in ASTM designation D4355. Use of burlap is not acceptable since it rots and deteriorates easily.
- Sand bag Size: Each sand-filled bag shall have a length of 18 in (450 mm), width of 12 in (300 mm), thickness of 3 in (75 mm), and mass of approximately 33 lb. (15 kg). Bag dimensions are nominal, and may vary based on locally available materials. Alternative bag sizes shall be submitted to the engineer for approval prior to deployment.
- Fill Material: All sand bag fill material shall be non-cohesive, Class 1 or Class 2 permeable material free from clay and deleterious material, conforming to the provisions in Caltrans Standard Specifications Section 68-1.025 “Permeable Material”. The requirements for the Durability Index and Sand Equivalent do not apply. Fill material is subject to approval by the engineer.
- Only use sandbag barriers when diverting runoff or run-on.

Installation

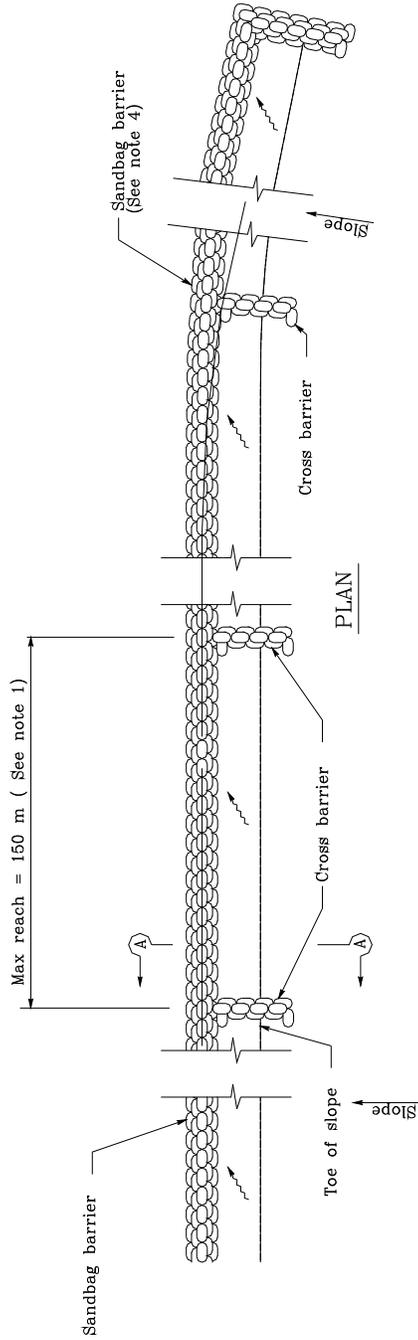
- Install along a level contour.
- Turn ends of sand bag row up slope to prevent flow around the ends.
- Generally, sand bag barriers shall be used in conjunction with temporary soil stabilization controls up slope to provide effective erosion and sediment control.
- Construct sand bag barriers with a set-back of at least 3 ft (1m) from the toe of a slope. Where it is determined to be not practical due to specific site conditions, the sand bag barrier may be constructed at the toe of the slope, but shall be constructed as far from the toe of the slope as practicable.

Minimum BMP standards are provided on the following details.

Inspection and Maintenance:

- Inspect sand bag barriers before, during, and after each rainfall event, and weekly throughout the rainy season.
- Reshape or replace sand bags as needed.
- Repair washouts or other damages as needed.
- Inspect sand bag barriers for sediment accumulations and remove sediment when accumulation reaches 1/3rd the barrier height. Removed sediment shall be incorporated in the project at locations designated by the engineer or shall be disposed of properly.
- Remove sand bags when no longer needed. Remove sediment accumulation, and clean, re-grade, and stabilized the area.

SAND BAG BARRIER – SC-2



TEMPORARY LINEAR SEDIMENT BARRIER (TYPE SANDBAG)

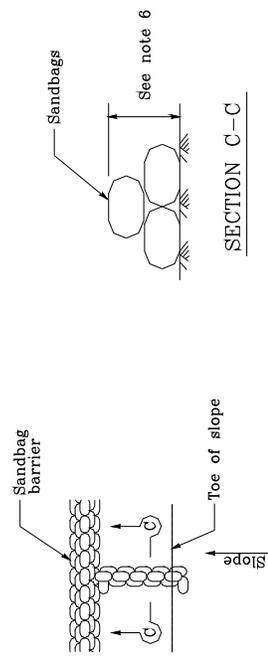
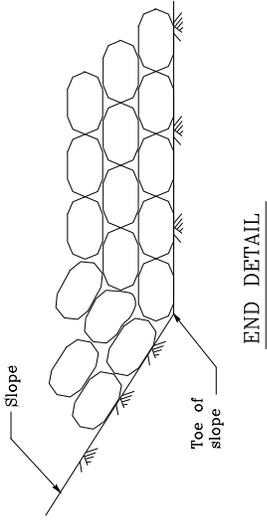
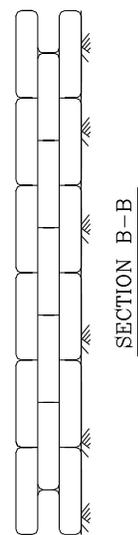
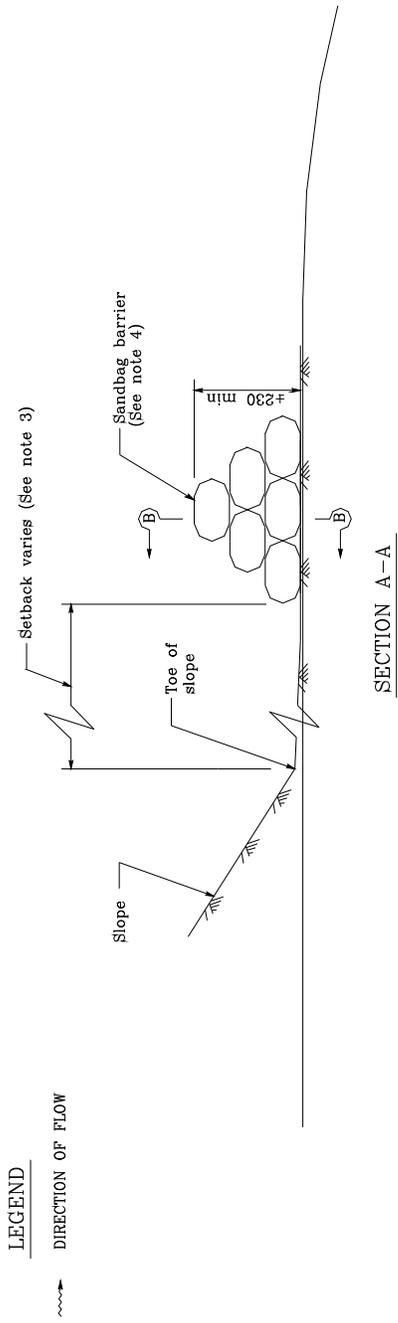
NOTES

1. Construct the length of each reach so that the change in base elevation along the reach does not exceed 1/2 the height of the linear barrier. In no case shall the reach length exceed 150 m.
2. Place sandbags tightly.
3. Dimension may vary to fit field condition.
4. Sandbag barrier shall be a minimum of 3 bags high.
5. The end of the barrier shall be turned up slope.
6. Cross barriers shall be a min of 1/2 and a max of 2/3 the height of the linear barrier.
7. Sandbag rows and layers shall be staggered to eliminate gaps.

TEMPORARY LINEAR SEDIMENT BARRIER (TYPE SANDBAG)

NO SCALE
ALL DIMENSIONS ARE IN
MILLIMETERS UNLESS OTHERWISE SHOWN

SAND BAG BARRIER – SC-2



CROSS BARRIER DETAIL

TEMPORARY LINEAR SEDIMENT BARRIER
 (TYPE SANDBAG)

NO SCALE
 ALL DIMENSIONS ARE IN
 MILLIMETERS UNLESS OTHERWISE SHOWN

GRAVEL BAG BERM – SC-3

Construction Specifications:

Unlike sand bag barriers that divert flow, gravel bag berms are intended to intercept and filter sediment-laden storm water runoff from disturbed areas, retaining the sediment and releasing the water.

Materials

- **Bag Material:** Bags shall be woven polypropylene, polyethylene or polyamide fabric, minimum unit weight four ounces per square yard (135 g/m²), mullen burst strength exceeding 300 psi (2,070 kPa) in conformance with the requirements in ASTM designation D3786, and ultraviolet stability exceeding 70% in conformance with the requirements in ASTM designation D4355.
- **Bag Size:** Each gravel-filled bag shall have a length of 18 in (450 mm), width of 12 in (300 mm), thickness of 3 in (75 mm), and mass of approximately 33 lb (15 kg). Bag dimensions are nominal, and may vary based on locally available materials. Alternative bag sizes shall be submitted to the engineer for approval prior to deployment.
- **Fill Material:** Gravel shall be between 0.4 and 0.8 inch (10 mm and 20 mm) in diameter, and shall be clean and free from clay balls, organic matter, and other deleterious materials. The opening of gravel-filled bags shall be between 28 and 48 lb (13 kg and 22 kg) in mass. Fill material is subject to approval by the engineer.

Installation

- When used as a linear control for sediment removal:
 - Install along a level contour.
 - Turn ends of gravel bag row up slope to prevent flow around the ends.
 - Generally, gravel bag barriers shall be used in conjunction with temporary soil stabilization controls up slope to provide effective erosion and sediment control.
- When used for concentrated flows:
 - Stack gravel bags to required height using a pyramid approach.
 - Upper rows of gravel bags shall overlap joints in lower rows.
- Construct gravel bag barriers with a set-back of at least 1m from the toe of a slope. Where it is determined to be not practicable due to specific site conditions, the gravel bag barrier may be constructed at the toe of the slope, but shall be constructed as far from the toe of the slope as practicable.
- A certificate of compliance for the gravel and bags shall be provided.

Inspection and Maintenance:

- Inspect gravel bag berms before, during, and after each rain event, and weekly throughout the rainy season. More frequent inspections may be required by local municipalities.
- Reshape or replace gravel bags as needed.
- Repair washouts or other damages as needed.
- Inspect gravel bag berms for sediment accumulations and remove sediments when accumulation reaches 1/3rd of the berm height. Removed sediment shall be incorporated in the project.
- Remove gravel bag berms when no longer needed. Remove sediment accumulations and clean, re-grade, and stabilize the area.

STRAW BALE DIKE – SC-4

Construction Specifications:

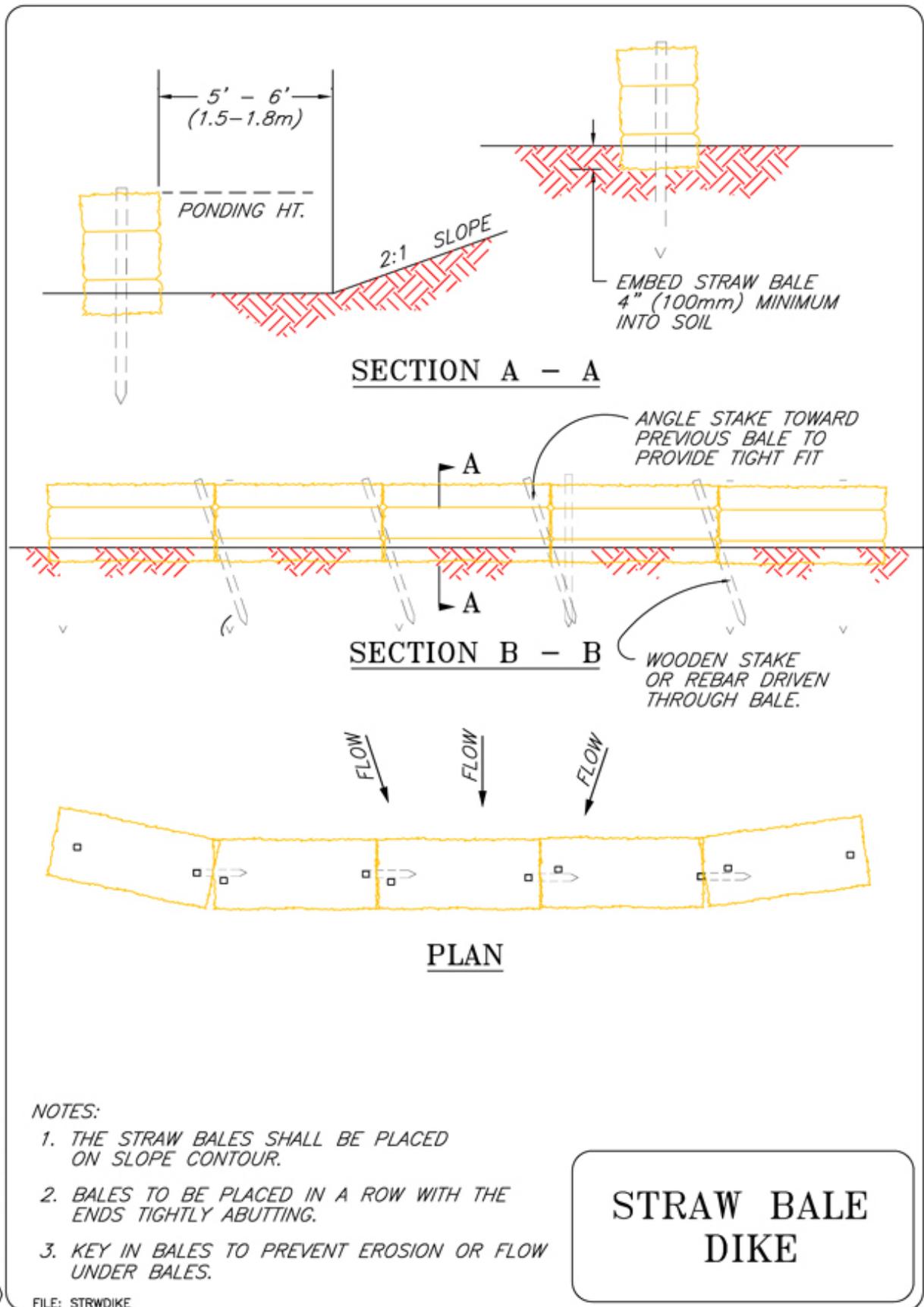
- Some local municipalities may only allow the use of straw bale dikes on an emergency basis; local requirements should be reviewed and followed.
- The bales shall be placed on the slope contour at the base of the slope or around the perimeter of the construction site. If the dike is constructed at the toe of a slope, place it 5-6 feet (1.5-1.8 m) away from the slope if possible.
- Do not construct the dike more than one bale high.
- Bales shall be placed in a row with the ends tightly abutting.
- Each bale shall be embedded in the soil a minimum of 4 inches (101 mm). Use straw, rocks, or filter fabric to fill any gaps between the bales and tamp the backfill material to prevent erosion under or around the bales.
- If the bales are wire bound, they should be oriented so the bindings are around the sides rather than along the top and bottom. Wire bindings that are placed in contact with the soil soon disintegrate and may allow the bale to fall apart.
- The bales shall be securely anchored in place by two wooden stakes or rebar driven through the bales. The first stake in each bale shall be driven toward the previously laid bale to force the bales tightly together. Drive the stakes at least 18 inches (0.5 m) into the ground.
- The straw bales do not need to be anchored if the bales are used on a relatively flat construction area with slope lengths less than 100 feet and the straw bale dike is inspected regularly. The trapped sediment should be removed when required, and repairs made promptly. The bales also do not need to be anchored if they are to be removed and replaced daily to facilitate construction.

Minimum BMP standards are provided on the following detail.

Inspection and Maintenance:

- The straw bale dikes shall be inspected before, during, and after each rain event.
- Straw bales should be replaced if they have decomposed.
- In wet areas, bales may require replacement every 6 to 9 weeks during the rainy season.
- Repairs and/or replacement shall be made promptly. Replacement bales shall be in good condition, not previously exposed to weather.
- Remove sediment behind the barrier when it reaches a depth of 6 inches (0.2 m).
- Remove the straw bales when the upslope areas have been permanently stabilized.
- Sediment shall be removed and deposited in an area that will not contribute sediment offsite.

STRAW BALE DIKE – SC-4



ROCK OR BRUSH FILTER – SC-5

Rock or brush filters are temporary barriers composed of brush, wrapped in filter cloth and secured in place, or rock anchored in place. They are intended to intercept and filter sediment-laden storm water runoff from disturbed area, retaining the sediment and releasing water as sheet flow, at a reduced velocity. Note: filters require sufficient space for ponded water; are not effective for diverting runoff since filters allow to slowly seep through; and rock filter berms may difficult to remove when construction is complete.

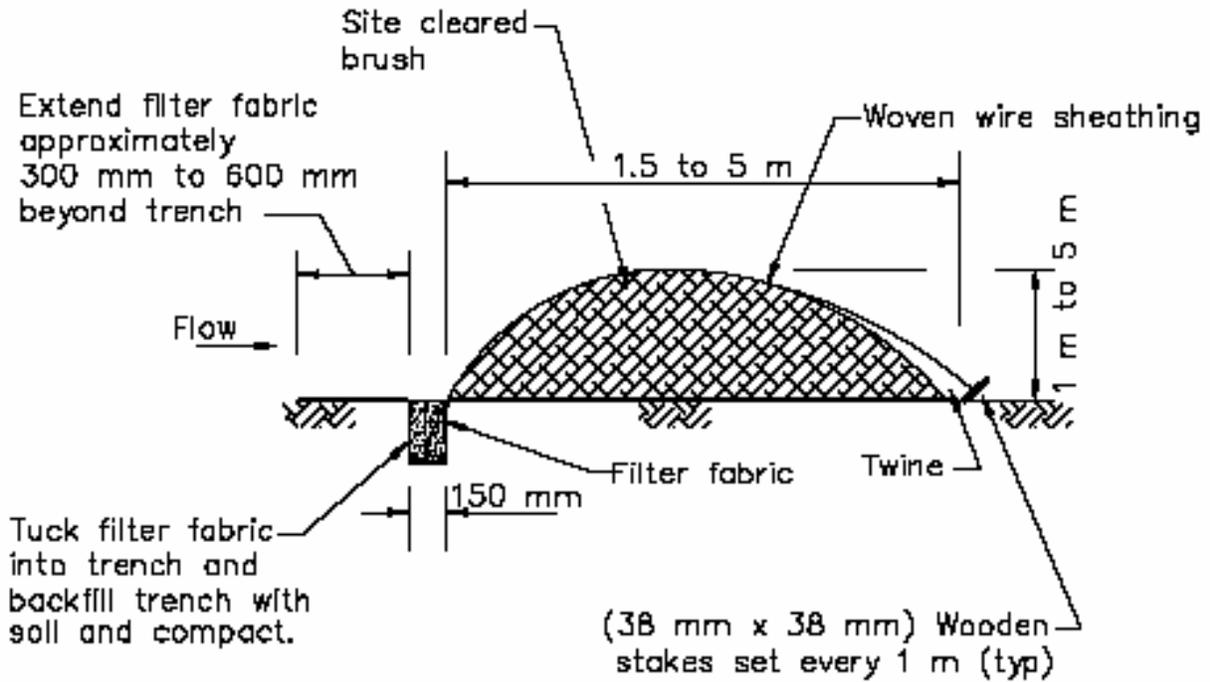
Construction Specifications:

- Use for contributing drainage areas less than or equal to 5 ac (2 ha).
- Use along the perimeter of disturbed areas; near the toe of slopes which may be subject to flow and rill erosion; around temporary spoil areas; along streams and channels; and across mildly sloped construction roads (rock filter berms, only).
- Brush and rock filters shall be installed on a level contour.
- Provide adequate areas upstream of filter to accommodate ponding.
- Brush shall consist of site-cleared brush, or alternative material approved by engineer.
- Stakes: 1.5 in x 1.5 in (38 mm x 38 mm) wooden stake, or metal stake with equal holding capabilities.
- Rock: open-graded rock, 0.75 in (19 mm) to 3 in (75 mm) to 5 in (125 mm) for concentrated flow applications.
- Woven wire sheathing: 1 in (25 mm) diameter, hexagonal mesh, galvanized 20 gauge (used with rock filters in areas of concentrated flow).
- In construction traffic areas, maximum rock berm heights shall be 12 in (300 mm). Multiple berms should be constructed every 300 ft (90 m) on slopes less than 5:100 (V:H) (5%), every 200 ft (60 m) on slopes between 5:100 (V:H) (5%) and 10:100(V:H) (10%), and every 100 ft (30 m) on slopes greater than 10:100 (V:H) (10%).

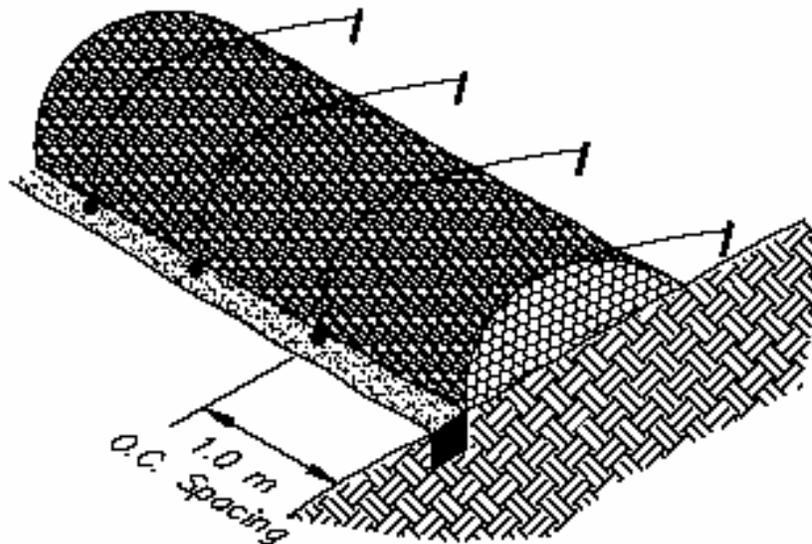
Inspection and Maintenance:

- Inspect berms before and after each significant rain event, and weekly throughout the rainy season.
- Reshape berms as needed and replace lost or dislodged rock, brush and/or filter fabric.
- Inspect for sediment accumulation, remove sediments when depth reaches 1/3 of the berm height or 12 in (300 mm), whichever occurs first.
- Filter berms should be removed upon completion of construction activities.

ROCK OR BRUSH FILTER – SC-5

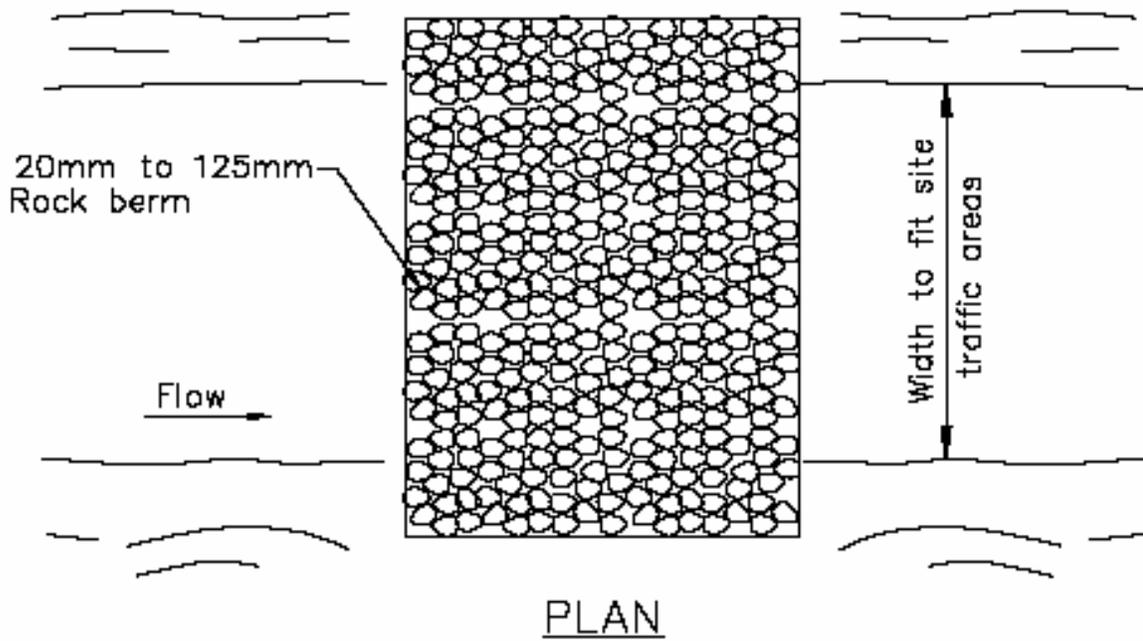
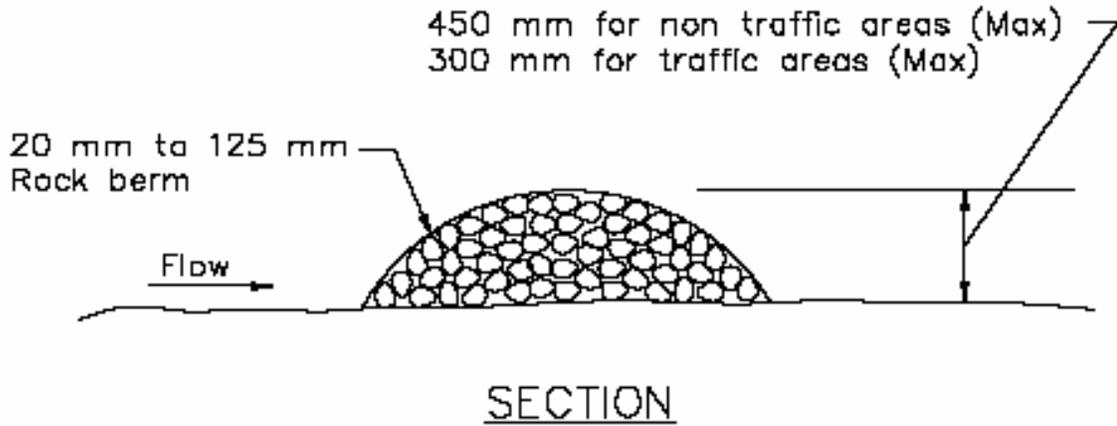


SECTION



TYPICAL BRUSH FILTER
NOT TO SCALE

ROCK OR BRUSH FILTER – SC-5



TYPICAL ROCK FILTER
NOT TO SCALE

COMPOST BERMS AND SOCKS SC-6



Construction Specifications

A compost filter berm is a trapezoidal berm applied by a blower and a compost sock is compost material encased in mesh to form a tube/roll. Both techniques intercept sheet flow and pond runoff, allowing sediment to fall out of suspension, and often filtering sediment as well. Compost berms and socks provide an environmentally-sensitive and cost-effective alternative to sediment fence.

Advantages

- Compost berms and compost socks made from biodegradable mesh sometimes offer a better solution than sediment fence and other sediment control methods, because compost does not require any special trenching, construction, or removal, unlike straw bales, sediment fence or coir rolls. This makes the technique very cost-effective.
- Compost is organic, biodegradable, renewable, and can be left onsite. This is particularly important below embankments near streams, as re-entry to remove or maintain the berm can cause additional disturbance. Sediment fence has to be disposed of in landfills and is often left abandoned on jobsites.
- Compost does not leach nutrients. Field tests in Connecticut have shown that run-off from compost treated sites has very low soluble salts, and all metals and nutrients are well within pollution leaching limits.
- Compost berms can be easily and quickly fixed should something happen to them in the course of construction. Compost socks withstand heavy machinery, but frequent disturbance can decrease the effectiveness of the sock.
- Mechanical compost spreaders for compost berms are commercially available and are widely used in the Pacific Northwest.
- When properly made, compost is full of nutrients and micro-organisms that stimulate turf and increase resistance to diseases. Compost binds heavy metals and can break down hydrocarbons into carbon, salts and other innocuous compounds.



COMPOST BERMS AND SOCKS SC-6

Design Considerations

Compost filter berms and socks should be used at the base of slopes 2:1 or less. There are many types of compost, all with different properties, so it is best to determine what application the compost is being used for. For compost berms and socks, compost should have the following specifications:

- Compost needs to be stable and mature.
- Particle size: Compost should consist of both large and small pieces for maximum filtration. Finer grades (screened through 3/8-1/2") are better for vegetation establishment, long term plant nutrients, and increased infiltration rates. The coarser grades (screened 2-3") are better for increased filtration, and are less likely to be disturbed by rainfall and runoff. For berms, the ratio of coarse and fine material should be 1:1. No particle should be greater than 3".
- The recommended moisture content ranges from 20-50%. Compost that is too dry is harder to apply, while that which is too wet is heavier and harder to transport. In drier areas, use compost with a higher moisture content; in wet areas, use the drier compost, as it will absorb water.
- Organic matter content: The percentage of carbon based materials in finished compost should range between 40-70%. However, Texas DOT specifies no less than 70%.
- The pH should be between 5.0 and 8.5.
- Nitrogen Content: 0.5-2.0%.
- Compost should have a minimum of soluble salts, as these can inhibit vegetation establishment. These levels should be between 4.0 and 6.0 mmhos/cm.
- Compost must be weed and pesticide free, with manmade materials comprising less than 1%.

Construction Specifications

- For compost berms on slopes of 3:1 or less, install a compost berm 1-2 ft high and 2-4 ft wide at the base. For maximum filtration properties, install berm in a trapezoidal shape, with a 4-6 ft base, and a 2-3 ft wide top. Larger berms should be used for steeper slopes. The basic rule of thumb is that the base should be twice the height of the berm.
- Typically, compost socks can handle the same water flow or slightly more than sediment fence. However, the installation technique is especially important for them to work effectively. For most applications, standard sediment fence is replaced with 12" compost socks.
 - When placed on level contours sheet flow of water should be perpendicular to the compost sock at impact and un-concentrated.
 - Place compost socks at a 5' or greater distance away from the toe of slopes to maximize space available for sediment deposition.
 - In order to prevent water flowing around the ends of compost socks, point the ends upslope to place them at a higher elevation.



COMPOST BERMS AND SOCKS SC-6

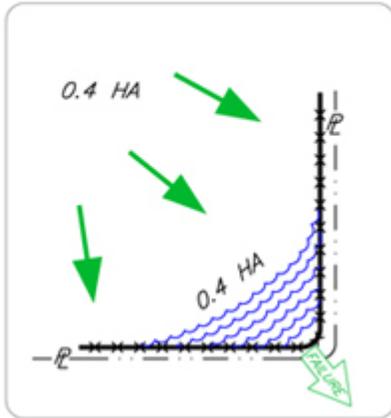


- Compost Berms and Socks can be placed around the perimeter of affected areas, if the area is flat or the perimeter is on contour. Berms and socks should be placed using ‘smiles’ and j-hooks. Do not place berms and socks where they cannot pond water.
- For steeper slopes, an additional berm or sock can be constructed on the top of the slope.
- Compost berms and socks can be seeded during application. However, field tests indicate that it is best to have only a thin layer of compost over the seed in compost berms. Slopes seeded with 2- 4” of compost over the seed had less vegetation establishment than slopes with less compost over the seed.
- Do not use compost berms and socks in areas of concentrated flow, as they are intended to control and filter sheet flow only.
- Tackifiers may be applied to berms if needed to enhance performance.

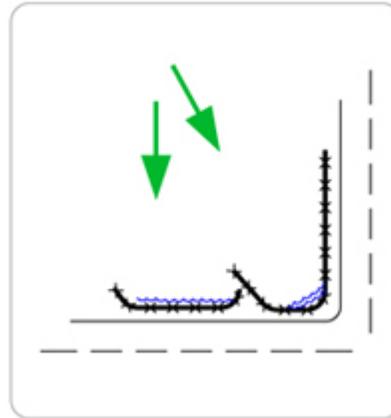
Inspection and Maintenance

- Compost berms and socks shall be inspected after each storm event and reapplied if necessary.
- Sediment retained by the berm or sock shall be removed when it has reached 1/3 of the exposed height of the berm. Alternatively, the sediment and berm or sock can be stabilized with vegetation at the end of construction.
- Berms can be left onsite and seeded, or spread out in place as a soil enhancement.

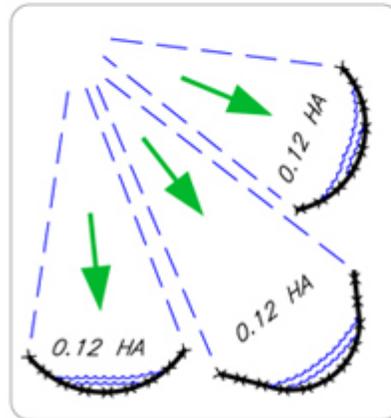
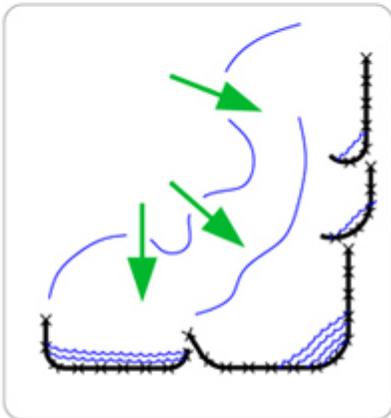
COMPOST BERMS AND SOCKS SC-6



Incorrect - Do Not layout "perimeter control" compost berms along property lines. All sediment laden runoff will concentrate and overwhelm the system.



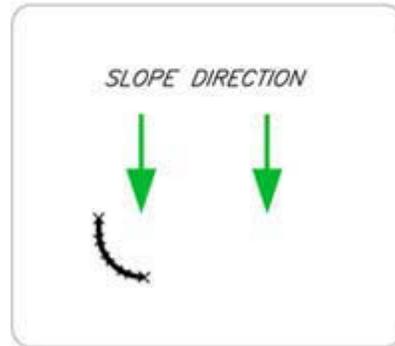
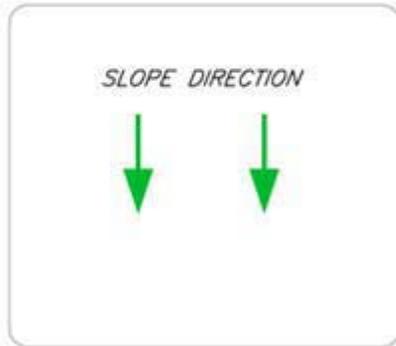
Correct - Install J-hooks



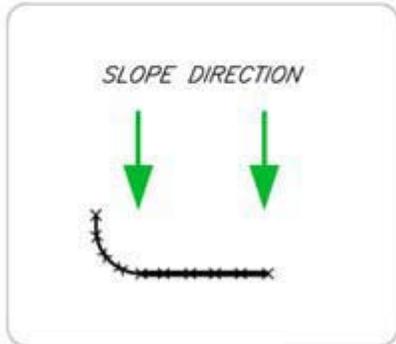
Discreet segments of compost berms, installed with J-hooks or 'smiles' will be much more effective.

COMPOST BERM PLACEMENT FOR PERIMETER CONTROL

COMPOST BERMS AND SOCKS SC-6



STEP 1 - CONSTRUCT LEG



STEP 2 - CONSTRUCT DAM

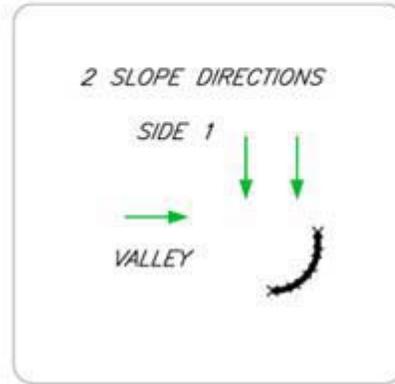
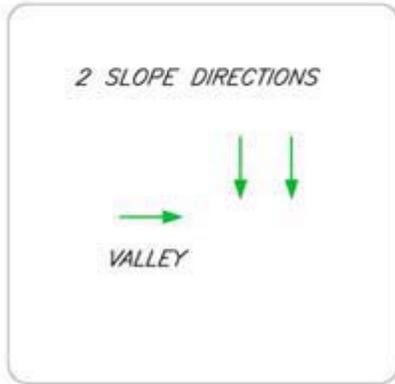


STEP 3 - CONSTRUCT LEG 2

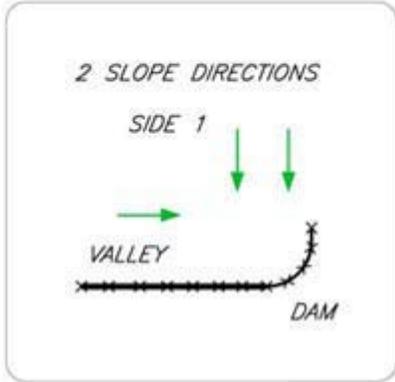
INSTALLATION WITH J-HOOKS OR 'SMILES' INCREASE COMPOST BERM EFFICIENCY.

COMPOST BERM
TYPICAL PLACEMENT-ONE SLOPE

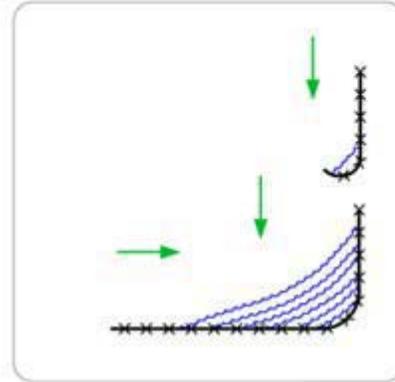
COMPOST BERMS AND SOCKS SC-6



STEP 1 - CONSTRUCT A DAM



STEP 2 - CONSTRUCT SIDE 2



STEP 3 - CONSTRUCT J-HOOKS AS NEEDED

INSTALLATION WITH J-HOOKS WILL INCREASE COMPOST BERM EFFICIENCY AND REDUCE EROSION-CAUSING FAILURES.

COMPOST BERM TYPICAL PLACEMENT-TWO SLOPES

FIBER ROLLS OR WATTLES SC-7

Construction Specifications

Fiber rolls are manufactured from biodegradable fibers (such as weed-free rice straw) that are wrapped in photo degradable netting. They range from approximately 8 to 20 inches in diameter by 25-30 feet (8-9 m) long. Rolls are placed and staked along the contour of newly constructed or disturbed slopes, in shallow trenches. Fiber rolls reduce slope length, and are intended to capture and keep sediment on the slopes. Fiber rolls are useful to temporarily stabilize slopes by reducing soil creep, and sheet and rill erosion until permanent vegetation can be established. Fiber rolls can catch soil that is moved down the slope by the freeze/thaw processes. Organic matter and seeds are trapped behind the rolls, which provide a stable medium for germination. Rolls trap topsoil and retain moisture from rainfall, which aids in growth of seedlings planted upslope of the rolls.



Design Considerations:

- Sites appropriate for fiber rolls are:
 - Slopes susceptible to sheet and rill erosion.
 - Slopes producing dry ravel.
 - Slopes susceptible to freeze/thaw activity.
 - Slopes difficult to vegetate because of soil movement.
- Fiber rolls are not intended for use in concentrated flow situations.
- It is imperative, especially on steeper slopes, that a sufficiently deep trench is constructed in which to place the roll. Without the trench, the roll will not function properly, runoff will scour underneath it, and trees or shrubs planted behind the roll will not have a stable environment in which to become established.
- Fiber rolls last an average of two years, depending on the fiber and mesh used in manufacturing. This is an important factor to consider when planning how long the slope will need to be mechanically stabilized.
- Fiber rolls can be staked with live stakes if site conditions warrant. The moisture retained by the fiber roll will encourage cutting establishment.

Advantages

- Fiber rolls are a relatively low-cost solution to sheet and rill erosion problems.
- They can replace sediment fences or straw bales on steep slopes.
- Rolls are a short-term solution to help establish native vegetation.
- Rolls store moisture for vegetation planted immediately upslope.
- Plastic netting will eventually photo-degrade, eliminating the need for retrieval of materials after the fiber or straw has broken down.

FIBER ROLLS OR WATTLES SC-7

- The fibers become incorporated into the soil with time, adding organic material to the soil and retaining moisture for vegetation.

Disadvantages

- Rolls only function for one or two seasons.
- Pilot holes through the rolls must be pre-driven with a metal rod.
- If not installed properly with a sufficient trench, rolls may fail during the first rain event.
- Fiber rolls may require maintenance to ensure that the stakes are holding and the rolls are still in contact with the soil. This is especially true on steep slopes in sandy soil.

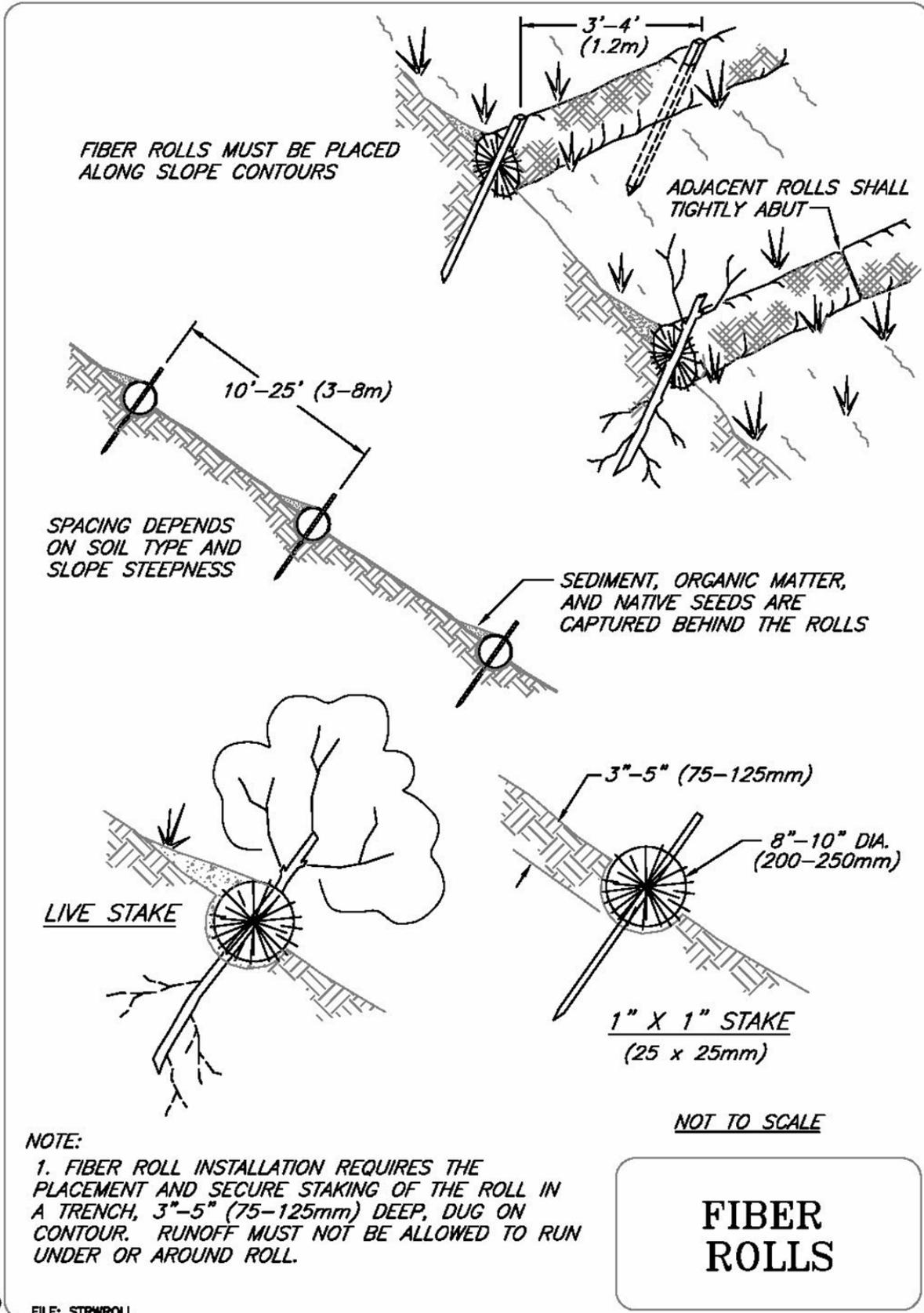
Installation

- Prepare the slope before the installation procedure is started.
- Shallow gullies should be smoothed as work progresses.
- Dig small trenches across the slope on contour, to place rolls in. The trench should be deep enough to accommodate half the thickness of the roll. When the soil is loose and uncompacted, the trench should be deep enough to bury the roll 1/3 of its thickness because the ground will settle.
- It is critical that rolls are installed perpendicular to water movement, and parallel to the slope contour.
- Start building trenches and installing rolls from the bottom of the slope and work up.
- Construct trenches at contour intervals 25-30 feet (8-10 m) apart depending on the steepness of the slope. The steeper the slope, the closer together the trenches should be.
- Lay the roll along the trenches fitting it snugly against the soil. Make sure no gaps exist between the soil and the straw wattle.
- Use a straight bar to drive holes through the roll and into the soil for the willow or wooden stakes.
- Drive the stake through the prepared hole, and into the soil. Leave only 1 or 2 inches (25 or 51 mm) of the stake exposed above roll.
- Install stakes at least every 4 feet (1.2 m) apart along the length of the wattle. Additional stakes may be driven on the downslope side of the trenches on highly erosive or very steep slopes.

Inspection and Maintenance

- Inspect the rolls and the slopes after rain events and at the frequencies required by local municipalities. Make sure the rolls are in contact with the soil.
- Repair any rills or gullies promptly.
- Reseed or replant vegetation if necessary until the slope is stabilized.

FIBER ROLLS OR WATTLES SC-7



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FILE: STRWROLL

STORM DRAIN INLET PROTECTION – SC-8

Construction Specifications:

Identify existing and/or planned storm drain inlets that have the potential to receive sediment-laden surface runoff. Determine if storm drain inlet protection is needed, and which method to use.

Methods and Installation

- DI Protection Type 1 - Filter Fabric Fence - The filter fabric fence (Type 1) protection is illustrated on Page 3. Similar to constructing a sediment fence. See BMP SC-1, “Sediment Fence.” Do not place filter fabric underneath the inlet grate since the collected sediment may fall into the drain inlet when the fabric is removed or replaced.
- DI Protection Type 2 - Excavated Drop Inlet Sediment Trap - The excavated drop inlet sediment trap (Type 2) is illustrated in Page 4. Similar to constructing a temporary sediment fence, See BMP SC-1, “Sediment Fence.” Size excavated trap to provide a minimum storage capacity calculated at the rate of 67 yd³/ac (130 m³/ha) of drainage area.
- DI Protection Type 3 – Gravel bag - The gravel bag barrier (Type 3) is illustrated in Page 5. Flow from a severe storm shall not overtop the curb. In areas of high clay and silts, use filter fabric and gravel as additional filter media. Construct gravel bags in accordance with BMP SC-3, “Gravel Bag Berm.” Gravel bags shall be used due to their high permeability.
- DI Protection Type 4 –Fiber Rolls – Fiber roll (Type 4) is placed around the inlet and keyed and anchored to the surface similar to SC-7 (“Fiber Rolls”) installation. Fiber rolls are intended for use as inlet protection where the area around the inlet is unpaved and the fiber roll can be secured to the surface. On impervious surfaces use weighted or gravel-filled fiber rolls in the same configuration as specified above or as specified by the manufacturer. Type 4 DI protection functions similarly to Types 1 and 2.

Minimum BMP standards are provided on the following details. The DI Protection (Types 1-4) as illustrated was not designed to significantly inhibit flow and cause flooding. If flooding problems occur, modify the existing BMP to alleviate flooding. Do not remove the BMP and allow sediment-laden water to discharge to the storm drain.

Alternative methods may be substituted for the methods described/shown herein such as prefabricated inlet insert devices, or gutter protection devices based on review and approval by DEQ or the local agency as submitted in the project ESCP. Typical installation details for SiltsackTM inserts and biofilter bags are included with this BMP.

Inspection and Maintenance:

General

- Inspect all inlet protection devices before and after every rain event, and at the frequencies recommended by local municipalities. During extended rain events, inspect inlet protection devices at least once every 24 hours.
- Inspect the storm drain inlet after severe storms in the rainy season to check for bypassed material.
- Remove all inlet protection devices after the site is stabilized, or when the inlet protection is no longer needed.
 - Bring the disturbed area to final grade and smooth and compact it. Appropriately stabilize all bare areas around the inlet.
 - Clean and re-grade area around the inlet and clean the inside of the storm drain inlet as it must be free of sediment and debris at the time of final inspection.

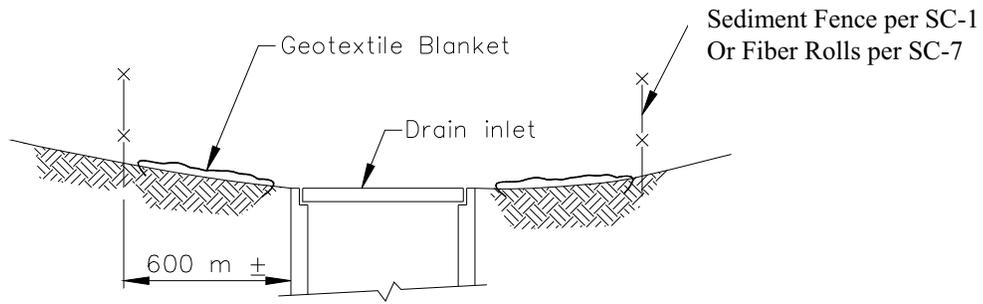
STORM DRAIN INLET PROTECTION – SC-8

Requirements by Method

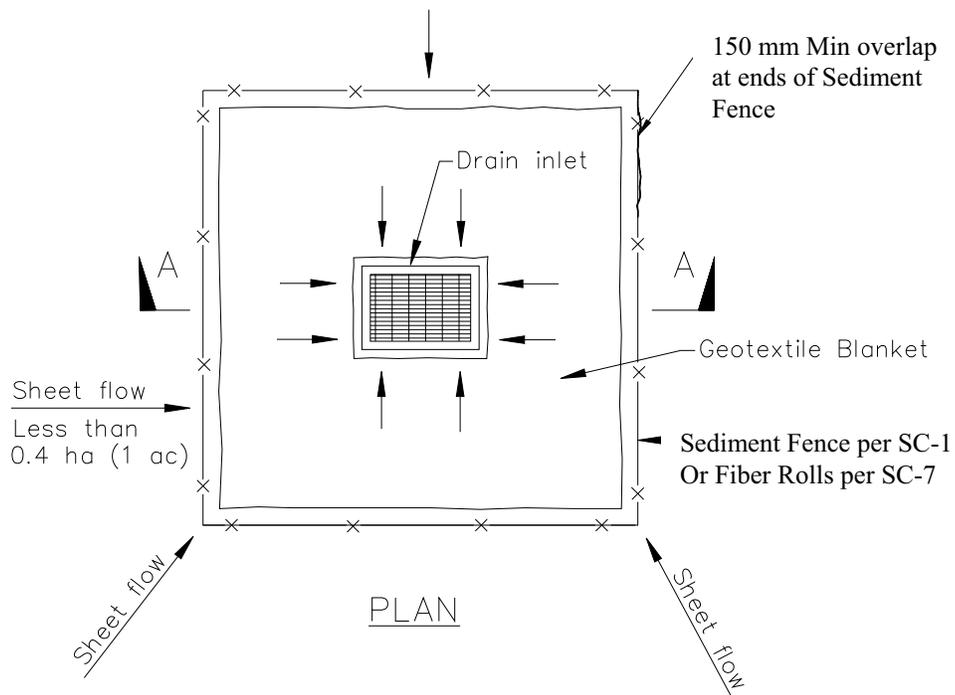
- Type 1 - Filter Fabric Fence
 - This method shall be used for drain inlets requiring protection in areas where finished grade is established and erosion control seeding has been applied or is pending.
 - Make sure the stakes are securely driven in the ground and are structurally sound (i.e., not bent, cracked, or splintered, and are reasonably perpendicular to the ground). Replace damaged stakes.
 - Replace or clean the fabric when the fabric becomes clogged with sediment. Make sure the fabric does not have any holes or tears. Repair or replace fabric as needed.
 - At a minimum, remove the sediment behind the fabric fence when accumulation reaches one-third the height of the fence or barrier height. Removed sediment shall be incorporated in the project or disposed of properly.
- Type 2 – Excavated Drop Inlet Sediment Trap
 - This method may be used for drain inlets requiring protection in areas that have been cleared and grubbed, and where exposed soil areas are subject to grading.
 - Remove sediment from basin when the volume of the basin has been reduced by one-half.
- Type 3 - Gravel Bag Barrier
 - This method may be used for drain inlets surrounded by asphalt concrete (AC) or paved surfaces.
 - Inspect bags for holes, gashes, and snags.
 - Check gravel bags for proper arrangement and displacement. Remove the sediment behind the barrier when it reaches one-third the height of the barrier. Removed sediment shall be incorporated in the project or disposed of properly
- Type 4 Fiber Rolls
 - This method may be used for drain inlets requiring protection in areas that have been cleared and grubbed, and where exposed soil areas subject to grading.
 - Use weighted or gravel-filled fiber rolls on impervious surfaces. Check that fiber rolls are in good contact with the surface without gaps or preferential flow paths.
 - Check fiber roll for proper arrangement and displacement. Remove the sediment behind the barrier when it reaches one-third the height of the barrier. Removed sediment shall be incorporated in the project or disposed of properly.

STORM DRAIN INLET PROTECTION – SC-8

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SECTION A-A



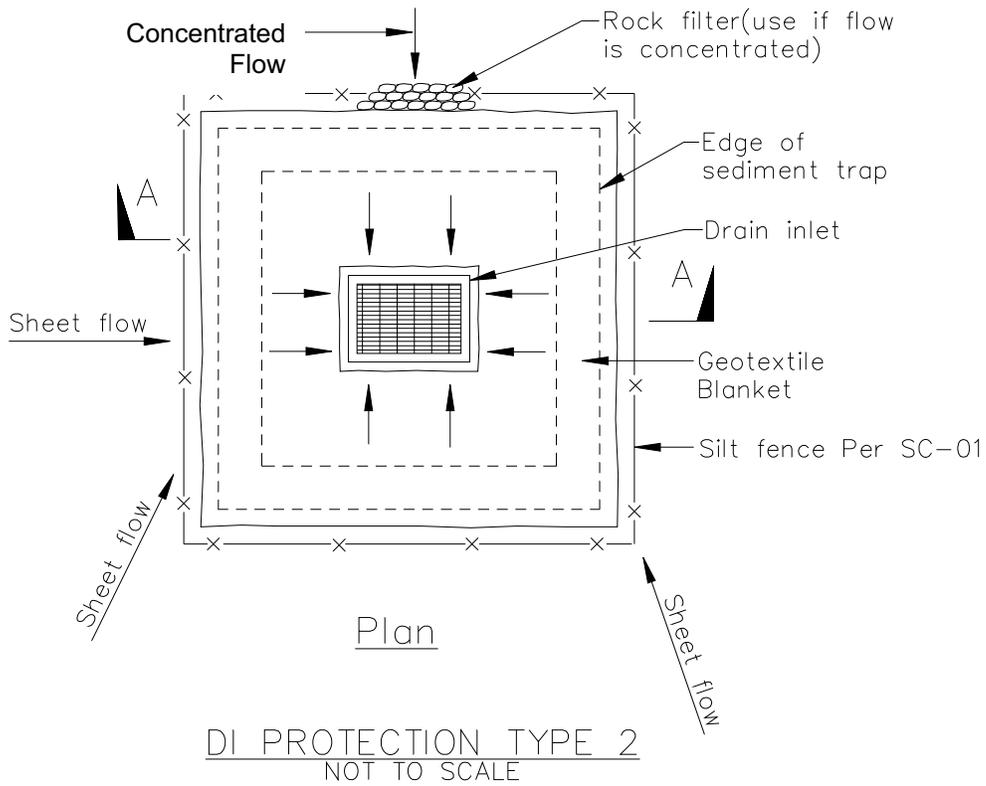
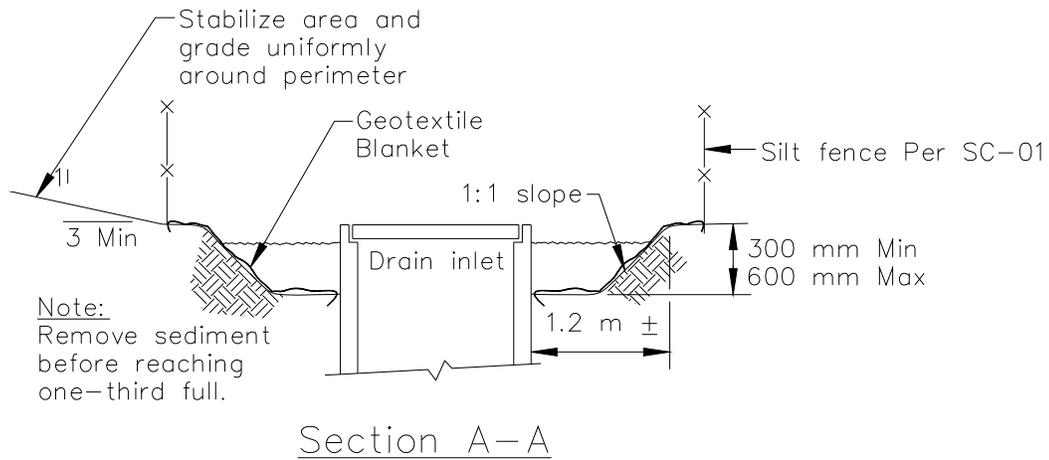
DI PROTECTION TYPE 1 AND TYPE 4

Not to scale

NOTES:

1. For use in areas where grading has been completed and final soil stabilization and seeding are pending.
2. Not applicable in paved areas.
3. Not applicable with concentrated flows.

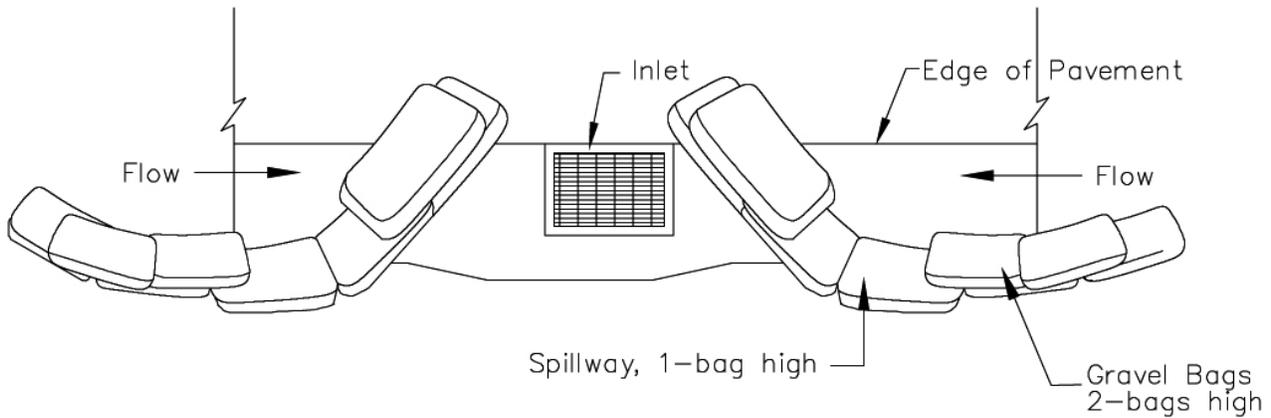
STORM DRAIN INLET PROTECTION – SC-8



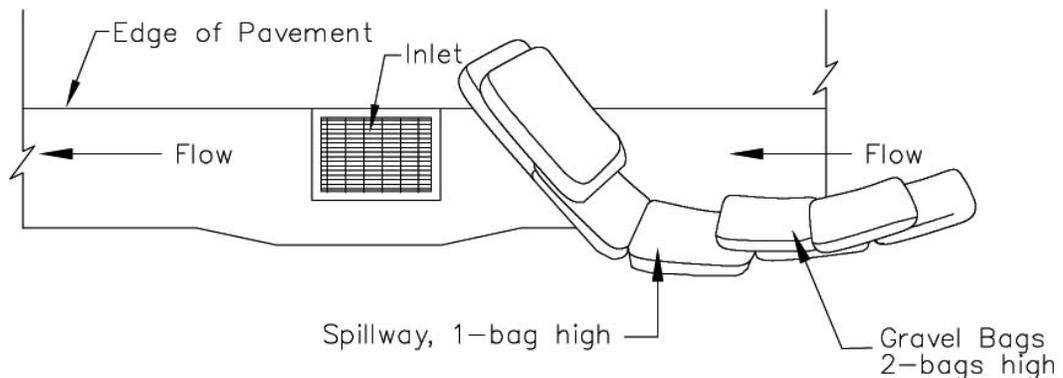
Notes

1. For use in cleared and grubbed and in graded areas.
2. Shape basin so that longest inflow area faces longest length of trap.
3. For concentrated flows, shape basin in 2:1 ratio with length oriented towards direction of flow.

STORM DRAIN INLET PROTECTION – SC-8



TYPICAL PROTECTION FOR INLET WITH OPPOSING FLOW DIRECTIONS



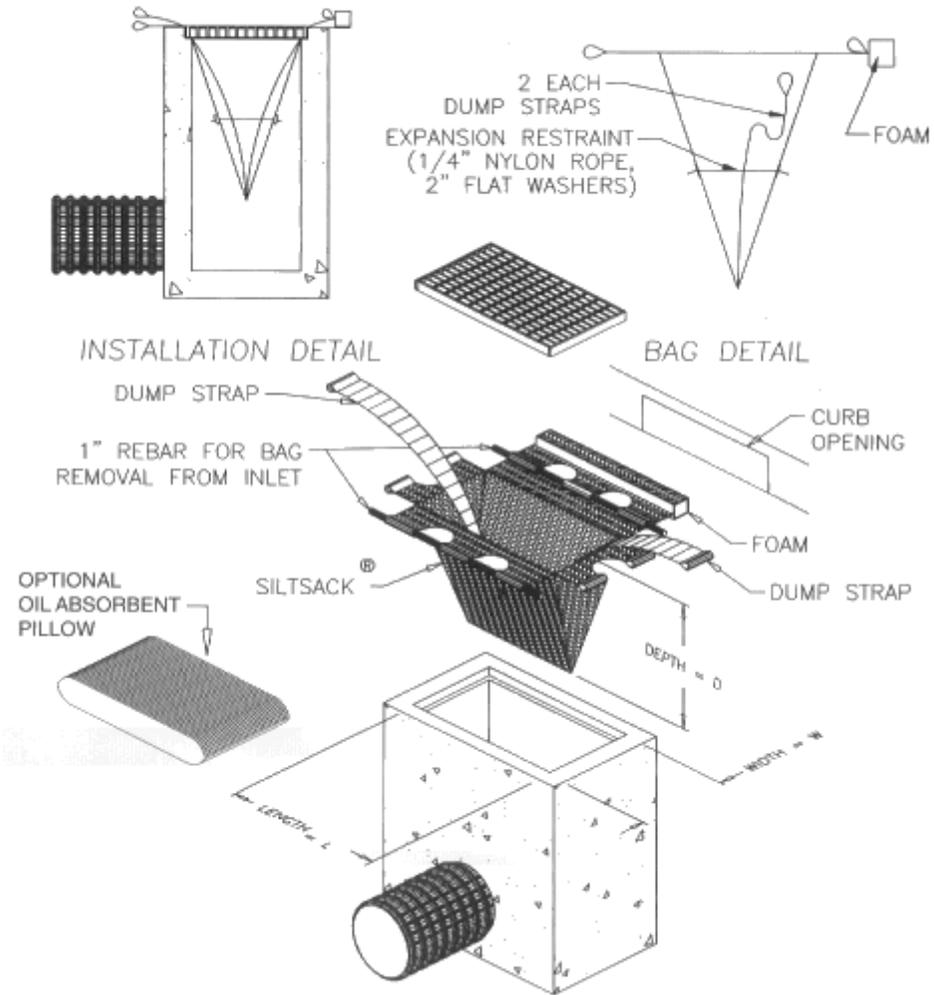
TYPICAL PROTECTION FOR INLET WITH SINGLE FLOW DIRECTION

NOTES:

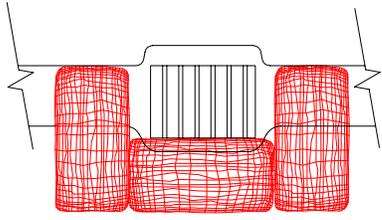
1. Intended for short-term use.
2. Use to inhibit non-storm water flow.
3. Allow for proper maintenance and cleanup.
4. Bags must be removed after adjacent operation is completed
5. Not applicable in areas with high silts and clays without filter fabric.

STORM DRAIN INLET PROTECTION – SC-8

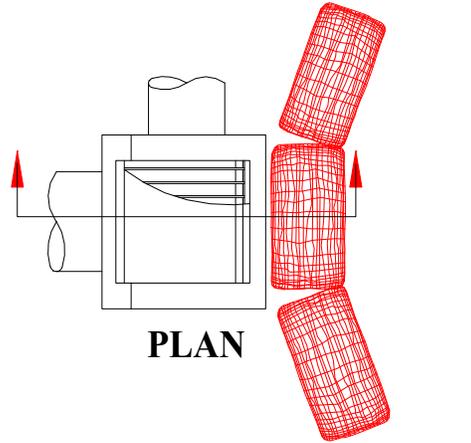
Typical Siltsack® Construction



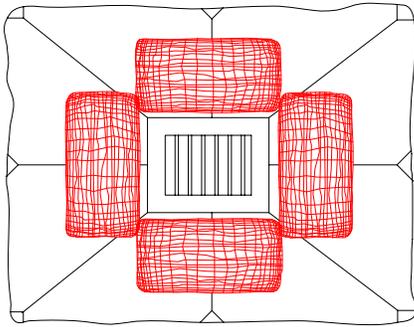
STORM DRAIN INLET PROTECTION – SC-8



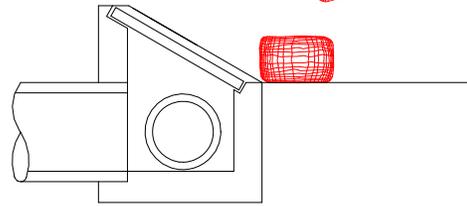
CATCH BASIN



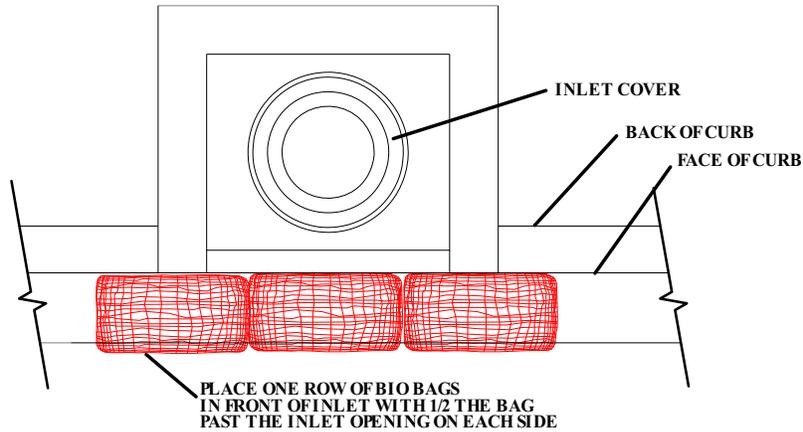
PLAN



AREA DRAIN



DITCH INLET



**CURB INLET CATCH BASIN
BIO BAG INLET PROTECTION**

NTS

TEMPORARY SEDIMENT BASIN –SC-9

Construction Specifications:

A sediment basin is a temporary basin with a controlled release structure, formed by excavating or constructing an earthen embankment across a waterway or low drainage area. Sediment basins may be placed where sediment laden storm water may enter a storm drain or watercourse, and around and/or up-slope from storm drain inlet protection measures. The sediment basin shall follow one of the four design options summarized below:

1. A sediment basin designed pursuant to local ordinance provided that the design efficiency is as protective, or more protective of water quality than Option No. 3.
2. A sediment basin designed with a minimum capacity of 3,600 cubic feet of storage per acre of disturbed land in a watershed equivalent to or more efficient than Option No. 3.
3. A sediment basin designed using the following equation:

$$(V) = 1.2Q/V_{sED} \text{ where:}$$

V = settling zone volume,

Q = flow rate based on peak discharge from a specified design storm (where $Q = C_iA$; see Section 2.4), and

V_{sED} = settling velocity of the design soil particle.

4. A basin designed using an equivalent surface area design equation, equivalent to or more efficient than Option No. 3.
- In accordance with the requirements of the NPDES 1200-C General Permit, all sediment basins must be designed by a professional engineer licensed in Oregon.
 - Construct the basin by excavating or building an embankment before any clearing or grading work begins.
 - Areas under the embankment and any structural works shall be cleared, grubbed and stripped of any vegetation and rootmat as shown on the grading plan.
 - In order to facilitate cleanout and restoration, the basin area shall be cleared, grubbed and stripped of any vegetation.
 - A cut-off trench shall be excavated along the centerline of the earth fill embankments. The minimum depth shall be 2 feet (0.6 m). The cut-off trench shall extend up both abutments to the spillway elevation.
 - Fill material for the embankment shall be clean mineral soil free of roots, woody vegetation, oversized stones, rocks or other objectionable material, and sufficiently moist for compaction.
 - Fill material shall be placed in 6 inch (0.2 m) lifts, continuous layers over the entire length of the fill. Compaction shall be obtained by routing the hauling equipment over the fill so that the entire surface of each layer of the fill is traversed by at least one wheel or tread track of the equipment, or by the use of a compactor.
 - The embankment should be constructed to an elevation of 10 percent higher than the design height to allow for settlement if compacting is achieved with hauling equipment. If compactors are used for compacting, the overbuild may be reduced to not less than 5 percent. The basin shall have means for dewatering within 7 days following a storm event.
 - The principal spillway riser shall be securely attached to the discharge pipe by welding all around. All connections shall be watertight. A trash rack shall be installed on the top of the riser to prevent clogging of the discharge pipe.

TEMPORARY SEDIMENT BASIN –SC-9

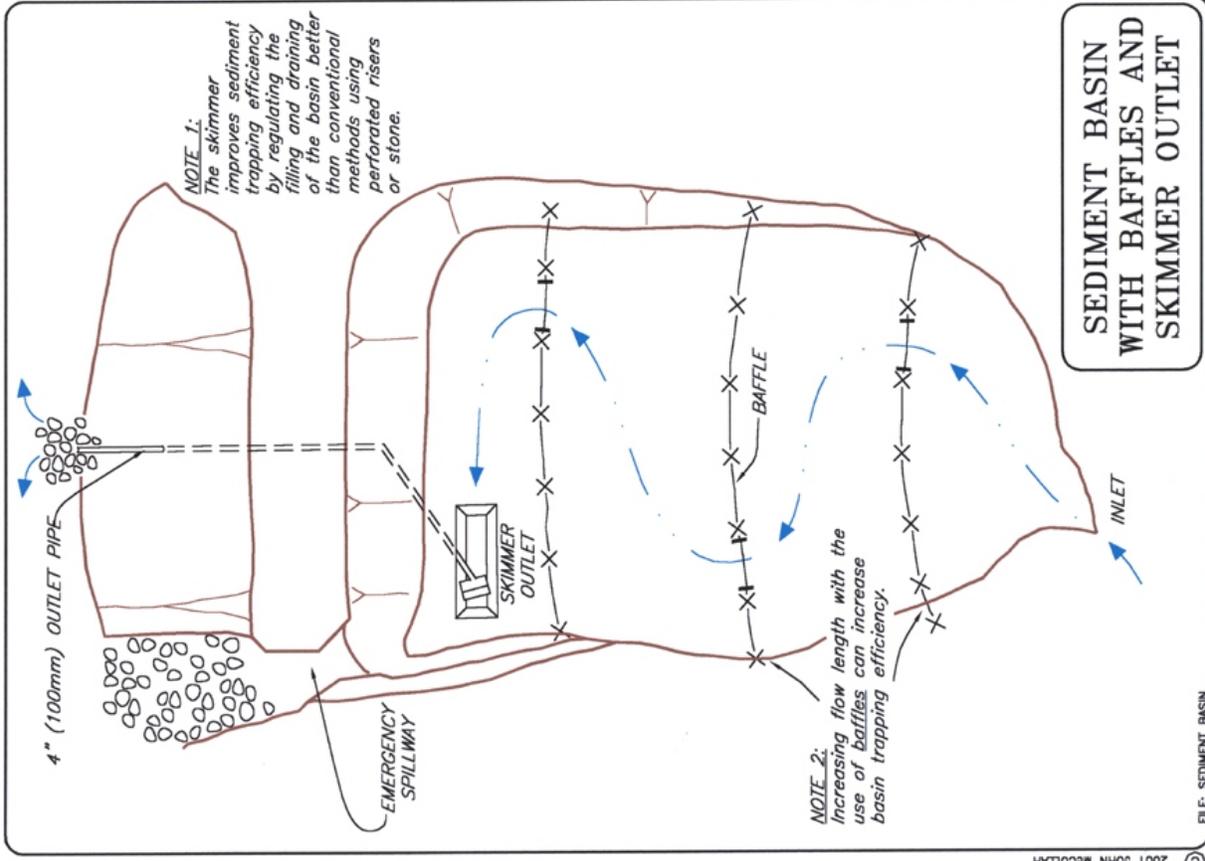
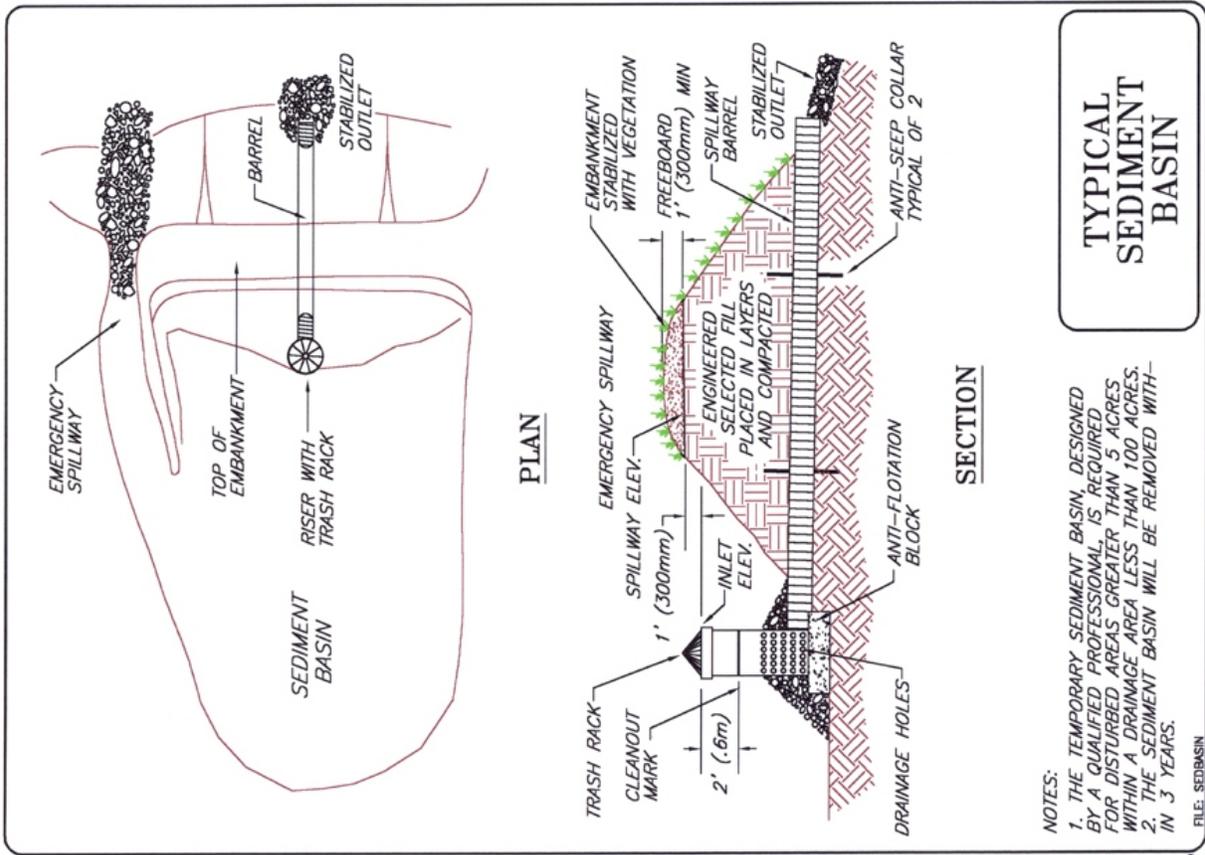
- The pipe and riser shall be placed on a firm, smooth soil foundation. The connection between the riser and the riser base shall be watertight. Pervious materials such as sand, gravel or crushed stone shall not be used as backfill around the pipe or anti-seep collars.
- The fill material around the pipe spillway shall be placed in 4-inch (101 mm) layers and compacted under the shoulders and around the pipe to at least the same density as the adjacent embankment. A minimum of 2 feet (0.6 m) of compacted backfill shall be placed over the pipe spillway before crossing it with construction equipment.
- Steel base plates shall have at least 2 1/2 feet (0.8 m) of compacted earth, stone or gravel over them to prevent flotation.
- The emergency spillway shall not be installed in fill. Elevations, design width, and entrance and exit channel slopes are critical to the successful operation of the emergency spillway.
- If used, baffles shall be constructed of 4 inch (101 mm) by 4 inch (101 mm) posts and of 4 foot (1.2 m) by 8 foot (2.4 m) - 1/2inch (12.7 mm) exterior plywood. The posts shall be set at least 3 feet (0.9 m) into the ground, no further apart than 8 feet (2.4 m) center to center, and shall reach a height 6 inches (0.2 m) below the riser crest elevation. Alternatively, earthen berms, metal sheeting, or other methods may be used as approved by DEQ or the local agency in the project ESCP.
- The embankment and emergency spillway shall be stabilized with vegetation immediately following construction. The outflow shall be provided with outlet protection to prevent erosion and scour of the embankment and channel.
- Construction operations shall be carried out in such a manner that erosion and water pollution will be minimized.
- Local and state requirements shall be met concerning fencing and signs warning the public of hazards of soft sediment and floodwater.

Minimum BMP standards are provided on the following details.

Inspection and Maintenance:

- Inspect before during, and after each rain event.
- All damages caused by soil erosion or construction equipment shall be repaired before the end of each working day.
- Remove sediment when the sediment storage zone is half full. This sediment shall be placed in such a manner that it will not erode from the site. The sediment shall not be deposited downstream from the embankment or in or adjacent to a stream or floodplain.
- When temporary structures have served their intended purpose and the contributing drainage area has been properly stabilized, the embankment and resulting sediment deposit shall be leveled or otherwise disposed of in accordance with the approved erosion and sediment control plan.

TEMPORARY SEDIMENT BASIN –SC-9



ENTRANCE / EXIT TRACKING CONTROLS – SC-10

Tracking controls reduce offsite tracking of sediment and other pollutants by providing a stabilized entrance at defined construction site entrances and exits and/or providing methods to clean-up sediment or other materials to prevent them from entering a storm drain by sweeping or vacuuming.

Construction Specifications:

- Stabilize entrances should be implemented on a project-by-project basis in addition to other BMPs.
- Sweeping or vacuuming should be implemented when sediment is tracked from the project site onto public or private paved roads, typically at points of site exit.
- Use stabilized entrances and/or sweeping at construction sites:
 - Where dirt or mud is tracked onto public roads;
 - Adjacent to water bodies;
 - Where poor soils are encountered, such as soils containing clay;
 - Where dust is a problem during dry weather conditions.

Stabilized Construction Entrances

- Limit the points of entrance/exit to the construction site by designating combination or single purpose entrances and exits. Require all employees, subcontractors and others to use them. Limit speed of vehicles to control dust. Clearly mark entrances and exits with appropriate signage.
- Locate construction entrances and exits to limit sediment leaving the site and to provide for maximum utility by all construction vehicles. Avoid entrances which have steep grades and entrances at curves in public roads.
- Grade each construction entrance/exit to prevent runoff from leaving the construction site.
- Design stabilized entrance/exit to support heaviest vehicles and equipment that will use it.
- Select construction access stabilization (aggregate, asphaltic concrete, concrete) based on longevity, required performance, and site conditions.
- Use of constructed or constructed/manufactured steel plates with ribs (e.g., shaker / rumble plates or corrugated steel plates) for entrance/exit access is allowable (See below).
- The aggregate size for construction of the pad shall be 3-6 inch (76-152 mm) stone. Place the gravel to the specific grade and dimensions shown on the plans, and smooth it.
- The thickness of the pad shall not be less than 8 inches (203 mm). Use geotextile fabric, if necessary, to improve stability of the foundation in locations subject to seepage or high water table.
- The width of the pad shall not be less than the full width of all points of ingress or egress and in any case shall not be less than 12 feet (3.6 m) wide.
- The length of the pad is as required, but not less than 50 feet (15.2 m).
- All sediment spilled, dropped, washed or tracked onto public rights-of-way shall be removed as soon as possible by hand sweeping or mechanized sweeper. Washing of sediment from the public right-of-way shall be prohibited.
- Provide drainage to carry water to a sediment trap or other suitable outlet.
- When necessary, wheels shall be cleaned to remove sediment prior to entrance onto public rights-of-way (see SC-11, Entrance / Exit Tire Wash).
- All sediment shall be reduced or prevented from entering any storm drain, ditch or watercourse through use of sediment fence, gravel bags, sediment barriers, or other approved methods.

ENTRANCE / EXIT TRACKING CONTROLS – SC-10

Minimum BMP standards are provided on the following detail.

Entrance with Shaker Plates

- Incorporate with a stabilized construction entrance/exit.
- Construct on level ground when possible, on a pad of coarse aggregate, greater than 3 inches (76 mm) and smaller than 6 inches (150 mm). A geotextile fabric shall be placed below the aggregate.
- Install constructed or manufactured steel plates with ribs (e.g., rumble plates or corrugated steel plates) at the entrance/exit in addition to the aggregate.
- Steel shaker plates shall be designed and constructed/manufactured for anticipated traffic loads.

Street Sweeping and Vacuum Sweeping

- Inspect potential sediment tracking locations daily.
- Visible sediment tracking should be swept or vacuumed as needed. Manual sweeping is appropriate for small jobs.
- For larger projects, it is preferred to use mechanical broom or vacuum sweepers that collect and contain removed sediment and material.

If not mixed with debris or trash, incorporate the removed sediment back into the project or dispose of it at an approved disposal site.

Inspection and Maintenance:

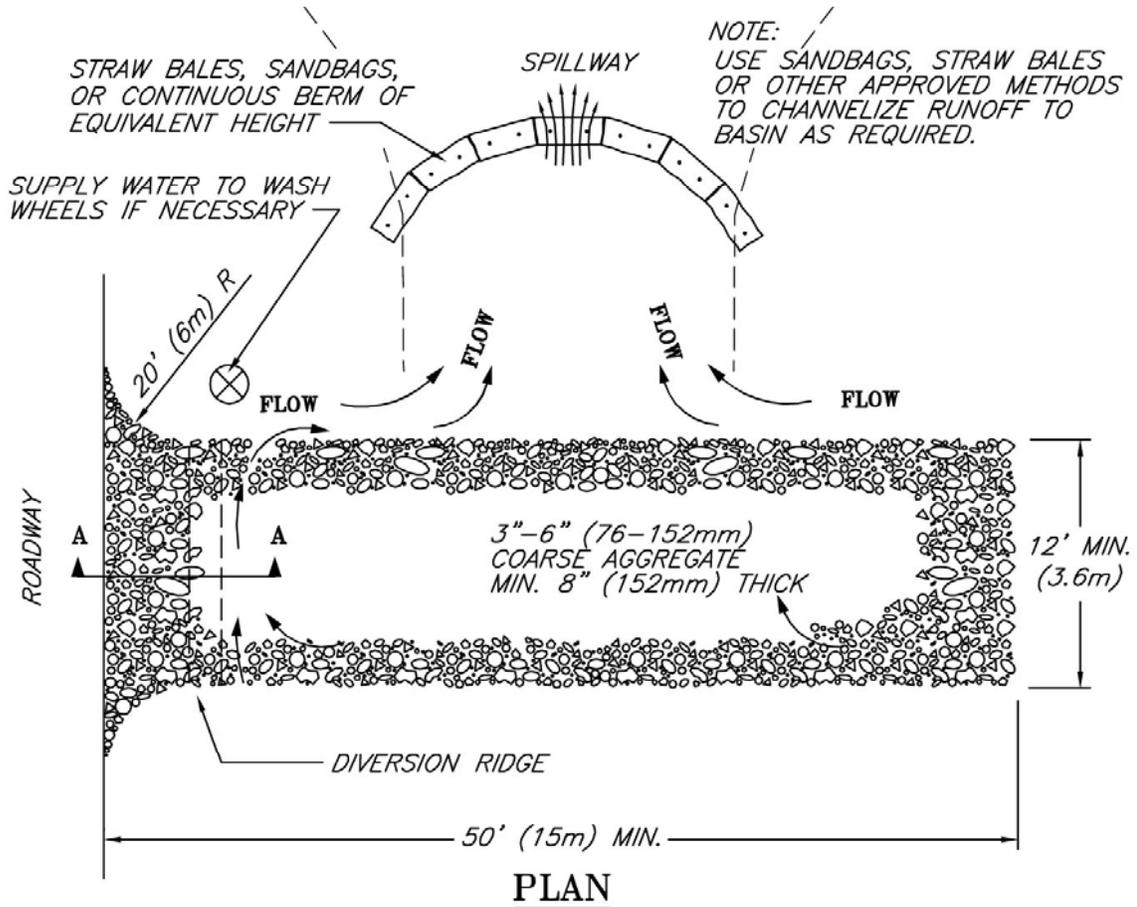
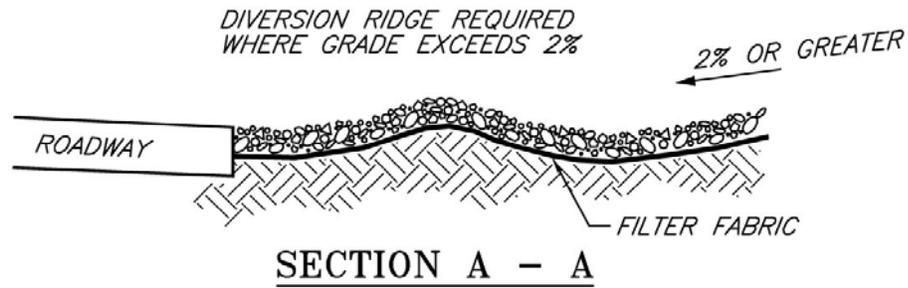
Stabilized Construction Entrance

- Inspect routinely for damage and assess effectiveness. Repair if access is clogged with sediment.
- Where tracking has occurred on roadways sweeping should be conducted the same day. Preferably water should not be used to wash sediment off the streets. If water is used, it should be captured preventing sediment-laden water from running off the site.
- Keep all temporary roadway ditches clear.
- The entrance shall be maintained in a condition that will reduce or prevent tracking or flowing of sediment onto public rights-of-way. This may require periodic top dressing with additional stone as conditions demand, and repair and/or maintenance of any measures used to trap sediment.
- Maintain the gravel pad in a condition to prevent mud or sediment from leaving the construction site. Replace gravel material when surface voids are visible.
- After each rainfall, inspect all gravel construction entrances and clean it out as necessary.
- As soon as possible remove all objectionable materials spilled, washed, or tracked onto public roadways. Remove all sediment deposited on paved roadways immediately.

Street Sweeping and Vacuuming

- Inspect entrance and exit points daily and sweep tracked sediment as needed.
- Be careful not to sweep up any unknown substance or any object that may be potentially hazardous.
- After sweeping is finished, properly dispose of sweeper wastes.

ENTRANCE / EXIT TRACKING CONTROLS – SC-10



NOTES:

1. THE ENTRANCE SHALL BE MAINTAINED IN A CONDITION THAT WILL PREVENT TRACKING OR FLOWING OF SEDIMENT ONTO PUBLIC RIGHT-OF-WAYS. THIS MAY REQUIRE TOP DRESSING, REPAIR AND/OR CLEAN OUT OF ANY MEASURES USED TO TRAP SEDIMENT.
2. WHEN NECESSARY, WHEELS SHALL BE CLEANED PRIOR TO ENTRANCE ONTO PUBLIC RIGHT-OF-WAY.
3. WHEN WASHING IS REQUIRED, IT SHALL BE DONE ON AN AREA STABILIZED WITH CRUSHED STONE THAT DRAINS INTO AN APPROVED SEDIMENT TRAP OR SEDIMENT BASIN.

**TEMPORARY
GRAVEL
CONSTRUCTION
ENTRANCE/EXIT**

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FILE: ENTRANCE

ENTRANCE / EXIT TIRE WASH – SC-11

Construction Specifications:

- Incorporate with a stabilized construction entrance/exit. See BMP SC-10, “Entrance / Exit Tracking Controls.”

Manual/Hose Tire Wash

- Construct on level ground when possible, on a pad of coarse aggregate, greater than 3 inches (75 mm) and smaller than 6 inches (150 mm). A geotextile fabric shall be placed below the aggregate.
- Tire wash shall be designed and constructed/manufactured for anticipated traffic loads.
- Provide a drainage conveyance that will convey the runoff from the wash area to a sediment trapping device. The drainage ditch shall be of sufficient grade, width, and depth to carry the wash runoff.
- Require that all employees, subcontractors, and others that leave the site with mud-caked tires and/or under-carriages use the wash facility.

Temporary Drive-Through Tire Wash

- Minimum dimensions: 40 feet by 12 feet by 1.5 feet (length, width, and sump depth; 12.2 m by 3.7 m by 0.46 m). The minimum length includes ingress and egress from the sump.
- The aggregate size for construction of the pad shall be 4-6 inch (101-152 mm) stone. Place the gravel to the specific grade and dimensions shown on the plans, and smooth it.
- The thickness of the pad shall not be less than 8 inches (203 mm). Use geotextile fabric under the gravel to improve stability of the foundation.
- Alternatively, install a 3 in. asphalt lift over a stable roadway base with the same dimensions identified above.
- The run out pad should extend 50 feet (15.2 m) past the egress ramp and drain back into the sump or to a suitable collection and treatment facility.
- Install fencing, as necessary, to manage vehicle traffic.

Minimum BMP standards are provided on the following illustrations.

Inspection and Maintenance:

Manual/Hose Tire Wash

- Remove accumulated sediment in tire wash and/or sediment trap to maintain system performance.
- Inspect routinely for damage and repair as needed.

Temporary Drive-Through Tire Wash

- Inspect routinely to assess the water levels within the sump, the depth of accumulated sediment, and identify any areas that require maintenance.
- Remove accumulated sediment from the tire wash facility to maintain tire wash sump depth. Sediment may be pumped, piped or vacuumed to a suitable collection and treatment facility.
- Clean or replace rock when clogged with sediment and re-grade as needed.
- Maintain the run-out pad as necessary to prevent sediment accumulation.
- Immediately remove any rock that is carried from the pad to the roadway.
- Ensure that wash water drainage, collection and treatment system is functioning.

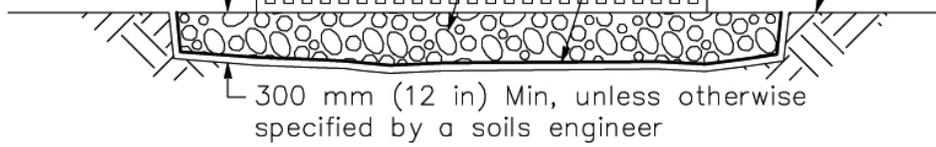
ENTRANCE / EXIT TIRE WASH – SC-11

Crushed aggregate greater than 75 mm (3 in) but smaller than 150 mm (6 in)

Corrugated steel panels

Filter fabric

Original grade

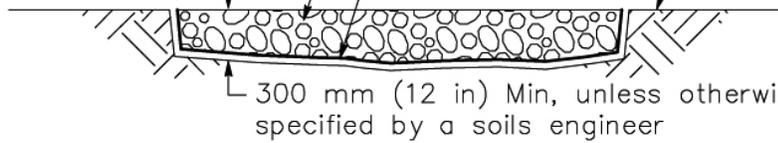


SECTION A-A
NOT TO SCALE

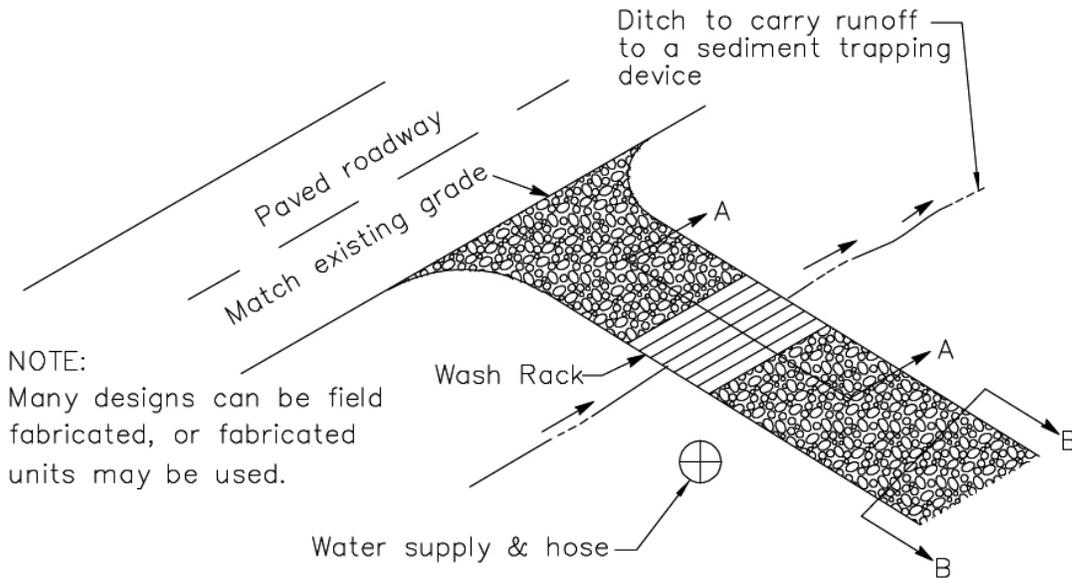
Crushed aggregate greater than 75 mm (3 in) but smaller than 150 mm (6 in)

Filter fabric

Original grade



SECTION B-B
NTS

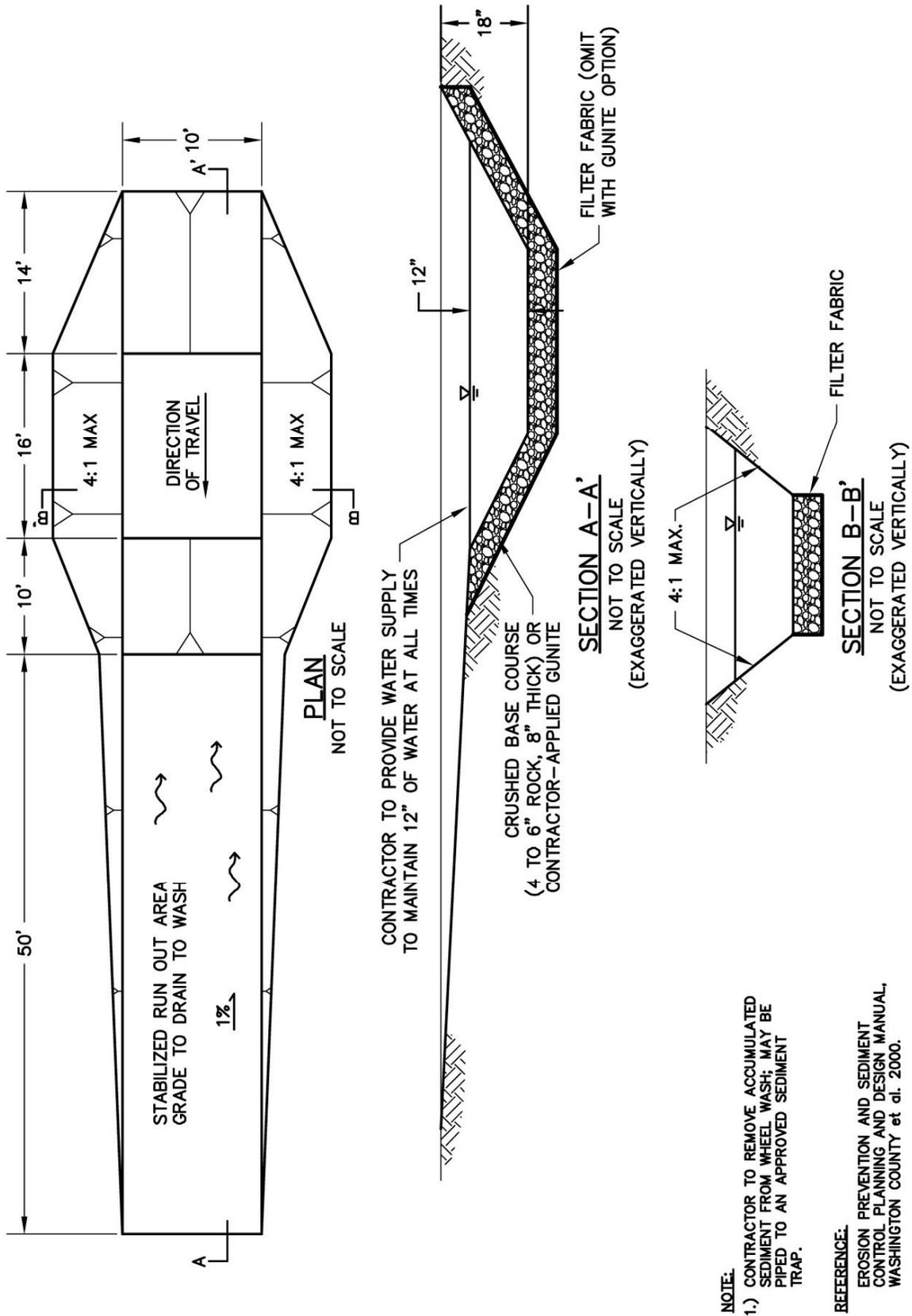


NOTE:
Many designs can be field fabricated, or fabricated units may be used.

TYPICAL TIRE WASH
NOT TO SCALE

MANUAL / HOSE TIRE WASH

ENTRANCE / EXIT TIRE WASH – SC-11



TEMPORARY DRIVE THROUGH TIRE WASH

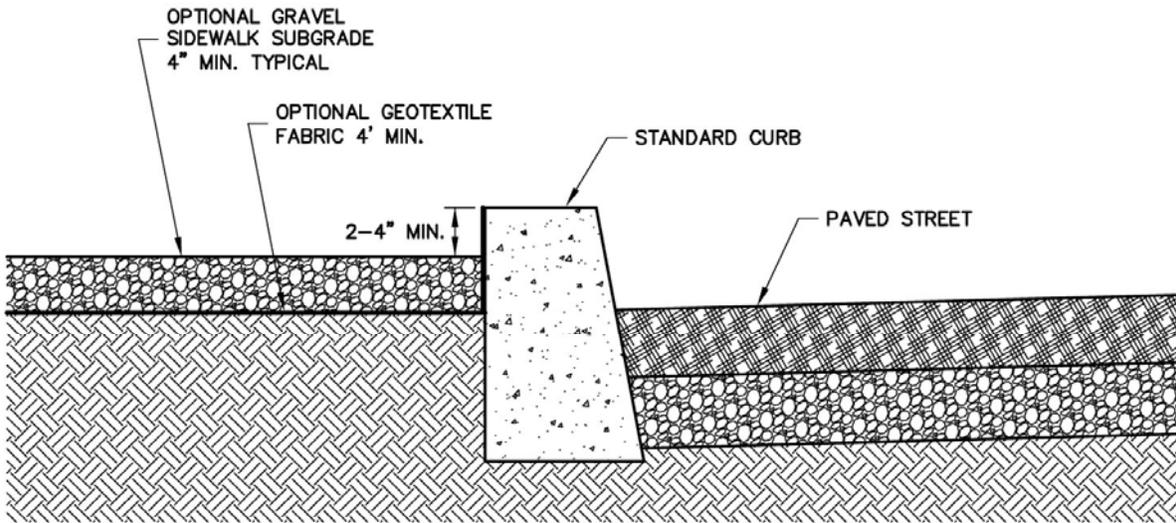
UNDERCUT LOTS – SC-12

Construction Specifications:

- Cut back soil from curb 2” – 4” deep to form a temporary sediment trap.
- Extend cut back a distance of 3’ – 4’ from curb, or the width of the parkway or sidewalk.

Inspection and Maintenance:

- Allow ponded water to infiltrate, evaporate, or pump out in accordance with BMP NS-1, “Dewatering and Ponded Water Management.”
- Remove accumulated sediment in sediment trap to maintain system capacity.
- Inspect routinely and maintain as needed.



SECTION UNDERCUT LOT
NOT TO SCALE