4.08 STORM DRAIN INLET PROTECTION (ES BMP 1.08)

Definition

A sediment filter or an excavated impounding area around a storm drain drop inlet or curb inlet.

Purpose

To prevent sediment from entering storm water conveyance systems prior to permanent stabilization of the disturbed area.

Condition Where Practice Applies

Where storm drain inlets are to be made operational before permanent stabilization of the disturbed drainage area. Different types of structures are applicable to different conditions (see Plates 4.08a through 4.08h).

Planning Considerations

Storm sewers which are made operational before their drainage area is stabilized can convey large amounts of sediment to receiving waters. In case of extreme sediment loading, the storm sewer itself may clog and lose most of its capacity. To avoid these problems, it is necessary to prevent sediment from entering the system at the inlets.

This section contains several types of inlet filters and traps which have different applications dependent upon site conditions and type of inlet. Other innovative techniques for accomplishing the same purpose are encouraged, but only after specific plans and details are submitted to and approved by the stormwater permitting agency.

Note that these various inlet protection devices are for drainage areas of less than one acre (0.4 ha). Runoff from large disturbed areas should be routed through a TEMPORARY SEDIMENT TRAP - Section 4.25 (ES BMP 1.25).

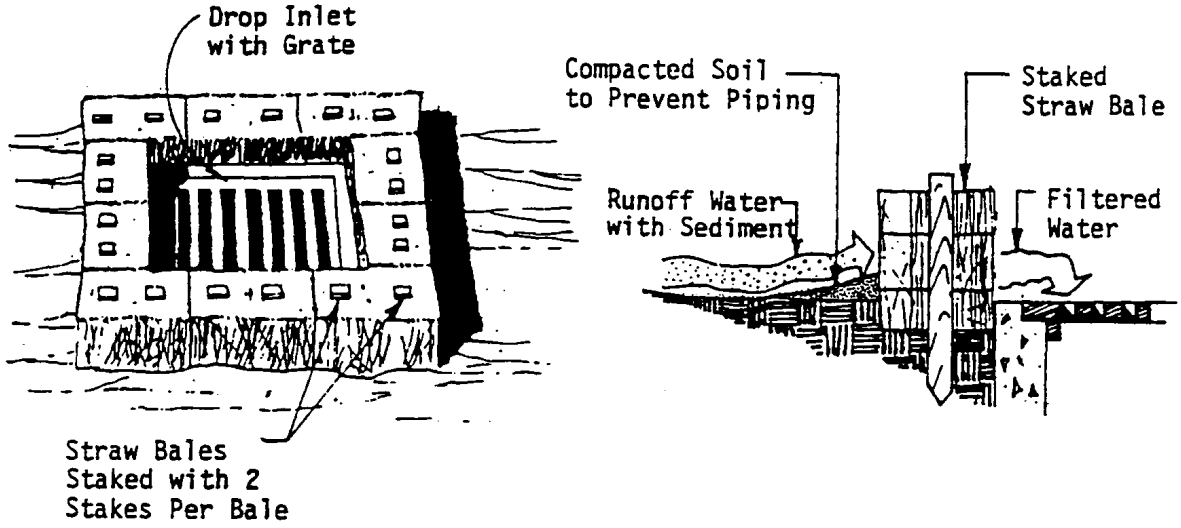
Design Criteria

1. The drainage area shall be no greater than 1 acre (0.4 ha).

2. The inlet protection device shall be constructed to facilitate clean out and disposal of trapped sediment and to minimize interference with construction activities.

3. The inlet protection devices shall be constructed so that any resultant ponding or stormwater will not cause excessive inconvenience or damage to adjacent areas or structures.

4. Design criteria more specific to each particular inlet protection devices will be found on Plates 4.08a-h.



Specific Application

This method of inlet protection is applicable where the inlet drains a relatively flat area (slopes no greater than 5 percent) where sheet or overland flows (not exceeding 0.5 cfs) are typical. The method shall not apply to inlets receiving concentrated flows, such as in street or highway medians.

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Plate 4.08a Straw Bale Drop Inlet Sediment Filter
Source: Michigan Soil Erosion and Sedimentation Control Guidebook

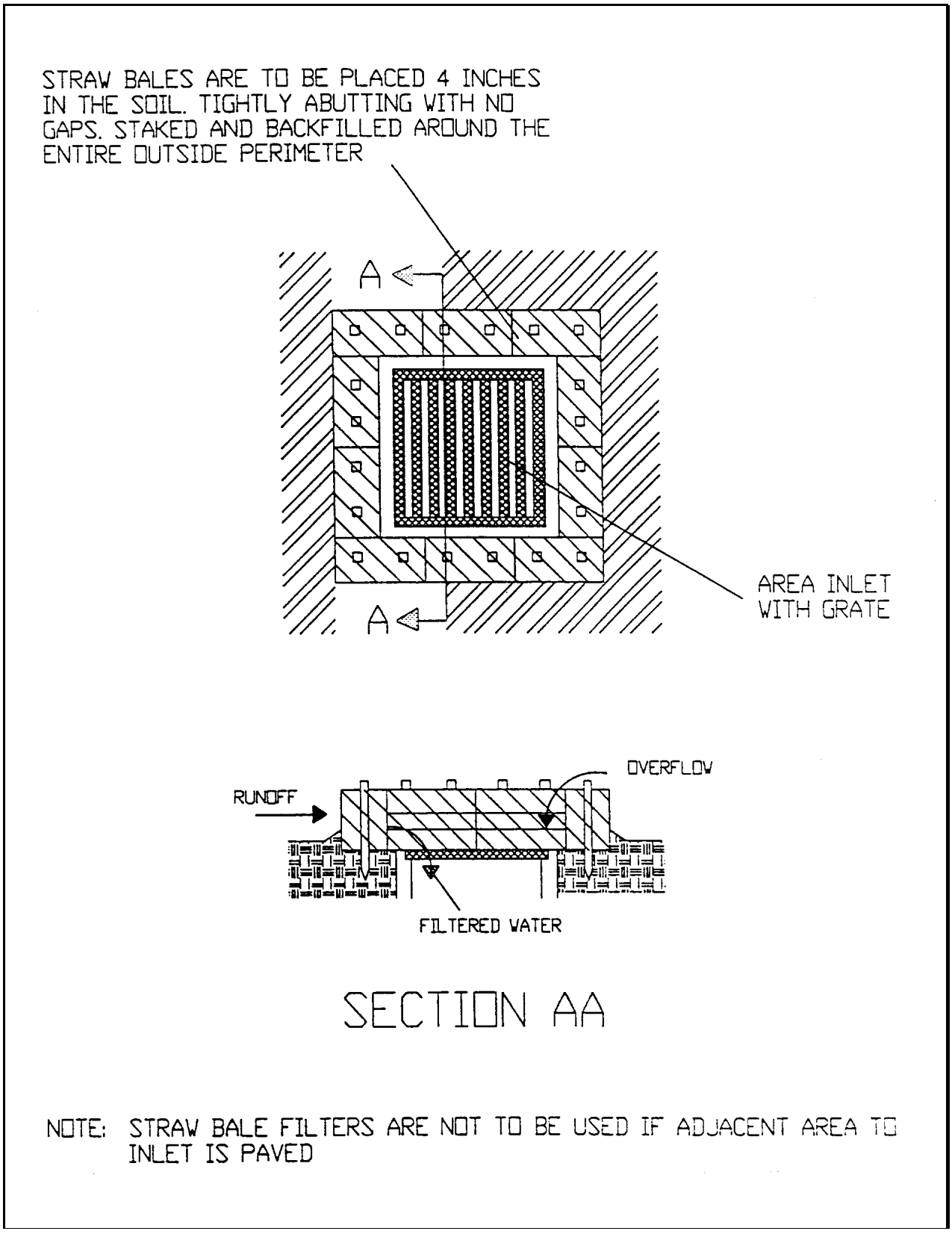
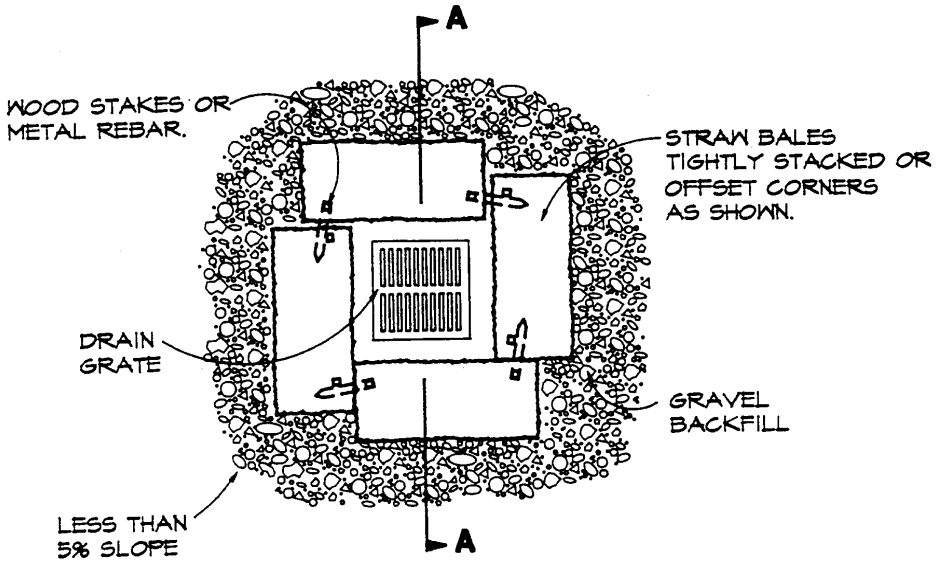
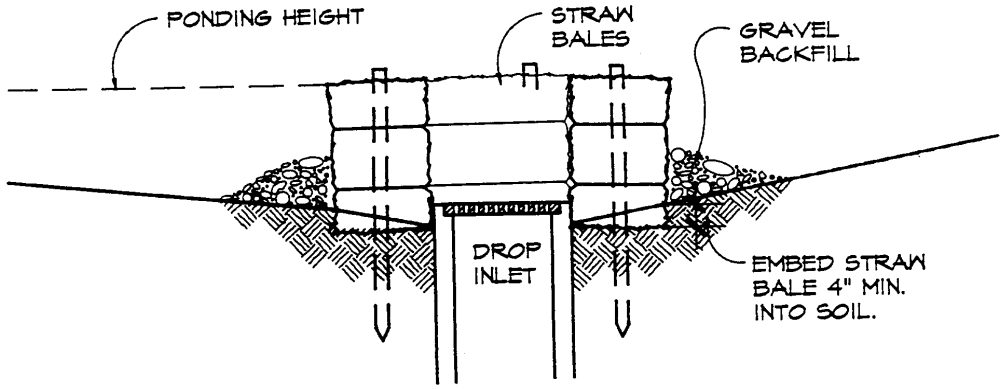


Plate 4.08b Straw Bale Filter for Area Inlet
Source: HydroDynamics, Inc.



PLAN VIEW



SECTION A-A

NOTES:
1. DROP INLET SEDIMENT BARRIERS ARE TO BE USED FOR SMALL, NEARLY LEVEL DRAINAGE AREAS. (LESS THAN 5%)
2. EMBED THE BALES 4" INTO THE SOIL AND OFFSET CORNERS OR PLACE BALES WITH ENDS TIGHTLY ABUTING. GRAVEL BACKFILL WILL PREVENT EROSION OR FLOW AROUND THE BALES.
3. THE TOP OF THE STRUCTURE (PONDING HEIGHT) MUST BE WELL BELOW THE GROUND ELEVATION DOWNSLOPE TO PREVENT RUNOFF FROM BY-PASSING THE INLET. EXCAVATION OF A BASIN ADJACENT TO THE DROP INLET OR A TEMP-ORARY DIKE ON THE DOWNSLOPE OF THE STRUCTURE MAY BE NECESSARY.

Plate 4.08c Straw Bale and Gravel Drop Inlet Sediment Barrier
Source: Erosion Draw

Construction Specifications

Straw bale drop inlet filter

1. Bales shall be either wire-bound or string-tied with the bindings oriented around the sides rather than over and under the bales.

2. Bales shall be placed lengthwise in a single row surrounding the inlet, with the ends of adjacent bales pressed together. (See Plate 4.08a)

3. The filter barrier shall be entrenched and backfilled. A trench shall be excavated around the inlet the width of a bale to a minimum depth of 4 inches (10 cm). After the bales are staked, the excavated soil shall be backfilled and compacted against the filter barrier. (See Plate 4.08b)

4. Each bale shall be securely anchored and held in place by at least two stakes or rebars (See p. 4-17) driven through the bale.

5. Loose straw should be wedged between bales to prevent water from entering between bales.

6. Gravel may be spread around the bales to improve stability. (See Plate 4.08c)

Fabric drop inlet sediment filter

1. Fabric shall be cut from a continuous roll to avoid joints.

2. Stakes shall be 2" x 4" (5 cm x 10 cm) wood (preferred) or equivalent metal with a minimum length of 3 feet (90 cm). (See Plate 4.08d)

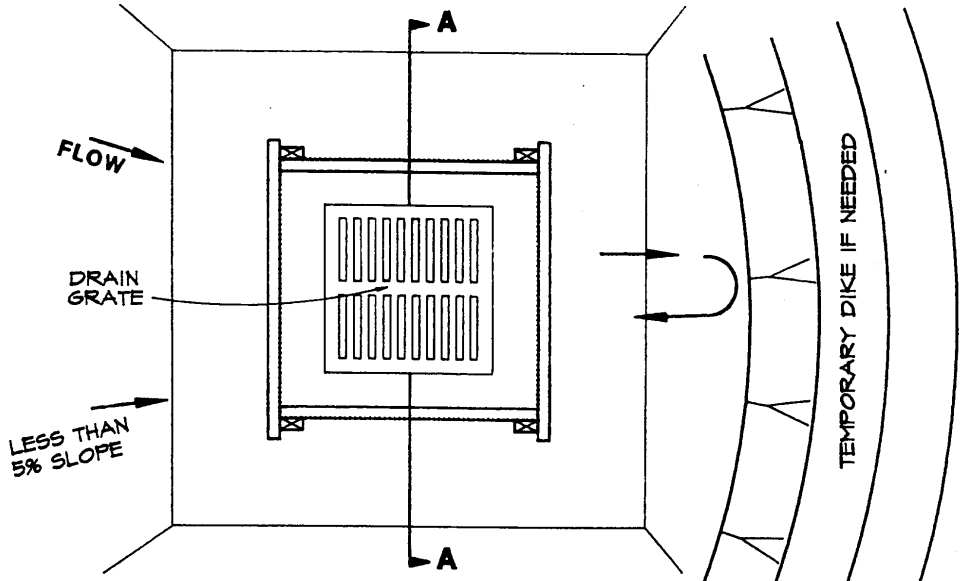
3. Staples shall be of heavy duty wire at least 1/2-inch (13 mm) long.

4. Stakes shall be spaced around the perimeter of the inlet a maximum of 3 feet (90 cm) apart and securely driven into the ground minimum of 8 inches (20 cm). A frame of 2" x 4" (5 cm x 10 cm) wood shall be constructed around the top of the stakes for proper stability.

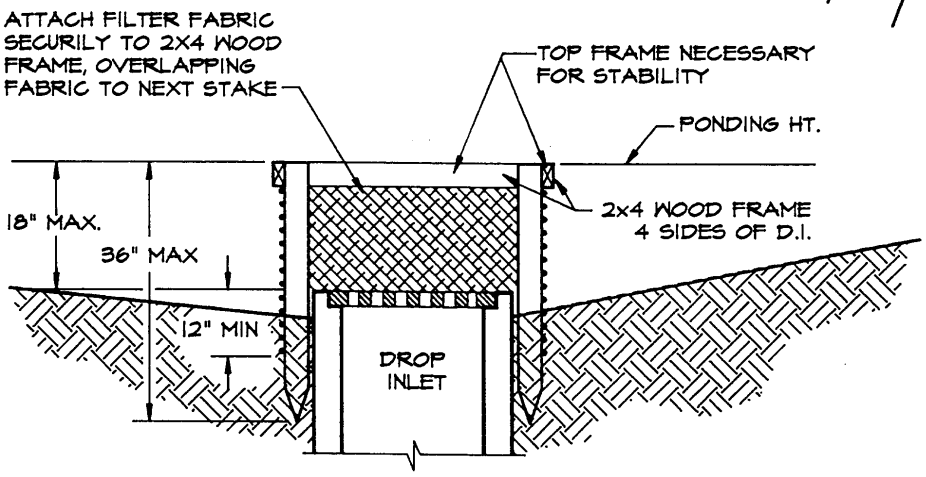
5. A trench shall be excavated approximately 4 inches (10 cm) wide and 4 inches (10 cm) deep around the outside perimeter of the stakes. (See Plate 4.08e)

6. The burlap shall be stapled to the wooden stakes, and 8 inches (20 cm) of the fabric shall be extended into the trench. The height of the filter barrier shall be a minimum of 15 inches (38 cm) and shall not exceed 18 inches (45 cm).

7. The trench shall be backfilled and the soil compacted over the burlap.



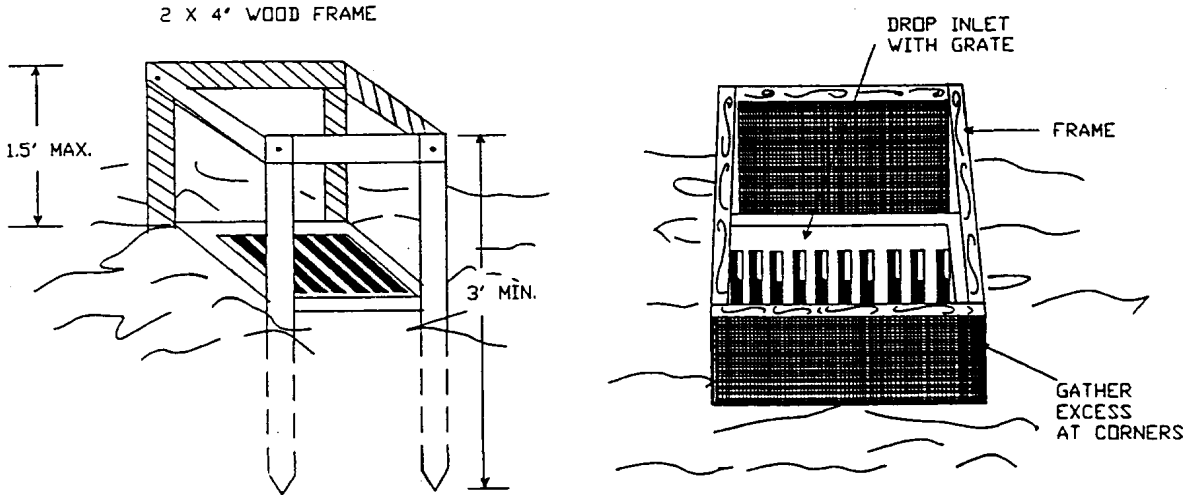
PLAN VIEW



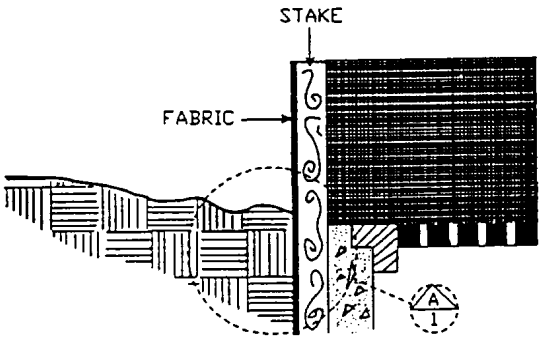
SECTION A-A

NOTES:
1. DROP INLET SEDIMENT BARRIERS ARE TO BE USED FOR SMALL, NEARLY LEVEL DRAINAGE AREAS. (LESS THAN 5%)
2. USE 2X4 WOOD OR EQUIVALENT METAL STAKES, (3 FT. MIN. LENGTH)
3. INSTALL 2X4 WOOD TOP FRAME TO INSURE STABILITY.
4. THE TOP OF THE FRAME (PONDING HEIGHT) MUST BE WELL BELOW THE GROUND ELEVATION DOWNSLOPE TO PREVENT RUNOFF FROM BY-PASSING THE INLET. A TEMPORARY DIKE MAY BE NECESSARY ON THE DOWNSLOPE SIDE OF THE STRUCTURE.

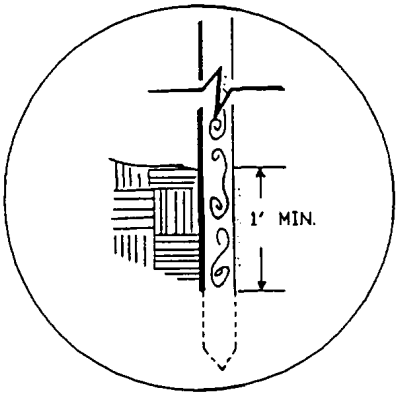
Plate 4.08d Silt Fence Drop Inlet Sediment Barrier
Source: Erosion Draw



Perspective Views



Elevation of Stake and
Fabric Orientaion



Detail A

Specific Application

This method of inlet protection is applicable where the inlet drains a relatively flat area (slope no greater than 5%) where the inlet sheet or overland flows (not exceeding 1 c.f.s.) are typical. The method shall not apply to inlets receiving concentrated flows, such as in street or highway medians.

Plate 4.08e Filter Fabric Drop Inlet Sediment Filter
Source: North Carolina Erosion and Sediment Control Manual

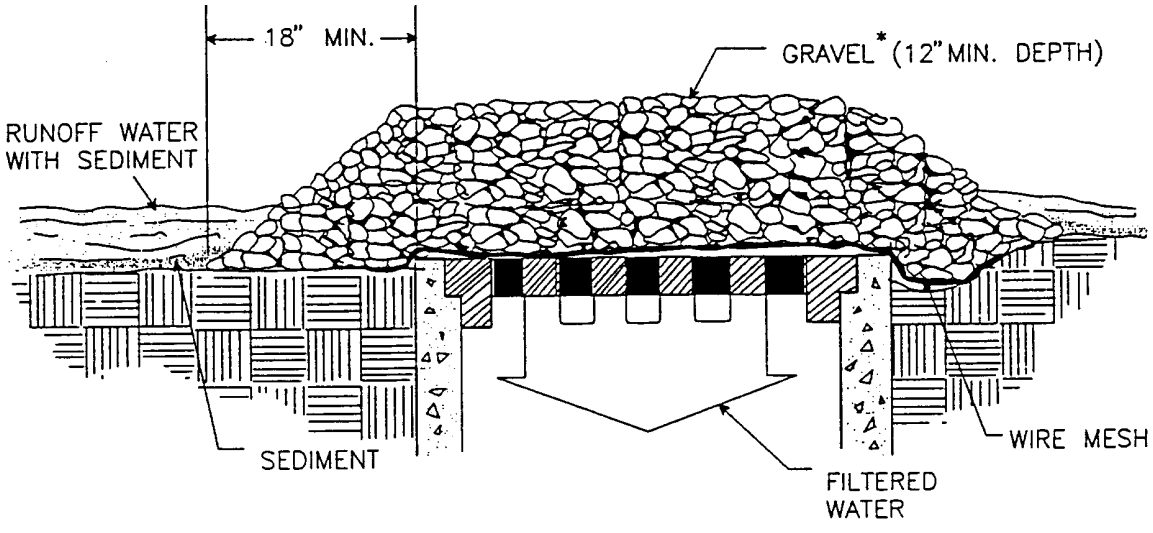
Gravel and wire mesh drop inlet sediment filter

1. Wire mesh shall be laid over the drop inlet so that the wire extends a minimum of one foot (30 cm) beyond each side of the inlet structure. Hardware cloth or comparable wire mesh with 1/2 inch (13 mm) openings shall be used. If more than one strip of mesh is necessary, the strips shall be overlapped at least 1 ft. (30 cm).

2. FDOT No. 1 Coarse Aggregate (1.5" to 3.5" stone)(4 - 9 cm) shall be placed over the wire mesh as shown on Plate 4.08c. The depth of stone shall be at least 12 inches (30 cm) over the entire inlet opening. The stone shall extend beyond the inlet opening at least 18 inches (45 cm) on all sides. (See Plate 4.08f)

3. If the stone filter becomes clogged with sediment so that it no longer adequately performs its function, the stones must be pulled away from the inlet, cleaned and replaced.

NOTE: This filtering device has no overflow mechanism. Therefore, ponding is likely especially if sediment is not removed regularly. This type of device must never be used where overflow may endanger an exposed fill slope. Consideration should also be given to the possible effects of ponding on traffic movement, nearby structures, working areas, adjacent property, etc.



Specific Application

This method of inlet protection is applicable where heavy concentrated flows are expected, but not where ponding around the structure might cause excessive inconvience or damage to adjacent structures and unprotected areas.

* Gravel Shall be VDOT #3, #357, or #5 Coarse Aggregate.

Plate 4.08f Gravel and Wire Mesh Drop Inlet Sediment Filter
Source: Virginia DSWC

Block and gravel drop inlet sediment filter

1. Place concrete blocks lengthwise on their sides in a single row around the perimeter of the inlet, with the ends of adjacent blocks abutting. The height of the barrier can be varied, depending on design needs, by stacking combinations of 4 inch, 8 inch and 12 inch (10, 20, and 30 cm) wide blocks. The barrier of blocks shall be at least 12 inches (30 cm) high and no greater than 24 inches (60 cm) high.

2. Wire mesh shall be placed over the outside vertical face (webbing) of the concrete blocks to prevent stone from being washed through the holes in the blocks. Hardware cloth or comparable wire mesh with 1/2 inch (13 mm) openings shall be used. (See Plate 4.08g)

3. Stone shall be piled against the wire to the top of the block barrier. Suitable coarse aggregate shall be used. (See Plate 4.08h)

4. If the stone filter becomes clogged with sediment so that it no longer adequately performs its function, the stone must be pulled away from the blocks, cleaned and replaced.

5. As a very temporary alternative, pervious burlap bags filled with gravel may be placed around the inlet provided that there are no gaps between the bags. (See Plate 4.08i)

6. Either of these two practices may be installed on pavement or bare ground

Sod drop inlet sediment filter

1. Soil shall be prepared and sod installed according to the specifications in SODDING - Section 6.67 (ES BMP 1.67).

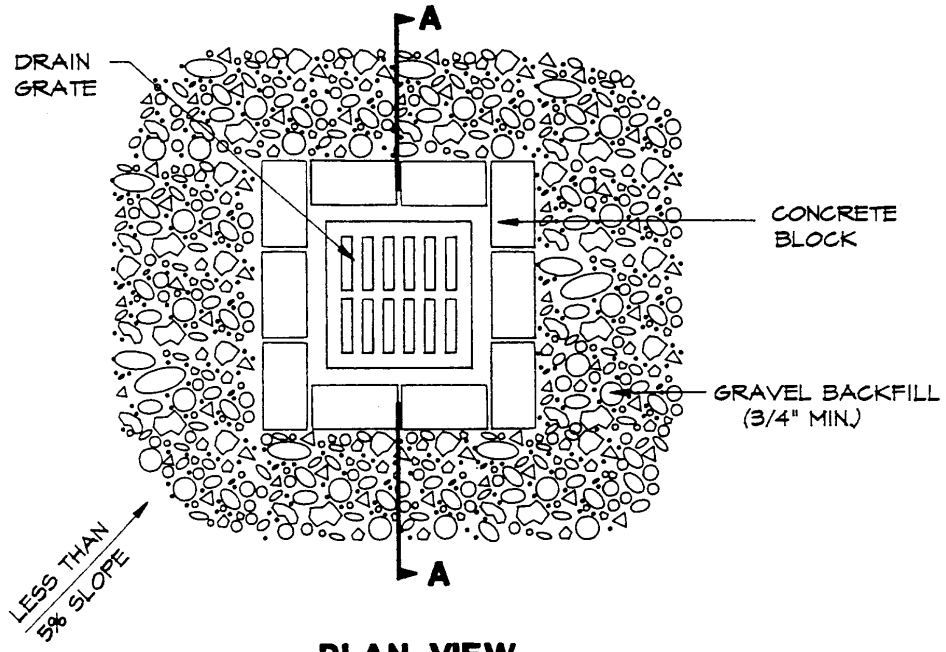
2. Sod shall be placed to form a turf mat covering the soil for a distance of 4 feet (1.2 m) from each side of the inlet structure. (See Plate 4.08j)

Prefabricated drop inlet internal filter bag (ACF Silt Sack)

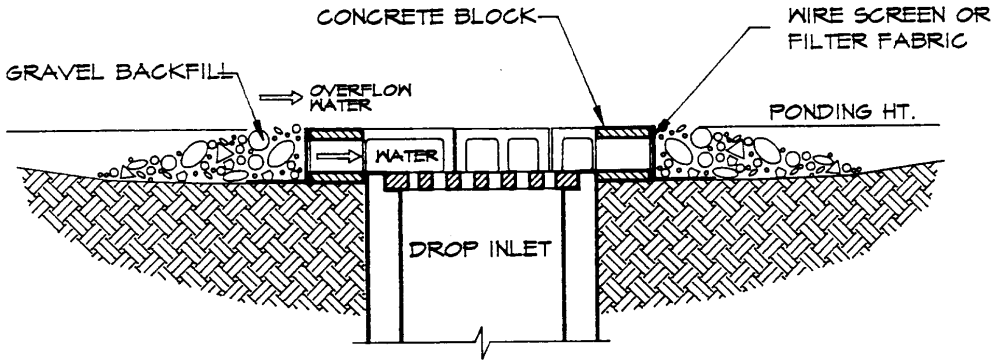
1. Remove the grate over the catch basin and insert the filter device, then replace grate to hold the device in position.

2. When sediments have accumulated to within one foot (30 cm) of the grate the filter insert must be removed by a front-end loader or forklift. The filter may be discarded and replaced or it may be emptied, cleaned, and reused.

NOTE: This segment does not constitute a product endorsement.



PLAN VIEW

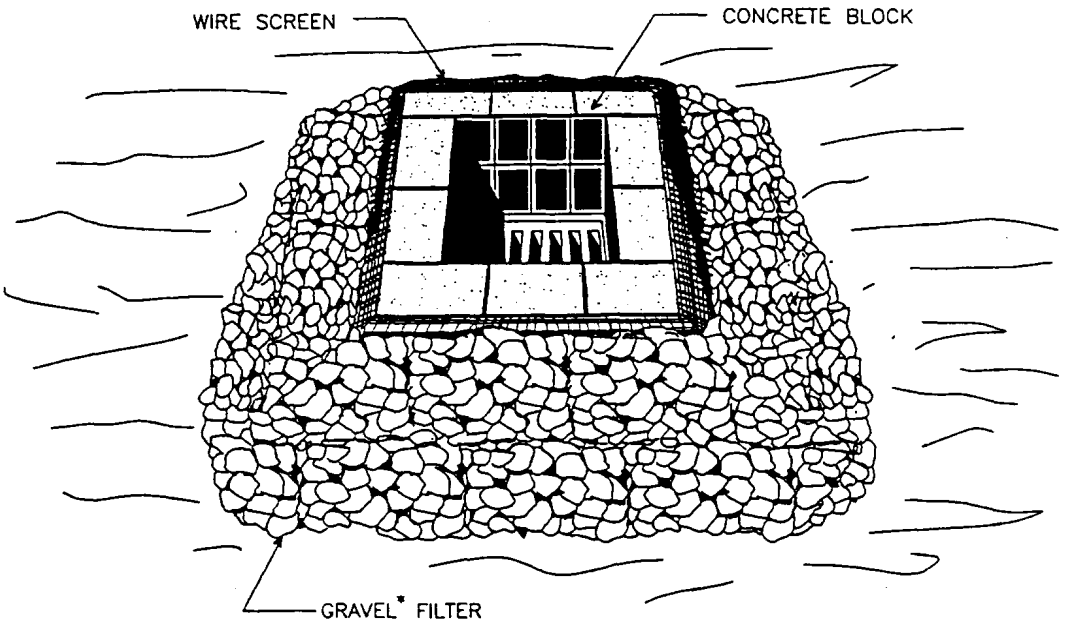


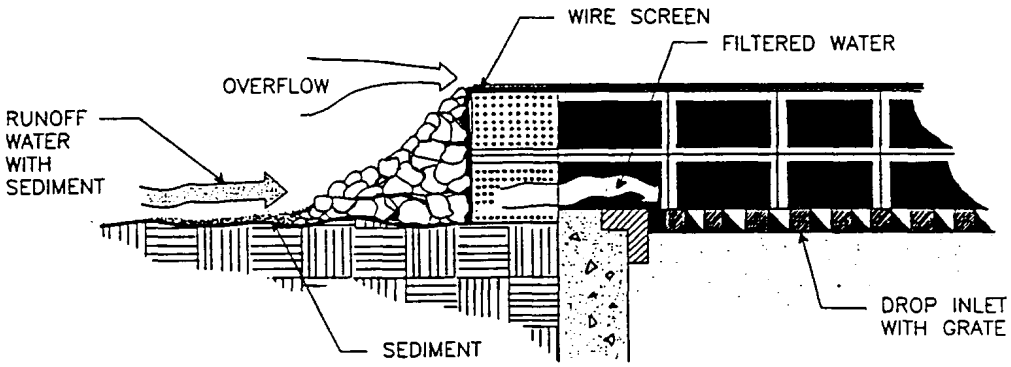
SECTION A - A

NOTES:

1. DROP INLET SEDIMENT BARRIERS ARE TO BE USED FOR SMALL, NEARLY LEVEL DRAINAGE AREAS. (LESS THAN 5%)
2. EXCAVATE A BASIN OF SUFFICIENT SIZE ADJACENT TO THE DROP INLET.
3. THE TOP OF THE STRUCTURE (PONDING HEIGHT) MUST BE WELL BELOW THE GROUND ELEVATION DOWNSLOPE TO PREVENT RUNOFF FROM BY-PASSING THE INLET. A TEMPORARY DIKE MAY BE NECESSARY ON THE DOWNSLOPE SIDE OF THE STRUCTURE.

Plate 4.08g Block and Gravel Drop Inlet Sediment Filter
Source: Erosion Draw





Specific Application

This method of inlet protection is applicable where heavy flows are expected and where an overflow capacity necessary to prevent excessive ponding around the structure.

* Gravel Shall be FDOT #3, #357, or #5 Coarse Aggregate.

Plate 4.08h Block and Gravel Drop Inlet Sediment Filter
Source: Michigan Soil Erosion and Sedimentation Control Guidebook

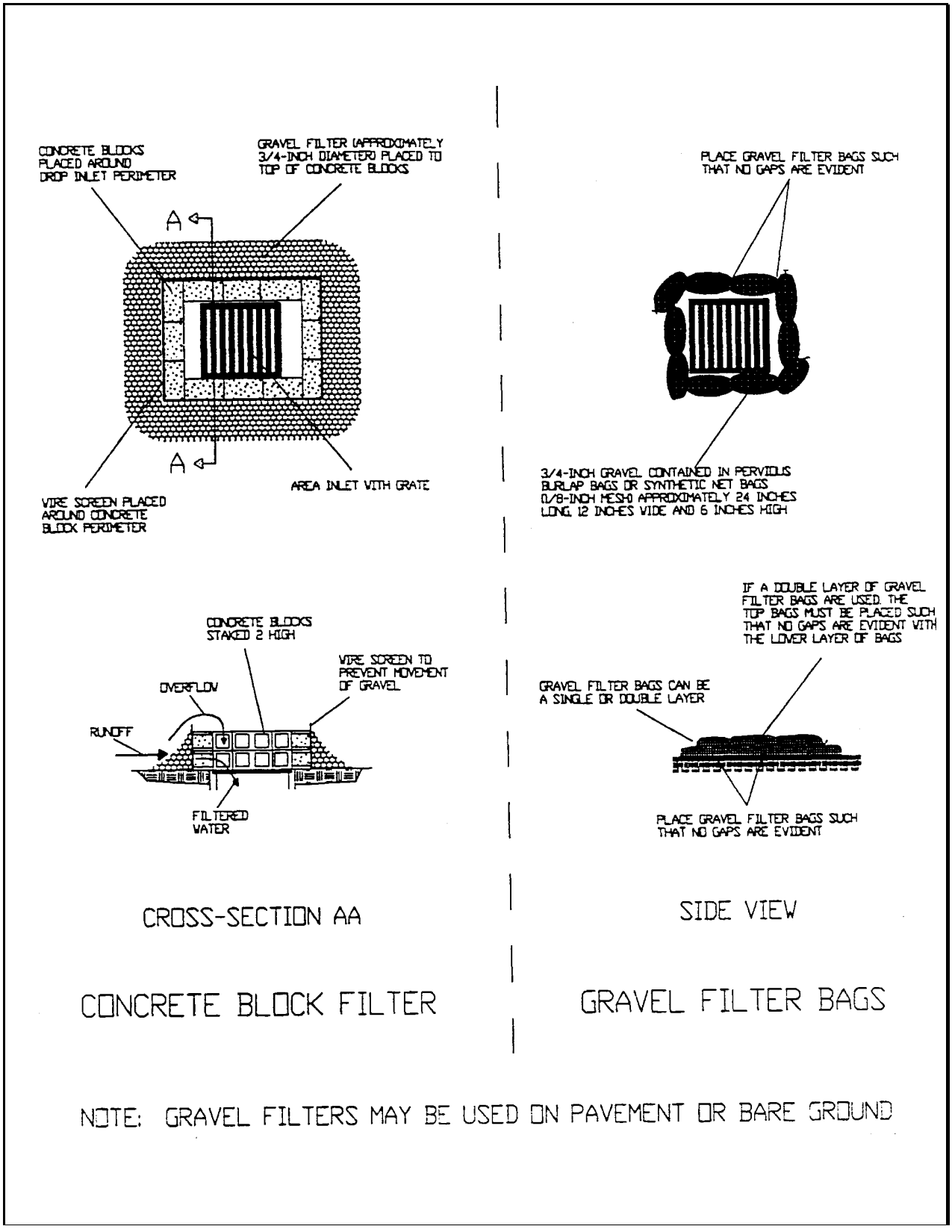


Plate 4.08i Gravel Filters for Area Inlets
Source: HydroDynamics, Inc.

Prefabricated drop inlet external filter (Suntree Isles Grate Inlet Protector)

1. Place the device over the inlet. If the inlet has a grate, the device shall be secured to the grate by means of a long toggle bolt. If the grate is not present, the device shall be bolted directly to the concrete.

2. Sediments shall be removed when they have accumulated to within one foot (30 cm) of the top of the device. The filter fabric elements shall be cleaned or replaced at that time.

NOTE: This segment does not constitute a product endorsement.

Gravel curb inlet sediment filter

1. Hardware cloth or comparable wire mesh with 1/2 inch (13 mm) openings shall be placed over the curb inlet opening so that at least 12 inches (30 cm) of wire extends across the top of the inlet cover and at least 12 inches (30 cm) of wire extends across the concrete gutter from the inlet opening. (See Plate 4.08k)

2. Stone shall be piled against the wire so as to anchor it against the gutter and inlet cover and to cover the inlet opening completely. FDOT No. 1 Coarse Aggregate shall be used.

3. An overflow weir can be constructed of 2" x 4" (5 x 10 cm) boards to lessen ponding from this practice. (See Plate 4.08L)

4. If the stone filter becomes clogged with sediment so that it no longer adequately performs its function, the stone must be pulled away from the block, cleaned and replaced.

Block and gravel curb inlet sediment filter

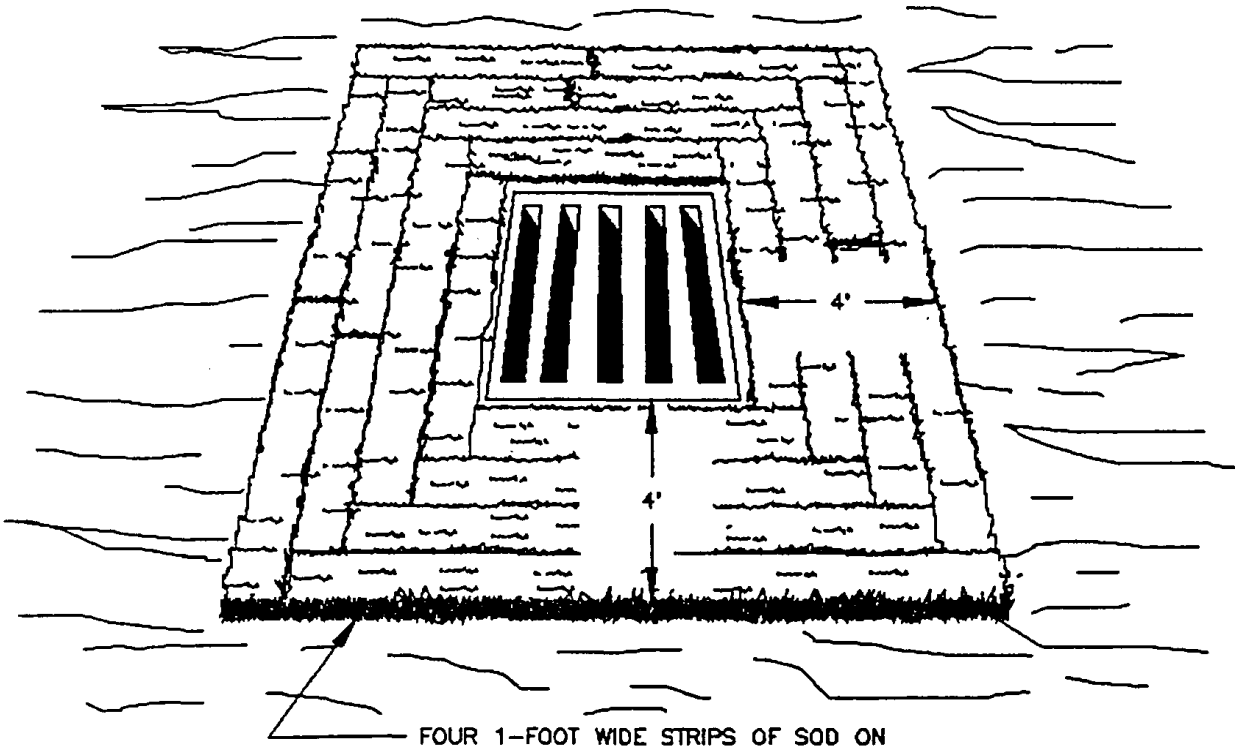
1. Two concrete blocks shall be placed on their sides abutting the curb at either side of the inlet opening.

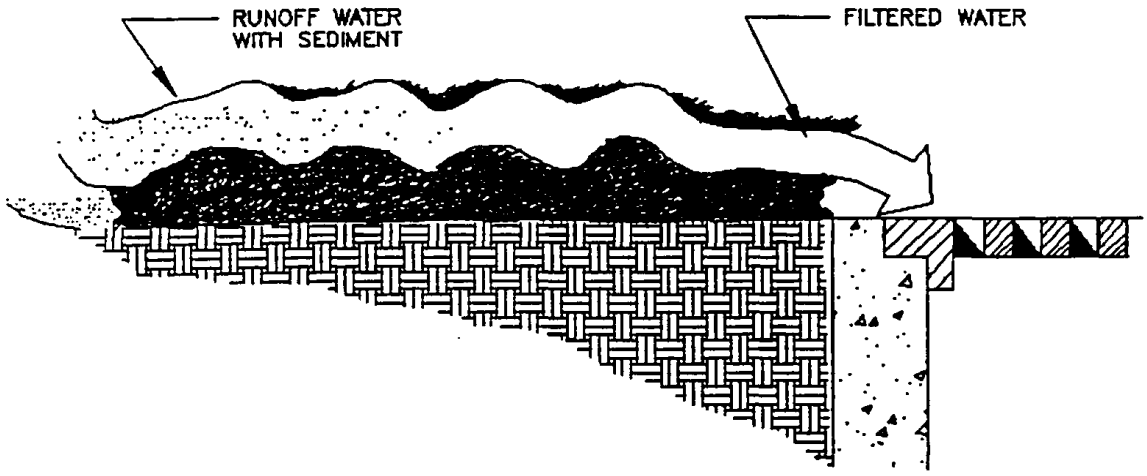
2. A 2" x 4" (5 x 10 cm) board shall be cut and placed through the outer holes of each spacer block to help keep the front blocks in place.

3. Concrete blocks shall be placed on their sides across the front of the inlet and abutting the spacer blocks. (See Plate 4.08m)

4. Wire mesh shall be placed over the outside vertical face (webbing) of the concrete blocks to prevent stone from being washed through the holes in the blocks. Hardware cloth with 1/2 inch (13 mm) openings shall be used.

5. FDOT No. 1 Coarse Aggregate shall be piled against the wire to the top of the barrier.

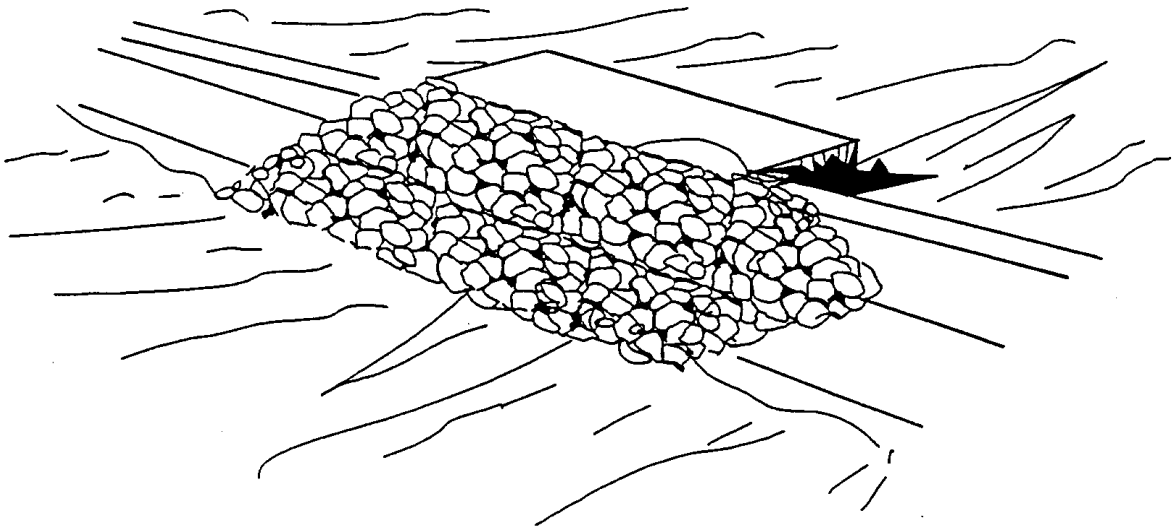


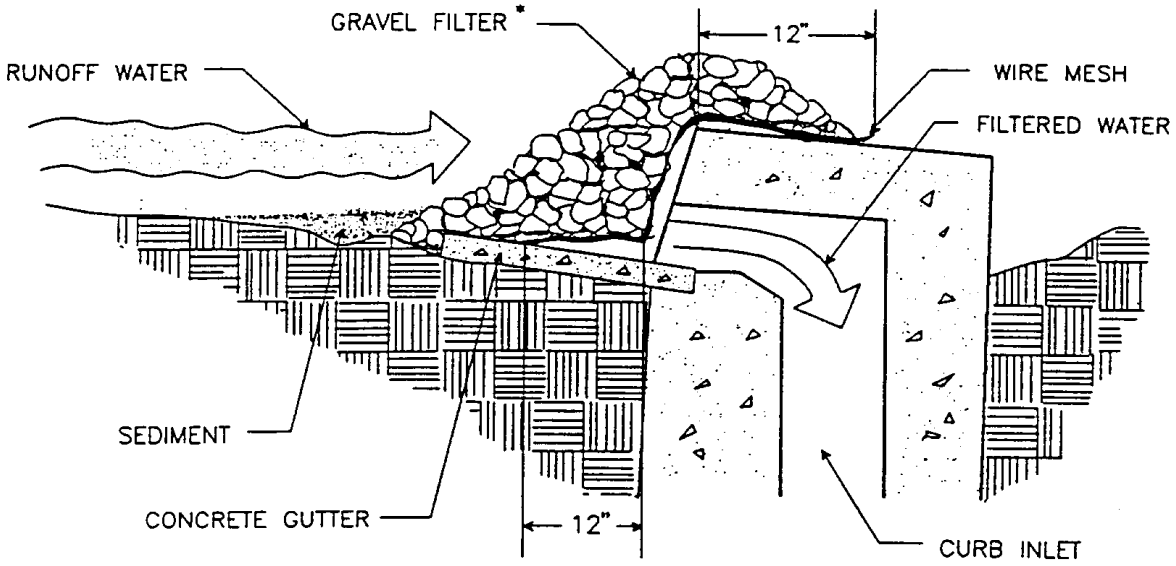


SPECIFIC APLLICATION

THIS METHOD OF INLET PROTECTION IS APPPLICABLE ONLY AT THE TIME OF PERMANENT SEEDING, TO PROTECT THE INLET FROM SEDIMENT AND MULCH MATERIAL UNTIL PERMANENT VEGETATION HAS BECOME ESTABLISHED.

Plate 4.08j Sod Drop Inlet Sediment Filter
Source: Virginia DSWC



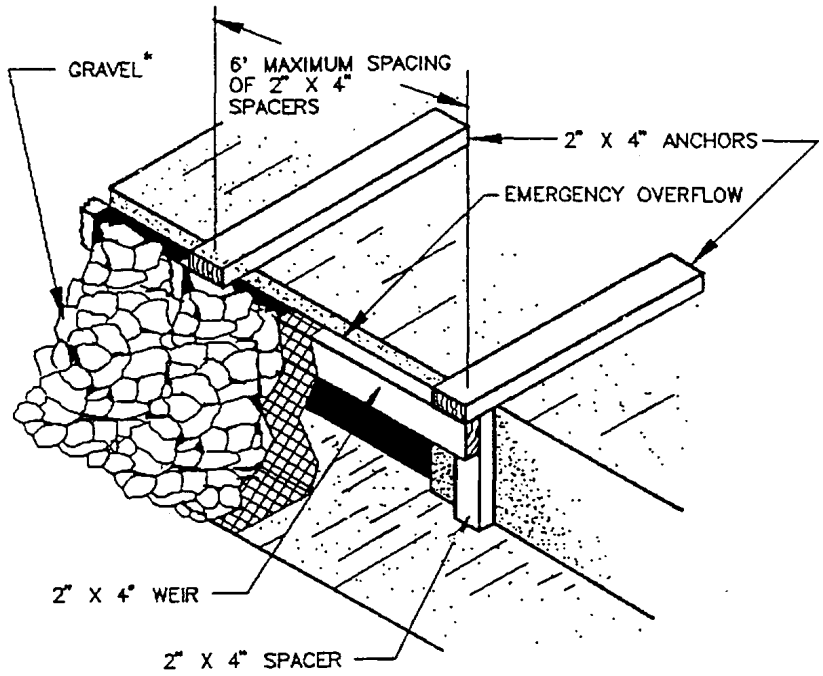


Specific Application

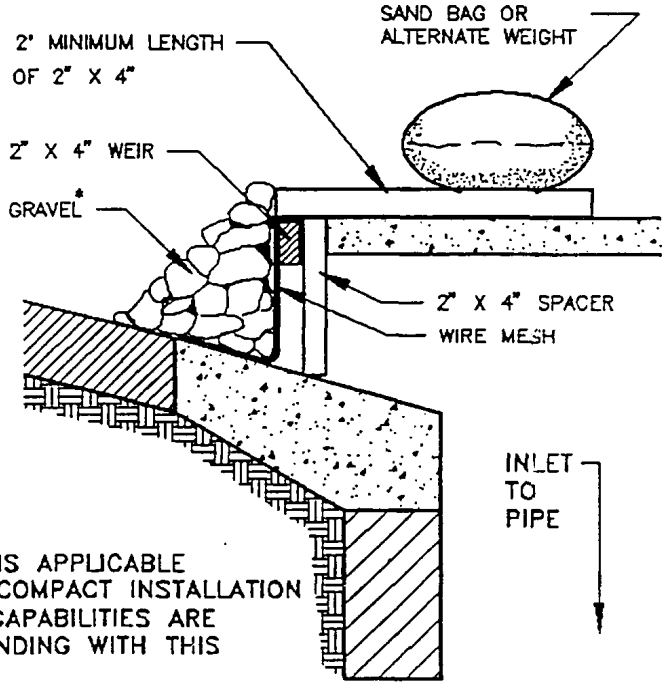
This method of inlet protection is applicable at curb inlets where ponding in front of the structure is not likely to cause inconvenience or damage to adjacent structures and unprotected ares.

* Gravel Shall be VDOT #3, #357, or #5 Coarse Aggregate.

Plate 4.08k Gravel Curb Inlet Sediment Filter
Source: Virginia DSWC



Perspective View



Side Elevation

SPECIFIC APPLICATION

THIS METHOD OF INLET PROTECTION IS APPLICABLE TO CURB INLETS WHERE A STURDY, COMPACT INSTALLATION IS DESIRED. EMERGENCY OVERFLOW CAPABILITIES ARE MINIMAL, SO EXPECT SIGNIFICANT PONDING WITH THIS MEASURE.

*GRAVEL SHALL BE VDOT COARSE AGGREGATE #3, #357 OR #5

Plate 4.08L Gravel Curb Inlet Sediment Filter with Overflow Weir
Source: Maryland Standards and Specifications for Soil Erosion and Sediment Control

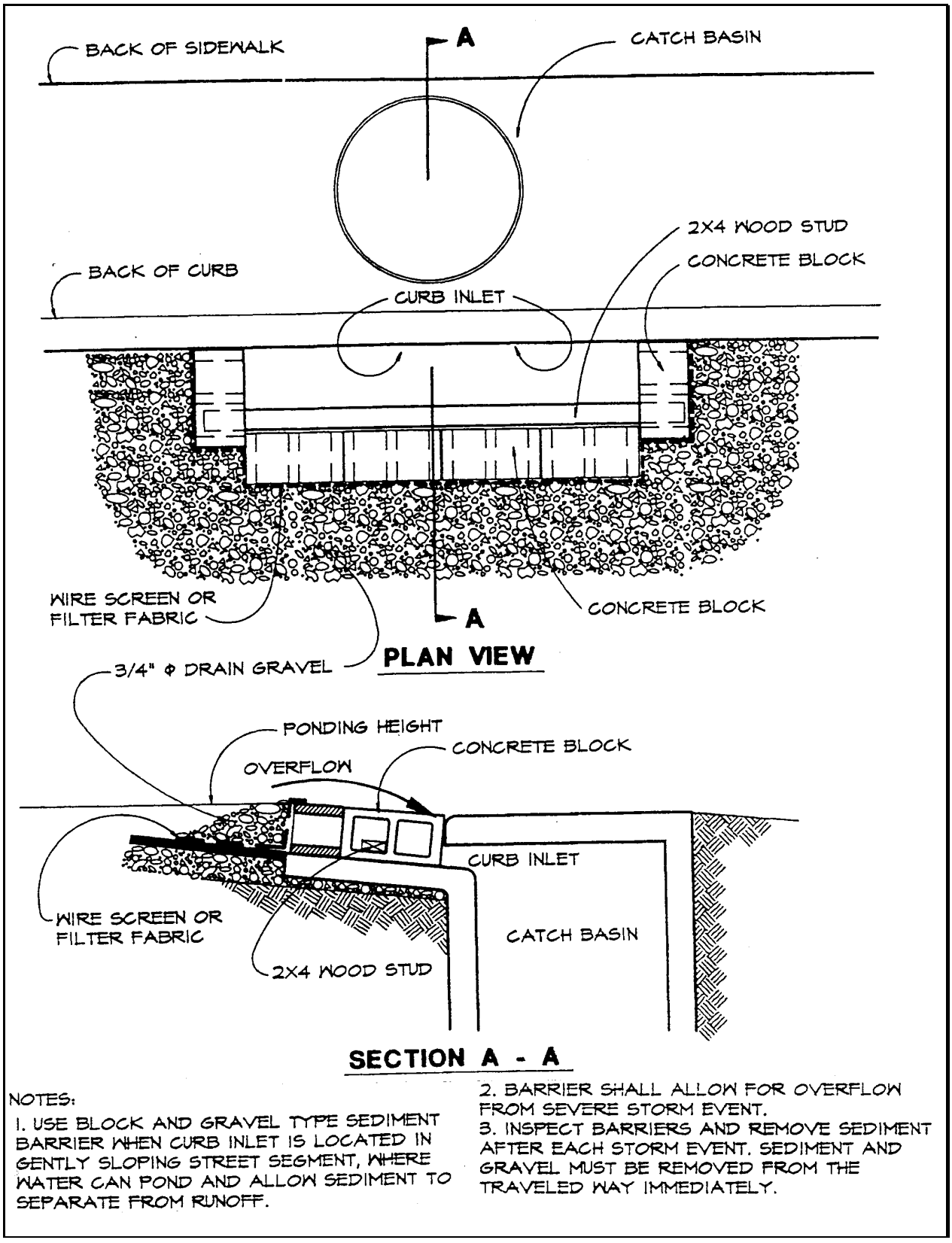


Plate 4.08m Block and Gravel Curb Inlet Sediment Barrier
Source: Erosion Draw

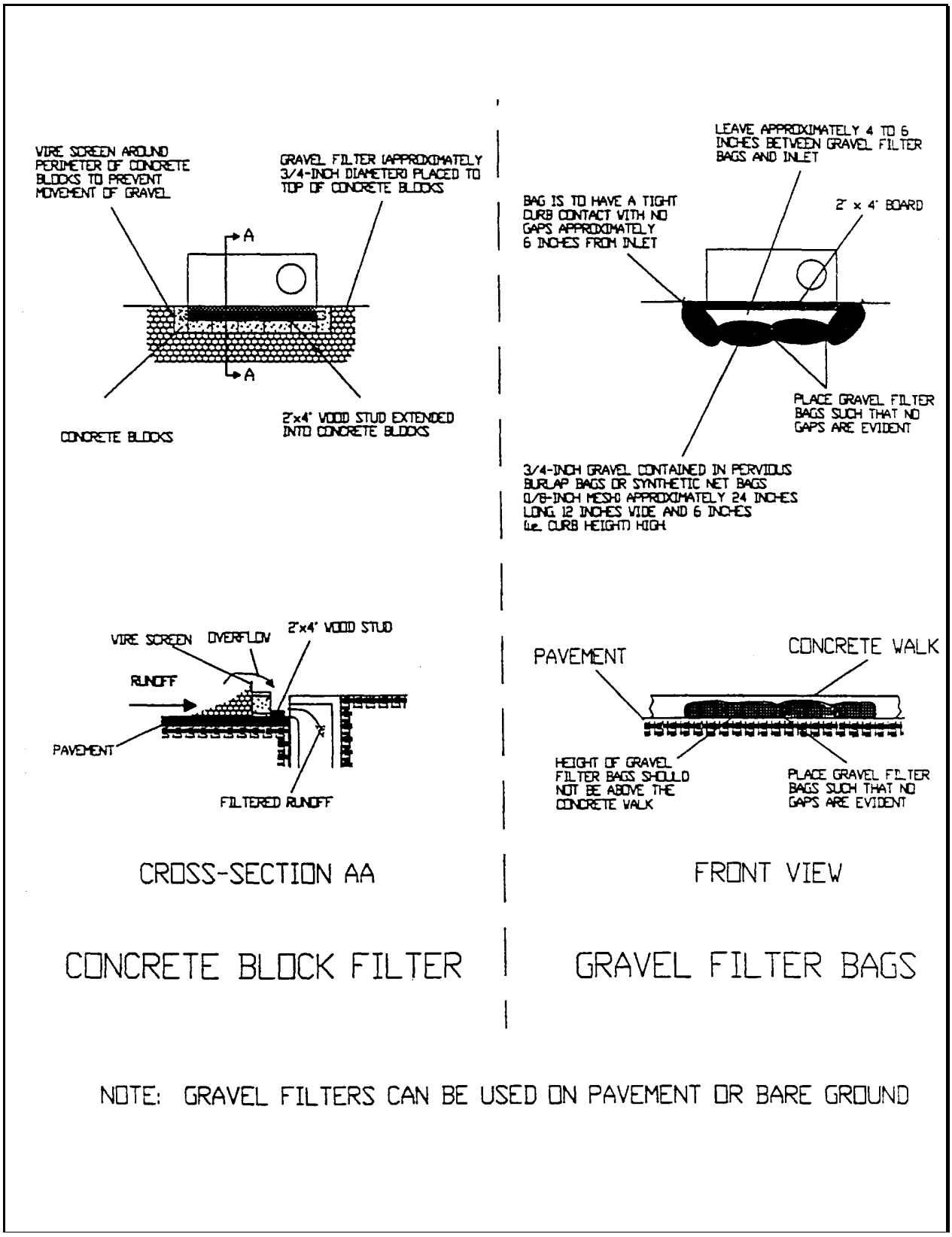


Plate 4.08n Curb Inlet Gravel Filters
Source: HydroDynamics, Inc.

6. If the stone filter becomes clogged with sediment so that it no longer adequately performs its function, the stone must be pulled away from the block, cleaned and replaced.

7. As an alternate, gravel filled burlap bags may be stacked tightly around the curb inlet. (See Plates 4.08n and 4.08o)

Curb and Gutter Sediment Barrier

1. Place gravel filled burlap bags on gently sloping street segments according to the spacing chart. (See Plate 4.08p)

2. Place two or more bags at each interval in a manner which provides maximum support.

3. When stacking several bags high, leave a one bag gap to provide an overflow spillway. (See Plate 4.08q)

4. Sediments must be removed after each rain event.

Maintenance

1. The structure shall be inspected after each rain and repairs made as needed.

2. Sediment shall be removed and the trap restored to its original dimensions when the sediment has accumulated to 1/2 of the design depth of the trap. Removed sediment shall be deposited in a suitable area and in such a manner that it will not erode.

3. Structures shall be removed and the area stabilized when the remaining drainage area has been properly stabilized.

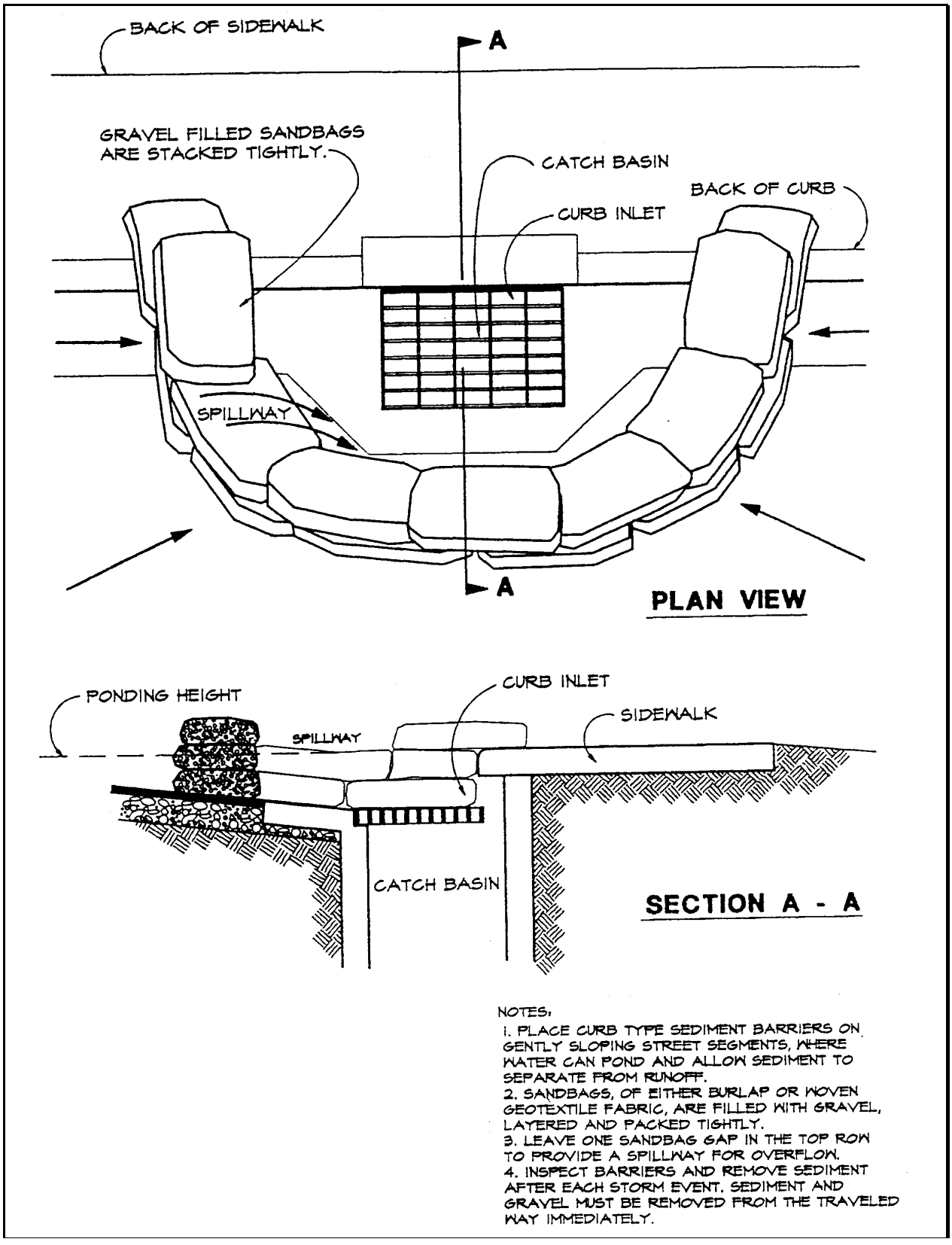
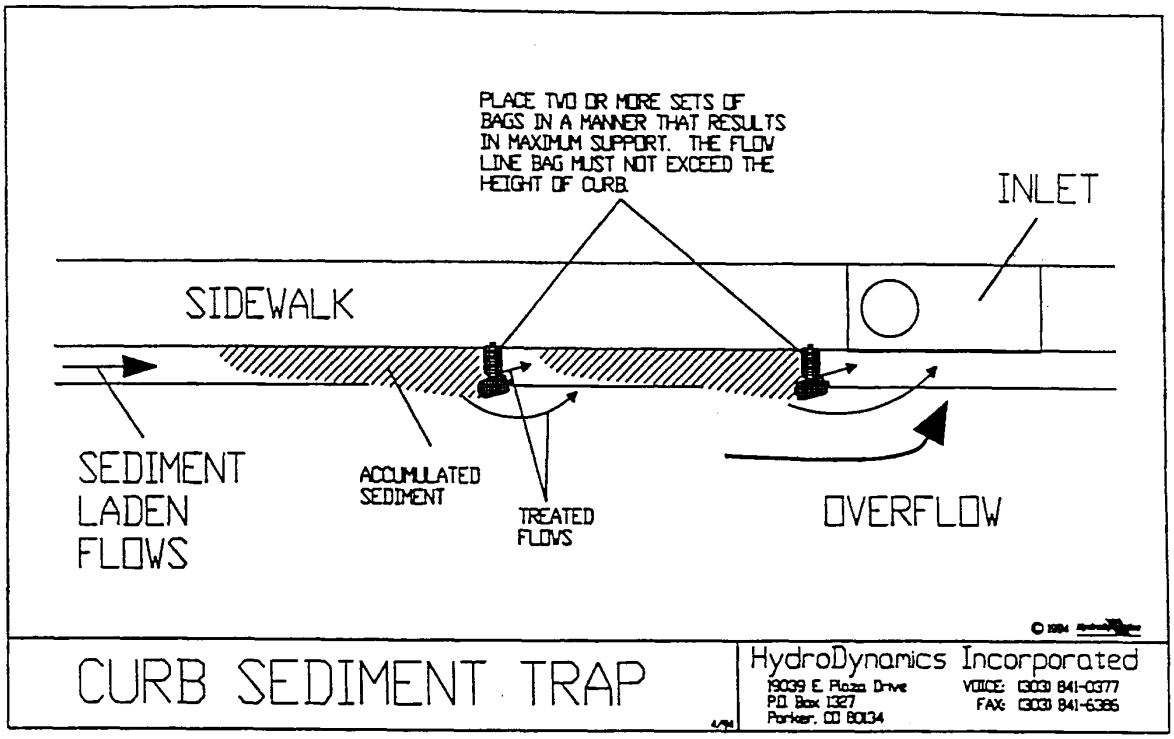


Plate 4.08o Curb Inlet Sediment Barrier
Source: Erosion Draw



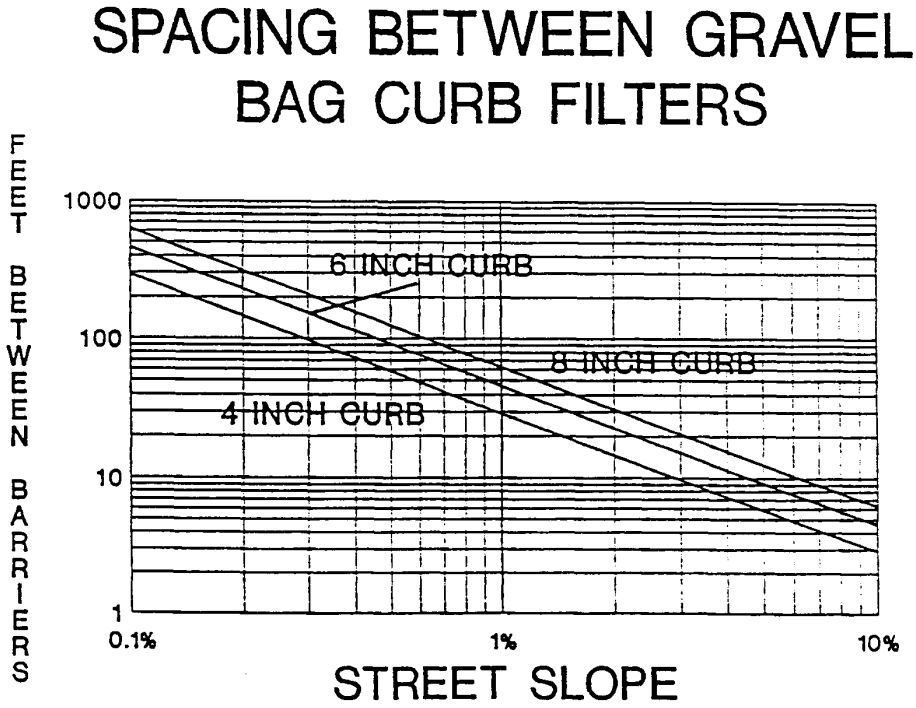
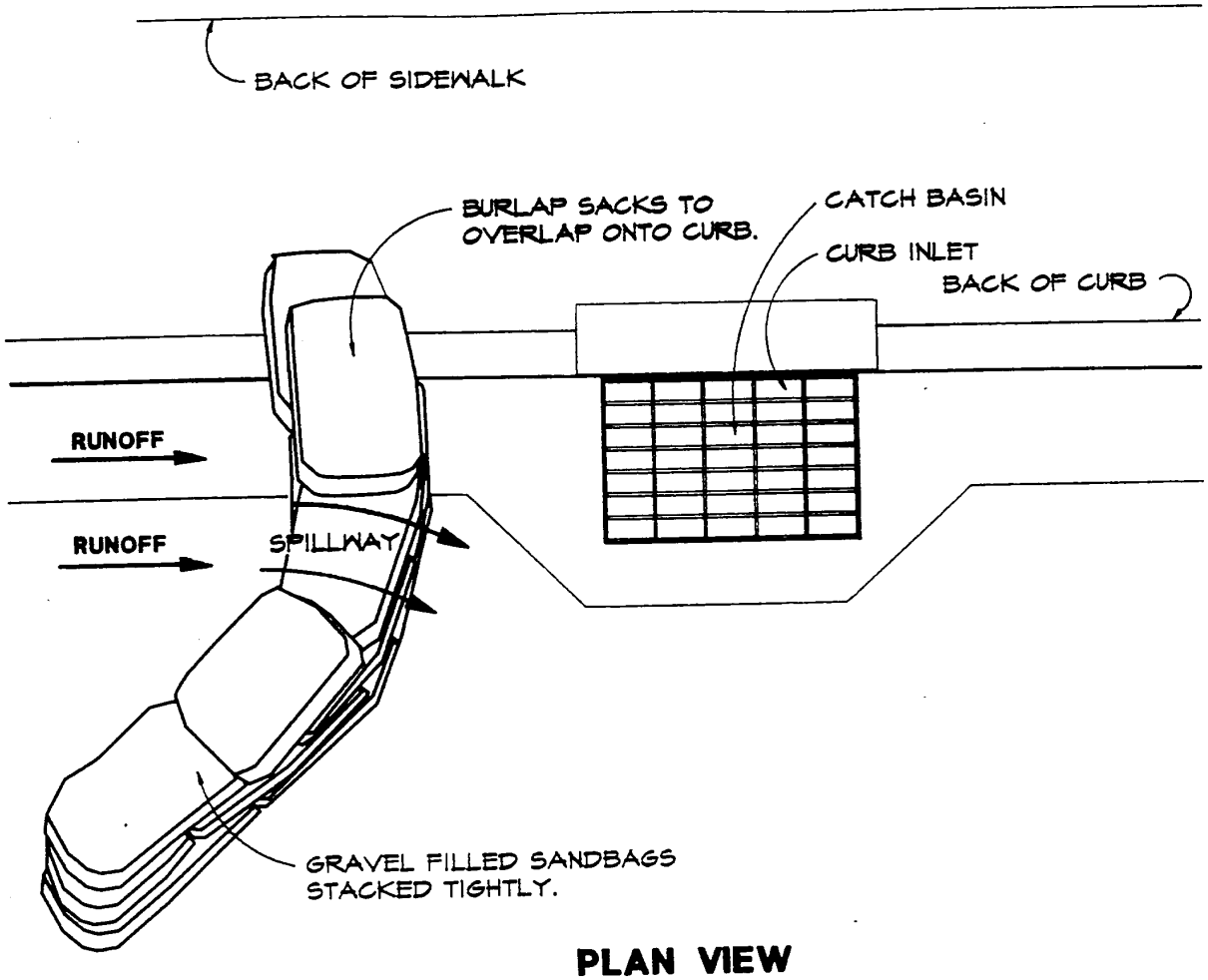


Plate 4.08p Gravel Bag Curb Sediment Filters
Source: HydroDynamics, Inc.



PLAN VIEW

NOTES:
1. PLACE CURB TYPE SEDIMENT BARRIERS ON GENTLY SLOPING STREET SEGMENTS, WHERE WATER CAN POND AND ALLOW SEDIMENT TO SEPARATE FROM RUNOFF.
2. SANDBAGS OF EITHER BURLAP OR WOVEN 'GEOTEXTILE' FABRIC, ARE FILLED WITH GRAVEL LAYERED AND PACKED TIGHTLY.
3. LEAVE A ONE SANDBAG GAP IN THE TOP ROW TO PROVIDE A SPILLWAY FOR OVERFLOW.
4. INSPECT BARRIERS AND REMOVE SEDIMENT AFTER EACH STORM EVENT. SEDIMENT AND GRAVEL MUST BE REMOVED FROM THE TRAVELED WAY IMMEDIATELY.

Plate 4.08q Curb and Gutter Sediment Barrier
Source: Erosion Draw