

6.4 Storm Drain Inlet Protection



Description

Storm drain inlet protection devices remove sediment from storm water before it enters storm sewers and downstream areas. Inlet protection devices are sediment barriers that may be constructed of washed gravel or crushed stone, geotextile fabrics and other materials that are supported around or across storm drain inlets.

Inlet protection is installed to capture some sediment and reduce the maintenance of storm sewers and other underground piping systems prior to the site being stabilized. Due to their poorer effectiveness, inlet protection is considered a secondary sediment control to be used in conjunction with other more effective controls.

Condition Where Practice Applies

Storm drain inlet protection is applicable anywhere construction site runoff may enter closed conveyance systems through storm sewer inlets. Generally inlet protection is limited to areas draining less than 1 acre.

This practice is generally not recommended as a primary means of sediment control. Storm drain inlet protection has limited capacity to control silts and clays, and is most effective in capturing larger sand-sized particles. It should only be a primary means if it is not possible to divert the storm drainage to a sediment trap or sediment basin, or if it is to be used only for a short period of time during the construction process.

Planning Considerations

Inlet protection in effect blocks storm drain inlets. Therefore consider the effect of ponding muddy water on streets and nearby areas and plan accordingly. Although ponding is beneficial in the sediment removal process, this may pose hazardous conditions for street travel. Additional ponding capacity with related increase in effectiveness can be provided for some drop inlets by excavating around the inlet.

Utilizing inlet protection on long sloping streets may cause runoff to bypass inlets on the slope and cause extra water to accumulate in low areas. In order for the inlet protection to work ponding must be maintained at the practice.

The recommended geotextiles are suitable for retaining/trapping large particle size materials, such as sand while maintaining some flow. Only specialized geotextile materials are suitable for retaining clay, silt and other fine soils. These materials, however, are subject to clogging.

Apply storm drain inlet protection as soon as the surface inlet is capable of receiving storm water. Geotextiles utilized in inlet protection are manufactured to control the rate of storm water flow, to retain certain sizes of soil particles. The controlled flow and ponding assists in sediment deposition. Geotextile fabrics come in a variety of materials with permeability, strength and durability ratings. In all cases, follow the manufacturer's recommendations for the specific product application, as well as installation and maintenance requirements.

All inlet protection practices require frequent maintenance and cleaning to maintain sufficient flow rates and to prevent accumulation of mud on streets and other areas.

The following types of storm drain inlet protection are listed according to type of flows and situations where they will perform best. Note that straw bales are not suitable as storm drain inlet protection, since they often cease to allow flow through once saturated and often leak where bales join. Different types of storm drain inlet protection available are as follows:

- A. Excavated Drop Inlet Sediment Trap. Where the storm sewer can be left below the final grade, a depression in the ground adjacent to the inlet can be an effective way of reducing sediment going to the storm sewer. Runoff is directed to the depression and a sediment barrier is maintained between the depression and the storm sewer.
- B. Geotextile Inlet Protection. This method consists of placing filter fence around the perimeter of the drop inlet and backfilling. Apply this method where the inlet drains overload flow or sheet flow from gentle slopes and sheet or overland flow.
- C. Geotextile-Stone Protection. These are used both on drop inlets and in street curbs and gutters where the ponding of water will not cause damage or inconvenience. This filter is simply constructed of geotextile materials over the inlet, with stone on top. Note: this practice does not have an opening for overflow and should not be placed where clogging and subsequent flooding would cause safety concerns or property damage.
- D. Geotextile-Stone Curb Inlet Protection. This method is used only on curb and gutter inlets and utilizes wire mesh, geotextile and stone over a wood frame. This practice should be used to prevent larger volumes of water from ponding in the street. If the overflow provided is insufficient, it may be modified according to this specification to accommodate greater flows.

- E. Block and Gravel Drop Inlet Protection. This practice utilizes a wall of cement blocks overlain with wire mesh and gravel around the perimeter to slow runoff before entering a storm drain. It is not recommended anywhere vehicle traffic will be operating.
- F. Manufactured Inlet Protection Devices. Any manufactured products utilized for inlet protection must be constructed of materials equally durable and effective as those provided in this practice. They must be able to be secured such that construction site runoff is intercepted, ponded and filtered prior to entering the storm drain except during extreme flows. Devices must allow the removal of captured material without falling into the catch basin.

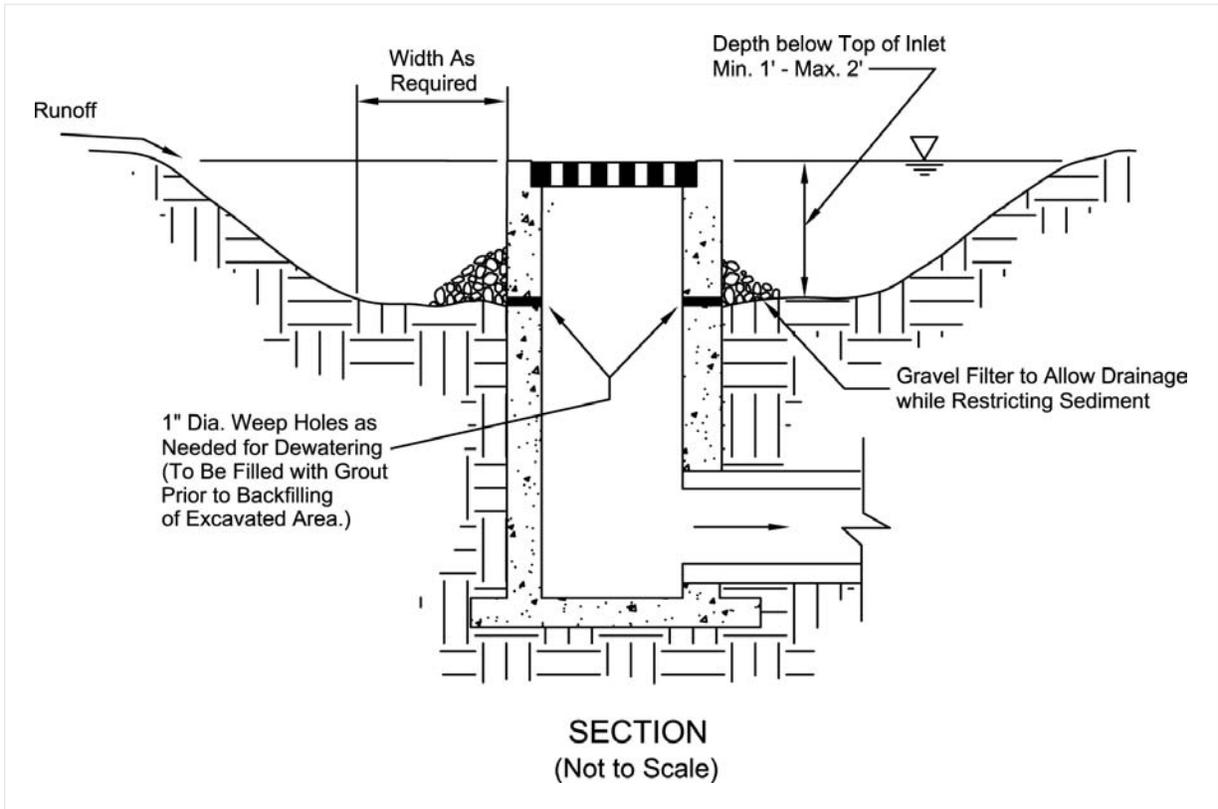
Maintenance

Effective storm drain inlet protection collects sediment and therefore must be cleaned regularly to prevent clogging and subsequent flooding conditions, piping, or overtopping of the control structures. Sediment barriers that sag, fall over, or are not properly secured, must be promptly repaired or replaced.

Inlet protection shall be inspected weekly and after each rainfall event. Areas where there is active traffic shall be inspected daily. Repairs shall be made as needed to assure the practice is performing as intended. Sediment shall be removed when accumulation is one-half the height of the trap. Sediment shall not be washed into the inlet. Sediment shall be removed and placed in a location where it is stable and not subject to erosion.

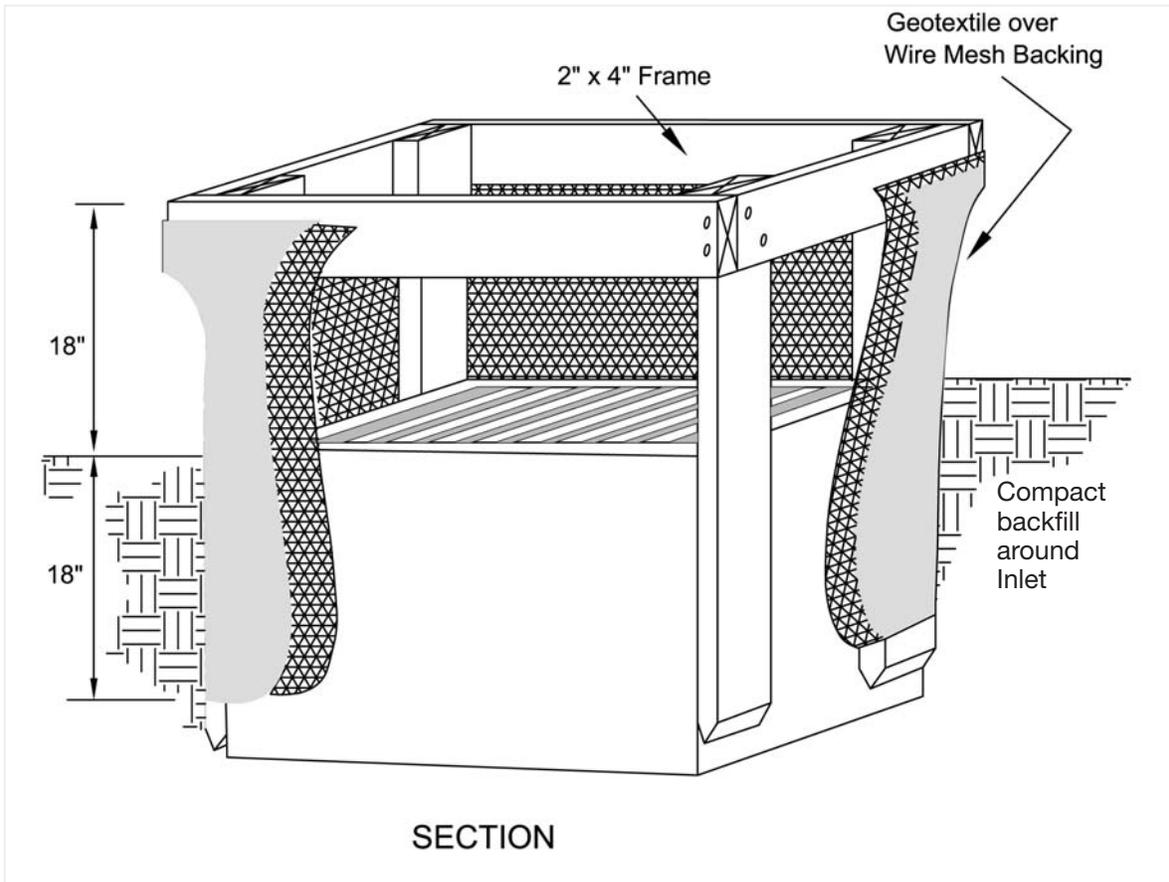
Once the contributing drainage area has been properly stabilized, all filter material and collected sediment shall be removed and properly disposed.

Specifications
for
Excavated Drop Inlet Sediment Protection



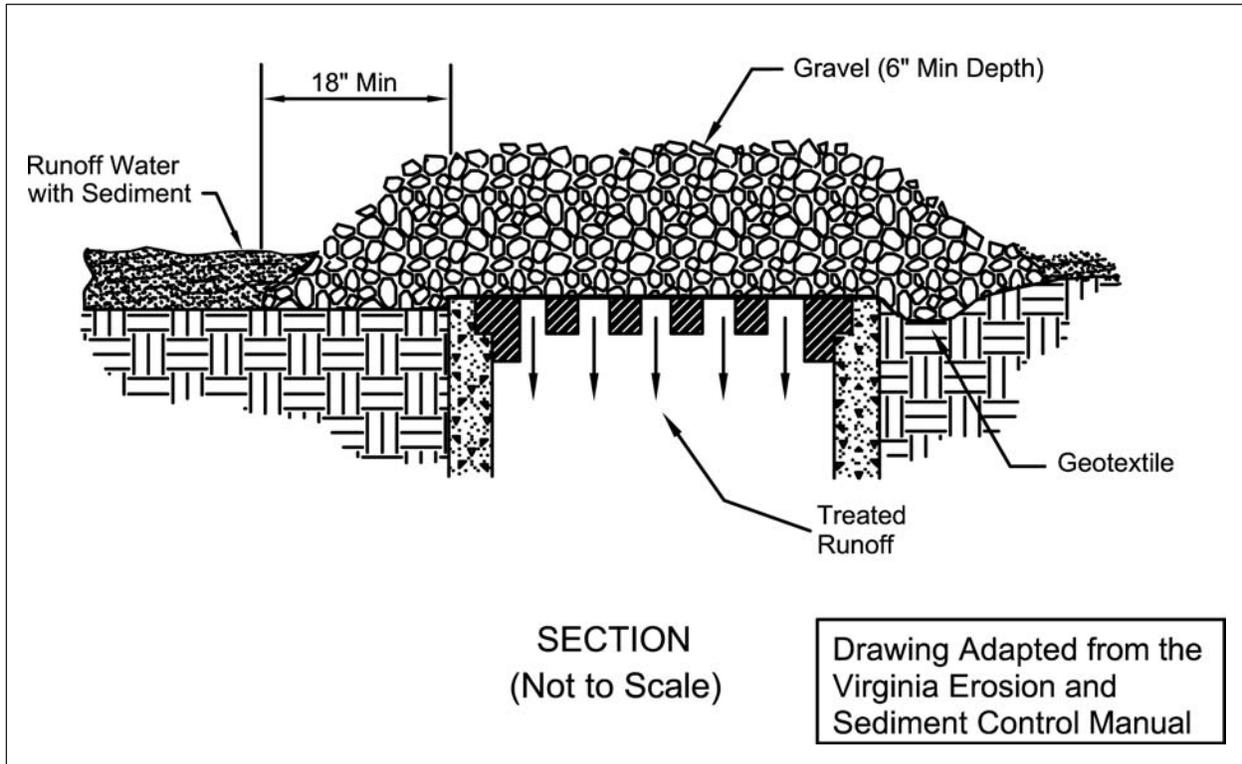
1. The excavated trap should be sized to provide a minimum storage capacity calculated at the rate of 135 cubic yards for one (1) acre of drainage area. A trap should be no less than one (1) foot, nor more than two (2) feet deep measured from the top of the inlet structure. Side slopes should not be steeper than 2:1.
2. The slopes of the trap may vary to fit the drainage area and terrain.
3. Where the area receives concentrated flows, such as in a highway median, provide the trap with a shape having a 2:1 ratio of length to width, with the length oriented in the direction of the flow.
4. Sediment should be removed and the trap restored to the original depth when the sediment has accumulated to 40% the design depth of the trap. Removed sediment should be spread in a suitable area and stabilized so it will not erode.
5. During final grading, the inlet should be protected with geotextile-stone inlet protection. Once final grading is achieved, sod or a suitable temporary erosion control material shall be implemented to protect the area until permanent vegetation is established.

Specifications
for
Geotextile Inlet Protection



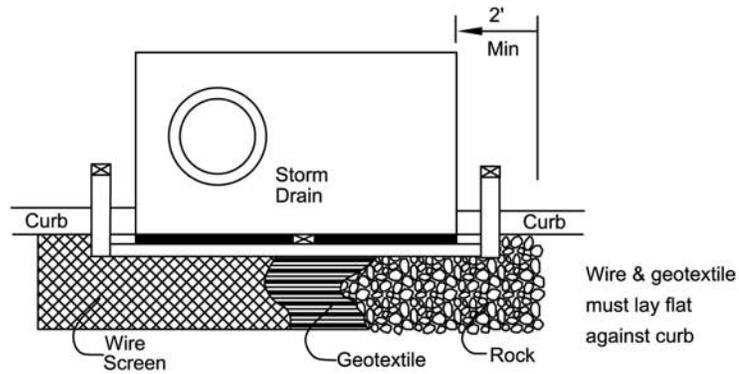
1. Inlet protection shall be constructed either before upslope land disturbance begins or before the inlet becomes functional.
2. The earth around the inlet shall be excavated completely to a depth at least 18 inches.
3. The wooden frame shall be constructed of 2-inch by 4-inch construction grade lumber. The 2-inch by 4-inch posts shall be driven one (1) ft. into the ground at four corners of the inlet and the top portion of 2-inch by 4-inch frame assembled using the overlap joint shown. The top of the frame shall be at least 6 inches below adjacent roads if ponded water will pose a safety hazard to traffic.
4. Wire mesh shall be of sufficient strength to support fabric with water fully impounded against it. It shall be stretched tightly around the frame and fastened securely to the frame.
5. Geotextile material shall have an equivalent opening size of 20-40 sieve and be resistant to sunlight. It shall be stretched tightly around the frame and fastened securely. It shall extend from the top of the frame to 18 inches below the inlet notch elevation. The geotextile shall overlap across one side of the inlet so the ends of the cloth are not fastened to the same post.
6. Backfill shall be placed around the inlet in compacted 6-inch layers until the earth is even with notch elevation on ends and top elevation on sides.
7. A compacted earth dike or check dam shall be constructed in the ditch line below the inlet if the inlet is not in a depression. The top of the dike shall be at least 6 inches higher than the top of the frame.

Specifications
for
Geotextile-Stone Inlet Protection

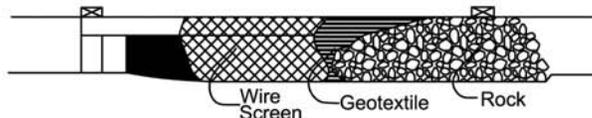


1. Inlet protection shall be constructed either before upslope land disturbance begins or before the inlet becomes functional.
2. Geotextile and/or wire material shall be placed over the top of the storm sewer and approximately six (6) inches of 2-inch or smaller clean aggregate placed on top. Extra support for geotextile is provided by placing hardware cloth or wire mesh across the inlet cover. The wire should be no larger than $\frac{1}{2}$ " mesh and should extend an extra 12 inches across the top and sides of the inlet cover.
3. Maintenance must be performed regularly, especially after storm events. When clogging of the stone or geotextile occurs, the material must be removed and replaced.

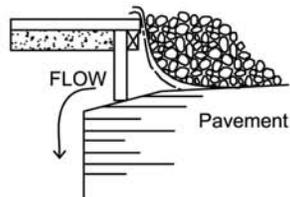
Specifications
for
Geotextile - Stone Inlet Protection for Curb Inlets



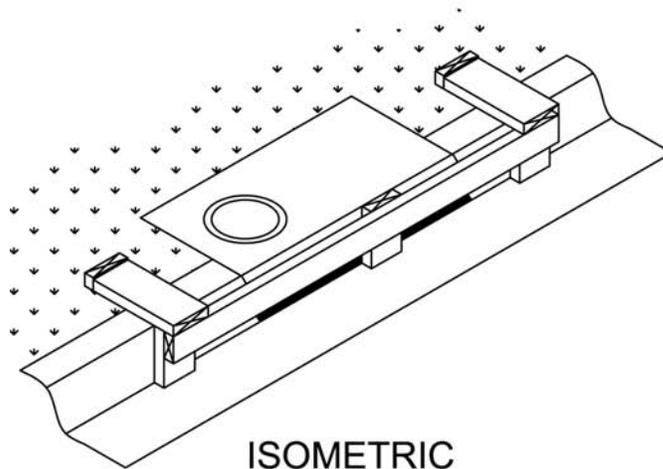
PLAN VIEW



ELEVATION



CROSS SECTION



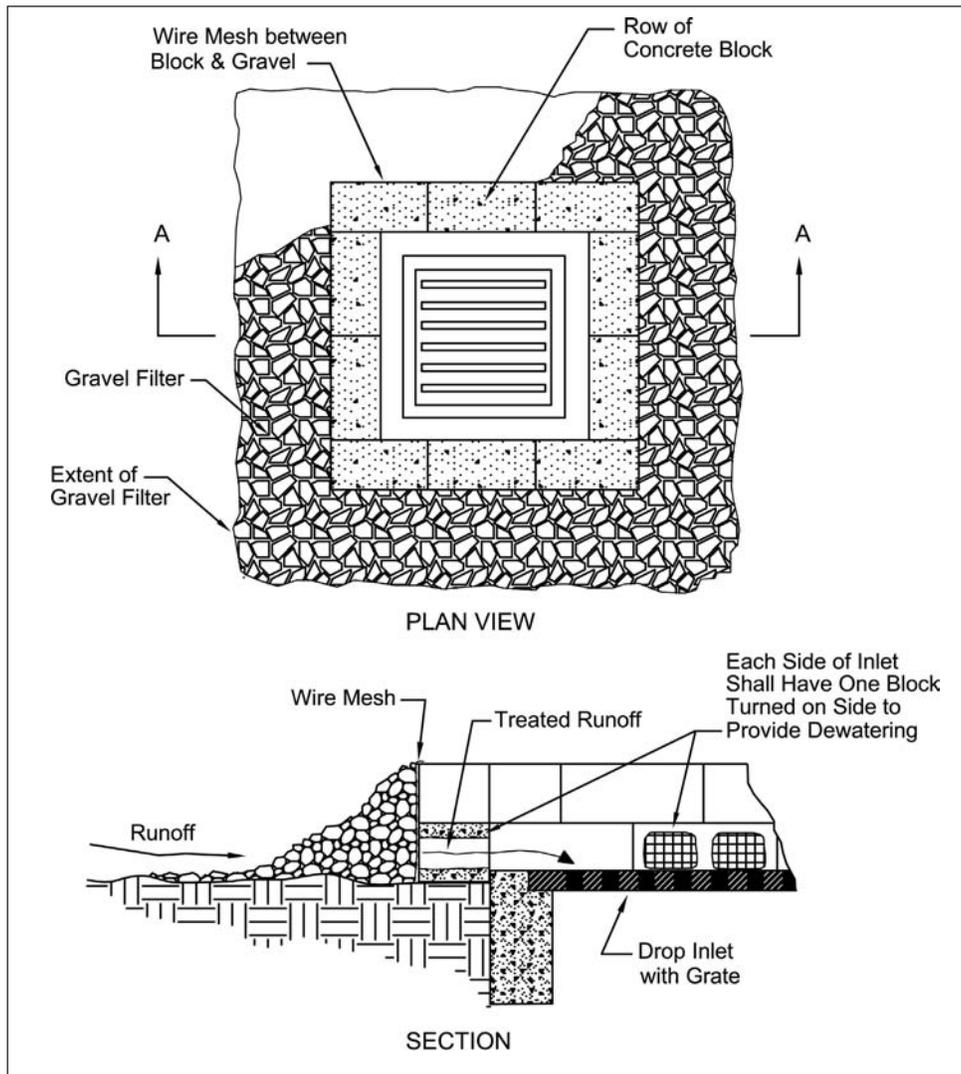
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Specifications
for

Geotextile-Stone Inlet Protection for Curb Inlets

1. Inlet protection shall be constructed either before upslope land disturbance begins or before the inlet becomes functional.
2. Construct a wooden frame of 2-by-4-in. construction-grade lumber. The end spacers shall be a minimum of 1 ft. beyond both ends of the throat opening. The anchors shall be nailed to 2-by-4-in. stakes driven on the opposite side of the curb.
3. The wire mesh shall be of sufficient strength to support fabric and stone. It shall be a continuous piece with a minimum width of 30 in. and 4 ft. longer than the throat length of the inlet, 2 ft. on each side.
4. Geotextile cloth shall have an equivalent opening size (EOS) of 20-40 sieve and be resistant to sunlight. It shall be at least the same size as the wire mesh.
5. The wire mesh and geotextile cloth shall be formed to the concrete gutter and against the face of the curb on both sides of the inlet and securely fastened to the 2-by-4-in. frame.
6. Two-inch stone shall be placed over the wire mesh and geotextile in such a manner as to prevent water from entering the inlet under or around the geotextile cloth.
7. This type of protection must be inspected frequently and the stone and/or geotextile replaced when clogged with sediment.

Specifications
for
Block and Gravel Drop Inlet Filter



1. Place 4-inch by 8-inch by 12-inch 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 upon the design needs, by stacking combinations of the same size blocks. The barrier of blocks should be at least 12-inches high but no greater than 24-inches high.
2. Wire mesh should be placed over the outside vertical face (webbing) of the concrete blocks to prevent stone from being washed through the block cores. Hardware cloth or comparable wire mesh with ½-inch openings should be used.
3. Two-inch stone should be piled against the wire to the top of the block barrier, as shown below.
4. If the stone filter becomes clogged with sediment so that it no longer adequately performs its function, pull stone away from the blocks, clean and/or replace.