

Storm Sewer Inlet Protection

Definition

Storm sewer inlet protection consists of a sediment filter or an impounding area around or upstream of a storm sewer, drop inlet, or curb inlet.

Description and Purpose

Storm sewer inlet protection measures temporarily pond runoff before it enters the storm sewer, allowing sediment to settle, or remove sediment by filtering.

The practice may also be called Storm Sewer Inlet Protection or Inlet Protection

Pollutant(s) controlled:

- Suspended Solids

Treatment Mechanisms:

- Settling of sediment through detention
- Filtration of sediment

Pollution Removal Efficiencies:

- Varies with soil type on site and type of inlet protection selected

Companion and Alternative BMPs

- Silt fence
- Sediment basins

Advantages and Disadvantages

Advantages:

- Will reduce the amount of sediment entering the storm sewer system, potentially extending the time until maintenance is needed
- In many cases, provides a last chance to remove suspended particles from runoff
- Areas requiring protection are easy to identify during both planning and construction

Disadvantages:

- Requires an adequate area for water to pond without encroaching into portions of the site where active construction is occurring or onto roadways subject to traffic.
- Inlet protection usually requires other methods of temporary protection to prevent sediment-laden stormwater and non-stormwater discharges from entering the storm sewer system.
- Sediment removal may be difficult in high flow conditions or if runoff is heavily sediment laden.

- Frequent maintenance is required.
- May be improperly used as the sole method of erosion and sedimentation control

Location

Every storm sewer inlet receiving sediment-laden runoff should be protected.

General Characteristics

- Three types of inlet protection are detailed in this specification:
 1. Silt Fence Barrier: Appropriate for drainage basins with less than a 5% slope, sheet flows, and flows under 0.5 cfs.
 2. Block and Gravel Filter: Appropriate for flows greater than 0.5 cfs.
 3. Premanufactured devices: A variety of manufactured products are available including: storm inlet filter socks, synthetic filter tubes for open throat curb inlets, inlet inserts, pop-up filters for area inlets, and many others. These products should be used and installed according to the manufacturer’s recommendations.
- DEQ does not recommend the use of filter fabric under the grate as an inlet protection measure. Fabric blinds off quickly when the pores space in the fabric close with sediment causing flooding to occur. When flooding occurs the fabric is often tampered with (slits cut in) rendering it ineffective at reducing or preventing sediment discharge into the stormwater system. In addition fabric is often unable to be effectively removed without causing the sediment on top of the fabric to drop into the catch basin.

Materials

1. Silt Fence Barrier:

Table 1: Materials and properties for silt fence construction

| Woven Geotextile Fabric Width | Min. Hardwood Post Length* | Min. Grab Tensile (ASTM D 4632) | Min. Trapezoidal Tear Strength (ASTM D 4533) | Min. Permittivity (ASTM D 4491) | Max. Apparent Opening Size (ASTM D 4751) |
|-------------------------------|----------------------------|---------------------------------|--|---------------------------------|--|
| 24" | 36" | 100 lbs | 45 lbs | 0.1 sec ⁻¹ | 0.6 mm |
| 36" | 42" | 100 lbs | 45 lbs | 0.1 sec ⁻¹ | 0.6 mm |

*Hardwood posts shall be a minimum of 1 1/8" x 1 1/8" thickness

Source: Adapted from Michigan Department of Transportation 2003 Standard Specifications for Construction

Additional materials:

- Metal Staples or nails for attaching lath and fabric to posts
- Hardwood Lath 6 to 8 inches shorter than fabric width

2. Block and Gravel Filter:

- Hardware cloth or comparable wire mesh with 0.5 in. openings
- Concrete blocks
- Washed stone 0.75 to 3 in.

Design Specifications

- If high flow conditions are expected, use other onsite sediment trapping techniques in conjunction with inlet protection.
- Using any inlet protection device that restricts the flow into the inlet should be avoided for inlets that are on-grade. Because of the flow restriction, a majority of the flow to an on-grade inlet will be bypassed to the downstream inlet. This creates the potential for flooding problems downstream.
- To limit the potential for flooding, limit the upstream drainage area to 1 acre
- Runoff should be routed to a sediment-trapping device designed for larger flows (e.g. sediment basin) when the drainage area exceeds 1/2 acre.
- Silt Fence Barrier (see figure 1)
 1. Silt fence must be installed per [Silt Fence Specification](#).
 2. Stakes must be a maximum of 3ft apart
 3. Fabric must be trenched in
 4. You may want to consider spill-over protection on the inlet side of the silt fence barrier such as mulch blanket, geotextile fabric, stone, etc. This prevents the dislodging of soil on the inside of the silt fence barrier by water passing through or over top of the silt fence.
- Block and Gravel Filter (see figure 2)
 1. Place concrete blocks lengthwise on their sides in a single row around the perimeter of the inlet, so that the open ends face outward, not upward. The ends of adjacent blocks should abut. The height of the barrier can be varied, depending on design needs, by stacking combinations of blocks that are 4 in., 8 in., and 12 in. wide. The row of blocks should be at least 12 in. but no greater than 24 in. high.
 2. Place wire mesh over the outside vertical face (open end) of the concrete blocks to prevent stone from being washed through the blocks. Use hardware cloth or comparable wire mesh with 0.5 in. opening.
 3. Pile washed stone against the wire mesh to the top of the blocks. Use 0.75 to 3 in.

Performance Enhancers

- An excavated drop inlet sediment trap can be used in conjunction with other inlet protection to enhance the settling of large sediment particles prior to it entering the storm sewer system.

Construction Guidelines

- Identify existing and planned storm sewer inlets that have the potential to receive sediment laden surface runoff. Determine if storm sewer inlet protection is needed and which method to use.
- Determine the acceptable location and extent of ponding in the vicinity of the drain inlet. The acceptable location and extent of ponding will influence the type and design of the storm sewer inlet protection device.
- Select the appropriate type of inlet protection and design
- Inlet protection should be placed immediately after storm sewer inlets are installed.
- Inlet protection should be left in place and maintained until the drainage area is stabilized with established vegetation and pavement.
- Remove storm sewer inlet protection once the drainage area is stabilized.

Monitoring

Inspect BMPs prior to forecast rain, daily during extended rain events, after rain events, weekly during the rainy season, and at two-week intervals during the non-rainy season.

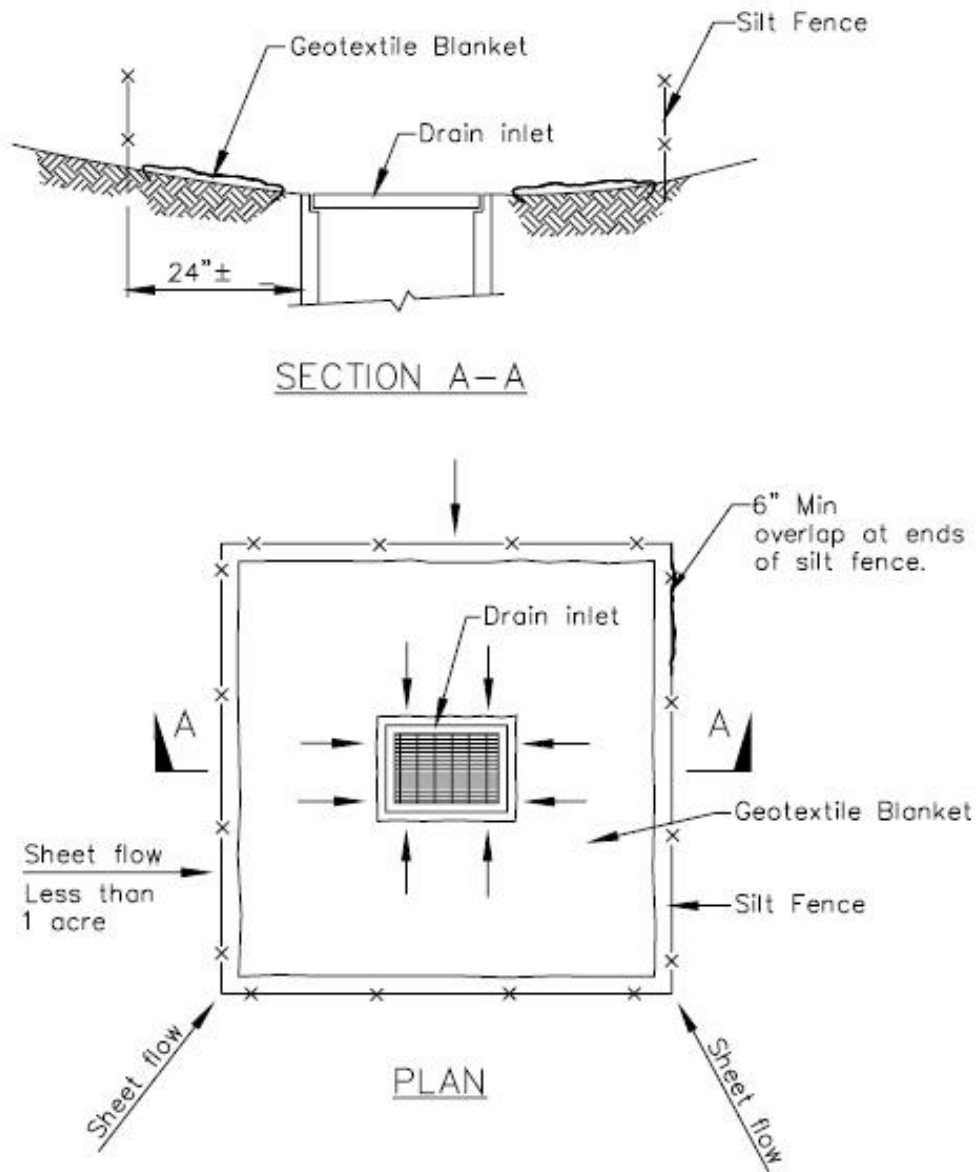
Maintenance

- Silt Fence Barriers. If the fabric becomes clogged, torn, or degrades, it should be replaced. Make sure the stakes are securely driven in the ground and are in good shape (i.e., not bent, cracked, or splintered, and are reasonably perpendicular to the ground). Replace damaged stakes.
- Block and Gravel Filters. If the gravel becomes clogged with sediment, it must be carefully removed from the inlet and either cleaned or replaced. Since cleaning gravel at a construction site may be difficult, consider using the sediment-laden stone as fill material and put fresh stone around the inlet.
- Sediment that accumulates in the BMP must be periodically removed in order to maintain BMP effectiveness. Sediment should be removed when the sediment accumulation reaches 1/3 – 1/2 of the silt fence height. Sediment removed during maintenance may be incorporated into earthwork on the site or disposed at an appropriate location.

References

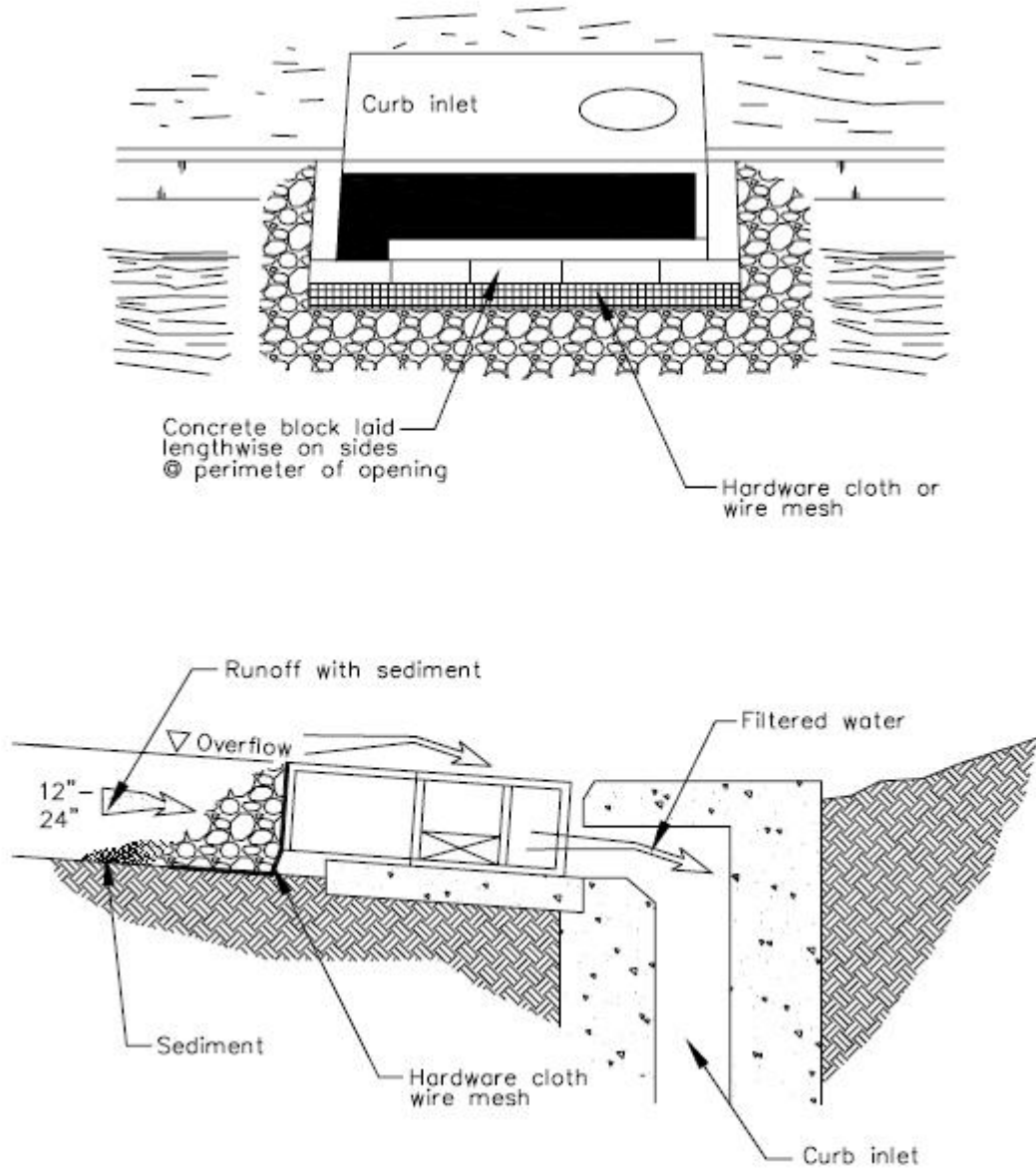
California Stormwater BMP Handbook, Construction, 2003

Figure 1. Silt Fence Barrier



Source: California Stormwater BMP Handbook, Construction, 2003

Figure 2. Block and Gravel Filter



Source: California Stormwater BMP Handbook, Construction, 2003