

4.5-p DRAIN INLET PROTECTION

Alternative Names: DI protection, Drop Inlet Protection

DESCRIPTION

Storm drain inlet (DI) protection slows and ponds stormwater, and filters sediment and debris before it enters a storm drain system. DI protection consists of different types of protection inside, around, and/or upstream of storm drain inlets.

SITE SUITABILITY

- If high flow conditions are expected, other on-site sediment trapping techniques must be used in conjunction with inlet protection.
- Every storm drain inlet, catch basin, curb inlet, culvert, or similar drainage device that is found downslope of a construction site or may receive sediment laden runoff must be protected by a combination of upstream erosion control and temporary inlet protection devices.

Advantages

- Minimizes sediment and debris from entering storm drains that lead to waterways and watercourses.

Disadvantages

- Requires frequent maintenance and inspection.
- Sediment removal from the drain inlet may be difficult in high flow conditions or if runoff is heavily sediment-laden.
- If not installed properly, downstream flooding may occur during storm events where each drain inlet protection directs stormwater downstream.

DESIGN CONSIDERATIONS

- Mark drain inlet protection with visible barriers when necessary to prevent damage of protection devices by vehicles and disturbance of bicyclists (e.g. use traffic cones, barricade fences, snow stakes, and large painted stones).
- Use drain inlet protection with other sediment and erosion control techniques.
- Provide ample area for water to pond behind drain inlet protection, without causing flooding to surrounding structures, roadways, properties, or downstream areas.
- Do not use sand bag drain inlet protection in the Lake Tahoe Region, because they break easily and allow sand and fine sediment to enter the storm drain system.
- Do not use straw bale drain inlet protection in the Lake Tahoe Region, because they may contain invasive weed seeds.
- Where bypass and flooding may occur on a long slope with multiple drains, drain inlet inserts that allow flow into the drain through a media-based filter system may be more appropriate.

BMP DESIGN APPROACH

Pollutant Source Control

Hydrologic Source Control

Stormwater Treatment

SCALE OF APPLICATION

All SFR and MFR < 1 acre

MFR 1-5 Acre and CICU < 5 acres

MFR and CICU > 5 acres and all WQIPs

TYPE OF APPLICATION

Temporary

Permanent

INSTALLATION

Construction Sequence/Timing Specifications:

- Identify existing and planned storm drain inlets that may receive sediment laden surface runoff.
- Determine the acceptable location and extent of ponding in the vicinity of the storm drain inlet. The acceptable location and extent of ponding will influence the type and design of the storm drain inlet protection device.
- Determine the extent of potential runoff diversion caused by drain inlet protection devices. Runoff ponded by these protection devices may overflow and run downstream.
- Select the appropriate type of drain inlet protection device for each area and design accordingly. More than one type of drain inlet protection device may be necessary for each drain inlet.
- Install drain inlet protection before construction begins.
- Remove drain inlet protection after the surrounding area is stabilized.

Installation Specifications:

Five devices are used for drain inlet protection. Each device is listed below with installation specifications:

- A. **Fiber rolls:** Use on paved and unpaved surfaces where flow velocities are less than 0.5 cubic feet per second to pond and filter water passing through them. Two types of fiber rolls are used, each for different drain inlet protection applications:
1. Non-weighted fiber rolls: Use on paved or unpaved surfaces upslope of, or around, drain inlets.
 - (a) For paved and unpaved surfaces, refer to Section 4.5-q for more details regarding Fiber Roll installation.
 - (b) For paved surfaces, install weighted fiber rolls flush with the ground upslope of and/or around inlets. Weigh down the fiber roll with gravel bags approximately every 3 feet. When more than one fiber roll is needed around the inlet, overlap the two fiber rolls at minimum of 6 inches. Take care to ensure that no spaces exist between the fiber roll and the pavement.
 2. Weighted fiber rolls: Use on paved surfaces next to drain inlets.
 - (a) Install weighted fiber rolls flush with the ground upslope of and/or around inlets. When more than one fiber roll is needed around the inlet, overlap the two fiber rolls a minimum of 6 inches. Take care to ensure that no gaps exist between the fiber roll and the pavement.
- B. **Gravel Bag Barrier:** Use these highly permeable bags to create a small sediment trap upstream of inlets on sloped paved streets. Apply them in sheet flow areas when concentrated flow velocities may exceed 0.5 cubic feet per second, and where overtopping is required to prevent flooding.
1. Use gravel bags made of geotextile fabric filled with 3/4 inch diameter, cleaned, washed gravel.
 2. Do not use burlap wrapped bags or sand filled bags.
 3. Leave space upstream of barrier for water to pond and sediment to settle.

4. Place one or several layers of overlapping bags packed tightly together around the drain inlet.
- C. Geotextile Fabric or Pre-Made Proprietary DI Protection Device: Use for all drain inlets along with one or more of the following devices. Place geotextile fabric underneath the grate and place the grate placed on top. Be sure to overlap the fabric outside of the grate to ensure a proper seal. For pre-made proprietary devices, refer to the manufacturer's installation instructions.
- D. Silt Fence: Use in areas where grading has been completed and final soil stabilization and seeding are pending. Use in drainage areas having slopes less than a 5 percent slope and velocities of sheet flow less than 0.5 cubic feet per second. Do not use in paved areas and other areas having concentrated flows.
1. Refer to Section 4.5-r, Silt Fence for more details regarding installation instructions. Do not allow the distance between weights or stakes for DI protection to exceed 3 feet.
 2. Place and stake geotextile fabric on the bare soil between the silt fence and the DI, to help prevent erosion of the bare soil.
- E. Block and Gravel Filter: Consider using for curb inlets commonly used in residential, commercial, and industrial construction. Apply where flow velocities are greater than 0.5 cubic feet per second.
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. Abut the ends of adjacent blocks. Place the bottom layer of blocks 2 inches below the soil surface, flush against the drain for stability. Install barrier heights of 12-24 inches, by stacking blocks that are 4, 8, or 12 inches high.
 2. Place geotextile fabric over the outside vertical face (open end) of the concrete blocks to prevent stone from being washed through the blocks. If more than one sheet of fabric is needed, overlap by at least 1 foot.
 3. Pile angular, washed gravel against the fabric up to the top of the blocks, with a slope no greater than 2:1 (run to rise). Use $\frac{3}{4}$ to 3 inch gravel.

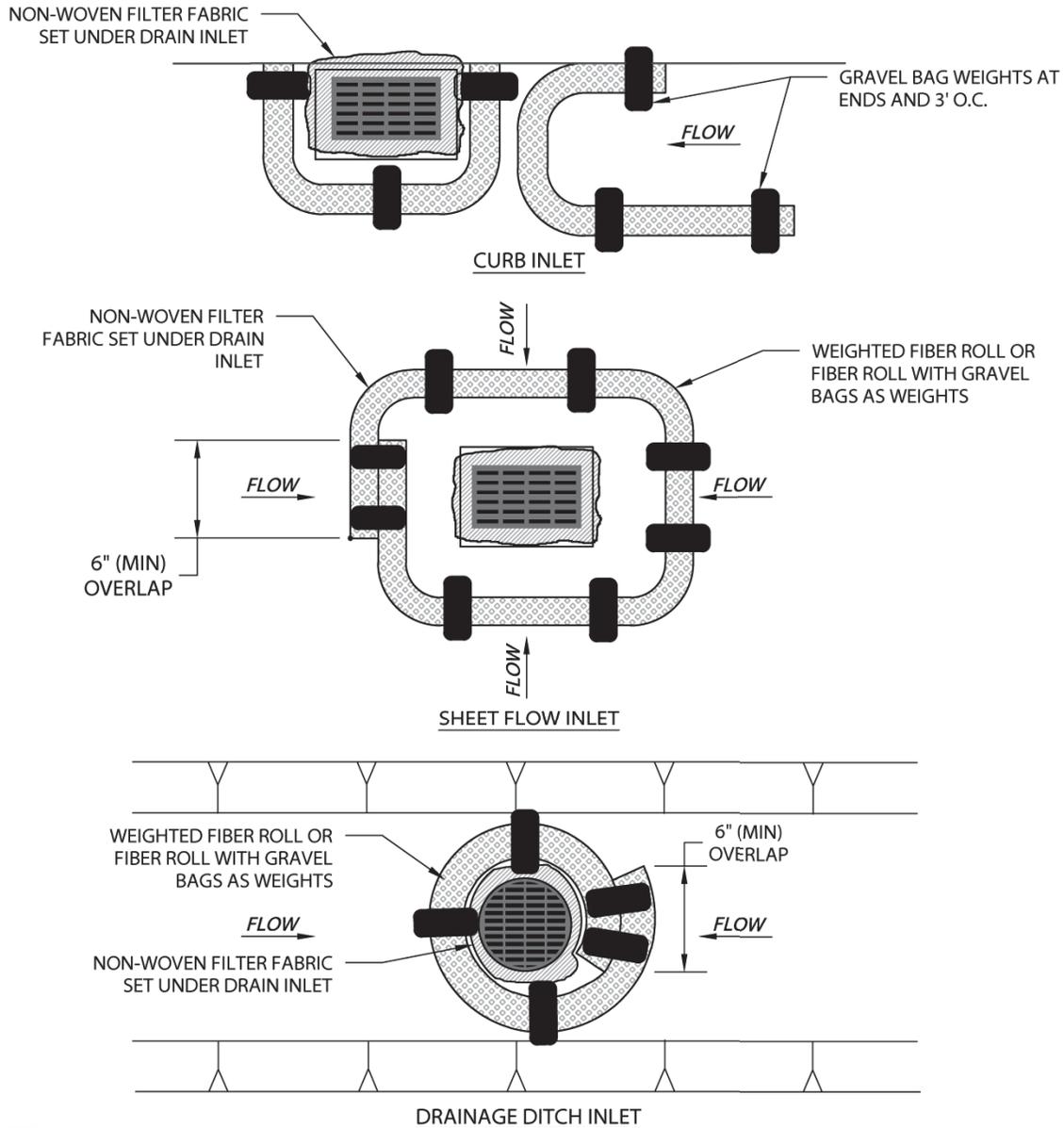
INSPECTION AND MAINTENANCE

- Inspect drain inlet 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.
- Replace clogged, torn, or degraded materials.
- Drive stakes securely into the ground.
- Ensure stakes are in good condition (not bent, cracked, or splintered, and reasonably perpendicular to the ground). Replace damaged stakes as needed.
- When the gravel in gravel filters becomes clogged with sediment, carefully remove the filter from the inlet and either clean or replace it. Since cleaning gravel at a construction site may be difficult, consider using the sediment-laden gravel as fill material and put fresh gravel around the inlet.
- Inspect fiber rolls and gravel bags for holes, gashes, and snags, and replace bags as needed. Check fiber rolls and gravel bags for proper arrangement and placement.
- Periodically remove sediment that accumulates in the drain inlet protection. Remove sediment when sediment accumulation reaches one-third the height of

the filter. Incorporate sediment removed during maintenance into earthwork on the site or dispose of it at an appropriate location.

- Remove storm drain inlet protection once the drainage area is stabilized. Clean the area around and inside the inlet, as it must be free of sediment and debris at the time of final inspection.
- When removing geotextile fabric or a pre-made proprietary drain inlet protection device from underneath the grate, ensure that trapped sediment is not spilled into the storm drain.

Drain Inlet Protection Figure



NOTES:

1. FIBER ROLL DRAIN INLET PROTECTION SHALL USE A MIN. 12" DIAMETER ROLL AND BE INSTALLED BEFORE CONSTRUCTION BEGINS.
2. GRAVEL BAGS SHALL BE FILLED WITH GRAVEL. SAND BAGS ARE NOT AN ACCEPTABLE SUBSTITUTE.
3. INSPECT AND REPAIR FIBER ROLLS EACH DAY AND AFTER EACH STORM EVENT. REMOVE SEDIMENT WHEN ONE THIRD OF THE FILTER DEPTH HAS BEEN FILLED. REMOVED SEDIMENT SHALL BE DISPOSED OF PROPERLY.
4. SEDIMENT AND GRAVEL DEPOSITED ON ROADWAYS SHALL BE IMMEDIATELY REMOVED.
5. IN HIGH TRAFFIC AREAS, MARK DRAIN INLET PROTECTION WITH VISIBLE BARRIERS SUCH AS SAFETY CONES.
6. REMOVE DRAIN INLET PROTECTION AFTER THE SURROUNDING AREA HAS BEEN STABILIZED.

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