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Erosion Prevention and Sediment Control Handbook

4.4.4 Inlet Protection: Area



Source: TNWRRRC

Definition and Purpose

Area inlet protection is a temporary measure installed around, on top of, or inside storm drain drop inlets or catch basins to prevent sediment from entering the storm drainage system during construction. These structures create ponding around the inlet, allowing coarse sediments to settle and, in some cases, filtering finer particles from runoff before it enters the system.

Appropriate Applications

Area inlet protection is appropriate for use on operational drop inlets or catch basins that receive runoff from disturbed drainage areas, particularly before site stabilization has been achieved. Various constructed and manufactured types exist, each of which with unique characteristics. Specific conditions where one type may be more appropriate than another are discussed in the planning and design criteria section.

Limitations and Maintenance

Inlet protection devices will likely cause ponding and, therefore, are not suitable for high-traffic areas or locations where standing water could create hazards. These measures are considered secondary sediment controls and should always be used in conjunction with additional upstream EPSC measures, as they are not capable of filtering out fine silt and clay particles or effective under high sediment loads. A common limitation is the tendency for materials such as stone, gravel, or filter fabric to clog quickly, which can lead to bypass flows,



DWR – NPDES-SOP – G – 16 –Erosion Prevention and Sediment Control Handbook – 01092026

Erosion Prevention and Sediment Control Handbook

increased ponding, and even erosion of unprotected areas if stormwater cannot enter the system. Maintenance demands are high compared to other measures, with sediment often needing to be removed after each storm event to restore capacity. Further, inspect the device to determine if it is structurally sound and will not collapse under sediment or hydrostatic loads. Additional upkeep may involve inspecting downstream structures after severe storms for bypassed sediment, cleaning accumulated debris from adjacent areas, and ensuring inlet protection devices and accumulated sediment are removed and disposed of properly after site stabilization (TDOT). Silt fence is not an approved inlet protection measure unless augmented with structural innovations as described in Section 6.4.

Planning and Design Considerations

All area inlet protection devices are to be installed before soil disturbance occurs within the drainage area, and in new developments, they should be installed immediately after the storm sewer inlets are constructed. There are various types of area inlet protection practices that can be constructed from common materials such as conventional riprap, sandbags, wattles, hardware cloth, etc., in addition to manufactured devices that are commercially available. Commercially available products are viable options that are structurally supported to withstand sediment and hydrostatic loads, pond water, and allow sediments to settle, do not float or undermine, do not cause erosion of the soil surface between the device and inlet, and have a dewatering mechanism that prevents onsite flooding during large rain events (ALSWCC, 2018).

Excavated drop inlet protection is designed for locations where relatively heavy flows are expected, and overflow capacity is needed. The practice involves excavating a temporary basin around the inlet to create storage volume that allows sediment to settle before runoff enters the storm drainage system (Figure 4.4.4-A). Basins are typically one to two feet deep, measured from the top of the inlet structure, with side slopes no steeper than 2H:1V. Storage capacity should be sized at approximately 134 cubic yards (about 1,800 cubic feet) per acre of contributing drainage area, and the basin should be shaped to fit site conditions. For maximum trapping efficiency, the longest dimension of the basin is oriented in the direction of inflow, and rectangular basins are recommended where concentrated flows occur, such as in highway medians. Construction begins by clearing debris, grading the approach to the inlet uniformly, and protecting any weep holes with gravel. The basin should include provisions to drain temporary pools to improve sediment trapping and reduce problems from standing water after storms. Regular maintenance is essential: sediment should be removed once it reaches half the design depth, and the trap restored to its original dimensions with proper disposal of spoil to a stable location. When the contributing drainage area has been permanently stabilized, the basin is decommissioned by sealing weep holes, backfilling to grade with compacted stable soil, and establishing final site stabilization.



DWR – NPDES-SOP – G – 16 –Erosion Prevention and Sediment Control Handbook – 01092026

Erosion Prevention and Sediment Control Handbook

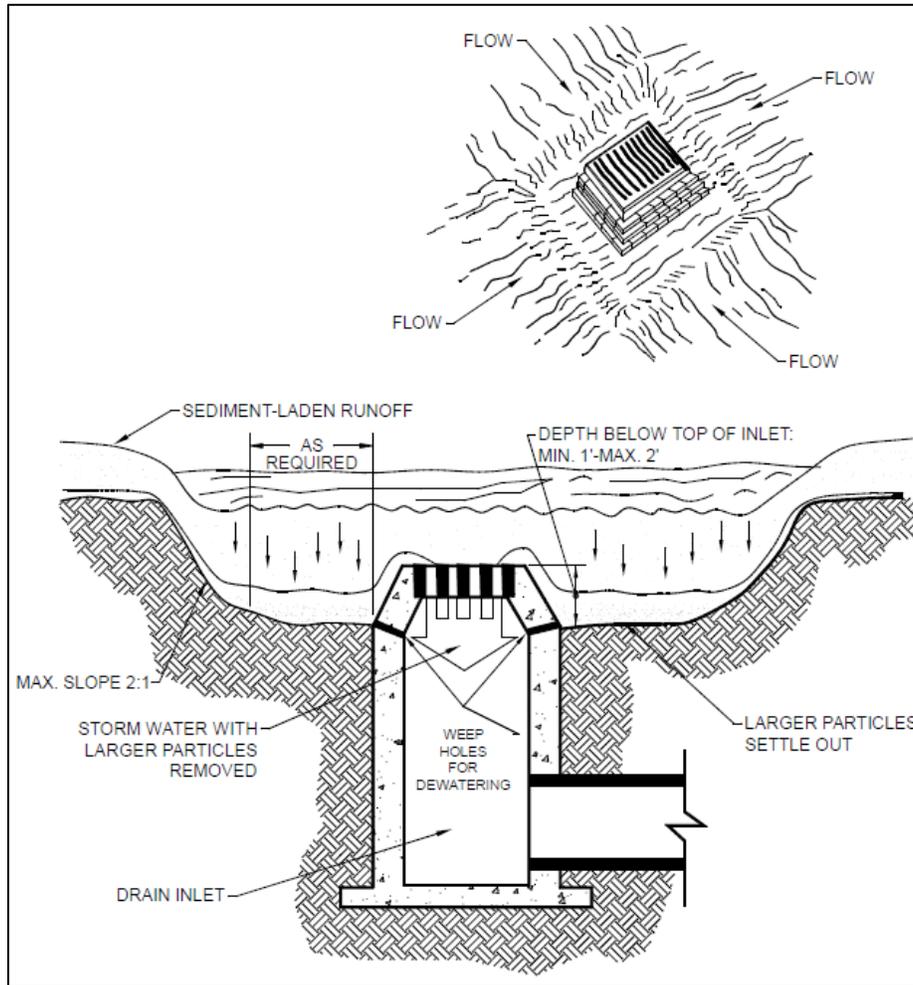


Figure 4.4.4-A: Excavated drop inlet protection details. Adapted from VDEQ (2024).

Hardware cloth and gravel inlet protection is designed for catch basins or drop inlets that receive light to moderate flow, particularly where shallow sheet flow is expected. This practice is most effective in relatively flat areas with slopes of less than one percent, and it should not be used near the edge of fill material or in locations where water could be diverted over cut or fill slopes. Each protected inlet should drain no more than one acre, ensuring proper function and sediment capture. The structure consists of a wire mesh barrier supported by steel T-posts and surrounded by clean gravel, forming a stable sediment trap that allows storm flows to pass through the inlet





DWR – NPDES-SOP – G – 16 –Erosion Prevention and Sediment Control Handbook – 01092026

Erosion Prevention and Sediment Control Handbook

rather than bypassing the structure (Figure 4.4.4-B). For construction, five-foot steel T-posts (1.25 pounds per linear foot) are driven at least two feet into the ground, spaced no more than four feet apart around the inlet. A minimum 19-gauge hardware cloth with 0.25-inch openings is secured to the posts at the top, middle, and bottom, with a two-foot flap extended on the ground and anchored beneath the gravel. Clean stone, such as #5 or #57 gravel, is placed on a 2:H1V slope to a height of roughly 16 inches against the hardware cloth, providing both structural stability and filtration. The top of the gravel structure should remain at least 12 inches lower than the downslope ground elevation to ensure that all flows pass through the inlet rather than bypassing it. Temporary dikes may be constructed below the inlet to further prevent bypass. Once the drainage area is stabilized, accumulated sediment should be removed, the barrier dismantled, and the site properly compacted and stabilized with groundcover.

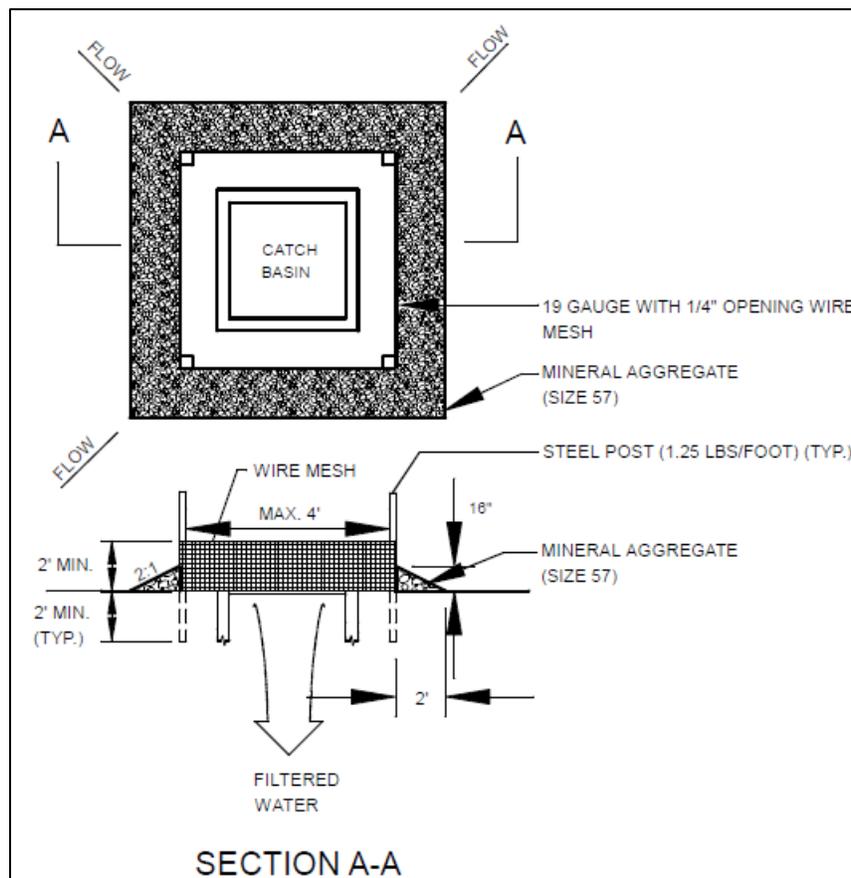


Figure 4.4.4-B: Hardware cloth and gravel filter inlet protection details. Source: TDOT.

Block and gravel inlet protection is designed as a temporary practice used at storm drain drop inlets where heavy flows are anticipated, and overflow capacity is needed to reduce



DWR – NPDES-SOP – G – 16 –Erosion Prevention and Sediment Control Handbook – 01092026

Erosion Prevention and Sediment Control Handbook

excessive ponding. The method consists of placing concrete or cinder blocks lengthwise on their sides in a single row around the inlet, with holes oriented horizontally and the ends tightly abutting. The barrier height should be no less than 12 inches and no greater than 24 inches, with the first course recessed at least two inches below the storm drain crest for stability. Additional courses may be stacked in a staggered pattern, with lateral support provided by wood studs if needed, and some blocks laid sideways at the lowest elevation to serve as dewatering points. Wire mesh or hardware cloth with half-inch openings is fitted over all block openings to prevent gravel loss. Clean stone, such as #57 washed stone, is then placed against the blocks in a triangular cross-section, extending to the top of the barrier and sloping outward at 2H:1V or flatter. A geotextile underlayment may also be installed beneath the blocks, gravel, and immediately around the inlet to provide additional stability and filtration. The top elevation of the structure should remain at least six inches below the adjacent downslope ground to ensure stormwater passes through the structure and into the drain rather than bypassing it. While this practice effectively reduces sediment entry into storm drains, shallow ponding following rainfall is expected, and accumulated sediment should be frequently removed to maintain performance.

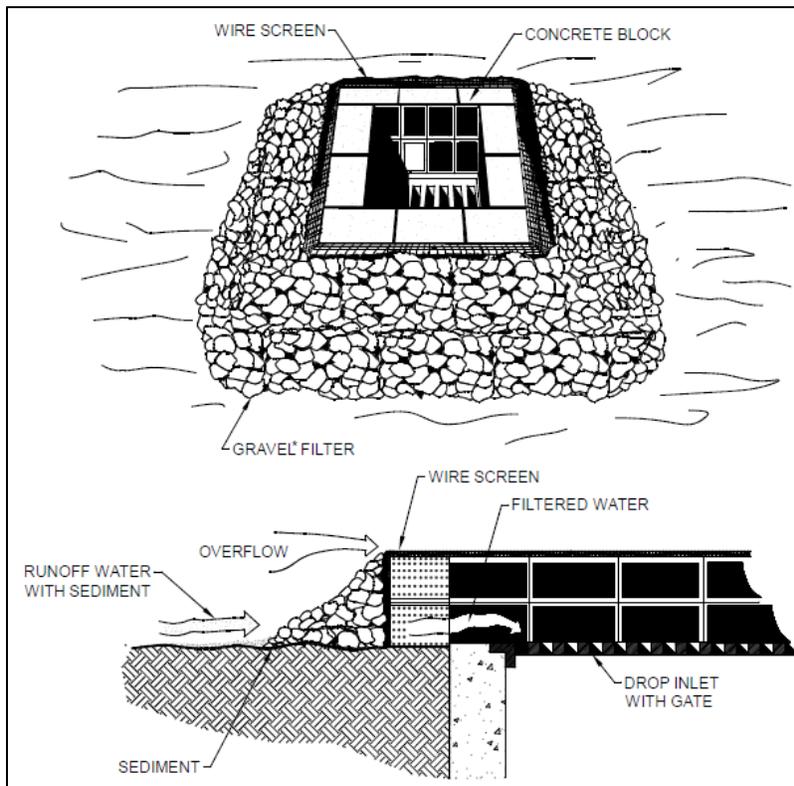


Figure 4.4.4-C: Block and gravel inlet protection details. Adapted from VDEQ (2024).



DWR – NPDES-SOP – G – 16 –Erosion Prevention and Sediment Control Handbook – 01092026

Erosion Prevention and Sediment Control Handbook

Rock ring inlet protection is designed for drop inlets that receive high velocity stormwater flows or drainage from larger contributing areas. The practice captures sediment within an excavated depression surrounding the inlet while reducing flow velocities before water enters the storm drain (Figures 4.4.4-D). A one-foot-wide level area, recessed four inches below the crest of the drop inlet, provides added protection against sediment intrusion. Conventional riprap, typically Class B, is placed in a ring around the inlet (ideally on top of a geotextile fabric to prevent piping) with side slopes no steeper than 2H:1V, a crest width of at least 18 inches, a bottom width of seven and a half feet or greater, and a height ranging from two to three and a half feet. The outside face of the riprap is wrapped in a 12-inch layer of clean, washed stone such as #57 aggregate, which enhances filtration and prevents fine sediment migration. Wire mesh with two-inch openings may also be placed over the inlet grate to intercept debris, but it needs to be inspected regularly to prevent clogging. The top elevation of the rock ring should remain at least 12 inches below the adjacent downslope ground surface to ensure stormwater passes through the structure and into the drain rather than bypassing it. In some cases, temporary dikes constructed downslope may be necessary to prevent uncontrolled flow around the structure. Construction involves clearing debris, grading a shallow depression toward the inlet with stable side slopes, installing the riprap to the specified dimensions, and backfilling with washed stone. Periodic sediment removal is required to maintain storage capacity and hydraulic function.



Source: TDEC

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DWR - NPDES-SOP - G - 16 -Erosion Prevention and Sediment Control Handbook - 01092026
Erosion Prevention and Sediment Control Handbook

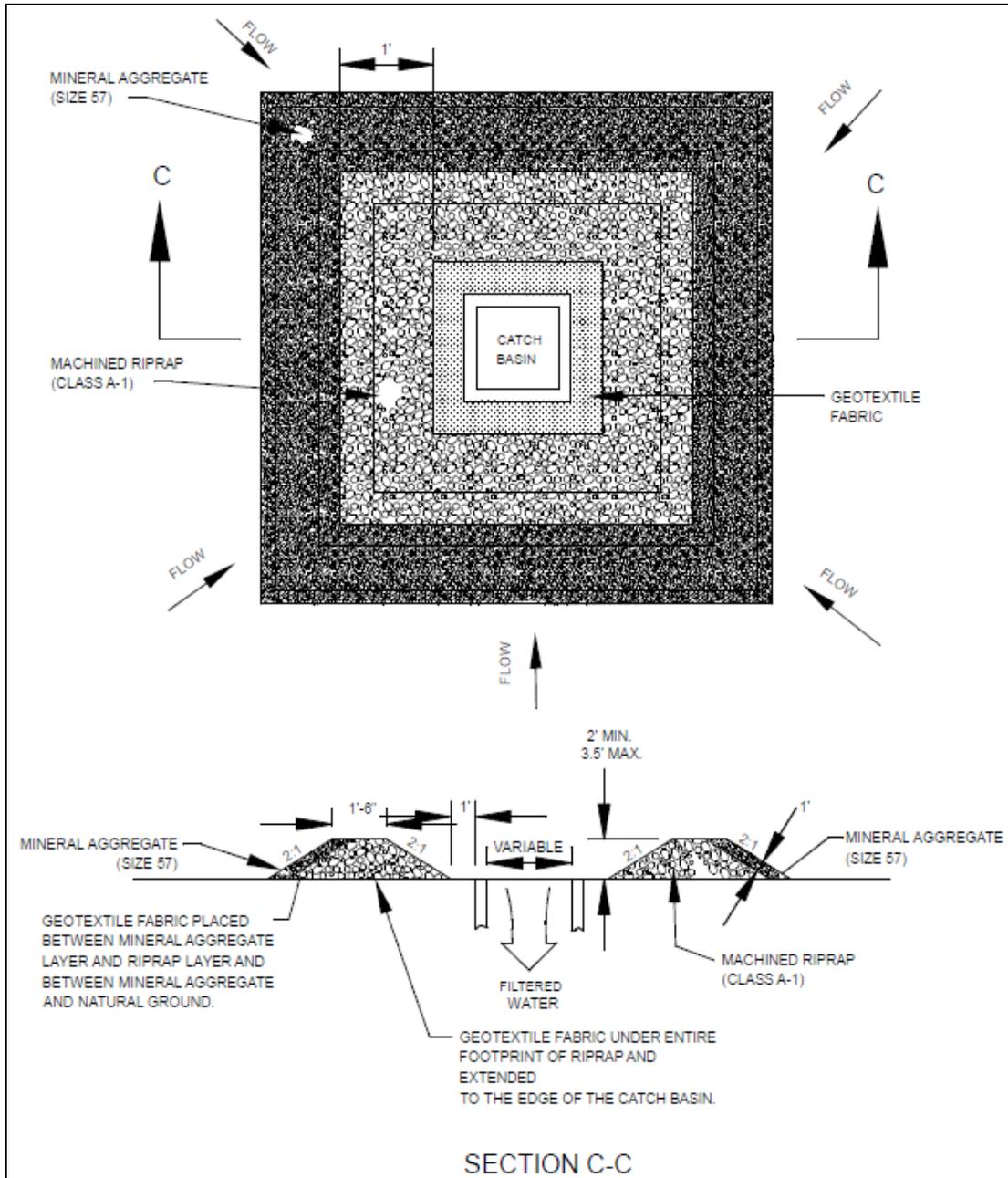


Figure 4.4.4-D: Rock ring inlet protection details. Source: TDOT.



DWR – NPDES-SOP – G – 16 –Erosion Prevention and Sediment Control Handbook – 01092026

Erosion Prevention and Sediment Control Handbook

Sandbags and wattles can both serve as effective inlet protection devices when properly installed around stormwater drop inlets (ALSWCC, 2018). In both applications, an eight-ounce non-woven geotextile is first placed as an underlayment on compacted earth,

extending at least one foot beyond the perimeter of the barrier and pinned securely at the inlet and edges. Both methods involve extending the barrier at least one foot away from the inlet, ensuring space for ponding and sediment capture before runoff enters the drainage system. Despite these similarities, the materials differ in their construction and installation. Sandbag protection relies on stacking multiple layers of bags in a triangular cross-section to achieve stability, with the bags placed tightly together (often in a staggered pattern) to form a sealed perimeter. In contrast, wattles require overlapping ends by at least 18 inches and securing them with stakes or sod staples to prevent movement or flotation, with denser wattles preferred to promote ponding. While sandbags achieve strength through layering and compaction, wattles rely on staking and density for performance, but both serve the common purpose of slowing stormwater and trapping sediment at drop inlets.



Source: TNWRRC



Source: TNWRRC

Do not stake through the straw wattles, instead, form an A-Frame to leave the wattle intact and prevent flotation.

There are several manufactured devices that are listed on TDOT's QPL report. A number of popular options include:

- Silt Saver Inlet Protection Products;
- Drain Filter for Oily Runoff & Sediment - FLT116 - New Pig;
- Drop Inlet Protection Filter — Mainline Materials; and
- Marsh Mat - Storm Inlet Filter Pad Kit - The Drainage Products Store.



**DWR – NPDES-SOP – G – 16 –Erosion Prevention and Sediment Control Handbook –
01092026
Erosion Prevention and Sediment Control Handbook**

Example Application

No formal design or quantities are required for this measure and therefore are not presented here.

References

ALSWCC. (2018). *Erosion Control, Sediment Control and Stormwater Management on Construction Sites and Urban Areas*.
TDOT. *Drainage Manual Ch10*.